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Technical Support Document for Residential Dust-lead Hazard Standards Rulemaking Approach taken to Estimate Blood Lead Levels and Effects from Exposures to Dust-lead

[RIN 2070-AJ82]

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300 **Acronym and Term Definition List**

AAS	Atomic Absorption Spectrometry
ACCLPP	CDC's Advisory Committee on Childhood Lead Poisoning Prevention
ADHD	Attention Deficit Hyperactivity Disorder
AHHS	American Health Homes Survey
AIC	Akaike Information Criteria
APEX	Air Pollutants Exposure Model
AQS	EPA Air Quality System
AVINTAKE	Level of Available Intake
BAEP	Brainstem Auditory Evoked Potentials
BLL	Blood Lead Level
BMD	Benchmark Dose
BMDL	Benchmark Dose Lower Bound
BSID	Bayley Scales of Infant Development
CASAC	EPA's Clean Air Scientific Advisory Committee
CCC	HUD Child Care Center Survey
CCC Data	First National Health Survey of Child Care Centers Data
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CHDS	Canadian House Dust Survey
CHAD	EPA's Consolidated Human Activity Database
CLEARS	Childhood Lead Exposure Assessment and Reduction Study
COF	Child-Occupied Facility
EPA	Environmental Protection Agency
EFH	EPA Exposure Factors Handbook
FAAS	Flame Atomic Absorption Spectrometry
FSIQ	Full-Scale Intelligence Quotient
GFAAS	Graphite Furnace Atomic Absorption Spectrometry
GLM	Generalized Linear Model
GM	Geometric Mean
GSD	Geometric Standard Deviation
HOME	Home Observation Measurement of the Environment
HUD	U.S. Department of Housing and Urban Development
HUD Survey Data	HUD's National Survey of Lead-Based Paint in Housing Data
ICC	Intraclass Correlation Coefficient

ICP-MS	Inductively-Coupled Plasma Mass Spectrometry
ICR	EPA's Office of Water data from Second Six-year Review National Compliance Monitoring Information Collection Request Dataset
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IQ	Intelligence Quotient
ISA	EPA's Integrated Science Assessment
LCR	Office of Water Proposed Modeling Approaches for a Health Based Benchmark for Lead in Drinking Water (Lead and Copper Rule)
LOD	Limit of Detection
MDI	Mental Development Index
NAAQS	Office of Air and Radiation National Ambient Air Quality Standards
NCHH	National Center for Healthy Homes
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
NHEXAS	National Human Exposure Assessment Survey
NSLAH	HUD's National Survey of Lead and Allergens in Housing
NTP	National Toxicology Program
OPPT	Office of Pollution Prevention and Toxics
P&CBs	Public and Commercial Buildings
PDI	Psychomotor Development Index
PIR	Poverty Income Ratio
ppb	parts per billion
ppm	parts per million
Primary microenvironment	The microenvironment where the exposure is set equal to the candidate hazard standard (residence or COF)
QL	Quasi-likelihood
RRP	EPA's Office of Pollution Prevention and Toxic's Lead Renovation, Repair and Painting Rule
SAB	EPA's Scientific Advisory Board
SDWA	Safe Drinking Water Act
Secondary microenvironment	All other microenvironments other than the hazard standard microenvironment of interest.
SES	Socioeconomic Status
SHEDS	Stochastic Human Exposure and Dose Simulation
TSCA	Toxic Substances Control Act

Executive Summary

The U.S. Environmental Protection Agency (EPA) considered a variety of mechanistic and empirically-based approaches to estimate exposures from dust-lead loadings. Note, mechanistic and modeling are used interchangeably throughout this document as several kinds of modeling are used in the mechanistic approach. EPA also estimated blood lead levels (BLLs) and associated health effects from these exposures.

Exposure Modeling

EPA estimated dust-lead concentrations for a wide range of candidate dust-lead hazard standard loadings. To do this, EPA converted unique floor/sill dust-lead loading combinations into dust-lead concentrations. EPA considered the relative contribution of floor and sill dust-lead loading using empirical data to derive a distribution for this fraction (Dixon et al., 2009). EPA considered the time children spend in different microenvironments using EPA's Consolidated Human Activity Database (CHAD; U.S. EPA, 2003b). EPA considered the concentrations of dust-lead in other microenvironments and the time spent in other microenvironments (Westat, 2003; HUD, 2011; U.S. EPA, 2003b). Once an average dust-lead loading value was calculated, EPA used a loading to concentration regression based on a meta-analysis conducted in a previous peer-reviewed EPA analysis to convert dust-lead loading values to dust-lead concentrations (U.S. EPA, 2014).

EPA also completed a literature search for dust-lead loadings on floors and sills. These values are presented in Tables 1.2 and 1.3 and are provided for context when comparing to values from the national surveys such as the American Healthy Homes Survey (AHHS; Westat, 2003). Data from national surveys were selected for primary use in this analysis. EPA qualitatively compared more highly exposed subpopulations in national surveys with more highly exposed subpopulations reported in the literature.

To estimate contributions from background media concentrations (i.e. contributions at background dust-lead levels and background levels in other environmental media), EPA used National Health and Nutrition Examination Survey (NHANES) BLL data from pooled years of 2005-2010 and 2009-2014 for comparison. EPA calculated the NHANES geometric mean plus and minus an upper and lower confidence interval. EPA also calculated the NHANES arithmetic mean plus and minus an upper and lower confidence interval. BLLs continue to change over time. NHANES is considered to represent population BLL for the entire country. EPA modeled age-specific background BLL estimates and found they are in close agreement with age-specific NHANES empirical BLL for both geometric mean and arithmetic mean estimates (see Figure 5.3). The exposed population for this rulemaking is a subpopulation of children in homes with a lead-based paint hazard and with loadings below the current hazard standard, represented by individuals sampled in the NHANES population. Background BLL estimates for the exposed subpopulation for this rulemaking are not readily available and the estimated background BLL is used as a reasonable surrogate, and is in close agreement with NHANES.

EPA completed deterministic modeling, probabilistic modeling, and a sensitivity analysis. The deterministic modeling used median and mean estimates. The sensitivity analysis compared inputs in the Integrated Exposure Uptake Biokinetic (IEUBK) model including variables that contribute to dust-lead concentration and are processed prior to entry in IEUBK such as "fraction of dust-lead from floor" and "fraction of time spent in primary microenvironment." EPA conducted a fit-for-purpose probabilistic modeling exercise meaning not all variables were

represented by a distribution and some variables were varied in a more-simple way. There are several potential next steps identified in the uncertainties section.

BLL Modeling

EPA coordinated within the Agency to determine modeling inputs for dust and non-dust parameters to estimate BLLs with the IEUBK Model (U.S. EPA, 2010b), the model the Office of Pollution Prevention and Toxics (OPPT) has determined is most appropriate for this rulemaking. EPA notes that different program offices estimate exposures for different populations, different media, and under different statutory authorities and may select different models or parameters fit for their purpose. The approaches described in this technical support document are tailored for this rulemaking. Other modeling approaches may be used by other offices of EPA. The selection of model inputs for this Technical Support Document should not be construed as a general recommendation for their use as input parameters in the IEUBK model for all EPA programs.

EPA also completed a literature search and a meta-analysis for studies that reported both BLL and dust-lead to inform the empirical relationship between BLL and dust-lead. The empirical analysis was used to inform several model inputs and was also used as a helpful check on central tendency and upper-percentile modeled BLL results. EPA considered how the empirical data could be used to characterize variability and uncertainty.

When interpreting the results of IEUBK modeling, it is important to recognize that the IEUBK was developed, calibrated and validated for site-specific risk assessments. The model and input parameters have been the subject of multiple Science Advisory Board (SAB) reviews, workshops and publications in the peer reviewed literature (Hogan et al., 1998; SAB, 1998;; NAS, 2005). OPPT determined that adjustments to the input parameters used for site-specific evaluations would be desirable to better reflect considerations specific to this rulemaking. These adjustments have not been a part of the technical and scientific reviews that have recommended the values employed in the IEUBK for site-specific evaluations (Hogan et al., 1998; SAB, 1998; NAS, 2005). OPPT's adjustments were based on peer-reviewed data sources such as EPA's Exposure Factors Handbook and analysis for EPA's Office of Water (U.S. EPA, 2011; U.S. EPA, 2017a; U.S. EPA, 2017b; Zartarian et al. 2017).

BLL to Intelligence (IQ) and Health Effects

EPA coordinated within the Agency to ensure that current approaches and data were used to estimate IQ changes associated with children's BLL changes. EPA characterized the differences in concurrent and lifetime BLL metrics from BLL modeling and from epidemiological data. EPA also summarized neurocognitive effects in children reported by EPA's Integrated Science Assessment (ISA; U.S. EPA, 2013) and National Toxicology Program (NTP)'s Monograph (NTP, 2012), along with select studies published since those authoritative reviews were published.

1 Background

Pursuant to Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and Title IV of Toxic Substances Control Act (TSCA), section 403 of TSCA directs the U.S. Environmental Protection Agency (EPA) to promulgate regulations that identify "lead-based paint hazards, lead-contaminated dust, and lead-contaminated soil." EPA promulgated regulations pursuant to TSCA section 403 on January 5, 2001 and codified them at 40 Code of Federal Regulations (CFR) part 745, subpart D (U.S. EPA, 2001).

These hazard standards identified dangerous levels of lead dust, and soil, and dangerous conditions of lead-based paint, and provided benchmarks on which to base remedial actions that safeguard children and the public from the dangers of lead. Lead-based paint hazards in target housing and child-occupied facilities are defined in these standards as paint-lead, dust-lead, and soil-lead hazards. A paint-lead hazard is any damaged or deteriorated lead-based paint, any chewable lead-based painted surface with evidence of tooth marks, or any lead-based paint on a friction surface if dust-lead levels underneath the friction surface exceed the dust-lead hazard standards.

A dust-lead hazard is surface dust that contains a mass-per-area loading of lead equal to or exceeding 40 micrograms per square foot ($\mu g/ft^2$) on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples. A soil-lead hazard is bare soil that contains total lead concentration equal to or exceeding 400 parts per million (ppm) in a play area or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples. The clearance levels were set to equal the dust-lead hazard standards in 2001.

On August 10, 2009, EPA received a petition from several environmental and public health advocacy groups requesting that EPA amend regulations issued under Title IV of TSCA (Sierra Club et al., 2009). Among other things, the petitioners requested that EPA lower the Agency's dust-lead hazard standards issued pursuant to section 403 of TSCA from:

1. 40 µg/ft2 to 10 µg/ft2 or less for floors and
2. 250 µg/ft2 to 100 µg/ft2 or less for window sills.

On October 22, 2009, EPA responded to this petition pursuant to section 553(e) of the Administrative Procedures Act, 5 U.S.C. 553(e) (U.S. EPA, 2009) and agreed to commence an appropriate proceeding. EPA did not commit to a particular schedule or to a particular outcome.

In June 2010, EPA issued two documents:

1. the Proposed Approach for Developing Lead Dust Hazard Standards for Residences (U.S. EPA 2010d) and
2. the Proposed Approach for Developing Lead Dust Hazard Standards for Public and Commercial Buildings (U.S. EPA, 2010c).

These documents were submitted to EPA's Science Advisory Board (SAB) Lead Review Panel for a consultation. The documents discussed methods for evaluating the health hazards associated with exposure to lead-contaminated floor and window sill dust-lead, including approaches for estimating dust-lead loading and lead concentrations, evaluating exposure patterns, estimating

lead intake from dust and other sources, identifying sensitive populations, and methods for predicting the blood lead level (BLL) impacts of dust-lead exposure at the proposed new dust-lead hazard standards.

The SAB Panel met on July 6–7, 2010 and provided comments on the Proposed Approach to EPA on August 20 (SAB, 2010). The Proposed Approach was revised to address the SAB comments and resubmitted for further peer review. The SAB Panel met again on December 6-7 2010 and provided further draft comments to the Office of Pollution Prevention and Toxics (OPPT; SAB, 2011). The documents were again revised to address remaining comments.

Due to the substantial overlap of content between the two documents, elements of these documents have been combined into this Technical Support Document. Differences across microenvironments such as residences and child-occupied facilities (COFs) will be characterized within this document.

In August 2016, the administrative petitioners – joined by additional citizen groups – filed a petition for writ of mandamus in the Ninth Circuit Court of Appeals, alleging that EPA had unreasonably delayed action and seeking a court order compelling EPA to issue a proposed rule within 90 days of that order, and a final rule within six months. EPA filed a response in opposition to the petition for writ of mandamus on January 17, 2017, and the parties presented oral arguments before Ninth Circuit on June 12, 2017.

On December 27, 2017, the Ninth Circuit granted the litigants' petition for writ of mandamus, and ordered EPA to issue a proposed rule within 90 days of the court's decision becoming final and a final rule within 1 year of issuing the proposed rule. On March 26, 2018, the Ninth Circuit granted a motion filed by EPA and directed EPA to issue a proposed rule within 90 days.

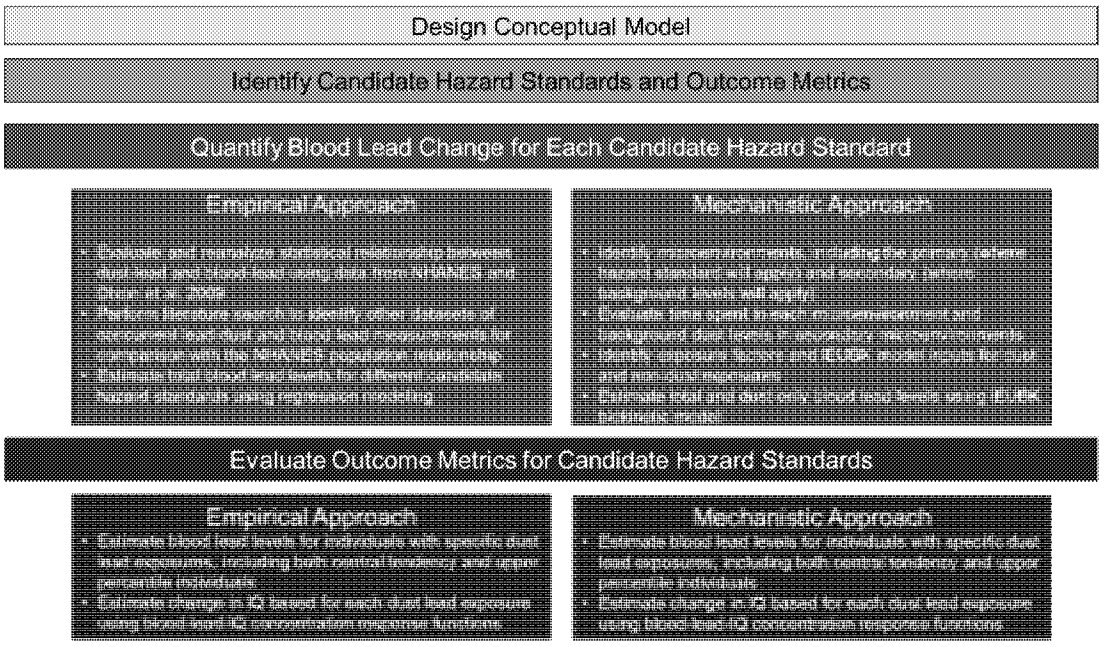
The dust-lead hazard standards support the Lead-based Paint Activities and Disclosure programs, and apply to target housing (i.e., most pre-1978 housing) and child-occupied facilities (pre-1978 non-residential properties where children under the age of 6 spend a significant amount of time such as daycare centers and kindergartens).

2 Overview of the Approach

This document describes the approach for quantifying the blood lead level (BLL) associated with various dust-lead hazard standard candidates. The dust-lead hazard standards are estimated as long-term chronic exposure levels that result in elevated BLL above a background level.

Figure 2-1 provides an overview of the process for evaluating candidate hazard standards for residences and child-occupied facilities (COFs). A range of candidate standards for dust-lead loading on floors and window sills is evaluated. As a first step, the Office of Pollution Prevention and Toxics (OPPT) identified the candidate hazard standards evaluated and identified a set of outcome metrics used in the evaluation.

Figure 2-1. Methodology for Evaluating BLL and Intelligence Quotient (IQ) change for Candidate Dust-lead Hazard Standards



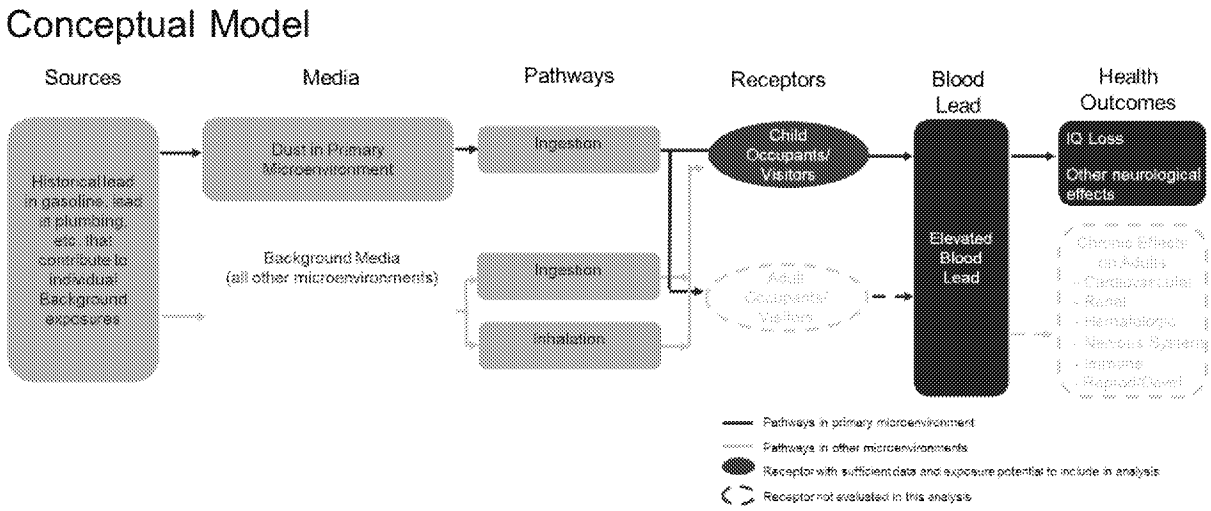
2.1 Conceptual Model and Overall Approach to Quantifying Outcome Metrics

OPPT developed a conceptual model to describe the sources, media, pathways, receptors, and outcomes for the analysis (Figure 2-2). This analysis focuses on levels of dust-lead from multiple sources such as historical lead in paint, tracked-in soil, air deposition, or other sources that result in an elevated residential dust-lead level.

Background contributions to BLLs from other media, including drinking water, diet, air, and soil must also be considered for each target receptor along with the dust-lead exposure from all microenvironments other than the primary microenvironment. Each receptor is exposed via ingestion and inhalation. Regardless of dust-lead exposure in the primary microenvironment (e.g., residences when evaluating the residence hazard standard and COF when evaluating the COF standard), the receptor will have a lead body burden from background exposures.

The analysis focuses on young children, who are more susceptible to lead exposure due to their exposure per-unit body weight relative to adults; their activity patterns, (e.g., such as crawling, mouth activities) and incidental ingestion of non-food contaminated items, which could result in higher ingestion rates (U.S. EPA, 2014). Additionally, for their size, children drink more and eat more compared to adults. In this analysis, the incremental increase in BLL from exposure to dust-lead in the primary microenvironment are calculated and incremental IQ changes for children are estimated.

Figure 2-2. Conceptual Model



During the 2010 Scientific Advisory Board (SAB) review for the draft EPA dust-lead hazard standard analysis, the panel recommended using both an empirical and a mechanistic approach to quantify BLL and IQ losses for given candidate hazard standards (SAB, 2010). During the first SAB review, when a strictly mechanistic approach was presented, the SAB commented:

"The blood lead modeling plays a critical role in establishing the quantitative relationship between lead loading and blood lead concentrations deemed to be protective of health. OPPT has chosen to rely on mechanistic models (e.g. IEUBK) to establish quantitative relationships between exposure and blood-Pb concentrations. This approach is traditional and benefits from years of development and review. However, with the availability of more recent epidemiologic data from Gaitens et al. 2009 and Dixon et al. 2009 provide OPPT the opportunity to consider an alternative option of empirical models establishing direct linkages between dust-Pb loading and blood-Pb. As described above, at a minimum, these epidemiologic findings might be used to "truth" the multi-compartment mechanistic approach described within the current documents."

A mechanistic method quantifies BLL using background concentrations, activity patterns, ingestion rates, and biokinetic models. The empirical methods focus on deriving statistical relationships between dust-lead loadings and BLL from both large surveys and from the literature.

Each of these approaches has strengths and weaknesses (see Table 2-1). Thus, individual-level central tendencies and sub-population ranges of BLL and IQ loss for each candidate hazard standard are estimated separately using both the mechanistic and the empirical approaches. These are compared in the evaluation of the candidate standards (Section 6.2) and in (Section 6.3).

Table 2-1. Summary of Empirical and Mechanistic Approaches

	Empirical Approach	Mechanistic Approach
Data set	National Health and Nutrition Examination Survey (NHANES) 1999-2004 with concurrent dust-lead loading and BLL measurements Meta-Analysis of studies with both dust-lead loading and BLL measurements	Inputs derived from a variety of datasets
Model	Statistical relationship of ln(BLL) as a function of powers of ln(floor lead), ln(sill lead), and other covariates	Integrated Exposure Uptake Biokinetic (IEUBK) model
Variability	Differences in demographics provide different central tendency estimates; each central tendency can also be used to estimate upper percentiles using the population geometric standard deviation.	Distributions in key variables and a geometric standard deviation to account for biological variability are incorporated into a Monte Carlo analysis.
Pros	• Relies on statistical relationship and does not require additional input parameters • Newer meta-analysis studies show similar relationship with BLL and dust-lead	• Uses an established peer-reviewed EPA model with updated inputs based on Agency feedback • Many different combinations (scenarios) can be modeled
Cons	• Based on data from NHANES 1999-2004 when BLLs were approximately twice what they were in NHANES 2014-2015 • Relatively few subjects in NHANES had elevated dust-lead levels and elevated BLL. • NHANES population, as represented by demographic variables, is likely different than subpopulation affected by this rulemaking; uncertainty in the confounding variables may affect conclusions.	• Depends on accuracy of input parameters and model algorithms, many of which have been updated over time but have not, in total, been evaluated at lower BLLs • Uses uncertain loading to concentration conversion relationship

2.2 Target Population and Discussion of Sub-Population Analysis

A critical element of the analysis is the target population being modeled. Decisions about a proposed rule may rely on changes in understanding the overall public health benefit to changing the hazard standard. The magnitude of a public health benefit depends on both the size of the affected population as well as the effect. The subpopulation of interest is children who live or may later live or spend time in residences or child-occupied facilities with dust-lead loadings above the current or proposed hazard standard levels. The number of children affected changes across different hazard standard candidates. Impacts for highly exposed

subpopulations expected to experience dust-related lead exposures are at the high-end of the national distribution of such exposures. This benefit may apply to relatively fewer children. Quantifying the change in the sub-population or population-level distribution of BLL or IQ loss requires quantifying how many children are in the sub-population affected by the change in hazard standard and how these children compare with the rest of the population. The section below discusses the challenges in meeting that goal and discusses potential and selected quantification methods for this analysis.

2.2.1 Analysis Options: Individual, Sub-population, and Population-level Analysis

Evaluation of candidate hazard standards and how a change relates to public health can be performed in a variety of ways. The different analyses are associated with different levels of uncertainty and include:

- Individual analysis: quantification of BLL and IQ changes for individuals with specific background exposures and demographics
- Sub-population analysis: quantification of BLL and IQ changes for a group of individuals (each with different background exposures and demographics) all exposed to a given dust-lead level
- Population analysis: quantification of how changes in the sub-populations affected by the change in hazard standard affects the overall population distribution (e.g., quantifying the 99.5th percentile).

These options are discussed below and in Figure 2-3 and Table 2-2. Each includes variability in exposure and uncertainty in different ways.

Individual Analysis

In the individual analysis, all factors affecting exposure, such as the exposure factors, demographics, background exposure concentrations, biokinetic parameters, and dust-lead levels are all set to a single value. This selects a specific individual from the population that is being modeled. This type of individual might constitute thousands, tens of thousands or more children in the overall United States population; this number depends on the selected exposure parameters and how prevalent they are. These values are typically all set to central tendency values in an effort to model the "typical" person in a population or sub-population. In Figure 2-3 (top), the figure demonstrates that for each dust-lead level (x-axis), a single BLL is estimated in the individual analysis. In the figure, this individual is the "typical" person of all individuals exposed at that dust-lead level.

Sub-Population-level Analysis

The sub-population analysis incorporates variability in all parameters EXCEPT the dust-lead level being evaluated. Thus, for a given hazard standard candidate, the output is the range of BLL (with associated probabilities of occurrence) within the population of children exposed at that level. This type of analysis can be achieved by performing a probabilistic (Monte Carlo) analysis by specifying distributions for input values or by evaluating the error terms in a statistical relationship. In Figure 2-3 (middle), the figure demonstrates that for each candidate dust-lead level (x-axis), a range of BLLs are estimated corresponding to the different exposure factors, demographics, background exposure concentrations, and biokinetic parameters across the sub-population. This sub-population could consist of hundreds, thousands, or more children in the overall United States population; this number depends on the dust-lead level being evaluated and how it fits into the overall dust-lead loading distribution in the affected population.

Population-level Analysis

The population-level analysis incorporates the variability in each sub-population but also places that sub-population into the context of the overall distribution of dust-lead loadings in the entire United States population. This type of analysis can be achieved in a "what-if" analysis:

- What is the current distribution of dust-lead levels in the United States and what are the associated BLLs?
- If the hazard standard were changed and all children exposed above that level shifted to be exposed at the new standard, how would the overall population distribution change?

This is depicted in Figure 2-3 (bottom). From a risk management perspective, this type of analysis provides additional detail about the benefit to the population as a whole. However, it also includes the greatest level of uncertainty. It depends on how well the sub-population variability is quantified and compared with the effect of that sub-population on the population distribution as a whole. In the case of this analysis, where the current hazard standard conditions are relatively infrequent in the national dust-lead loading distribution, quantifying numbers of affected children can be particularly uncertain. It is also uncertain how the dust-lead loading distribution in the subpopulation compares with the national distribution. Figure 2-4 compares national dust-lead loading central tendency values with central tendency values reported in more highly exposed subpopulations. Note, the overall affected population for this rule is in the tens to hundreds of thousands of children.

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Table 2-2. Summary of Individual, Sub-population, and Population Analysis Methods for Quantifying Changes in Health Outcomes

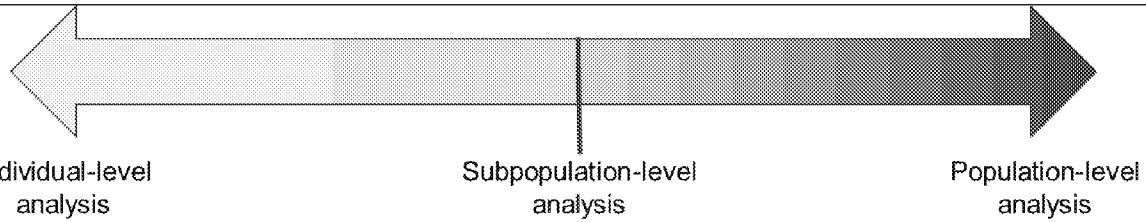
Analysis Details			
Dust-lead levels	Fixed at candidate hazard standard (constant)	Fixed at candidate hazard standard (constant)	Varies according to underlying population distribution of dust-lead levels; values above candidate standard are set to the candidate hazard standard (not constant)
Variability in Demographics/Background Exposures	Fixed for a given individual	Distribution reflecting population variability	Distribution reflecting population variability
Output Metric	Central-tendency individual-level BLL associated with the hazard standard candidate	Distribution of BLL across the sub-population exposed at the hazard standard candidate	Distribution of BLL across the entire population
Number of Individuals Represented by Analysis	Not quantified	Semi-quantified.	Quantified based on underlying population
Uncertainties	▪ Relationship between specific demographics/exposure factors and associated BLL and IQ	▪ Relationship between specific demographics/exposure factors and associated BLL and IQ ▪ Uncertainty in upper percentiles in input distributions and associated effect on BLL and IQ loss percentiles	▪ Relationship between specific demographics/exposure factors and associated BLL and IQ ▪ Uncertainty in upper percentiles in input distributions and associated effect on BLL and IQ loss percentiles ▪ Uncertainty in how sub-population modeled fits in the overall United States population (e.g., how many children; what overall percentile)
Included in Hazard Standard Analysis?	Yes: deterministic results	Yes: probabilistic results	No

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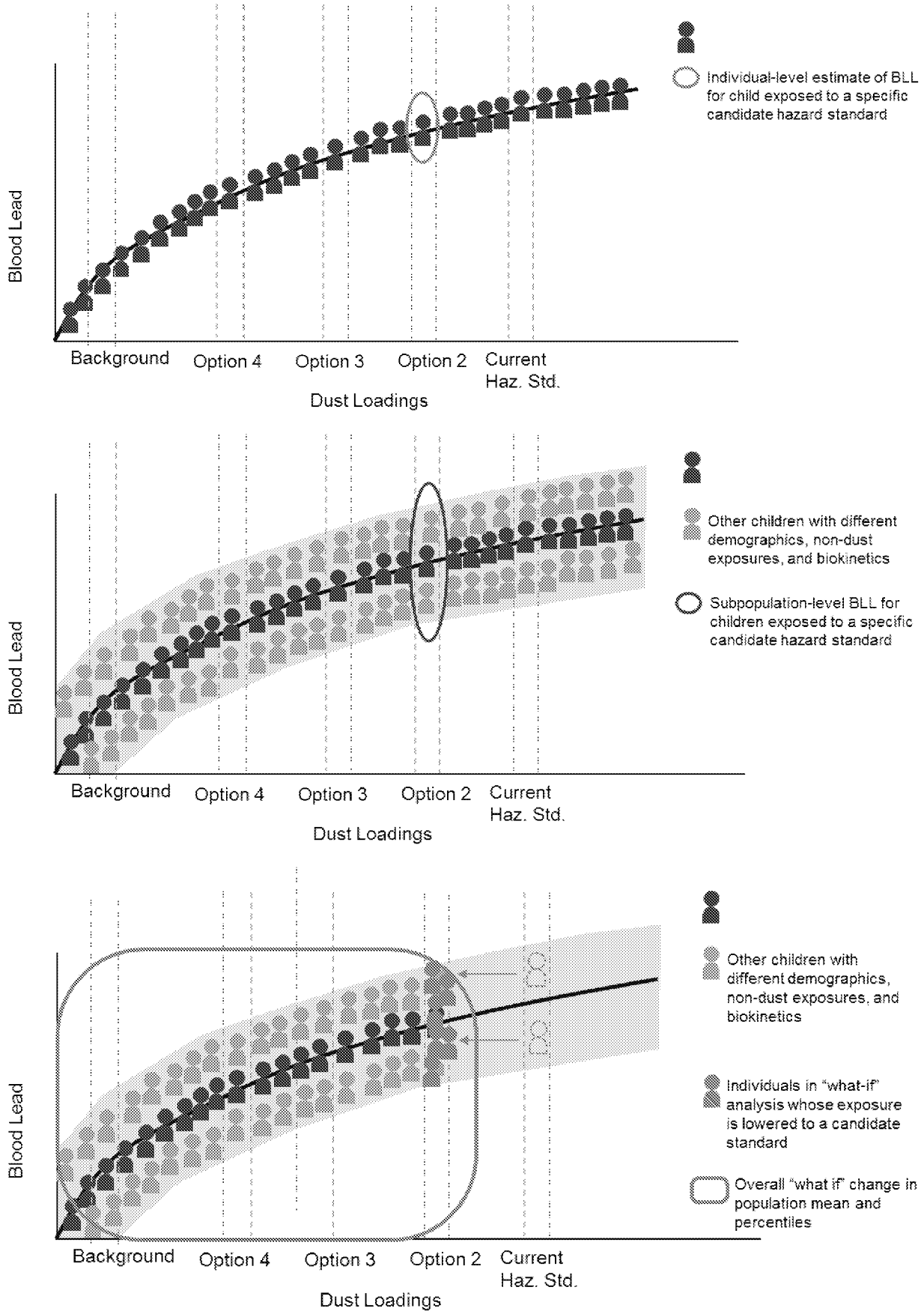
Figure 2-3. Individual (top), Sub-population (middle), and Population (bottom) Analyses



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2.2.2 Candidate Populations of Interest from Empirical Monitoring Studies

The goal of this exposure analysis is to provide accurate and quantified estimates of public-health changes associated with each candidate standard. The sub-population affected by any change in standard was placed within the context of the national population through comparison of available dust-lead loading monitoring studies. To specify that sub-population, a literature search was performed to find monitoring studies that measured dust-lead levels in different sub-populations in the United States.

Inclusion criteria for these monitoring studies were:

- Studies reported information on sampling and analytical methods and generally followed methods outlined in published documents such as U.S. EPA (2008b) for dust-lead concentration and HUD (2012) for dust-lead loading.
- Studies reported summary statistics of dust loading or concentration,
- Studies were in the United States or Canada, and
- Studies reported dust-lead in loading rather than concentration or provided enough supplementary information so that dust-lead loading could be estimated from dust-lead concentration.

Other sources of variability across monitoring studies include whether the population of interest represent a highly-exposed sub-population, what the housing vintage in the study population was (with older houses consistently reporting higher levels of lead in paint and dust, how values below the level of detection were treated, whether dust samples were sieved, whether a particle size cut-off used during sieving, units reported (e.g. ft^2 or m^2) for the surface area sampled, and whether composite or spot sampling was done.

Table 2-3 divides the studies into four different types:

- National-level background studies
- Regional background studies (including some at-risk populations)
- Intervention studies
- Historically contaminated sites (e.g., from mines or smelters)

The range in central tendency dust-lead loading varies greatly over these studies, as shown in Figure 2-4. The populations in these studies were chosen for different objectives and have varying sample numbers (10's to more than 1000). In general, national-level studies report relatively low geometric mean loadings, approximately 1 microgram per square foot ($\mu g/ft^2$). Regional studies are more variable, including central tendencies between approximately 1 to 20 $\mu g/ft^2$, with one notably high study at 343 $\mu g/ft^2$ (Adgate et al., 1995; not included in figure 2-4). The intervention studies have higher pre-intervention loadings, as expected, with pre-intervention central tendencies from 10 to 50 $\mu g/ft^2$. Finally, the historically contaminated sites have geometric means from approximately 3 to 15 $\mu g/ft^2$.

These ranges suggest that regional, intervention studies, and historically contaminated sites have geometric mean floor dust loadings that are higher than those from national databases. The range of these more highly exposed groups generally extends above both the range reported in national databases and the current hazard standard. However, many of these more highly exposed groups have central tendency floor dust-lead loadings below the current hazard standard of 40 $\mu g/ft^2$, and it is uncertain to draw comparisons from the ranges reported in these more highly exposed groups when compared to upper percentile values from national databases. As an example, the American Health Homes Survey (AHHS) data distributions are

shown in Figure 2-5. For the population as a whole, the current floor standard of 40 μg/ft^2 standard is above the 97.5th percentile, while the Pre-1940 homes are at or near the 97.5th percentile.

The fact that the current standard represents fairly high percentiles in national-level surveys means that estimating changes in exposure relative to the current standard at a population level will require confidence in the higher-end tails of the population distributions. With lower sample sizes in from highly exposed groups, and even in the national-level surveys, these tails will be particularly uncertain. Quantifying a sub-population or population-level change in exposure will be uncertain.

Table 2-3. Floor Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Samp. Size	LOD (% <LOD)	Floor Dust-lead Loading (μg/ft^2)		Reference
					Range	Central Tendency (μg/ft^2)	
National-level Background Studies (National Health and Nutrition Examination Survey [NHANES], American Health Homes Survey [AHHS], U.S. Department of Housing and Urban Development's [HUD] Child Care Center Survey [CCC])							
Throughout US	Single wipe in center of living room	• Pre-1940 • 1940-1977 • Post-1978 • All	• 304 • 919 • 1000 • 2223	2 μg/ft^2	• LOD to 126.6 • LOD to 36.0 • LOD to 9.5 • LOD to 126.6	• 0.96 (GM), 3.90 (GSD) • 0.49 (GM), 3.00 (GSD) • 0.29 (GM), 2.46 (GSD) • 0.47 (GM), 3.25 (GSD)	NHANES 1999-2004 (CDC, 2018)
Throughout US	Multiple wipes throughout residence	• Pre-1940 • 1940-1977 • Post-1978 • All	1,131	5 μg/ft^2 (NR)	• <LOD to 293 • <LOD to 134 • <LOD to 13 • <LOD to 293	• 2.48 (GM), 6.13 (GSD) • 0.77 (GM), 4.62 (GSD) • 0.35 (GM), 3.43 (GSD) • 0.69 (GM), 5.05 (GSD)	AHHS HUD (2011)
Throughout US	NR	All	336	3.5 μg/ft^2 (LOD); 10 μg/ft^2 (reporting limit)	LOD to 27.5	0.8 (GM), 2.5 (GSD)	CCC Data Westat (2003)
Regional Background Studies							
Jersey City, New Jersey	• Carpet • Hard Surface	Not reported	• 376 • 444	NR (NR)	• 7.4 to 19,509 (2,879-95th) • 0.37 to 10,219 (204-95th)	• 343 (GM), 4 (GSD) • 19.5 (GM), 3.9 (GSD)	Adgate et al (1995)
Jersey City, NJ	Carpet	Not reported	33	NR (NR)	0.9 to 53	7.8 (GM), 3.3 (GSD)	Bai et al (2003)
Tucson, AZ	Carpet/Hard Floor, estimated from combined concentration and reported dust-lead loading estimate	Not reported	10	NR (NR)	<DL to 13.72	2.09	Beamer et al (2012)

Table 2-3. Floor Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Samp. Size	LOD (% <LOD)	Floor Dust-lead Loading (µg/ft²)		Reference
					Range	Central Tendency (µg/ft²)	
Philadelphia, PA (urban)	• Hard floor-pre clean • Carpet-pre clean	Not reported	• 101 • 49	1 µg /ft² (21)	• <1 to 19.7 (99th perc) • <1 to 9.93 (99th perc)	• 12.9 (GM), 1.2 (GSD) • 6.5 (GM), 1.2 (GSD)	Campbell et al (2003)
Cincinnati	Carpet	Urban Cincinnati; years not reported	23	NR (0)	0.6 to 161 (max)	6.2 (GM), 4.6 (GSD)	Clark et al (1996)
New York City, Milwaukee, and Baltimore	Single-surface dust wipes	Pre-1950 and 1950-1978 housing	191	2 µg (22)	0.5 to 52.6 (95th CI for GM)	5.2 (GM)	Dixon et al (2007)
Syracuse, NY	Hard surface (kitchen floor)	NR (urban)	432	5 µg /ft² (LOQ)	370 (max)	3.11 (GM), 10.18 (AM)	Hunt et al (2012)
Montreal, Canada	Average of 3 rooms in residence	Older housing, years not reported	305	0.01 µg /ft² (0)	0.19 (10th) to 4.7 (90th)	0.85 (GM), 0.7 (median)	Levallois et al (2014)
Omaha, Nebraska	Hard Surface Carpet	Pre-1955	21	Not reported (0)	1 to 37.5 0.1 to 20.2	4.2 (GM), 7.2 (AM) 3.2 (GM), 1.48(AM)	Manton et al (2000)
New Jersey	• Main Entry interior-Exposed; • Family Room-Exposed; • Child Bedroom-Exposed; • Main Entry interior-Control; • Family Room-control; • Child Bedroom-control	Pre-1978 (exposed: 78.6 %; Control: 73.7 %)	• 38 • 36 • 47 • 22 • 22 • 31	0.04 µg/filter (NR)	• 0 to 103.4 • 0 to 7.1 • 0 to 19 • 0.1 to 492.1 • 0 to 14.6 • 0 to 4.1 (estimated 95th confidence interval based on GM and GSD)	• 2.1 (GM), 7.3 (GSD) • 0.55 (GM), 3.7 (GSD) • 0.55 (GM), 6.1 (GSD) • 6.78 (GM), 8.9 (GSD) • 0.84 (GM), 7.5 (GSD) • 0.27 (GM), 4 (GSD)	Piacitelli et al (1997)
Canada (urban)	Composite sample from dry living areas/rooms	Backgnd (1969+/- 22 years) Elevated (1930 +/- 37 years) Anomal. (1918 +/- 40 years)	1,022	NR (NR)	0.02 to 89.4 (28.7-98th percentile)	0.88 (GM), 2.87 (AM)	Rasmussen et al (2013) Rasmussen et al (2011)
California	Carpet	• Cases • Controls	• 142 • 187	• 0.01 µg /ft2 (2) • 0.01 µg /ft2 (4)	• 1.9 to 11.1 (IQR) • 1.7 to 11.1 (IQR)	• 4.4 (Median) • 5.4 (Median)	Whitehead et al (2015)

Table 2-3. Floor Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Samp. Size	LOD (% <LOD)	Floor Dust-lead Loading (µg/ft²)		Reference
					Range	Central Tendency (µg/ft²)	
Jersey City, NJ	Wipe samples throughout the residence floor, hard surface	Not reported	413	NR (NR)	1.7 to 290 (estimated 95th confidence interval based on GM and GSD)	22.3 (GM). 3.7 (GSD)	Yiin et al (2000)
Intervention Studies							
Throughout US	• Option 1 • Option 2 • Option 3 • Option 4 Four different intervention options	Pre-1970 housing (89% before 1940)	• 1273 • 459 • 155 • 296	• NR (NR) • NR (NR) • NR (NR) • NR (NR)	• 0.55 (1st perc) to 993 (99th) • 0.46 (1st perc) to 762 (99th) • 0.59 (1st perc) to 523 (99th) • 0.56 (1st perc) to 450 (99th)	• 23.5 (GM), 5 (GSD) • 18.9 (GM), 4.9 (GSD) • 17.6 (GM), 4.3 (GSD) • 16 (GM), 4.2 (GSD)	Clark et al (2011)
Vermont, Minnesota, Cleveland and Chicago	Single-surface dust wipes • Floor Pre-Intervention • Floor Post-intervention	• Pre-1978 housing • (NR)	189	1.6 (34)	• <LOD to 1,097 (99th perc) • <LOD to 261 (99th perc)	• 20.8 (GM), 5.5 (GSD) • 2.2 (GM), 7.8 (GSD)	Dixon et al (2012)
Baltimore, Maryland; Cincinnati/Columbus, Ohio; Newark, New Jersey; and Philadelphia, Pennsylvania	Floor Pre-Intervention Floor Post-intervention	Typically Pre 1950	370	NR (NR)	• 1.1 to 1,097 • 0.8 to 727.3 (estimated 95th confidence interval based on GM and GSD)	• 35 (GM), 5.8 (GSD) • 24 (GM), 5.7 (GSD)	Ettinger et al (2002)
Brooklyn, NY	• Floor Pre-intervention • Floor Post-Intervention	Pre 1940	• 42 • 41	5 (NR)	• 7.7 to 22.8 (CI of GM) • 2.0 to 3.8 (CI of GM)	• 13.3 (GM) • 2.7 (GM)	Klitzman et al (2005)

Table 2-3. Floor Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Samp. Size	LOD (% <LOD)	Floor Dust-lead Loading (µg/ft²)		Reference
					Range	Central Tendency (µg/ft²)	
Rochester, NY	• Hard Surface, Baseline, Intervention; • Hard Surface, Follow-up, Intervention; • Hard Surface, Baseline, Control; • Hard Surface, Follow-up, Control; • Carpet, Baseline, Intervention; • Carpet, Follow-up, Intervention; • Carpet, Baseline, Control; • Carpet, Follow-up, Control	Not reported	• 39 • 39 • 31 • 31 • 32 • 32 • 28 • 28	5 µg /sample	• 7.3 to 37.6 (GM +/- 1 GSD) • 2.2 to 27.3 (GM +/- 1 GSD) • 3.4 to 91.3 (GM +/- 1 GSD) • 2.4 to 39.8 (GM +/- 1 GSD) • 4.4 to 22 (GM +/- 1 GSD) • 1.6 to 7.6 (GM +/- 1 GSD) • 3.1 to 24.4 (GM +/- 1 GSD) • 1.3 to 12.8 (GM +/- 1 GSD)	• 16.6 (GM) • 7.7 (GM) • 17.7 (GM) • 9.8 (GM) • 9.9 (GM) • 3.5 (GM) • 8.7 (GM) • 4.1 (GM)	Lanphear et al (1996)
Rochester, NY	3-4 composite samples throughout residence	All	205	<0.25 µg /sample GFAAS (0)	1.2 to 2,114.2	49.0 (GM)	Lanphear et al (2002)
Throughout US	• Pre Intervention • Post Intervention (72 months)	NR	• 424 • 424	5-varied (12)	• 0.1 to 9,407 (141.8-90th) • <LOD to 2,299 (31.9-90th)	• 21.5 (GM), 4.8 (GSD) • 4.8 (GM), 5.5 (GSD)	Wilson et al (2006)
Historically-contaminated Sites							
Oklahoma	• Children BLL>10 • Children BLL<10 Wipe samples throughout the residence	Pre-1950	224	2.5-LOQ (0)	• 4.5 to 670 • 1.3 to 924	• 14.5 • 5.4	Malcoe et al (2002)
Oklahoma (near smelter)	Floor	1920-2004	74	1 µg /ft² (9)	<LOD to 576	4.7 (GM), 4.6 (GSD)	O'Connor et al (2008)
Puerto Rico (former landfill)	Wipe samples throughout the residence	Not reported	29	1 µg /ft² (0)	0.71 to 50.7	4.06 (GM), 8.43 (AM)	Sánchez-Nazario et al (2003)
Idaho (Superfund site)	Estimated from loading to concentration equation	• Pre 1960 homes • Post 1960 homes	• 28 • 21	0.003 µg /ft² based on concen.-vacuum method (NR)	NR	• 3.18 (GM) • 0.23 (GM)	Spalinger et al (2007)
Oklahoma (near mining site)	Main living area floor	Not reported	93	NR (0)	<LOD to 14	3 (GM)	Zota et al (2016)

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Table 2-4. Sill Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Sample Size	LOD (# <LOD)	Sill Dust-lead Loading (µg/ft²) Range	Sill Dust-lead Loading (µg/ft²) Central Tendency	Reference
National-level Background Studies (National Health and Nutrition Examination Survey [NHANES], American Health Homes Survey [AHHS], U.S. Department of Housing and Urban Development's [HUD] Child Care Center Survey [CCC])							
Throughout US	Sill surfaces in living room	• Pre-1940 • 1940-1977 • Post-1978 • All	• 304 • 919 • 1000 • 2223	2 µg/ft²	• LOD to 7,650 • LOD to 2,258 • LOD to 6,317 • LOD to 6,317	• 9.35 (GM), 14.08 (GSD) • 2.35 (GM), 9.81 (GSD) • 1.37 (GM), 6.97 (GSD) • 2.34 (GM), 10.19 (GSD)	NHANES 1999-2004 (CDC, 2018)
Throughout US	Sill surfaces in multiple rooms	• Pre-1940 • 1940-1977 • Post-1978 • All	1,043	5 µg/ft² (NR)	• <LOD to 67632 • <LOD to 7873 • <LOD to 4206 • <LOD to 67632	• 28.20 (GM), 8.67 (GSD) • 4.11 (GM), 9.00 (GSD) • 1.12 (GM), 5.29 (GSD) • 3.51 (GM), 9.95 (GSD)	AHHS HUD (2011)
Throughout US	NR	All	336	3.5 µg/ft² (LOD); 10 µg/ft² (reporting limit)	LOD to 1,154.7	2.7 (GM), 6.3 (GSD)	CCC Westat (2003)
Regional Background Studies							
New Jersey, NJ	Sills	Not reported	164	Not reported	2.78 to 39,978 (603 95th)	57.5 (GM), 4.9 (GSD)	Adgate et al (1995)
New York City, Milwaukee, and Baltimore	Single-surface dust wipes	Pre-1950 and 1950-1978 housing	611	1.9 to 28.3 µg/ft2	1.3 to 2,265.7 (95% CI for GM)	53.7 (GM)	Dixon et al (2007)
Montreal, Canada	Average of 3 rooms in residence	Older housing, years not reported	263	0.01 (0)	1.06 (10th perc) to 50.89 (90th perc)	7.14 (GM), 7.15 (median)	Levallois et al (2014)
Omaha, Nebraska	Window Sill	Pre-1955	21	NR (0)	21.5 to 898.4	110.3 (GM), 239.8 (AM)	Manton et al (2000)
New Jersey	• Family Room-Exposed; • Child Bedroom-Exposed; • Family Room-control; • Child Bedroom-control	Pre-1978 (exposed: 78.6 percent; Control: 73.7 percent)	• 25 • 38 • 18 • 23	0.3 µg/wipe(NR)	• 1.6 to 693.5 • 1.6 to 1098.4 • 1.2 to 1525.9 • 1.1 to 1039.5 (estimated 95th confidence interval based on GM and GSD)	• 33.4 (GM), 4.7 (GSD) • 41.8 (GM), 5.3 (GSD) • 42.7 (GM), 6.2 (GSD) • 34.3 (GM), 5.7 (GSD)	Piacitelli et al (1997)

Table 2-4. Sill Dust-lead Loading Monitoring Summary

Location	Sampling Site	Year of Housing	Sample Size	LOD (# <LOD)	Sill Dust-lead Loading (µg/ft²) Range	Sill Dust-lead Loading (µg/ft²) Central Tendency	Reference
Jersey City, NJ	Wipe samples hard surface	Not reported	214	Not reported	2.5 to 1493.8 (estimated 95th confidence interval based on GM and GSD)	61.3 (GM), 5.1 (GSD)	Yiin et al (2000)
Intervention Studies							
Vermont, Minnesota, Cleveland and Chicago	• Pre-Intervention (all) • 12 year post-Intervention (all)	Pre-1978 housing	188	1.6 µg/ft² (21)	• 4.9 to 10018.1 • 0.4 to 2639.3 (estimated 95th confidence interval based on GM and GSD)	• 221 (GM), 7 (GSD) • 32 (GM), 9.5 (GSD)	Dixon et al (2012)
Rochester, NY	• Sill, Baseline, Int, • Sill, Follow-up, Int, • Sill, Baseline, Control • Sill, Follow-up, Control	Not reported	• 37 • 37 • 35 • 35	10 µg/sample	• 40.5 to 606.9 (GM +/- 1 GSD) • 24.2 to 328.8 (GM +/- 1 GSD) • 49.5 to 769 (GM +/- 1 GSD) • 18.9 to 431.9 (GM +/- 1 GSD)	• 156.7 (GM) • 89.3 (GM) • 195 (GM) • 90.3 (GM)	Lanphear et al (1996)
Rochester, NY	3-4 composite samples throughout residence • Baseline • 24-month dust-control intervention	All	• 276 • 249	<0.5 µg/sample GFAAS (0)	• 873-3971 (95% CI) • 294-1172 (95% CI)	• 2422 (AM) • 733 (AM)	Lanphear et al (2002)
Throughout US (New York City, Minnesota, Milwaukee, and Vermont)	• HUD Pre Intervention • HUD Post Intervention (72 months)	Pre 1910 (57 %), 1910-1929 (39%), 1930-1949 (4 %)	• 424 • 420	5-varied (7)	• 3 to 129,188 (2,598-90th) • <LOD to 12,358 (837-90th)	• 239 (GM), 5.7 (GSD • 73 (GM), 7.7 (GSD)	Wilson et al (2006)
Historically-contaminated Sites							
Oklahoma	• Children BLL>10 • Children BLL<10	Pre-1950	210	2.5-LOQ (0)	• 6.7 to 4,303 (714.5-95th) • 1.3 to 11,203.7 (772.5-95th)	• 107.9 (median) • 27 (median)	Malcoe et al (2002)

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Figure 2-4. Central Tendency Values in Different Study Types (One Representative Point per Study)

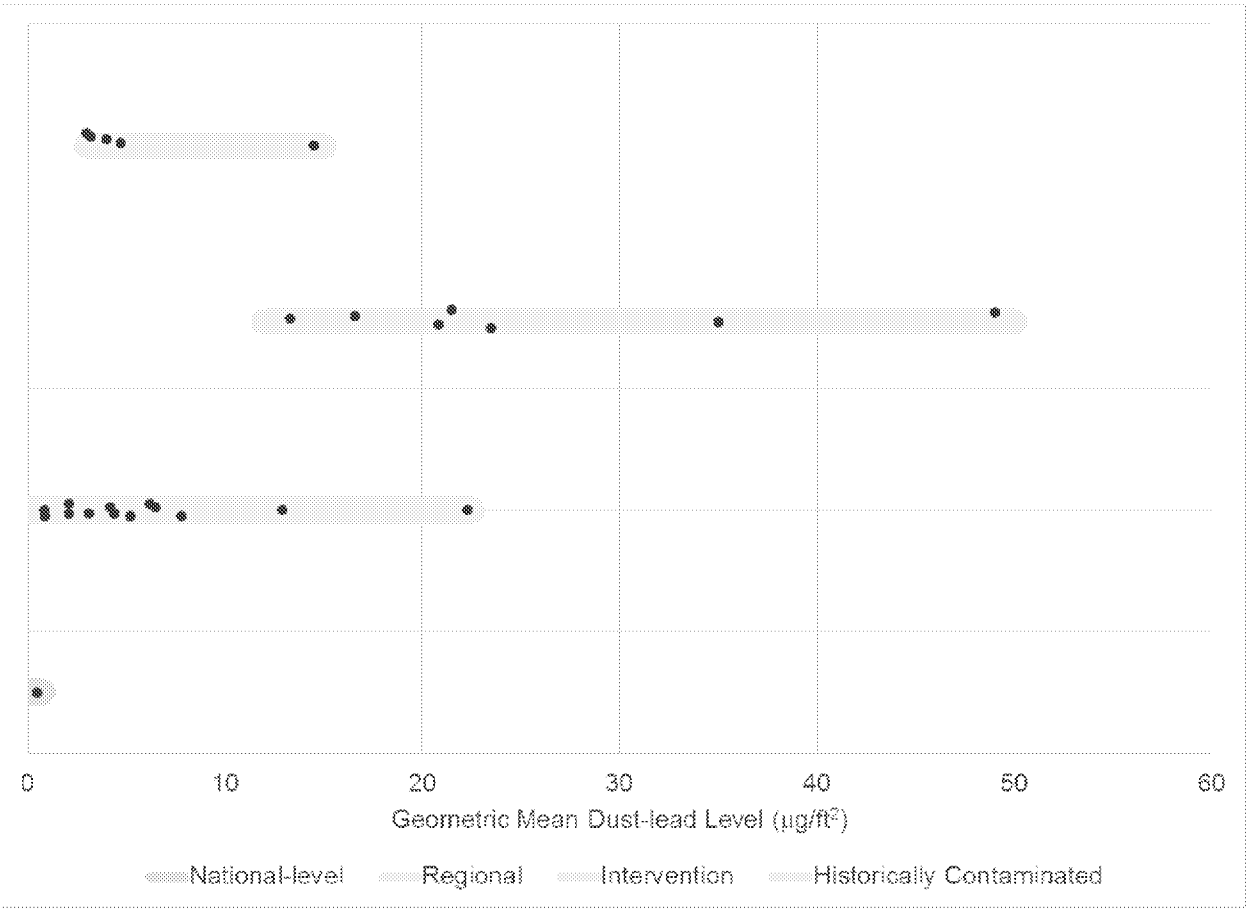
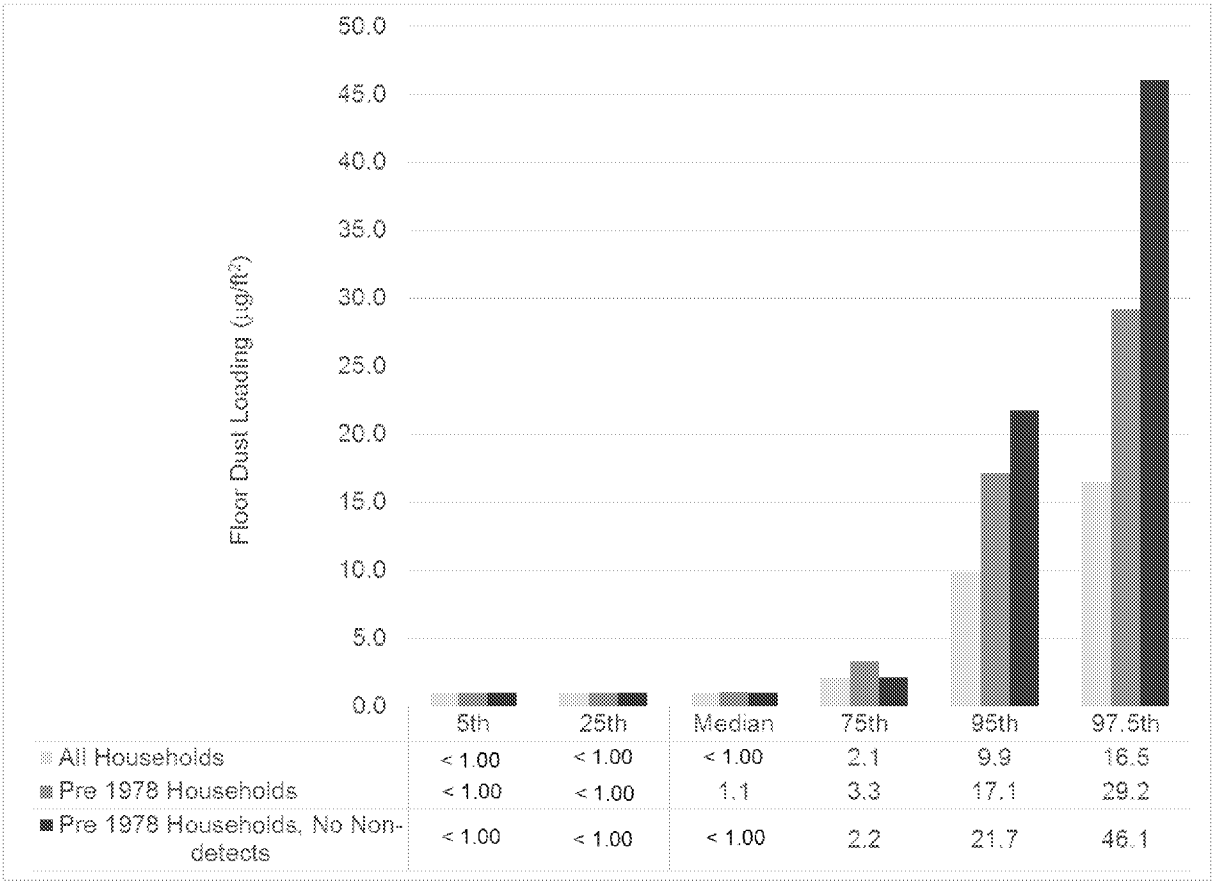
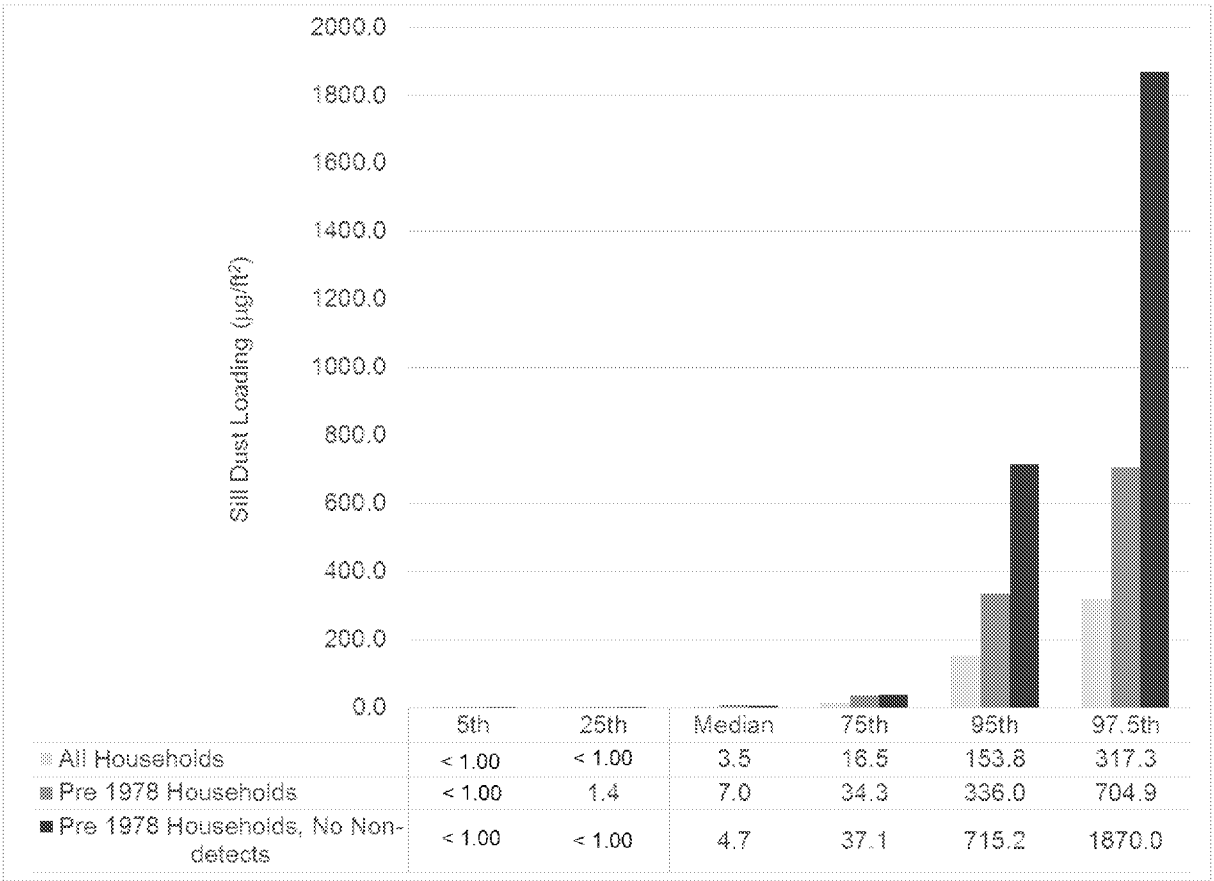


Figure 2-5. Different Dust-lead Distributions from AHHS (in µg/ft²)





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2.2.3 Selection of Analysis Option and Application to Target Population

TSCA section 403 (15 U.S.C. 2683) mandates EPA to identify LBP hazards for purposes of administering Title X. Under TSCA section 401 (15 U.S.C. 2681), LBP hazards are defined as conditions of LBP and lead-contaminated dust and soil that "would result in adverse human health effects," and lead-contaminated dust is defined as "surface dust in residential dwellings" that contains lead in excess of levels determined "to pose a threat of adverse health effects."

The goal of this analysis is to provide a proposed decision framework by determining the relationship dust-lead and BLL as well as BLL and IQ in order to quantify outcome metrics for individuals and subpopulations exposed to each candidate hazard standard.

Because of the difficulty in quantifying specific changes relative to the current standard at a population level, the analysis in this technical support document focuses on individual-level and sub-population level exposures, as discussed in the text box at the left.

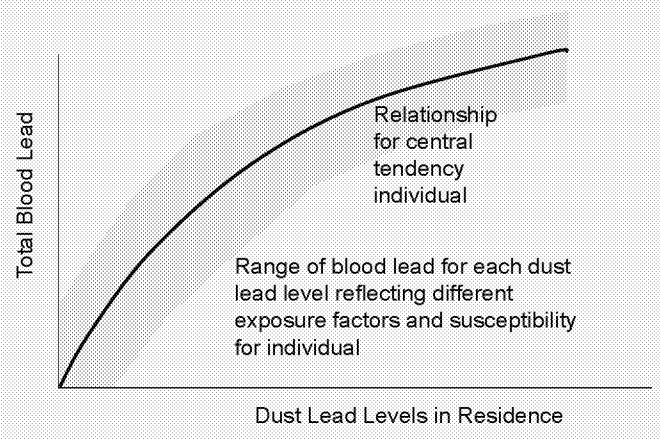
Any individual exposed to a given dust-lead loading can have a range of BLLs based on differences in exposures, intakes, and uptakes combined with differences in inherent susceptibility to lead. Thus, the outcome of this analysis are a central tendency estimates and

For this analysis, individual and sub-population analyses are performed to determine the relationship between dust-lead and BLL for each candidate hazard standard.

Exposure at each standard represents a sub-population in the United States that is currently exposed at that level. Each sub-population may consist of thousands or hundreds of thousands of children depending on the where the candidate standard falls in relation to current population-level exposures (e.g., the American Healthy Homes Survey [AHHS]).

What this analysis provides:

The outcome of this analysis is a framework of BLL and IQ metrics that can be used as a tool to evaluate different candidate standards. The framework includes central tendency estimate (individual analysis, black line) and an associated range of expected BLL (sub-population analysis, gray area) and associated IQ loss for a given dust level. The sub-population is the group of children with different background exposures, demographics, exposure factors, and biokinetics that are all exposed at the candidate level.



What this analysis does not provide:

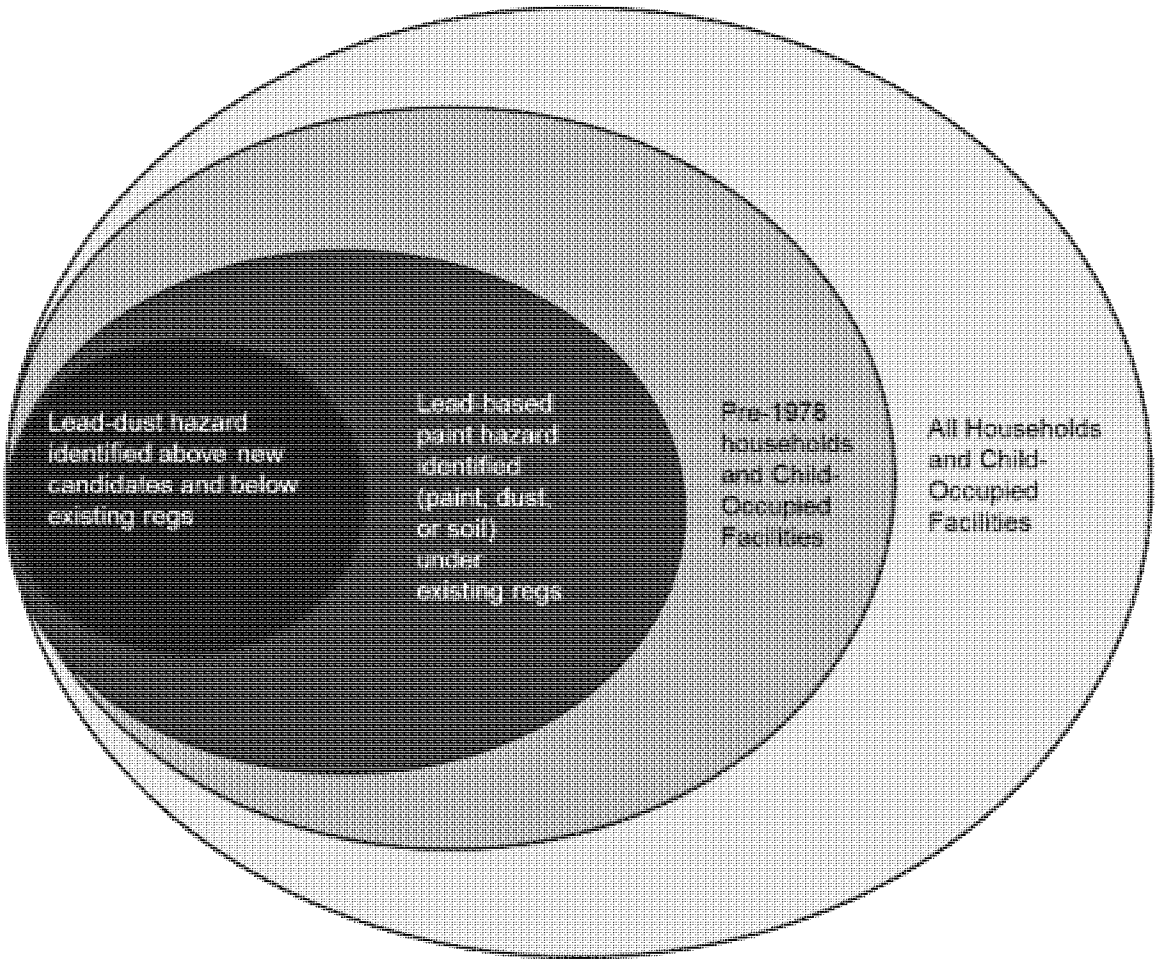
Because of the difficulty in selecting the applicable target population, a population-level analysis has not been completed at this time. Thus, this analysis does not indicate how many children are in each sub-population or how the overall statistics of the sub-population covered by this rule might change compared to current conditions if the hazard standard were changed.

associated ranges of expected BLL for a given dust-lead loading. Owing to the inherent uncertainty in the tails of the survey distributions, this document does not discuss how prevalent these individuals are within the United States population.

2.2.4 Placing the Sub-population Analysis into the Context of Existing National Populations

The sub-population BLLs and IQ losses are placed into the context of existing sub-populations of the United States using the AHHS population. Different sub-populations within that national-level survey are shown in Figure 2-6 as a series of concentric circles. The full population is the outermost circle (○). Lead-based paint was banned from residential paint in 1978; thus, the timeframe of construction is used as a proxy for whether lead-based paint hazards might be present in a household (second outermost circle, ◍). Furthermore, homes where the level of lead in the dust is determined to be above the level of detection are more likely to have a lead-dust hazard, so this variable is used as a proxy to identify households in the second innermost circle (◉). Finally, the population of children with a dust-lead hazard but below the existing hazard standard are identified as the sub-population that most directly benefits from any change to the hazard (innermost circle, ●). In Section 7, the results from this analysis are placed into the context of these sub-populations to further help interpret the results.

Figure 2-6. Diagram of Different Sub-populations Within the Overall Population that Are Relevant for the Hazard Standard



2.3 Selection of Candidate Hazard Standards

The candidate dust-lead hazard standard loadings for both sills and floors (Table 2-5) are based on feasibility of reaching the loading as determined by the U.S. Department of Housing and Urban Development (HUD) guidelines (HUD, 2012) as well as the relative contribution of floor vs. sill to dust-lead loadings and concentrations. The full range of candidates shown in the table were explored in this analysis to ensure the proper ranges were included. Many of these options produced similar BLLs at the sub-population level; thus, the options are largely restricted to those highlighted in the table in the results section (where all options are shown once as a demonstration of the ranges). Options 3, 7, 8, 11, and 13 were further considered in the Economics Analysis.

Table 2-5. Candidate Floor and Sill Dust-lead Loadings

Option	Floor Dust-lead Loading ($\mu g/ft^2$)	Sill Dust-lead Loading ($\mu g/ft^2$)
Option 1 (Current)	40	250
Option 2	40	150
Option 3	40	100
Option 4	40	50
Option 5	30	250
Option 6	30	100
Option 7	20	250
Option 8	20	100
Option 9	15	250
Option 10	15	100
Option 11	10	250
Option 12	10	150
Option 13	10	100
Option 14	10	50
Option 15	5	250
Option 16	5	100
Option 17 (Background)[1]	1	10

[1] Background floor and sill values taken from the geometric means in the NHANES 1999-2004 survey; updated values using the AHHS data could be substituted in future efforts.

2.4 Selection of Outcome Metrics

In order to evaluate the candidates, EPA established the outcome metrics that were calculated and compared. While these metrics are distinct, they are likely to be highly correlated; refinements in one metric will be accompanied by refinements in others.

Outcome metrics for this analysis are defined in Table 2-6. . For both BLL and IQ, metrics include both the total and the dust-only contribution to the total. During the SAB review of the draft hazard standard analysis in 2010, SAB recommended the following:

"In modeling the relationship between lead dust and blood lead, EPA considered all routes and pathways of exposure contributing to blood lead levels. Since the focus of EPA's effort is on establishing a lead dust standard, the SAB recommends examining blood lead concentrations as a result of only lead dust exposures by using an incremental risk assessment approach. An incremental risk assessment approach assesses how incremental changes in dust lead result in incremental changes in blood lead concentrations. In the empirical modeling approach, this can

be accomplished by varying lead dust and comparing the slopes of the relationship between lead dust and blood lead concentration. In the biokinetic modeling approach, this can be accomplished by either zeroing out all other exposure inputs, or by varying only lead dust while holding all other exposures constant. This will also reduce the considerable uncertainty resulting from estimation of the other exposure parameters." (SAB, 2010).

For this analysis, both the dust-only BLL and IQ loss are estimated. For each of these metrics, policy decisions will require specifying health-protective thresholds or comparison levels for each metric. Because lead is not known to have a threshold below which health effects do not occur (U.S. EPA, 2014), choosing policy-relevant levels for the outcome metrics is particularly difficult. The comparison values selected for this technical support document are examples of what might be chosen for policy decisions. In the case of BLL, the Centers for Disease Control (CDC) reference level of 5 micrograms per deciliter (μg/dL) is chosen; however, the dust-only increment is not compared to this level, since the reference level is based on total exposure. However, IQ loss, which itself is an increment comparing IQ in the absence of any lead exposure with IQ including dust exposure, suits itself particularly well for an incremental analysis. Values of 1 and 2 IQ points are examined for dust-only IQ loss.

Table 2-6. Outcome Metrics Included in this Technical Support Document as Examples

Outcome	Total	Dust-only	Probability of Being Greater than a Comparison Value	
BLL loss and BLL change	Central Tendency and upper percentiles	Central Tendency and upper percentiles	The probability that a child's total BLL is above the current CDC reference level of 5 μg/dL and former CDC hazard level of 10 μg/dL.	
IQ loss and IQ change	Central Tendency and upper percentiles	Central Tendency and upper percentiles	The probability that a child's total and dust-only IQ loss is above 1 IQ point	The probability that a child's total and dust-only IQ loss is above 2 IQ points

In addition to these different metrics, for the mechanistic analysis, BLL is captured over different time horizons:

- Age-specific: a snapshot of the BLL for children at different ages (averaged over months).
- Concurrent: BLLs between ages 5 to 7. This age range matches the age range when IQ tests were administered and BLLs were measured in the Lanphear pooled analysis from which the concentration-response curve is derived.
- Lifetime average: BLLs averaged from birth up to age 5 to 7, where the average is over age-specific BLL estimates in increments of 6 months. This metric matches the "lifetime" BLL metric in the Lanphear pooled analysis (Lanphear et al., 2005) from which the concentration-response curve is derived.

Note, that a single outcome metric is not likely to fully explain differences across potential hazard standard candidates. For this reason, a suite of potentially relevant outcome metrics were used to compare all seventeen hazard standard candidates. The specific outcome metrics are summarized in Section 7.1

2.5 Mechanistic Approach to Quantifying Dust-lead/BLL Relationship

The mechanistic approach involves generating BLL estimates for specific exposure scenarios. This approach includes identifying microenvironments in which to evaluate exposures, estimating time spent in the microenvironments, developing exposure metrics for environmental media (air, soil, dust) in the various microenvironments in order to:

- Estimate the average loading to which the child is exposed in the primary microenvironment, given contributions from both floor and sill,
- Estimate background lead exposures (diet, drinking water, soil, and dust in other microenvironments), and
- Characterize total and dust-only exposure for each of the candidate hazard standards.

Exposure scenarios evaluated to characterize total lead exposures include both the primary (the microenvironment where the hazard standard is being evaluated) and secondary microenvironments (all other microenvironments). Residences, COFs, and other microenvironments are considered. Background exposure from non-dust media and from dust-lead outside the primary microenvironment are identified to establish a baseline BLL. Then, changes to the BLL from changes in the dust-lead level in the primary microenvironment are quantified.

The model used as the primary tool for predicting children's BLL impacts was EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) (U.S. EPA, 2010b). This model has been peer-reviewed and has been used in prior regulatory analyses. The model simulates exposure from air, soil, dust, diet, water, and "other" for children age 0-7 and allows implementation of user-specific media concentrations, media intakes, and media-specific bioavailabilities. When a population geometric standard deviation is specified, the model also estimates the fraction of the population above a user-specified BLL threshold. The smallest output timescale is one month.

Use of the biokinetic models requires quantitative estimates of dust-lead and soil-lead concentration from which lead intake can be estimated. Thus, it is necessary to convert the lead loadings for the exposure scenarios into lead concentrations in floor and window sill dust. However, few studies are available that can be used to directly assess the relationship between residential dust-lead loading and concentration. Based on recommendations from peer review of EPA's *Approach for Estimating Exposures and Incremental Health Effects from Lead due to RRP Activities in P&CBs*, a regression based on available empirical data is used to derive estimates of dust-lead lead concentration from dust-lead loading (U.S. EPA, 2014).

A streamlined sensitivity analysis and fit-for-purpose probabilistic Monte Carlo methodology were used to evaluate the impacts of variability and uncertainty in model inputs on BLL estimates. Variability due to differences in exposure concentrations and factors were modeled using distributions for input variables; variability from biokinetic differences were modeled by applying a biological geometric standard deviation to the individual exposure estimates.

The sensitivity of the deterministic relationships between dust-lead and BLL to changes in key parameters and covariates is explored through sensitivity analyses. As presented in

Section6.1.2, the modeling inputs and assumptions that most strongly affect the predicted BLL distributions associated with candidate dust-lead hazard standards have been identified, based on the measures of statistical uncertainty from the empirical analyses and sensitivity analyses of the biokinetic models.

When appropriate, considerations of other EPA lead regulatory work, including the Office of Water Proposed Modeling Approaches for a Health Based Benchmark for Lead in Drinking Water for the Lead in Copper Rule (LCR) analysis (U.S. EPA, 2017a), the Office of Air and Radiation National Ambient Air Quality (NAAQS) review (U.S. EPA, 2007), the OPPT Lead Renovation, Repair, and Painting Rule (RRP) analysis (U.S. EPA, 2008a), and the use of the IEUBK model in the Office of Land and Emergency Management Superfund program (U.S. EPA, 2018) were integrated into this modeling approach. In general, the probabilistic modeling is broadly consistent with the LCR analysis, although the analysis here used a custom-built Excel tool rather than the Stochastic Human Exposure and Dose Simulation (SHEDS) model (U.S. EPA, 2008c) in order to implement the chosen dust ingestion method (see Section 3.2.4) that is not available in SHEDS.

2.6 Empirical Approach to Quanitifying Dust-lead/BLL Relationships

The empirical approach involves the estimation of BLL impacts based on analyses of empirical data from the 1999–2004 NHANES (CDC, 2018), as originally analyzed by Gaitens et al. (2009) and Dixon et al. (2009), and comparing observed trends with empirical relationships in other published studies.

Gaitens et al. (2009) and Dixon et al. (2009) developed regression relationships for floor and window sill dust-lead levels, other covariates, and BLL. They explored two different types of analyses:

1. A log-linear model to predict BLL based on dust-lead loadings and other covariates
2. A logistic regression that predicts the percent of individuals above a given threshold (e.g., 3.5 or 5 µg/dL) for different dust-lead loadings and other covariates.

One complication with their analysis is that the log-linear model includes the floor dust-lead loading as an interaction term with the floor condition, meaning assumptions must be made about floor conditions to use the regression to develop BLL predictions. EPA conducted a reanalysis analogous to the Gaitens et al. and Dixon et al. analysis but removed the interaction term between floor lead loading and floor surface condition.

The regression analysis returns equations for BLL in the following form:

$$\ln(PbB) = Intercept + A \times \ln(DustLoading) + B \times \ln^2(DustLoading) + C \times \ln^3(DustLoading) + D \times \ln(Sill\ Loading) + E \times Covariate1 + F \times Covariate2 + G \times Covariate3 \ldots$$

Thus, the BLL for a range of dust-lead loadings and floor loadings can be derived given specific choices for the other covariates. The complete list of covariates is shown in Table 2-7. The error terms in the regression were analyzed against the dependent variables to ensure correlations between variables did not affect the error terms.

Table 2-7. Covariates Included in the Gaitens et al. (2009) Regression Equations

Independent Variables	Interaction Terms
1. Age in months 2. Poverty Income Ratio (PIR) 3. Race/ethnicity 4. Country of Birth 5. Year of Construction 6. Home-apartment type 7. Smoking in home 8. Floor/surface condition 9. Log (window sill dust-lead) 10. Log (cotinine concentration) 11. Window, cabinet, or wall renovation in Pre-1978 home	12. Age in months x log (floor dust-lead) 13. Floor surface/condition x log (floor dust-lead) 14. Floor surface/condition x log (floor dust-lead)^2 15. Floor surface/condition x log (floor dust-lead)^3

The NHANES data used for the analysis are nationally representative and represent a concurrent snapshot of lead in dust-lead and BLL for study participants in the 1999 –2004 timeframe (CDC, 2018). This is the only NHANES survey timeframe that captured both dust-lead and BLL. Sampling weights can then be used to adjust the data points so they represent the United States population as a whole.

Another approach focused on evaluation of additional studies that included concurrent measures of dust-lead and BLL. These studies investigated BLL among specific populations from geographic areas with similarly low-level lead exposures. These studies have smaller sample sizes than NHANES and are less representative. However, the exposure/BLL relationships suggested by these studies are compared with the NHANES typical child population relationship to draw conclusions as to whether the additional, more recently analyzed, populations display consistent trends compared with the NHANES national 1999 –2004 average and to provide support to the generalizability of the previously described NHANES analyses.

2.7 Evaluation of Candidate Hazard Standards

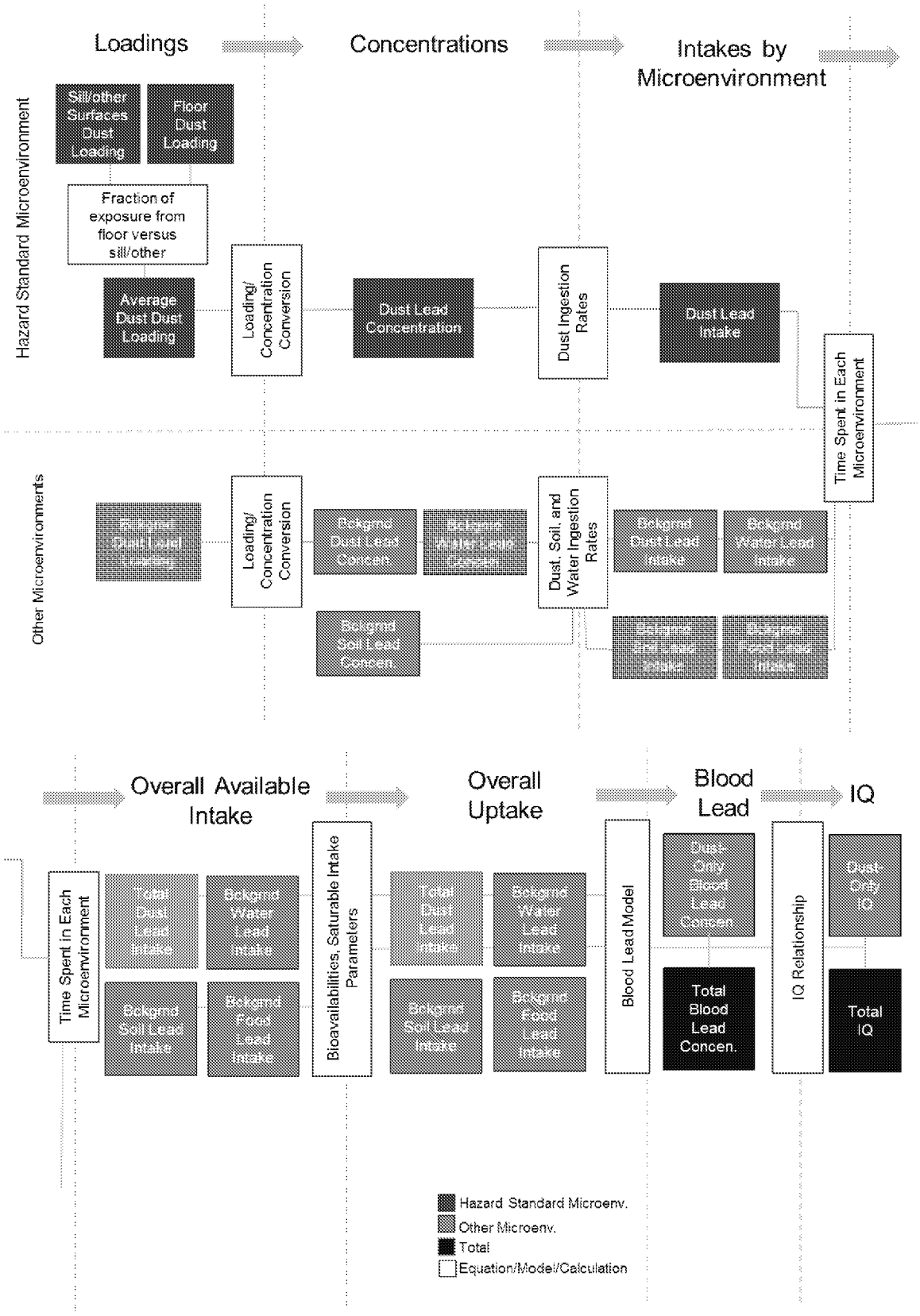
Once the BLL changes from the candidate hazard standards are quantified, these are evaluated with respect to defined outcome metrics and placed into context using the AHHS data sub-populations. Predictions for each metric from the empirical and mechanistic models are made for each of the candidate hazard standard dust-lead levels, and the results are evaluated for each metric.

The goal for the mechanistic approach is to predict the contribution of the residential dust-lead loadings to the overall BLL for both the total (including other background lead sources) BLL and the "dust-only" incremental BLL scenarios. The mechanistic approach calculates the incremental "dust-only" BLL by including all sources and subtracting the BLL from all non-dust sources. This approach is taken because the dust-lead loading/BLL relationship is non-linear, which is due to the non-linear equation used to convert dust-lead loading to dust-lead concentration.

3 Methods for Estimating BLL Impacts Based on Mechanistic Models

Mechanistic modeling techniques were used to create "ground-up" estimates of changes in BLL and IQ changes for specific assumptions about the hazard standards. Figure 3-1 shows the overall mechanistic hazard standard framework. The overall framework assumes that background exposure concentrations for all media (air, soil, water, and diet) are multiplied by media ingestion rates to estimate a background intake rate. In addition, background dust-lead concentrations in all other microenvironments outside the primary hazard standard environment are also included in the background intake estimate. Then, a range of candidate hazard standard levels are added to that background intake and used as input into a lead biokinetic model. By comparing background-only and background with the hazard standard, the incremental increase in blood lead level (BLL) and the associated intelligence quotient (IQ) change can be calculated.

Figure 3-1. Mechanistic Hazard Standard Framework



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As shown in Figure 3-1, the framework requires inputs for each exposure scenario:

1. Definition of the different microenvironments considered in the analysis,
2. The fraction of exposure from floor versus sill in the primary microenvironment,
3. A conversion equation to estimate lead concentration from lead loading,
4. Background media concentrations,
5. Media-specific exposure factors,
6. Time spent in the different microenvironments (primary versus all others),
7. Bioavailabilities of lead in different media,
8. Other BLL model biokinetic parameters,
9. A geometric standard deviation of BLL to account for population variations, and
10. Health outcome concentration-response relationships.

Inputs (1-9) were used with the Integrated Exposure Uptake Biokinetic (IEUBK) model to determine the BLL for each candidate hazard standard. In addition, distributions of input parameters will be used to estimate the overall distribution of BLL for each candidate hazard standard and for individuals within the affected population.

When interpreting the results of IEUBK modeling, it is important to recognize that the IEUBK was developed, calibrated and validated for site-specific risk assessments. The model and input parameters have been the subject of multiple Science Advisory Board (SAB) reviews, workshops and publications in the peer reviewed literature (Hogan et al., 1998; SAB, 1998; NAS, 2005). The Office of Pollution Prevention and Toxics (OPPT) determined that adjustments to the input parameters used for site-specific evaluations would be desirable to better reflect considerations specific to this rulemaking. These adjustments have not been a part of the technical and scientific reviews that have recommended the values employed in the IEUBK for site-specific evaluations (Hogan et al., 1998; SAB, 1998; NAS, 2005). OPPT's adjustments were based on peer-reviewed data sources such as EPA's Exposure Factors Handbook (EFH) and analysis for EPA's Office of Water (U.S. EPA, 2011; U.S. EPA, 2017a; U.S. EPA, 2017b; Zartarian et al. 2017).

The sections below discuss the equations used to generate inputs for the biokinetic model, the variable distributions estimated for each input, and how the biokinetic model was implemented. Model evaluation and results are then discussed in Section 5.

3.1 Equations Used to Estimate Lead Uptake

The IEUBK BLL model accepts inputs for media concentrations (dust, soil, water, and air), media-specific and age-specific ingestion rates/ventilation rates (dust, soil, water, and air), the age-specific daily lead intake from food, bioavailabilities for each media, uptake parameters, and some exposure factors (e.g., ratio of indoor and outdoor air concentrations and fraction of time spent outdoors). The model combines the above parameters to estimate the ingestion uptake and inhalation intake; then, internal (cannot be changed by the user) biokinetic variables and equations are used to estimate the time-dependent BLL from the uptake.

For the exposure scenarios developed for this hazard standard analysis, variables are combined to estimate the ingestion uptake from both background sources and the dust-lead levels in the primary microenvironment of interest (i.e., the residence for the residential hazard standard analysis). The equations below demonstrate how the variables in this analysis are combined to generate the uptake, where all equations involved converting concentrations to daily total

ingestion uptakes match those used in IEUBK and discussed in Zartarian et al. (2017). These uptakes are then used to generate the BLLs, as discussed in Section 3.3.

First, the floor and windowsill candidate hazard standards are combined to estimate a total average exposure loading in the primary microenvironment. These loadings are combined using a variable representing the fraction of a child's daily exposure from the floor relative to the window sill (see section 3.2 for variable values).

$$Average\ Dust\ Loading_{PRIMARY} = Dust\ Loading_{FLOOR} \times Fraction\ Exposure_{FLOOR} + Dust\ Loading_{SILL} \times (1 - Fraction\ Exposure_{FLOOR}) \quad \text{Equation 1}$$

Where:

Average Dust Loading$_{PRIMARY}$	=	The average dust-lead loading in the primary microenvironment accounting for exposure from both floors and windowsills (μg/ft^2)
Dust Loading$_{FLOOR}$	=	The dust-lead loading in the primary microenvironment on the floors (μg/ft^2)
Fraction Exposure$_{FLOOR}$	=	The fraction of exposure from floors (as opposed to windowsills) (unitless)
Dust Loading$_{SILL}$	=	The dust-lead loading in the primary microenvironment on the windowsills (μg/ft^2)

The hazard standard governs acceptable lead loadings in units of μg of lead per square foot of floor or sill. To estimate ingestion, two different approaches are available, as follows:

- **First considered approach (not adopted)**: Estimate the "dust factor" based on activity patterns; this method provides a multiplier in units of ft^2/day.

  $$Lead\ Ingestion = Dust\ Factor\ \times Lead\ Loading$$

  This method is activity-based and incorporates factors such as mouthing frequency, efficiency of saliva in extracting dust from the hand, etc. Published implementations of this method include Özkaynak et al. (2011) and Wilson et al. (2016).

- **Second considered approach (adopted):** Convert the dust-lead loading to a dust-lead concentration (average mass of lead per mass of dust). Then, multiply the concentration by a dust ingestion factor.

  $$Lead\ Concen = f(Lead\ Loading)$$

  $$Lead\ Ingestion = Dust\ Ingestion\ \times Lead\ Concen$$

  This method is empirically-based and derives an empirical relationship between lead loading and lead concentration. This method has historically been used in EPA lead rule makings (e.g., U.S. EPA (2007); U.S. EPA (2008a); U.S. EPA (2017a)).

For the hazard standard analysis, EPA chose to continue to use the empirically-based dust-lead loading to concentration conversion. This decision was based on the facts that:

- Many of the inputs for the dust factor method are highly uncertain; for example, the Wilson study method and an analysis based on the Özkaynak method give factors that differ by a factor of three to five.
- Dust ingestion rates have recently been reanalyzed and updated in the EFH (U.S. EPA, 2017) and represent up-to-date knowledge of these parameters.
- The loading to concentration method is consistent with other ongoing Agency rulemakings for lead.

Thus, the next three equations illustrate how the dust-lead loading is converted to a lead ingestion rate for dust. The dust-lead loading in the primary microenvironment is converted to a dust-lead concentration, the primary microenvironment and background dust-lead concentration are averaged together using the time spent in each, and the final average total concentration is multiplied by an age-specific dust-lead ingestion rate and the dust-lead bioavailability to give the total available intake. This language ("total available intake") matches language and equation used in the IEUBK (U.S. EPA, 1994)

$$\boldsymbol{Average\ Dust\ Concen_{PRIMARY} = exp(5.145 + 0.421 \times (\ln(Average\ Dust\ Loading_{PRIMARY}) - 0.881))}$$ Equation 2

Where:

Average Dust Concen$_{PRIMARY}$	=	The average dust-lead concentration in the primary microenvironment accounting for exposure from both floors and windowsills (μg/g)
Average Dust Loading$_{PRIMARY}$	=	The average dust-lead loading in the primary microenvironment accounting for exposure from both floors and windowsills (μg/ft^2)

$$\begin{aligned}\boldsymbol{Average\ Dust\ Concen_{TOTAL}} &\\ &\boldsymbol{= Average\ Dust\ Concen_{PRIMARY} \times Time\ Spent_{PRIMARY}}\\ &\boldsymbol{+ Background\ Dust\ Concen_{OTHER} \times (1 - Time\ Spent_{PRIMARY})}\end{aligned}$$ Equation 3

Where:

Average Dust Concen$_{TOTAL}$	=	The average dust-lead concentration across all microenvironments accounting for time spent in each microenvironment (μg/g)
Average Dust Concen$_{PRIMARY}$	=	The average dust-lead concentration in the primary microenvironment accounting for exposure from both floors and windowsills (μg/g)
Time Spent$_{PRIMARY}$	=	The fraction of time spent in the primary microenvironment (unitless)
Background Dust Concen$_{OTHER}$	=	Background dust-lead concentration in the other microenvironments (μg/g)

$$\textbf{Available Intake}_{DUST} = \textbf{Average Dust Concen}_{TOTAL} \times \textbf{Ingestion Rate}_{DUST} \times \textbf{Bioavailability}_{DUST}$$ Equation 4

Where:

Available Intake$_{DUST}$	=	The amount of lead ingested per day in dust and available for uptake (µg/day)
Average Dust Concen$_{TOTAL}$	=	The average dust-lead concentration across all microenvironments accounting for time spent in each microenvironment (µg/g)
Ingestion Rate$_{DUST}$	=	Age-specific dust ingestion rate (g/day)
Bioavailability$_{DUST}$	=	Fraction of ingested lead in dust that is available for uptake (unitless)

Next, the available intake for the other ingestion pathways from background sources are estimated by again multiplying the concentration by the media- and age-specific ingestion rate and the media-specific bioavailability. To match conventions in IEUBK, the dietary intake is provided as a variable rather than the separate food concentrations and dietary intake rates.

$$\textbf{Available Intake}_{SOIL} = \textbf{Background Concen}_{SOIL} \times \textbf{Ingestion Rate}_{SOIL} \times \textbf{Bioavailability}_{SOIL}$$ Equation 5

Where:

Available Intake$_{SOIL}$	=	The amount of lead ingested per day in soil and available for uptake (µg/day)
Background Concen$_{SOIL}$	=	The vintage-specific background soil concentration (µg/g)
Ingestion Rate$_{SOIL}$	=	Age-specific soil ingestion rate (g/day)
Bioavailability$_{SOIL}$	=	Fraction of ingested lead in soil that is available for uptake (unitless)

$$\textbf{Available Intake}_{WATER} = \textbf{Background Concen}_{WATER} \times \textbf{Ingestion Rate}_{WATER} \times \textbf{Bioavailability}_{WATER}$$ Equation 6

Where:

Available Intake$_{WATER}$	=	The amount of lead ingested per day in water and available for uptake (µg/day)
Background Concen$_{WATER}$	=	The background water concentration (µg/g)
Ingestion Rate$_{WATER}$	=	Age-specific water ingestion rate (g/day)
Bioavailability$_{WATER}$	=	Fraction of ingested lead in water that is available for uptake (unitless)

$$Available\ Intake_{DIET} = Lead\ Intake\ Rate_{DIET} \times Bioavailability_{DIET}$$ Equation 7

Where:

$Available\ Intake_{DIET}$	=	The amount of lead ingested per day in diet and available for uptake (µg/day)
$Lead\ Intake\ Rate_{DIET}$	=	The intake rate of lead in the diet (µg/day)
$Bioavailability_{DIET}$	=	Fraction of ingested lead in diet that is available for uptake (unitless)

The total ingestion intake is found by adding together the available intake from each pathway.

$$\boldsymbol{Available\ Intake_{TOTAL} = Available\ Intake_{DUST} + Available\ Intake_{SOIL} + Available\ Intake_{WATER} + Available\ Intake_{DIET}}$$ Equation 8

Where:

$Available\ Intake_{TOTAL}$	=	Total amount of lead ingested per day across all pathways (µg/day)
$Available\ Intake_{DUST}$	=	The amount of lead ingested per day in dust and available for uptake (µg/day)
$Available\ Intake_{SOIL}$	=	The amount of lead ingested per day in soil and available for uptake (µg/day)
$Available\ Intake_{WATER}$	=	The amount of lead ingested per day in water and available for uptake (µg/day)
$Available\ Intake_{DIET}$	=	The amount of lead ingested per day in diet and available for uptake (µg/day)

Finally, the uptake is calculated in the same manner as in the IEUBK model. The technical support document U.S. EPA (1994) states:

> "In the absence of saturation effects, total lead absorption is equal to the sum of media specific absorption values where absorption from each media is equal to the intake rate multiplied by the absorption fraction for that media…To more accurately model lead uptake at higher intake rates, the absorption fractions must be modified so as to separate their non-saturable and saturable components…Lead uptake by the passive pathway is assumed to be linearly proportional to intake at all dose levels. The user parameter PAF is the fraction of the total net absorption at low intake rates that is attributable to non-saturable processes. Specifically, the lead uptake by the passive pathway is equal to PAF × AVINTAKE(t). We have assumed that the fraction of absorbed lead intake that is absorbed by non-saturable processes is the same for all media. At low doses, the quantity of lead absorbed by the saturable pathway is: (1-PAF) × AVINTAKE(t). However, at higher doses, only a certain fraction of this amount will be absorbed. The equation for a rectangular hyperbola (familiar from biochemistry as the functional form applied with Michaelis Menton enzyme kinetics) is used to represent saturable pathway absorption. The key parameter in this relationship is SATINTAKE(t), which represents the level of available intake (AVINTAKE) at which the saturable pathway uptake reaches half

of its maximum value. This half-saturation parameter depends on the age t of the children." (U.S. EPA, 1994).

The term SATINTAKE(T) varies with age and the model was developed to allow the user to set the value at age 2 (SATINTAKE24). The remaining ages are calculated using an internal equation that scales SATINTAKE24 by the body weight at the other ages. The equation for other ages is given indirectly in the IEUBK Technical Support Document using information on pp. A-6 (Eq U-3), A-12 (Eq B-5f), and B-13 (descriptions of SATINTAKE(t) and SATINTAKE24.

This equation for saturable uptake is implemented using the IEUBK defaults of 0.2 for the passive fraction and 100 µg/day as the available intake where saturable uptake reaches half of its maximum value for a two year old (SATINTAKE24):

$$\boldsymbol{Uptake_{TOTAL} = PAF \times Available\ Intake_{TOTAL} + (1 - PAF) \times Available\ Intake_{TOTAL}/(1 + Available\ Intake_{TOTAL}/SATINTAKE(T))}$$

Equation 9

$$\boldsymbol{SATINTAKE(T) = \frac{SATINTAKE24 \times \left[\left(\frac{8.375}{1 + e^{-(AGE-3.8)/3.6}}\right) + \left(\frac{17.261}{1 + e^{-(AGE-48.75)/20.63}}\right)\right]}{12.34087}}$$

Where:

$Uptake_{TOTAL}$	=	Total amount of lead absorbed into the blood stream (µg/day)
Available $Intake_{TOTAL}$	=	Total amount of lead ingested per day across all pathways (µg/day)
PAF	=	Fraction of absorption due to passive (non-saturable) processes
SATINTAKE(T)	=	The age-dependent available intake at which the saturable pathway uptake reaches half of its maximum value (µg/day)
SATINTAKE24	=	The available intake for a two year old at which the saturable pathway uptake reaches half of its maximum value (µg /day)
AGE	=	Age (months)

For the inhalation pathway, a background air concentration is multiplied by an age-specific ventilation rate to get the total inhaled dose.

$$\boldsymbol{Inhaled\ Dose = Background\ Concen_{AIR} \times Lead\ Ventilation\ Rate \times Lung\ Absorption}$$

Equation 10

Where:

Inhaled Dose	=	The amount of lead inhaled per day (µg/day)
Background $Concen_{AIR}$	=	The intake rate of lead in the diet (µg/m^3)
Lead Ventilation Rate	=	Age-specific ventilation rate (m^3/day)
Lung Absorption	=	Absorption fraction (unitless), set equal to 0.32

3.2 Exposure Scenarios and Input Variables

Using the above equations, exposure scenarios and input variable values were calculated for the hazard standard analysis. Model inputs were chosen after consultation with multiple offices within EPA and values were selected that best supported this rulemaking. For example, because of the dust focus for this analysis, the updated dust and soil ingestion rates from the updated EFH was favored (U.S. EPA, 2017b). In addition, because this analysis considers changes in larger subpopulations and population groups (and not, for example, site-specific assessments), care was taken to select background concentrations that best represented these broader populations. Different options were investigated, and a comparison with pooled 2005-2010 and 2009-2016 national-level National Health and Nutrition Examination Survey (NHANES) BLL data was used to inform the choice in input parameters (see Figure 6-3). Note: different modeling inputs may be used by other offices to support estimating exposures unique to populations considered in their regulatory or non-regulatory analyses.

Because of the lognormal distributions of the input data, it was most appropriate to use the geometric means for use in the IEUBK-based modeling approaches. This approach differs from the initial evaluation and calibration of the IEUBK model, which relied on arithmetic mean input values. The IEUBK model results using geometric mean inputs are intended for the purpose of estimating BLL for this rulemaking and may not be applicable to other analyses that use the IEUBK model. The selection of the geometric mean for exposure rate inputs (water ingestion, soil and dust ingestion, and dietary intake) in this draft report should not be construed as a recommendation for their general usage as an input parameter in the IEUBK model.

3.2.1 Identification of Microenvironments and Exposure Scenarios for Dust/Soil Exposure

To analyze BLL impacts of the dust-lead standards, exposure scenarios were used that included only those microenvironments that (1) account for a significant proportion of children's total lead intake, based on analyses discussed in U.S. EPA (2006a), (2) for which exposure data were available, and (3) that are relevant to the impacts evaluation of the hazard standards.

Two microenvironments meeting these requirements were included in the children's exposure scenarios: (1) residence (indoor dust, with the surrounding background-exposure related to outdoor soil) and (2) non-residence, including child-occupied facilities (indoor dust, with the surrounding background-exposure related to outdoor soil). Although background lead exposure can occur in other settings (e.g., inside vehicles), more complex scenarios were not evaluated owing to the relative uncertainty in exposure estimates in other microenvironments and in the time spent in each.

To further capture variability across the affected populations, each primary microenvironment was assumed to have a range of different housing vintages; this variable affected the soil concentrations used for that scenario. The affected population is in Pre-1978 housing; the population was divided into bins "Pre-1940", "1940-1978", and "Pre-1978" (Pre-1940 and 1940-1977 together). Table 3-1 summarizes the scenarios chosen.

ED_001863D_00006892-00047

Table 3-1. Summary of Scenarios Identified for Analysis

Primary Microenvironment	Background Microenvironment (dust)	Vintage of Building	Floor/Sill Combinations
Residence	Other, Including Child-Occupied Facilities	Pre-1940	17 including current background
Residence	Other, Including Child-Occupied Facilities	1940-1977	17 including current background
Residence	Other, Including Child-Occupied Facilities	Pre-1978	17 including current background
Child-Occupied Facilities	Residence	Pre-1940	17 including current background
Child-Occupied Facilities	Residence	1940-1977	17 including current background
Child-Occupied Facilities	Residence	Pre-1978	17 including current background

3.2.2 Selection of Ages

The different scenarios were run for children between the ages of 0 and 7. Several considerations for interpreting those results:

- Seven years old was selected as the upper bound because it is the upper bound of the ages that can be simulated in the current version of IEUBK and is broadly consistent with the age when neurocognitive effects have been seen in epidemiological studies (see Section 5.1).

- The Toxic Substances Control Act (TSCA) Title IV applies to both residences and child-occupied facilities (COFs). The official definition of a COF is: "a building, or portion of a building, constructed prior to 1978, visited regularly by the same child, under 6 years of age, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours." Thus, the selected age range covers the definition of the COF.

- BLL tends to be highest for children around the age of two, in part because ingestion of soil and dust-lead tends to be highest at that age. Thus, BLL at age two is particularly relevant when considering BLL metrics.

- IQ studies, and in particular the Lanphear pooled analysis (Lanphear et al., 2005), measures BLL through time but administers the IQ test between the ages of five and seven (or up to age 10). Thus, BLL between age five and seven are particularly relevant when considering IQ metrics.

3.2.3 Relative Contributions of Floor and Window Sill Dust-lead to Lead Exposures

Little evidence is available concerning the relative contribution of sill and floor dust-lead to total dust-lead exposure. The issue is complicated by the expected relationships among age,

behavioral variables, dust exposure patterns, and the potential correlation between sill and floor lead loading. Because empirical and biokinetic models generally support that toddlers (children less than 3 years old) are most sensitive to BLL impacts of dust-lead exposure based on considerations of approximate relative response to changes in dust-lead exposure, direct exposure to sill dust-lead might not be expected to be an important source of exposure for this group. To the extent that window sill dust-lead acts as a source of highly contaminated dust that is subsequently transported to floors, however, its indirect impact on total exposures might not be negligible. Several studies (Lanphear et al. 1995, Lanphear and Roghmann 1997) have found correlations (R > 0.2) between window sill dust-lead and children's BLLs. While the magnitudes of these correlations suggest that the contribution of window sill dust-lead to BLL may vary, these studies displayed unadjusted coefficients of correlation that did not take into account other sources of lead, including floor dust that would also be strongly correlated with BLL and with window sill dust.

Owing to a relative lack of data about the exposure from floors versus windowsills, an empirically-driven approach was used. The EPA re-analysis of the NHANES data which is linear in ln(floor) and ln(sill) (see Section 4.3) was used to generate estimates of BLL for different floor/sill combinations. Then the mechanistic model described throughout this section (Section 3) was also used to estimate the BLL for the same floor and sill combinations, using the "Pre-1978" residential parameters.

Table 3-2. shows the empirical predictions as a function of the mechanistic predictions of BLL (dark dots). For reference, the 1:1 line is shown as a heavy dark line. If the mechanistic and empirical predictions perfectly matched, all points would lie on the 1:1 line. Instead, a linear regression through those points has a slope of 1.69. The NHANES empirical data were collected in 1999-2004 when BLLs owing to background concentrations were higher than today. Because the BLL empirical relationship is a function of the natural log of the floor loading/sill loading, this suggests that the U.S. population BLLs may be lower than the 1999-2004 population by a constant multiplicative factor[1]. Thus, the light dots show the empirical versus mechanistic predictions when divided by the slope of the first regression line (1.69). Now, the points have the same slope as the 1:1 line; any small remaining intercept represents continued discrepancies between the mechanistic and empirical data.

These adjusted values were then created for a variety of *Fraction floor* assumptions. In each case, the mean squared error between the empirical and mechanistic estimates was calculated. The *Fraction floor* variable was set to the value that minimized the mean squared error, or 0.96. Figure 3-2 shows the adjusted data points for the selected value (0.96) compared with an alternate value (0.80).

This process was repeated for the upper and lower confidence limits of the empirical predictions to get the lower (0.91) and upper (0.98) limits of the ratio. A triangular distribution was used in the probabilistic analysis to represent the variability. The distribution is shown in Table 3-2.

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[1] The empirical relationship is modeled as:

$$blood\ lead = \mathrm{a} \times \ln(floor) + b \times \ln(sill) + c$$

Figure 3-2. Comparison of Mechanistic and Empirical BLL With Different Assumptions about Fraction of Exposure from Floor Versus Sill

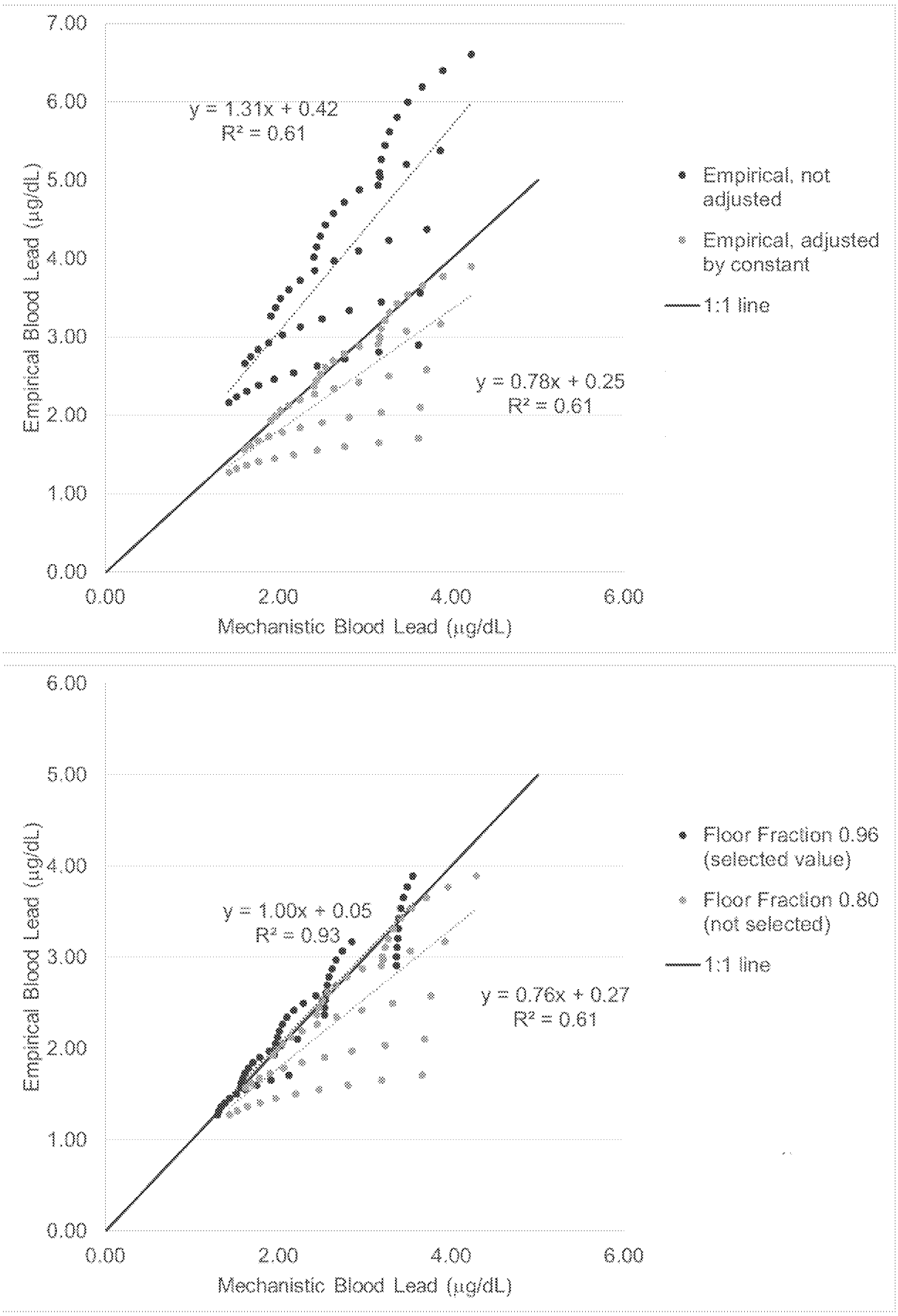


Table 3-2. Summary of Fraction of Exposure from Floor Distribution

	Units	Distribution Type	Lower Limit	Central Tendency	Upper Limit	Used for Median Analysis	Used for Mean Analysis
Fraction Exposure$_{FLOOR}$	unitless	Triangular	0.91	0.96	0.98	0.96	0.96

3.2.4 Conversion Equation to Estimate Dust-lead Concentration from Dust-lead Loading

The indoor dust model provides an estimate of the lead loading in terms of mass of lead per square foot of floor. However, the selected biokinetic BLL model requires lead concentrations, or the amount of lead per mass of ingested dust.

EPA previously analyzed the available evidence on the relationship between dust-lead loading statistics and dust-lead concentrations and developed an empirical approach that uses a regression relationship between dust-lead loading and dust-lead concentration measurements (U.S. EPA, 2008a). A log-log model was fitted to data from the U.S. Department of Housing and Urban Development's (HUD's) National Survey of Lead-Based Paint in Housing ("HUD Survey Data"), which are provided in Appendix C-1 of EPA's risk assessment for TSCA Appendix 403 (U.S. EPA, 1998a). This type of relationship was used by the Lead National Ambient Air Quality Standards (NAAQS) review and the Office of Water Lead and Copper Rule (LCR) analysis.

EPA searched for additional data sources to supplement the HUD Survey Data. There were two goals of identifying additional data sources. The first was to determine if other data sources showed a similar relationship between dust-lead loading and concentration, further supporting use of this approach. The second was to increase the overall sample size and improve the overall fit of the regression.

EPA notes that phase 2 of the American Healthy Homes Survey is underway and this study is also planning to collect dust-lead loading and dust-lead concentration information from 800 homes. EPA plans to incorporate this data if available, along with information from any other available studies, to refine its loading to concentration conversion approach.

Three data sources were pooled together to develop a more robust loading to concentration relationship.

1. The HUD Survey data measured floor dust-lead loadings based on vacuum samples and used an empirical equation to estimate the associated wipe loadings. It is anticipated that the wipe samples better capture the total lead present in the home; the vacuum samples are subject to vacuum collection efficiencies. Thus, the estimated wipe lead loadings were paired with the Blue Nozzle lead concentrations at each home to develop the loading-to-concentration statistical relationship.

Table 3-3. Statistics for HUD Survey Data

Statistic	Loading (µg/ft^2)	Concentration (µg/g)
Average	19.48	520
Min	0.51	0.09
Max	375	50,400
50th percentile	6.35	190

2. A study by Adgate et al. (1995) examined the relationship between dust-lead loading, lead loading, and lead concentration in house dust in 216 homes in Jersey City, New Jersey. The total sample size was 444 data points. The data points from the scatterplot in Figure 7A were digitized using the GetData®; because some of the data points were located on top of each other, only 312 of the 444 data points were captured during the digitization. Wipe samples were collected for lead loadings and were compared to dust-lead concentrations collected by a vacuum cleaner from wall to wall carpet and area rugs greater than 48 square feet. The total amount of dust-lead was adjusted for vacuum collection efficiency using an algorithm developed by Wang et al. (1995).

Table 3-4. Statistics for Adgate data

Statistic	Loading (µg/ft^2)	Concentration (µg/g)
Average	96.34	1,004.65
Min	0.38	18.64
Max	9,626.97	33,113.4
50th percentile	22.32	468.69

3. The Canadian House Dust Study (CHDS; Rasmussen et al. 2013) collected dust-lead samples from 1,025 homes across 13 cities and was designed to estimate nationally representative urban house dust metal concentrations and metal loadings. Trained technicians followed a vacuum sampling protocol to collect a composite sample of active dust from all dry living areas of each house. Participants were instructed not to clean for at least one week prior to sample collection. Fine (<80 µm) and coarse (80–300 µm) particle size fractions were collected and were combined to calculate loading values based on: measurements of the area sampled, dust mass, dust-lead concentration, and time elapsed since cleaning (details in Rasmussen et al., 2013). As area measurements were not available for three houses, the overall sample size for the loading calculation was 1,022.

Table 3-5. Statistics for the Canadian House Dust Study

Statistic	Loading (µg/ft^2)	Concentration (µg/g)
Average	2.88	210
Min	0.019	14.2
Max	89.4	7,800
50th percentile	2.02	137

These three data sources were pooled together and an outlier analysis was conducted. Three outliers were detected and excluded from the pooled sample by plotting percentiles in log-space and finding ln(concentration) values that were higher and lower than the bulk of the data (>20,000 µg/g (2 points) and < 0.1 µg/g (1 point)) resulting in an overall sample size of 1,643. The summary statistics for the pooled data set are provided below in Table 3-6.

Table 3-6. Statistics for the Pooled Data Set

Statistic	Loading (µg/ft^2)	Concentration (µg/g)
Average	22.86	370.10
Min	0.019	2.01
Max	9,626.9	14,935.96
50th percentile	2.02	137

From the raw data, each loading and concentration was transformed by taking the natural log, and the average of the natural log of the loadings across all data points was subtracted from each loading. The latter step re-centers the data and makes the estimated slope and intercept uncorrelated. A regression was performed on these data using the add-on Regression function in Excel® to calculate a predictive distribution as detailed in Qian (2010). The regression was used to calculate the degrees of freedom, slope, intercept, error variance, and estimated standard deviation of the slope and intercept using the following regression equation:

$$\ln(Conc) = Intercept + Slope * (\text{Adj } \ln(Load)) + ErrorVariance$$

$$\text{where: Adj } \ln(Load)) = \ln(Load) - \text{Average}(\ln(Load))$$

The regression modeling treated the lead data as a simple random sample and did not take the survey weights and survey design in the HUD Survey Data into account. Each individual measurement is assumed to give equal information about the relationship between loading and concentration. The results of the regression modeling are presented below in Table 3-7.

Table 3-7. Regression Results for Loading-Concentration Conversion

Parameter	Value
Degrees of Freedom	1641
Intercept	5.145
Slope	0.421
Error variance	0.544
Estimated standard deviation (standard error) of intercept	0.018
Estimated standard deviation (standard error) of slope	0.009
R^2	0.55

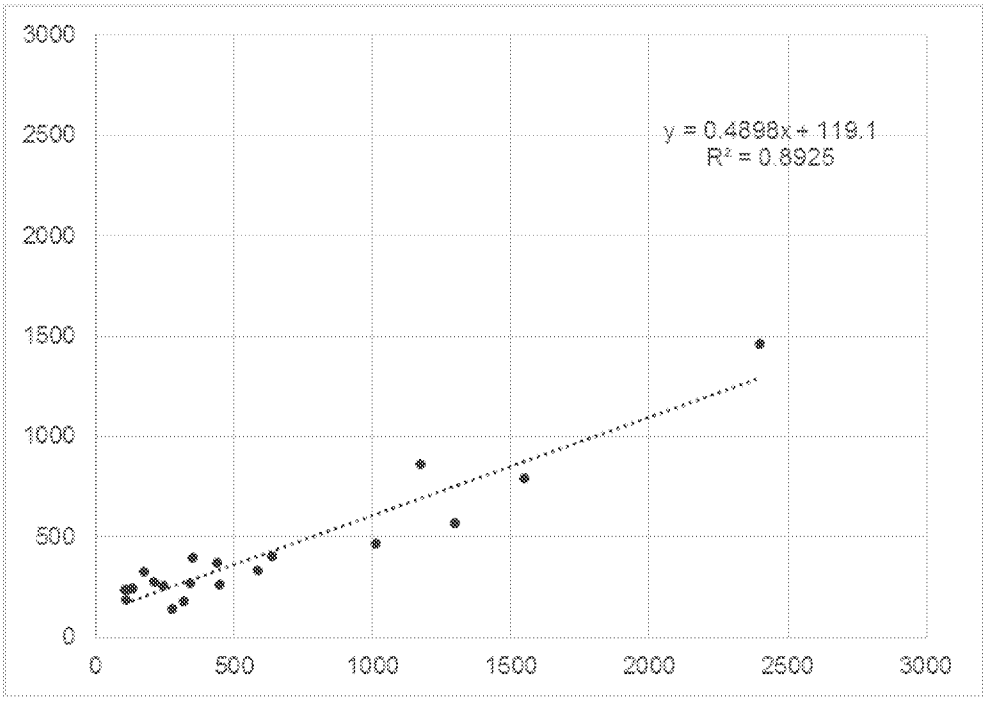
The error variance term represents the true variability around the regression line, which captures the reality that a ln(*Load*) can be associated with a range of ln(*Conc*). Because the regression is calculated using 1643 concentration and loading data pairs, there is some uncertainty in the predicted intercept and slope, captured as the estimated standard deviation, or standard error, of the intercept and slope. However, both of these values were reduced when using the larger pooled data set when compared to using the HUD Survey Data alone. The standard error of the intercept was reduced from 0.04 to 0.018, the standard error of the slope was reduced from 0.05 to 0.009, and the R Square was improved from 0.465 to 0.55.

EPA identified additional data sources (shown in Table 3-8), independent from the three sources identified above. The data sources below reported various summary statistics for both dust-lead loading and dust-lead concentration, but did not report raw data. The loading to concentration conversion was used to evaluate how well the conversion compared with reported dust-lead concentrations, as shown in Figure 3-3. There was general agreement between estimated and reported concentrations. There was no overall bias found; the loading to concentration conversion both over and under-predicted dust lead concentrations. This dataset was also used to explore which confidence interval could be used for this parameter in the probabilistic analysis. A confidence interval of +/- 25% ensured that 20 data points across 16 studies were all within the prediction interval. A smaller confidence interval such as +/-10% resulted in fewer studies within the predicted interval. Larger confidence intervals such as +/-45% resulted in very large ranges of concentrations for a single loading.

Table 3-8. Comparison of Loading to Concentration Conversion with Independent Summary-level data

Study Name	Interior Dust-lead loading (µg/ft^2)	Interior Dust-lead Concentration (µg/g)	Converted Dust-lead Loading to Concen. using equation	Lower and Upper 25/75 Confidence Interval)
(1) Bingham Creek UT, 1992, reported in Gulson et al. (2018)	2.87	110	185	79 to 431
(2) Butte, MT 1989, , reported in Gulson et al. (2018)	6.59	451	262	112 to 611
(3) Cincinnati child study 1981-1985, reported in Gulson et al. (2018)	90.67	1548	790	338 to 1846
(4) Cincinnati soil lead study, reported in Gulson et al. (2018)	6.96	344	268	115 to 625
(5) Clark et al. (1996)	6.21	244	255	109 to 596
(6a) Clayton et al. (1999) NHEXAS (95th)	110.4	1176	858	367 to 2005
(6b) Clayton et al. (1999) NHEXAS (97.5th)	391.6	2398	1462	625 to 3420
(6c) Clayton et al. (1999) NHEXAS (Geometric mean)	5.2	114	237	101 to 553
(6d) Clayton et al. (1999) NHEXAS (Median)	5.5	132.8	243	104 to 566
(7) U.S. EPA (1998a) Baltimore R&M (Geometric mean)	40.9	1300	565	242 to 1323
(8) U.S. EPA (1998a) Rochester Lead in Dust (Geometric mean)	17.7	351	397	170 to 929
(9) Leadville, CO 1991, reported in Gulson et al. (2018)	18.11	638	401	172 to 936
(10) Magna UT 1994, reported in Gulson et al. (2018)	10.77	178	322	138 to 752
(11) Midvale, UT 1989, reported in Gulson et al. (2018)	14.95	438	370	158 to 863
(12) Palmerton, PA 1994, reported in Gulson et al. (2018)	11.33	589	329	141 to 768
(13a) Piacitelli et al. (1997) (average across all)	2.58	319	176	76 to 412
(13b) Piacitelli et al. (1997) (GM across all)	1.42	278	137	59 to 320
(14) Sandy, UT 1994, reported in Gulson et al. (2018)	7.43	212	275	118 to 643
(15) Taril B.C. 1992, reported in Gulson et al. (2018)	26.01	1014	467	200 to 1090
(16) Zota et al. (2011) (average)	5	109	233	100 to 544

Figure 3-3. Comparison of Estimated and Reported Dust-lead Concentrations when evaluating the Loading to Concentration conversion



3.2.5 Media Background Concentrations: Dust

For residences, the background dust-lead loading values were estimated using AHHS conducted in 2005-2006 (AHHS) (HUD, 2011). AHHS is a follow-up to the National Survey of Lead and Allergens in Housing (NSLAH) (HUD, 2002); NSLAH was conducted from 1997 through 2000 and monitored dust-lead levels in homes; these dust-lead levels are likely higher than current dust-lead levels. These data were favored over other sources (e.g., NHANES and data from the open literature) because the AHHS raw survey data with building vintage data were available. Different background dust-lead distributions could be developed for each building vintage and exposure scenario. This data source was also used by Zartarian et al. (2017) and the work for the ongoing Office of Water for the LCR (U.S. EPA, 2017a).

The raw survey data were obtained from Quantech (the contractor working with the AHHS survey) and had previously been adjusted to estimate values below the limit of detection using a distribution. In the SAS files obtained, some of these adjusted values were below zero because these files had been created for a different purpose; the values below zero were updated to an overall lower limit of 0.05 $\mu g/ft^2$. The adjusted non-detect values reflect the overall distribution of the data; thus, this value was chosen so the majority of the points continue to reflect that distribution but none are negative. Then, the geometric mean and geometric standard deviation across the dataset was estimated in the SAS software package, utilizing the sample weights in the data so that the estimates were nationally representative. Finally, the loading values were converted to concentrations using the loading-to-concentration conversion in Section 3.2.4.

Background values of dust-lead are needed in COF for the residential scenario; children are assumed to be in COFs when not in the residence. Little information is available about the levels of lead in dust in COFs. A literature search was conducted but few sources were found. The data source found was the First National Health Survey of Child Care Centers (hereafter the CCC Data; Westat, 2003). The survey provides information on the geometric mean and geometric standard deviation from 336 samples of lead floor loading. As with the residences data, the loading values were converted to concentrations using the loading-to-concentration conversion in Section 3.2.4.

The final central tendency values are shown in Table 3-9. For the background dust variables, only a nationally-representative central tendency value was used for the probabilistic analysis.

Table 3-9. Summary of Background Dust-lead Concentrations

Microenviron.	Median Background Concen (µg/g)	Mean Background Concen (µg/g)
Residences	101.2	164.0
COFs	107.8	175.9

3.2.6 Media Background Concentrations: Soil

Background soil values were estimated using the AHHS data (HUD, 2011). The data were first processed to include the play equipment and main yard measurements; data in these yard locations at the same home were averaged to create yard-wide average estimates. Building vintages were assigned to each home using the AHHS year built field and the survey comment fields (e.g., "Sometime before 1930" was assigned to the Pre-1940 vintage). Homes built after 1977 were excluded from the analysis, per the definition of the analysis sub-population (see Section 2.2.2). Finally, the geometric means and geometric standard deviations were estimated, incorporating survey weights to create nationally-representative values, as shown in Table 3-10

Table 3-10. Summary of Background Soil-lead Concentrations

Vintage, All Microenvironments	Geometric Mean Background Concen (µg/g)	Geometric Standard Deviation (unitless)	Median Background Concen	Mean Background Concen
Pre-1940	113.4	3.58	113.4	246.8
1940-1977	28.6	2.9	28.6	50.0
Pre-1978	26.3	3.8	26.3	64.1

3.2.7 Media Background Concentrations: Water

Background drinking water concentrations were taken from the Supplemental Information from Zartarian et al. (2017), which in turn analyzed the EPA's Office of Water data from Second Six-year Review National Compliance Monitoring Information Collection Request (ICR) Dataset

(U.S. EPA, 2010a). The proposed updated values for the IEUBK model also use this data source. As Zartarian et al. state,

> "this "Six-Year Review 2 ICR Dataset" was collected through an Information Collection Request to all States and primacy entities to voluntarily submit their Safe Drinking Water Act (SDWA) compliance monitoring data collected between 1/1998 and 12/2005 for regulated contaminants (see USEPA, 2009). These data represent the national occurrence of regulated contaminants in public drinking water systems. They may not reflect water systems or homes with lead service lines. The average, 95th percentile and 99th percentile values from this data set are 0.89, 2.25 and 13.27 μg/L, respectively."

These data represent the most recent publicly-available data and may reflect higher values than current lead levels. The mean and 95th percentile were used to estimate the geometric mean and geometric standard deviation using the following process:

- Make an initial estimate of the geometric mean (GM) and geometric standard deviation (GSD)
- Estimate the summed squared error between the mean values (actual and predicted) and 95th percentiles (actual and predicted)
- Use Excel's Solver function to change the GM and GSD until the error is minimized.

This yielded a median of 0.69 μg/L and a geometric mean of 2.1. The distribution is shown in Table 3-11. Because of the relative uncertainty in these estimates, values were rounded to 1 μg/L (one significant digit) for the modeling. Newer six-year review monitoring data is still being evaluated.

Table 3-11. Summary of Background Concentrations for Water

Geometric Mean Background Concen (μg/L)	Geometric Standard Deviation (unitless)	Median Backgrnd. Concen (μg/L)	Mean Backgrnd. Concen (μg/L)
0.69	2.1	0.69 (value of 1 used for modeling)	0.89 (value of 1 used for modeling)

3.2.8 Media Background Concentrations: Air

The outdoor air lead concentration was set to 0.01 μg/m^3. This value is the same as that used by the analysis for the LCR (U.S. EPA, 2017a). They state this value:

> "is based on data presented in a 2013 EPA memorandum that summarizes air lead concentration data on 50 urban sites with populations of more than 500,000 people (Cavender, 2013). Outdoor lead monitoring occurred in these sites on a continuous basis in 2013 to comply with an air monitoring requirement of the National Ambient Air Quality Standards (NAAQS). In these 50 sites, the average of the highest rolling 3-month average for all of the monitoring sites was 0.01 μg/m^3."

This variable was used for the deterministic analysis; for the probabilistic analysis, the air pathway was not retained owing to a relative lack of sensitivity to this pathway, as described in Section 5. The value is summarized in Table 3-12. Of note is the fact that air exposure is incorporated using the inhalation pathway only. Additional effects of air exposure, including effects of deposition on both soil and dust, are incorporated through the dust and soil pathways.

Table 3-12. Summary of Background Air Concentrations

Geometric Mean Background Concen (μg/m³)	Used for Mean Analysis (μg/m³)	Used for Median Analysis (μg/m³)
0.01	0.01	0.01

3.2.9 Media Background Concentrations: Summary

Table 3-13 summarizes the variables discussed above to provide the background concentrations in a single table. Following the conventions of the IEUBK model, the dietary contributions are expressed as intake and are in the exposure-factors table.

Table 3-13. Summary of Distributions of Background Concentrations for All Media

Variable	Units	Dist. Type	Residential Analysis		COF Analysis		Data Source
			GM	GSD	GM	GSD	
Background Concen$_{DUST,}$ Residence	μg/g	Lognorm.	Varies		101.2	N/A	COF: Childcare Center Survey (Westat, 2003)
Background Concen$_{DUST,}$ Child-Occupied Facility	μg/g	Lognorm.	107.8	N/A	Varies		Residence: AHHS Survey (HUD, 2011)
Background Concen$_{SOIL}$, Pre-1940	μg/g	Lognorm.	113.4	3.58	113.4	3.58	AHHS (HUD, 2011)
Background Concen$_{SOIL}$, 1940-1977	μg/g	Lognorm.	28.6	2.9	28.6	2.9	AHHS (HUD, 2011)
Background Concen$_{SOIL}$, Pre-1978	μg/g	Lognorm.	26.3	3.8	26.3	3.8	AHHS (HUD, 2011)
Background Concen$_{WATER}$	μg/L	Lognorm.	0.69	2.1	0.69	2.1	Zartarian et al. (2017)
Background Concen$_{AIR}$	μg/m³	None	0.01	N/A	0.01	N/A	Air Quality System (AQS; U.S. EPA, 2017a)

3.2.10 Correlations Between Media Concentrations

Correlations between media concentrations were implemented in the probabilistic model. The correlation between floor and windowsill loading was estimated using the AHHS data (HUD, 2011). The correlations between total dust-lead concentration and water and soil concentrations were taken from Zartarian et al. (2017) which were themselves taken from the National Human Exposure Assessment Survey (NHEXAS) data (dust-lead concentrations and water concentrations) as reported in Clayton et al. (1999) and based on analysis of the AHHS data (dust-lead concentrations and soil concentrations. The values of 0.2 for dust-water and 0.48 for dust-soil were retained.

The implementation of these correlations is discussed in Section 3.3.

3.2.11 Media-Specific Exposure Factors

In general, media-specific ingestion rates and ventilation rates were all taken from the EPA EFH (U.S. EPA, 2011; U.S. EPA, 2017b). To estimate the GM and GSD, the following assumptions were made:

- The central tendency and upper percentile dust/soil ingestion values represent the median and 95th percentile, respectively.
- The total dust and soil ingestion rates were used and an assumed 55% dust fraction was assumed (U.S. EPA, 1994).
- Values for age 0 to 1 are the weighted average of values for age groups within that bin where applicable.
- The approach used to estimate the water concentration distribution can also be used for the ingestion/ventilation rates:
    - Make an initial estimate of the GM and GSD
    - Estimate the summed squared error between the mean/median values (actual and predicted) and 95th percentiles (actual and predicted)
    - Use Excel's Solver function to change the GM and GSD until the error is minimized.

The values are summarized below in Table 3-14.

The food intakes were taken from a reanalysis done for the LCR analysis (U.S. EPA, 2017a) and Zartarian et al. (2017). The values were taken directly from the LCR report. Of note is the fact that these dietary estimates include the lead in commercial foods and those that specify water in the official recipe but not the lead potentially added to food cooked using the local tap water (e.g. potatoes cooked in water at home with discard of the cooking water prior to serving).

Baseline scenarios for the biokinetic modeling included contributions from diet, water, and ambient air exposures, in addition to soil and dust. However, because the background exposures vary considerably across the population, there is uncertainty associated with central-tendency vs. distributional estimates of non-dust exposures when estimating total BLL due to correlation and co-occurrence of exposures.

Table 3-14. Summary of Media- and Age-specific Ingestion Rates and Intake Rates (Diet)

Variable	Age Range	Units	Distr.	GM	GSD	Used in Median Analysis	Used in Mean Analysis	Data Source
Ingestion Rate$_{DUST}$	0 to <1	g/day	Lognorm.	0.03	1.84	0.030	0.04	Exposure Factors Handbook (U.S. EPA, 2017b)
	1 to <2			0.05	1.63	0.050	0.06	
	2 to <3			0.033	2.08	0.033	0.04	
	3 to <4			0.033	2.08	0.033	0.04	
	4 to <5			0.033	2.08	0.033	0.04	
	5 to <6			0.033	2.08	0.033	0.04	
	6 to <7			0.033	2.08	0.033	0.04	
Ingestion Rate$_{SOIL}$	0 to <1	g/day	Lognorm.	0.025	1.84	0.025	0.03	Exposure Factors Handbook (U.S. EPA, 2017b)
	1 to <2			0.041	1.63	0.041	0.05	
	2 to <3			0.027	2.08	0.027	0.04	
	3 to <4			0.027	2.08	0.027	0.04	
	4 to <5			0.027	2.08	0.027	0.04	
	5 to <6			0.027	2.08	0.027	0.04	
	6 to <7			0.027	2.08	0.027	0.04	
Ingestion Rate$_{WATER}$	0 to <1	L/day	Lognorm.	0.198	2.693	0.32	0.32	Exposure Factors Handbook (U.S. EPA, 2011)
	1 to <2			0.169	2.648	0.27	0.27	
	2 to <3			0.225	2.284	0.32	0.32	
	3 to <4			0.218	2.461	0.33	0.33	
	4 to <5			0.218	2.461	0.33	0.33	
	5 to <6			0.218	2.461	0.33	0.33	
	6 to <7			0.247	2.768	0.41	0.41	
Intake Rate$_{DIET}$	0 to <1	µg lead/ day	Lognorm.	0.65	4.12	0.65	1.77	EPA Office of Water LCR Analysis (U.S. EPA, 2017a)
	1 to <2			2.00	2.16	2.00	2.69	
	2 to <3			2.85	1.94	2.85	3.55	
	3 to <4			2.98	1.89	2.98	3.65	
	4 to <5			3;00	1.87	3.00	3.65	
	5 to <6			3.31	1.77	3.31	3.90	
	6 to <7			3.29	1.76	3.29	3.86	
Ventilation Rate	0 to <1	m^3/ day	Lognorm.	5.40	n/a	5.40	5.40	Exposure Factors Handbook (U.S. EPA, 2011)
	1 to <2			8.00	n/a	8.00	8.00	
	2 to <3			8.90	n/a	8.90	8.90	
	3 to <4			10.10	n/a	10.10	10.10	
	4 to <5			10.10	n/a	10.10	10.10	
	5 to <6			10.10	n/a	10.10	10.10	
	6 to <7			12.00	n/a	12.00	12.00	

3.2.12 Time Spent in Microenvironments

Exposure for each microenvironment was assumed to be proportional to the average time (hours per day) spent in the microenvironment. EPA's Consolidated Human Activity Database (CHAD; U.S. EPA, 2003b) is used as the source of time in various microenvironments. This database is frequently updated with new time-activity studies, and the latest version (November 2016) contains data from 22 separate studies, with a total of 179,012 diary days. Each day consists of 24 hours (midnight to midnight of activity descriptions,

microenvironments, and durations. CHAD has been used with many of the EPA human exposure models, including Stochastic Human Exposure and Dose Simulation (SHEDS; U.S. EPA, 2008c) and the Air Pollutants Exposure Model (APEX; U.S. EPA, 2003a).

For this analysis, the data from children who have not reached their seventh birthday were extracted. Ages were converted to whole years, effectively rounding up, so from birth to 11+ months was year=1, then one year to just under two full years was year=2, and so on. Seven years were kept, totaling 10,213 diary days.

For these purposes, residence time is defined as all time spent in locations codes from "30000" to "30400" inclusive, plus time in code "32810" (which is child care in a house, as opposed to a commercial building). These codes are summarized in Table 3-15. The total residence time (per 24-hour diary), initially expressed in minutes, was converted to fractions of total time by dividing by 1440 (minutes per day).

Table 3-15.Estimates of Children's Time (Fraction) Spent in Residences (CHAD)

Location code	Code Description	Location code	Code Description
30000	Residence, General	30200	Residence, Outdoor
30010	Your Residence	30210	Your residence, Outdoor
30020	Other's Residence	30211	Your residence - Pool, spa
30100	Residence, indoor	30219	Your residence - Other outdoor
30120	Your residence, indoor	30220	Other's residence, outdoor
30121	Kitchen	30221	Other's residence - Pool, spa
30122	Living room / family room	30229	Other's residence - Other outdoor
30123	Dining room	30300	Garage
30124	Bathroom	30310	Indoor garage
30125	Bedroom	30320	Outdoor garage
30126	Study / Office	30330	Your garage
30127	Basement	30331	Your indoor garage
30128	Utility room / Laundry room	30332	Your outdoor garage
30129	Other indoor	30340	Other's garage
30130	Other's residence, indoor	30341	Other's indoor garage
30131	Other's Kitchen	30342	Other's outdoor garage
30132	Other's living room / family room	30400	Other, residence
30133	Other's Dining room	32810	Childcare facility, house
30134	Other's Bathroom		
30135	Other's Bedroom		
30136	Other's Study / Office		
30137	Other's Basement		
30138	Other's utility room / laundry room		
30139	Other indoor		

Grouped by year of age, the CHAD data are summarized in Table 3-16.

Table 3-16. Fraction of Time Spent in Residences (One Day Data), from CHAD

Age	Num. Diaries	Arith. Mean	Std. Dev.	10%ile	25%ile	50%ile	75%ile	90%ile
Age 0-<1	594	0.90	0.12	0.77	0.86	0.93	0.99	1.00
Age 1-<2	1017	0.88	0.12	0.70	0.82	0.92	0.98	1.00
Age 2-<3	1814	0.82	0.17	0.58	0.73	0.86	0.96	1.00
Age 3-<4	1851	0.82	0.16	0.58	0.73	0.85	0.96	1.00
Age 4-<5	1765	0.81	0.16	0.60	0.71	0.83	0.94	1.00
Age 5-<6	1748	0.78	0.16	0.58	0.67	0.79	0.91	0.99
Age 6-<7	1424	0.76	0.16	0.57	0.67	0.75	0.89	0.98

The above data are not well fit by normal or lognormal distributions, in part because lognormal distributions are skewed toward higher values, while the time spent variable must be truncated at an upper bound of 1 (100% of time in residence). For data with these characteristics, beta distributions can fit the data adequately. Beta distributions, defined by two parameters c and d, have the following form:

$$PDF = \frac{x^{c-1}(1-x)^{d-1}}{\frac{\Gamma(c)\Gamma(d)}{\Gamma(c+d)}} \qquad \text{Equation 11}$$

$$c = \frac{m \times (m \times (1-m) - v)}{v} \qquad \text{Equation 12}$$

$$d = \frac{c \times (1-m)}{m} \qquad \text{Equation 13}$$

where:

M = mean of the distribution

v = variance of the distribution

Γ = the gamma distribution

A standard beta distribution is bounded to be between zero and one. Hence, a standard beta may fit (using the above formulas) only if *0<m<1.* Also required is that *v < m*(1-m).* Both requirements should automatically be satisfied provided all the data values lie between zero and one.

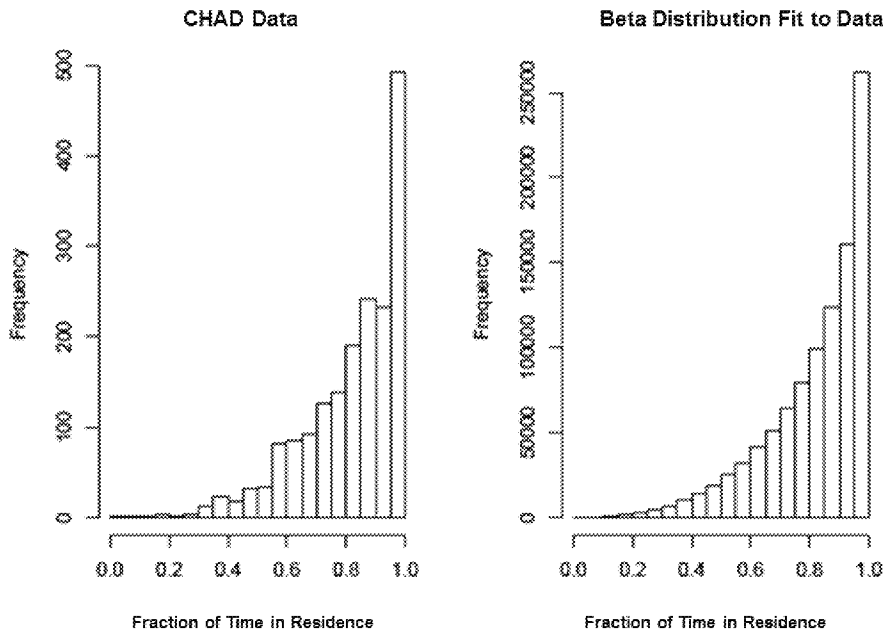
SAS software was used to fit beta distributions to each age group, as shown in Table 3-17.

Table 3-17. Regression Parameters for CHAD Residence Times (One-day Data)

Year	Shape	First (or "c") parameter	Second (or "d") parameter
Age 0-<1	Beta	4.74	0.53
Age 1-<2	Beta	5.10	0.53
Age 2-<3	Beta	3.52	0.77
Age 3-<4	Beta	3.76	0.82
Age 4-<5	Beta	4.26	1.00
Age 5-<6	Beta	4.75	1.34
Age 6-<7	Beta	4.80	1.49

As an illustration, Figure 3-4 provides the histogram of the raw CHAD data at age 2-<3 along with a histogram of the fit distribution (beta(3.52,0.77)).

Figure 3-4. Comparison of Frequency Plots for Raw CHAD Data and Beta Distribution Fit to Data



The fitted distribution had a much larger sample size, to smooth out irregularities from stochastic noise. Presumably, any irregularities in the CHAD data are due to sampling error and would not persist if much larger numbers of diaries were available. The other ages also show good agreement between the CHAD data and the fitted distributions.

For the hazard standard approach, longer term exposures (and not just single days of exposure) are modeled. For this purpose, it is better to use the distribution of the long-term average time fractions rather than the distribution of the single-day diaries. The relationship between one-day time fractions and long-term averages is addressed in Glen et al. (2008). The "diversity" statistic in that paper, or the related intraclass correlation coefficient (ICC), measures the relationship between the variability across a population of the group average compared to the variability of an entire set. In this case, the "group average" is the longitudinal average for one person over a set period (such as a year), and the variability of the entire set is the variability seen across all diary days for a given age group. In application of the U.S. EPA APEX model, the diversity has ranged from 0.1 to 0.5. Values at the low end of this range indicate homogeneous populations, such as a set of children living in the same neighborhood and attending the same school. Since CHAD is more heterogeneous, having been collected across the country and over many years, this statistic should be larger; values over 0.3 apply to adult populations, which tend to have more diverse behaviors than children. A value of 0.25 was selected for this analysis, taking the above into account.

The simplest method of accounting for this variability reduction in long-term averages is to scale back the variability seen in the CHAD data, and then fit new beta distributions. The long-term mean is the same as the one-day mean, but the standard deviation (which is the square root of the variance) is reduced accordingly. In this case, the standard deviation was decreased

by a factor of sqrt (0.25), which is 0.5. This leads to new beta distributions as follows as shown in Table 3-18. The statistics corresponding to these long-term beta distributions are shown in Table 3-19.

Table 3-18. Regression Parameters for CHAD Residence Times (Long Term Averages)

Year	Mean	Standard deviation	First (or "c") parameter	Second (or "d") parameter
Age 0-<1	0.899	0.0601	21.6	2.42
Age 1-<2	0.882	0.0620	23.1	3.09
Age 2-<3	0.821	0.0832	16.6	3.60
Age 3-<4	0.821	0.0811	17.5	3.82
Age 4-<5	0.809	0.0785	19.5	4.58
Age 5-<6	0.780	0.0778	21.3	6.03
Age 6-<7	0.754	0.0682	21.5	6.68

Table 3-19. Statistics for Long-term Beta Distributions for Time Spent

Age	Arith. Mean	Std. Dev.	10%ile	25%ile	50%ile	75%ile	90%ile
Age 0-<1	0.90	0.06	0.82	0.87	0.91	0.94	0.97
Age 1-<2	0.88	0.06	0.80	0.85	0.89	0.93	0.95
Age 2-<3	0.82	0.08	0.71	0.77	0.83	0.88	0.92
Age 3-<4	0.82	0.08	0.71	0.77	0.83	0.88	0.92
Age 4-<5	0.81	0.08	0.70	0.76	0.82	0.87	0.90
Age 5-<6	0.78	0.08	0.67	0.73	0.79	0.84	0.88
Age 6-<7	0.76	0.07	0.66	0.71	0.77	0.82	0.86

The final time spent values used in the modeling are summarized in **T**able 3-20. Values for ages 6 and 7 were rounded down to 0.7 to reflect the assumption that school age children spend at least 8 hours a day at school during the week and at least 4 hours out of the house on the weekend.

Table 3-20. Estimates of Children's Time (Fraction) Spent in Residences (CHAD)

Variable	Age	Units	Dist. Type	C	V	Used for Median Analysis	Used for Mean Analysis	Data Source
Time Spent$_{PRIMARY}$, Residences	0 to <1	unitless	Beta	21.6	2.42	0.9	0.9	CHAD
	1 to <2			23.1	3.09	0.9	0.9	
	2 to <3			16.6	3.60	0.8	0.8	
	3 to <4			17.5	3.82	0.8	0.8	
	4 to <5			19.5	4.58	0.8	0.8	
	5 to <6			21.3	6.03	0.7	0.7	
	6 to <7			21.5	6.68	0.7	0.7	
Time Spent$_{PRIMARY}$, Child-Occupied Facilities	0 to <1	unitless	Based on resid.	1- *Time Spent*$_{RESIDENCE}$		0.1	0.1	
	1 to <2					0.1	0.1	
	2 to <3					0.2	0.2	
	3 to <4					0.2	0.2	
	4 to <5					0.2	0.2	
	5 to <6					0.2	0.2	
	6 to <7					0.2	0.2	

3.2.13 Maternal BLL

The maternal BLL was estimated from analyses of the NHANES data for the LCR (U.S. EPA 2017a). This analysis used the data from NHANES 2011-2012 and 2013-2014 and used the Centers for Disease Control and Prevention (CDC)-recommended method for incorporating sampling weights. The estimated maternal BLL is 0.61 µg/dL, as shown in Table 3-21.

Table 3-21. Maternal BLL

Variable	Units	Distribution	Value	Used for Median Analysis	Used for Mean Analysis	Data Source
Maternal Blood Lead Level	µg/dL	None	0.61	0.61	0.61	U.S. EPA 2017a, based on an analysis of the NHANES survey

3.2.14 Bioavailabilities and Absorption Saturation Parameters

The absolute bioavailabilities represent the fraction of ingested lead that is available for uptake for each media. The bioavailability itself can depend on a number of factors, including age, lead species, media, and the amount of food in stomach at the time of ingestion (Barltrop and Meek, 1975; Mushak, 1991; U.S. EPA, 1986). The IEUBK Technical Support Document (U.S. EPA, 1994)

recommends food and water absolute bioavailabilities of 0.5 based on studies of the solubility of lead acetate. The absolute bioavailability of dust and soil is set to 0.3 based on tracer studies in humans (children and adults). Bioavailability can vary based on specific site conditions (U.S. EPA, 2018), Site-specific measured bioavailability data is an alternative to the default presented here. Site-specific estimates of bioavailability are not appropriate for this rulemaking since the sub-populations under consideration are not necessarily co-located, and the analysis represents conditions across the United States.

For the deterministic analysis, the recommended IEUBK defaults are retained, as shown in Table 2.7. For the probabilistic analysis, EPA could impose a distribution on dust bioavailability (or all media); however, other parameters related to transport of lead in the body, such as lead transfer rates, cannot be varied by the user in IEUBK and lack sufficient data to justify inclusion in a probabilistic analysis. Instead, an overall biological GSD is used to incorporate biological variability with exposure variability (which is modeled directly). The bioavailability is judged to fall into this category; thus, it is included as a central tendency only and the biological GSD is judged to incorporate the variability in BLL from these parameters.

The final absorption parameters are the PAF and SATINTAKE24 variables governing the saturable pathway (see Equation 9). This analysis retains the IEUBK defaults of 20% and 100 μg/day, respectively. A summary of the bioavailability and saturation parameters are shown in Table 3-22.

Table 3-22. Bioavailabilities by Media and Absorption Parameters

Variable	Units	Distribution	Value	Used for Median Analysis	Used for Mean Analysis	Data Source
$Bioavailability_{DUST}$	unitless	None	0.3	0.3	0.3	IEUBK User Manual (U.S. EPA, 1994)
$Bioavailability_{SOIL}$	unitless	None	0.3	0.3	0.3	IEUBK User Manual (U.S. EPA, 1994)
$Bioavailability_{WATER}$	unitless	None	0.5	0.5	0.5	IEUBK User Manual (U.S. EPA, 1994)
$Bioavailability_{DIET}$	unitless	None	0.5	0.5	0.5	IEUBK User Manual (U.S. EPA, 1994)
PAF	unitless	None	0.2	0.2	0.2	IEUBK User Manual (U.S. EPA, 1994)
SATINTAKE	μg/day	None	100	100	100	IEUBK User Manual (U.S. EPA, 1994)

3.2.15 A Geometric Standard Deviation of BLL to Account for Population Variations

The probabilistic model described in Section 3.3 is intended to model the variability in BLL and IQ due to the variability in exposure parameters across the population of interest. However, that population will also have variability associated with biological processes, including absorption, distribution, and excretion. Little data are available for many of those parameters and distributions cannot be estimated. Thus, this analysis models the exposure variability and then imposes additional biological variability using an assumed geometric standard deviation.

Other Agency lead rules have also used the GSD approach. In each case, three considerations are applicable:

- How old are the studies on which the GSD was based? Overall GSD's have increased in the past few decades owing to a gradual decrease in the median population BLL. The subsections below summarize GSD values used across the Agency as well as the GSD in the NHANES survey.

- How homogenous is the population? Heterogeneous populations have higher GSDs than more homogenous populations.

- What variability is captured by the GSD? If full exposure and biological variability needs to be captured, the GSD should be higher; if only biological variability needs to be captured, the GSD should be lower.

In review of the NAAQS (U.S. EPA, 2007), EPA's Clean Air Scientific Advisory Committee (CASAC) made the following observation: "As these high exposures and blood lead levels decreased, GSDs were noted to increase, arriving at a consensus value of 1.6 for risk assessment in the 1990's, although this value is often disputed. The 1.6 selected is correctly described as appropriate for a group of children with uniform exposures. However, it is not likely that all of the variance should be ascribed to differences in individual response. The GSD reflects both individual variation and some degree of variation in the exposure variables, as well. The 1.6 value is recognized as being appropriate to situations where the degree of variation in exposure is typical of the types of scenarios being evaluated."

Below are descriptions of how other Agency lead analyses have implemented the GSD and the data each used when deciding on the appropriate value.

<u>IEUBK model</u>

Within the application of the IEUBK model, the GSD is the variability in BLLs among children exposed to similar concentrations of environmental lead (U.S. EPA 1994). It accounts for both some exposure variability and biological variability, but it does not account for variability from differences in exposure concentrations.

A default GSD of 1.6 is used in the IEUBK model (U.S. EPA 1994). This value was derived from epidemiological data and further tested by Hogan et al. (1998), who determined that observed and predicted probabilities of BLLs above a comparison value (defined at the time as > 10 μg/dL) matched within 4%.

<u>Lead NAAQS</u>

For the lead NAAQS review, the GSD was applied to point estimates of BLLs to account for both the full exposure and biological variability. EPA employed different GSD values for different

simulated population case studies, where the different values reflect the fact that GSDs are expected to be larger in more diverse populations compared with populations near, for example, a point source of lead (U.S. EPA, 2007). The document provides a summary of available GSD values in different populations as of 2007, and low and high GSD values of 1.6 (based on the Bellinger et al., 1992 study in Boston) and 2.2 (based on NHANES) were used for the "general urban case study", where populations are expected to be more variable than in the smelter case study.

Selection of the GSD

For the probabilistic analysis, two sources of variability are included:

- **Exposure variability**: variability in variables affecting lead intake, including exposure media concentrations, exposure factors, and activity patterns.
- **Biological variability**: variability in variables affecting lead absorption, distribution, and elimination of lead in the body, including the bioavailability of lead, body weight, transfer coefficients, and elimination parameters.

Exposure variability is modeled directly using population-analysis Monte Carlo methods. Biological variability is more difficult to quantify using distributions of input variables, so an overall biological GSD is applied to the exposure estimates to account for biological variability.

Previous EPA lead rules have implemented a population-level GSD for different populations (more or less homogenous than the hazard standard population) and for different purposes (strictly biological variability; biological variability with variability in exposure factors, etc.). Selection of the GSD is critical for accurately estimating upper percentiles in the modeled population.

For this rule, biological variability was estimated by:

- Simulating a population with AHHS dust-lead loading distributions and other exposure variable distributions but without biological variability.
- Comparing the exposure GSD with the overall NHANES BLL GSD.
- Estimating the biological GSD based on this residual variance and applying to modeled populations across all dust-lead exposure scenarios.

Lead Renovation, Repair, and Painting (RRP) Rule

Following the recommendation of the IEUBK model and the studies supporting that default value, the 2008 Lead RRP Rule (U.S. EPA, 2008a) adopted a GSD of 1.6 to account for inter-individual variability. The Monte Carlo analysis in that exposure assessment incorporated distributions for exposure concentrations and some behavioral characteristics; thus, this GSD largely accounted for biological variability.

Lead and Copper Rule Analysis

The exposure assessment supporting the LCR by the Office of Water employed two different ways to account for variability (U.S EPA, 2017a). In one analysis, IEUBK was run with central tendency values and a GSD of 1.6 was applied to account for inter-individual variability. For the second analysis, the SHEDS Multimedia model (U.S. EPA, 2008c) was used to model exposure

variability to account for inter-individual variability and no GSD was applied to the model results.

Zartarian et al. 2017 provided an alternate approach to estimating the biological GSD for use with the SHEDS exposure analysis. The updated approach assumes that the variability relating to exposure and to biological processes are independent and that the distribution is log-normal. Under these assumptions, the following equations holds:

$$(Q_{Total})^2 = (Q_e)^2 + (Q_b)^2 \qquad \text{Equation 14}$$

Where:

Q_{Total}	=	Total variance in log-space
Q_e	=	Exposure variance in log-space
Q_b	=	Biological variance in log-space

Solving for the biological variability and using the fact that the variance is the natural log of the GSD squared, then:

$$GSD_b = \exp(\sqrt{(\ln(GSD_{Total}))^2 - (\ln(GSD_e))^2} \qquad \text{Equation 15}$$

Where:

GSD_{Total}	=	Total GSD
GSD_e	=	Exposure GSD
GSD_b	=	Biological GSD

Zartarian et al. (2017) performed additional model evaluation using this GSD estimation approach.

<u>NHANES</u>

The NHANES survey, discussed further in Section 4, provides BLL estimates across the general population. In general, owing to sampling limitations, the upper tail of the distribution may be underestimated. In this survey, the GSD can be obtained in two ways:

- Estimate the geometric mean BLL and associated GSD for an individual with specific covariate and dust/soil exposure values. This GSD captures the remaining variability in BLL from other exposure or biological variations.

- Estimate the geometric mean BLL and associated GSD across the full population without accounting for any covariates.

The first partially accounts for exposure and, potentially, biological variability by estimating the geometric mean for different covariate combinations. The remaining variability (GSD = 1.7 in NHANES 1999-2004) is lower than the population GSD estimated in the second method (GSD = 1.8 to 2.6 for children age 1 to 5). The total child population GSD from the most recent NHANES (2015-2016) is 1.8 to 2.2 for children age 1 to 7.

Because of the growing range between the upper tails of the distribution and the overall population median, some researchers have suggested the NHANES BLLs may be becoming bimodal and a lognormal GSD is no longer appropriate. Figure 3-5 shows the NHANES 2013-2014 probability distribution. Although there is slight evidence of a bimodal structure, with a

second peak at around 10 μg/dL, the power in that peak is low for this nationally-representative population. Figure 3-5 also shows the probability distribution from the 1999-2004 NHANES; because that survey included dust-lead levels, the population can be restricted to children living in Pre-1978 housing with dust-lead levels above the non-detect level. The whole population does display a bimodal distribution with peaks near 0.5 μg/dL and a second at 2 μg/dL. However, the susceptible sub-population (children in Pre 1978 housing with dust-lead levels above the detection limit) reflects a single peak at 2 μg/dL. Because the population of interest is also children in Pre-1978 housing with dust-lead hazards, the single-peak lognormal distribution is deemed appropriate for this analysis.

Selection of GSD

The above analyses and implementation of different GSD values suggest the following:

- GSDs have continued to increase since the late 1990s as population median BLLs have continued to decrease. This increase is likely related largely to differences in exposure conditions and not biological shifts.

- IEUBK, when used as part of the Superfund program for more homogenous populations, recommends a GSD of 1.6 to account for biological variability and exposure variability (other than variability in exposure concentrations) based on an analysis of available study data and considerations of population heterogeneity.

- The NAAQS analysis varied the overall GSD for an urban population for biological variability and exposure variability (other than variability in exposure concentrations) between 1.6 and 2.1 for low and high estimates based on an analysis of available study data and considerations of population heterogeneity.

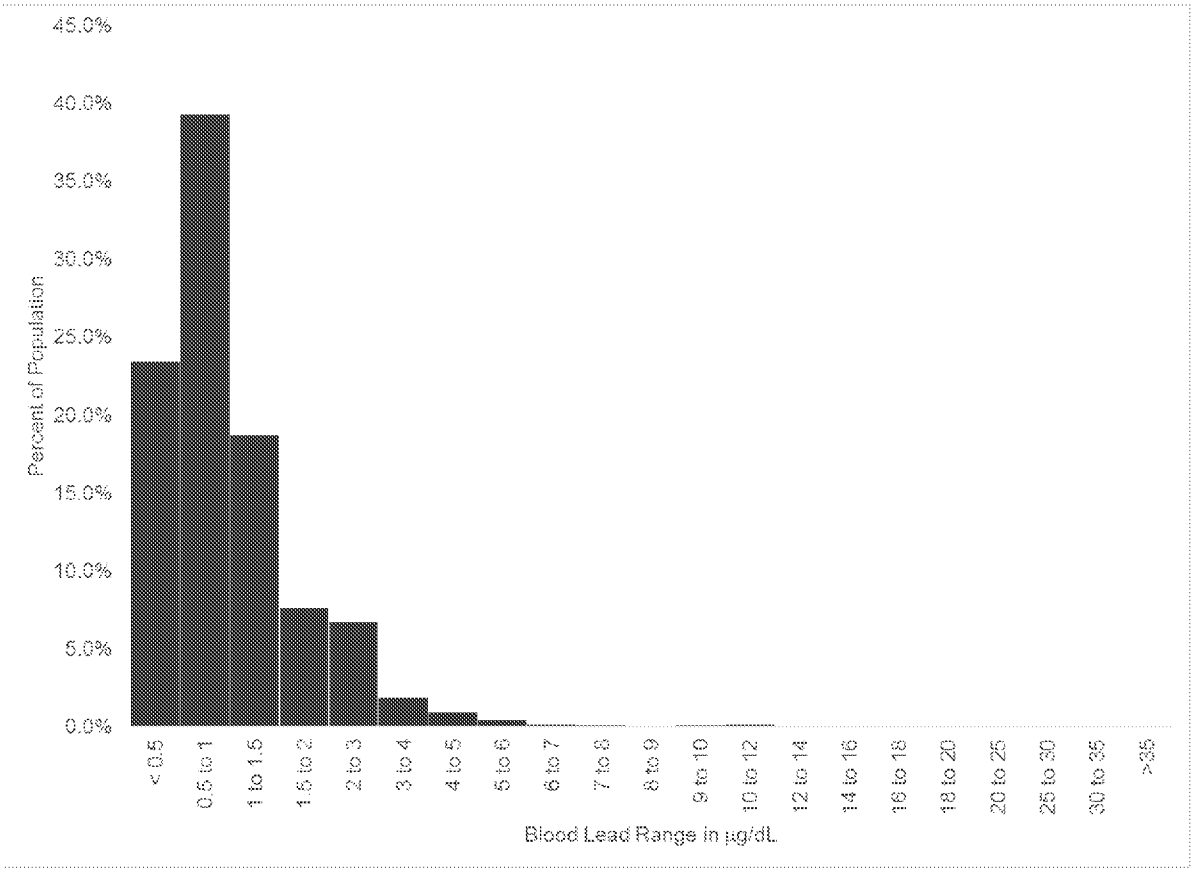
- The LCR analysis and the RRP analyses both adopted the IEUBK default value of 1.6.

- For a heterogeneous national population, the NHANES 2013-2014 suggests an overall childhood population GSD of 2.1.

- For a more homogeneous population (i.e., where dust-lead levels and other covariates are the same), NHANES from the early 2000's suggests a GSD of 1.8 to 2.6 for children age 1-5. More recent NHANES (2015-2016) have GSD's of 1.7 to 2.2 for children age 1-7.

For the hazard standard analysis, the GSD should capture biological variability and not exposure variability (which is captured in the probabilistic modeling). The population in the hazard standard analysis (children with a dust-lead hazard) are likely similar to the NAAQS general urban case study and somewhat less homogenous than a Superfund population. The above datasets and implementations are summarized in Table 3-23).

Figure 3-5. Distribution of BLL in NHANES for 2013-2014 (whole population, top) and 1999-2004 (whole population and susceptible sub-population, bottom)



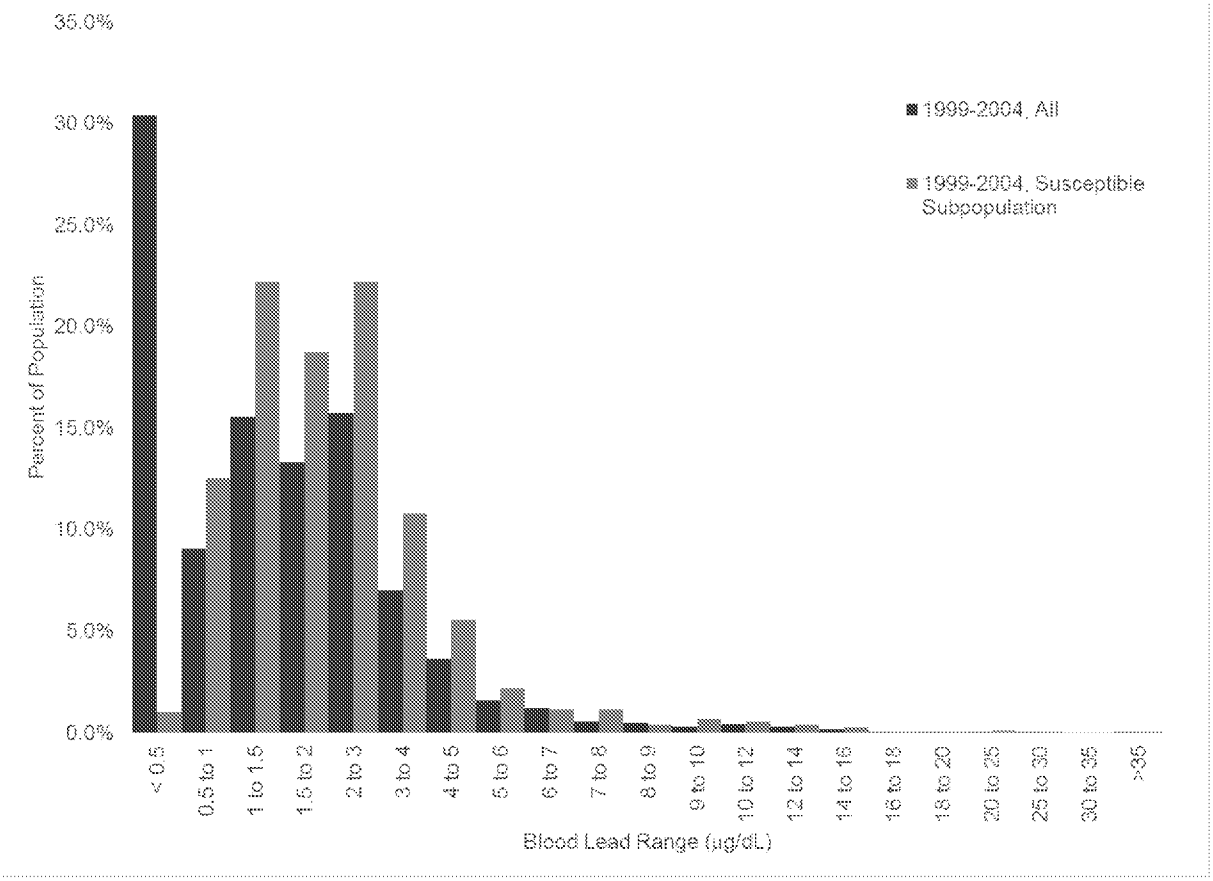


Table 3-23. Implementations of GSD for Different Agency Lead Analyses, Taking into Account Exposure Variability, Biological Variability, and Population Heterogeneity

Agency Lead Regulation	GSD Used	Includes Exposure Variability?	Includes Biological Variability?	Is Hazard Standard Population More or Less Homogenous?	Is Hazard Standard GSD Expected to Be Higher or Lower?
IEUBK Proposed Updates, Office of Land and Emergency Management (U.S. EPA, 2018)	1.6	Yes, aside from differences in concentrations	Yes	Less	Unclear
Lead NAAQS Review, Office of Air (U.S. EPA, 2007)	1.6 (low end) - 2.1 (high end) for general urban case study	Yes, aside from differences in concentrations	Yes	Similar	Lower
Lead Renovation, Repair, and Painting Rule, Office of Pollution Prevention and Toxics (U.S. EPA 2008a)	1.6	No	Yes	Similar	Similar
Draft Analysis for LCF, Office of Water (U.S. EPA, 2017a	1.6 in IEUBK-only analysis	Yes	Yes	Similar	Lower
NHANES, across the whole population (CDC, 2018)	2.0 for 1999-2004; 2.1 for 2015-2016	Yes	Yes	Less	Lower
NHANES, after correcting for covariates (CDC, 2018)	Same value for whole population, Pre-1978, and Pre-1978 with dust-lead hazard: 1.7	Yes, aside from variability in exposure captured by covariates	Yes, aside from variability in biological processes captured by covariates	Similar	Unclear
This Hazard Standard Analysis (Biological GSD)	**1.4**	**No**	**Yes**	NA	NA
This Hazard Standard Analysis (Total GSD)	**Median-1.98** **Range 1.82 to 2.16**	Yes	Yes	NA	NA

Because the observations above do not lead to a firm conclusion about an appropriate GSD, the method from Zartarian et al. (2017) (equations 14 and 15) were used to estimate a biological GSD. The probabilistic analysis was run without biological variability and using residential dust lead-loading distributions from AHHS (all housing vintages, all dust observations). This

simulation is expected to best capture conditions similar to NHANES population-level variability. These age-specific GSD's were compared with GSD values from the literature, including the most recent NHANES (2015-2016), the NHANES that measured dust (1999-2004), and the range of GSD from the studies included in the empirical meta-analysis (see Section 4.1.2). The meta-analysis studies span a variety of different populations, including populations expected to be more homogenous than the national population.

Table 3-24 shows the modeled exposure variability, the total GSDs, and the estimated biological GSDs. "n/a" means the total GSD from data is actually lower than the exposure GSD; this happens for older studies including the NHANES data and the low end of the meta-analysis (taken from Yiin et al., 2000). For the NHANES 2015-2016 data, the estimated biological GSD is equal to or less than 1.6.

Table 3-24. Estimation of Biological GSD Based on Probabilistic Modeling and Empirical Data

Age	Modeled Exposure GSD (Prob. Analysis)	Total GSD from Empirical Studies				Estimated Biological GSD			
		NHANES 2015-2016	NHANES 1999-2004	Meta-analysis studies, high end	Meta-analysis studies, low end	NHANES 2015-2016	NHANES 1999-2004	Meta-analysis high end	Meta-analysis low end
1	1.96	2.21	2.20	5.10	1.80	1.5	1.5	4.4	n/a
2	1.75	2.04	2.02			1.6	1.5	4.6	1.2
3	1.73	2.00	1.90			1.5	1.4	4.6	1.2
4	1.75	1.85	1.72			1.3	n/a	4.6	1.2
5	1.72	1.84	1.61			1.3	n/a	4.6	1.3
6	1.68	1.70	1.50			1.1	n/a	4.7	1.3
7	1.65	1.80	1.40			1.4	n/a	4.7	1.4

"n/a" means the estimated exposure GSD was larger than the total empirical GSD
Blue shading reflects the NHANES survey deemed most appropriate for this analysis, since it represents the most recent national-level study data.

The age-specific biological GSD estimates show variability across ages of the same approximate magnitude as variability across NHANES surveys. Total GSD is expected to vary with age due to differences in exposure. Biological GSD is expected to be relatively more stable over time and across ages. For this reason, age-specific biological GSD values were not used. Instead, an overall value of 1.4 was used for the biological GSD for this analysis as a representative value across ages 1 to 7, as shown in the blue column of Table 3-25 . When this value was chosen, the resulting total GSDs from the probabilistic modeling ranged from 1.82 to 2.16. These values align with GSD values reported in the 2015-2016 NHANES (1.80 to 2.21).

In an earlier draft of this analysis, EPA completed modeling using the fit for purpose probabilistic modeling (as described) and a biological GSD of 1.6. The total GSDs using this approach were higher than what was reported in the most recent NHANES (median 2.3). Because of this the biological GSD and/or the exposure GSD needed to be reduced. For this analysis, EPA chose to reduce the biological GSD to 1.4 as described above which resulted in a median total GSD of 1.98. EPA could consider another approach in the future where total GSD is set to equal the reported age-specific NHANES values, for example 1.7 to 2.2, and allow biological GSD to vary based on age specific exposure GSD and equations 14 and 15. EPA would need to further consider which NHANES cycle(s) and whether to pool ages when selecting total GSD value(s). This could result in either higher or lower estimated exposure GSDs which could

further inform estimates and relationships between the total GSD, exposure GSD, and biological GSD.

Table 3-25. Exposure and Biological GSD

Exposure GSD	Biological GSD
Estimated using probabilistic model and input distributions	1.4

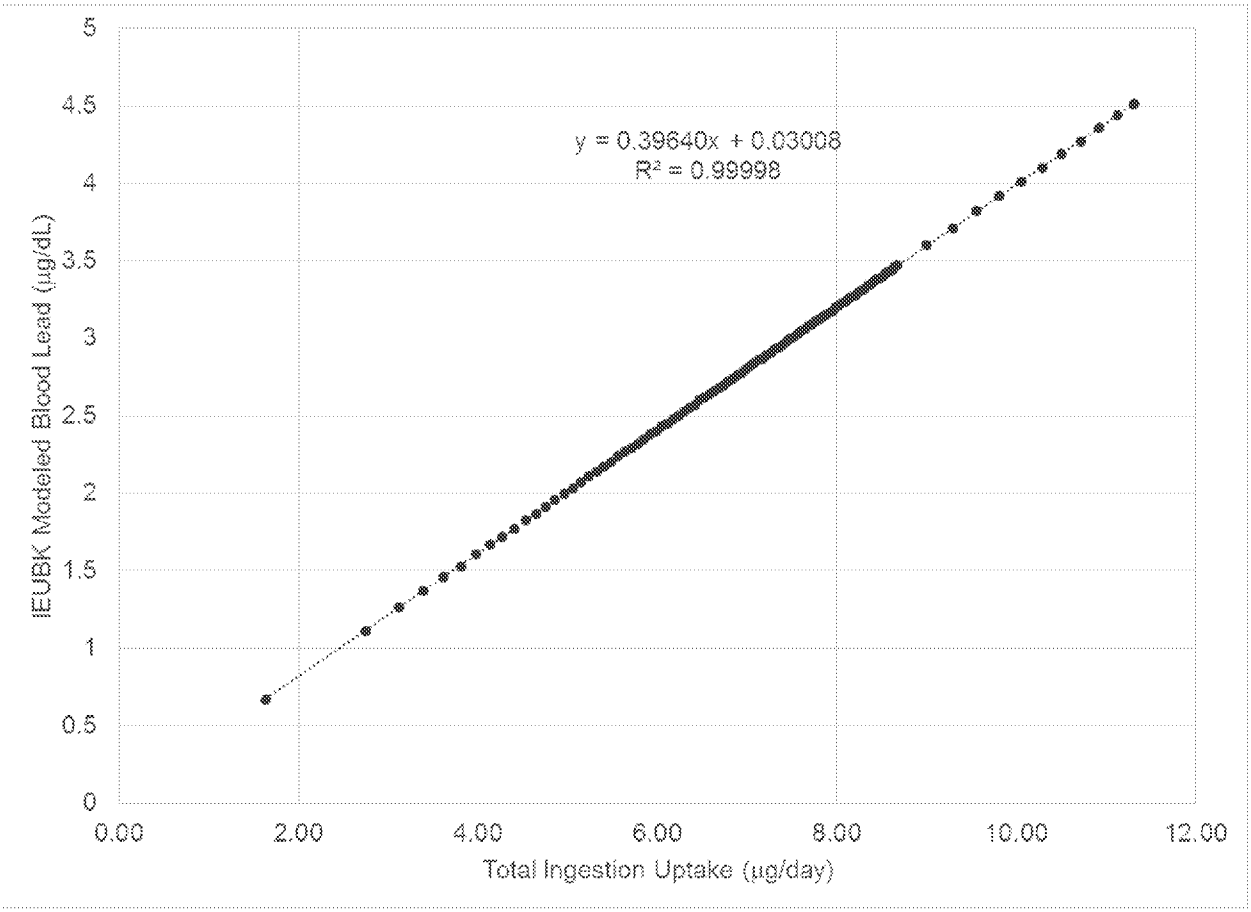
3.3 Estimation for Hazard Standard Outcome Metrics Using Biokinetic Model

The IEUBK model is used to estimate the deterministic BLLs for each hazard standard candidate, scenario, and age of child. The IEUBK model is a biokinetic model that models time-dependent BLL based on media concentrations and intake rates (exposure component), absorption parameters (uptake component), biokinetic transfer between compartments (biokinetic component) and variability amongst individuals (variability component) (U.S. EPA, 1994). The user can specify inputs for the exposure, absorption, and variability components; the biokinetic component is hard coded and cannot be changed by the user via the user interface. The model can be run in batch mode by specifying different ages and media concentrations assuming the same intake rates and absorption parameters.

For the hazard standard, ages were between 6 months and 7 years old in increments of 6 months. Because a large number of runs were necessary (17 candidates x 6 scenarios x 14 ages = 1428 cases), the IEUBK batch mode utility was used. The deterministic results were run two ways: in one case, medians from the input parameter distributions were used for all inputs. In a second, the arithmetic means for the input parameters were used. IEUBK was originally validated using arithmetic means as inputs, so it is intended to be used with that type of input. As part of this analysis, we did an additional model evaluation comparing the BLL estimated from geometric mean input with geometric means from NHANES and BLL using arithmetic mean inputs with the arithmetic means from NHANES. However, the choice to use the geometric mean for exposure inputs in one set of deterministic results should not be construed as a recommendation for their usage as an input parameter in the IEUBK model.

Once these deterministic runs were complete, a regression analysis was performed to link the total uptake for each run to the modeled BLL. Separate regression equations were calculated for each age, and the same equation then applies to each exposure scenario for that given age. Figure 3-6 shows the "Residence Pre-1978" scenario for a two-year old; the model is highly linear for the uptakes in questions, and the R^2 is 0.99998. In general, the R^2 were on this order of magnitude for each separate age/scenario combination, and the error in the predictions across the dust-lead loading range of interest were between 0 and +/- 1%.

Figure 3-6. Example Regression Equation Relating Total Ingestion Uptake to Modeled BLL for the Residence Pre-1978 Scenario at Age 2



The sensitivity analysis and probabilistic analyses were completed by calculating the total uptake and using the appropriate regression equation to estimate the BLL. In the probabilistic analysis, each new simulation consisted of a single age (or range of ages, assuming each in the range is equally probable), scenario (e.g., Pre1940 Residence), and candidate (e.g., fix the residence dust-lead loading at 40 µg/ft^2 for floors and 250 µg/ft^2 for sills). Ages 1, 2, 3, 4, 5, 6, 7, and 5 through 7 were run.

An Excel workbook was written for this analysis; the probabilistic methods and exposure equations in this tool are similar to those in the SHEDS model. However, the SHEDS population model uses the activity-based method for estimating intake from dust loadings. For this analysis, the loading-to-concentration conversion with dust intake was selected because of its historical use in TSCA lead rulemaking and the incorporation of newer data. However, the SHEDS method and this probabilistic analysis are similar in outcome metrics produced (i.e., sub- or population level BLLs).

Within the workbook, the distributions in Section 3.2 were each sampled 2,000 times to determine the overall BLL distribution from exposure variability. Correlations between total average dust-lead exposure in the primary microenvironment and the soil and water concentrations were performed in Excel using methodology identical to that in the SHEDS model (U.S. EPA, 2008c); rank correlations and normal distributions are transformed into the distributions of interest, ensuring the overall correlation across all 2,000 iterations matches the

desired value. Then, the biological GSD of 1.4 was applied to each iteration at multiple percentiles (2.5%ile, 5%ile, 25%ile, 50%ile, 75%ile, 95%ile, 97.5%ile), giving a final total of 14,000 iterations for each age/scenario/candidate combination. During the sampling, all distributions were truncated at the 5th and 95th percentile levels; that is, when a sampled value was below the 5th percentile, the value was adjusted to the 5th percentile, and when a sampled value was above the 95th percentile, the value was adjusted to the 95th percentile. This truncation was made owing to the relative uncertainty in the upper and lower percentiles in the data sources, owing to both number of samples and the detection limits; had the values not been truncated, the resulting distribution could be biased by these relatively uncertain extreme values. Percentiles, arithmetic means, geometric means, and geometric standard deviations were then estimated for all metrics (total BLL, dust-only BLL, total IQ loss using three different equations, and dust-only IQ loss using three different equations) for each age/scenario/candidate combination. This gave a total of 8 ages x 6 scenarios x 17 candidates x 8 BLL/IQ metrics = 6,528 distributions.

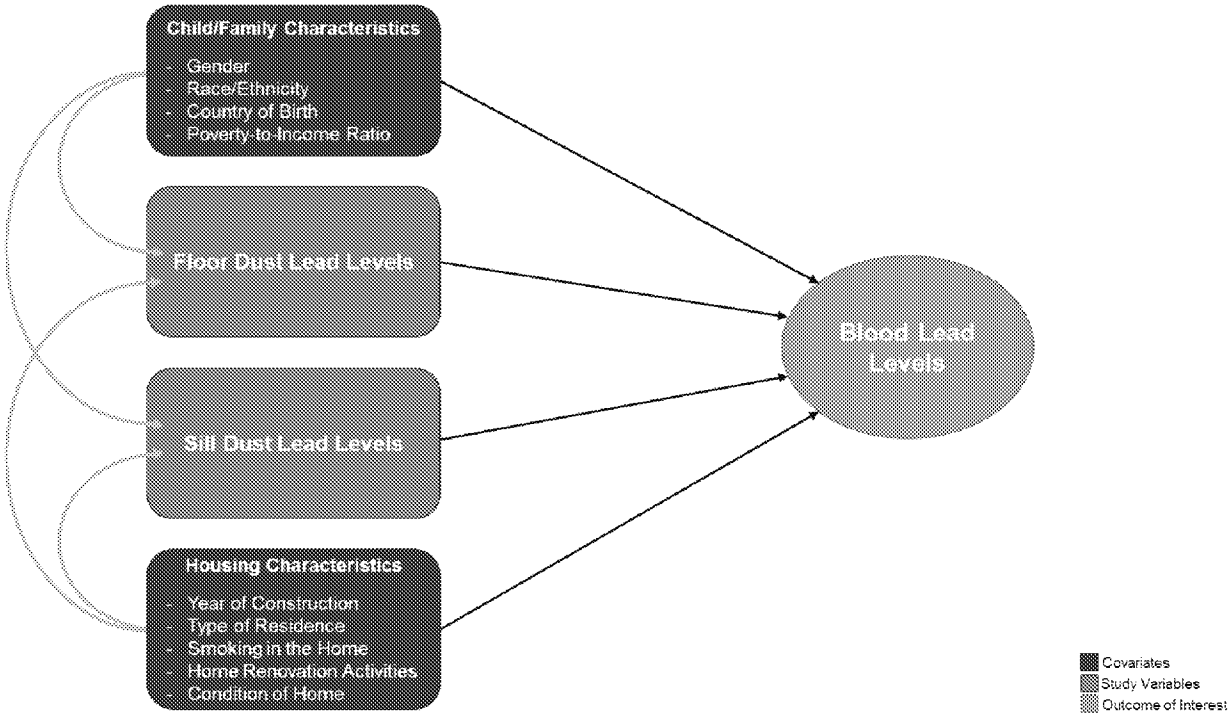
4 Methods for Estimating BLL Impacts Based on Empirical Data

Empirical studies relating dust-lead lead and BLL provide useful information for guiding U.S, Environmental Protection Agency's (EPA) evaluation of potential dust-lead hazard standards, helping to identify key factors affecting children's BLL and suggesting approaches to investigate BLL impacts. Figure 4-1 provides a schematic illustrating that individual and family demographic effects as well as the floor and sill dust-lead levels impact the empirical estimates of blood lead levels (BLL) in individuals.

In examining the impact of potential dust-lead hazard standards, EPA has chosen empirical studies that focus primarily on nationally representative populations. As will be discussed below, the dust-lead loading in 1999-2004 National Health and Nutrition Examination Survey (NHANES) residences is considerably lower than those in other studies. In addition, the NHANES data include an exhaustive range of covariates related to ethnicity, income, housing characteristics and conditions, and others that can be included in predictive BLL models. For this reason, recent analyses of the NHANES data (Dixon et al., 2009) were used as a model for an EPA reanalysis, and this reanalysis regression is used as a tool for estimating the BLL impacts of hazard standards.

EPA also conducted a targeted literature search to identify other studies that investigate the dust-lead/BLL relationship. These additional studies are less representative of the entire U.S. population, but they include newer studies. Some of the studies are for non-random, high-risk populations (children with known or suspected high BLL and/or high lead exposures), while others are more representative of typical exposures. In addition to high exposures, demographic, socioeconomic and behavioral factors are known to strongly influence BLL. The populations in the additional studies included some with a high proportion of minorities compared to the general population, included people that were somewhat poorer than average, and included people living in older housing units. These demographic effects will be used by the economic analysis to capture variability between particular individuals of specified demographics. Comparison between the relationship in a nationally-representative study (NHANES) and other sub-populations is performed to build confidence that the NHANES relationship, including the effects of demographic variables, can be applied to the analysis sub-population.

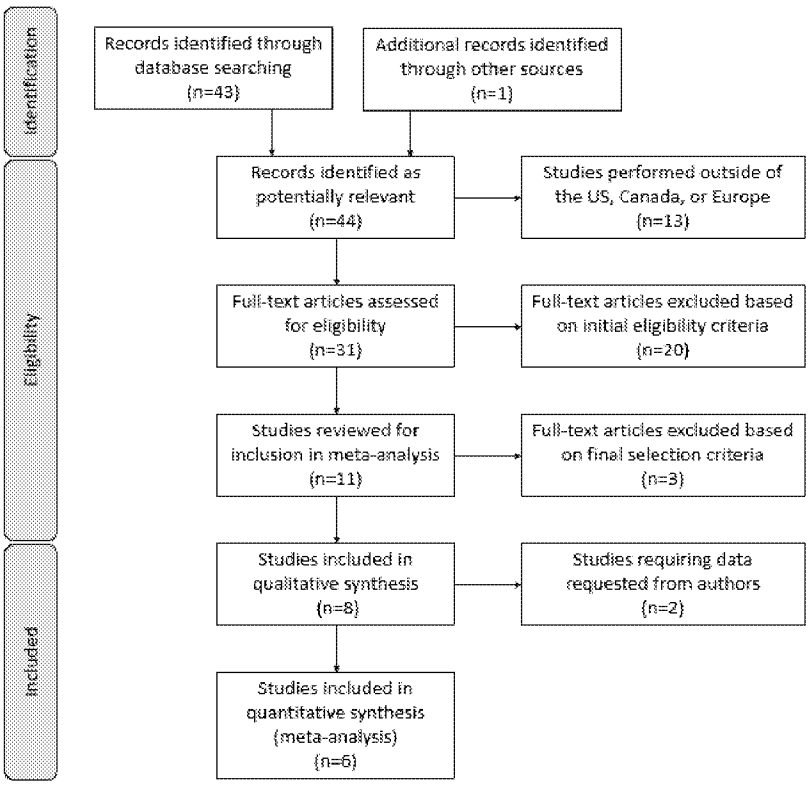
Figure 4-1. Empirical Hazard Standard Framework



4.1 Selection of Empirical Studies

To assess how the NHANES data fit in the landscape of published empirical literature, a literature search was performed to collect all relevant studies investigating the relationship between BLL and dust-lead among data sources outside of NHANES. After the search was performed, first eligibility criteria were applied. Then, further inclusion criteria were applied to arrive at the final list of included studies. Figure 4-2 shows a PRISMA diagram indicating how literature was identified and selected.

Figure 4-2. PRISMA Diagram of Systematic Literature Review and Inclusion



4.1.1 Initial Application of Eligibility Criteria

To be considered potentially relevant, the study had to conform to the following inclusion criteria:

- The study must have a primary research interest in the association between dust-lead and BLL.
- Methods and variables with the potential to act as confounders must be adequately described in the study.
- The age of the population must be described in detail and include children under seven years of age, consistent with the target population for this analysis as described in Section 2.2.
- The data had to be collected in the United States, Canada, or Europe. Data from other countries tend to be collected in areas with different housing attributes and higher BLL ranges and are less applicable to the United States population.
- Each included study also had to explicitly investigate the association of dust-lead and BLL on a one-to-one basis, such that at least one dust sample was collected from the residence that each study participant lived.
- Additionally, the population in each study had to be unique; if two studies both looked at the same population, the results of only one of the studies was included.
- Dust-lead must be measured as loading (μg/ft^2), not as dust-lead concentration levels (μg/g) to match the units of the hazard standard.

The goal of this literature search was to identify studies that were similar to the NHANES data set that had direct measures of the impact of dust-lead loading on BLL (where Dixon et al. (2009) only examined interaction terms regarding the relation of dust-lead and BLL), to provide support to the regression analyses described in Section 2.3 and 2.4. Applying the criteria above ultimately resulted in eleven studies to be considered for inclusion in the meta-analysis, excluding Dixon et al. (2009) whose analysis of the NHANES data set will be used as a reference value. The studies included in the empirical analysis were also reviewed with regards to the analytical techniques implemented to assess dust-lead levels. This review included documenting the specific methodology, levels of detection, analytical techniques, number of square feet sampled, and location of sampling (e.g., floor, sill, entry way, etc.) in each study. The full list of studies identified, along with a summary of the analytical techniques, is shown in Table 4-1.

Table 4-1. Summary of Methods and Final Inclusion Criteria from Empirical Literature

Study Details						Inclusion Criteria Applied		
Author	Level of Detection	Method	Analytical Technique	Sq. Ft. Sampled	Sample Location	Continuous Measures of Dust-lead/BLL	Log-linear Regression Model	Included in EPA Hazard Standard Analysis?
Dixon et al. (2009)	DL: 0.3 µg/dL	Wipe	Graphite furnace atomic absorption spectrometry (GFAAS), Flame atomic absorption spectrometry (FAAS)	1 sq ft floor length/width of sill	Room where child spent most time at home	Yes	Yes	NHANES data to be used a reference value - No
Cambra and Alonso (1995)	Lowest detected concentration: 10 µg/g	Vacuum	hot acid extraction with concentrated nitric acid, then subjected to atomization with acetylene/air flame	entire floor	Where child spent majority of waking hours (homes and daycare centers)	Yes	No	No
Kimbrough et al. (1995)	DL: <= 20 ppm half of LoD used for non-detects	Vacuum	EPA method 6010 using inductively coupled argon plasma emission spectroscopy	1 sq m floor, vacuumed 3x	Composite of main entrance, room most used by the child, and child's bedroom	Yes	No	No
Landrigan et al. (1975)	Lowest detected concentration: 100 ppm	Not Reported	Not Reported	Not Reported	Not Reported	No	No	No
Lanphear et al. (1996)	FAAS DL: 10 µg/sample graphite DL:	Wipe	FAAS followed by graphite furnace	1 sq ft floor	Floors, sills, window troughs of play area, child's bedroom, kitchen, and entryway	Yes	Yes-author provided	Yes

Table 4-1. Summary of Methods and Final Inclusion Criteria from Empirical Literature

Study Details						Inclusion Criteria Applied		
Author	Level of Detection	Method	Analytical Technique	Sq. Ft. Sampled	Sample Location	Continuous Measures of Dust-lead/BLL	Log-linear Regression Model	Included in EPA Hazard Standard Analysis?
	0.25 µg/sample							
Levallois et al. (2014)	DL: 0.01 µg Quantification limit: 0.015 µg/sample	Wipe	Inductively-coupled plasma mass spectrometry (ICP-MS)	1 sq ft floor, other surfaces measured to express µg/ft^2	Center of available floor space in child's room, entryway, and other frequented room as specified per child	Yes-author provided	Yes-author provided	Yes
Malcoe et al.[+] (2002)	QL: 2.5 µg/ft^2	Wipe	AAS	1 sq ft floor, bounded dimensions of sill	Floor and sill from all areas of home (including entryway, hallway, living room, play room, bathroom, kitchen, children's bedroom, and other rooms)	Yes	Yes	Yes
Oulhote et al. (2013)	LOQ: 2 µg/m^2	Wipe	ICP-MS	0.1 sq m	Floor where child was reported to play, 2 common areas of multiunit dwellings	Yes	No	Additional data requested from authors - No
Safruk et al. (2017)	DL: 1 µg/wipe, 0.001 µg/cm^2, 0.93 µg/ft^2	Wipe	FAAS, GFAAS	30 sq cm	Two hard floor surfaces where children spend significant time and common or play area	Yes	No	Additional data requested from authors - No
Sánchez-Nazario et al. (2003)	FAAS DL: 100 µg/L graphite DL: 1.0 µg/L	Wipe	FAAS followed by graphite furnace	1 sq ft floor, measured metric line of sill	Minimum of four floor samples (e.g. child's bedroom, entrance, living room, kitchen), sill of child's bedroom	Yes	Yes	Yes

Table 4-1. Summary of Methods and Final Inclusion Criteria from Empirical Literature

Study Details						Inclusion Criteria Applied		
Author	Level of Detection	Method	Analytical Technique	Sq. Ft. Sampled	Sample Location	Continuous Measures of Dust-lead/BLL	Log-linear Regression Model	Included in EPA Hazard Standard Analysis?
Yiin et al.[+] (2000)	FAAS DL: 0.5 ppm GFAA: 10 ppb	Vacuum and Wipe	FAAS for vacuum samples, GFAAS for wipes	0.25 m sq vacuum, 100 sq cm wipe	Wipes of floors and sills in areas most likely to be used by children (e.g., living rooms, bedrooms, and kitchens), vacuum for carpet and rugs	Yes	Yes	Yes
Zota et al. (2016)	DL: 0.01 μg/g	Vacuum	ICP-MS	2 sq m	Main living area floor	Yes	Yes	Yes

4.1.2 Final Selection of Included Empirical Literature

The majority of the studies selected to be included in the empirical analysis investigated the association of BLL and dust-lead loading through linear regression models. Therefore, the meta-analysis was designed to capture and pool the regression coefficients (β values) from each included study, weighted by the standard error around these values. These β values represent the change in log BLL resulting from a 1-unit change in log dust-lead levels.

In the final analysis, studies were included that met the following criteria:

- BLL and dust-lead levels must be captured as continuous measures (not categorical thresholds).
- The association between BLL and dust-lead levels must be compared through a log-linear regression model

Table 3-1 includes a breakdown of how each study met or fell short of each inclusion criterion and Table 4-2 presents a summary of the data in each included study.

Table 4-2. Summary of Epidemiologic data from Included Studies

Author	Study Design	Age of Children	No. of BLL Samples/ Child	BLL Measure-ment Technique	BLL Range [GM, GSD] (µg/dL)	Dust-lead Range (µg/ft²)
Lanphear et al. (1996, 2002)	Cross-Sectional	12-31 mos	6	Electrothermal atomization AAS	0.01-17.9 [7.7, 5.1]	10-1167
Levallois et al. (2014)	Cross-Sectional	1-5 yrs	1	ICP-MS	0.77-2.69 [1.32, NR]	0.19-4.70
Malcoe et al. (2002)	Nested Case-Control	1-6 yrs	1	Graphite furnace AAS	1.0-24.0 [5.8, 3.6]	1.3-924
Sánchez-Nazario et al. (2003)	Cross-Sectional	<7 yrs	2	Graphite furnace AAS	1.99-2.63 [2.28, NR]	2.59-6.35
Yiin et al. (2000)	Randomized Intervention Study	6-32 mos	12	Electrothermal atomization AAS	3-28 [9.56, 1.8]	0.01-709.78
Zota et al. (2016)	Birth Cohort	0-12 mos	3	ICP-MS	0.01-5.7 [1.5, 2.1]	0.01-14.3

NR = Not Reported

Authors of studies which did not include a linear regression analysis and were published in the past 10 years were contacted to ask for additional data so those findings can be properly integrated into the meta-analysis. Other investigations that collected dust-lead and BLL can be considered. EPA anticipates that additional studies may be identified that were not identified by our initial search. To date, linear regression data or raw data is available for six studies that match all inclusion criteria, with two additional studies pending, as illustrated in Figure 3-2. Additional information on the included studies, including any novel sub-analyses and data provided by the authors, is included in the Appendix (Section A).

4.1.3 Comparison of Data Ranges in Included Studies

Figure 4-3 and Figure 4-4 show the range of dust-lead loading and the range of BLL, respectively, in the different studies. Here the x-axis in both plots is on a log-scale and the blue band shows the central tendency while the gray bars show the range. It should be noted that

these graphs represent the overall central tendency and range of measurements of dust-lead loading and BLL, but those two data points may not have come from the same house/individual. These graphs were analyzed to identify studies that focus on highly-exposed populations. In general, the range in the dust-lead loading and BLL is broad in many of the studies, but is within the range of what would be expected in this analysis subpopulation.

Figure 4-3. Central Tendencies and Ranges of Floor Dust-lead Loading Measurements in Empirical Studies

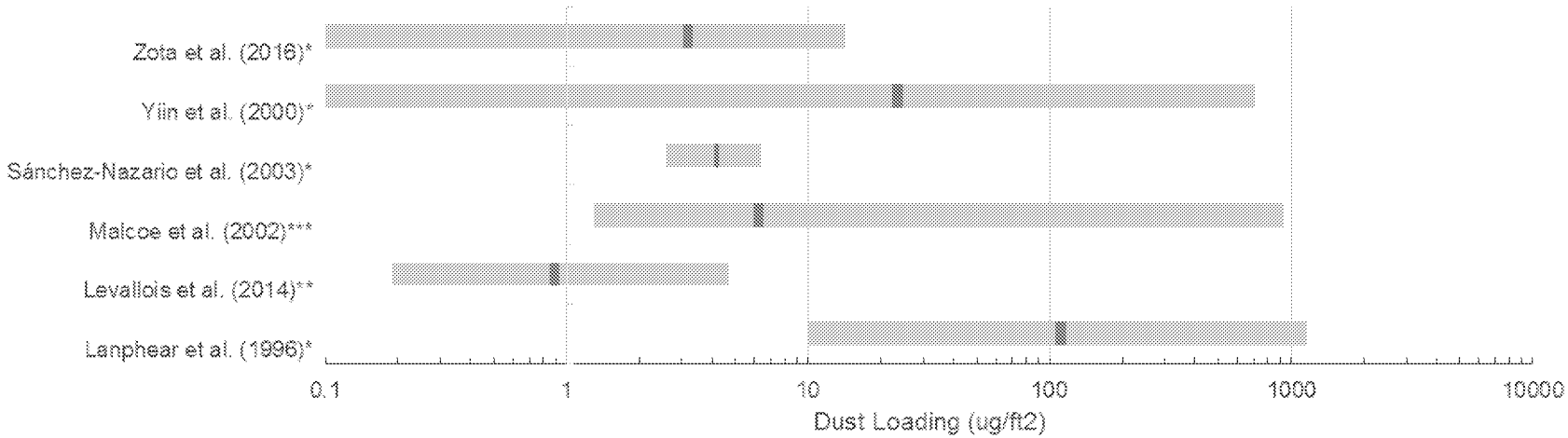
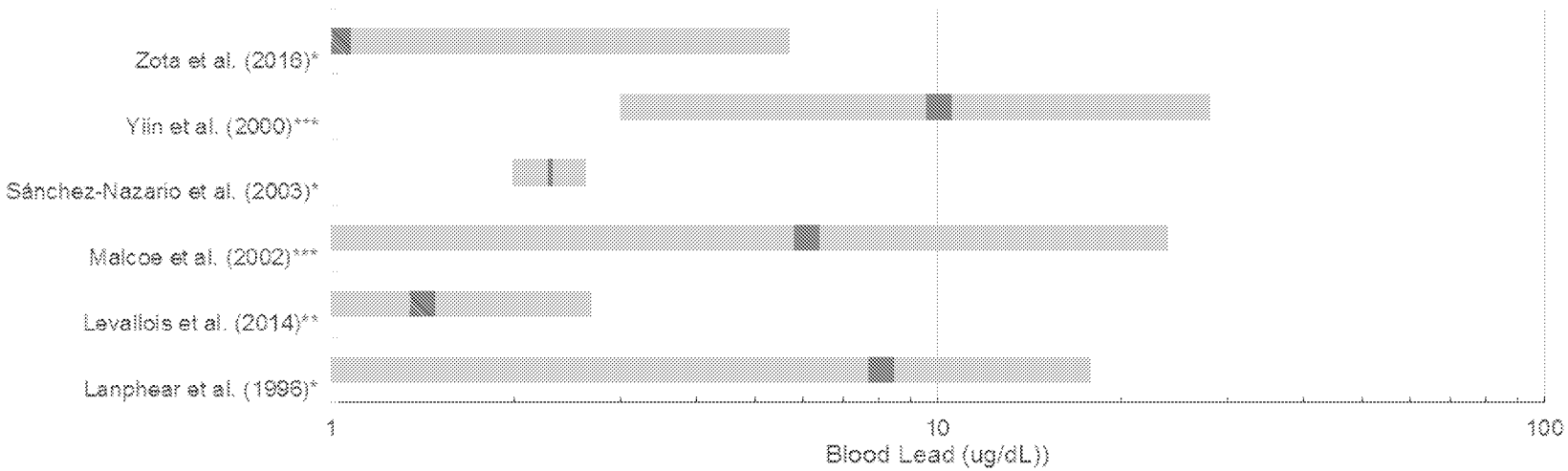


Figure 4-4. Central Tendencies and Ranges of BLL in Empirical Studies



*Range reported as ±2 SD, **Range reported as 10-90th percentile, ***Range reported as Min-Max values

4.2 NHANES Analysis by Dixon et al. (2009) and Gaitens et al. (2009)

The 1999-2004 NHANES data were analyzed in two papers by the same group of authors which aimed to determine how various housing and demographic characteristics influenced BLL in children (Gaitens et al., 2009; Dixon et al., 2009).

Dixon et al., (2009) developed a log-linear regression model (implemented using the SUDAAN programming package) that accounted for stratified sampling, clustering, and sampling weights, to characterize the relationship between geometric mean BLL, dust-lead loading, and other covariates in the NHANES data. For variables with missing values, the regressions included intercept terms to avoid eliminating large numbers of observations. The variable selection used backward stepwise elimination with the criterion $p > 0.10$. The model regressed $\log_e$ BLL against $\log_e$ floor dust-lead and $\log_e$ sill dust-lead, also adjusting for the previously selected variables, using a quartic function of age (in years) and a cubic function of $\log_e$ floor dust-lead. For the missing sill values, the $\log_e$ window sill dust-lead values were imputed using the unweighted regression ln(sill dust-lead) = 2.654 + 0.524 × ln(floor dust-lead). In Dixon et al., (2009) and in this analysis, references to log, $\log_e$, and ln all indicate the natural logarithm. In addition, a logistic regression model was used to predict the probability that BLL is ≥10 µg/dL and ≥5 µg/dL. Model fit was assessed using residual analysis for linear models (ignoring the survey data assumption) and analysis of deviance for the logistic models (accounting for survey weights, but ignoring clustering).

Table 4-3 displays the table of log-linear model coefficients reported by Dixon et al., (2009). The coefficients for all the powers of age are significant, along with those for all of the date of construction variables except 1940-49 (contrasted to Pre-1940 as a reference group). Poverty-income ratio (PIR) was significantly related to lower BLL, while being non-Hispanic Black or being born in Mexico (contrasted to non-Hispanic white as a reference group) was significantly associated with higher BLL. Living in a mobile home or trailer was associated with higher BLL, while living in a large apartment building was significantly correlated with lower BLL, at least in this dataset (the reference group was children living in single-family detached homes). Consistent with previous analyses, having one or more smoking adults in the household and having increased serum cotinine levels were both positively associated with BLLs. The interaction between having a window replaced or wall repaired in the last 12 months and living in a home constructed before 1978 also resulted in higher predicted BLL.

When considering home condition, higher BLL were positively correlated with having a smooth and cleanable or carpeted floor and with the log of floor dust-lead loading, as well as with 2nd-order interaction between floor dust-lead loading and floor condition. The sign of the (statistically significant) 3rd-order interaction coefficient between floor dust-lead loading and floor condition was negative. The coefficient for window sill dust-lead loading was also significantly positive in the log-linear model.

Table 4-3. Log-Linear Model Results for Children's BLL[a] (Dixon et al. 2009)

Variables	Overall p-value	Levels	Coefficient (SE)	p-Value
Intercept	0.172		−0.517 (0.373)	0.172
Age (in years)	< 0.001	Age	2.620 (0.628)	< 0.001
		Age^2	−1.353 (0.354)	< 0.001
		Age^3	0.273 (0.083)	0.002
		Age^4	−0.019 (0.007)	0.008
Year of construction	0.014	Intercept for missing	−0.121 (0.052)	0.024
		1990–present	−0.198 (0.058)	0.001
		1978–1989	−0.196 (0.060)	0.002
		1960–1977	−0.174 (0.056)	0.003
		1950–1959	−0.207 (0.065)	0.003
		1940–1949	−0.012 (0.072)	0.870
		Before 1940	0.000	—
PIR	< 0.001	Intercept for missing	0.053 (0.065)	0.420
		Slope	−0.053 (0.012)	< 0.001
Race/ethnicity	< 0.001	Non-Hispanic white	0.000	—
		Non-Hispanic black	0.247 (0.035)	< 0.001
		Hispanic	−0.035 (0.030)	0.251
		Other	0.128 (0.070)	0.073
Country of birth	0.002	Missing	−0.077 (0.219)	0.728
		United States[b]	0.000	—
		Mexico	0.353 (0.097)	< 0.001
		Elsewhere	0.154 (0.121)	0.209
Floor surface/condition × log floor dust-lead	< 0.001	Intercept for missing	0.178 (0.094)	0.065
		Not smooth and cleanable	0.386 (0.089)	< 0.001
		Smooth and cleanable or carpeted	0.205 (0.032)	< 0.001
Floor surface/condition × (log floor dust-lead)^2		Not smooth and cleanable	0.023 (0.015)	0.124
		Smooth and cleanable or carpeted	0.027 (0.008)	0.001
Floor surface/condition × (log floor dust-lead)^3		Uncarpeted not smooth and cleanable	−0.020 (0.014)	0.159
		Smooth and cleanable or carpeted	−0.009 (0.004)	0.012
Log window sill dust-lead	0.002	Intercept for missing	0.053 (0.040)	0.186
		Slope	0.041 (0.011)	< 0.001
Home-apartment type	< 0.001	Intercept for missing	−0.064 (0.097)	0.511
		Mobile home or trailer	0.127 (0.067)	0.066
		One family house, detached	−0.025 (0.046)	0.596
		One family house, attached	0.000	—
		Apartment (1–9 units)	0.069 (0.060)	0.256
		Apartment (≥ 10 units)	−0.133 (0.056)	0.022
Anyone smoke inside the home	0.015	Missing	0.138 (0.140)	0.331
		Yes	0.100 (0.040)	0.015
		No	0.000	—
Log cotinine concentration (ng/dL)	0.004	Intercept for missing	−0.150 (0.063)	0.023
		Slope	0.039 (0.012)	0.002
Window, cabinet, or wall renovation in a Pre-1978 home	0.045	Missing	−0.008 (0.061)	0.896
		Yes	0.097 (0.047)	0.045
		No	0.000	—

[a] n = 2,155; R2 = 40%.

[b] Includes the 50 states and the District of Columbia.

4.3 Reanalysis of the 1999-2004 NHANES Data

The log-linear model chosen by Dixon et al. (2009) is a widely accepted and frequently-employed method for evaluating relationships between household lead exposures and BLL (U.S. EPA, 1998a; U.S. EPA, 2000; Rust et al., 1997). From a statistical standpoint, it is a natural choice, because both environmental measurements (dust-lead loading, for example) and children's BLL distributions tend to be highly dispersed, with long positive tails, and are often well-approximated by lognormal distributions. After log-transformation, the data then can be analyzed by relatively conventional methods (multiple regressions) with minimal violations of important distributional assumptions. EPA therefore selected the Dixon et al. (2009) model as one approach to consider for predicting BLL associated with different floor and dust-lead hazard standards.

EPA reanalyzed the 1999–2004 NHANES for the specific purpose of evaluating several other robust statistical methods for estimating dust-lead/BLL relationships. The motivations for developing alternative models were to appropriately account for the impact of the small number of observations with very high dust-lead concentrations, to avoid the low-exposure supra-linearity associated with the log-log model form, and to include the dust-lead/BLL relationship as a main effect without an interaction term between floor lead and floor condition. EPA developed a series of empirical models based on assumptions relating dust-lead to BLLs and selected models to use for the exposure analysis.

Three different fitting techniques were used to estimate the dust-lead loading/BLL concentration relationship.

1. **Linear Quasi-likelihood**: The first employed a linear relationship between dust-lead and BLL and used quasi-likelihood methods to account for the dispersion in the data. The *survey* package[2] (Lumley 2010) in R programming language was used to fit generalized linear models (GLMs) to the untransformed and the transformed equations, using a model design that took into account the stratification and clustering of the 1999-2004 NHANES data. Based on an evaluation of the distributions of BLLs within deciles, the quasi-likelihood (QL) model variance was estimated as being proportional to the mean BLL.
2. **Dixon et al., no interaction term:** The second employed the same model form as the Dixon et al. (2009) and Gaitens et al. (2009) analysis but considered floor lead loading as a dependent variable without any interaction with the floor condition variable.
3. **Log-Linear in floor and sill, no covariates:** The third used the same model form as the Dixon et al. (2009) and Gaitens et al. (2009) analysis but did not include the covariates; instead, the effect of the covariates was captured entirely within the intercept.

Manual stepwise regression based on residual deviance was used to test individual variables for inclusion in the model. Variables were retained in the models if their coefficients were statistically significant and if they added more than approximately 0.5 percent to the explained deviance. Single variables were first tested for their contribution to deviance reduction, and then interaction variables were successively added to and removed from the model until the fit

[2] The package, first introduced in 2003, was available as ver. 3.22-4 from October 2010 to March 2011 and has been in ver. 3. since May 2005. Documentation for all phases of this open-source software and its development is freely available. This particular routine has been used in ver. 3.22-4 in Heeringa et al. (2010) side by side with several more well-known, statistical packages.

was no longer improved. Based on the findings of Dixon et al. (2009), powers of age up to the fourth power were tested for inclusion, along with all the other variables that were included in their model. Intercepts were included for each variable to account for any missing data.

The results of the dust-lead loading/BLL models are summarized in Table 4-4. Coefficients for both floor and window sill dust-lead loading are highly significant, along with the first three powers of age. Unlike in the findings of Dixon et al. (2009), the fourth power of age was not found to be a significant predictor of BLL. Being non-Hispanic black or born in Mexico were significant and positive predictors of BLL (but not being born in "other" countries), while higher income (Poverty Income Ratio) was associated with lower BLL. Living in a large apartment complex was significantly correlated with lower BLL, and coefficients for all housing age categories more recent than 1950 were also negative (compared to the Pre-1940 units). The coefficient for houses built between 1940 and 1949 was also negative, but not significant.

Table 4-4. Summary of Regression Equations for Dust-lead Loading/BLL Relationships

Model		Dixon et al. 2009; Gaitens et al. 2009		EPA Reanalysis					
		Cubic in ln(floor dust-lead loading) with covariates and interaction terms		Linear in floor dust-lead loading with covariates, quasi-likelihood regression		Cubic in ln(floor dust-lead loading) with covariates and without interaction terms		Linear in ln(floor dust-lead) and ln(sill dust-lead) without covariates or interaction terms	
Model Form		$\ln(PbB) = Intercept + A \times \ln(DustLoading) \times FloorCondition + B \times \ln^2(DustLoading) \times FloorCondition + C \times \ln^3(DustLoading) \times FloorCondition + D \times \ln(Sill\ Loading) + E \times Covariate1 + F \times Covariate2 + G \times Covariate3 \ldots$		$PbB = Intercept + A \times DustLoading + D \times Sill\ Loading + E \times Covariate1 + F \times Covariate2 + G \times Covariate3 \ldots$		$\ln(PbB) = Intercept + A \times \ln(DustLoading) + B \times \ln^2(DustLoading) + C \times \ln^3(DustLoading) + D \times \ln(Sill\ Loading) + E \times Covariate1 + F \times Covariate2 + G \times Covariate3 \ldots$		$\ln(PbB) = Intercept + A \times \ln(DustLoading) + +D \times \ln(Sill\ Loading)$	
Variables		**Coeff (SE)**	**p-val.**	**Coeff (SE)**	**p-val.**	**Coeff (SE)**	**p-val.**	**Coeff (SE)**	**p-val.**
Intercept		−0.517 (0.373)	0.172	2.135	<0.001	-0.333 (0.482)	0.493	0.656 (0.047)	<0.001
Floor dust-lead loading, μg/ft²	Slope	None	None	0.629	<0.001	None	None	None	None
Sill dust-lead loading, μg/ft²	Slope	None	None	5E-04	<0.001	None	None	None	None
Floor dust-lead loading, μg/ft²	Intercept for missing	None	None	None	None	0.171 (0.11)	0.127	0.187 (0.124)	0.138
ln (floor dust-lead loading), μg/ft²	Slope	None	None	None	None	0.218 (0.034)	<0.001	0.226 (0.019)	<0.001
ln² (floor dust-lead loading), μg/ft²	Slope	None	None	None	None	0.026 (0.009)	0.007	None	None
ln³ (floor dust-lead loading), μg/ft²	Slope	None	None	None	None	-0.01 (0.004)	0.017	None	None
ln (window sill dust-lead loading), μg/ft²	Intercept for missing	0.053 (0.040)	0.186	None	None	0.074 (0.047)	0.12	0.12 (0.059)	0.047
	Slope	0.041 (0.011)	<0.001	None	None	0.048 (0.012)	<0.001	0.074 (0.014)	<0.001
Floor surface/condition	Intercept for missing	0.178 (0.094)	0.065	None	None	None	None	None	None

Table 4-4. Summary of Regression Equations for Dust-lead Loading/BLL Relationships

Model		Dixon et al. 2009; Gaitens et al. 2009		EPA Reanalysis					
		Cubic in ln(floor dust-lead loading) with covariates and interaction terms		Linear in floor dust-lead loading with covariates, quasi-likelihood regression		Cubic in ln(floor dust-lead loading) with covariates and without interaction terms		Linear in ln(floor dust-lead) and ln(sill dust-lead) without covariates or interaction terms	
× ln (floor dust-lead loading), μg/ft²	Not Smooth and Cleanable	0.386 (0.089)	<0.001	None	None	None	None	None	None
	Smooth and Cleanable or Carpeted ("Other")	0.205 (0.032)	<0.001	-0.182	0.008	None	None	None	None
Floor surface/condition × ln² (floor dust-lead loading), μg/ft²	Not smooth and cleanable	0.023 (0.015)	0.124	None	None	None	None	None	None
	Smooth and Cleanable or Carpeted ("Other")	0.027 (0.008)	0.001	None	None	None	None	None	None
Floor surface/condition × ln³ (floor dust-lead loading), μg/ft²	Uncarpeted not smooth and cleanable	−0.020 (0.014)	0.159	None	None	None	None	None	None
	Smooth and Cleanable or Carpeted ("Other")	−0.009 (0.004)	0.012	None	None	None	None	None	None
Age (months) x ln (floor dust-lead loading), μg/ft²	Age	None	None	-0.007	0.001	None	None	None	None
Age (in months)	Age	2.620 (0.628)	<0.001	0.087	0.01	2.926 (0.804)	<0.001	None	None
	Age²	−1.353 (0.354)	<0.001	-0.003	0.004	-1.52 (0.451)	0.002	None	None
	Age³	0.273 (0.083)	0.002	<0.001	0.004	0.309 (0.105)	0.005	None	None
	Age⁴	−0.019 (0.007)	0.008	None	None	-0.022 (0.009)	0.015	None	None
PIR	Intercept for missing	0.053 (0.065)	0.42	None	None	0.059 (0.065)	0.369	None	None
	Slope	−0.053 (0.012)	<0.001	-0.162	<0.001	-0.067 (0.014)	<0.001	None	None
Race/ethnicity	Non-Hispanic white	0	—	0	—	-0.076 (0.07)	0.285	None	None
	Non-Hispanic black	0.247 (0.035)	<0.001	0.869	<0.001	0.186 (0.069)	0.009	None	None
	Hispanic	−0.035 (0.030)	0.251	None	None	-0.126 (0.066)	0.062	None	None
	Other	0.128 (0.070)	0.073	None	None	0	—	None	None
Country of birth	Missing	−0.077 (0.219)	0.728	None	None	0	—	None	None
	United States		—	0	—	0	—	None	None
	Born in Mexico	0.353 (0.097)	<0.001	1.279	0.001	0.381 (0.101)	<0.001	None	None
	Elsewhere	0.154 (0.121)	0.209	None	None	0.198 (0.117)	0.097	None	None
Year of construction	Intercept for missing	−0.121 (0.052)	0.024	None	None	-0.151 (0.058)	0.013	None	None
	Residence Built post-1990	−0.198 (0.058)	0.001	-0.712	0.002	-0.233 (0.065)	<0.001	None	None

Table 4-4. Summary of Regression Equations for Dust-lead Loading/BLL Relationships

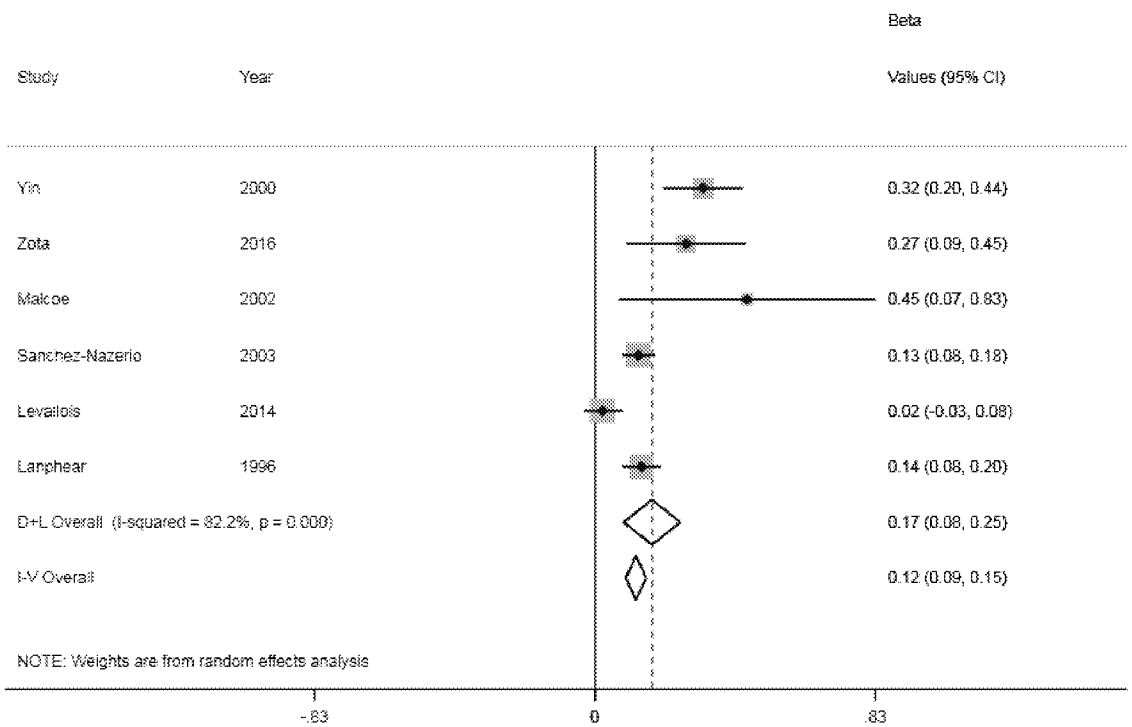
Model		Dixon et al. 2009; Gaitens et al. 2009		EPA Reanalysis					
		Cubic in ln(floor dust-lead loading) with covariates and interaction terms		Linear in floor dust-lead loading with covariates, quasi-likelihood regression		Cubic in ln(floor dust-lead loading) with covariates and without interaction terms		Linear in ln(floor dust-lead) and ln(sill dust-lead) without covariates or interaction terms	
	Residence Built 1978–1989	−0.196 (0.060)	0.002	-0.756	<0.001	-0.241 (0.069)	0.001	None	None
	Residence Built 1960–1977	−0.174 (0.056)	0.003	-0.523	0.005	-0.219 (0.069)	0.003	None	None
	Residence Built 1950–1959	−0.207 (0.065)	0.003	-0.682	0.005	-0.247 (0.073)	0.002	None	None
	Residence Built 1940-1949	−0.012 (0.072)	0.87	None	None	-0.031 (0.088)	0.725	None	None
	Residence Built Pre-1940	0	—	0	—	0	—	None	None
Home-apartment type	Intercept for missing	−0.064 (0.097)	0.511	None	None	None	None	None	None
	Mobile home or trailer	0.127 (0.067)	0.066	None	None	0.067 (0.062)	0.282	None	None
	One family house, detached	−0.025 (0.046)	0.596	None	None	-0.113 (0.051)	0.034	None	None
	One family house, attached	0	—	0	—	-0.097 (0.066)	0.151	None	None
	Apartment (1-9 units)	0.069 (0.060)	0.256	None	None	0	—	None	None
	Apartment Complex > 10 units	−0.133 (0.056)	0.022	-0.353	<0.001	-0.192 (0.049)	<0.001	None	None
	Other	None	None	None	None	-0.274 (0.089)	0.004	None	None
Anyone smoke inside the home	Missing	0.138 (0.140)	0.331	None	None	0.135 (0.155)	0.39	None	None
	No smokers	0	—	0	—	-0.111 (0.045)	0.017	None	None
	One or More Smokers in Household	0.100 (0.040)	0.015	0.521	0.001	0	—	None	None
Floor surface/ condition	Not Smooth and Cleanable	None	None	0	—	-0.023 (0.084)	0.781	None	None
	Smooth and Cleanable	None	None	0.203	0.11	0	—	None	None
ln (cotinine concentration) (ng/dL)	Intercept for missing	−0.150 (0.063)	0.023	None	None	-0.143 (0.071)	0.049	None	None
	Slope	0.039 (0.012)	0.002	None	None	0.038 (0.014)	0.011	None	None
Window, cabinet, or wall renovation in a Pre-1978 home	Missing	−0.008 (0.061)	0.896	None	None	-0.28 (0.176)	0.118	None	None
	Yes	0.097 (0.047)	0.045	None	None	None	None	None	None
	No	0	—	None	None	-0.098 (0.058)	0.098	None	None

4.4 Meta-analysis of Empirical Data on the Association of BLL and Dust-lead

Among the studies that matched our inclusion criteria but required additional data from the authors was the Lanphear study of the Rochester Longitudinal Lead Cohort (Lanphear et al., 1996). In the original study, Lanphear et al. present a linear regression analysis of BLL and dust-lead loading, but not on a log-log scale. Therefore, we have reanalyzed the data from this cohort to generate a simple linear regression of the relationship between log BLL and log dust-lead loading and included the coefficient in our meta-analysis. We have also received additional information from Levallois et al. including coefficient values from a multiple linear regression model they performed on their data to assess the effect of floor dust-lead on BLL, which have been included in the pooled analysis.

Due to the variety of study populations, laboratory standards and analytical methods, and covariates included in the papers, the confidence intervals around each beta varied from study to study and a statistically significant amount of heterogeneity was observed, as shown in Figure 4-5 (I^2=69.1%, p=0.012). A random effects pooled estimate (DerSimonian and Laird [D+L Overall] estimate) was therefore utilized for the final meta-analysis model. Fixed effect models (inverse-variance [I-V Overall] estimates) require that studies in the analysis are functionally identical, with common effect sizes, and limit the generalizability to other populations. Random effect models are optimal to use when a variety of populations are included in the meta-analysis, such as across the studies we have included in our analysis, and allow generalizability to a wider range of scenarios and populations by estimating a mean distribution of effects.

Figure 4-5. Meta-analysis of Included Empirical Literature



The β values from the five currently included studies were all relatively similar, ranging from 0.02-0.45, with no statistically significant difference between their values. Based on the random effects pooled estimate incorporating all these studies, BLL are expected to increase by 0.17 log µg/dL for each 1 log µg/ft^2 increase in dust-lead levels (95% CI, 0.08 to 0.25). As previously discussed, the Dixon et al. (2009) study examines the effect of dust-lead loading on BLL only as the interaction between floor surface/condition and floor dust-lead loading. Therefore, that study was excluded from the pooled estimate. However, the pooled estimate strongly supports the log-linear regression model derived from NHANES without an intercept, which estimated that BLL would increase 0.26 log µg/dL for each 1 log µg/ft^2 increase in dust-lead. Furthermore, the similarity between the beta coefficients derived from these data sets adds supporting evidence to regression models based on NHANES data.

5 Neurocognitive Effects in Children and Modeling IQ Changes

5.1 Summary of Evidence of Neurodevelopmental Health Effects in Children

Several comprehensive reviews of the adverse health effects in humans of lead exposure have been published, including, EPA's Integrated Science Assessment for Lead (U.S. EPA, 2013), the National Toxicology Program's Monograph on Low-Level Lead Exposures (NTP, 2012) and the Toxicological Profile for Lead of the Agency for Toxic Substances and Disease Registry (ATSDR, 2007). In addition, the American Academy of Pediatrics has issued a policy statement recognizing the evidence that continues to accrue that commonly encountered BLLs, even those below 5 µg/dL (50 ppb), impair cognition in children (AAP, 2016). In this section, we present a brief summary of the health effects of lead exposures in children, with a focus on neurodevelopmental outcomes.

Reduced cognitive functions in children is the effect best substantiated as occurring at the lowest BLLs (AAP, 2016; U.S. EPA, 2013; NTP, 2012). The intelligence quotient (IQ) is a commonly measured neurodevelopmental endpoint in lead-exposed children, and BLL is the most common exposure/dose metric in epidemiologic studies. In addition to affecting cognitive function, lead is also associated with decrements on tests of attention, increased impulsivity, and hyperactivity (NTP 2012; U.S. EPA 2013). In addition, there is evidence that lead exposure can lead to conduct disorders, depression, anxiety, auditory, motor function decrements. The evidence suggests that the neurodevelopmental effects of lead exposure may persist into adolescence and adulthood. A major strength of the evidence for the cognitive and behavioral effects of low levels lead exposures in children is the consistency of findings across multiple epidemiologic studies conducted in diverse populations. As discussed in EPA's Integrated Science Assessment for Lead (U.S. EPA, 2013), the exposure patterns contributing to the BLLs reported in studies of young children is relatively certain compared to older children and adults. Accordingly, we focus the discussion of public health implications relevant to this review predominantly on nervous system effects, including IQ decrements, in children.

Overall, there is consistent evidence of cognitive function decrements as measured by Full Scale IQ, academic performance, and executive function) in young children (4 to 11 years old) with mean or group BLLs (measured at various life stages and time periods) between 2 and 8 µg/dL (U.S. EPA, 2013). A number of epidemiologic cohort studies in various populations of children (Boston, Cincinnati, Cleveland, Mexico City, Port Pirie, Rochester, and Yugoslavia) consistently

reported changes in full scale IQ at BLLs less than 10 µg/dL measured prenatally (maternal or umbilical cord) or early in childhood or averaged over childhood (Bellinger et al., 1991; Bellinger et al., 1992; Canfield et al., 2003; Hornung et al., 2009; Jusko et al., 2008; Lanphear et al. 2005; Needleman and Bellinger 1991). Several cross-sectional and prospective analyses of the Rochester, Boston, and Cincinnati cohorts found associations between higher concurrent or lifetime (to age 5 years) BLLs and poorer memory in children ages 5-16 years (Canfield et al. 2004; Froehlich et al., 2007). Prenatal and postnatal lead exposure as low as 5 µg/dL had an adverse effect on infant neurodevelopment as measured by the Mental Development Index (MDI) and the Psychomotor Development Index (PDI) of the Bayley Scales of Infant Development BSID-II (MDI and PDI) (U.S. EPA, 2013; Liu et al., 2014).

The Centers for Disease Control and Prevention's (CDC) Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) recognizes that "no blood lead threshold for adverse health effects has been identified in children, and no BLL above zero is free of all risk" (ACCLPP 2012; Shefa and Heroux 2017). EPA's Integrated Science Assessment for Lead (U.S. EPA, 2013) also concluded that a threshold BLL at with which nervous system effects, and specifically neurocognitive effects, occur in young children cannot be discerned from the currently available studies. In an international pooled analysis of seven cohort studies, estimated that an increase in a child's BLL from 2.4 µg/dL to 10 µg/dL would result in a decrease of approximately 3.8 IQ points (Kirrane and Patel, 2014; Lanphear et al. 2005)). Multiple studies show that lead exposures have a greater incremental effect on intelligence test scores at relatively lower levels of exposure (Lanphear et al., 2005; Crump et al., 2013). More recently, in a large prospective cohort study, Evens et al. (2015) found that early life BLLs < 10 µg/dL were inversely associated with reading and math scores in third grade children. The non-linear effect for reading scores (steeper failure rates at lower BLLs) has been reported in several new studies (Evens et al. 2015, Magzamen et al., 2015). In a large National Health and Nutrition Examination Survey (NHANES) cross-sectional study, Geier et al. (2017) found a significant dose-dependent relationship between increasing BLLs in 6 to 15 year olds and increasing risk of learning disabilities, with children in the higher percentiles (1.007 to 13.5 µg/dL) of BLL more likely to have learning disabilities than those in the lower percentiles (0.2 to 1.007 µg/dL) BLLs.

The impact of exposure to lead can be long lasting. A prospective cohort study based on a population representative 1972-1973 birth cohort from New Zealand (the Dunedin Multidisciplinary Health and Development Study) found that lead exposure in childhood (mean BLLs at age 10 of 10.99 µg/dL) was significantly associated with lower cognitive function and socioeconomic status at age 38 years (Reuben et al., 2017). Greater childhood lead exposure was also associated with greater declines in IQ from childhood to adulthood and greater declines in socio-economic status relative to parents (Reuben et al., 2017).

Low-level lead exposures have also been associated with attention decrements, impulsivity, and hyperactivity symptoms (assessed using objective neuropsychological tests and parent and teacher ratings) in children 7-17 years (U.S. EPA, 2013). The strongest evidence for BLL associated increases in these behaviors was found in prospective studies examining prenatal (maternal or cord), age 3-60 months, age 6 years, or lifetime average (to age 11-13 years) mean BLLs of 7 to 14 µg/dL and groups with early childhood (age 30 months) BLLs >10 µg/dL. Several case-control studies found higher concurrent BLLs in children with diagnosed ADHD; however, because ADHD studies had various limitations in terms of design, inconsistent adjustment for SES and parental education, they were not a major consideration in drawing conclusions (U.S. EPA, 2013). A recent prospective analysis of a random sample of birth cohort members from

the Project on Human Development in Chicago Neighborhoods (Winter and Sampson 2017) reported significant associations between increased BLLs in childhood and elevated adolescent impulsivity, anxiety or depression (Winter and Sampson 2017).

Conduct disorder behaviors, increased criminal behavior, elevated parent and teacher ratings of internalizing behaviors such as symptoms of depression or anxiety, and withdrawn behavior in early adulthood were found in populations of young children with mean BLLs 7 to 14 µg/dL (U.S. EPA, 2013; NTP, 2012).

BLLs <10 µg/dL in children have also been associated with decreased auditory acuity, decreased hearing thresholds, and elevated brainstem auditory evoked potentials (BAEPs) in children and young adults (NTP, 2012; U.S. EPA, 2013). These associations were found with BLLs measured at various time periods, including prenatal maternal, neonatal (10-day mean 4.8 µg/dL), lifetime average, and concurrent BLLs (median 8 µg/dL). For evidence of visual function impairments in children, the available epidemiologic and toxicological evidence is of insufficient quantity, quality and consistency (U.S. EPA, 2013) to support a significant association with BLLs.

Results in a few epidemiologic studies indicate associations of childhood BLLs (ranges 4.8 to 31.1 µg/dL) and changes in brain structure (white matter microstructure) and functional changes in cognitive performance or motor skills in young adults (U.S. EPA, 2013). However, because of the small samples sizes of several studies and limited consideration for potential confounding, implications of the effects of lead exposure specifically on changes in brain structure and physiology are not certain.

5.2 Selection of IQ Concentration-Response Relationships

Studies have previously demonstrated a statistically significant relationship between BLL and IQ loss, and the slope of the relationship is steeper for lower BLLs (Tellez Rojo et al., 2006; Kordas et al., 2006; Lanphear et al., 2005; Canfield et al., 2003; Bellinger and Needleman 2003). To quantify the relationship, data from separate studies were pooled together and evaluated using different BLL metrics (peak, lifetime, concurrent, and early-childhood) and different functional forms. The sections below summarize the original study and three reanalysis studies. Then, the findings are summarized and selections are made for this hazard standard analysis.

5.2.1 Lanphear et al. (2005) Pooled Analysis

Lanphear et al. (2005) reported the results of seven studies that measured full-scale IQ in school age children (mean age at IQ testing was 6.9 years) in four U.S. cities (Boston, Cincinnati, Cleveland, and Rochester), as well as in Australia, Mexico, and Yugoslavia. All children were assessed using age-appropriate versions of the Wechsler scales. Four measures of lead exposure were examined: concurrent BLL (BLL closest in time to the IQ test), maximum BLL level (highest BLL measured at any time prior to the IQ test), average lifetime BLL (time-weighted mean BLL incorporating the results of all BLL measurements from 6 months to the concurrent sample), and early childhood BLL average (mean BLL across all samples taken between ages 6 to 24 months). A pooled analysis of the relationship between cord BLLs and IQ also was conducted in the sub-sample for which cord blood samples were available.

Lanphear et al. explored regression models that adjusted for the effect of BLL for site, as well as 10 common potential confounders. These included HOME Inventory scores, birth weight, maternal education and IQ, and prenatal substance abuse. Statistical testing was employed to assess the linearity or nonlinearity of the relationship between BLLs and FSIQ. Regression

diagnostics also were performed to ascertain whether lead coefficients were affected by co-linearity or influential observations. The fits of all four measures of postnatal BLLs were compared based on R^2 values. The BLL measure with the largest R^2 (adjusted for the same covariates) was nominated *a priori* as the preferred BLL index relating lead exposure to IQ in subsequent inspections of the relationships. The primary analysis used a fixed-effects model, although a mixed model treating sites as random effects was also examined.

The median lifetime average BLL concentration in the seven cohorts that were studied was 12.4 µg/dL (5th to 95th percentile, 4.1 to 34.8 µg/dL), with about 18 percent of the children having peak BLLs below 10 µg/dL. Thus, regression equations are based on higher BLLs, with relatively few children in the lower BLL range typical of the broader U.S. population. All four measures of postnatal exposure were highly correlated. However, the concurrent BLL exhibited the strongest association with IQ, as estimated by R^2. Nevertheless, the results of the regression analyses for all BLL measures were very similar. The best-fitting model included the log of concurrent BLL, study site, maternal IQ, HOME Inventory scores, birth weight, and maternal education. No significant interactions were observed between BLL and study site or other covariates.

Various models, including a linear model, a cubic spline function, a log-linear model, and a piecewise linear model, were investigated in Lanphear et al. (2005). The shape of the concentration-response relationship was determined to be non-linear; the log-linear model was found to best fit to the data, based on R^2 values.

5.2.2 Crump et al. (2013) Reanalysis of Lanphear et al. (2005) Data

Crump et al. (2013) subsequently obtained the raw data set supporting the Lanphear et al. pooled analysis, attempted to replicate the results of the original study, sought to identify problems with the data and statistical methods that were used to analyze them, and proceeded to "evaluate the robustness of their conclusions." Their paper consists of two parts: a reanalysis using the same functional forms and a new analysis based on fitting to the ln(BLL+1).

In their analysis, Crump et al. implemented several adjustments to the treatment of the data:

- They developed a revised site-specific scheme for linking specific BLL sampling rounds to specific IQ measurements.
- Derived time-weighted average BLL metrics to substitute for the unweighted metrics used by Lanphear et al., and added BLL measurements at 24 months into the calculation of the averages.
- Corrected the equation used in the log transformation of BLL data from the Boston cohort and used full scale IQ rather than performance IQ.
- Substituted the McCarthy Scales of Children's Abilities General Cognitive Index measured at 57 months for the Wexler full-scale IQ at 120 months that had been used as the "concurrent" IQ measure for BLL measured in the Boston cohort at 57 months. For all other groups, Wexler full-scale IQ measurements were selected.
- Identified IQ measurement in 10 children from the Mexican Cohort where the closest "concurrent" measurement was at age 78 months rather than 72 months.

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Crump et al. then attempted to replicate the earlier regression estimates derived by Lanphear et al., using the original data and the data that had been "corrected" based on the adjustments noted above. Based on that analysis, Crump et al. indicated "Although we found some small errors and questionable decisions by Lanphear et al. that, taken alone, could cause doubt in their conclusions, our reanalysis tended to support their conclusions. We concluded that there was statistical evidence that the exposure-response is non-linear over the full range of BPb evaluated in these studies, which implies that, for a given increase in BLL, the associated IQ decrement is greater at lower BPb levels."

5.2.3 Kirrane and Patel (2014) Reanalysis of Lanphear et al. (2005) Data

EPA also independently performed a reanalysis of the Lanphear et al. data in order to verify the Crump reanalysis (Kirrane and Patel, 2014). In their memorandum, they detailed the analysis they performed and reinforced the conclusions from Crump that while there were errors in the original Lanphear analysis, the conclusions from that original analysis remain unchanged. They also noted that while the Lanphear study found that concurrent and lifetime BLL regression had the highest R^2 values, the updated analysis found that the early childhood values had the highest R^2, although the R^2 values for concurrent, lifetime, and early childhood are all very close (0.6414, 0.6411, and 0.6433, respectively).

5.2.4 Budtz-Jørgensen et al. (2013) Estimation of BMDs and BMDLs

Budtz-Jørgensen et al. (2013) estimated BLL-IQ relationships from the Lanphear et al. (2005) data using a set of linear mixed models. An important difference from the previous is the use of likelihood methods (rather than linear regression) were used to optimize the models. This allowed relative goodness of fits and model parsimony to be compared using differences in AIC (Akaike Information Criteria.) Another important difference was that Budtz-Jørgensen et al. applied the results of their models to derive BMD and BMDL estimates for a change of 1.0 IQ points for each BLL metric.

EPA has decided not to employ the Budtz-Jørgensen et al. results in estimating IQ loss associated with the different candidate standards. Use of the continuous regression models from the Lanphear/Crump et al. analysis does not require that selection of a cutoff value for reduced IQ and will produce a continuous distribution of IQ loss as a function of exposure. In contrast, the Budtz-Jørgensen BMDs and BMDLs are calculated for specified values of IQ loss (1 point, 1 percent, etc.), so the output of a risk assessment using these values would be an estimate of what proportion of the exposed population exceeds the selected cutoff values. EPA believes that the regression approach will provide more useful information about the distribution of outcomes (predicted IQ changes) than would be obtainable using the BMDs/BMDLs from the Budtz-Jørgensen et al. study without considerable adaptation.

5.2.5 Additional Summary of Studies from the Lead NAAQS Review

As part of the Lead NAAQS 2014 review, EPA collected average linear slopes from U.S. studies with young children with BLLs closest to the U.S. average BLL at that time. They compiled average linear slopes from those studies for the central tendency BLL range of 2.9 to 3.8. In those studies, the median slope was -1.75. Because many of the BLL scenario central tendencies also apply in this general BLL range, this slope can be used to help evaluate which concentration-response curve might be most appropriate.

Table 5-1. Table 3-3 from the 2014 Lead NAAQS Review: "Summary of quantitative relationships of IQ and blood Pb for analyses with blood Pb levels closest to those of young children in the U.S. today."

Blood Pb Levels (µg/dL)			Average Linear Slope[A] (IQ[B] points per µg/dL)
Geometric Mean	Range (min-max)	Study/Analysis	
2.9	0.8 – 4.9	Tellez-Rojo et al (2006)[B], subgroup with concurrent blood Pb <5 µg/dL	-1.71
3.3	0.9 – 7.4	Lanphear et al (2005)[C], subgroup with peak blood Pb <7.5 µg/dL	-2.53
3.32	0.5 – 8.4	Canfield et al (2003)[C], subgroup with peak blood Pb <10 µg/dL	-1.79
3.8	1 - 9.3	Bellinger and Needleman (2003)[C], subgroup with peak blood Pb <10 µg/dL	-1.56
		Median value	-1.75

A - Average linear slope estimates here are generally for relationship with IQ assessed concurrently with blood Pb measurement. As exceptions, Bellinger & Needleman (2003) slope is relationship for 10 year old IQ with blood Pb levels at 24 months, and the data for Boston cohort included in Lanphear et al 2005 slope are relationship for 10 year old IQ with blood Pb levels at 5 years.
B -The slope for Tellez-Rojo et al 2006 is for BSID (MDI), a measure of cognitive development appropriate to study population age (24-mos).
C - The Lanphear et al. (2005) pooled international study also includes blood Pb data from the Rochester and Boston cohorts, although for different ages (6 and 5 years, respectively) than the ages analyzed in Canfield et al. (2003) and Bellinger and Needleman (2003). Thus, the ages at the blood Pb measurements used in derivation of the linear slope for the Lanphear et al (2005) subgroup shown here are 5 to 7 years. The blood Pb levels and coefficient presented here reflect the recalculation using the corrected pooled dataset (Kirrane and Patel, 2014).

Originally compiled from information in U.S. EPA (2008) and Kirrane and Patel (2014).

5.2.6 Summary of Concentration-Response Functions and Selections for this Analysis

For the Hazard Standard analysis, EPA considered the following:

- Which BLL metric should be used
- Which functional form should be used to relate IQ changes to BLLs (e.g., log-linear, piecewise linear, etc.)
- Which version of the regression parameters should be used

The log-linear relationships are advantageous because they do not have a discontinuity where the slope abruptly changes, as is true for the bilinear models. However, these models go to infinity when BLLs are 0. In the Lead NAAQS analysis, log-linear models were used with the following assumptions:

1. Assume IQ values cannot be predicted for BLLs below the lowest BLL measured in the pool study. In this way, identify a cutpoint below which the IQ change is assumed to be zero.
2. Assume the slope is linear at low doses; implement the cutpoint, but assume a linear concentration-response curve below the cutpoint, where the slope is equal to the slope at the cutpoint.

These were evaluated separately for both the lifetime and concurrent metrics.

The Crump et al. regression using ln(BLL+1) overcomes the discontinuity at BLL=0 by adding 1 to the BLL; this means that when BLL=0, IQ loss equals zero. Thus, this is an additional functional form that allows estimation of IQ loss at BLL below the cutpoint.

Table 5-2. Functional Form of Selected IQ Concentration-Response Functions

Functional Form	Equation	
Log-linear with Cutpoint	$If\ BLL \leq cutpoint,$	0
	$If\ BLL > cutpoint,$	$beta \times \ln(BLL)$
Log-linear with Linearization Below Cutpoint	$If\ BLL \leq cutpoint,$	$low\ dose\ slope \times BLL$
	$If\ BLL > cutpoint,$	$low\ dose\ slope \times cutpoint + beta \times \ln(BLL)$
Log-linear for BLL+1		$beta \times \ln(BLL + 1)$

Table 5-3. Parameter Values of Selected IQ Concentration-Response Functions

	Concurrent			Lifetime		
	From Kirrane and Patel, 2014 and Crump et al. 2013		From Crump et al. 2013	From Kirrane and Patel, 2014 and Crump et al. 2013[1]		From Crump et al. 2013
	Concurrent, Log-linear with Cutpoint	Concurrent, Log-linear with linearization below 1	Concurrent, Log-linear for BLL+1	Lifetime, Log-linear with Cutpoint at 1.47	Lifetime, Log-linear with linearization below 1.47	Lifetime, Log-linear for BLL+1
Beta	-2.65	-2.65	-3.315	-3.14	-3.14	-3.246
Cutpoint	1	1	NA	1.47	1.47	NA
low-dose slope	N/A	-2.65	NA	NA	-2.14	NA

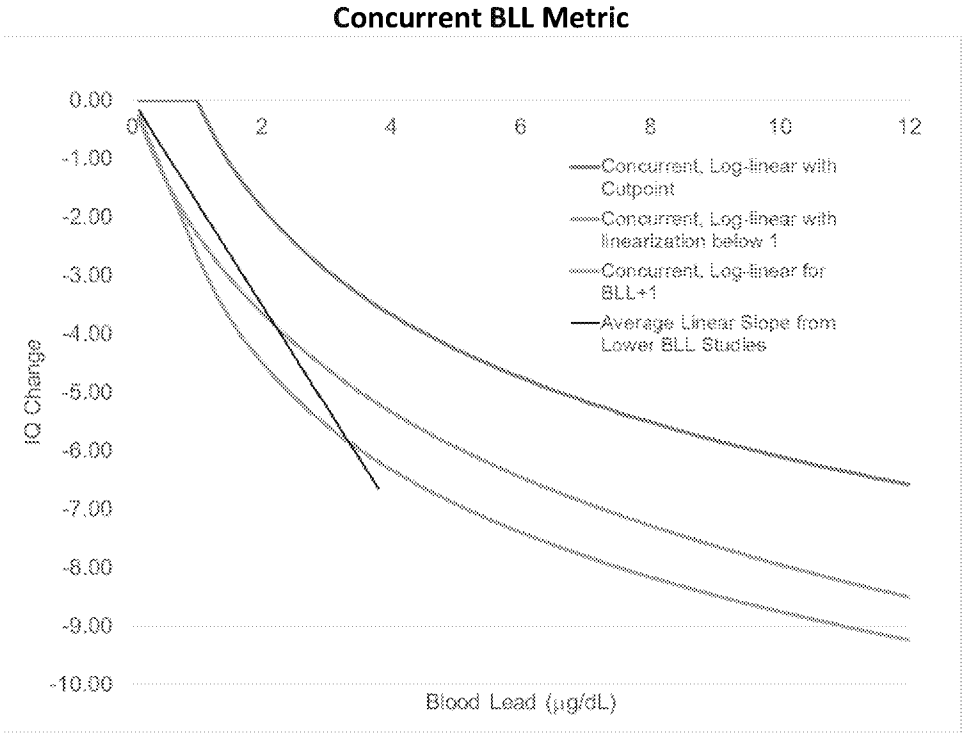
[1]Crump et al. (2013) and Kirrane and Patel (2014) found slightly different lifetime beta values (-3.14 versus -3.19). The Kirrane and Patel values were used in this analysis.

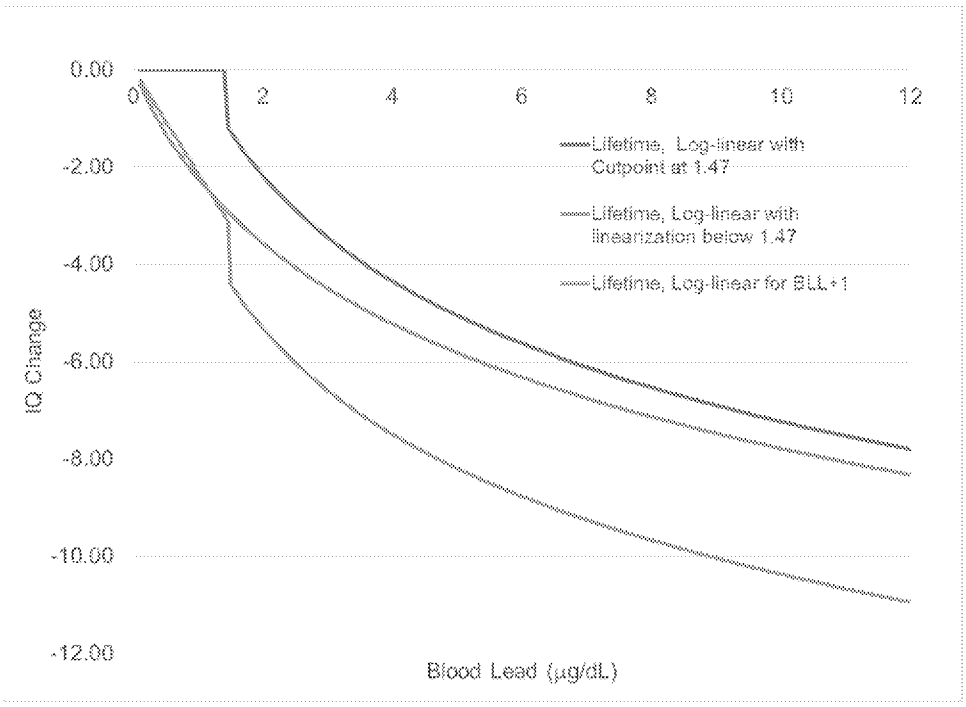
For this analysis, EPA retained the NAAQS log-linear functional forms, with associated cutpoints and low-dose slopes; the Crump et al. regression using ln(BLL+1) was added as a third option. As with the Lead NAAQS, these were evaluated for both the concurrent and lifetime average metrics. Because the lifetime average cutpoint is not 1 μg/dL (it was adjusted based on the lowest lifetime average BLL in the underlying seven studies, or 1 μg/dL), there is a discontinuity in the log-linear lifetime curves. Table 5-2 and Table 5-3 provide a summary of the functional forms, cutpoints, and beta values.

Figure 5-1. IQ Concentration-Response Functions Used in Analysis for Concurrent Metric (upper) and Lifetime Average Metric (lower)

illustrates the shape of the curves. All six expressions were used in the hazard standard analysis to facilitate exploration of the sensitivity of IQ loss to the choice of regression equation.

Figure 5-1. IQ Concentration-Response Functions Used in Analysis for Concurrent Metric (upper) and Lifetime Average Metric (lower)





Also shown in the figure is the median linear slope for lower BLL studies from the NAAQS analysis. This value is used to help place the other expressions into context for lower BLLs and in the range where many of the candidate hazard standard median BLLs will fall. Of the available curves, the ln(BLL+1) curve most closely follows this slope at lower BLLs.

6 Predicted Sub-population BLL and IQ for Empirical and Mechanistic Methods

The approaches documented in Sections 3 and 4 were implemented to estimate the key outcome metrics for the analysis, as shown in Table 6-1 below. Age-specific BLL is the predominant metric if considering BLL as the relevant outcome of interest; it illustrates a snapshot of the BLL for a child of that age for each candidate. They tend to be largest around age two owing to ingestion rates. The concurrent and lifetime BLL, in contrast, are predominantly for use in estimating the IQ changes; they are valid for children between age five and seven, the times when children in the Lanphear et al. pooled analysis took the IQ test. Thus, the graphs in the sections focus on different ages for the different metrics.

Table 6-1. Summary of Metrics Estimated for Each Analysis

green shading identifies the metrics evaluated; gray indicates metrics that are not available for that analysis

Analysis	Age-Specific BLL[1]		Concurrent BLL[2]		Lifetime BLL[3]		IQ, Using Concurrent Equation (2)		IQ, Using Lifetime Equations (3)	
	Total	Dust-Only	Total	Dust-Only	Total	Dust-Only	Total	Dust-Only	Total	Dust-Only
Mechanistic – Deterministic, Median and Mean Only										
Mechanistic – Sensitivity, Median Only										
Mechanistic – Probabilistic, mean, 50th and 97.5th Percentiles										
Empirical – mean 50th and 95th Percentiles										

[1] BLL at each age between 0 and 7 years old, in increments of either 6 months (deterministic) or 1 year (probabilistic)

[2] BLL at ages 5-7, concurrent with when the IQ test was administered in the study supporting the concentration-response function

[3] Average BLL between age 0 and 5, 0 and 6, or 0 and 7, consistent with the lifetime metric in the study supporting the concentration-response function

As a reminder, Table 6-2 repeats the candidate hazard standards mentioned in Section 2. In the following graphs and tables, these are referred to by "option number" as well as by the floor and sill values (e.g., 10f, 100s represents a floor loading of 10 μg/ft^2 and a sill loading of 100 μg/ft^2).

Table 6-2. Candidate Floor and Sill Dust-lead Loadings

Option	Floor Dust-lead Loading (µg/ft²)	Sill Dust-lead Loading (µg/ft²)
Option 1 (Current)	40	250
Option 2	40	150
Option 3	40	100
Option 4	40	50
Option 5	30	250
Option 6	30	100
Option 7	20	250
Option 8	20	100
Option 9	15	250
Option 10	15	100
Option 11	10	250
Option 12	10	150
Option 13	10	100
Option 14	10	50
Option 15	5	250
Option 16	5	100
Option 17 (Background) [1]	1	10

[1] Background floor and sill values taken from the geometric means in the NHANES 1999-2004 survey; updated values using the AHHS data could be substituted in future efforts.

6.1 Mechanistic Approach

The mechanistic approach consists of the following:

- Deterministic results for model evaluation (individual, central tendency)
- Sensitivity analysis to prioritize variables
- Probabilistic analysis to characterize 50th and 97.5th percentiles (sub-population, distribution)

The models were completed for the six scenarios (Residence: Pre-1940, 1940-1977, Pre-1978; COF: Pre-1940, 1940-1977, Pre-1978) and for ages between 0 and 7 years of age. Illustrative example charts and tables are provided in Section 6.1; results for all scenarios for total BLL and dust-only IQ loss for a subset of the options are provided in Appendix B and C.

6.1.1 Deterministic Analysis and Model Evaluation

For the deterministic analysis, all metrics were estimated for all scenarios, including both total BLL/IQ and dust-only BLL/IQ. The graphs in this section are intended to provide a snapshot of the results to illustrate trends across different input variables (residence versus COF, building vintage, age of child, outcome metric, and hazard standard candidate combination). The mechanistic approach was also run two different ways:

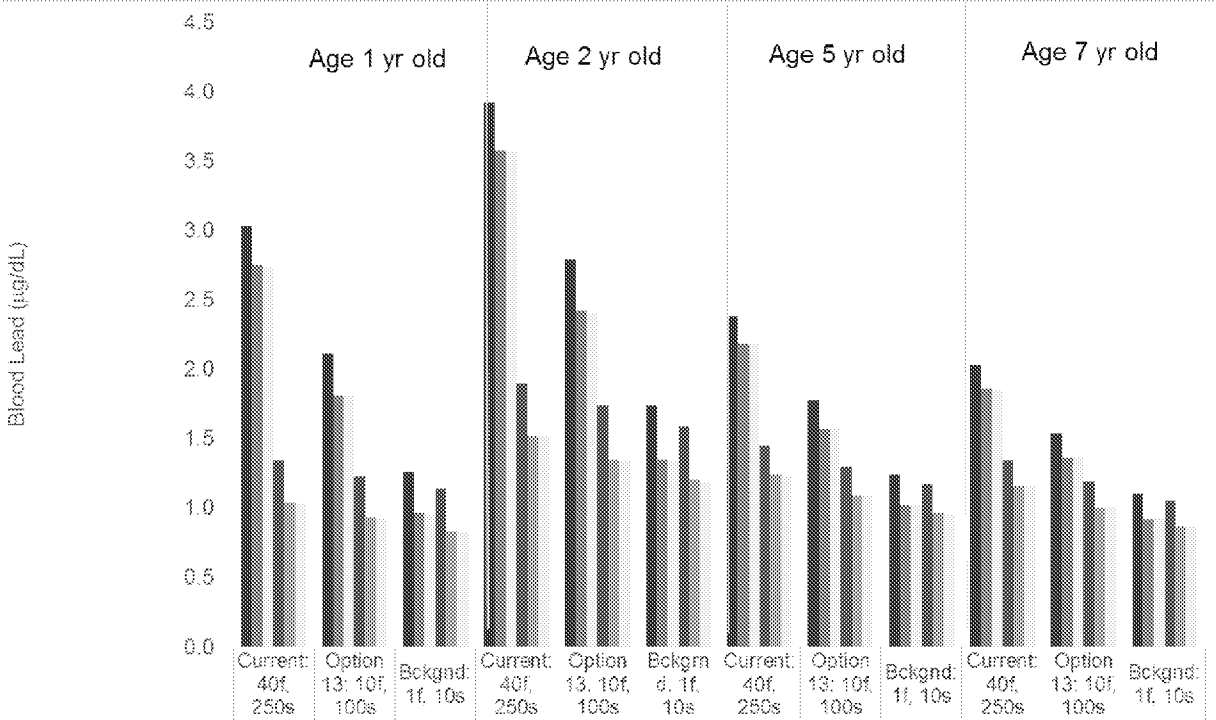
1. Using the medians from all input distributions to illustrate the central tendency
2. Using the means from all input distributions to illustrate the central tendency

In general, the mean values are larger than the median values for the lognormal distributions used in the analysis.

BLL: Comparison Across Ages, Candidates, and Scenarios

Figure 6-1 shows the deterministic total age-specific BLLs using median inputs for three different candidate hazard standards spanning the range of the full list of candidates (current conditions at 40 μg/ft^2 for floor and 250 μg/ft^2 for sill, alternate of 10 μg/ft^2 floor and 100 μg/ft^2 sill, and background levels at 1 μg/ft^2 floor and 10 μg/ft^2 sill). The results are shown for all scenarios and for four of the ages. In general, the residential scenarios have higher BLLs than the COF scenarios, predominantly because the time spent in residences is high for children. BLLs are also higher for the earlier housing vintage compared with the later vintage because of the difference in background soil concentrations in those scenarios. And finally, BLLs are highest for two-year-olds compared with the younger and older children owing to higher dust and soil ingestion rates for that age group. Median BLLs range from 3.9 (current conditions) to 1.3 (background residential dust conditions) μg/dL for a two year old in a residence, and from 1.9 to 1.2 μg/dL for a two year old in a COF. For a five year old, the range is narrower (2.4 to 1.0 μg/dL in residences and 1.5 to 1.0 μg/dL in COFs).

Figure 6-1. Median Total Age-Specific BLL for Three Candidates (Current, 10f 100s, and Background) at Four Ages Across Six Scenarios



	Current: 40f, 250s	Option 13: 10f, 100s	Bckgnd: 1f, 10s	Current: 40f, 250s	Option 13: 10f, 100s	Bckgnd: 1f, 10s	Current: 40f, 250s	Option 13: 10f, 100s	Bckgnd: 1f, 10s	Current: 40f, 250s	Option 13: 10f, 100s	Bckgnd: 1f, 10s
Residence Pre-1940	3.0	2.1	1.3	3.9	2.8	1.7	2.4	1.8	1.2	2.0	1.5	1.1
Residence 1940-1977	2.6	1.8	1.0	3.6	2.4	1.4	2.2	1.6	1.0	1.9	1.4	0.9
Residence Pre-1978	2.7	1.8	1.0	3.6	2.4	1.3	2.2	1.6	1.0	1.9	1.4	0.9
COF Pre-1940	1.3	1.2	1.1	1.9	1.7	1.6	1.5	1.3	1.2	1.3	1.2	1.1
COF 1940-1977	1.0	0.9	0.8	1.5	1.4	1.2	1.2	1.1	1.0	1.2	1.0	0.9
COF Pre-1978	1.0	0.9	0.8	1.5	1.3	1.2	1.2	1.1	1.0	1.2	1.0	0.9

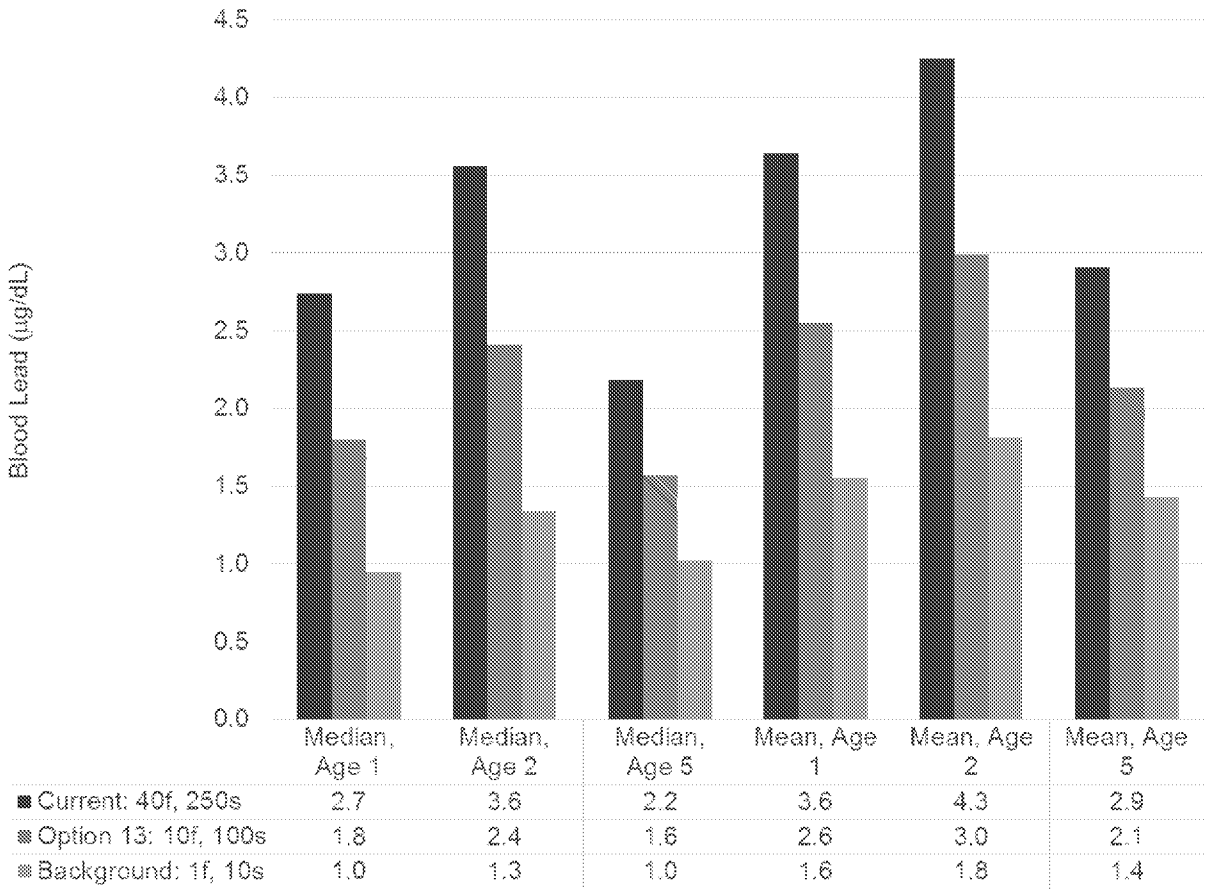
BLL: Comparison of Median and Mean Estimates for Several Candidates

As discussed in Section 3, the deterministic results were run two different ways:

1. Using the medians from all variable distributions
2. Using the means from all variable distributions

The specific values used are provided throughout Section 3.2. In exposure science, both the median and mean are often used to capture "central tendency". The mean will tend to be higher than the median if many of the underlying variable distributions are skewed toward higher values (e.g., lognormal distributions). In probability theory, the median indicates the BLL for the person in which half the population has higher values and half the population has lower values. The mean, on the other hand, is the "expected value" of any individual randomly chosen from the population. Figure 6-2 illustrates the magnitude of difference when using median inputs versus mean inputs, where using medians is expected to be closer to the overall distribution median while using means is expected to be closer to the overall distribution mean. In general, the means are larger than the medians by less than 1 µg/dL.

Figure 6-2. Mean and Median Age-Specific Total BLL for the "Residence Pre-1978" Scenario at Two Years of Age For Three Candidates (Current, 10f 100s, and Background)



BLL: Model Evaluation Using Central Tendency Estimates

The previous graphs illustrate trends in the deterministic results. Figure 6-3, instead, provides a comparison between modeled data and the NHANES BLL surveys. Because BLLs have steadily decreased since the 1980s, two different time periods are shown: 2005-2010 and 2009-2016. The mechanistic model involves independently setting over fifteen different variables, some of which vary by age. They were also selected from a wide range of data sources, some of which are based on earlier data (e.g., dietary concentrations) than others (e.g., maternal BLLs). Thus, an important model check is comparing the model predictions under background dust conditions for different age groups with the NHANES central tendencies and confidence intervals.

The NHANES data consist of individual-level BLLs along with a weight that can be used to weigh individuals differently to create a nationally-representative BLL estimate. These individual BLLs and weights can be used to calculate a variety of statistics including the population geometric mean, the population median, or the population arithmetic mean. Because NHANES generally follows a lognormal distribution, the geometric mean and the median are similar and the arithmetic mean is larger because of the influence of the tails of the distribution. These different statistics can be used to evaluate different assumptions in the input parameter distributions and the deterministic modeling.

The checks performed include:

1. **Overall Range:** Are the overall BLLs in the same range as the NHANES data? Are they closer to current conditions or older NHANES surveys?
2. **Trend With Age**: Is the trend with age similar to the trend in the NHANES data?
3. **Input Parameter Geometric Means/Medians:** Are the NHANES geometric means consistent with the modeled estimates using the geometric mean/median from all input distributions?
4. **Input Parameters Geometric Standard Deviations:** Are the NHANES arithmetic means consistent with the modeled estimates using the arithmetic means from all input distribution? That would lend partial evidence that the underlying parameter geometric standard deviations (which affect how much larger the tails are than the geometric means) are consistent with measured data.

Figure 6-3 compares the geometric means from NHANES with the deterministic results using geometric means (left) and the arithmetic means from NHANES with the deterministic results using arithmetic mean inputs (right) for the Pre-1978 residential scenario and Option 17 (background) dust-lead levels. Overall, the range of the modeled values are within the range of the measured values for both the medians and the means. The trend with age is also broadly consistent with NHANES. Finally, the medians are between the range of medians for the two NHANES survey and the means are within the range of the latest NHANES survey. Thus, this model comparison overall lends support for the selected model inputs and biokinetic model.

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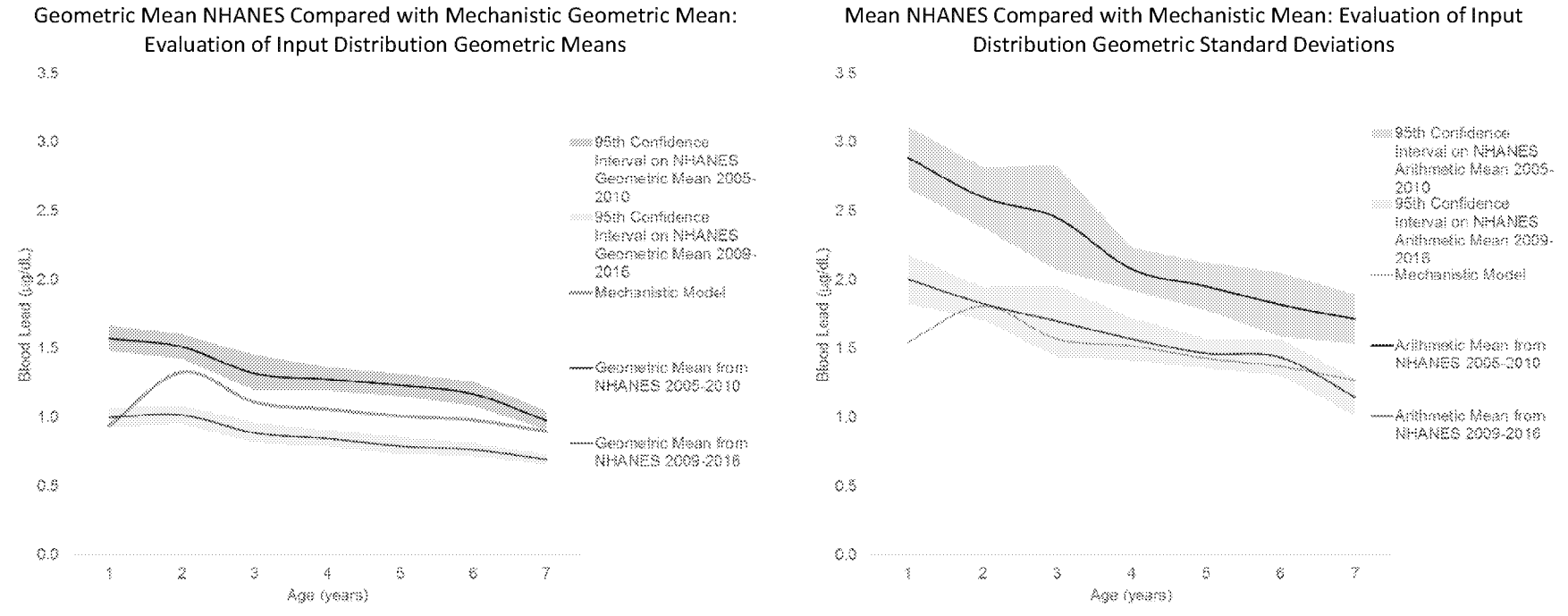
Figure 6-3. Comparison of Deterministic Results Using Both Geometric and Arithmetic Mean Variable Inputs for the Background Scenario



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6.1.2 Sensitivity Analysis

A sensitivity analysis was undertaken to identify sensitive model parameters prior to implementing a probabilistic modeling analysis.

To rank the variables, the elasticity was calculated:

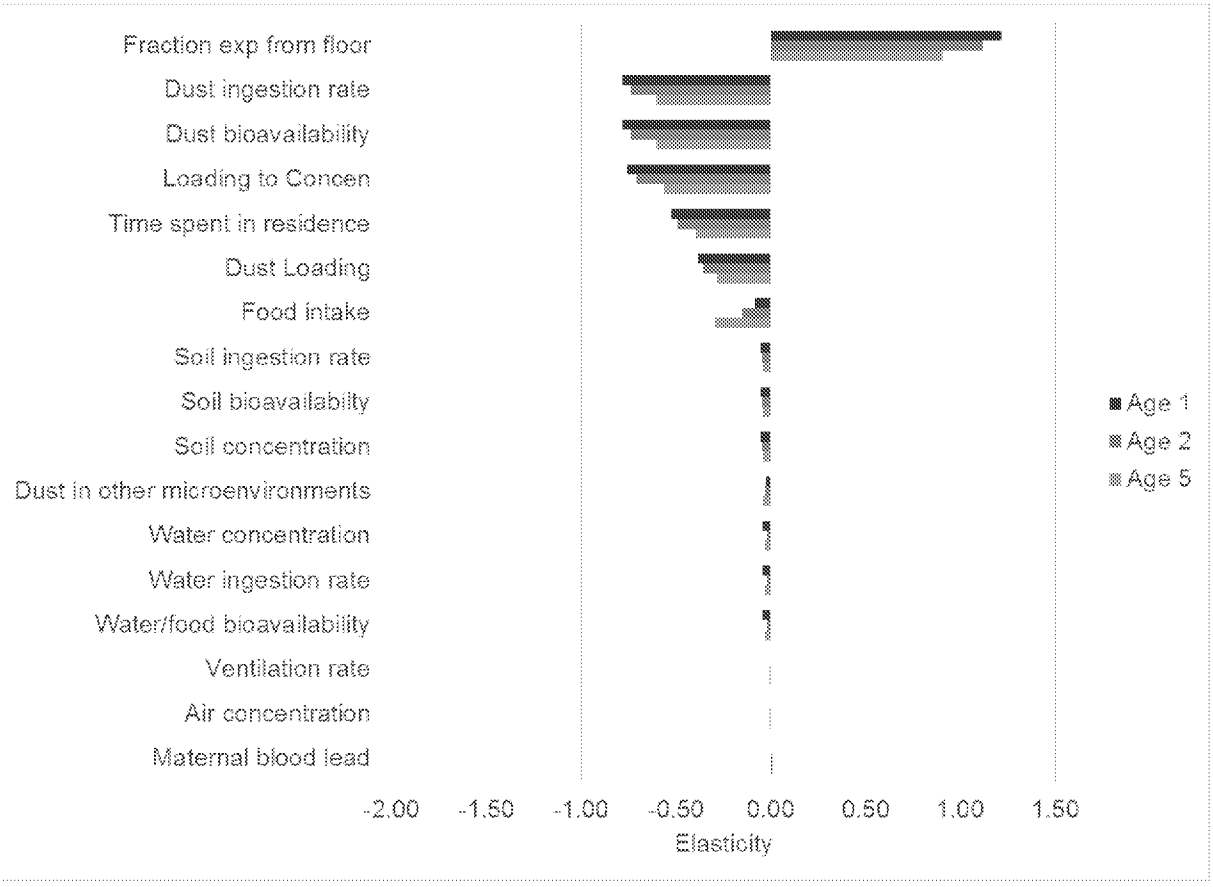
$$Elasticity = \frac{\%\ change\ in\ blood\ lead}{\%\ change\ in\ input\ value} \qquad \text{Equation 14}$$

The elasticity indicates that if a variable were to change by 1%, the corresponding BLL would change by [elasticity] %. Thus, an elasticity of 0.1 means a 1% change in the variable results in a 0.1% change in the BLL, while an elasticity of 1 means a 1% change in the variable results in a 1% change in the BLL. Variables with higher elasticities are more sensitive. Finally, negative elasticities indicate that when the variable is increased, the corresponding BLL decreases.

Figure 6-4 shows the elasticity of the input variables for the residential scenario at three ages (top) and three scenarios at age 2 (bottom). The elasticities are sorted by their magnitude, so that the most sensitive variables appear at the top of the charts. Note that "fraction exposure from floor" could also have been presented as "fraction exposure from sill" and would have had a positive rather than negative elasticity. The fraction of exposure from floor and other dust-related variables are among the most sensitive, along with the loading to concentration conversion, the time spent in the residence, and the food intake. Soil and water parameters have a much more limited contribution, and the inhalation parameters and maternal BLLs have elasticities close to 0, indicating a very limited effect on BLL.

Table 6-3 provides the elasticities for the most sensitive variables for the 10f, 100s option for a two-year-old. The table also provides an example of the % change in BLL that would arise from a 10% change in the variable given the elasticity.

Figure 6-4. Elasticity for Each Variable Examined in the Sensitivity Analysis



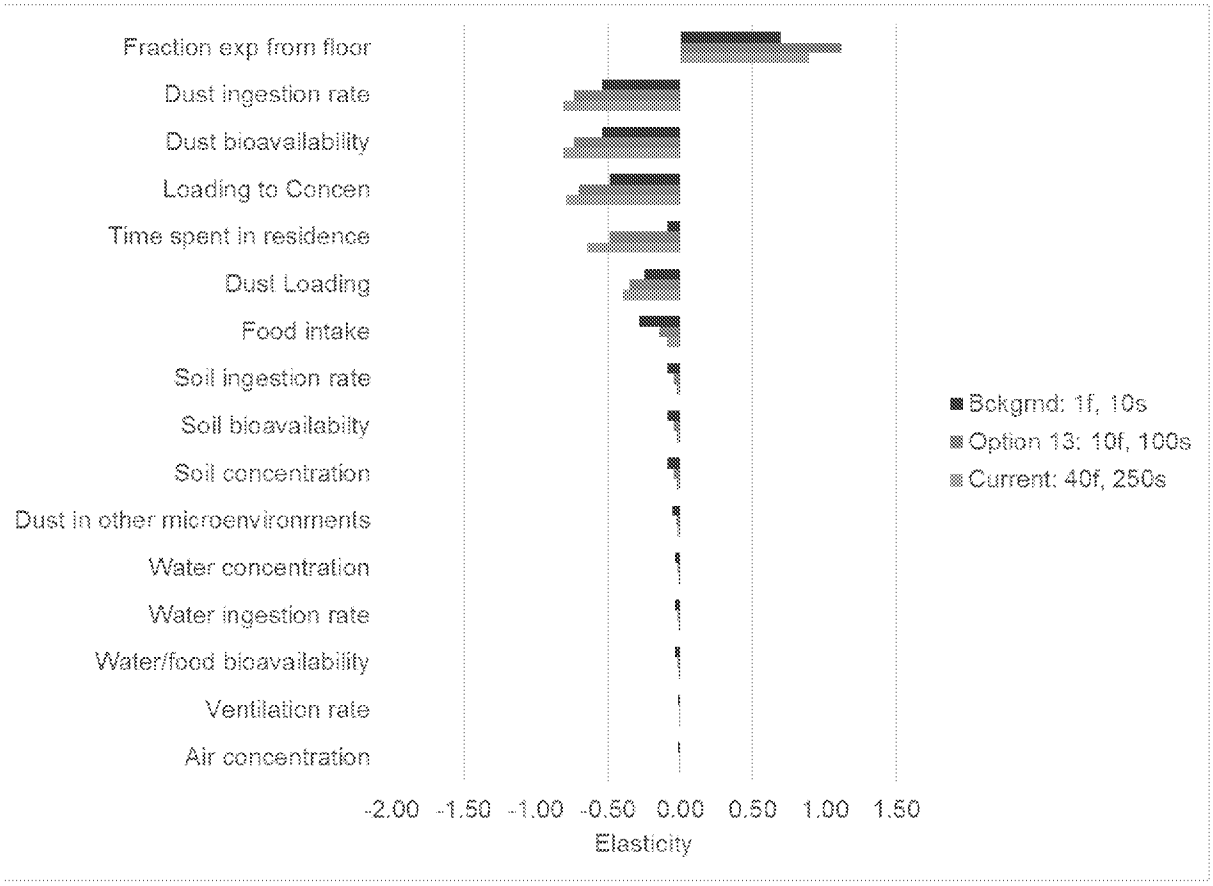


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Table 6-3. Most Sensitive Variables for a Two Year Old for the 10f 100s Option with Elasticities and Demonstration of Associated Percent Change in BLL

	Elasticity	If variable changed by 10%, median BLL would change by…
Fraction exp from floor	-0.90	-9%
Dust ingestion rate	0.81	8%
Dust bioavailability	0.81	8%
Loading to Concentration conversion	0.79	8%
Time spent in residence	0.64	6%
Dust-lead Loading	0.39	4%
Food intake	0.10	1%

This sensitivity analysis does not include the GSD; it is based on median BLLs, and the GSD does not affect median values. However, the GSD strongly affects upper percentiles. Table 6-4 shows 95th and 97.5th percentiles in a lognormal distribution for two different median BLLs (1.5 and 3 µg/dL) and three different GSDs (1.4, 1.6, and 1.8). The increasing GSD increases the upper percentiles and also increases the difference between the 97.5th and 95th percentile. Although care was taken to consider all options and select the GSD based on data evidence, the GSD remains a key uncertainty in this analysis.

Table 6-4. Example Sensitivity of Upper Percentiles to GSD

Median BLL (µg/dL)	GSD	95th Percentile (µg/dL)	97.5th Percentile (µg/dL)
1.5	1.4	2.6	2.9
	1.6	3.2	3.8
	1.8	4.3	5.3
3.0	1.4	5.2	5.8
	1.6	6.5	7.5
	1.8	7.9	9.5

6.1.3 Fit for Purpose-Probabilistic Analysis

Based on the sensitivity analysis and considerations of what data were available to determine variable distributions, input variables were either specified as distributions and sampled as part of the probabilistic analysis or were set to their deterministic value. Table 6-5 provides a summary of the input variables, whether that variable is deterministic or probabilistic, and the distribution type. The bioavailabilities were not varied because they are assumed to be part of the biological variability represented by the GSD. To focus on the microenvironment of interest, the dust in other microenvironments were also held at their central tendency value. The air parameters and maternal BLL were not included because the sensitivity analysis revealed very limited sensitivity. Details about the distributions are provided in Section 3.

Table 6-5. Summary of Variables in Probabilistic Analysis

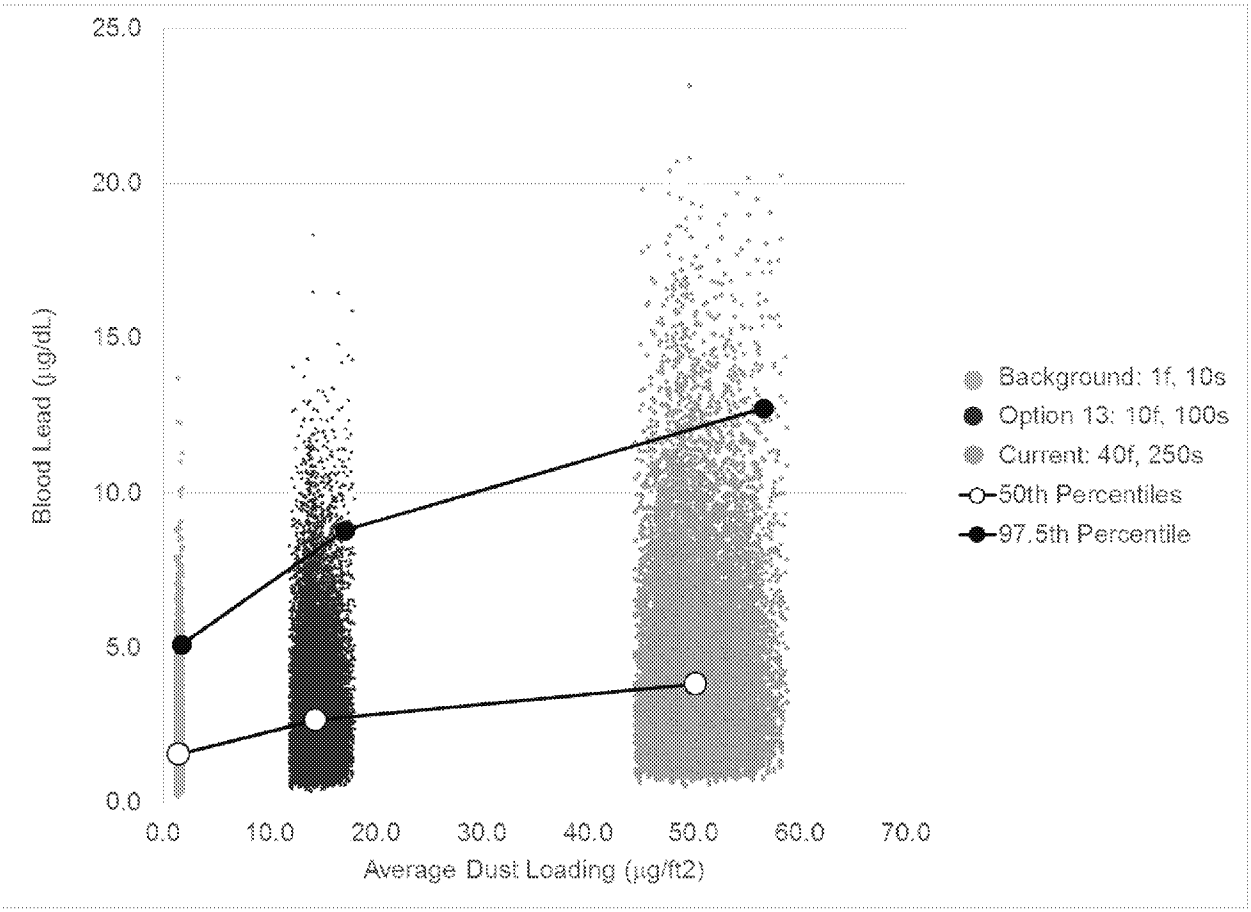
Variable	Deterministic or Probabilistic?	Distribution Type
Dust ingestion rate	Probabilistic	Lognormal
Soil ingestion rate	Probabilistic	Lognormal
Water ingestion rate	Probabilistic	Lognormal
Food intake	Probabilistic	Lognormal
Ventilation rate	N/A	None
Dust-lead in other microenvironments	Deterministic	Central Tendency
Soil concentration	Probabilistic	Lognormal
Water concentration	Probabilistic	Lognormal
Air concentration	N/A	None
Dust bioavailability	Deterministic	Central Tendency (variability included via biological GSD)
Soil bioavailability	Deterministic	Central Tendency (variability included via biological GSD)
Water bioavailability	Deterministic	Central Tendency (variability included via biological GSD)
Food bioavailability	Deterministic	Central Tendency (variability included via biological GSD)
Fraction exposure from floor	Probabilistic	Triangular
Time spent in residence	Probabilistic	Beta
Loading to concentration conv.	Probabilistic	Uses normal distribution for error term
Maternal BLL	N/A	None

As with the deterministic section, the graphs below are intended to provide information about magnitudes and trends across variables for the analysis. Summary tables across additional scenario/option combinations are provided in Appendices B and C.

BLL Values Across All Iterations

The probabilistic analysis included 2,000 separate iterations per scenario, where each iteration represents one modeled individual with sampled variable values. Then, the biological GSD was used to create seven additional BLL estimates for each of the iterations, for a total of 14,000 BLL estimates per scenario. Figure 6-5 shows all 14,000 iterations for the Residence Pre-1978 scenario for a two year old child for three of the hazard standard candidates (background, current conditions, and one of the options). The graph also shows the median and 97.5th percentile for each of these scenarios. The dust-lead loading for each scenario is not constant; because the "fraction exposure from floor" was a probabilistic variable, each floor/sill candidate combination could result in a range of average dust-lead loadings in the primary microenvironment. Overall, the 97.5th percentiles increase across the scenarios, indicating greater spread in the predictions for the current condition scenario candidate than the background.

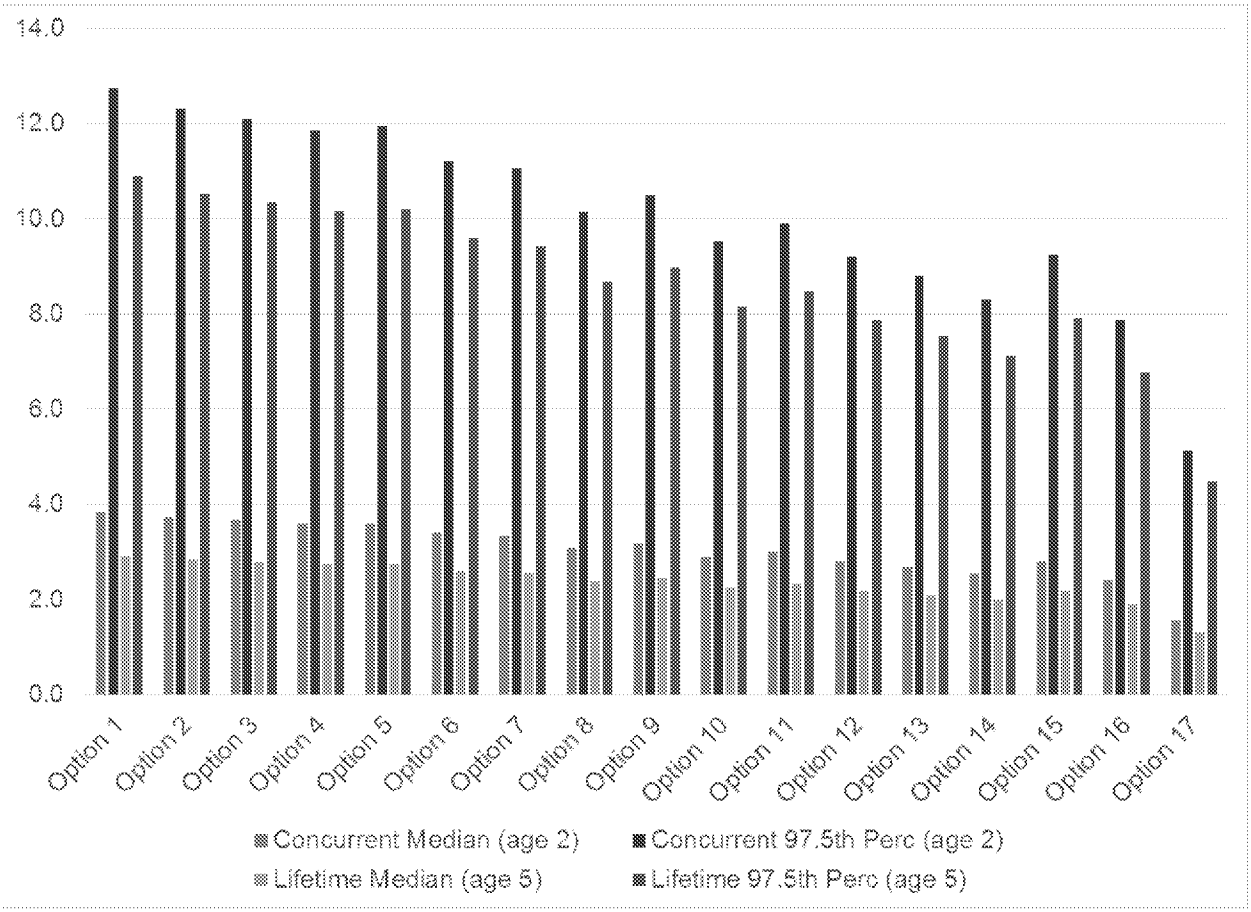
Figure 6-5. All 14,000 Iterations with Median and 97.5th Percentile for Three Candidates for the "Residence Pre-1978" Scenario for a Two Year Old



BLL: Comparison Across Candidates

Figure 6-6 shows the total and concurrent BLL (median and 97.5th percentile) for a two year old in the residence Pre-1978 scenario across all the different hazard standard candidates. In general, many of the different candidates give similar results, even in the 97.5th percentile. The median values are within 10-20% of the central tendency values in the deterministic runs, and the background case (1 floor, 10 sill) approximates the NHANES background scenario. As one might expect, the most protective combination at the 97.5th percentile is the 5f, 100s combination. It is more protective than the 10f, 50s combination.

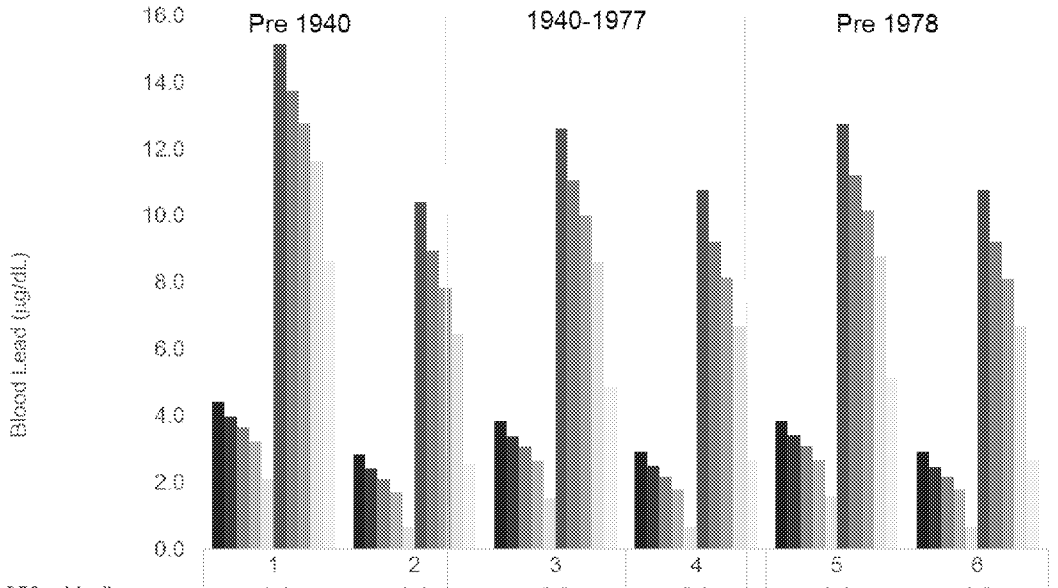
Figure 6-6. A Summary of Total BLL for All Candidates for the "Residence Pre-1978" Scenario for a Two Year Old



BLL: Comparison Between Total and Dust-Only BLL At Different Percentiles

Figure 6-7 shows the median and 97.5th percentile concurrent BLLs for both the "total" BLL and the "dust-only" BLL. The dust-only BLL represents the BLL associated with the dust-lead in the primary microenvironment without other background exposures; because it is an incremental value, it cannot be compared with BLL benchmarks. The 97.5th percentiles are approximately 2 to 4 times larger than the medians for these scenarios, depending on the underlying input distributions for each housing vintage and candidate. Values for the 1940-1977 and Pre-1978 scenarios are almost the same, since the soil distributions (which represent the variation by housing vintage) do not strongly differ.

Figure 6-7. Total and Dust-Only Concurrent BLL for All Housing Vintages and Five Candidates for the Residence Scenario for a Two Year Old

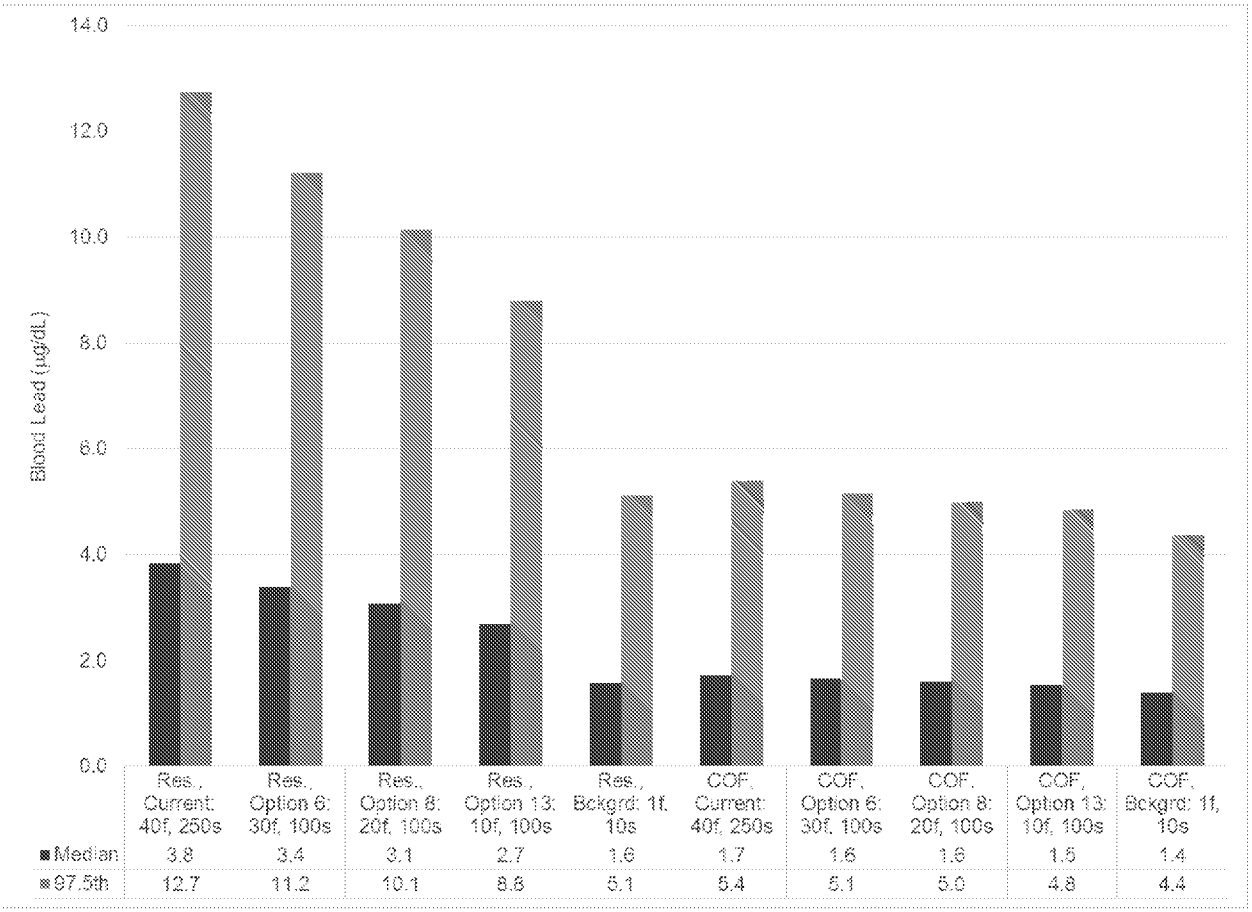


	1	2	3	4	5	6
Current: 40f, 250s, Median	4.4	2.8	3.8	2.9	3.8	2.9
Option 6: 30f, 100s, Median	4.0	2.4	3.4	2.5	3.4	2.5
Option 8: 20f, 100s, Median	3.7	2.1	3.1	2.2	3.1	2.2
Option 13: 10f, 100s, Median	3.2	1.7	2.7	1.8	2.7	1.8
Background: 1f, 10s, Median	2.1	0.7	1.5	0.7	1.6	0.7
Current: 40f, 250s, 97.5th Perc	15.1	10.4	12.8	10.8	12.7	10.8
Option 6: 30f, 100s, 97.5th Perc	13.7	8.9	11.0	9.2	11.2	9.2
Option 8: 20f, 100s, 97.5th Perc	12.8	7.9	10.0	8.1	10.1	8.1
Option 13: 10f, 100s, 97.5th Perc	11.6	6.4	8.6	6.7	8.8	6.7
Background: 1f, 10s, 97.5th Perc	8.7	2.6	4.8	2.7	5.1	2.7

BLL: Comparison Between Residences and COFs

Figure 6-8 shows compares results for the two microenvironments covered by the analysis, residences and COFs. Residential BLLs are higher owing to the "time spent" variable and the relatively high fraction of time spent in the residence. The different candidates for the COF scenario reflect only small differences in BLLs. The most protective combination in this figure (other than background levels) is 10f, 100s.

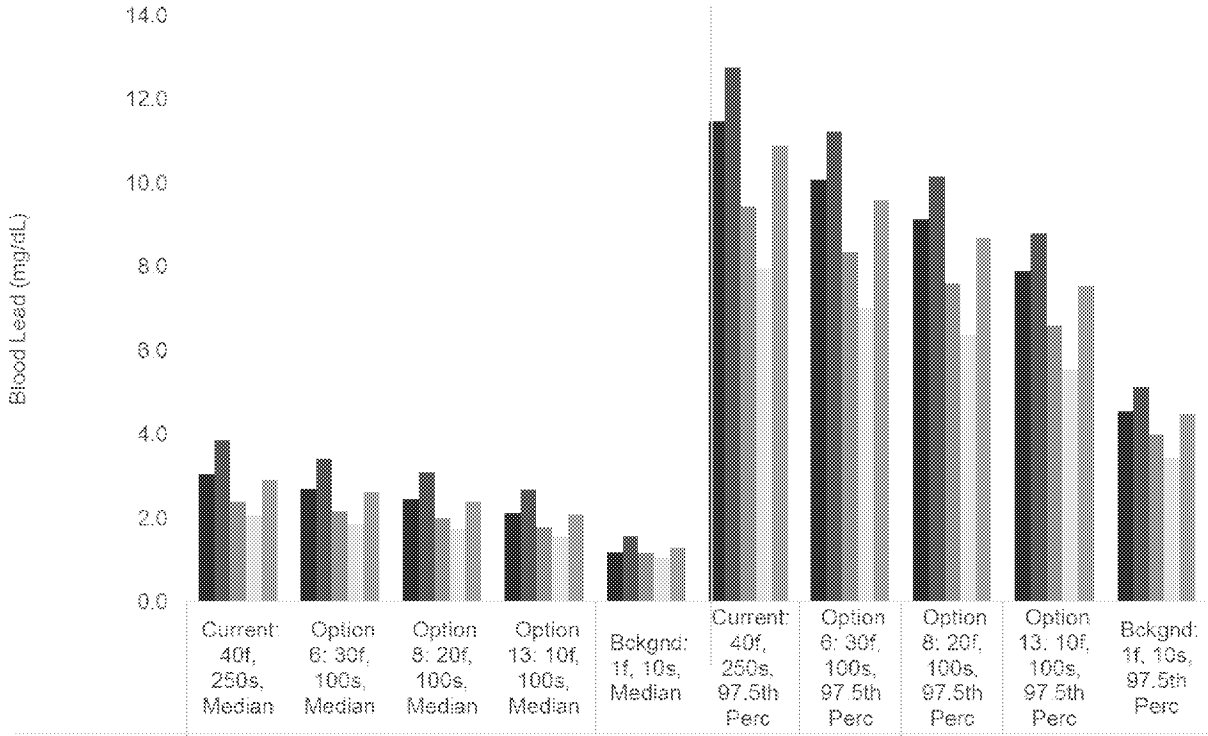
Figure 6-8. Comparison of Total Concurrent BLL for Residence and COF Scenarios for Five Candidates For A Two Year Old



BLL: Comparison Across Both Candidates and Ages

Figure 6-9 presents the variation in BLL across a subset of the candidates for four different ages, highlighting the trend across both candidate and age. Two year olds have the highest BLLs, due to the higher dust ingestion rates at that age; seven year olds have the lowest. Comparison between the current standard and the proposed standard of 10f, 100s suggests a change of between 3 to 5 µg/dL for the 97.5th percentile child exposed at that level.

Figure 6-9. Comparison of Total BLL for Four Different Ages (Concurrent) and Lifetime (Age 5) for the "Residence Pre-1978" Scenario and Five Candidates



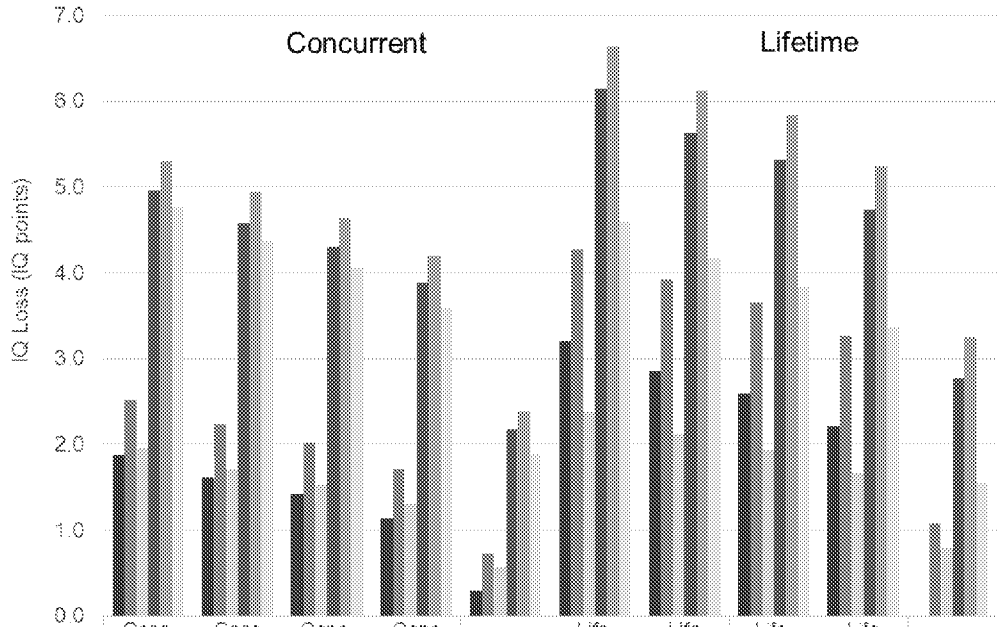
	Current: 40f, 250s, Median	Option 6: 30f, 100s, Median	Option 8: 20f, 100s, Median	Option 13: 10f, 100s, Median	Bckgnd: 1f, 10s, Median	Current: 40f, 250s, 97.5th Perc	Option 6: 30f, 100s, 97.5th Perc	Option 8: 20f, 100s, 97.5th Perc	Option 13: 10f, 100s, 97.5th Perc	Bckgnd: 1f, 10s, 97.5th Perc
Conc, Age 1	3.1	2.7	2.4	2.1	1.2	11.5	10.1	9.1	7.9	4.5
Conc, Age 2	3.8	3.4	3.1	2.7	1.6	12.7	11.2	10.1	8.8	5.1
Conc, Age 5	2.4	2.2	2.0	1.8	1.2	9.5	8.4	7.6	6.6	4.0
Conc, Age 7	2.1	1.9	1.7	1.6	1.1	7.9	7.0	6.4	5.5	3.4
Lifetime, Age 5	2.9	2.6	2.4	2.1	1.3	10.9	9.8	8.7	7.5	4.5

IQ: Dust-only IQ Loss for Different Candidates and Different Concentration-Response Functions

Figure 6-11 shows the dust-only IQ loss at both the median and 97.5th level for all concentration-response functions, for both lifetime and concurrent BLL metrics, and for five different candidate standards. In general, lifetime IQ changes are larger than those using the concurrent metric; within each metric, the log-linear with linearization gives the highest IQ changes for the concurrent metric, while the ln(BLL + 1) equation gives the highest IQ changes for the lifetime metric. In general, the variability across the different concentration-response functions is of a similar magnitude as the variability across the candidate hazard standards for the options shown, indicating that the IQ equation is a key source of uncertainty in the analysis.

As discussed in Section 5.2.6, the concurrent average linear slope for studies with lower BLLs gives IQ changes most similar to the ln(BLL+1) equation for BLLs between 0 and 4 μg/dL. For this reason, the remaining graphs focus on this concentration-response function, although all three are in Appendices B and C.

Figure 6-10. Dust-only IQ Loss Using All IQ Equations for Concurrent and Lifetime BLL for the "Residence Pre-1978" Scenario, Age 5

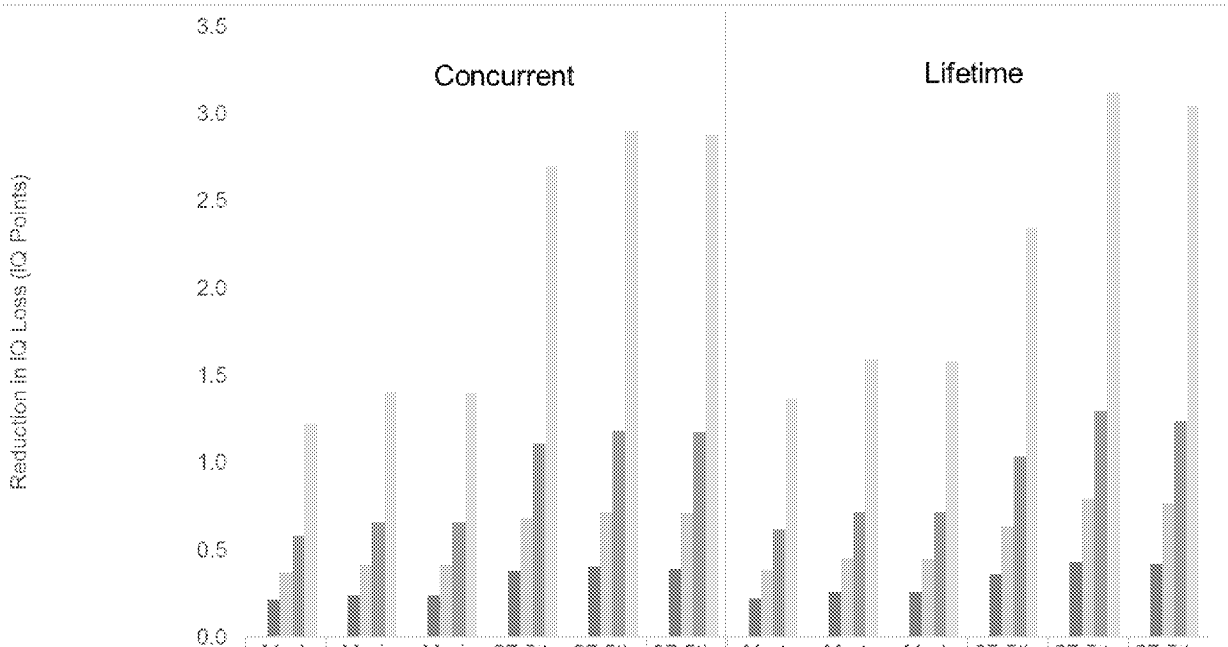


	Conc. Current: 40f, 250s	Conc. Option 6: 30f, 100s	Conc. Option 8: 20f, 100s	Conc. Option 13: 10f, 100s	Conc. Bckgnd: 1f, 10s	Life. Current: 40f, 250s	Life. Option 6: 30f, 100s	Life. Option 8: 20f, 100s	Life. Option 13: 10f, 100s	Life. Bckgnd: 1f, 10s
log-linear cutpt, Median	1.9	1.6	1.4	1.1	0.3	3.2	2.9	2.6	2.2	0.0
log-linear linear., Median	2.5	2.2	2.0	1.7	0.7	4.3	3.9	3.7	3.3	1.1
log-linear PbB+1, Median	2.0	1.7	1.5	1.3	0.6	2.4	2.1	1.9	1.7	0.8
log-linear cutpt. 97.5th Perc	5.0	4.6	4.3	3.9	2.2	6.1	5.6	5.3	4.7	2.8
log-linear linear., 97.5th Perc	5.3	4.9	4.6	4.2	2.4	6.6	6.1	5.8	5.2	3.2
log-linear PbB+1, 97.5th Perc.	4.8	4.4	4.1	3.6	1.9	4.6	4.2	3.8	3.4	1.6

<u>IQ: Incremental Changes Between the Current Standard and Different Candidates for all Equations</u>

Figure 6-11 shows the incremental IQ change for the 50th percentile and 97.5th percentile when compared with the current standard for all candidate IQ equations for the concurrent and lifetime metrics. Thus, the y-axis represents an increase in IQ for a child exposed at one of the candidates compared with the current hazard standard at both the 50th and 97.5th percentiles. IQ changes are showed for a 5 year old child. The log-linear with linearization gives higher differences for the median but smaller differences in the 97.5th percentile child. This trend relates to the particular shape of the curve, including a relatively steeper slope between 0 and 2 μg/dL and a shallower slope for higher BLLs.

Figure 6-11. Increase in IQ Points Compared with the Current Standard for Concurrent and Lifetime BLL using the ln(BLL+1) IQ Equation for the "Residence Pre-1978" Scenario, Age 5



	Med, conc, Pre 1940	Med, conc, 1940-1977	Med, conc, Pre 1977	97.5th, conc, Pre 1940	97.5th, conc, 1940-1977	97.5th, conc, Pre 1977	Med, life, Pre 1940	Med, life, 1940-1977	Med, life, Pre 1977	97.5th, life, Pre 1940	97.5th, life, 1940-1977	97.5th, life, Pre 1977
Current, 40f, 250s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Option 6: 30f, 100s	0.2	0.2	0.2	0.4	0.4	0.4	0.2	0.3	0.3	0.4	0.4	0.4
Option 8: 20f, 100s	0.4	0.4	0.4	0.7	0.7	0.7	0.4	0.5	0.4	0.6	0.8	0.8
Option 13: 10f, 100s	0.6	0.7	0.7	1.1	1.2	1.2	0.6	0.7	0.7	1.0	1.3	1.2
Bckgnd: 1f, 10s	1.2	1.4	1.4	2.7	2.9	2.9	1.4	1.6	1.6	2.3	3.1	3.0

6.2 Empirical Approach

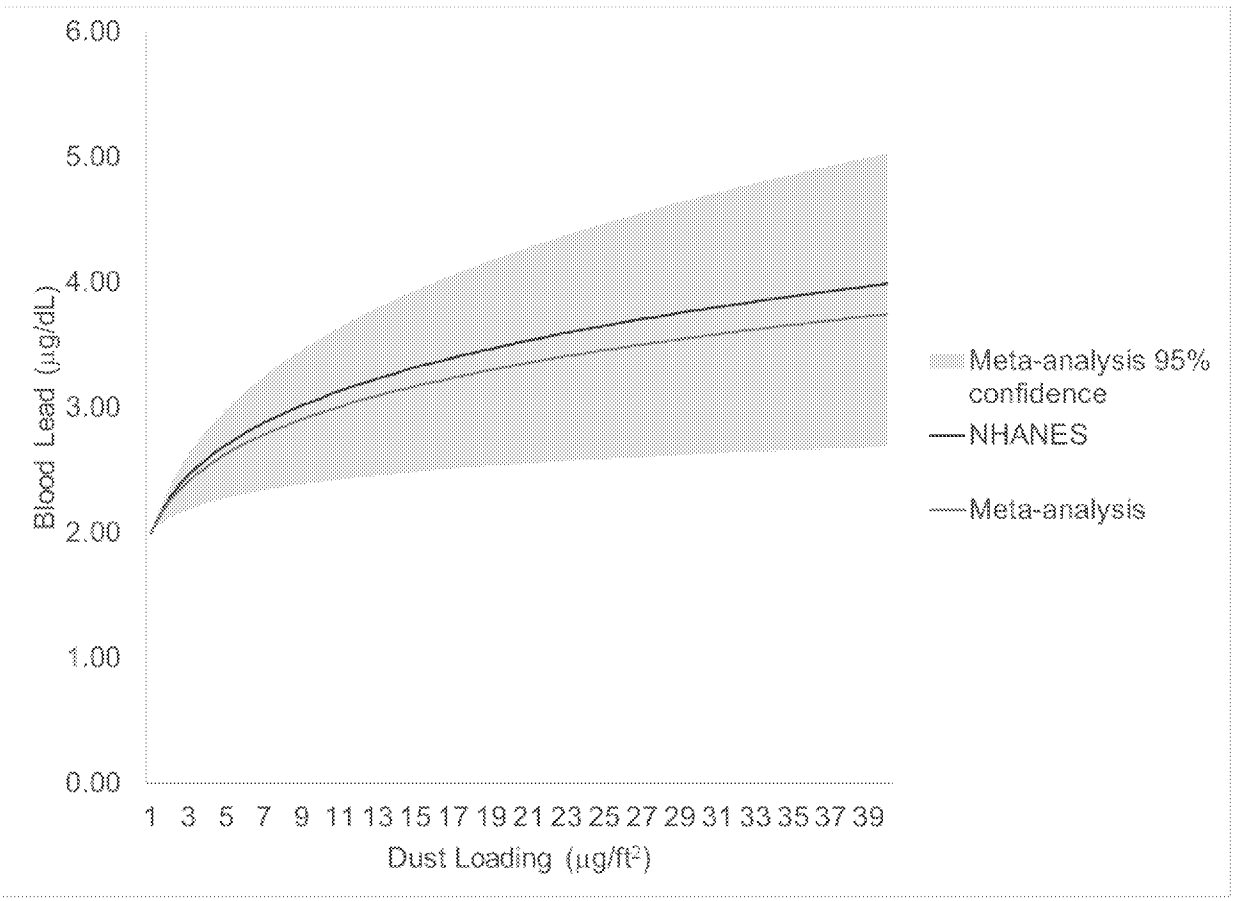
6.2.1 Evaluating NHANES Regression Using Meta-Analysis

As previously discussed, the NHANES dataset provides a nationally representative survey of dust-lead loading and BLL in the pediatric population. The regression presented in Section 4.2 captures the dust-lead/BLL relationship in a linear model as best fits the NHANES data. However, the majority of the national population has dust-lead exposure levels less than 5 $\mu g/ft^2$, so care needs to be taken when applying this model to sub-populations with different exposure levels and risk factors.

To evaluate the validity of using an NHANES-derived regression in other sub-populations, we compared the model to the meta-analysis which encapsulated a range of studies from across the nation, including the high-exposure population of the Rochester Longitudinal Lead Cohort. As described in Section 4.3.3, we identified the beta-coefficients associated with dust-lead loading in the included studies, which represent the percent change in BLL associated with a 1% change in dust-lead loading. The pooled estimate supports the log-linear regression model in EPA's reanalysis. The β value from the regression without covariates (0.187) was compared with the meta-analysis β (0.17). The regression without covariates was selected because it is linear with respect to ln(floor dust-lead loading) and does not include the added complication of the covariate value selection. The similarity between the β coefficients derived from these data sets adds supporting evidence to regression models based on NHANES data.

To visualize the meta-analysis results, Figure 4.1 assumes that at a dust-lead loading of 1 μg/ft^2, the BLL is approximately 1 μg/dL, broadly consistent with the average dust-lead loading and BLL for the 1999-2004 NHANES population. Then, using the percent changes implied by the β values, the NHANES regression, meta-analysis, and meta-analysis confidence intervals were calculated and plotted. The change in BLL attributable to dust-lead loading predicted by the NHANES model is within the confidence interval of the meta-analysis pooled estimate and is therefore statistically similar even to populations with varying exposure levels. The similarity between the NHANES regression coefficients and the rest of the included literature underscores its generalizability to the rest of the pediatric population in the United States and similar geographic areas, including areas not fully sampled by NHANES, and adds support to the other analyses included in the empirical approach which relied on this dataset.

Figure 6-12. BLL Predicted by the Without-Covariates NHANES Regression (1999-2004) and the Meta-Analysis Assuming 1 μg/ft^2 Corresponds to a BLL of 1 μg/dL



6.2.2 Selection of Regression Equation

EPA evaluated a number of different regression models in considering the best empirical approach for the hazard standard. The application of the different models is shown in Table 6-6. The Gaitens et al. and Dixon et al. models were used as peer-reviewed sources that helped inform the model approach and which covariates to include. The model was not used directly because the hazard standard approach required a model where the floor condition was not included as an interaction term. The linear floor dust-lead loading quasi-likelihood model and the cubic ln(floor dust-lead models) (Models 2 and 3) were both considered for the empirical analysis. EPA decided to use the model form suggested by the Gaitens et al. and Dixon et al.

analysis because that source is peer reviewed; thus, Model 3 is the primary model for the empirical analysis. The simpler version of this model (linear in ln(floor) with no covariates, Model 4) is attractive because it can be easily generalized to the population level without specifying each covariate; however, the β values associated with ln(floor) and ln(sill) may overstate the variability due to each variable if these variables happen to be correlated with any of the covariates. Thus, this model is only used when a simpler tool is needed, as in the estimation of the fraction of exposure from the floor (Section 3) and the comparison of the NHANES regressions to the meta-analysis (Section 6.1.1).

Table 6-6. List of Considered Empirical Models and Description of How They Are Used in the Hazard Standard Analysis

Model	Source	Where is it Used?
Cubic in ln(floor dust-lead loading) with covariates and interaction terms (Model 1)	Gaitens et al.; Dixon et al.	Used to inform the EPA re-analysis approach
Linear in floor dust-lead loading with covariates, quasi-likelihood regression (Model 2)	EPA re-analysis	Showed for comparison only
Cubic in ln(floor dust-lead loading) with covariates and without interaction terms (Model 3)	EPA re-analysis	Primary evaluation of candidate hazard standards
Linear in ln(floor) and ln(sill) without covariates or interaction terms (Model 4)	EPA re-analysis	Comparison with meta-analysis and estimation of the fraction of exposure from floor
Meta-analysis	EPA meta-analysis	Validation of the NHANES regression for application to diverse populations

6.2.3 Evaluation of Candidate Hazard Standards

To evaluate the hazard standards for the empirical model that includes covariates, hypothetical people (combinations of covariates) need to be established. For this analysis, we considered "highest", "high-end", "typical", "low-end", and "lowest".

The combination of typical covariates are the values corresponding to the average in the underlying NHANES distribution. The "lowest" and "highest" can be determined from the regression parameters; in each category (e.g., housing vintage), there is a selection contributes the most and the least to BLL (e.g., Pre-1940 and 1950-1959, respectively). To find the age value that produced the "lowest" or "highest" GM, the model was applied for all ages between 12 and 60 months and the lowest and highest predictions were selected.

For the "Low End" and "High End" cases, geometric mean BLLs were estimated for each child in NHANES using their non-dust covariates but substituting one of the candidates for the floor and sill dust-lead loadings. The covariates for the child with the overall lowest and highest BLLs was selected for the "low end" and "high end", respectively.

The five sets of covariates are shown in Table 6-7. In general, the "lowest" and "highest" combinations may be extremely unlikely to occur (e.g., a person living in a mobile home from

1940-1949). Thus, these covariate combinations are not carried through the analysis; instead, the low end and high end are used to provide a look at the variability associated with the covariates.

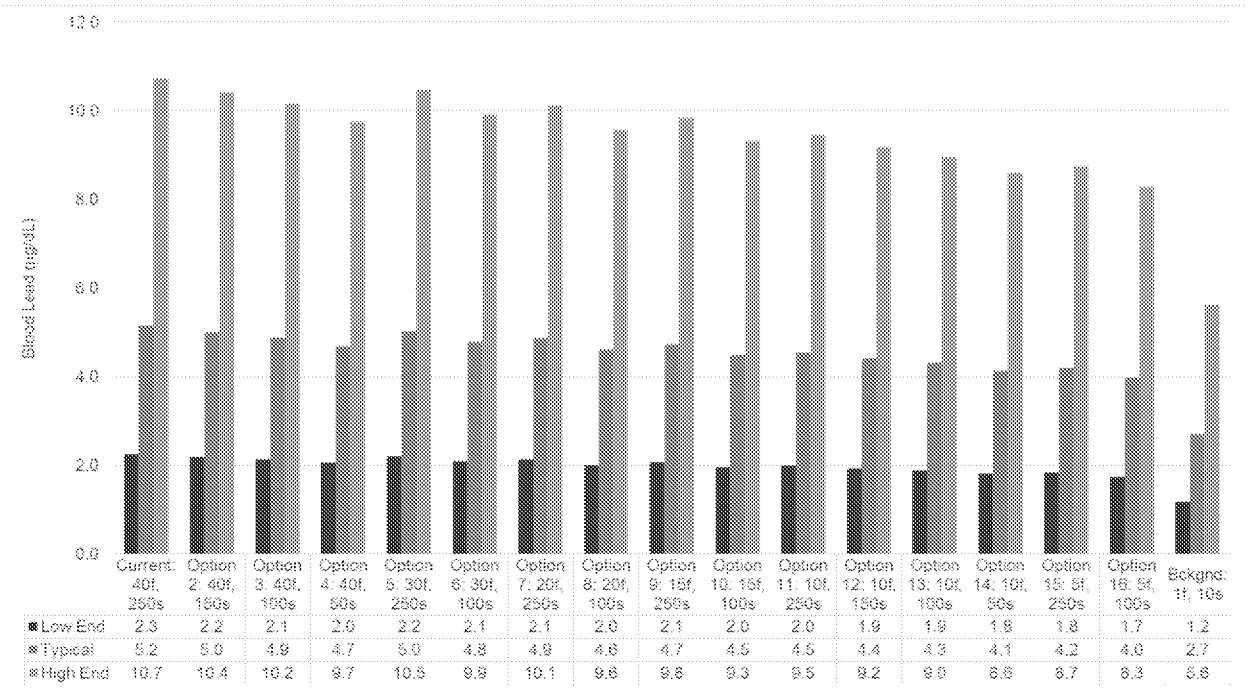
Table 6-7. Summary of Covariate Values for Each Hypothetical Person Evaluated

Variable	Value	Lowest	Low End	Typical	High End	Highest
Age (in months)	Age	5	4.9	1.5	1.75	1.7
PIR	Missing					x
	Continuous	5	4.64	1.1	0.29	
Race/ethnicity	Non-Hispanic white		x	x		
	Non-Hispanic black				x	x
	Hispanic	X				
	Other					
Country of Birth	United States	X	x	x	x	
	Born in Mexico					x
	Elsewhere					
Year of Construction	Residence Built post-1990					
	Residence Built 1978–1989					
	Residence Built 1960–1977			x		
	Residence Built 1950–1959	X	x			
	Residence Built 1940-1949					x
	Residence Built Pre-1940				x	
Home-apartment type	Mobile home or trailer					x
	One family house, detached	X				
	One family house, attached			x	x	
	Apartment (1-9 units)					
	Apartment Complex > 10 units					
	Other		x			
Anyone smoke inside the home	Missing					x
	No smokers	X	x	x		
	One or More Smokers in Household				x	
Floor surface/ condition	Not Smooth and Cleanable	X				
	Smooth and Cleanable		x	x	x	x
ln (cotinine concentration) (ng/dL)	Missing		x	x	x	
	Continuous	-4.5				2.88
Window, cabinet, or wall renovation in a Pre-1978 home	Missing	X				
	Yes				x	x
	No		x	x		

Figure 6-13 shows the geometric mean BLL estimates for the low end, typical, and high end individuals, as defined by their other covariates. The graph corresponds to children age 1-5 (the ages in the NHANES survey where dust-lead loadings were collected). In general, trends are similar as in the mechanistic results, with many of the candidates producing similar BLL

estimates and range of 5.2 down to 4.0 for a "typical" person for the current standard and options 2-16.

Figure 6-13. Predicted Geometric Mean BLL for the Three Covariate Combinations For All Candidates



6.3 Comparison of Mechanistic and Empirical Approaches

To compare the mechanistic and empirical approach results, the following was done:

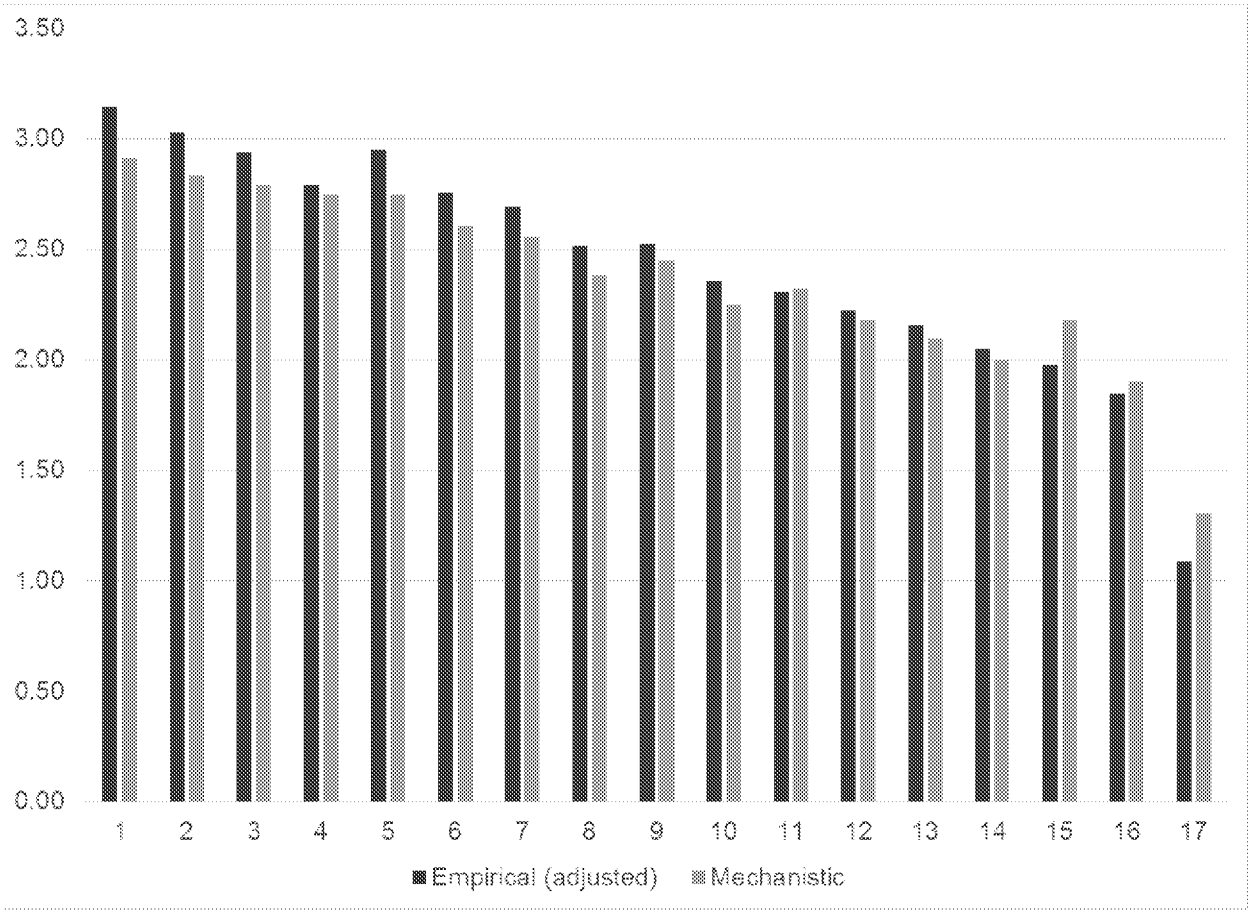
- To compare the results for a given floor and sill dust-lead level, the empirical equation without covariates was used.

- The empirical regressions are based on the NHANES data from 1999-2004; however, BLLs have decreased since then. In lognormal equations, this change can be represented as a constant multiplier between the population in 1999-2004 versus the population today. The geometric mean age-specific BLLs from 1999-2004 were compared with the geometric mean age-specific BLLs from 2011-2015. The average ratio was found to be 2.2. The empirical predictions for each floor and sill lead level were thus divided by 2.2 to approximate the corresponding median in the present day.

- The residential, Pre-1978, lifetime average, median BLL for a five year old was also calculated for candidate standards.

The adjusted empirical medians and the mechanistic medians are compared in Figure 6-14. In general, the comparison illustrates that while the un-adjusted regression equation values are higher than the mechanistic values, the agreement is good when these values are adjusted for temporal trends. Note, however, this adjustment may not hold at higher percentiles. The close agreement between empirical and mechanistic BLL lends support for the mechanistic modeling results.

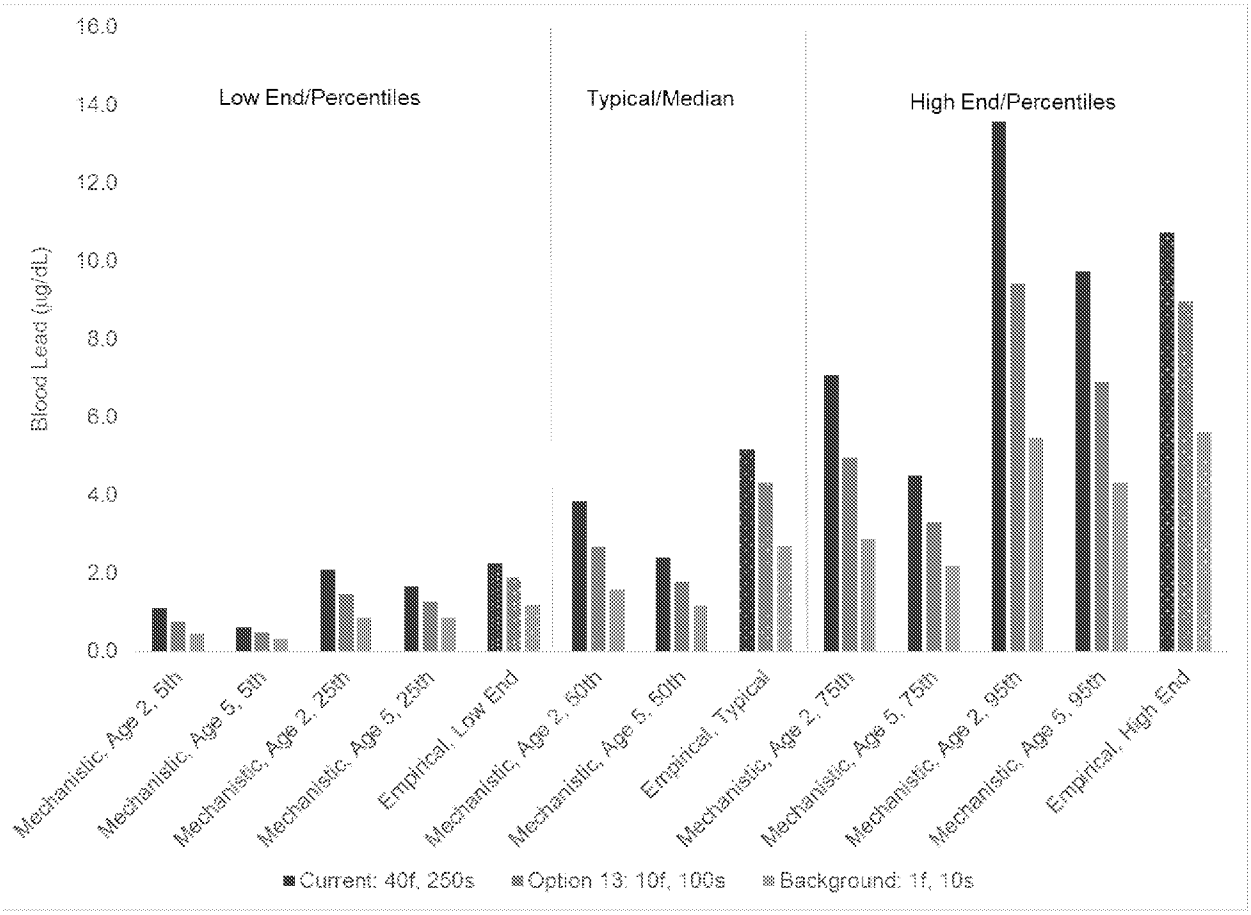
Figure 6-14. Comparison of Adjusted Empirical Median BLLs (from regression without covariates) and Mechanistic Median BLLs (Pre-1978, residence, lifetime average at age 5) For Candidates



Empirical results from the regression are divided by 2.2 to account for decreases in median population BLL between 1999-2004 to the present.

Figure 6-15 provides as comparison between the BLL predictions in the mechanistic and empirical (unadjusted) approaches. The mechanistic results are shown for both age two and age five, while the empirical represent children age 1-5. In general, the "typical" empirical result is somewhat higher than the mechanistic median predictions, in part because the empirical relationship are based on older NHANES data (1999-2004), and BLLs have subsequently fallen. The empirical "low end" is higher than the 5th percentile but within the range of the 25th percentile mechanistic results. The "high end" values are within the range of the mechanistic 95th percentiles. Overall, the results are broadly consistent, with the mechanistic predictions somewhat lower than the empirical ones.

Figure 6-15. Comparison of BLL Predictions From the Mechanistic Approach (ages 2 and 5, "Residence Pre-1978" Scenario, three candidates) and the Empirical Approach (ages 1-5, three candidates)



6.4 Overall Summary of Incremental BLL and IQ Results Across Both Methods

As a final summary, Table 6-8 and Table 6-9 provide the change in BLL compared with the current standard (median and 97.5th percentile), the probability an individual has a BLL above 5 µg/dL for each candidate, and the change in IQ compared with the current standard (median and 97.5th percentile) for the Pre-1978 and Pre-1940 residential scenarios. The 1940-1977 vintage is not included because the values are close to those for the Pre-1978 vintages, although complete results can be found in Appendices B and C. The BLL metrics are shown at age 1, 2, and 5, while the IQ metrics are shown at age 5 and 7. This type of table can be used to determine how individual-level BLL and IQ levels might change if an individual currently exposed to the current hazard standard were exposed to a lower candidate instead. Considerations of both the median child and the 97.5th child with that dust-lead exposure (but variability in other media exposures, behaviors, or biokinetics) are presented so that variability can be considered as part of the overall rule analysis.

Table 6-8. Changes in Age-Specific BLL and the Probability that BLL is Above 5 µg/dL when Compared with the Current Standard

Hazard Standard Option	Mechanistic									Empirical	
	Age 1			Age 2			Age 5				
	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Typical BLL	Change in High End BLL
Pre-1978											
Current: 40f, 250s	0.0	0.0	24%	0.0	0.0	34%	0.0	0.0	15%	0.0	0.0
Option 2: 40f, 150s	-0.1	-0.4	22%	-0.1	-0.4	32%	-0.1	-0.3	14%	-0.2	-0.3
Option 3: 40f, 100s	-0.1	-0.6	22%	-0.2	-0.7	31%	-0.1	-0.4	14%	-0.3	-0.6
Option 4: 40f, 50s	-0.2	-0.8	21%	-0.2	-0.9	30%	-0.1	-0.6	13%	-0.5	-1.0
Option 5: 30f, 250s	-0.2	-0.7	21%	-0.2	-0.8	30%	-0.1	-0.6	13%	-0.1	-0.3
Option 6: 30f, 100s	-0.4	-1.4	19%	-0.4	-1.5	27%	-0.2	-1.1	11%	-0.4	-0.8
Option 7: 20f, 250s	-0.4	-1.5	18%	-0.5	-1.7	26%	-0.3	-1.3	11%	-0.3	-0.6
Option 8: 20f, 100s	-0.6	-2.4	15%	-0.8	-2.6	22%	-0.4	-1.9	9%	-0.6	-1.2
Option 9: 15f, 250s	-0.5	-1.9	16%	-0.7	-2.3	24%	-0.4	-1.6	10%	-0.4	-0.9
Option 10: 15f, 100s	-0.8	-2.9	13%	-0.9	-3.2	19%	-0.5	-2.3	8%	-0.7	-1.4
Option 11: 10f, 250s	-0.7	-2.5	14%	-0.8	-2.8	21%	-0.4	-2.1	9%	-0.6	-1.3
Option 12: 10f, 150s	-0.9	-3.2	12%	-1.0	-3.6	18%	-0.6	-2.6	7%	-0.7	-1.6
Option 13: 10f, 100s	-0.9	-3.6	11%	-1.2	-4.0	16%	-0.6	-2.9	6%	-0.9	-1.8
Option 14: 10f, 50s	-1.1	-4.0	9%	-1.3	-4.4	14%	-0.7	-3.2	6%	-1.0	-2.1
Option 15: 5f, 250s	-0.9	-3.2	12%	-1.0	-3.5	18%	-0.6	-2.5	7%	-1.0	-2.0
Option 16: 5f, 100s	-1.2	-4.4	8%	-1.4	-4.9	12%	-0.8	-3.5	5%	-1.2	-2.5
Background: 1f, 10s	-1.9	-6.9	2%	-2.3	-7.6	3%	-1.2	-5.4	1%	-2.5	-5.1

Table 6-8. Changes in Age-Specific BLL and the Probability that BLL is Above 5 µg/dL when Compared with the Current Standard

Hazard Standard Option	Mechanistic									Empirical	
	Age 1			Age 2			Age 5				
	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Median BLL	Change in 97.5th Percentile BLL	Probability of BLL > 5 µg/dL	Change in Typical BLL	Change in High End BLL
Pre-1940											
Current: 40f, 250s	0.0	0.0	34%	0.0	0.0	44%	0.0	0.0	24%	NA	NA
Option 2: 40f, 150s	-0.1	-0.5	33%	-0.1	-0.5	42%	-0.1	-0.3	23%	NA	NA
Option 3: 40f, 100s	-0.1	-0.7	32%	-0.2	-0.8	42%	-0.1	-0.5	23%	NA	NA
Option 4: 40f, 50s	-0.2	-0.9	31%	-0.2	-1.0	41%	-0.1	-0.7	22%	NA	NA
Option 5: 30f, 250s	-0.2	-0.9	31%	-0.2	-0.9	41%	-0.1	-0.7	23%	NA	NA
Option 6: 30f, 100s	-0.4	-1.6	29%	-0.4	-1.8	39%	-0.2	-1.3	21%	NA	NA
Option 7: 20f, 250s	-0.4	-1.8	29%	-0.5	-1.9	38%	-0.3	-1.5	20%	NA	NA
Option 8: 20f, 100s	-0.6	-2.8	26%	-0.8	-3.0	35%	-0.4	-2.2	19%	NA	NA
Option 9: 15f, 250s	-0.5	-2.4	27%	-0.7	-2.5	36%	-0.4	-1.9	19%	NA	NA
Option 10: 15f, 100s	-0.8	-3.5	24%	-0.9	-3.7	32%	-0.5	-2.8	17%	NA	NA
Option 11: 10f, 250s	-0.7	-3.2	25%	-0.8	-3.2	34%	-0.5	-2.5	18%	NA	NA
Option 12: 10f, 150s	-0.9	-4.0	23%	-1.0	-4.0	31%	-0.6	-3.0	16%	NA	NA
Option 13: 10f, 100s	-1.0	-4.3	22%	-1.2	-4.5	30%	-0.6	-3.4	16%	NA	NA
Option 14: 10f, 50s	-1.1	-4.8	20%	-1.3	-5.1	28%	-0.7	-3.8	15%	NA	NA
Option 15: 5f, 250s	-0.9	-3.9	23%	-1.1	-4.0	31%	-0.6	-3.0	16%	NA	NA
Option 16: 5f, 100s	-1.2	-5.3	19%	-1.4	-5.5	26%	-0.8	-4.1	14%	NA	NA
Background: 1f, 10s	-1.9	-7.9	11%	-2.3	-8.6	15%	-1.3	-6.2	8%	NA	NA

Table 6-9. Changes in IQ when Compared with the Current Standard for Concurrent Metric

Hazard Standard Candidate	Mechanistic				Empirical (Age 1-5)	
	Age 5		Age 7			
	Change in Median IQ	Change in 97.5th Percentile IQ	Change in Median IQ	Change in 97.5th Percentile IQ	Change in IQ, Typical	Change in IQ, High End
Pre-1978						
Current: 40f, 250s	0.0	0.0	0.0	0.0	0.0	0.0
Option 2: 40f, 150s	0.1	0.1	0.1	0.1	-0.1	-0.1
Option 3: 40f, 100s	0.1	0.1	0.1	0.2	-0.2	-0.2
Option 4: 40f, 50s	0.1	0.2	0.1	0.2	-0.3	-0.3
Option 5: 30f, 250s	0.1	0.2	0.1	0.2	-0.1	-0.1
Option 6: 30f, 100s	0.2	0.4	0.2	0.4	-0.3	-0.3
Option 7: 20f, 250s	0.3	0.4	0.3	0.4	-0.2	-0.2
Option 8: 20f, 100s	0.4	0.7	0.4	0.6	-0.4	-0.4
Option 9: 15f, 250s	0.4	0.6	0.3	0.5	-0.3	-0.3
Option 10: 15f, 100s	0.5	0.8	0.5	0.8	-0.5	-0.5
Option 11: 10f, 250s	0.5	0.7	0.4	0.7	-0.4	-0.4
Option 12: 10f, 150s	0.6	0.9	0.5	0.9	-0.5	-0.5
Option 13: 10f, 100s	0.7	1.1	0.6	1.0	-0.6	-0.6
Option 14: 10f, 50s	0.8	1.2	0.7	1.2	-0.7	-0.7
Option 15: 5f, 250s	0.6	0.9	0.5	0.9	-0.7	-0.7
Option 16: 5f, 100s	0.8	1.4	0.8	1.3	-0.9	-0.9
Background: 1f, 10s	1.5	2.4	1.3	2.3	-2.1	-2.1

Table 6-9. Changes in IQ when Compared with the Current Standard for Concurrent Metric

Hazard Standard Candidate	Mechanistic				Empirical (Age 1-5)	
	Age 5		Age 7			
	Change in Median IQ	Change in 97.5th Percentile IQ	Change in Median IQ	Change in 97.5th Percentile IQ	Change in IQ, Typical	Change in IQ, High End
Pre-1940						
Current: 40f, 250s	0.0	0.0	0.0	0.0	NA	NA
Option 2: 40f, 150s	0.1	0.1	0.1	0.1	NA	NA
Option 3: 40f, 100s	0.1	0.1	0.1	0.1	NA	NA
Option 4: 40f, 50s	0.1	0.2	0.1	0.1	NA	NA
Option 5: 30f, 250s	0.1	0.2	0.1	0.1	NA	NA
Option 6: 30f, 100s	0.2	0.3	0.2	0.3	NA	NA
Option 7: 20f, 250s	0.3	0.3	0.2	0.3	NA	NA
Option 8: 20f, 100s	0.4	0.5	0.4	0.5	NA	NA
Option 9: 15f, 250s	0.3	0.5	0.3	0.4	NA	NA
Option 10: 15f, 100s	0.5	0.7	0.4	0.6	NA	NA
Option 11: 10f, 250s	0.4	0.6	0.4	0.5	NA	NA
Option 12: 10f, 150s	0.6	0.7	0.5	0.7	NA	NA
Option 13: 10f, 100s	0.6	0.8	0.6	0.8	NA	NA
Option 14: 10f, 50s	0.7	0.9	0.6	0.9	NA	NA
Option 15: 5f, 250s	0.6	0.7	0.5	0.7	NA	NA
Option 16: 5f, 100s	0.8	1.1	0.7	1.0	NA	NA
Background: 1f, 10s	1.4	1.7	1.2	1.6	NA	NA

7 Interpretation of Results and Examples of Decision Criteria

The results presented in Section 6 provide a framework of sub-population analyses that allow quantification of the range of BLLs and IQ losses associated with specific dust-lead exposure levels. The methods presented here are examples of how this framework could be used by policy-makers; actual decisions may use different criteria or approaches.

7.1 Using the Framework of Model Predictions with Decision Criteria

This hazard standard analysis estimated:

- A number of different outcome metrics: BLL and IQ loss for different sub-population percentiles and the probability of exceeding a given value within the sub-population,
- For a number of different scenarios: residence versus COF; different housing vintages; different ages.

Together these comprise a framework to inform selection of the hazard standard.

One way to evaluate the framework is to compare each scenario-based outcome metric with a health-protective threshold value for that metric. However, lead does not have a known exposure threshold below which health effects do not occur (U.S. EPA, 2014). Thus, selection of the standard may need to be based on multiple lines of evidence across multiple metrics.

As an example evaluation of the framework, a set of different outcome metrics across both BLL and IQ loss were selected, as shown in Table 7-1. These metrics represent an example of what could be chosen. These metrics include median values (e.g., median IQ loss), upper percentiles (e.g., 97.5th percentile total BLL) and the probability that a person within the subpopulation exposed at that candidate hazard standard exceeds a given value (e.g., probability BLL exceeds 5 μg/dL). These different metrics allow evaluation of both central tendency changes and changes to more susceptible individuals in the sub-population.

Then, a comparison value is selected for each metric. These values are referred to as "comparison values" and not "threshold values", since there is no appropriate threshold below which lead does not cause health effects. Instead, the comparison values are specific levels for each outcome metric that can be used as a point of reference or "measuring stick" to compare different hazard standard candidates. Multiple comparisons across multiple metrics can be used to reach an overall evidence-based decision.

BLL comparison values are based on the current CDC reference level of 5 μg/dL and, for comparison, the former reference level of 10 μg/dL. The CDC has opted to base the reference level on the 97.5th percentile of total BLL in the population; thus, the 97.5th percentile of total BLL from the mechanistic modeling is used in the comparison. The CDC reference value is based on total BLL, so total BLL is used as the outcome metric.

Table 7-1. Summary of Outcome Metrics and Comparison Values

Residence Pre-1978 Scenario, Ages 0-5, 0-6, and 0-7

Metric Ident.	Outcome (total vs dust-only; lifetime vs. concurrent; IQ concentration-response equation)	Metric	Comparison Value
BLL #1	Total lifetime BLL	97.5th percentile	>10 µg/dL
BLL #2		97.5th percentile	>5 µg/dL
BLL #3		Probability > 10 µg/dL	>1% probability
BLL #4		Probability > 5 µg/dL	>10% probability
IQ #1	Dust-only lifetime IQ loss using ln(BLL+1) equation	50th Percentile	>2 IQ points
IQ #2		Probability > 2 IQ points	>25% probability
IQ #3	Gain in lifetime and/or concurrent dust-only IQ when moving from current to new standard using any equation	50th Percentile	<1 IQ point

Table 7-2. Summary of Outcome Metrics and Comparison Values for Each Hazard Standard Option

Candidate Hazard Standard	Multiple outcome metrics considered						
	BLL #1	BLL #2	BLL #3	BLL #4	IQ #1	IQ #2	IQ #3
40/250 (Current)							
40/150							
40/100							
40/50							
30/250							
30/100							
20/250							
15/250							
20/100							
10/250							
15/100							
10/150							
5/250							
10/100							
10/50							
5/100							
1/10 (Background)							
Scenarios never exceed comparison value		Results suited or available related difficult/not-valid					

For IQ, the IQ loss represents changes in IQ relative to a no-dust exposure scenario. Thus, this metric lends itself to an incremental analysis; the outcome metrics selected for this comparison analysis are the IQ loss associated with the dust exposure only. The first and second comparison values for IQ are based on a dust-only IQ change of less than 2 IQ points. The third option is based on the relative increase in IQ when moving from the current standard to the new standard; a comparison value of 1 IQ point is used here.

Table 7-2 provides an overview of which candidate standards fall below the comparison values for each metric. The metrics are evaluated for the residential pre-1978 scenario for ages 0-5, 0-6, and 0-7. For IQ, either one or multiple concentration-response curves are evaluated, as noted in Table 7-1. The table indicates that the selected outcome metrics and associated comparison values are always exceeded for the current hazard standard; background results in outcome metrics and comparison values that are never exceeded. However, background is not achievable as a hazard standard option and is provided for reference. Hazard standard candidates where most metrics are "green" are more likely to have lower exposure and greater health gains when compared to the current hazard standard.

Incremental reduction in exposures across hazard standard options results in incremental gains in health outcomes. Note that 10/100 and 10/50 both have favorable comparisons in five of seven outcome metrics. However, the incremental difference between these two options is small. For example, in BLL #1, the 97.5th blood lead level for the pre-1978 scenario is 7.5 μg/dL for 10f/100s and 7.1 μg/dL for 10f/50s for a five-year-old. The percent reduction in 97.5th lifetime blood lead compared with the current standard is 31% for 10f/100s and 35% for 10f/50s. The incremental difference between 10f/100s and 10f/50s and the percent difference from the 40f/250s (current) are similar across the other six metrics.

Note, uncertainties associated with these results are described extensively in the uncertainties section. Selection of different scenarios, outcome metrics, or comparison values results in a different distribution of red and green cells in Table 7-2. These values were selected to provide an all-in-one place snapshot that presents the overall magnitude and trends across hazard standard candidates, but alternate metrics/comparison values could also be chosen.

7.2 Placing Candidate Standards and Results within Population-level Context

As discussed in Section 2.2, this hazard standard analysis is a sub-population level analysis quantifying the range of expected BLLs for the populations of children exposed to dust-lead levels equal to each of the hazard standard candidates. This allows an understanding of changes in median and upper percentile exposures for different exposure levels, but it does not quantify the number of children exposed at each level. To quantify the number of children, a full population-level analysis would be needed (see discussion below).

As discussed in Section 2.2 and shown in Figure 2-6, the population benefitting from any change in the hazard standard could be identified using survey variables as proxies, including children living in 1) houses built before 1978, 2) houses built before 1978 with dust-lead levels above the detection limit, or 3) houses built before 1978 with dust-lead levels lower than the current standard (but above a candidate) and above the detection limit. Figure 7-1 shows total average residential dust exposure for five of the candidate hazard standards, assuming 96% of dust exposure is from the floor and 4% is from the sill. In addition, the cumulative distribution functions for each of these sub-populations and the AHHS population as a whole are shown.

This graph allows a cross-reference between a given candidate and the associated percentile of current exposure in these sub-populations. Moving from the top to the bottom of the legend is the same as moving from the outer circles inward in Figure 2-6; the percentiles of dust-lead increase, but the number of children represented in the population also decreases.

This figure could be used in policy-relevant decisions as follows:

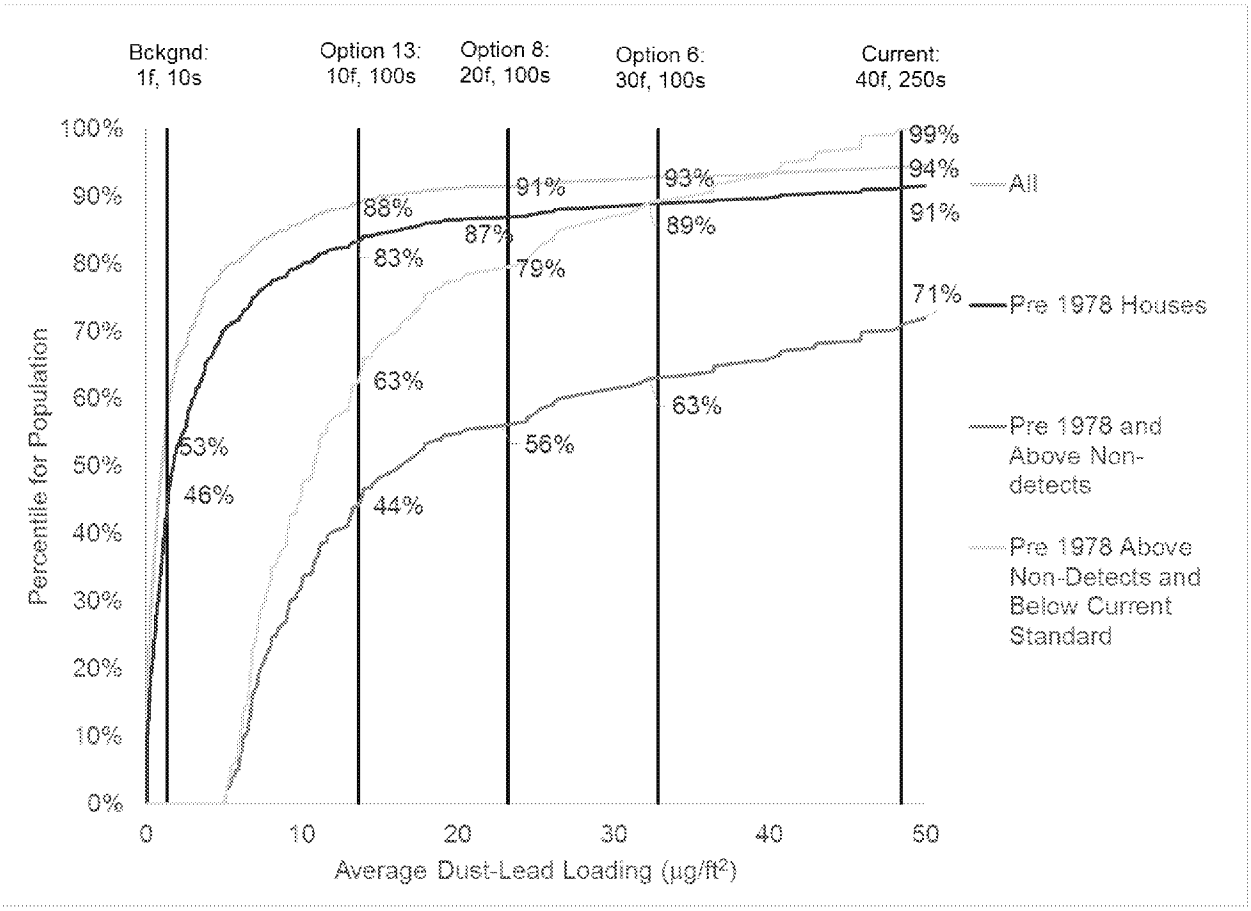
- Select a candidate standard,
- Determine whether that candidate meets the criteria with respect to health metrics, and
- Determine the qualitative impact on the population by noting the fraction of the sub-population that is at or above that exposure level.

Candidate standards that

- meet the health metric criteria and
- lead to a greater fraction of the population affected
- for a relatively larger population (outer circles in Figure 2-6, as opposed to inner circles)

may be deemed to have the greater health impacts.

Figure 7-1. Percentiles of Dust Exposure Corresponding to Different Hazard Standard Options in Current National Sub-populations



To instead quantify the full population-level effects of changing the hazard standard, a "what-if" analysis could be performed in the future, as in the bottom panel of Figure 2-3. In this analysis, the AHHS sub-population with associated floor and sill dust-lead loadings are used to predict the BLL for each individual. Then, the analysis asks "what-if" every child observed to be above a given standard were instead exposed at the given standard.

To perform the analysis, the AHHS data could be processed using the following assumptions:

- Restrict homes to those built before 1978.
- Assign each home to either be "Pre 1940" or "1940-1977" based on survey responses.
- Exclude homes with missing sill data.
- Exclude homes where the original processed floor or sill dust-lead loading were reported at very low levels. The level of detection in AHHS was high at 5 $\mu g/ft^2$ and samples were quantified below this level. Because of how samples were quantified, there is more uncertainty with very low floor or sill dust-loadings such as those below 0.1 $\mu g/ft^2$
- Assume an average loading by estimating a fraction of exposure from floor of 96%.
- Consider the effect of including or excluding dust-lead loadings at very low levels

Then, the probabilistic model could be run, where the fraction of exposure from floor was fixed at 96%, but all other variables were varied as described in the previous sections. The model could be run for all child ages (6 months to 7 years in increments of six months) for both vintages and in increments of 0.5 $\mu g/ft^2$ for the average floor/sill loading. The associated summary statistics could be obtained for each scenario.

As part of this probabilistic model, the AHHS homes, with associated vintage, floor and sill dust-lead levels, and survey weights, could each be repeated five times. Then, for each simulated household, a random number could be used to assign the age of the child in the home (assuming each age is equally likely). The probabilistic results could be used to find the simulation where the age of the child and vintage matched, and the average loading was closest to, but less than, the average loading of the household. Repeating each sample five times could allow increased sample size to better capture variability.

Each home could be simulated assuming that any homes out of compliance with the current standard (40f, 250s) were "reset" to that set of dust-lead loadings. This represents the "what-if" scenario for the current standard; the households and associated survey weights could be used to estimate overall population statistics such as the GM, GSD, arithmetic mean, and upper percentiles.

Then, the homes could be "reset" so that any homes out of compliance with Option 13 (10f, 100s) could be adjusted so that the floor value was 10 $\mu g/ft^2$ and the sill value was 100 $\mu g/ft^2$. The analysis could be repeated and new population statistics obtained. This could be done for any of the candidate hazard standard options.

The target population for the hazard standard analysis is children living in homes with lead-based paint; as a proxy, the AHHS population with Pre 1978 homes and dust levels above the

non-detect level was used. However, the non-detect level for the survey was somewhat high (5 μg/ft^2), potentially limiting the number of data points (from 524 with non-detects to 67 without non-detects, based on the additional data process described above). Thus, the analysis could consider alternative cut-points for lower dust-lead loadings.

This simulation would not represent "real conditions", since if the hazard standard were changed, not all houses would be in compliance or, if previously out of compliance, not all new values would exactly equal the new standard. However, it could suggest that a population with similar characteristics to the AHHS population could show population-level changes in exposure across candidate hazard standard options.

8 Uncertainties and Potential Next Steps

This section discusses some of the uncertainties in this analysis, including why certain assumptions were made and suggesting future actions that could be undertaken to further explore the uncertainties.

8.1 Selection of Target Population and Metrics

For this analysis, the sub-population could be based on different demographic and measurement conditions:

- House built before 1978 (when lead-based paint was banned),
- Dust-lead levels above the limit of detection (as a proxy for lead-based paint hazard), and
- Dust-lead levels above below the current standard but above a candidate.

Design and application of the analysis to this population is associated with uncertainties, as discussed below.

8.1.1 Limitations of Empirical Data

Empirical data needed as either inputs into this analysis or for use in method evaluation required the following characteristics:

- Presence of floor dust-lead loading and/or sill dust-lead loading
- Coincident BLL monitoring data in the same homes/children as dust measurements
- Clearly identified population, including coverage of a "typical" child and a more susceptible child

Two datasets that provide these types of measurements include the NHANES data (CDC, 2018) and the Rochester dataset (Lanphear et al., 1996). Each of these datasets have limitations:

- The NHANES data that include BLL and dust-lead measurements were taken in 1999-2004; BLL have continued to decline for much of the population since then, making these data potentially biased high from a population perspective.
- The NHANES survey is intended to be nationally representative; the measurements adequately characterize the median dust-lead and BLL; however, the tails of the distribution

are not well-resolved. Of the 5,215 measurements, only 68 have BLL above 5 µg/dL. Thus, even when survey weights are applied, the tails of the distribution are based on relatively small numbers of data points and may not accurately capture susceptible populations.

- The Rochester data were collected under more uniform conditions and have higher BLLs and dust-lead distributions, giving the data the potential to be used to examine the methods for a susceptible sub-population; however, the children examined were generally age two or under, making the data more difficult to generalize to older children.

Other available data sets, like the AHHS (HUD, 2011), also may not adequately characterize the tails of the distribution and lack key information, such as BLLs.

Using the definition of the target population, the NHANES and AHHS data can both be used to identify this sub-population within the data and characterize the associated distributions; however, care must be taken when interpreting upper percentiles from these datasets. In the future, the Rochester data or other data that EPA may become aware of could be used for additional model evaluation or sub-population investigations.

8.1.2 Sub-populations of Consideration and Associated Metrics

As suggested above, the hazard standard applies to the full population of the United States, so a population-level analysis will help quantify the number of children affected by changes in the regulation. However, certain sub-populations may be more susceptible to the lead in dust and may not be characterized by either the tails of the distribution or the data at all:

- Children highly exposed due to elevated water concentration (e.g., lead pipes), soil concentration (e.g., living near roadways with historic gasoline exposure), exposure characteristics (e.g., pica or nutritional status), or other demographic differences that affect susceptibility,
- Infants who were exposed to lead in utero via exposure of pregnant women,
- Women of childbearing age, and
- Adults, including occupationally exposed adults and the elderly.

The highly exposed children are captured in this analysis using upper percentiles of empirical data or using the distributions in input variables and the biological GSD. However, uncertainties in these data/variables means exposure and associated variability in BLL could be under- or over-predicted.

In children, IQ effects were quantified in this analysis. Other neurocognitive effects are also associated with BLL in children, as discussed in Section 5.1. These effects could also be quantified if an associated concentration-response function is available and the age group BLLs can be predicted by existing models.

For infants exposed in utero, EPA's Integrated Science Assessment found evidence suggestive of a causal relationship between lead exposure and adverse birth outcomes (U.S. EPA 2013). Some studies have estimated concentration-response functions characterizing the relationship for specific outcomes, such as reduced birth weight (e.g., Zhu et al. 2010).

For adults, EPA's Integrated Science Assessment found evidence of a causal relationship between lead exposure and certain cardiovascular, hematological, and reproductive and

developmental effects (U.S. EPA, 2013). In addition, it found evidence of a likely causal or suggestive of a causal relationship for certain nervous system, renal, and immune system effects (U.S. EPA, 2013). Some studies provide concentration-response functions to characterize the relationship between lead exposure and specific adult health effects. However, the development of a concentration-response function for adult health effects is complicated by the lack of knowledge of whether the health effect is related to current BLLs and/or the result of higher BLLs at earlier times in life. Studies that follow populations from childhood through adulthood would help to fully characterize these health effects, although concentration-response functions may also be available from studies based on variation in adult BLLs. Data from these types of studies, if available, could be incorporated into this analysis if concentration-response functions become available.

Finally, this analysis is based on chronic exposure assumptions; thus, the exact window of exposure and the associated life stage susceptibility is not critical for applying the concentration-response curves; however, the data on which those curves are based will naturally include children of different life stages. A life stage approach, as described in EPA's Framework for Assessing Health Risk of Environmental Exposures to Children (U.S. EPA, 2006b), could add value by providing a more robust evaluation of the potential for vulnerability at different life stages, including a focus on the underlying biological events and incorporation of information related to different critical developmental periods.

8.2 Mechanistic Methods and Inputs

The mechanistic approach relies on selection of a BLL model and characterizing the distribution of the underlying inputs. Where possible, EPA OPPT has endeavored to harmonize modeling approaches and inputs across different Offices in the Agency. Additional efforts in the future could include alternate modeling methods (including the SHEDS-IEUBK model method, Zartarian et al. 2017).

8.2.1 Model Selection

The IEUBK is a well-developed model that has been extensively used by EPA. The IEUBK model has a history of independent reviews (Hogan et al., 1998; SAB, 1998; NAS 2005). The Agency is planning to peer review another biokinetic lead model, the All Ages Lead Model, later in 2018. Based on the peer review of the All Ages Lead Model and any newly available information, potential evaluation of new biokinetic modeling parameters informing the adsorption, distribution, metabolism, and excretion of lead in the body could help reduce uncertainty associated with estimating BLLs across a wider range of exposures and ages.

For this analysis, a custom Excel workbook that implemented the probabilistic sampling and application of variable correlations was used rather than the SHEDS model (U.S. EPA, 2008c). In part, this is because the loading-to-concentration conversion method, rather than a behavior-based method as in SHEDS, was used to convert lead-dust loading to intake. Many of the other characteristics of the model, including sampling of multiple individuals to characterize the overall variability and the mathematical method used to ensure the correlations were achieved, are identical. Additional comparison between the method used here and the SHEDS method could be performed in the future. In addition, further exploration of different input variable values could be examined.

8.2.2 Loading to Concentration Conversion

The loading to concentration conversion represents a source of uncertainty in this analysis; rather than being based on a physical understanding of exposure/cleaning habits and associated variability, it is a purely empirical relationship.

To derive this relationship, EPA used three data sources, resulting in an increased sample size and overall decrease in the standard error. The three studies, however, used different approaches for gathering loading data (wipe versus vacuum) and were conducted in different sampling periods (years) and different countries. The overall confidence intervals in the empirical equation are wide, indicating a wide spread in the relationship between dust-lead loading and concentration. Alternatively, considering the many covariates that could affect dust-lead loading and lead concentration (cleaning frequency, floor type, condition of interior paint, size and lead concentration of ambient air particles, etc.), that the simple dust-lead loading/dust-lead concentration regression has a significant slope and explains over half the variance in the (logarithm of the) data is notable. In addition, the log-log form of the relationship has a physical basis, where the distribution of dust-lead concentrations is taken as arising from random multiple dilutions of dust from multiple sources. Additional paired dust-lead loading, dust-lead concentration summary statistics were identified and compared to the loading to concentration conversion. When a confidence interval of +/-25% was applied to the conversion equation, this approach estimated concentrations within range for 16 of 16 studies identified.

Ultimately, this approach was chosen since a more behavior-based, physical, linear approach (e.g., Wilson et al. 2016) is based on underlying variables that are themselves poorly constrained by observational data and highly uncertain. However, the loading-to-concentration conversion remains a source of uncertainty in this analysis.

8.2.3 Ingestion Rates

Ingestion rates used in this analysis were based on the EPA Exposure Factors Handbook (U.S. EPA, 2011; U.S. EPA, 2017); the dust and soil ingestion rates were reevaluated in 2017, and the values used represent the current state of knowledge about this variable. However, the underlying range in ingestion rates in the literature is wide (U.S. EPA, 2017), and this variable continues to introduce uncertainty.

8.2.4 Bioavailability

Bioavailabilities are also highly variable, as discussed in Section 3.2.14. They can depend on the species of lead, particle size, nutritional status, age, and amount of food in the stomach, among other considerations. Central tendency values based on IEUBK defaults were used, and variability was assumed to be incorporated through the biological GSD. However, this GSD may over- or under-predict the variability associated with this variable.

8.2.5 Time Spent

The variable representing the time spent in the microenvironment was analyzed based on individual diary entries in the CHAD database and adjusted to account for long term patterns in behavior compared with daily variations represented by the diaries. The time spent was also treated relatively simply, assuming a child is either in the residence or in a COF at all times and using weekly averages. Sleeping time was also included as part of the residential time-spent,

even though exposure is unlikely while the child is asleep. Additional refinements to the time spent method could be made in the future.

8.2.6 Background Concentrations/Dietary Intake

Background concentrations and dietary intake were taken from a variety of sources, many of which are from the 2000's or early 2010's. The dietary intakes were taken from a recent re-analysis of the Total Diet Survey by Zartarian et al. (2017), but the survey itself represents diet samples from the early 2000's. The data also do not account for lead in water that may be present in the food after cooked. More recent data, including an upcoming update to the AHHS survey, will be considered as it becomes available. At this time, uncertainty in these variables stems primarily from the relative paucity of recent and comprehensive observational studies.

8.2.7 Correlations Between Variables

The Approach does account for some correlations between certain input variables. Dust-lead on floors, lead in soil, and lead in drinking water were assigned correlation coefficients. The correlations estimated were from data sets and may not approximate the correlations for individuals in this exposed population. Other correlations such as dust-lead loadings between microenvironments were not considered. Owing to a lack of information about such correlations and the potential biases possible with mischaracterizing these suggests both the means and the 97.5th percentiles could be biased either high or low.

8.2.8 Biological GSD

The biological GSD represents uncertainty in this analysis for the sub-population upper percentiles. The variability owing to exposure factors are accounted for mechanistically in this approach. However, robust distribution data for variables such as absorption, transfer between tissues, and excretion are not available. Thus, the biological inter-individual variability is captured using the biological GSD; it is assumed to account for variability associated with all processes after intake, including bioavailability.

Different analyses across the Agency have used a GSD to account for inter-individual variability, but the different analyses applied the GSD for different purposes (see Section 3.2.15). Obtaining a GSD for the biological portion of variability alone from empirical data is difficult, since no existing dataset allows for the separation of exposure and biological variability.

The value for this analysis was selected by considering underlying data leading to a recommended IEUBK default, the specific purpose the GSD is intended to serve in IEUBK, other datasets and associated application by the NAAQS program, expected temporal trends in the GSD, and estimation methods used in Zartarian et al. (2017). The selected value is plausible, but it represents uncertainty and most strongly affects the higher percentile estimates. These estimates could be biased either high or low.

The method employed to estimate the biological GSD is predicated on the assumption that the overall distribution is lognormal and the exposure and biological variability are independent. These assumptions may not be accurate; in particular, biological variability could be correlated with variables that are also correlated with exposure, such as race, ethnicity, nutritional status, or others. Correlations such as these would introduce further uncertainty in the biological GSD estimate.

The GSD also complicates the estimation of the "dust only" BLL predictions. These are obtained by assuming a person exposed to the "total" and the "no residential dust" cases are at the same percentile on the BLL distribution; thus, if they are 95th percentile for "total", they are also at 95th percentile for "no residential dust". Then, the "no residential dust" is subtracted from the "total" to get the "dust-only" estimate for that iteration. This is a simplifying assumption, however, and leads to uncertainty in the "dust-only" predictions.

8.3 Interpreting the Results

The results in this analysis focus on sub-population level variability, considering all sources of variability other than the floor and sill lead-dust loading values. Thus, the primary question answered is:

- For the subpopulation exposed to a given floor and sill dust-lead loading, what is the associated range in BLL due to both exposure and biological variability?

Based on that variability, we estimate geometric means, arithmetic means, and percentiles for each floor/sill combination.

The geometric means represent the 50th percentile in the distribution if the distribution is purely lognormal. If a child is at the 50th percentile, half the individuals also exposed at that floor/sill dust-lead level are above their BLL and half are below. The arithmetic mean is the "expected value" of the BLL; if a child is randomly selected from all children exposed at that floor/sill dust-lead level, the best prediction of what that child's BLL would be is the arithmetic mean.

The difference between these central tendency estimates is nuanced; at present, the geometric means are used as the main central tendency estimate for the individuals exposed at each floor/sill combination; in the future, arithmetic means could be used for comparison.

For model evaluation, both the arithmetic mean and geometric means were compared with the associated metric from NHANES based on the deterministic results. Comparison of both metrics is intended to increase the transparency into the difference between these estimates and to provide additional confidence in the model selection and input distributions. Comparison of modeled and empirical percentiles remains challenging owing to the uncertainty of the upper percentiles in NHANES.

The analysis here focuses on sub-population level predictions and variability for a given hypothetical dust-lead loading. This aids the evaluation of the hazard standard candidates by comparing how all individuals (central tendency and more-susceptible) exposed at each candidate would differ. However, this does not take into account the overall benefit to the population as a whole if the candidate is changed or quantify the number of children affected by a change in the standard. This could be addressed in part in a "what-if" analysis as discussed in section 7 in the future. It remains important when interpreting the results to understand the distinctions between whole population, subpopulation, and individual estimates.

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A. Summary of Included Empirical Studies Discussed in Technical Support Document

A-1 NHANES (1999-2004)

NHANES is an ongoing program of studies conducted by the National Center for Health Statistics (NCHS) designed to assess the health and nutritional status of adults and children in the United States. The survey examines a nationally representative sample of about 5,000 persons each year. These persons are located in counties across the country, 15 of which are visited each year. The survey is unique in that it combines interviews and physical

examinations. In the 1999-2004 sampling periods, as mentioned above, dust-lead loading data were collected from homes of the participants in the survey. This provided a unique opportunity to evaluate BLL data normally collected from NHANES participants with environmental samples collected in their homes. Another important feature of the NHANES data is that the sampling strategy was not limited to children living in areas with known high lead contamination. Thus, the lead exposures in the NHANES data set (within the limitations of the clustered sampling design) are likely to be more nationally representative than data from studies of more limited areas with recognized residential lead contamination problems. As data from a complex survey, however, NHANES data require use of sampling weights when numeric estimate to reflect the country as a whole are desired.

Data was collected in three NHANES sampling periods (1999-2000, 2001-2002, 2003-2004) on 2155 children aged 12-60 months with measured BLL. A single floor dust-lead sample and a single window sill dust-lead sample were collected from the room most occupied by the child. Data for 2,065 floor dust-lead samples and 1,618 window sill dust-lead samples were available for analysis. NHANES also collects information on demographic characteristics (age, race, sex, income, poverty-to-income ratio [PIR]; country of birth); household characteristics (type of home, year of construction, paint condition inside and outside home, sill and floor surface condition); and the smoking behaviors of adults in the household.

Table A-1 provides the descriptive statistics for some of the important covariates and the BLL and dust-lead variables. The (unweighted) dust-lead and BLLs in the NHANES data set are spread across a wide range, with the majority of the values occurring at relatively low BLL and dust-lead values. NHANES also includes subjects with higher BLL and dust-lead values; when the data are log-transformed, these higher values tend to track linearly with the lower values.

This pattern in the log-transformed data suggest that statistical analyses of the log-transformed data are likely to be more straightforward than attempting to fit models to the raw data (see below)[3]. However, the issue still arises whether the extreme data points in the untransformed data are:

1. accurately measured and reported
2. representative of the actual distributions of dust-lead and BLL likely to be encountered in the survey population, or
3. unduly influential in statistical models fitted to the data.

[3] The plot of the log-transformed data also illustrates that non-Hispanic black children tend to have both higher floor dust-lead exposures and higher BLL than other children, clearly identifying this as a high-risk population.

Table A-1. Descriptive Statistics for Demographic and Lead Variables (NHANES 1999-2004)

Variable	Demographic	N	Weighted percentage or Value
Sex	Males	1,139	54.21%
	Females	1,016	45.79%
Race /ethnicity	Non-Hispanic white	618	57.09%
	Non-Hispanic black	634	15.32%
	Hispanic	837	23.82%
	Other	66	3.77%
Floor dust-lead loading	Missing	90	-
	Non-missing	2,065	0.52 (0.03) μg/ft^2
Sill dust-lead loading	Missing	537	-
	Non-missing	1,618	7.64 (1.07) μg/ft^2
BLL	(All)	2,155	2.03 (1.03) μg/dL

[a] Values = weighted geometric mean, (weighted geometric standard error), based on NHANES survey weights for the combined data set.

Statistical tests (chi-squared goodness-of-fit and Kolmogorov-Smirnov) of the dust-lead loading and BLL data indicate that the distribution of neither dust-lead loading nor BLL is likely to be lognormal ($p \leq 0.01$). Such a result is not unexpected with the large size of the data sets, and the sensitivity of these tests. Probability plotting of the log-transformed data shows that the highest three values of each variable depart slightly from log-normality; analysis without these data points improves the linearity of the lognormal probability plots. This finding does not mean that removal of these points is appropriate, only that log-transformation does not account for all of the dispersion of the data. A multivariate outlier test (based on Mahalanobis distances on the untransformed data) distinguishes a number of the highest floor dust-lead loading values, but does not identify any of the high BLLs as possible outliers when a linear relationship is assumed to hold between the two variables.

Statistical analysis of the NHANES data set presents some challenges that cannot easily be overcome because they are inherent in the study design, or are simply the results of the data as collected. NHANES was not originally developed for collection of precise, nationally representative environmental samples. The collection of BLL data in tandem with dust-lead samples from the children's homes, however, provides a unique opportunity for its application in the clearance level analysis. Ideally, studies of dust-lead/BLL relationships take multiple samples from multiple locations in the home where children may be exposed (Lanphear et al. 1996), and variability of dust-lead levels within residences is known to be high (Wilson et al. 2007).

As noted above, the NHANES sampling protocol included only a single floor dust-lead measurement and a single sill dust-lead measurement for each child, collected in the most visited room in the dwelling of the child participant. The taking of a single floor and window sill dust-lead sample from each home results in a high degree of uncertainty in estimates of lead exposures. In addition, because all households were sampled (not just highly contaminated

areas), floor dust-lead samples for 259 (14.2%) of the observations were below the limit of detection (LOD) of 0.16 µg. There were 714 (36.3%) observations below the LOD of 2 µg for window sill dust-lead. For the EPA analysis, floor and sill dust-lead values below the LOD were assigned values of 0.11 µg/ft^2 and 1.41 µg/ft^2, respectively (i.e., LOD/√2, as recommended by NHANES and the NCHS). Similarly, for BLL, the non-detects were replaced with 0.21 µg/dL.

The NHANES data do not include measurements of residential soil lead levels, lead in drinking water (at least not in the 1999-2004 sampling rounds), or lead in diet, all of which may also contribute substantially to children's BLLs. The NHANES data also do not report floor dust-lead concentrations. Thus, any biokinetic models, which predict children's BLL based on total lead intake (part of which is expressed as dust-lead concentration and part as loading), cannot be compared directly to dust-lead loading/BLL relationships seen in the NHANES data. Rather, it is necessary to estimate the dust-lead concentration associated with dust-lead loading measurements. This is a non-trivial task, as discussed in Section 3.2.4.

Additionally, although the NHANES survey is designed to include a nationally representative sample of children 1 to 5 years old, no attempt was made to assure the representativeness of the housing stock in which they lived. Some evidence suggests that the demographic and housing characteristics and BLL distributions for the NHANES 1999–2004 sample might not be exactly representative of the U.S. population as a whole. Iqbal et al (2008) reported that missing BLLs are more common for relatively affluent non-Hispanic whites than for other groups.

Only 1,618 of the records in NHANES (2,155 records of BLL measurements and 2,065 records of floor dust-lead loading measurements) include sill dust-lead measurements. Therefore, for use in a statistical model, the data must either be imputed for the missing (447) values or the records must be limited to just those with sill dust-lead measurements, which is a smaller data set. EPA has explored the implications of these limitations of the NHANES data and developed statistical models to address their potential impact on BLL prediction.

A-2 Lanphear et al. 1995, 1996, and 1998

Lanphear et al. (1995, 1996) evaluated and compared methods for measuring lead exposures, and investigated the nature of the relationships between indoor and outdoor lead contamination and BLL data from 205 children aged 12-30 months living in Rochester, N.Y. The mean BLL in their test population was 7.7 µg/dL and geometric mean dust-lead loading levels measured on uncarpeted and carpeted floors were 11 and 16 µg/ft^2, respectively. The authors reported that dust-lead loading was a better predictor of children's BLL in the population they studied than dust-lead concentration, and that both floor and window sill dust-lead loading measurements provided were strongly correlated with children's BLL. Since these studies were conducted in the United States, explicitly investigated the association of dust-lead loading and BLL it met the inclusion criteria for the meta-analysis described in Sections 4.1.1 and 4.1.2. However, the original Lanphear studies did not implement a linear regression model, so additional sub-analysis of the Rochester dataset had to be performed for the data to be included in the pooled estimates. A simple linear regression model including only dust-lead loading and blood lead was developed and the coefficient of that model is included in the meta-analysis in Section 4-4.

Lanphear et al. (1998) also conducted a pooled analysis of dust-lead/BLL in 1,297 children 6-12 months old from 12 sites across the U.S. that included both urban areas and children living near contaminated mining and smelting sites. Geometric mean BLLs in the 12 studies ranged from

2.8 to 11.17 µg/dL, with an overall geometric mean of 5.07 µg/dL. Geometric mean dust-lead loading measures ranged from 2.29 to 2,934 µg/ft^2 across the 12 studies, with a pooled geometric mean of 13.52 µg/ft^2. Soil lead concentrations were also rather high at all of the study locations, ranging from 96.91 to 965.5 µg/g, with an overall geometric mean of 509 µg/g. They fit a log-log regression to their data that predicted strong dependence of BLL on both soil lead concentrations in indoor dust-lead loading, predicting BLLs of approximately 2.3 µg/dL at the low end of their exposure range (dust-lead = 1 µg/ft^2, soil lead concentration = 10 µg/g) to 11.3 µg/dL at high dust (100 µg/ft^2) and soil (4,000 µg/g) exposures.

A-3 NCHH-UC, 2004

In 2004, the National Center for Healthy Housing (NCHH) and the University of Cincinnati (UC) reported the results of an evaluation of the U.S. Department of Housing and Urban Development's Lead-Based Paint Hazard Control Program (NCHH-UC, 2004). The study examined the efficacy (in terms of reduced indoor lead exposures and children's BLL) of varying remedial interventions undertaken by 14 grantees (state and municipal health and housing agencies) in approximately 3000 homes across the U.S. between 1994 and 1998. Median dust-lead loading in occupied units was 16 µg/ft^2 on interior floors and 20 µg/ft^2 on entryway floors; median dust-lead loading on window sills was 237 µg/ft^2 in occupied homes. Geometric mean BLL ranged from 5.3 µg/dL for children 6-12 months old to 10.0 µg/dL for children 24-36 months old, with an overall geometric mean of 8.9 µg/dL. The highest BLL occurred in African American children (geometric mean = 10.9 µg/dL), compared to 7.0 µg/dL in whites.

The majority of the interventions that were evaluated resulted in substantial reductions in measured post-remediation indoor dust-lead loading (78-95 percent compared to pre-intervention levels), and the reductions persisted through the three-year follow-up period. The reductions in dust-lead loading were accompanied by reductions in BLL in children residing in remediated homes. Geometric mean BLL were 18-30 percent below pre-intervention levels at one-year post-intervention, and by an average of 37 percent at the two- and three year time points.

A-4 Yin et al., 2000

Yiin et al. (2000) studied seasonal changes in dust-lead levels and its relationship to BLL using the Childhood Lead Exposure Assessment and Reduction Study (CLEARS), gathered from June 1992 through September 1995 among children 6-32 months of age living in the area of Jersey City, New Jersey. The CLEARS study was performed in the United States and is explicitly and primarily focused on investigating the association of dust-lead loading and BLL, therefore this study met the inclusion criteria for the meta-analysis described in Sections 4.1.1 and 4.1.2. Our analysis captured the overall relationship of dust-lead and BLL over the course of the year, without focusing on the seasonal findings of the study. The 313 children included in the study had a geometric mean BLL of 9.56 µg/dL, and the 413 floor dust-lead samples had a mean dust-lead loading level of 22.30 µg/ft2.

A-5 Zota et al., 2016

Zota et al. (2016) were interested in assessing the effect of exposures to various metals commonly found in mining communities. They surveyed homes near the Tar Creek Superfund

Site (Oklahoma, USA) and compared the impact of exposure on different time points during development and initial ambulation. This study, and the linear regression model provided therein, met all inclusion criteria described in Sections 4.1.1 and 4.1.2, and was included in the meta-analysis in Section 4.4. Our investigation focused on the second sampling session, where children were 6-12 months of age. The 53 children involved in the cohort exhibited a geometric mean of 0.3 µg/dL and the median house dust-lead loading of the 46 houses involved was 3.06 µg/ft^2.

A-6 Malcoe et al., 2002

To facilitate lead poisoning prevention among Native American Children, Malcoe et al. (2002) investigated the relationship between mining waste and BLL among tribes of northeastern Oklahoma compared to which children living in a former mining region. 245 children aged 1-6 years of age were sampled for BLL (ranging from 1-24 µg/dL) and residential dust-lead samples were taken from a variety of environmental sources around each house, with median dust-lead loading ranging from 5.8-6.1 µg/ft^2 between the two ethnicities. Regression analyses found associations with floor dust-lead loading and BLL in addition to associations and interactions with soil lead and poverty levels. The authors concluded that current residential dust-lead standards were not sufficient to protect children in light of the health hazard from mining contamination. This regression met the inclusion criteria described in Sections 4.1.1 and 4.1.2, therefore the dust-lead loading coefficients were included in the pooled estimates in Section 4.4.

A-7 Sánchez-Nazario et al., 2003

Sánchez-Nazario et al. (2003) investigated lead exposure among children living in a former landfill in Vega Baja-Puerto Rico, a U.S. EPA designated Superfund Site. Specifically, they included 42 children up to 6 years of age and analyzed 29 houses for lead from various environmental sources. BLLs ranged from 0.97 to 7. 79 µg/dL. Lead values for floors fluctuated from 0.12 to 98.30 µg/ft2, with 17% of houses surpassing the U.S. EPA standard of 40 µg/ft2. This direct investigation of the effects of dust-lead loading on BLL in a US territory through linear regression analyses met our inclusion criteria, and therefore the data from this study was included in the pooled estimates generated in Section 4.4.

A-8 Levallois et al., 2014

Levallois et al. (2014) performed a cross-sectional survey to evaluate the contribution of various residential lead sources on BLLs of young children (1-5 years of age) living in Montreal, Canada. The geometric mean of BLLs from the 306 children enrolled in the study was 1.35 µg/dL (95% CI 1.27-1.43), and dust-lead loading was 0.85 µg/ft^2 (95% CI 0.73-0.98). Since Canada shares similar housing attributes and BLL ranges to the United States, and this study explicitly investigated the effect of dust-lead loading on BLL, this study met the study criteria described in Sections 4.1.1 and 4.1.2. In the original study, the Levallois et al. investigated the association between BLL and dust-lead loading through logistic regression models, finding that even in cases of relatively low BLLs, tap water and house dust-lead contributed to BLL in exposed children. Upon request for additional information, the authors performed a novel linear regression model to examine the relationship between these variables. The dust-lead loading coefficient from this model was included in our meta-analysis and pooled risk estimates. The

dust-lead loading coefficient from this model was included in our meta-analysis and pooled risk estimates, and other model parameters are described below (Table A-2).

Table A-2. Novel Linear Regression Parameters for estimating BLL, provided upon request by Levallois et al.

Parameter	Beta Coefficient Values
Intercept	-0.199056
Kitchen Tap Water*	0.069590
Paint lead (XRF ≥1 mg/cm^2 or Paint chips <5000 mg/kg)	0.011909
Paint lead (Paint chips ≥5000 mg/kg)	0.214424
Log floor-dust lead loading	0.022339
Log windowsill dust lead loading	0.188299
Daycare use	0.053801
Caucasian ethnicity	0.122466
Consumption of untreated tap water per kg of BW	0.237721
Log windowsill dust lead loading*Daycare use	-0.130800
Smoking in the residence	0.215716
Chronic disease in the child	0.233890
Pet(s) in the residence	-0.099208
Autumn sampling season (Before December 15th)	0.273781
Log windowsill dust lead loading*Autumn sampling season	-0.089586
Age of the child (24-35 months)	0.166236
Age of the child (36-71 months)	0.056809

* Arithmetic mean of the five kitchen tap water samples (1 liter after 5 min flushing after 30-minute stagnation)

3431 # B. Summary Mechanistic Results Tables: Total Blood Lead

3432 ## B-1 Median Total Blood Lead

Table B-1. Median Total Blood Lead, Residence Pre-1940 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	3.5	4.4	3.1	3.0	2.8	3.3
Option 3: 40f/100s	3.4	4.2	3.0	2.9	2.7	3.2
Option 7: 20f/250s	3.1	3.9	2.8	2.7	2.5	3.0
Option 8: 20f/100s	2.9	3.7	2.6	2.5	2.3	2.8
Option 11: 10f/250s	2.8	3.6	2.6	2.5	2.3	2.8
Option 13: 10f/100s	2.6	3.2	2.4	2.3	2.1	2.5
Background: 1f/10s	1.6	2.1	1.7	1.6	1.5	1.7
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-4%	-4%	-3%	-3%	-4%	-4%
Option 7: 20f/250s	-12%	-11%	-10%	-10%	-10%	-11%
Option 8: 20f/100s	-18%	-17%	-15%	-15%	-15%	-16%
Option 11: 10f/250s	-20%	-19%	-17%	-17%	-17%	-18%
Option 13: 10f/100s	-27%	-26%	-23%	-23%	-23%	-25%
Background: 1f/10s	-54%	-53%	-46%	-46%	-46%	-49%

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Table B-2. Median Total Blood Lead, Residence 1940-1977 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	3.0	3.8	2.7	2.6	2.4	2.9
Option 3: 40f/100s	2.9	3.6	2.6	2.5	2.3	2.8
Option 7: 20f/250s	2.6	3.3	2.4	2.3	2.1	2.5
Option 8: 20f/100s	2.4	3.1	2.2	2.1	2.0	2.4
Option 11: 10f/250s	2.4	3.0	2.2	2.1	1.9	2.3
Option 13: 10f/100s	2.1	2.7	2.0	1.9	1.8	2.1
Background: 1f/10s	1.2	1.5	1.3	1.3	1.2	1.3
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-5%	-4%	-4%	-4%	-4%
Option 7: 20f/250s	-14%	-13%	-11%	-12%	-11%	-12%
Option 8: 20f/100s	-20%	-20%	-17%	-17%	-17%	-18%
Option 11: 10f/250s	-23%	-22%	-19%	-19%	-19%	-20%
Option 13: 10f/100s	-31%	-30%	-26%	-27%	-26%	-28%
Background: 1f/10s	-61%	-60%	-51%	-51%	-51%	-55%

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Table B-3. Median Total Blood Lead, Residence Pre-1978 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	3.1	3.8	2.7	2.6	2.4	2.9
Option 3: 40f/100s	2.9	3.7	2.6	2.5	2.3	2.8
Option 7: 20f/250s	2.6	3.3	2.4	2.3	2.1	2.6
Option 8: 20f/100s	2.4	3.1	2.2	2.2	2.0	2.4
Option 11: 10f/250s	2.4	3.0	2.2	2.1	1.9	2.3
Option 13: 10f/100s	2.1	2.7	2.0	1.9	1.8	2.1
Background: 1f/10s	1.2	1.6	1.3	1.3	1.2	1.3
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-5%	-4%	-4%	-4%	-4%
Option 7: 20f/250s	-13%	-13%	-11%	-11%	-11%	-12%
Option 8: 20f/100s	-20%	-20%	-17%	-17%	-17%	-18%
Option 11: 10f/250s	-22%	-22%	-19%	-19%	-19%	-20%
Option 13: 10f/100s	-31%	-30%	-26%	-26%	-26%	-28%
Background: 1f/10s	-61%	-59%	-51%	-51%	-51%	-55%

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Table B-4. Median Total Blood Lead, COF Pre-1940 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	1.7	2.2	1.9	1.8	1.7	1.9
Option 3: 40f/100s	1.7	2.2	1.9	1.8	1.7	1.9
Option 7: 20f/250s	1.7	2.2	1.8	1.8	1.7	1.8
Option 8: 20f/100s	1.6	2.1	1.8	1.7	1.6	1.8
Option 11: 10f/250s	1.6	2.1	1.8	1.7	1.6	1.8
Option 13: 10f/100s	1.6	2.1	1.7	1.7	1.6	1.7
Background: 1f/10s	1.5	1.9	1.6	1.5	1.4	1.6
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-1%	-1%	-2%	-1%
Option 7: 20f/250s	-3%	-3%	-4%	-4%	-4%	-4%
Option 8: 20f/100s	-5%	-5%	-6%	-6%	-6%	-6%
Option 11: 10f/250s	-5%	-6%	-7%	-6%	-7%	-6%
Option 13: 10f/100s	-7%	-8%	-9%	-9%	-10%	-9%
Background: 1f/10s	-14%	-15%	-18%	-18%	-19%	-17%

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Table B-5. Median Total Blood Lead, COF 1940-1977 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	1.3	1.7	1.5	1.5	1.4	1.5
Option 3: 40f/100s	1.2	1.7	1.5	1.4	1.4	1.4
Option 7: 20f/250s	1.2	1.6	1.4	1.4	1.3	1.4
Option 8: 20f/100s	1.2	1.6	1.4	1.4	1.3	1.4
Option 11: 10f/250s	1.2	1.6	1.4	1.3	1.3	1.3
Option 13: 10f/100s	1.1	1.5	1.3	1.3	1.2	1.3
Background: 1f/10s	1.0	1.4	1.2	1.2	1.1	1.2
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-2%	-2%	-2%	-2%	-2%
Option 7: 20f/250s	-4%	-4%	-5%	-5%	-5%	-5%
Option 8: 20f/100s	-6%	-6%	-7%	-7%	-7%	-7%
Option 11: 10f/250s	-7%	-7%	-8%	-8%	-8%	-8%
Option 13: 10f/100s	-9%	-10%	-11%	-11%	-11%	-10%
Background: 1f/10s	-18%	-19%	-22%	-21%	-22%	-20%

Table B-6. Median Total Blood Lead, COF Pre-1978 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	1.3	1.7	1.5	1.5	1.4	1.5
Option 3: 40f/100s	1.3	1.7	1.5	1.4	1.4	1.5
Option 7: 20f/250s	1.2	1.6	1.5	1.4	1.3	1.4
Option 8: 20f/100s	1.2	1.6	1.4	1.4	1.3	1.4
Option 11: 10f/250s	1.2	1.6	1.4	1.4	1.3	1.4
Option 13: 10f/100s	1.2	1.5	1.4	1.3	1.2	1.3
Background: 1f/10s	1.1	1.4	1.2	1.2	1.1	1.2
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-2%	-2%	-2%	-2%
Option 7: 20f/250s	-4%	-4%	-5%	-5%	-5%	-5%
Option 8: 20f/100s	-6%	-7%	-7%	-7%	-7%	-7%
Option 11: 10f/250s	-7%	-7%	-8%	-8%	-8%	-8%
Option 13: 10f/100s	-9%	-10%	-11%	-10%	-11%	-10%
Background: 1f/10s	-18%	-19%	-21%	-21%	-22%	-20%

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B-2 97.5th Percentile Total Blood Lead

Table B-7. 97.5th Percentile Total Blood Lead, Residence Pre-1940 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	13.4	15.1	12.2	11.8	11.1	12.7
Option 3: 40f/100s	12.9	14.5	11.7	11.4	10.6	12.2
Option 7: 20f/250s	12.0	13.6	11.0	10.5	9.9	11.4
Option 8: 20f/100s	11.3	12.8	10.4	9.9	9.2	10.7
Option 11: 10f/250s	11.1	12.6	10.2	9.8	9.1	10.5
Option 13: 10f/100s	10.1	11.6	9.5	8.9	8.4	9.7
Background: 1f/10s	7.5	8.7	7.2	6.5	6.2	7.2
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-4%	-4%	-4%	-4%	-4%	-4%
Option 7: 20f/250s	-11%	-10%	-10%	-11%	-11%	-10%
Option 8: 20f/100s	-16%	-16%	-15%	-16%	-17%	-16%
Option 11: 10f/250s	-18%	-17%	-16%	-17%	-18%	-17%
Option 13: 10f/100s	-24%	-23%	-22%	-24%	-24%	-24%
Background: 1f/10s	-44%	-43%	-41%	-45%	-44%	-43%

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Table B-8. 97.5th Percentile Total Blood Lead, Residence 1940-1977 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	11.3	12.6	10.4	10.1	9.3	10.7
Option 3: 40f/100s	10.7	11.9	9.9	9.6	8.9	10.2
Option 7: 20f/250s	9.7	10.9	9.0	8.7	8.0	9.3
Option 8: 20f/100s	8.9	10.0	8.3	8.0	7.4	8.5
Option 11: 10f/250s	8.8	9.8	8.1	7.8	7.2	8.3
Option 13: 10f/100s	7.7	8.6	7.2	6.9	6.4	7.4
Background: 1f/10s	4.4	4.8	4.3	4.1	3.9	4.3
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-5%	-5%	-5%	-5%	-5%
Option 7: 20f/250s	-14%	-13%	-13%	-13%	-14%	-13%
Option 8: 20f/100s	-21%	-21%	-20%	-20%	-20%	-20%
Option 11: 10f/250s	-22%	-23%	-22%	-23%	-23%	-22%
Option 13: 10f/100s	-31%	-32%	-31%	-31%	-31%	-31%
Background: 1f/10s	-61%	-62%	-58%	-59%	-59%	-60%

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Table B-9. 97.5th Percentile Total Blood Lead, Residence Pre-1978 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	11.5	12.7	10.6	10.2	9.5	10.9
Option 3: 40f/100s	10.9	12.1	10.0	9.7	9.0	10.3
Option 7: 20f/250s	10.0	11.1	9.1	8.8	8.2	9.4
Option 8: 20f/100s	9.1	10.1	8.5	8.1	7.6	8.7
Option 11: 10f/250s	9.0	9.9	8.3	7.9	7.4	8.5
Option 13: 10f/100s	7.9	8.8	7.3	7.0	6.6	7.5
Background: 1f/10s	4.5	5.1	4.5	4.2	4.0	4.5
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-5%	-5%	-5%	-4%	-5%
Option 7: 20f/250s	-13%	-13%	-14%	-14%	-14%	-13%
Option 8: 20f/100s	-20%	-20%	-20%	-20%	-20%	-20%
Option 11: 10f/250s	-22%	-22%	-22%	-22%	-22%	-22%
Option 13: 10f/100s	-31%	-31%	-31%	-31%	-30%	-31%
Background: 1f/10s	-60%	-60%	-57%	-58%	-58%	-59%

Table B-10. 97.5th Percentile Total Blood Lead, COF Pre-1940 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	7.5	8.9	7.8	7.2	6.9	7.6
Option 3: 40f/100s	7.4	8.7	7.7	7.1	6.8	7.5
Option 7: 20f/250s	7.3	8.6	7.5	6.9	6.6	7.4
Option 8: 20f/100s	7.3	8.5	7.4	6.8	6.5	7.3
Option 11: 10f/250s	7.3	8.5	7.3	6.8	6.4	7.3
Option 13: 10f/100s	7.2	8.4	7.2	6.6	6.3	7.1
Background: 1f/10s	7.0	8.1	6.7	6.2	5.9	6.8
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-1%	-1%	-1%	-1%
Option 7: 20f/250s	-2%	-3%	-4%	-4%	-4%	-3%
Option 8: 20f/100s	-2%	-4%	-5%	-6%	-6%	-4%
Option 11: 10f/250s	-3%	-3%	-6%	-6%	-7%	-5%
Option 13: 10f/100s	-4%	-5%	-8%	-8%	-9%	-7%
Background: 1f/10s	-6%	-9%	-14%	-14%	-14%	-11%

Table B-11. 97.5th Percentile Total Blood Lead, COF 1940-1977 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	4.5	5.2	5.2	4.9	4.7	4.9
Option 3: 40f/100s	4.4	5.1	5.1	4.8	4.6	4.8
Option 7: 20f/250s	4.3	4.9	4.9	4.6	4.4	4.6
Option 8: 20f/100s	4.2	4.8	4.7	4.5	4.2	4.5
Option 11: 10f/250s	4.2	4.8	4.7	4.4	4.2	4.5
Option 13: 10f/100s	4.1	4.6	4.4	4.2	4.0	4.3
Background: 1f/10s	3.8	4.1	3.8	3.6	3.5	3.8
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-2%	-3%	-3%	-3%	-2%
Option 7: 20f/250s	-4%	-5%	-6%	-6%	-7%	-6%
Option 8: 20f/100s	-6%	-8%	-10%	-10%	-10%	-9%
Option 11: 10f/250s	-7%	-8%	-10%	-10%	-10%	-9%
Option 13: 10f/100s	-10%	-11%	-15%	-14%	-14%	-13%
Background: 1f/10s	-17%	-20%	-27%	-27%	-26%	-23%

Table B-12. 97.5th Percentile Total Blood Lead, COF Pre-1978 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	4.7	5.4	5.4	5.1	4.9	5.1
Option 3: 40f/100s	4.6	5.3	5.2	5.0	4.8	5.0
Option 7: 20f/250s	4.5	5.1	5.1	4.8	4.6	4.8
Option 8: 20f/100s	4.4	5.0	4.9	4.6	4.4	4.7
Option 11: 10f/250s	4.4	5.0	4.8	4.6	4.4	4.6
Option 13: 10f/100s	4.3	4.8	4.6	4.4	4.2	4.5
Background: 1f/10s	4.0	4.4	4.0	3.8	3.6	3.9
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-2%	-3%	-2%	-2%	-2%
Option 7: 20f/250s	-4%	-5%	-6%	-6%	-6%	-5%
Option 8: 20f/100s	-6%	-7%	-9%	-9%	-9%	-8%
Option 11: 10f/250s	-7%	-8%	-10%	-10%	-10%	-9%
Option 13: 10f/100s	-9%	-10%	-14%	-14%	-13%	-12%
Background: 1f/10s	-15%	-19%	-26%	-26%	-26%	-22%

3451

B-3 Probability Total Blood Lead > 5 µg/dL

Table B-13. Probability Total Blood Lead is > 5 µg/dL, Residence Pre-1940 Scenario

Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	31%	42%	25%	24%	20%	28%
Option 3: 40f/100s	29%	40%	23%	22%	19%	26%
Option 7: 20f/250s	25%	35%	20%	19%	16%	23%
Option 8: 20f/100s	22%	32%	18%	17%	14%	20%
Option 11: 10f/250s	21%	30%	17%	16%	14%	20%
Option 13: 10f/100s	18%	26%	15%	14%	11%	16%
Background: 1f/10s	7%	11%	6%	6%	5%	7%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-2%	-2%	-2%	-1%	-2%
Option 7: 20f/250s	-6%	-7%	-5%	-4%	-4%	-5%
Option 8: 20f/100s	-9%	-11%	-7%	-7%	-6%	-8%
Option 11: 10f/250s	-10%	-12%	-7%	-7%	-7%	-9%
Option 13: 10f/100s	-13%	-17%	-10%	-10%	-9%	-12%
Background: 1f/10s	-24%	-31%	-19%	-18%	-16%	-21%

3452

Table B-14. Probability Total Blood Lead is > 5 µg/dL, Residence 1940-1977 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	23%	33%	19%	18%	15%	21%
Option 3: 40f/100s	21%	31%	17%	16%	13%	19%
Option 7: 20f/250s	17%	26%	14%	13%	11%	16%
Option 8: 20f/100s	15%	22%	12%	11%	9%	13%
Option 11: 10f/250s	14%	20%	11%	10%	8%	12%
Option 13: 10f/100s	10%	15%	8%	8%	6%	9%
Background: 1f/10s	2%	3%	2%	2%	1%	2%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-3%	-2%	-2%	-1%	-2%
Option 7: 20f/250s	-6%	-8%	-5%	-4%	-4%	-5%
Option 8: 20f/100s	-9%	-12%	-7%	-7%	-6%	-8%
Option 11: 10f/250s	-10%	-13%	-7%	-7%	-6%	-9%
Option 13: 10f/100s	-13%	-18%	-10%	-10%	-8%	-12%
Background: 1f/10s	-22%	-31%	-17%	-16%	-13%	-19%

3453

3454

Table B-15. Probability Total Blood Lead is > 5 µg/dL, Residence Pre-1978 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	24%	34%	19%	18%	15%	22%
Option 3: 40f/100s	22%	31%	17%	16%	14%	20%
Option 7: 20f/250s	18%	26%	14%	14%	11%	16%
Option 8: 20f/100s	15%	22%	12%	11%	9%	14%
Option 11: 10f/250s	14%	21%	12%	11%	9%	13%
Option 13: 10f/100s	11%	16%	9%	8%	6%	10%
Background: 1f/10s	2%	3%	2%	2%	1%	2%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-3%	-2%	-2%	-1%	-2%
Option 7: 20f/250s	-6%	-8%	-5%	-4%	-4%	-5%
Option 8: 20f/100s	-9%	-12%	-7%	-7%	-6%	-8%
Option 11: 10f/250s	-10%	-13%	-7%	-7%	-6%	-9%
Option 13: 10f/100s	-13%	-18%	-10%	-10%	-9%	-12%
Background: 1f/10s	-22%	-31%	-17%	-16%	-14%	-20%

Table B-16. Probability Total Blood Lead is > 5 µg/dL, COF Pre-1940 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	8%	12%	9%	8%	7%	9%
Option 3: 40f/100s	8%	12%	8%	7%	6%	8%
Option 7: 20f/250s	7%	12%	8%	7%	6%	8%
Option 8: 20f/100s	7%	11%	7%	6%	5%	7%
Option 11: 10f/250s	7%	11%	7%	6%	5%	7%
Option 13: 10f/100s	7%	11%	7%	6%	5%	7%
Background: 1f/10s	6%	9%	5%	5%	4%	6%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
Option 7: 20f/250s	-0.5%	-0.9%	-0.9%	-0.8%	-0.7%	-0.7%
Option 8: 20f/100s	-0.7%	-1.3%	-1.3%	-1.2%	-1.1%	-1.1%
Option 11: 10f/250s	-0.8%	-1.4%	-1.4%	-1.3%	-1.2%	-1.2%
Option 13: 10f/100s	-1.1%	-1.9%	-1.9%	-1.8%	-1.6%	-1.7%
Background: 1f/10s	-1.9%	-3.5%	-3.4%	-3.1%	-2.8%	-3.0%

Table B-17. Probability Total Blood Lead is > 5 µg/dL, COF 1940-1977 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	2%	4%	3%	3%	2%	3%
Option 3: 40f/100s	2%	3%	3%	3%	2%	3%
Option 7: 20f/250s	2%	3%	3%	2%	2%	2%
Option 8: 20f/100s	2%	3%	2%	2%	2%	2%
Option 11: 10f/250s	2%	3%	2%	2%	2%	2%
Option 13: 10f/100s	1%	2%	2%	2%	1%	2%
Background: 1f/10s	1%	2%	1%	1%	1%	1%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Option 7: 20f/250s	-0.3%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%
Option 8: 20f/100s	-0.4%	-0.9%	-0.9%	-0.8%	-0.7%	-0.7%
Option 11: 10f/250s	-0.5%	-1.0%	-1.0%	-0.9%	-0.8%	-0.8%
Option 13: 10f/100s	-0.6%	-1.3%	-1.3%	-1.2%	-1.0%	-1.1%
Background: 1f/10s	-1.1%	-2.1%	-2.2%	-2.0%	-1.6%	-1.8%

Table B-18. Probability Total Blood Lead is > 5 µg/dL, COF Pre-1978 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	2%	4%	4%	3%	3%	3%
Option 3: 40f/100s	2%	4%	3%	3%	2%	3%
Option 7: 20f/250s	2%	3%	3%	3%	2%	3%
Option 8: 20f/100s	2%	3%	3%	2%	2%	2%
Option 11: 10f/250s	2%	3%	3%	2%	2%	2%
Option 13: 10f/100s	2%	3%	2%	2%	2%	2%
Background: 1f/10s	1%	2%	1%	1%	1%	1%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Option 7: 20f/250s	-0.3%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%
Option 8: 20f/100s	-0.5%	-0.9%	-1.0%	-0.9%	-0.7%	-0.8%
Option 11: 10f/250s	-0.5%	-1.0%	-1.0%	-0.9%	-0.8%	-0.8%
Option 13: 10f/100s	-0.7%	-1.3%	-1.4%	-1.3%	-1.1%	-1.1%
Background: 1f/10s	-1.2%	-2.3%	-2.3%	-2.1%	-1.7%	-1.9%

3462

B-4 Probability Total Blood Lead > 10 µg/dL

Table B-19. Probability Total Blood Lead is > 10 µg/dL, Residence Pre-1940 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	7%	10%	5%	5%	4%	6%
Option 3: 40f/100s	6%	9%	4%	4%	3%	5%
Option 7: 20f/250s	5%	7%	4%	3%	2%	4%
Option 8: 20f/100s	4%	6%	3%	3%	2%	3%
Option 11: 10f/250s	4%	6%	3%	3%	2%	3%
Option 13: 10f/100s	3%	4%	2%	2%	1%	2%
Background: 1f/10s	1%	1%	1%	1%	0%	1%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-1%	-1%	0%	-1%
Option 7: 20f/250s	-2%	-3%	-1%	-1%	-1%	-2%
Option 8: 20f/100s	-3%	-4%	-2%	-2%	-2%	-2%
Option 11: 10f/250s	-3%	-4%	-2%	-2%	-2%	-3%
Option 13: 10f/100s	-4%	-6%	-3%	-3%	-2%	-3%
Background: 1f/10s	-6%	-9%	-4%	-4%	-3%	-5%

3463

Table B-20. Probability Total Blood Lead is > 10 µg/dL, Residence 1940-1977 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	4%	6%	3%	3%	2%	3%
Option 3: 40f/100s	4%	5%	3%	2%	2%	3%
Option 7: 20f/250s	3%	4%	2%	2%	1%	2%
Option 8: 20f/100s	2%	3%	1%	1%	1%	2%
Option 11: 10f/250s	2%	3%	1%	1%	1%	1%
Option 13: 10f/100s	1%	2%	1%	1%	1%	1%
Background: 1f/10s	0%	0%	0%	0%	0%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	0%	0%	0%	-1%
Option 7: 20f/250s	-2%	-2%	-1%	-1%	-1%	-1%
Option 8: 20f/100s	-2%	-3%	-2%	-2%	-1%	-2%
Option 11: 10f/250s	-2%	-4%	-2%	-2%	-1%	-2%
Option 13: 10f/100s	-3%	-5%	-2%	-2%	-2%	-3%
Background: 1f/10s	-4%	-6%	-3%	-3%	-2%	-3%

3464

Table B-21. Probability Total Blood Lead is > 10 µg/dL, Residence Pre-1978 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	4%	6%	3%	3%	2%	4%
Option 3: 40f/100s	4%	6%	3%	3%	2%	3%
Option 7: 20f/250s	3%	4%	2%	2%	1%	2%
Option 8: 20f/100s	2%	3%	2%	1%	1%	2%
Option 11: 10f/250s	2%	3%	1%	1%	1%	2%
Option 13: 10f/100s	1%	2%	1%	1%	1%	1%
Background: 1f/10s	0%	0%	0%	0%	0%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	0%	0%	0%	-1%
Option 7: 20f/250s	-2%	-2%	-1%	-1%	-1%	-1%
Option 8: 20f/100s	-2%	-3%	-2%	-2%	-1%	-2%
Option 11: 10f/250s	-2%	-4%	-2%	-2%	-1%	-2%
Option 13: 10f/100s	-3%	-5%	-2%	-2%	-2%	-3%
Background: 1f/10s	-4%	-6%	-3%	-3%	-2%	-4%

Table B-22. Probability Total Blood Lead is > 10 µg/dL, COF Pre-1940 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.9%	1.5%	1.0%	0.8%	0.6%	0.9%
Option 3: 40f/100s	0.9%	1.5%	0.9%	0.7%	0.6%	0.9%
Option 7: 20f/250s	0.9%	1.4%	0.8%	0.7%	0.5%	0.8%
Option 8: 20f/100s	0.8%	1.3%	0.8%	0.6%	0.5%	0.8%
Option 11: 10f/250s	0.8%	1.3%	0.8%	0.6%	0.5%	0.8%
Option 13: 10f/100s	0.8%	1.2%	0.7%	0.5%	0.4%	0.7%
Background: 1f/10s	0.7%	1.0%	0.5%	0.4%	0.3%	0.5%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.0%
Option 7: 20f/250s	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Option 8: 20f/100s	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.2%
Option 11: 10f/250s	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%
Option 13: 10f/100s	-0.2%	-0.3%	-0.3%	-0.3%	-0.2%	-0.2%
Background: 1f/10s	-0.3%	-0.5%	-0.5%	-0.4%	-0.3%	-0.4%

Table B-23. Probability Total Blood Lead is > 10 µg/dL, COF 1940-1977 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%
Option 3: 40f/100s	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%
Option 7: 20f/250s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Option 8: 20f/100s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Option 11: 10f/250s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Option 13: 10f/100s	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%
Background: 1f/10s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 7: 20f/250s	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
Option 8: 20f/100s	0.0%	-0.1%	-0.1%	-0.1%	0.0%	-0.1%
Option 11: 10f/250s	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Option 13: 10f/100s	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Background: 1f/10s	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%

Table B-24. Probability Total Blood Lead is > 10 µg/dL, COF Pre-1978 Scenario

Probability for Total Blood Lead (µg/dL)						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%
Option 3: 40f/100s	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%
Option 7: 20f/250s	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%
Option 8: 20f/100s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Option 11: 10f/250s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Option 13: 10f/100s	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Background: 1f/10s	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr. Age 1	Concurr. Age 2	Concurr. Age 3	Concurr. Age 4	Concurr. Age 5	Lifetime, Age 5
Cur: 40f/250s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 3: 40f/100s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Option 7: 20f/250s	0.0%	0.0%	-0.1%	-0.1%	0.0%	0.0%
Option 8: 20f/100s	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Option 11: 10f/250s	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Option 13: 10f/100s	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Background: 1f/10s	-0.1%	-0.1%	-0.2%	-0.2%	-0.1%	-0.1%

C. Summary Mechanistic Results Tables: Dust-Only IQ Loss

C-1 Median Dust-Only IQ Loss

Table C-1. Median Dust-Only IQ Loss, Residence Pre-1940 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.7	2.8	2.1	3.4	1.7	2.0
Option 3: 40f/100s	1.6	2.7	2.0	3.3	1.6	1.9
Option 7: 20f/250s	1.4	2.4	1.8	3.0	1.4	1.8
Option 8: 20f/100s	1.3	2.3	1.7	2.8	1.3	1.6
Option 11: 10f/250s	1.2	2.2	1.6	2.7	1.3	1.6
Option 13: 10f/100s	1.0	2.0	1.4	2.4	1.1	1.4
Background: 1f/10s	0.4	0.7	0.6	0.9	0.5	0.7
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-4%	-5%	-3%	-5%	-4%
Option 7: 20f/250s	-16%	-12%	-14%	-10%	-15%	-13%
Option 8: 20f/100s	-24%	-18%	-21%	-17%	-22%	-19%
Option 11: 10f/250s	-27%	-21%	-23%	-19%	-24%	-21%
Option 13: 10f/100s	-38%	-30%	-33%	-30%	-34%	-30%
Background: 1f/10s	-79%	-75%	-72%	-73%	-72%	-67%

Table C-2. Median Dust-Only IQ Loss, Residence 1940-1977 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9	3.2	2.5	4.3	2.0	2.4
Option 3: 40f/100s	1.8	3.1	2.4	4.2	1.9	2.3
Option 7: 20f/250s	1.6	2.8	2.2	3.9	1.7	2.1
Option 8: 20f/100s	1.4	2.6	2.0	3.7	1.6	1.9
Option 11: 10f/250s	1.4	2.5	2.0	3.6	1.5	1.9
Option 13: 10f/100s	1.2	2.2	1.7	3.3	1.3	1.7
Background: 1f/10s	0.3	0.0	0.7	1.1	0.6	0.8
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-6%	-4%	-5%	-3%	-5%	-4%
Option 7: 20f/250s	-16%	-13%	-13%	-9%	-14%	-12%
Option 8: 20f/100s	-24%	-19%	-20%	-14%	-21%	-19%
Option 11: 10f/250s	-28%	-22%	-22%	-16%	-24%	-21%
Option 13: 10f/100s	-39%	-31%	-32%	-23%	-33%	-30%
Background: 1f/10s	-85%	-100%	-71%	-75%	-71%	-67%

Table C-3. Median Dust-Only IQ Loss, Residence Pre-1978 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9	3.2	2.5	4.3	2.0	2.4
Option 3: 40f/100s	1.8	3.1	2.4	4.1	1.9	2.3
Option 7: 20f/250s	1.6	2.8	2.2	3.9	1.7	2.1
Option 8: 20f/100s	1.4	2.6	2.0	3.7	1.5	1.9
Option 11: 10f/250s	1.4	2.5	2.0	3.6	1.5	1.9
Option 13: 10f/100s	1.1	2.2	1.7	3.3	1.3	1.7
Background: 1f/10s	0.3	0.0	0.7	1.1	0.6	0.8
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-6%	-4%	-4%	-3%	-5%	-4%
Option 7: 20f/250s	-16%	-12%	-13%	-9%	-14%	-12%
Option 8: 20f/100s	-24%	-19%	-20%	-14%	-21%	-19%
Option 11: 10f/250s	-27%	-21%	-22%	-16%	-24%	-21%
Option 13: 10f/100s	-39%	-31%	-32%	-24%	-34%	-30%
Background: 1f/10s	-84%	-100%	-71%	-75%	-71%	-67%

Table C-4. Median Dust-Only IQ Loss, COF Pre-1940 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0.4	0.5	0.5	0.6	0.4	0.4
Option 3: 40f/100s	0.4	0.5	0.5	0.6	0.4	0.4
Option 7: 20f/250s	0.3	0.4	0.4	0.5	0.3	0.4
Option 8: 20f/100s	0.3	0.4	0.4	0.4	0.3	0.3
Option 11: 10f/250s	0.3	0.3	0.4	0.4	0.3	0.3
Option 13: 10f/100s	0.2	0.3	0.3	0.4	0.3	0.3
Background: 1f/10s	0.1	0.1	0.1	0.1	0.1	0.1
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-4%	-3%	-4%	-3%	-2%
Option 7: 20f/250s	-8%	-11%	-9%	-10%	-7%	-7%
Option 8: 20f/100s	-12%	-17%	-13%	-15%	-11%	-10%
Option 11: 10f/250s	-13%	-19%	-15%	-17%	-12%	-11%
Option 13: 10f/100s	-18%	-25%	-21%	-24%	-16%	-16%
Background: 1f/10s	-32%	-46%	-40%	-46%	-32%	-32%

Table C-5. Median Dust-Only IQ Loss, COF 1940-1977 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0.4	0.0	0.6	0.7	0.5	0.5
Option 3: 40f/100s	0.4	0.0	0.6	0.7	0.5	0.5
Option 7: 20f/250s	0.3	0.0	0.5	0.6	0.4	0.4
Option 8: 20f/100s	0.3	0.0	0.5	0.5	0.4	0.4
Option 11: 10f/250s	0.3	0.0	0.5	0.5	0.4	0.4
Option 13: 10f/100s	0.2	0.0	0.4	0.4	0.3	0.3
Background: 1f/10s	0.1	0.0	0.2	0.2	0.1	0.1
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	0%	-4%	-5%	-3%	-3%
Option 7: 20f/250s	-9%	0%	-11%	-12%	-8%	-8%
Option 8: 20f/100s	-13%	0%	-16%	-19%	-13%	-12%
Option 11: 10f/250s	-15%	0%	-18%	-21%	-14%	-13%
Option 13: 10f/100s	-20%	0%	-25%	-29%	-19%	-18%
Background: 1f/10s	-36%	0%	-50%	-56%	-38%	-37%

Table C-6. Median Dust-Only IQ Loss, COF Pre-1978 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0.4	0.4	0.6	0.7	0.5	0.5
Option 3: 40f/100s	0.4	0.0	0.6	0.7	0.5	0.5
Option 7: 20f/250s	0.3	0.0	0.5	0.6	0.4	0.4
Option 8: 20f/100s	0.3	0.0	0.5	0.5	0.4	0.4
Option 11: 10f/250s	0.3	0.0	0.5	0.5	0.4	0.4
Option 13: 10f/100s	0.2	0.0	0.4	0.4	0.3	0.3
Background: 1f/10s	0.1	0.0	0.2	0.2	0.1	0.1
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-40%	-4%	-5%	-3%	-3%
Option 7: 20f/250s	-9%	-40%	-11%	-12%	-8%	-7%
Option 8: 20f/100s	-13%	-40%	-16%	-19%	-13%	-12%
Option 11: 10f/250s	-15%	-40%	-18%	-21%	-14%	-13%
Option 13: 10f/100s	-20%	-40%	-25%	-29%	-19%	-18%
Background: 1f/10s	-35%	-40%	-49%	-55%	-38%	-37%

C-2 97.5th Percentile Dust-Only IQ Loss

Table C-7. 97.5th Percentile Dust-Only IQ Loss, Residence Pre-1940 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	4.5	4.8	4.9	5.3	4.3	3.5
Option 3: 40f/100s	4.4	4.6	4.7	5.2	4.2	3.4
Option 7: 20f/250s	4.1	4.4	4.4	4.9	3.9	3.1
Option 8: 20f/100s	3.9	4.1	4.2	4.6	3.7	2.9
Option 11: 10f/250s	3.8	4.0	4.1	4.5	3.6	2.8
Option 13: 10f/100s	3.5	3.7	3.8	4.2	3.2	2.5
Background: 1f/10s	1.9	2.4	2.1	2.8	1.7	1.2
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-4%	-3%	-2%	-3%	-4%
Option 7: 20f/250s	-9%	-9%	-9%	-7%	-10%	-12%
Option 8: 20f/100s	-14%	-14%	-13%	-12%	-16%	-18%
Option 11: 10f/250s	-16%	-16%	-15%	-14%	-17%	-20%
Option 13: 10f/100s	-23%	-22%	-22%	-20%	-26%	-29%
Background: 1f/10s	-58%	-51%	-57%	-47%	-62%	-66%

Table C-8. 97.5th Percentile Dust-Only IQ Loss, Residence 1940-1977 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	5.0	6.3	5.3	6.7	4.8	4.7
Option 3: 40f/100s	4.8	6.1	5.2	6.5	4.6	4.6
Option 7: 20f/250s	4.6	5.7	4.9	6.2	4.3	4.2
Option 8: 20f/100s	4.3	5.5	4.6	5.9	4.1	3.9
Option 11: 10f/250s	4.2	5.3	4.6	5.8	4.0	3.8
Option 13: 10f/100s	3.9	4.8	4.2	5.3	3.6	3.4
Background: 1f/10s	2.2	2.8	2.4	3.3	1.9	1.6
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-3%	-3%	-3%	-3%	-3%
Option 7: 20f/250s	-8%	-8%	-8%	-8%	-10%	-11%
Option 8: 20f/100s	-13%	-13%	-13%	-12%	-15%	-17%
Option 11: 10f/250s	-15%	-15%	-14%	-14%	-17%	-19%
Option 13: 10f/100s	-22%	-23%	-21%	-21%	-25%	-27%
Background: 1f/10s	-56%	-55%	-55%	-51%	-60%	-66%

Table C-9. 97.5th Percentile Dust-Only IQ Loss, Residence Pre-1978 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	5.0	6.1	5.3	6.6	4.8	4.6
Option 3: 40f/100s	4.8	5.9	5.2	6.5	4.6	4.5
Option 7: 20f/250s	4.6	5.6	4.9	6.1	4.3	4.1
Option 8: 20f/100s	4.3	5.3	4.6	5.8	4.1	3.8
Option 11: 10f/250s	4.2	5.2	4.6	5.7	4.0	3.8
Option 13: 10f/100s	3.9	4.7	4.2	5.2	3.6	3.4
Background: 1f/10s	2.2	2.8	2.4	3.2	1.9	1.6
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-3%	-3%	-2%	-3%	-3%
Option 7: 20f/250s	-8%	-9%	-8%	-8%	-10%	-11%
Option 8: 20f/100s	-13%	-14%	-13%	-12%	-15%	-17%
Option 11: 10f/250s	-14%	-16%	-14%	-15%	-17%	-18%
Option 13: 10f/100s	-22%	-23%	-21%	-21%	-25%	-27%
Background: 1f/10s	-56%	-55%	-55%	-51%	-60%	-66%

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Table C-10. 97.5th Percentile Dust-Only IQ Loss, COF Pre-1940 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.8	1.8	1.8	2.2	1.5	0.9
Option 3: 40f/100s	1.7	1.8	1.7	2.1	1.5	0.8
Option 7: 20f/250s	1.5	1.7	1.6	2.0	1.3	0.7
Option 8: 20f/100s	1.4	1.6	1.4	1.9	1.2	0.7
Option 11: 10f/250s	1.3	1.6	1.4	1.9	1.2	0.6
Option 13: 10f/100s	1.1	1.6	1.2	1.8	1.0	0.5
Background: 1f/10s	0.5	1.3	0.5	1.4	0.4	0.2
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-2%	-4%	-3%	-5%	-5%
Option 7: 20f/250s	-14%	-6%	-13%	-7%	-15%	-16%
Option 8: 20f/100s	-22%	-11%	-21%	-12%	-22%	-25%
Option 11: 10f/250s	-24%	-12%	-22%	-13%	-25%	-28%
Option 13: 10f/100s	-34%	-15%	-33%	-17%	-35%	-37%
Background: 1f/10s	-72%	-31%	-71%	-36%	-73%	-74%

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Table C-11. 97.5th Percentile Dust-Only IQ Loss, COF 1940-1977 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9	2.1	2.0	2.4	1.7	1.2
Option 3: 40f/100s	1.8	2.0	1.9	2.4	1.6	1.1
Option 7: 20f/250s	1.7	1.9	1.8	2.2	1.4	1.0
Option 8: 20f/100s	1.5	1.8	1.6	2.1	1.3	0.9
Option 11: 10f/250s	1.5	1.8	1.6	2.1	1.3	0.8
Option 13: 10f/100s	1.3	1.7	1.4	2.0	1.1	0.7
Background: 1f/10s	0.6	1.3	0.6	1.5	0.5	0.3
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-4%	-4%	-3%	-5%	-6%
Option 7: 20f/250s	-14%	-8%	-13%	-8%	-15%	-16%
Option 8: 20f/100s	-21%	-12%	-20%	-12%	-22%	-26%
Option 11: 10f/250s	-23%	-14%	-22%	-14%	-24%	-28%
Option 13: 10f/100s	-33%	-19%	-32%	-19%	-35%	-39%
Background: 1f/10s	-71%	-37%	-70%	-40%	-72%	-76%

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Table C-12. 97.5th Percentile Dust-Only IQ Loss, COF Pre-1978 Scenario

Dust-Only IQ Loss (IQ Points)						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9	2.1	2.0	2.4	1.7	1.1
Option 3: 40f/100s	1.8	2.0	1.9	2.3	1.6	1.1
Option 7: 20f/250s	1.7	1.9	1.8	2.2	1.5	0.9
Option 8: 20f/100s	1.5	1.8	1.6	2.1	1.3	0.8
Option 11: 10f/250s	1.5	1.8	1.6	2.1	1.3	0.8
Option 13: 10f/100s	1.3	1.7	1.4	2.0	1.1	0.7
Background: 1f/10s	0.6	1.3	0.6	1.5	0.5	0.3
% Change Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-5%	-2%	-4%	-3%	-5%	-5%
Option 7: 20f/250s	-14%	-8%	-13%	-8%	-15%	-17%
Option 8: 20f/100s	-21%	-12%	-20%	-12%	-22%	-25%
Option 11: 10f/250s	-23%	-13%	-22%	-13%	-24%	-28%
Option 13: 10f/100s	-33%	-18%	-32%	-19%	-34%	-38%
Background: 1f/10s	-71%	-36%	-70%	-39%	-72%	-75%

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C-3 Probability Dust-Only IQ Loss > 1 IQ Point

Table C-13. Probability Total IQ Loss is > 1 IQ Point, Residence Pre-1940 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	72%	87%	86%	98%	78%	97%
Option 3: 40f/100s	70%	86%	84%	98%	75%	96%
Option 7: 20f/250s	65%	84%	80%	96%	70%	94%
Option 8: 20f/100s	60%	81%	76%	95%	65%	91%
Option 11: 10f/250s	58%	80%	74%	94%	63%	90%
Option 13: 10f/100s	52%	76%	67%	91%	55%	82%
Background: 1f/10s	16%	37%	25%	42%	14%	10%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-1%	-2%	0%	-3%	-1%
Option 7: 20f/250s	-7%	-4%	-6%	-2%	-8%	-3%
Option 8: 20f/100s	-12%	-6%	-10%	-3%	-13%	-6%
Option 11: 10f/250s	-13%	-7%	-12%	-4%	-15%	-8%
Option 13: 10f/100s	-20%	-11%	-19%	-7%	-23%	-15%
Background: 1f/10s	-55%	-50%	-61%	-56%	-64%	-87%

3485

Table C-14. Probability Total IQ Loss is > 1 IQ Point, Residence 1940-1977 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	73%	83%	93%	98%	86%	98%
Option 3: 40f/100s	71%	81%	91%	97%	84%	97%
Option 7: 20f/250s	66%	78%	88%	96%	79%	95%
Option 8: 20f/100s	63%	75%	85%	94%	74%	93%
Option 11: 10f/250s	61%	73%	84%	94%	73%	92%
Option 13: 10f/100s	55%	69%	78%	90%	65%	87%
Background: 1f/10s	21%	41%	35%	54%	21%	28%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-2%	-1%	-1%	-2%	-1%
Option 7: 20f/250s	-6%	-5%	-4%	-2%	-7%	-3%
Option 8: 20f/100s	-10%	-8%	-7%	-4%	-11%	-5%
Option 11: 10f/250s	-11%	-9%	-9%	-4%	-13%	-6%
Option 13: 10f/100s	-18%	-14%	-15%	-7%	-20%	-10%
Background: 1f/10s	-52%	-41%	-58%	-44%	-65%	-69%

Table C-15. Probability Total IQ Loss is > 1 IQ Point, Residence Pre-1978 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	72%	83%	92%	98%	85%	98%
Option 3: 40f/100s	70%	81%	91%	97%	83%	97%
Option 7: 20f/250s	66%	78%	88%	96%	79%	95%
Option 8: 20f/100s	62%	75%	85%	94%	74%	93%
Option 11: 10f/250s	61%	74%	84%	94%	73%	92%
Option 13: 10f/100s	55%	69%	78%	90%	65%	87%
Background: 1f/10s	20%	42%	34%	54%	21%	28%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-2%	-1%	-1%	-2%	-1%
Option 7: 20f/250s	-6%	-5%	-4%	-2%	-7%	-3%
Option 8: 20f/100s	-10%	-8%	-7%	-3%	-11%	-5%
Option 11: 10f/250s	-11%	-9%	-9%	-4%	-13%	-6%
Option 13: 10f/100s	-18%	-14%	-15%	-8%	-20%	-10%
Background: 1f/10s	-52%	-41%	-58%	-44%	-65%	-70%

3486

Table C-16. Probability Total IQ Loss is > 1 IQ Point, COF Pre-1940 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	15%	18%	20%	18%	11%	1%
Option 3: 40f/100s	14%	15%	18%	15%	10%	0%
Option 7: 20f/250s	10%	12%	13%	12%	7%	0%
Option 8: 20f/100s	8%	10%	10%	10%	5%	0%
Option 11: 10f/250s	7%	10%	9%	10%	4%	0%
Option 13: 10f/100s	4%	8%	5%	8%	2%	0%
Background: 1f/10s	0%	4%	0%	4%	0%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-2%	-2%	-2%	-2%	0%
Option 7: 20f/250s	-5%	-5%	-7%	-5%	-5%	-1%
Option 8: 20f/100s	-8%	-7%	-10%	-7%	-7%	-1%
Option 11: 10f/250s	-8%	-8%	-11%	-8%	-7%	-1%
Option 13: 10f/100s	-11%	-9%	-14%	-9%	-9%	-1%
Background: 1f/10s	-15%	-14%	-20%	-14%	-11%	-1%

3487

Table C-17. Probability Total IQ Loss is > 1 IQ Point, COF 1940-1977 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	20%	32%	27%	33%	16%	6%
Option 3: 40f/100s	18%	29%	24%	29%	14%	4%
Option 7: 20f/250s	15%	23%	20%	23%	10%	2%
Option 8: 20f/100s	12%	18%	16%	18%	8%	1%
Option 11: 10f/250s	11%	17%	15%	17%	7%	1%
Option 13: 10f/100s	7%	12%	9%	12%	4%	0%
Background: 1f/10s	0%	4%	0%	4%	0%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-3%	-3%	-4%	-2%	-2%
Option 7: 20f/250s	-5%	-10%	-7%	-10%	-6%	-4%
Option 8: 20f/100s	-8%	-14%	-11%	-15%	-8%	-5%
Option 11: 10f/250s	-9%	-15%	-13%	-16%	-9%	-5%
Option 13: 10f/100s	-13%	-20%	-18%	-21%	-12%	-6%
Background: 1f/10s	-20%	-28%	-27%	-29%	-16%	-6%

Table C-18. Probability Total IQ Loss is > 1 IQ Point, COF Pre-1978 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	20%	32%	27%	32%	16%	5%
Option 3: 40f/100s	18%	28%	24%	28%	14%	3%
Option 7: 20f/250s	15%	22%	20%	22%	10%	2%
Option 8: 20f/100s	12%	17%	16%	17%	8%	1%
Option 11: 10f/250s	11%	16%	14%	16%	7%	0%
Option 13: 10f/100s	7%	12%	9%	12%	4%	0%
Background: 1f/10s	0%	4%	0%	4%	0%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-2%	-4%	-3%	-4%	-2%	-2%
Option 7: 20f/250s	-5%	-10%	-7%	-10%	-6%	-3%
Option 8: 20f/100s	-8%	-14%	-11%	-15%	-8%	-4%
Option 11: 10f/250s	-9%	-16%	-13%	-16%	-9%	-5%
Option 13: 10f/100s	-13%	-20%	-18%	-20%	-12%	-5%
Background: 1f/10s	-20%	-27%	-27%	-28%	-16%	-5%

3490

C-4 Probability Dust-Only IQ Loss > 2 IQ Points

Table C-19. Probability Total IQ Loss is > 2 IQ Points, Residence Pre-1940 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	41%	75%	53%	85%	39%	52%
Option 3: 40f/100s	38%	73%	49%	83%	36%	47%
Option 7: 20f/250s	32%	67%	43%	77%	30%	35%
Option 8: 20f/100s	28%	61%	38%	72%	25%	27%
Option 11: 10f/250s	27%	59%	36%	70%	24%	24%
Option 13: 10f/100s	20%	48%	29%	60%	18%	13%
Background: 1f/10s	2%	7%	3%	19%	1%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-3%	-4%	-2%	-3%	-5%
Option 7: 20f/250s	-9%	-9%	-10%	-8%	-9%	-16%
Option 8: 20f/100s	-13%	-14%	-15%	-13%	-14%	-25%
Option 11: 10f/250s	-14%	-17%	-17%	-15%	-15%	-28%
Option 13: 10f/100s	-21%	-28%	-24%	-25%	-21%	-39%
Background: 1f/10s	-39%	-68%	-50%	-66%	-38%	-52%

3491

Table C-20. Probability Total IQ Loss is > 2 IQ Points, Residence 1940-1977 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	47%	72%	66%	85%	49%	67%
Option 3: 40f/100s	45%	70%	63%	83%	46%	63%
Option 7: 20f/250s	39%	66%	56%	79%	39%	55%
Option 8: 20f/100s	34%	62%	51%	76%	34%	47%
Option 11: 10f/250s	33%	61%	49%	74%	32%	44%
Option 13: 10f/100s	26%	55%	41%	69%	25%	33%
Background: 1f/10s	3%	15%	6%	28%	2%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-2%	-3%	-2%	-3%	-4%
Option 7: 20f/250s	-9%	-6%	-9%	-6%	-10%	-12%
Option 8: 20f/100s	-13%	-10%	-15%	-9%	-15%	-20%
Option 11: 10f/250s	-15%	-12%	-17%	-10%	-17%	-23%
Option 13: 10f/100s	-21%	-17%	-25%	-16%	-24%	-34%
Background: 1f/10s	-44%	-57%	-60%	-56%	-47%	-67%

Table C-21. Probability Total IQ Loss is > 2 IQ Points, Residence Pre-1978 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	47%	72%	65%	85%	49%	66%
Option 3: 40f/100s	44%	70%	62%	83%	45%	63%
Option 7: 20f/250s	38%	66%	56%	79%	39%	54%
Option 8: 20f/100s	34%	62%	51%	76%	34%	47%
Option 11: 10f/250s	32%	61%	48%	74%	32%	44%
Option 13: 10f/100s	26%	55%	40%	69%	25%	32%
Background: 1f/10s	3%	14%	6%	27%	2%	0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-3%	-2%	-3%	-2%	-3%	-4%
Option 7: 20f/250s	-9%	-6%	-10%	-6%	-10%	-12%
Option 8: 20f/100s	-13%	-10%	-15%	-9%	-15%	-20%
Option 11: 10f/250s	-14%	-11%	-17%	-10%	-17%	-23%
Option 13: 10f/100s	-21%	-18%	-25%	-16%	-24%	-35%
Background: 1f/10s	-44%	-58%	-59%	-58%	-47%	-66%

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Table C-22. Probability Total IQ Loss is > 2 IQ Points, COF Pre-1940 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.1%	1.0%	1.4%	5.2%	0.6%	0.0%
Option 3: 40f/100s	0.8%	0.9%	1.1%	4.3%	0.5%	0.0%
Option 7: 20f/250s	0.6%	0.5%	0.7%	2.6%	0.3%	0.0%
Option 8: 20f/100s	0.4%	0.2%	0.5%	1.4%	0.2%	0.0%
Option 11: 10f/250s	0.3%	0.1%	0.4%	1.1%	0.2%	0.0%
Option 13: 10f/100s	0.1%	0.1%	0.1%	0.4%	0.0%	0.0%
Background: 1f/10s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	0%	0%	0%	-1%	0%	0%
Option 7: 20f/250s	-1%	-1%	-1%	-3%	0%	0%
Option 8: 20f/100s	-1%	-1%	-1%	-4%	0%	0%
Option 11: 10f/250s	-1%	-1%	-1%	-4%	0%	0%
Option 13: 10f/100s	-1%	-1%	-1%	-5%	-1%	0%
Background: 1f/10s	-1%	-1%	-1%	-5%	-1%	0%

3493

Table C-23. Probability Total IQ Loss is > 2 IQ Points, COF 1940-1977 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9%	3.6%	2.7%	12.4%	1.1%	0.0%
Option 3: 40f/100s	1.4%	2.7%	2.0%	10.7%	0.8%	0.0%
Option 7: 20f/250s	0.9%	1.7%	1.3%	7.4%	0.5%	0.0%
Option 8: 20f/100s	0.6%	1.0%	0.8%	5.1%	0.3%	0.0%
Option 11: 10f/250s	0.5%	0.8%	0.7%	4.2%	0.3%	0.0%
Option 13: 10f/100s	0.3%	0.4%	0.4%	2.1%	0.1%	0.0%
Background: 1f/10s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-1%	-2%	0%	0%
Option 7: 20f/250s	-1%	-2%	-1%	-5%	-1%	0%
Option 8: 20f/100s	-1%	-3%	-2%	-7%	-1%	0%
Option 11: 10f/250s	-1%	-3%	-2%	-8%	-1%	0%
Option 13: 10f/100s	-2%	-3%	-2%	-10%	-1%	0%
Background: 1f/10s	-2%	-4%	-3%	-12%	-1%	0%

3494

Table C-24. Probability Total IQ Loss is > 2 IQ Points, COF Pre-1978 Scenario

Probability for Total IQ Loss						
	Log-linear with Cutpoint		Log-linear with Linearization		Log-linear with ln(BLL+1)	
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	1.9%	3.3%	2.7%	11.9%	1.1%	0.0%
Option 3: 40f/100s	1.4%	2.7%	2.0%	10.4%	0.8%	0.0%
Option 7: 20f/250s	0.9%	1.6%	1.3%	7.1%	0.5%	0.0%
Option 8: 20f/100s	0.6%	1.0%	0.8%	5.0%	0.3%	0.0%
Option 11: 10f/250s	0.5%	0.8%	0.7%	4.1%	0.3%	0.0%
Option 13: 10f/100s	0.3%	0.3%	0.4%	1.8%	0.1%	0.0%
Background: 1f/10s	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Change in Probability Moving from Cur: 40f/250s						
Dust Level	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5	Concurr., Age 5	Lifetime, Age 5
Cur: 40f/250s	0%	0%	0%	0%	0%	0%
Option 3: 40f/100s	-1%	-1%	-1%	-1%	0%	0%
Option 7: 20f/250s	-1%	-2%	-1%	-5%	-1%	0%
Option 8: 20f/100s	-1%	-2%	-2%	-7%	-1%	0%
Option 11: 10f/250s	-1%	-3%	-2%	-8%	-1%	0%
Option 13: 10f/100s	-2%	-3%	-2%	-10%	-1%	0%
Background: 1f/10s	-2%	-3%	-3%	-12%	-1%	0%

3495

Message

From: Hamilton, Sabrina [Hamilton.Sabrina@epa.gov]
Sent: 11/14/2017 4:37:21 PM
To: Lewis, Josh [Lewis.Josh@epa.gov]; Dominguez, Alexander [dominguez.alexander@epa.gov]
CC: Cyran, Carissa [Cyran.Carissa@epa.gov]
Subject: RE: LA Attorney General Landry
Attachments: AX-17-000-6391.pdf

I forgot one. No response was sent for this letter either.

Sabrina

Sabrina Hamilton
Air and Radiation Liaison Specialist
and FOIA Coordinator
Office of Air and Radiation - Correspondence Unit
U.S. Environmental Protection Agency (EPA)
1200 Pennsylvania Avenue, N.W. (6101-A)
Washington, D.C. 20460
Tel: (202) 564-1083
Fax: (202) 501-0600

From: Hamilton, Sabrina
Sent: Tuesday, November 14, 2017 11:28 AM
To: Lewis, Josh <Lewis.Josh@epa.gov>; Dominguez, Alexander <dominguez.alexander@epa.gov>
Cc: Cyran, Carissa <Cyran.Carissa@epa.gov>
Subject: RE: LA Attorney General Landry

Alex and Josh,

Attached are the incoming and response letters to Jeff Landry. Please note that no responses were sent for the letters referencing AX-17-000-5735 and AX-16-000-7944. Let me know if you need anything else.

Sabrina

Sabrina Hamilton
Air and Radiation Liaison Specialist
and FOIA Coordinator
Office of Air and Radiation - Correspondence Unit
U.S. Environmental Protection Agency (EPA)
1200 Pennsylvania Avenue, N.W. (6101-A)
Washington, D.C. 20460
Tel: (202) 564-1083
Fax: (202) 501-0600

From: Lewis, Josh
Sent: Tuesday, November 14, 2017 10:32 AM
To: Dominguez, Alexander <dominguez.alexander@epa.gov>
Cc: Hamilton, Sabrina <Hamilton.Sabrina@epa.gov>; Cyran, Carissa <Cyran.Carissa@epa.gov>
Subject: RE: LA Attorney General Landry

Sabrina or Carissa can confirm whether the recent Landry letter has been sent and also whether other letters exist (off the top of my head, I don't recall seeing others).

From: Dominguez, Alexander
Sent: Tuesday, November 14, 2017 9:57 AM
To: Lewis, Josh <Lewis.Josh@epa.gov>
Subject: LA Attorney General Landry

Hey Josh,

Could you point me in the right direction for who to get the below information from:

Any letters we have received from Louisiana Attorney General Jeff Landry as well as our responses. I know there was the one on Tier IV NOx emission standards, but was not sure if that has been sent yet. Any others would be great as well. I also reached out to OCIR but was not sure who in OAR handles this.

Appreciate it,

Alex Dominguez
Policy Analyst to the Principal Deputy Assistant Administrator
Office of Air and Radiation
U.S. Environmental Protection Agency

KEN PAXTON
ATTORNEY GENERAL OF TEXAS

March 7, 2017

Hon. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Avenue, N.W.
Washington D.C. 20460

Re: Request to reexamine delegation of certain environmental regulation authority to the States in accordance with the express terms of the Clean Air and Water Acts; from State of Texas, from State of Alabama, from State of Arizona, from State of Arkansas, from State of Georgia, from State of Indiana, from State of Kansas, from State of Kentucky, from State of Louisiana, from State of Mississippi, from State of Missouri, from State of Montana, from State of Nebraska, from State of Nevada, from State of North Dakota, from State of Oklahoma, from State of South Carolina, from State of West Virginia, from State of Wyoming

Dear Administrator Pruitt:

We write to call your attention to the fact that the extensive regulation from the Environmental Protection Agency during the last decade is directly at odds with the express terms and structure of the Clean Air Act and Clean Water Act. We ask that as you assess the performance of your Agency, you do so with a keen eye toward compliance with these governing laws and not repugnance to them.

These federal laws acknowledge basic truths: that the primary regulators of the environment are the States and local governments. The Clean Air Act wastes no time making this point. The very first section states that "air pollution prevention . . . and air pollution control at its source is the primary responsibility of States and local governments." 42 U.S.C. § 7401(a)(3). The Clean Air Act then establishes a preferred method for the federal government to assist States and local governments: "to provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution prevention and control programs." *Id.* § 7401(b)(3). The Act's terms such as "encourage," "assist," and "promote" envision a collaborative arrangement.[1] As one court summarized,

[1] The Clean Water Act is based on a collaborative framework that is substantially similar to the cooperative arrangement underlying the Clear Air Act. *See, e.g.*, 33 U.S.C. § 1251(b) (providing that the policy of the Clear Water Act is to preserve the "primary responsibilities of States to prevent, reduce, and eliminate" water pollution).

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"[t]he great flexibility accorded the states under the Clean Air Act is ... illustrated by the sharply contrasting, narrow role to be played by EPA." *Fla. Power & Light Co. v. Costle*, 650 F.2d 579, 587 (5th Cir. 1981).

The methods we have seen from the Agency as of late, however, are in direct conflict with the cooperative arrangement the Act establishes. The Agency has replaced "encourage" and "promote" with "command" and "commandeer." Take one recent example. Texas formulated a state implementation plan for Regional Haze. That plan imposed reasonable regulations on such things as power generators in the State to ensure air quality was sufficiently high to allow good visibility. The Agency rejected the State's plan, imposed a federal plan costing $2 billion without achieving any visibility changes, and tried to insulate itself by requiring Texas to challenge the rejection of its plan in the D.C. Circuit.

Unsurprisingly, the Fifth Circuit rejected the Agency's attempt to transfer venue and stayed the federal plan.[2] At that point, the Agency had the opportunity to return to using its authority under the Act—rather than acting on its own. Instead, the Agency imposed a renewed regional haze rule almost as bad as the first.[3] These actions show that the Agency ignored the efforts of the State, perhaps blinded by the belief that good results can only result from top down management by the federal government. Or worse, the prior Administration's agenda and policy goals drove the Agency's decision rather than the requirements of the statute.

The federal government must respect the clear terms of cooperative federal-state enactments. For example, federal agencies may not add conditions on the receipt of federal funds unless the terms are clearly stated in the controlling statute. *Arlington Cent. Sch. Dist. Bd. of Educ. v. Murphy*, 548 U.S. 291, 296 (2006). And federal agencies may not stray outside the boundaries of their statutory authority by relying on policy documents and other non-statutory materials. *See, e.g., Luminant Generation Co., LLC v. EPA*, 675 F.3d 917, 931 (5th Cir. 2012).

Similarly, the federal government may interpose itself between a State and its municipal subdivisions only if Congress provides a clear directive to do so. *Tennessee v. FEC*, 832 F.3d 597, 610 (6th Cir. 2016). From our perspective, the recent overreach by the Agency amounts to a striking departure from the Clean Air and Clean Water Acts. Respectfully, we ask that you consider the steps that the Agency may take to restore the principles of cooperative federalism embodied in these important statutes.

Sincerely yours,

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[2] *Texas v. United States Envtl. Prot. Agency*, 829 F.3d 405 (5th Cir. 2016).

[3] 82 Fed. Reg. 3,078 (Jan. 10, 2017)

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cc: Hon. Jeff Sessions, United States Attorney General

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From: Frye, Tony (Robert)
Sent: Tue 10/3/2017 9:55:59 PM
Subject: Administrator Pruitt Confirmation Hearing Questions
scott-pruitt-qfr-responses-01.18.2017.pdf
Sen Markey Questions - scott-pruitt-qfr-responses-01.18.2017.pdf
Adm. Pruitt Nom Hearing Transcript.pdf

Hello All,

Attached please find the full hearing transcript for Administrator Pruitt's nomination hearing. The dialogue with Senator Markey can be found on pgs. 63-67; 144-149; and 199-203 and the questions from Senator Harris can be found on pgs. 79-86.

I have also attached the questions for the record Administrator Pruitt received following his hearing. Additionally, I specifically pulled questions from Senator Markey; however, Senator Harris did not submit any questions for the record.

Let me know if you have any additional thoughts or questions.

Best,

Tony

Tony Frye

Special Assistant to the Deputy Associate Administrator

Office of Congressional & Intergovernmental Affairs

Environmental Protection Agency

Phone: 202.564.0640

Ex. 6 - Personal Privacy

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%$55$662└
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7KDW└ PHDQV└ LI└ WKHUH└ DUH└ GLVRUGHUV☼└ GHPRQVWUDWRUV└ E\└ D└ PHPEHU└ RI└ WKH└ DXGLHQFH☼└ WKH└ SHUVRQ└ FDXVLQJ└ WKH└ GLVUXSWLRQ└ ZLOO└ EH└ HVFRUWHG└ IURP└ WKH└ URRP└ E\└ WKH└ &DSLWRO└ 3ROLFH◀

6LQFH└ WKLV└ LV└ RXU└ ILUVW└ KHDULQJ└ RI└ WKLV└ VHVVLRQ☼└ ,G└ OLNH└ WR└ ZHOFRPH└ RXU└ QHZ└ PHPEHUV☼└ 6HQDWRUV└ -HUU\└ 0RUDQ└ DQG└ -RQ└ (UQVW☼└ 7DPP\└ 'XFNZRUWK☼└ DQG└ .DPDOD└ +DUULV◀└ 7KDQN└ \RX└ YHU\└ PXFK☼└ DQG└ FRQJUDWXODWLRQV└ LQ└ MRLQLQJ└ /KH└ FRPPLWWHH◀

,G└ DOVR└ OLNH└ WR└ ZHOFRPH└ 6HQDWRU└ 7RP└ &DUSHU☼└ LQ└ KLV└ QHZ└ URCH└ DV└ WKH└ UDQNLQJ└ PHPEHU└ RI└ WKH└ FRPPLWWHH◀

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<HDK☼└ KH└ GHVHUYHV└ DSSODXVH☼└ WKDW└ ULJKW◀

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:LWK└ UHVSHFW└ WR└ WRGD\V└ KHDULQJ└ └ ZHOO└ EH└ ┼ ┼ └ ZHOO└ DELGH└ E\└ WKH└ FRPPLWWHHV└ ILYH┼ PLQXWH└ UXOH◀ └ 7KH└ ILYH└ PLQXWHV└ LQFOXGHV└ QRW└ MXVW└ WKH└ TXHVWLRQV└ EXW└ DOVR└ WKH└ QRPLQHHV└ DQVZHU└ └ VR└ ,└ DVN└ RXU└ PHPEHUV└ WR└ SOHDVH└ CHDYH└ HQRXJK└ WLPH└ IRU└ WKH└ QRPLQHH└ WR└ DQVZHU└ \RXU└ TXHVWLRQ◀ └ 7RGD\└ └ ZHOO└ KDYH└ PDQ\└ URXQGV└ RI└ TXHVWLRQV└ └ DV└ DUH└ CHFHVDU\└ └ VR└ WKDW└ PHPEHUV└ TXHVWLRQV└ DUH└ DQVZHUHG◀

7RGD\V└ KHDULQJ└ LV└ WR└ FRQVLGHU└ WKH└ QRPLQDWLRQ└ RI└ $VWRUGH\└ *HQHUDO└ RI└ 2NDKRPD└ └ 6FRWW└ 3UXLWW└ └ WR└ EH└ WKH└ DGPLQLVWUDWRU└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\◀

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1RZ└ $VWRUGH\└ *HQHUDO└ 3UXLWW└ KDV└ WDNHQ└ RQ└ SRODWWHUV└ └ LQFOXGLQJ└ WKH└ RLO└ LQGXWWU\└ └ ZKHQ└ WKHUH└ LV└ FDXVH◀ └ 5DQG\└ (OOLV└ └ DQ└ DZDUG└ ZLQQLQJ└ LQYHWWLJDWLYH└ UHSRUWHU└ ZLWK└ 7KH└ 2NDKRPDQ└ QHZVSDSHU└ └ SUDLVHG└ 3UXLWW└ IRU└ KLV└ DELOLWW└ WR└ WDNH└ RQ└ LQGXWWU\◀

7KH└ SDSHU└ KLJKOLJKWVHG└ WKH└ ZRUN└ RI└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ WR└ KROG└ D└ CDUJH└ RLO└ FRPSDQ\└ DFFRXQWDECH◀└ 7KLV└ LV└ ZKDW└ (OOLV└ WDWHG◀└ +H└ VDLG└ │ 0U◀└ 3UXLWW└ GHPRQVWUDWHG└ WKDW└ KH└ ZLOO└ WDNH└ RQ└ LQGXVWU\└ ZKHQ└ WKH\└ RYHUXWHS└ ZKHQ└ KH└ VXHG└ RLO└ FRPSDQLHV└ VXFK└ DV└ %3└ ZKR└ NQRZLQJO\└ GRXECH╢└ GLS└ E\└ FRCHFWLQJ└ UHLPEXUVHPHQW└ IRU└ FRUUHFWLYH└ HQYLURQPHQWDO└ FRWW└ IRU└ VLWHV└ WKDW└ WKH\YH└ SRODXWHG◀│

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&RCHDJXHV└ RQ└ ERWK└ VLGHV└ RI└ WKH└ DLVCH└ VD\└ WKDW└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ KDV└ WKH└ ULJKW└ H[SHULHQFH└ IRU└ WKH└ SRVLWLRQ◀└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ XQGHUWDQGV└ WKH└ CHHG└ WR└ ERWK└ SURWHFW└ WKH└ HQYLURQPHQW└ ZKLCH└ DOORZLQJ└ RXU└ CDWLRQV└ HFRCRP\└ WR└ JURZ◀└ 7KH└ DJHQF\└ CHHGV└ D└ CHDGHU└ ZKR└ ZLOO└ IROORZ└ WKH└ CDZV└ FUHDWHG└ E\└ WKLV└ FRPPLWWHH◀

'XULQJ└ WKH└ CDWW└ HLJKW└ \HDUV└ (3$└ DGPLQLWUDWRUV└ FUHDWHG└ EURDG└ DQG└ CHJDOO\└ TXHWWLRQDECH└ CHZ└ UHJXCDWLRQV└ ZKLFK└ KDYH└ XQGHUPLQHG└ WKH└ $PHULFDQ└ SHRSCHV└ IDLWK└ LQ└ WKH└ DJHQF\◀└ 7KHVH└ UHJXCDWLRQV└ KDYH└ GRCH└ JUHDW└ GDPDJH└ WR└ WKH└ OLYHOLKRRGV└ RI└ RXU└ CDWLRQV└ KDUGHWW└ ZRUNLQJ└ FLWL]HQV◀

7KH└ UHJXCDWRU\└]HDO└ RI└ WKH└ CDWW└ HLJKW└ \HDUV└ KDV└ YLRCDWHG└ D└ IXQGDPHQWDO└ SULQFLSCH└ RI└ HQYLURQPHQWDO└ WWHZDUGVKLS└ ZKLFK└ LV└ GR└ QR└ KDUP◀└ 7KLV└ IDLCHG└ HQYLURQPHQWDO└ CHDGHUVKLS└ KDV└ FRQWULEXWHG└ WR└ WZR└ RI└ WKH└ ZRUWW└ JRYHUQPHQW╢ FUHDWHG└ HQYLURQPHQWDO└ GLVDWWHUV└ LQ└ GHFDGHV└ WKH└ *ROG└ .LQJ└ 0LCH└ VSLOO└ DQG└)OLQW└ 0LFKLJDQ└ ZDWHU└ FULVLV◀└ 7KRVH└ GLVDWWHUV└ KXUW└ SHRSCH└ PDQ└ IURP└ CRZ└ LQFRPH└ DQG└ PLGRULW└ FRPPXQLWLHV└ ZKR└ FDQ└ CHDW└ DI IRUG└ LW◀

$V└ ,YH└ GLVFXWHG└ ZLWK└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ P\└ KRPH└ WDWH└ RI└ :\RPLQJ└ LV└ D└ CHDGLQJ└ HCHUJ\└ SURGXFLQJ└ WDWH◀└ :H└ KDYH└ DEXQGDQW└ VXSSOLHV└ RI└ FRDO└ CDWXUDO└ JDV└ FUXGH└ RLO└ DQG└ XUDQLXP◀└ 7KHVH└ LQGXWULHV└ SURYLGH└ WKRXVDQGV└ RI└ JRRG╢ SD\LQJ└ MREV└ IRU└ :\RPLQJ└ FRPPXQLWLHV◀

:H└ DUH└ DOVR└ LQ└ P\└ RSLQLRQ└ RCH└ RI└ WKH└ PRWW└ EHDXWLIXO└ WDWHV└ LQ└ WKH└ CDWLRQ◀└ :H└ DUH└ KRPH└ WR└ <HOORZWWRCH└ DQG└ *UDQG└ 7HWRQ└ CDWLRCDO└ SDUNV└ DQG└ QXPHURXV└ CDWLRCDO└ IRUHWW└ DQG└ SULWWLCH└ CDNHV└ DQG└ ZDWHUZD\V◀└ 2XU└ ZLOGOLIH└ SRSXCDWLRQ└ LV└ GLYHUVH└ DQG└ DEXQGDQW◀└ :H└ KDYH└ WKULYLQJ└ SRSXCDWLRQV└ RI└ JUL]]O\└ EHDUV└ ZROYHV└ HCN└ DQG└ ELVRQ◀

3HRSOH└ WUDYHO└ IURP└ DURXQG└ WKH└ ZRUOG└ WR└ FRPH└ WR└ :\RPLQJ☼ └ EHFDXVH└ RXU└ WDWHV└ QDWXUDO└ UHVRXUFHV└ DUH└ VSHFWDFXODU◀ └ :\RPLQJ└ KDV└ PDQDJHG└ WR└ WUULNH└ WKDW└ EDODQFH└ EHWZHHQ└ RXU└ HQYLURQPHQW└ DQG└ RXU└ HFRQRP\☼ └ DQG└ LW└ VKRZV◀

)RU└ HLJKW└ \HDUV☼ └ :\RPLQJ└ KDV└ VXIIHUHG└ XQGHU└ DQ└ (3$└ WKDW└ GLGQW└ EHOLHYH└ LQ└ WUULNLQJ└ D└ EDODQFH◀ └ $V└ (3$└ UHJXODWLRQV└ FUXVKHG└ HQHUJ\└ MREV└ LQ└ P\└ WDWH☼ └ WDWH└ UHYHQXH└ IHDO☼ └ WKDW└ SD\V└ IRU└ WDWH└ SURJUDPV◀ └ 7KLV└ LQFOXGHV└ SD\LQJ└ IRU└ RXU└ YLWDO└ HQYLURQPHQWDO└ SURJUDPV◀

&HDUO\☼ └ D└ ZKRHVDCH└ FKDQJH└ LV└ QHHGHG◀ └ $Q\└ QHZ└ DGPLQLWUDWRU└ RI└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ QHHGV└ WR└ SURWHFW└ WKH└ HQYLURQPHQW└ LQ└ D└ UHVSRQVLECH└ ZD\☼ └ WKDW└ GRHVQW└ LJQRUH└ WKH└ JRRG└ ZRUN└ WKDW└ WDWHV└ GR└ WR└ SURWHFW└ WKHLU└ DLU☼ └ CDQG└ DQG└ ZDWHU☼ └ DV└ ZHOO└ DV└ WKHLU└ HFRQRPLHV◀

$W└ WKLV└ WLPH☼ └ ,G└ OLNH└ WR└ DVN└ UDQNLQJ└ PHPEHU☼ └ 6HQDWRU└ &DUSHU☼ └ IRU└ DQ└ RSHQLQJ└ WDWHPHQW◀

&$53(5 └
0U◀ └ &KDLUPDQ☼ └ WKDQN└ \RX◀ └ 7KDQN└ \RX└ IRU└ EULQJLQJ└ XV└ KHUH└ WRGD\◀ └ 7KDQN└ \RX└ IRU└ \RXU└ NLQG☼ └ NLQG└ ZRUGV☼ └ DV└ ZHOO◀ └ /HW└ PH└ EHJLQ└ E\└ ZHOFRPLQJ└ RXU└ CRPLCHH☼ └ KLV└ ZLIH└ 0DULO\Q└ + + └ 0DUO\Q☼ └ DQG└ WKHLU└ FKLOGUHQ☼ └ &DCH└ DQG└ 0F.HQDD☼ └ WR└ ZKDW└ D└ YHU\└ LPSRUWDQW└ KHDULQJ◀

-XW└ SXW└ + + └ WKLV└ SDW└ 6XQGD\└ PRUQLQJ☼ └ ,└ URVH└ DW└ GDZQ☼ └ DQG└ ,└ ZHQW└ IRU└ D└ CRQJ└ UXQ◀ └ ,W└ WRRN└ PH└ WKURXJK└ D└ EHDXWLIXO└ WDWH└ SDUN└ LQ└ WKH└ CRUWKHUQ└ SDUW└ RI└ 'HDZDUH◀

,└ UHDFKHG└ WKH└ SDUN└ DW└ VXQULVH☼ └ MKW└ DV└ WKH└ VXQ└ ZDV└ FRPLQJ└ XS☼ └ DQG└ WKH└ VN\└ ZDV└ WXUQLQJ└ D└ EULOOLDQW└ EOXH◀ └ 7KH└ ZLQWHU└ DLU└ ZDV└ FULVS☼ └ DQG└ FCHDU◀ └ :LOGOLIH└ ZDV└ DOO└ DURXQG◀ └ ,Q└ D└ ZRUG☼ └ LW└ ZDV└ SHUIHFW◀ └ $V└ ,└ UDQ☼ └ ,└ VDLG└ D└ SUD\H RI└ WKDQNVJLYLQJ└ IRU└ WKH└ JLIW└ RI└ WKLV└ PRPHQW◀

/DWHU└ WKDW└ PRUQLQJ☼ └ P\└ ZLIH└ DQG└ ,└ ZHQW└ WR└ FKXUFK☼ └ DQG└ WKHUH└ ZH└ MRLQHG└ RXU└ FRQJUHJDWLRQ└ LQ└ VLQJLQJ└ D└ K\PQ└ WKDW└ EHJDQ└ ZLWK└ WKHMH└ ZRUGV◀ └ |)RU└ ΛKH└ EHDXW\└ RI└ WKH└ HDUWK☼ └ IRU└ WKH└ JCRU\└ RI└ WKH└ VNLHV☼ └ IRU└ WKH└ CRYH└ ZKLFK└ IRUPHG└ RXU└ ELUWK☼ └ RYHU└ DQG└ DURXQG└ XV└ OLHV◀ └ /RUG└ RI└ DOO☼ └ WR└ WKHH└ ZH└ UDLVH└ ΛKLV☼ └ RXU└ K\PQ└ RI└ JUDWHIXO└ SUDLVH◀ |

7KRVH└ ZRUGV└ ILOOHG└ P\└ KHDUW└ ZLWK└ HPRWLRQ└ WKHQ└ └ DQG└ WKH\└ GR└ VR└ DJDLQ└
/KLV└ PRUQLQJ◀ └ ,Q└ D└ OLWWOH└ PRUH└ WKDQ└ ┤ ← └ KRXUV└ └ 'RQDOG└ 7UXPS└ ZLOO└ SODFH└ KLV└
KDQG└ RQ└ D└ ELEOH◀ └ +HOO└ WDNH└ DQ└ RDWK└ WR└ GHIHQG└ RXU└ FRXQWU\└ DQG└
FRQVWLWXWLRQ◀ └ 7KDW└ ELEOH└ UHPLQGV└ XV└ UHSHDWHGO\└ WR└ CRYH└ RXU└ CHLJKERUV└ DV└
RXUVHOYHV└ └ DQG└ LW└ DQVZHUV└ WKH└ TXHVWLRQ└ └ ZKR└ LV└ P\└ CHLJKERU◀

$OVR└ IRXQG└ LQ└ WKRVH└ SDJHV└ DUH└ VFRUHV└ RI└ DGPRQLWLRQV└ ZLWK└ ┤ ┤ └ DERXW└
DGRWKHU└ REOLJDWLRQ└ WKDW└ WKRVH└ RI└ XV└ ZKR└ OLYH└ RQ└ WKLV└ HDUWK└ DUH└ H[SHFWHG└ WR└
PHHW◀ └ 6LPSO\└ SXW└ └ ZHUH└ WR└ VHUYH└ DV└ WWHZDUGV└ RI└ WKLV└ SODCHW◀ └ ,└ EHOLHYH└ WKDW└
ZH└ KDYH└ D└ PRUDO└ REOLJDWLRQ└ WR└ GR└ VR◀

$└ JUHDW└ PDQ\└ RI└ P\└ FRODHDJXHV└ LQ└ WKH└ 6HQDWH└ DJUHH└ └ DQG└ VR└ GR└ PRW└
$PHULFDQV◀ └ :H└ QHHG└ WR└ EH└ FRQYLQFHG└ WKDW└ \RX└ HPEUDFH└ LW└ DV└ ZHOO└ └ QRW└
VXWW└ ZLWK└ \RXU└ ZRUGV└ └ EXW└ ZLWK└ \RXU└ GHHGV◀ └ 0XFK└ RI└ \RXU└ UHFRUG└ VXJJHWW└
RWKHUZLVH◀ └ $QG└ WRGD\└ └ DQG└ LQ└ WKH└ GD\V└ WKDW└ IROORZ└ └ ZH└ QHHG└ WR└ ILQG└ RXW└
ZKHUH└ WKH└ WUXWK└ OLHV◀

/HDGLQJ└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ LV└ KDUG└ ZRUN◀ └ 7KDW└
DJHQF\└ └ FUHDWHG└ E\└ 3UHVLGHQW└ 5LFKDUG└ 1L[RQ└ DQG└ D└ ELSDUWLVDQ└ &RQJUHVV└ └
┤ ├ └ \HDUV└ DJR└ └ LV└ WDVNHG└ ZLWK└ LPSOHPHQWLQJ└ RXU└ QDWLRQV└ PRW└ LPSRUWDQW└
FOHDQ└ DLU└ └ FOHDQ└ ZDWHU└ └ DQG└ VDIH└ FKHPLFDO└ ODZV◀

7KH└ (3$└ LV└ UHTXLUHG└ WR└ XVH└ VRXQG└ VFLHQFH└ WR└ SURWHFW└ ERWK└ RXU└
HQYLURQPHQW└ DQG└ RXU└ SXEOLF└ KHDOWK◀ └ %\└ DQG└ CDUJH└ └ WKH└ (3$└ KDV└ GRQH└ WKLV└
VXFFHVVIXOO\└ IRU└ GHFDGHV└ └ ZKLOH└ RXU└ HFRQRP\└ KDV└ FRQWLQXHG└ WR└ JURZ◀

0DQ\└ LQ└ WKLV└ URRP└ WRGD\└ PD\└ QRW└ UHPHPEHU└ D└ WLPH└ EHIRUH└ WKH└ (3$└ └ D└
/LPH└ ZKHQ└ WWDWHV└ KDG└ WR└ ZRUN└ LQGLYLGXDOO\└ WR└ SURWHFW└ FLWL]HQV└ LQ└ WKH└
FRPPXQLW\└ LQ└ ZKLFK└ WKH\└ OLYHG└ └ D└ WLPH└ EHIRUH└ WKH└ &HDQ└ :DWHU└ $FW└ DQG└
&HDQ└ $LU└ $FW└ ZHUH└ VLJHG└ LQWR└ ODZ└ └ D└ VLJQ└ ZKHQ└ EXVLHVVHV└ RSHUDWLQJ└
/KURXJKRXW└ WKH└ 8◀ 6◀ └ ZHUH└ IDFHG└ ZLWK└ D└ P\ULDG└ RI└ FRQIOLFWLQJ└ WWDWH└ DQG└
CRFDO└ ODZV└ DI IHFWLQJ└ RXU└ KHDOWK└ DQG└ RXU└ HQYLURQPHQW◀

7KH└ FKRNLQJ└ VPRJ└ DQG└ VRRW└ RI└ D└ KDOI└ FHQWXU\└ DJR└ VHHP└ XQIDWKRPDECH└
QRZ◀ └ 5LYHUV└ RQ└ ILUH└ └ DQG└ GHDGO\└ WR[LF└ SOXPHV└ VRXQG└ OLNH└ VRPHWKLQJ└ IURP└
DGRWKHU└ ZRUOG└ └ LPSRWLECH└ LQ└ RXU└ 8QLWHG└ 6WDWHV└ RI└ $PHULFD◀

7RGD\└ ZH└ KDYH└ WKH└ OX[XU\└ RI└ CDUJHD\└ IRUJHWWLQJ└ WKHMH└ IULJKWHQLQJ└
FLUFXPWDQFHV└ └ WKDQNV└ WR└ WKH└ HI IRUWW└ RI└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└
$JHQF\└ └ LW└ HPSOR\HHV└ └ LQ└ SDUWQHUWKLS└ ZLWK└ WWDWH└ DQG└ CRFDO└ DJHQFLHV└ └ DQG└
ZLWK└ FRPSDQLHV└ DFURW└ $PHULFD◀

,Q└ IDFW└ └ WKH└ (3$└ DQG└ LWW└ PDQ└ SDUWGHUV└ WKURXJKRXW└ WKLV└ FRXQWU└ KDYH└ EHHQ└ VR└ VXFFHVVIXO└ └ WKDW└ LWW└ HDV└ IRU└ VRPH└ RI└ XV└ WR└ IRUJHW└ MXW└ ZK└ WKLV└ DJHQF└ LV└ VR└ FULWLFDO◀ └)RU└ VRPH└ └ LWW└ DOVR└ HDV└ WR└ SUHVXPH└ WKDW└ QRW└ PXFK└ PRUH└ ┼ ┼ └ WKHUHV└ QRW└ PXFK└ PRUH└ IRU└ WKH└ DJHQF└ WR└ GR└ └ DQG└ WKDW└ MXW└ FRXOG└ QRW└ EH└ IXUWKHU└ IURP└ WKH└ WUXWK◀

7KH└ HQYLURQPHQWDO└ WKUHDWW└ WKDW└ ZH└ IDFH└ WRGD└ DUH└ UHDO◀ └ 7KH└ GRQW└ UHVSHFW└ WDWH└ ERXQGDULHV◀ └ $V└ ZH└ FRQVLGHU└ D└ GRPLQH└ WR└ UXQ└ RXU└ GDWLRQV└ IRUHPRWW└ HQYLURQPHQWDO└ CHJDF└ DJHQF└ └ LWW└ ZRUWK└ UHPLQGLQJ└ HYHU└ KHUH└ ZK└ WKH└ PLWLRQ└ RI└ WKH└ (3$└ LV└ VR└ FULWLFDO└ └ DQG└ MXW└ ZKDW└ LV└ DW└ WDNH◀

2YHU└ WLPH└ └ P└ WDWH└ RI└ 'HDZDUHV└ PDGH└ ┼ ┼ └ WKH└ KDYH└ PDGH└ JUHDW└ WULGHV└ LQ└ FHDQLQJ└ XS└ RXU└ RZQ└ DLU└ SROOXWLRQ└ └ EXW└ RXU└ ZRUN└ RQD└ JRHV└ VR└ IDU◀ └ 'HDZDUH└ └ OLNH└ PDQ└ WDWHV└ RQ└ WKH└ (DWW└ &RDWW└ └ VLW└ DW└ WKH└ HQG└ RI└ ZKDW└ LV└ NQRZQ└ DV└ $PHULFDV└ WDLOSLSH◀

1LQHW└ SHUFHQW└ RI└ WKH└ DLU└ SROOXWLRQ└ LQ└ 'HDZDUH└ FRPHV└ IURP└ RXWLGH└ RI└ WKH└ IUWW└ WDWH└ └ IURP└ SRZHU└ SODQW└ └ KXQGUHGV└ RI└ PLCHV└ DZD└ LQ└ SDFHV└ OLNH└ .HQXFN└ └ 2KLR└ └ ,QGLDQD└ DQG└ DFURW└ WKH└ 0LGZHW◀

$V└ JRYHUQRU└ RI└ 'HDZDUH└ └ LI└ ,└ KDG└ HDLPLQDWHG└ HYHU└ VRXUFH└ RI└ DLU└ SROOXWLRQ└ ZLWKLQ└ P└ WDWH└ └ WRSSHG└ HYHU└ FRPEXWLRQ└ VRXUFH└ DQG└ RUGHUHG└ HYHU└ PRWRU└ YHKLFCH└ RII└ WKH└ URDGV└ └ 'HDZDUH└ ZRXOG└ WLOO└ KDYH└ IDFHG└ GHDGO└ GRVHV└ RI└ DLU└ SROOXWLRQ◀

6KRXOG└ FKLOGUHQ└ DQG└ RWKHUV└ LQ└ 'HDZDUH└ UHDO└ EH└ IRUFHG└ WR└ OLYH└ ZLWK└ WKH└ FRQVHTXHQFHV└ RI└ GHFLVLRQV└ PDGH└ E└ SROOXWHUV└ KXQGUHGV└ RU└ HYHQ└ WKRXVDQGV└ RI└ PLCHV└ DZD└ ZKR└ JDLQ└ HFRQRPLFDOO└ IURP└ RXU└ GLVDGYDQWDJH"└ ,└ GRQW└ WKLQN└ VR◀

)RUWXQDWHO└ └ WKH└ (3$└ KDV└ UHFHQW└ LPSOHPHQWHG└ VRPHWKLQJ└ FDOOHG└ WKH└ *RRG└ 1HLJKERU└ UXOH└ └ WR└ PDNH└ VXUH└ WKDW└ DOO└ WDWHV└ GR└ WKHLU└ IDLU└ VKDUH└ WR└ FCHDQ└ XS└ WKH└ DLU◀ └ (YHU└ FLWL]HQ└ LQ└ WKLV└ FRXQWU└ KDV└ D└ ULJKW└ WR└ EUHDWKH└ FCHDQ└ DLU└ └ UHJDUGCHW└ RI└ ZKHWKHU└ WKH└ UH└ LQ└ D└ GRZQZLQG└ RU└ DQ└ XSZLQG└ WDWH◀ └ 7KDW└ LV└ ZK└ ZH└ KDYH└ WKH└ (3$◀

,└ UHPHPEHU└ ILVKLQJ└ └ DV└ D└ ER└ └ ZLWK└ P└ GDG└ └ DORQJ└ WKH└ 'DQ└ 5LYHU└ └ QHDU└ P└ KRPHWRZQ└ RI└ 'DQYLOCH└ └ 9LUJLQLD◀ └ :H└ EURXJKW└ KRPH└ WKH└ ILVK└ WKDW└ ZH└ FDXJKW└ └ WR└ HDW└ └ DQG└ P└ PRP└ DQG└ VLWWHU└ DWH└ WKHP└ DV└ ZHOO◀

7RGD\☼ └ WKDW└ TXLQWHVVHQWLDO└ $PHULFDQ└ SDWULPH└ FRPHV└ ZLWK└ D└ ZDUQLQJ└
CDEHD◀ └ 7KDW└ ULYHU☼ └ DCRQJ└ ZLWK└ FRXQWCHVV└ RWKHU└ SRCCXWHG└ WWUHDPV☼ └ ULYHUV└ DQG└
CDNHV☼ └ LQ└ DOO└ ↑ !! └ WWDWHV☼ └ DUH└ VXEMHFW└ WR└ SXEOLF└ KHDOWK└ DGYLVRULHV☼ └ FDXWLRQLQJ└
FLWL]HQV└ DJDLQWW└ HDWLQJ└ WKH└ PHUFXU\┼ CDGHQ└ ILVK└ IRXQG└ LQ└ WKHP◀

:HYH└ NQRZQ└ IRU└ GHFDGHV└ WKDW└ PRWW└ RI└ WKH└ PHUFXU\└ LQ└ RXU└ ILVK└ FRPH└
IURP└ DLU└ SRCCXWLRQ☼ └ WKDWW└ HPLWWHG└ IURP└ WKH└ GLUWLHXW└ FRDO└ SCDQWW☼ └ DQG└ WKHQ└
WHWWCHV└ LQ└ RXU└ ZDWHU└ ZD\V◀ └ :H└ DOWR└ NQRZ└ WKDW└ PHUFXU\└ LV└ D└ SRZHUIXO└
QHXURWR[LQ☼ └ WKDW└ DFFXPXCDWHV└ LQ└ WKH└ KXPDQ└ ERG\└ RYHU└ WLPH☼ └ WKUHDWHQLQJ└
WKH└ KHDOWK└ RI└ WKLV└ HQYLURQPHQW└ DQG└ WKLV└ JHQHUDWLRQ☼ └ DQG└ IRU└ JHQHUDWLRQ└ WR└
FRPH◀

7KH└ (3$└ UHFHQWO\└ LVXHG└ SXEOLF└ KHDOWK└ SURWHFWLRQV└ WR└ FCHDQ└ XS└ WKH└ WR[LF└
DLU└ SRCCXWLRQ└ IURP└ RXU└ GLUWLHXW└ FRDO└ SCDQWW☼ └ DCCRZLQJ└ IDPLOLHV└ LQ└ 'HDZDUH└
DQG└ WKRXVDQGV└ RI└ RWKHU└ FRPPXQLWLHV└ WR└ RQFH└ DJDLQ└ HDW└ WKH└ ILVK└ IURP└ RXU└
ULYHUV☼ └ RXU└ CDNHV☼ └ RXU└ WWUHDPV☼ └ ZLWKRXW└ FRQFHUQ└ RI└ PHUFXU\└ SRLVRQLQJ◀ └
7KDWW└ ZK\└ ZH└ KDYH└ WKH└ (3$◀

7RR└ RIWHQ☼ └ ZKHQ└ WWDWH└ DQG└ CRFDO└ FRPPXQLWLHV└ DUH└ SLQFKHG└ IRU└ FDVK☼ └ WKH\└
WU\└ WR└ VDYH└ PRCH\└ E\└ VKRUW┼ FKDQJLQJ└ FCHDQ└ DLU└ DQG└ FCHDQ└ ZDWHU└
SURWHFWLRQV◀ └ ,PSURYHPHQW└ WR└ ZDWHU└ LQIUDWXUXFWXUH└ DUH└ RIWHQ└ WLPHV└
LJCRUHG◀ └ &RUCHUV└ DUH└ FXW◀ └ 6ROXWLRQV└ DUH└ DGRSWHG└ WKDW└ PD\└ VDYH└ GRCCUV└
CRZ☼ └ EXW└ LQICLFW└ FRWWO\└ DQG└ XQCHFHWDU\└ GDPDJH└ CDWHU◀

$V└ ZHYH└ VHHQ└ PRWW└ UHFHQWO\└ LQ└ WKH└ FLW\└ RI└)OLQW☼ └ 0LFKLJDQ☼ └ WKHWH└ FXW└ FDQ└
KDYH└ D└ WHUULECH☼ └ HYHQ└ D└ WUDJLF└ LPSDFW└ RQ└ WKH└ KHDOWK└ RI└ WKH└ PRWW└
YXCQHUDECH└ LQ└ RXU└ VRFLHW\☼ └ HVSHFLDOO\└ WKH└ \RXQJHWW└ DPRQJ└ XV◀ └ 7RGD\☼ └ WKH└
FLWL]HQV└ RI└)OLQW└ WWLOO└ CDFN└ FCHDQ└ GULQNLQJ└ ZDWHU◀ └ $QG└ WKH└ QHZ└ JHQHUDWLRQ└
WKHUH☼ └ ZKLFK└ KDV└ EHHQ└ H[SRVHG└ WR└ KLJK└ CHYHDV└ RI└ CHDG☼ └ IDFHV└ DQ└ XQFHUWDLQ└
IXWXUH◀ └ 7KDWW└ ZK\└ ZH└ KDYH└ WKH└ (3$◀

<RX└ PD\└ QRW└ NQRZ└ LW☼ └ 0U◀ └ 3UXLWW☼ └ EXW└ 'HDZDUH└ LV└ WKH└ CRZHXW┼ O\LQJ└ WWDWH└ LQ└
RXU└ CDWLRQ◀ └ 7KH└ KLJKHXW└ SRLQW└ LQ└ 'HDZDUH└ LV└ D└ EULGJH◀ └ %DFN└ KRPH☼ └ WKH└
UHDOLW\└ WKDW└ RXU└ FOLPDWH└ LV└ FKDQJLQJ└ LV└ CRW└ XS└ IRU└ JUDEV☼ └ RU└ XS└ IRU└ GHEDWH◀

)DPLOLHV└ DQG└ EXVLCHW└ RZCHUV└ IDFH└ WKH└ WWDUN└ UHDOLW\└ RI└ FOLPDWH└ FKDQJH└
HYHU\└ VLQJCH└ GD\◀ └ $QG└ WDFNOLQJ└ WKDW└ FKDOCHQJH└ LV└ CRW└ MXWW└ WKH└ ULJKW└ WKLQJ└ WR└
CR☼ └ ZKDW└ LV└ EHWW└ IRU└ 'HDZDUHV└ HFRCRP\☼ └ LW└ LV└ D└ PDWWHU└ RI└ VXUYLYDO◀

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +HDUL◀QJ└ DJH└└ RI└└

7DNH└ D└ ULGH└ ZLWK└ PH└ VRPHWLPH└ └ VRPH└ ┬ !! └ PLCHV└ VRXWK└ RI└ 'RYHU└ $LU└)RUFH└
?DVH└ └ KHDGLQJ└ HDWW- WRZDUG└ WKH└ 'HDZDUH└ %D\└ RQ└ 3ULPH└ +RRN└ 5RDG└ └ DQG└
\RXOO└ VHH└ ZKDW- ,└ PHDQ◀ └ 7KHUH└ ZDV└ D└ WLPH└ └ GRW- ORQJ└ DJR└ └ ZKHUH└ MXWW-
EHIRUH└ \RX└ UHDFKHG└ WKH└ 'HDZDUH└ %D\└ └ \RX└ FDPH└ WR└ D└ SDUNLQJ└ ORW◀ └ 7RGD\└
/KDW- SDUNLQJ└ ORW- LV└ XQGHU└ ZDWHU◀

6WDQG└ WKHUH└ ZLWK└ PH└ └ ORRNLQJ└ WR└ WKH└ HDWW└ └ DQG└ \RXOO└ VHH└ SDUW- RI└ D└
FRQFUHWH└ EXQNHU└ WLFNLQJ└ XS└ RXW- RI└ WKH└ ZDWHU└ └ DERXW- ¶ └ RFORFN◀ └ 5HFHQWO\└ └
VRPHRQH└ VKRZHG└ PH└ D└ SKRWR└ WDNHQ└ RI└ WKDW- EXQNHU└ LQ└ ¶ ┤ → └ WKH└ \HDU└ ,└
ZDV└ ERUQ◀ └ ,W- ZDV└ RQ└ GU\└ ODQG└ └ ↑ !! !! └ IHHW- ZHXW- RI└ WKH└ ZDWHUV└ HGJH└ └ ↑ !! !! └ IHHW
ZHXW◀

?&XW- RXU└ OLWWOH└ WWDWH└ DORQH└ FDQQRW- WWHP└ WKH└ IORZ└ RI└ JUHHQKRXVH└ JDVHV└ LQWR└
RXU└ DWPRVSKHUH└ WKDW└ CDUJHD\└ FDXVLQJ└ RXU└ FOLPDWH└ WR└ FKDQJH└ └ RXU└ VHDV└ WR└
ULVH└ └ DQG└ RXU└ FRDWWOLCH└ WR└ UHWUHDW◀ └ (YHU\└ WWDWH└ PXWW- GR└ LWW└ IDLU└ VKDUH└ WR└
VDIHJXDUG└ RXU└ FOLPDWH└ DQG└ WKHLU└ CHLJKERUV◀ └ 7KDW- LV└ ZK\└ ZH└ KDYH└ WKH└
(3$◀

([DPSCHV└ RI└ DLU└ DQG└ ZDWHU└ SRODXWLRQ└ SURGXFHG└ E\└ RCH└ WWDWH└ LQ└ IRXOLQJ└ WKH└
DLU└ DQG└ ZDWHUV└ RI└ RWKHU└ FDQ└ WWLOO└ EH└ IRXQG└ LQ└ WRR└ PDQ\└ SDUW└ RI└ $PHULFD└ └
OLNH└ WKH└ UXCRII└ IURP└ 3HQQV\OYDQLD└ WKDW- GHJUDGHV└ WKH└ ZDWHUV└ RI└ WKH└
&KHMDSHDNH└ %D\└ └ RU└ WKH└ KD]H└ H[SRUWHG└ IURP└ RWKHU└ WWDWHV└ ZKLFK└ RIWHQ└
/LPHV└ VKURXGV└ WKH└ 6PRN\└ 0RXQWDLQV└ DQG└ GHJUDGHV└ YLVLELOLW\└ DW- WKH└
*UDQG└ &DQ\RQ◀ └ 7KDW└ ZK\└ ZH└ KDYH└ WKH└ (3$◀

$QG└ VRPH└ RI└ P\└ FRCHDJXHV└ GHVFULEH└ PH└ DV└ | UHFRYHULQJ└ JRYHUCRU◀ | └)RU└
/KH└ PRXW- SDUW└ └ ,└ EHOLHYH└ WKDW- JRYHUCRUV└ DQG└ SUHVLGHQW└ GHVHUYH└
GHIHUHQFH└ LQ└ SLFNLQJ└ WKH└ PHPEHUV└ RI└ WKHLU└ CHDGHUVKLS└ WHDPV◀ └ $QG└ DV└ D└
UHVXOW└ └ ,YH└ JLYHQ└ SUHVLGHQW└ RI└ ERWK└ SDUWLHV└ WKDW- GHIHUHQFH└ └ LQ└ PRW-
LQWWDQFHV◀

6LQFH└ FRPLQJ└ WR└ WKH└ 6HQDWH└ LQ└ ⊥ !! !! ¶ └ ,YH└ RSSRVHG└ RQD\└ RCH└ RI└ WKH└
CRPLCHHV└ IRU└ (3$└ DGPLQLWWUDWRU└ └ VXSSRUWLQJ└ WZR└ 5HSXEOLFDQV└ └ WZR└
'HPRFUDW└ CRPLCHHV◀ └ 6XEVHTXHQWO\└ └ HYHU\└ (3$└ DGPLQLWWUDWRU└ WKDW- ,YH└
VXSSRUWHG└ GHPRQWUDWHG└ FCHDLO\└ WKDW- WKH└ ZHUH└ FRPPLWWHG└ WR└ IXUWKHULQJ└
/KH└ RYHUDOO└ PLWLRQ└ RI└ WKH└ (3$└ └ SURWHFWLQJ└ KXPDQ└ KHDOWK└ DQG└ RXU└
HQYLURQPHQW◀

,P└ DOVR└ FRPPLWWHG└ WR└ D└ IXOO└ DQG└ IDLU└ FRQILUPDWLRQ└ SURFHVV└ └ ZLWK└ UHVSHFW- WR└
RXU└ CRPLQDWLRQV└ WKDW- WKLV└ SUHVLGHQW┤ HCHFW- KDV└ RI IHUHG└ └ WRR◀ └ $QG└ KDYLQJ└
VDLG└ WKDW└ └ WKRXJK└ └ ,YH└ VKDUHG└ ZLWK└ 0U◀ └ 3UXLWW└ └ DQG└ ,OO└ VKDUH└ ZLWK└ P\└

FRQGHDJXHV└ WRGD\└ WKDW└ WRR└ PXFK└ RI└ ZKDW└ ,YH└ VHHQ└ RI└ KLV└ UHFRUG└ RQ└ WKH└ HQYLURQPHQW└ └ DQG└ KLV└ YLHZV└ DERXW└ WKH└ URCH└ RI└ (3$└ DUH└ WUXEOLQJ└ └ DQG└ LQ└ VRPH└ FDVHV└ └ GHHSO\└ WUXEOLQJ◀

(YHQ└ IRUPHU└ 5HSXEOLFDQ└ $GPLQLWWUDWRU└ └ (3$└ $GPLQLWWUDWRU└ &KULWWLGH└ :KLWPDQ└ └ ZLWK└ ZKRP└ ,└ VHUYHG└ IRU└ VHYHQ└ \HDUV└ DV└ JRYHUQRU└ RI└ QHLJKERULQJ└ WDWHV└ └ UHFHQWO\└ VDLG└ WKDW└ VKH└ FDQW└ └ DQG└ ,└ TXRWH└ └ VKH└ | FDQW└ UHFDOO└ HYHU└ KDYLQJ└ VHHQ└ DQ└ DSSRLQWPHQW└ RI└ VRPHRQH└ ZKR└ LV└ VR└ GLVGDLQIXO└ RI└ WKH└ DJHQF\└ DQG└ WKH└ VFLHQFH└ EHKLQG└ ZKDW└ WKH└ DJHQF\└ GRHV◀ |

/HW└ PH└ FRQFXGH└ ZLWK└ WKLV◀ └ ,W└ KDUG└ WR└ LPDJLQH└ D└ PRUH└ GDPQLQJ└ WDWHPHQW└ └ DQG└ IURP└ RQH└ ZKR└ VHUYHG└ QRW└ QRQJ└ DJR└ LQ└ WKDW└ SRVLWLRQ└ RI└ /XXW└ └ 0U◀ └ 3UXLWW└ └ WR└ ZKLFK└ \RXYH└ EHHQ└ QRPLQDWHG◀ └ 7RGD\└ LV└ \RXU└ RSSRUWXQLW\└ WR└ VKRZ└ WKDW└ VKHV└ JRWWHQ└ LW└ ZURQJ◀ └ 7R└ EH└ KRQHW└ ZLWK└ \RX└ └ FRPLQJ└ WR└ WKLV└ KHDULQJ└ WRGD\└ └ ,└ IHDU└ WKDW└ VKHV└ JRWWHQ└ LW└ ULJKW◀ └ 7KDQN└ \RX◀

%$55$662 └
7KDQN└ \RX└ YHU\└ PXFK└ └ 6HQDWRU└ &DUSHU◀

,Q└ D└ IHZ└ PRPHQWW└ └ ,G└ OLNH└ WR└ WXUQ└ WR└ 6HQDWRU└ ,QKRIH└ DQG└ /DQNIRUG└ └ IURP└ /KHLU└ KRPH└ WDWH└ RI└ 2NODKRPD└ └ UHJDUGLQJ└ WKH└ GRPLQHHV└ GLWLQJXLVKHG└ FDUHHU◀ └ %HIRUH└ ,└ GR└ WKDW└ └ WKRXJK└ └ ,└ ZDQW└ WR└ VD\└ D└ IHZ└ ZRUGV└ DERXW└ 6HQDWRU└ ,QKRIH└ DQG└ KLV└ GLWLQJXLVKHG└ FDUHHU└ DV└ FKDLUPDQ└ RI└ WKH└ 6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH◀

)LUWW└ ,└ ZDQW└ WR└ WKDQN└ P\└ IULHQG└ └ -LP└ ,QKRIH└ └ IRU└ KLV└ CHDGHUVKLS└ RI└ WKLV└ FRPPLWWHH◀ └ +LV└ GHGLFDWLRQ└ WR└ SURWHFWLQJ└ WKH└ HQYLURQPHQW└ └ UHEXLOGLQJ└ RXU└ QDWLRQV└ LQIUDWXUXFWXUH└ └ WXUHQJWKHQLQJ└ WKH└ FRXQWU\V└ HFRQRP\└ └ ZHUH└ FCHDUO\└ HYLGHQW└ WKURXJKRXW└ KLV└ WLPH└ DV└ FKDLUPDQ◀ └ +H└ ZRUNHG└ DFURVV└ SDUW\└ OLQHV└ WR└ JHW└ WKLQJV└ GRQH◀

'XULQJ└ WKH└ ¶ ¶ ┤ WK└ &RQJUHVV└ └ XQGHU└ -LP└ ,QKRIHV└ CHDGHUVKLS└ └ WKLV└ FRPPLWWHH└ KHDG└ ├ → └ KHDULQJV◀ └ 2I└ WKRVH└ HLJKW└ ZHUH└ ILHDG└ KHDULQJV◀ └ 7KLUW\┤ /WR└ ELOOV└ SDVVHG└ RXW└ RI└ WKH└ FRPPLWWHH└ WKDW└ ZHUH└ VLJHG└ LQWR└ CDZ◀ └ &KDLUPDQ└ ,QKRIH└ XQGHUVDZ└ ┤ ┤ └ RYHUVDZ└ WKH└ ILUW└ CRQJ┤ WHUP└ KLJKZD\└ ELOO└ LQ└ D└ GHFDGH◀ └ 7KLV└ CDZ└ ZLOO└ LPSURYH└ WKH└ QDWLRQV└ URDGV└ EULGJHV└ WUDQWLW└ V\WWHPV└ └ DQG└ UDLO└ WUDQVSRUWDWLRQ└ GHWZRUNV◀

+H└ DOVR└ ZRUNHG☼ └ RQ└ D└ ELSDUWLVDQ└ EDVLV☼ └ ZLWK└ IRUPHU└ UDQNLQJ└ PHPEHU☼ └
%DUEDUD└ %R[HU☼ └ WR└ SDVV└ EDGO\└ QHHGHG└ :DWHU└ 5HVRXUFHV└ 'HYHORSPHQW└
$FW└ CHJLVODWLRQ◀ └ 7KLV└ QHZ└ ODZ└ SURULUWL]HV└ GDP☼ └ ZDWHUZD\└ DQG└ SRUW└
FRQWUXFWLRQ└ SURMHFWV☼ └ DQG└ LW└ VXSSRUWV└ ICRRG└ FRQWURO└ SURMHFWV└ WKDW└ SURWHFW└
PLOOLRQV└ RI└ SHRSOH◀

)RU└ WKH└ ILUWW└ WLPH└ LQ└ ┤ ‼ └ \HDUV☼ └ WKH└ 7R[LF└ 6XEWDQFHV└ &RQWURO└ $FW└ ZDV└
PRGHUQL]HG☼ └ XQGHU└ &KDLUPDQ└ ,QKRIHV└ WHQXUH◀ └ 7KLV└ ODZ└ HQDFWV└ D└ QHZ└
XQLIRUP└ UHJXODWRU\└ SURJUDP└ WKDW└ ZLOO└ LPSURYH└ SXEOLF└ FRQILGHQFH└ LQ└ WKH└
\DIHW\└ RI└ FKHPLFDOV☼ └ SURPRWH└ LQQRYDWLRQ☼ └ DQG└ SURYLGH└ PDQXIDFWXUHUV└
ZLWK└ FHUWDLQW\└ UHJDUGLQJ└ UHJXODWLRQ◀

&KDLUPDQ└ ,QKRIH└ DOVR└ ZRUNHG└ WR└ NHHS└ WKH└ DGPLQLWUDWLRQ└ DFFRXQWDEOH◀ └
&KDLUPDQ└ ,QKRIH└ ZRUNHG└ WR└ HQVXUH└ WKDW└ WKHUH└ ZDV└ RYHUVLJKW└ RI└ RYHU┼
UHDFKLQJ└ DGPLQLWUDWLRQ└ UHJXODWLRQV└ FRQFHUQLQJ└ WKH└ FOHDQ└ SRZHU└ SODQ☼ └
:DWHUV└ RI└ WKH└ 8◀ 6◀ ☼ └ WKH└ WWUHDP└ EXIIHU└ UXOH☼ └ FRDO└ DVK└ UHJXODWLRQV└ DQG└
PDQ\└ PRUH◀

6R└ ,P└ YHU\└ JODG└ WKDW└ 6HQDWRU└ ,QKRIH└ ZLOO└ UHPDLQ└ RQ└ WKH└ FRPPLWWHH◀ └ ,└ CRRN└
IRUZDUG└ WR└ ZRUNLQJ└ FORVHO\└ ZLWK└ KLP└ WR└ SURWHFW└ RXU└ HQYLURQPHQW└ DQG└
EROXWHU└ RXU└ QDWLRQV└ HFRQRP\◀

6HQDWRU└ ,QKRIH☼ └ WKDQN└ \RX└ IRU└ \RXU└ KDUG└ ZRUN☼ └ \RXU└ GHGLFDWLRQ☼ └ DQG└ \RXU└
CHDGHUVKLS◀ └ 6HQDWRU└ ,QKRIH☼ └ \RXUH└ QRZ└ UHFRJQL]HG☼ └ WR└ LQWURGXFH└ DQG└ WDON└
DERXW└ $WWRUQH\└ *HQHUDO└ 3UXLWW◀ └ 7KDQN└ \RX◀

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6HQDWRU└ %DUUDWW☼ └ WKDQN└ \RX└ YHU\└ PXFK◀ └ $QG└ ,P└ CRRNLQJ└ IRUZDUG└ WR└
ZRUNLQJ└ LQ└ D└ YHU\└ VHQLRU└ SRVLWLRQ└ RI└ \RXU└ FRPPLWWHH◀ └ $QG└ WKLV└ LV└ WKH└
FRPPLWWHH└ WKDW└ JHWW└ WKLQJV└ GRQH☼ └ DV└ 6FRWW└ 3UXLWW└ IXOO\└ DZDUH◀

1RZ☼ └ ,└ WKDQN└ \RX☼ └ &KDLUPDQ└ %DUUDWW☼ └ DQG└ DOVR└ \RX☼ └ 6HQDWRU└ &DUSHU☼ └ IRU└
CHWWLQJ└ PH└ MRLQ└ \RX└ IRU└ WKLV◀ └ $QG└ ,P└ KRQRUHG└ WR└ MRLQ└ P\└ IHOORZ└ VHQDWRU☼ └
6HQDWRU└ /DQIRUG☼ └ LQ└ LQWURGXFLQJ└ QRW└ MXWW└ WKH└ DWWRUQH\└ JHQHUDO└ RI└ ┼ ┼ └ 6FRWW└
3UXLWW☼ └ EXW└ P\└ JRRG└ IULHQG☼ └ DQG└ WR└ RIIHU└ P\└ VXSSRUW└ IRU└ KLV└ QRPLQDWLRQ└ WR└
EH└ WKH└ QH[W└ DGPLQLWUDWRU└ RI└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\◀

7KRXJK└ QHLWKHU└ RI└ XV└ ZHUH└ ERUQ└ LQ└ 2NODKRPD☼ └ ZH└ JRW└ KHUH└ DV└ TXLFN└ DV└
ZH└ FRXOG☼ └ DQG└ ERWK└ HQGHG└ XS└ LQ└ 7XOVD☼ └ DQG└ VR└ KHV└ DOVR└ D└ QHLJKERU◀ └
$WWRUQH\└ *HQHUDO└ 3UXLWW☼ └ \RXOO└ EH└ JODG└ WR└ NQRZ└ WKLV└ ♂ LQDXGLECH□ ☼ └ EXW└ KH└
ZDV└ ERUQ└ LQ└ .HQWXFN\◀

$QG└ KH└ VKRZHG└ ZKDW└ ┼ ┼ └ ZKDW└ KH└ ZDV└ PDGH└ RXW└ RI◀ └ +H└ HQGHG└ XS└ D└ JUHDW└
EDVHEDOO└ SOD\HU└ └ WKDW└ ZDV└ ┼ ┼ └ ZDV└ DECH└ WR└ JHW└ D└ VFKRODUVKLS└ └ DQG└ JR└
/KURXJK└ WKH└ XQLYHUVLW\└ WKHUH◀ └ 7KHQ└ KH└ FDPH└ WR└ 2NODKRPD└ DQG└ ZHQW└
/KURXJK└ ODZ└ VFKRRO└ └ DW└ 7XOVD└ 8QLYHUVLW\└ LQ└ 7XOVD└ └ DQG└ GLG└ DOO└ NLQG└ RI└
/KLQJV◀ └ +H└ VSHFLDOL]HG└ └ DW└ WKDW└ WLPH└ └ LQ└ FRQWUXWWLRQDO└ ODZ◀

,Q└ ¶ ← └ *HQHUDO└ 3UXLWW└ ┼ ┼ └ 3UXLWW└ UDQ└ DQG└ ZDV└ HOHFWHG└ WR└ WKH└ 2NODKRPD└
6WDWH└ 6HQDWH└ └ ZKHUH└ KH└ VHUYHG└ VL[└ \HDUV└ └ DQG└ KH└ TXLFNO\└ EHFDPH└ D└
OHDGHU◀ └ ,QGHHG└ └ VXFFHVV└ KDV└ IROORZHG└ KLP└ WKURXJKRXW└ KLV└ ODZ└ SUDFWLFH└ └ WR└
/KH└ 6WDWH└ 6HQDWH└ └ WR└ EHFRPH└ WKH└ FR┼ RZQHU└ DQG└ PDQDJHU└ └ PDQDJLQJ└
JHQHUDO└ SDUWQHU└ RI└ 2NODKRPD└ &LWLV└ $$$└ PLQRU└ OHDJXH└ EDVHEDOO└ WHDP└ ┼ ┼ └
VHH└ └ ZH└ KDYH└ VRPHWKLQJ└ LQ└ DGGLWLRQ└ WR└ WKH└ 7KXQGHU└ └ WKDW└ ZHUH└ DOO└ IXOO└
DZDUH└ RI└ └ DQG└ LV└ FXUUHQWO\└ 2NODKRPDV└ └ RI└ FRXUVH└ └ DWWRUQH\└ JHQHUDO◀

7KURXJK└ WKH└ FRXUVH└ RI└ KLV└ FDUHHU└ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ KDV└ WRRG└ RXW└
DV└ D└ FKDPSLRQ└ RI└ WDWH└ DQG└ LQGLYLGXDO└ ULJKWV└ └ DQG└ KDV└ IRXJKW└ DJDLQWW└
IHGHUDO└ RYHU┼ UHDFK◀ └ +H└ KDV└ HDUQHG└ D└ UHSXWDWLRQ└ DV└ D└ GHIHQGHU└ RI└ WKH└ UXCH└
RI└ ODZ└ └ DQG└ KDV└ ZRUNHG└ WR└ NHHS└ WKRVH└ ┼ ┼ └ WKH└ URCH└ RI└ WKH└ IHGHUDO└
JRYHUQPHQW└ LQ└ FKHFN◀

$V└ KHDG└ RI└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ └ $WWRUQH\└ *HQHUDO└
3UXLWW└ ZLOO└ HQVXUH└ WKDW└ WKH└ DJHQF\└ IXOILOOV└ WKH└ URCH└ GHCHJDWHG└ WR└ LW└ E\└ WKH└
ODZV└ SDVVHG└ E\└ &RQJUHVV└ └ QRWKLQJ└ PRUH└ └ DQG└ QRWKLQJ└ CHVV◀ └ 2NODKRPD└ LV└
DQ└ HQHUJ\└ DQG└ DJULFXOWXUH└ WDWH└ EXW└ ZHUH└ DOVR└ D└ WDWH└ WKDW└ NQRZV└ ZKDW└ LW└
PHDQV└ WR└ SURWHFW└ WKH└ HQYLURQPHQW└ └ ZKLCH└ EDODQFLQJ└ FRPSHWLQJ└ LQWHUHWWV◀

$V└ DWWRUQH\└ JHQHUDO└ └ 6FRWW└ ZDV└ LQWXUXPHQWDO└ ┼ ┼ └ RK└ └ WKLV└ LV└ D└ ELJ└ GHDO◀ └ :H└
DFWXDOO\└ KDYH└ KDG└ DQ└ RQJRLQJ└ OLWLJDWLRQ└ IRU└ ¶ !! !! └ \HDUV◀ └ ,W└ ZDV└ WKH└ 6WDWH└ RI└
2NODKRPD└ └ WKH└ &LWL└ RI└ 2NODKRPD└ &LWL└ └ WKH└ &KRFWDZ└ 1DWLRQ└ ┼ ┼ └ WKH└
&KLFNDVDZ└ 1DWLRQ◀ └ ,W└ ZDV└ RYHU└ ZDWHU└ ULJKWW◀ └ $QG└ ZH└ ZHUHQW└ DECH└ WR└
UHVROYH└ WKDW└ SURECHP◀

7KLV└ JX\└ FRPHV└ WUWWLQJ└ DORQJ└ DQG└ UHVROYHV└ LW└ RYHUQLJKW└ └ DWWHU└ ¶ !! !! └ \HDUV└
RI└ IDLOXUHV└ RI└ WU\LQJ└ WR└ JHW└ WKLV└ GRQH◀ └ +HV└ DOVR└ ZRUNHG└ ZLWK└ WKH└ 2NODKRPD└
'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\└ └ DQG└ WKH└ 2NODKRPD└ :DWHU└
5HVRXUFHV└ %RDUG└ └ WR└ SURWHFW└ WKH└ VFHQLF└ ULYHUV◀

+HV└ NLQG└ RI└ D└ KHUR└ RI└ WKH└ VFHQLF└ ULYHUV└ SCDFH◀ └ 3HRSCH└ GRQW└ ┼ ┼ └ WKH\└ GRQW└
NQRZ└ └ 6FRWW└ └ WKDW└ ZH└ └ LQ└ 2NODKRPD└ └ DFWXDOO\└ KDYH└ PRUH└ PLCHV└ RI└ IUHVK└
ZDWHU└ VKRUHOLCH◀ ◀ ◀

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, └ ZRXOG└ DVN└ WKH└ VHQDWRU└ WR└ SCHDVH◀ ◀ ◀

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<HV◀

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◀ ◀ ◀ └ VXVSHQG└ KLV└ UHPDUNV└ IRU└ D└ IHZ└ VHFRQGV☼ └ PD\EH◀ └ 7KDQN└ \RX☼ └ 6HQDWRU└

,QKRIH◀

,1+2)(└

7KH\└ REYLRXVO\└ GRQW└ OLNH└ VFHQLF└ ULYHUV☼ └ EXW└ ZH└ GR☼ └ LQ└ 2NODKRPD◀

$QG\ZD\☼ └ DGGLWLRQDOO\☼ └ LQ└ ┴ !! ¶ ┴ ☼ └ 2NODKRPD└ SDUWQHUHG└ ZLWK└ WKUHH└ RWKHU└

\WDWHV☼ └ 1HZ└ 0H[LFR☼ └ &RORUDGR☼ └ .DQVDV└ DQG└ 7H[DV☼ └ WR└ EULQJ└ WRJHWKHU└

WWDWH└ RI ILFLDOV☼ └ FRQVHUYDWLRQ└ JURXSV☼ └ HQHUJ\└ DQG└ DJ└ LQGXWUHV☼ └ DQG└ RWKHU└

SULYDWH└ ODQG└ RZQHUV☼ └ WR└ DGUHVV└ WKH└ FKDOOHQJHV└ IDFLQJ└ RQH└ RI└ RXU└ ┼ ┼ └ RQH└

RI└ WKH└ SUREHPV└ WKDW└ ZH└ KDYH└ WKHUH☼ └ KDYLQJ└ WR└ GR└ ZLWK└ D☼ └ ZKDW└ PLJKW└

EHFRPH└ D└ ┼ ┼ └ DQ└ HQGDQJHUHG└ VSHFLHV◀

,W└ ZDV└ DQ└ HI IRUW└ WKDW└ VDZ└ VXFFHVV└ LQ└ LVW└ ILUXW└ \HDU◀ └ 1RZ└ WKLV└ LV└ ZRUNLQJ└

ZLWK└ IRXU└ ┼ ┼ └ IRXU└ GLI IHUHQW└ WWDWHV◀ └ 'HVSLWH└ HQGRUVLQJ└ WKH└ SCDQ☼ └ WKH└)LVK└

DQG└ :LOGOLIH└ 6HUYLFH└ PRYHG└ IRUZDUG└ ZLWK└ OLWWLQJ└ WKH└ VSHFLHV└ DV└

ΛKUHDWHQHG☼ └ HQGDQJHULQJ└ WKH└ FRRSHUDWLRQ└ UHDFKHG└ EHWZHHQ└ WKHMH└

YDU\LQJ└ LQWHUHWWW◀

6R└ $WWRUQH\└ *HQHUDO└ 6FRWW└ VXHG└ WKH└)LVK└ DQG└ :LOGOLIH└ 'HSDUWPHQW└ IRU└

LJCRULQJ└ WKH└ XQLTXH└ FRRSHUDWLYH└ DJUHHPHQW☼ └ DQG└ KH└ ZRQ◀ └ +H└ ZLQV◀ └ +H└

ZLQV└ WKHMH└ WKLQJV◀ └ <HV☼ └ DV└ DWWRUQH\└ JHQHUDO☼ └ WKH└ ┼ ┼ └ 6FRWW└ 3UXLWW└ KDV└

IRXJKW└ WKH└ (3$☼ └ WKH└)LVK└ DQG└ :LOGOLIH└ 6HUYLFH☼ └ WKH└ RLO└ FRPSDQLHV☼ └ DQG└

ΛKH└ RXW└ RI└ ┼ ┼ └ RXWJRLQJ└ DGPLQLWWUDWLRQ☼ └ RQ└ PDQ\└ IUQWW◀

%XW└ DOO└ RI└ WKHMH└ VXLWW└ ZHUH└ EURXJKW└ WR└ SURWHFW└ WWDWH└ DQG└ CRFDO└ LQWHUHWWW└

IURP└ RYHU┼]HDORXV└ DQG└ DFWLYLWW└ H[HFXWLYH└ DJHQFLHV◀ └ 2YHU└ WKH└ CDWW└ HLJKW└

\HDUW☼ └ WKH└ 2EDPD└ DGPLQLWWUDWLRQ└ KDV└ DGYDQFHG└ D└ UDGLFDO└ HQYLURQPHQWDO└

DJHQGD☼ └ KDV└ H[KLELWHG└ D└ GHHS└ GLWWUXWW└ RI└ WWDWH└ JRYHUQPHQW└ DQG└ SULYDWH└

CDQG└ RZQHUW☼ └ DQG└ KDV└ ZRUNHG└ WR└ REWWUXFW└ WKH└ IRWWLO└ IXHO└ LQGXWWU\└ DQG└

DJULFXQWXUH└ SURGXFHUW☼ └ WKH└ PRWW└ DUGHQW└ SURWHFWRUW└ RI└ WKH└ HQYLURQPHQW◀

7KHVH└ DUH└ LQGXVWULHV└ DQG└ LQWHUHVWV└ WKDW└ 2NODKRPD└ UHOLHV└ RQ◀ └ $QG└ IDU└ IURP└ EHLQJ└ DQ└ HQHP\└ RI└ WKH└ HQYLURQPHQW└ └ 6FRWW└ KDV└ SURYHQ└ KLPVHOI└ WR└ EH└ DQ└ H[SHUW└ DW└ EDODQFLQJ└ HFRQRPLF└ JURZWK└ ZLWK└ HQYLURQPHQWDO└ VXSHU└ ┼ ┼ └ WWHZDUGVKLS◀

6R└ ,└ EHOLHYH└ WKDW└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ ZLOO└ UHWXUQ└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ WR└ LWV└ SURSHU└ UROH└ DV└ D└ WWHZDUG└ IRU└ WKH└ HQYLURQPHQW└ └ DFWLQJ└ ZLWKLQ└ WKH└ ERXQGV└ SUHVFULEHG└ E\└ &RQJUHVV└ DQG└ WKH└ &RQWWLWXWLRQ◀

7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └
7KDQN└ \RX└ └ 6HQDWRU└ ,QKRIH◀

6HQDWRU└ /DQNIRUG◀

/$1.)25' └
&KDLUPDQ└ %DUUDWRW└ └ WKDQN└ \RX◀ └ 5DQNLQJ└ 0HPEHU└ &DUSHU└ └ PHPEHUV└ RI└ WKH└ FRPPLWWHH└ └ WKDQN└ \RX└ IRU└ DOORZLQJ└ PH└ WR└ EH└ DECH└ WR└ EH└ KHUH└ WRGD\└ └ WR└ LQWURGXFH└ P\└ IHOORZ└ 2NODKRPD└ └ DQG└ IRU└ 6HQDWRU└ ,QKRIH└ DQG└ ,└ WR└ ERWK└ EH└ DECH└ WR└ WWDQG└ ZLWK└ KLP└ └ DQG└ WR└ EH└ DECH└ WR└ LQWURGXFH└ ZKR└ ZH└ EHOLHYH└ ZLOO└ EH└ D└ WUHPHQGRXV└ GRPLQHH└ IRU└ WKH└ └ DV└ DGPLQLWWUDWRU└ IRU└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\◀ └ ,WW└ DQ└ KRQRU└ WR└ VSHDN└ LQ└ VXSSRUW└ RI└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ WRGD\◀

2YHU└ WKH└ SDWW└ VL[└ \HDUV└ └ 6FRWW└ KDV└ EHHQ└ D└ CHDGHU└ LQ└ WKH└ 6WDWH└ RI└ 2NODKRPD└ └ WWURQJO\└ FRPPLWWHG└ WR└ HQIRUFLQJ└ WKH└ CDZ└ DQG└ DGKHULQJ└ WR└ WKH└ &RQWWLWXWLRQ◀ └ +HV└ D└ WWDWHWPDQ◀ └ +HV└ D└ GHGLFDWHG└ SXEOLF└ VHUYDQW◀ └ $V└ WKH└ DGPLQLWWUDWRU└ RI└ WKH└ (3$└ └ ,└ ZRXOG└ IXOO\└ H[SHFW└ 6FRWW└ WR└ CHDG└ WKH└ DJHQF\└ WR└ IROORZ└ HYHU\└ HQYLURQPHQWDO└ CDZ└ └ DQG└ WR└ SDUWQHU└ ZLWK└ WWDWHV└ └ CRFDO└ DXWKRULWLHV└ └ DQG└ WULEHV└ └ WR└ GR└ ZKDW└ EHWW└ IRU└ RXU└ SUHVHQW└ DQG└ IRU└ RXU└ IXWXUH◀

$V└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ └ KH└ WWRRG└ VKRXOGHU└ WR└ VKRXOGHU└ ZLWK└ PRUH└ WKDQ└ KDOI└ RI└ WKH└ WWDWHV└ └ WR└ HQVXUH└ WKH└ IHGHUDO└ JRYHUQPHQW└ RSHUDWHV└ ZLWKLQ└ WKH└ ERXQGV└ RI└ WKH└ WWDWWWH└ DQG└ WKH└ &RQWWLWXWLRQ◀ └ +HV└ DUJXHG└ FRQVLWWHQWO\└ WKDW└ PDQ\└ UHJXODWLRQV└ WKDW└ WKH└ (3$└ SURPXOJDWHV└ DUH└ └ LQ└ IDFW└ └ /KH└ UHVSRQVLELOLWLHV└ RI└ WWDWH└ JRYHUQPHQW└ └ ILUWW◀

,Q└ DQ└ HQYLURQPHQW└ ZKHUH└ &KHYURQ└ GHIHUHQFH└ LV└ SUHFHGHQW└ └ LW└ LV└ FULWLFDO└ ΛKDW└ WKH└ CHDGHU└ RI└ DQ└ DJHQF\└ KDV└ ┼ ┼ └ WKDW└ KDV└ VXFK└ ZLGH└ CDWLWXGH└ WR└ H[WUDFW└ FRXW└ IURP└ WKH└ HFRQRP\└ └ DOVR└ UHVSHFW└ WKH└ LPSRUWDQFH└ RI└ RXU└ IHGHUDOLW└ └ IRXQGDWLRQ└ └ DQG└ WKH└ SRFNHWERRN└ RI└ KDUG┼ └ ZRUNLQJ└ IDPLOLHV◀

,Q└ SUHYLRXV└ FRQJUHWLRQDO└ WHXWLPRQ\└ └ 6FRW└ KDV└ HPSKDVL]HG└ WKH└ LPSRUWDQFH└ RI└ CDZ└ OLNH└ WKH└ &CHDQ└ $LU└ $FW└ └ WWLHWLQJ└ WKDW└ LW└ ┼ ┼ └ WWLHWLQJ└ ΛKDW└ WKH└ LQWHQWLRQ└ ZDV└ IRU└ WWDWHV└ DQG└ WKH└ (3$└ WR└ ZRUN└ WRJHWKHU└ └ XQGHU└ D└ PRGHO└ RI└ FRRSHUDWLYH└ IHGHUDOLVP└ └ WKDW└ SURWHFW└ WKH└ HQYLURQPHQW└ └ ZKLCH└ FRQVLGHULQJ└ HFRQRPLF└ FRXW◀

$V└ DWWRUCH\└ JHGHUDO└ └ 3UXLW└ ┼ ┼ └ DV└ DWWRUCH\└ JHGHUDO└ └ 6FRW└ KDV└ EHHQ└ DQ└ DUGHQW└ GHIHQGHU└ RI└ WKH└ UXCH└ RI└ CDZ└ IRU└ 2NCDKRPDQ◀ └ ,Q└ ⊥ ‼ ¶ ⊥ └ KH└ VXHG└ ⁄UWLVK└ 3HWUCHXP└ └ DUJXLQJ└ WKDW└ WKH\└ NQZLQJO\└ GRXECHG┼ GLSSHG└ └ WKURXJK└ ΛKH└ FRCHFWLRQ└ RI└ IXGV└ └ WKURXJK└ D└ FCHDQXS└ IXGG└ └ GHVSLWH└ KDYLQJ└ LQVXUDQFH└ FRYHUDJH└ IRU└ HQYLURQPHQWDO└ FCHDQXS◀ └ +H└ GLG└ QW└ KHVLWDWH└ WR└ WDQG└ XS└ IRU└ KLV└ FRQWLWXHQW└ DQG└ IRU└ KLV└ WDWH◀

0LNH└ 7XUSHQ└ LV└ WKH└ IRUPHU└ DWWRUCH\└ JHGHUDO└ RI└ WKH└ 6ΛDWH└ RI└ 2NCDKRPD└ └ DQG└ WKH└ IRUPHU└ FKDLUPDQ└ RI└ WKH└ 2NCDKRPD└ 'HPRFUDWLF└ 3DUW◀ └ +H└ VSRNH└ RXW└ LQ└ PLG┼ 'HFHPEHU└ └ ZKHQ└ 6FRW└ ZDV└ ILUXW└ DQQRXQFHG◀ └ /HW└ PH└ MXW└ UHDG└ D└ VKRUW└ SRUWLRQ└ RI└ KLV└ YHU\└ CRQJ└ WDWHPHQW└ LQ└ VXSSRUW└ RI└ 6FRW└ 3UXLW◀

)RUPHU└ $WWRUCH\└ *HGHUDO└ 0LNH└ 7XUSHQ└ └ DQG└ RXU└ IRUPHU└ 'HPRFUDWLF└ 3DUW└ &KDLUPDQ└ VDLG└ └ | 2NCDKRPD└ $WWRUCH\└ *HGHUDO└ 6FRW└ 3UXLW└ LV└ D└ JRRG└ FKRLFH└ WR└ KHDG└ XS└ WKH└ (QYLURQPHQWDO└ 3UWHFWLRQ└ $JHQF\◀ └ ,P└ FRQYLQFHG└ 6FRW└ 3UXLW└ ZLOO└ ZRUN└ WR└ SUWHFW└ RXU└ CDWXUDO└ KDELWDW└ └ UHVHUYHV└ DQG└ UHVRXUFHV◀ └ +LV└ YLVLRQ└ IRU└ D└ SURSHU└ UHDWLRQ└ EHWZHHQ└ SUWHFWLRQ└ DQG└ SURVSHULW└ PDNHV└ KLP└ D└ VXSHUEO└ TXDOLILHG└ WR└ VHUYH└ DV└ RXU└ CH[W└ (3$└ DGPLQLWUDWRU◀ |

6FRW└ LV└ DQ└ DFWLYH└ PHPEHU└ └ DQG└ D└ GHDFRQ└ DW└ KLV└ FKXUFK└ └)LUW└ %DSWLW└ &KXUFK└ %URNH└ $UUZ└ └ D└ FRQJUHJDWLRQ└ RI└ DCFRW└ ⊥ └ ‼ ‼ ‼ └ SHRSCH◀ └ +H└ LQFUHGLEO└ WWURQJ└ LQ└ KLV└ IDLWK└ └ DQG└ KH└ WWULYHV└ WR└ ZDCN└ LQ└ LQWHJULW◀ └ 6FRW└ D└ VHULRXV└ EDVHEDOO└ IDQ└ DV└ ZHOO◀ └ ,I└ \RX└ UXQ└ RW└ RI└ HQYLURQPHQWDO└ RU└ CHJDO└ TXHWWLRQV└ WRGD\└ └ ZKLFK└ ,└ GRXEW└ \RX└ ZLOO└ └ EW└ LI└ \RX└ UXQ└ RW└ └ ZK\└ GRQW└ \RX└ DVN└ KLP└ D└ FRXSCH└ RI└ TXHWWLRQV└ DERXW└ EDVHEDOO└ WWUDWHJ\└ DQG└ VSULQJ└ ΛUDLQLQJ└ └ ZKLFK└ WWDUW└ LQ└ MXW└ D└ IHZ└ ZHHNV◀

,└ KDYH└ WR└ WHOO└ \RX└ 6FRWW└ D└ IULHQG◀ └ ,YH└ SUD\HG└ ZLWK└ 6FRWW◀ └ ,YH└ VHHQ└ 6FRWW└ WXUXJJCH└ ZLWK└ KDUG└ GHFLVLRQV└ WKDW└ DII HFW└ RXU└ WDWHV└ IXWXUH◀ └ ,YH└ VHHQ└ 6FRWW└ OLWWHQ└ WR└ SHRSCH└ WR└ WU\└ WR└ CHDUQ└ DOO└ VLGHV└ RI└ DQ└ LVVXH└ DQG└ ,YH└ VHHQ└ 6FRWW└ /DNH└ GLI ILFXOW└ WDQGV└ RQ└ PDWWHUV└ RI└ CDZ◀

,└ WKLQN└ KHOO└ EH└ DQ└ H[FHOOHQW└ DGPLQLWUDWRU└ IRU└ WKH└ (3$◀ └ $QG└ ,└ WKLQN└ KHOO└ GR└ YHU\└ ZHOO└ WRGD\└ LQ└ JHWWLQJ└ D└ FKDQFH└ WR└ EULQJ└ \RX└ WKH└ FRQILGHQFH└ WKDW└ KH└ ZLOO└ ZRUN└ KDUG└ IRU└ RXU└ QDWLRQV└ SUHVHQW└ DQG└ IRU└ WKH└ IXWXUH◀

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

%$55$662 └
:HOO└ WKDQN└ \RX└ VR└ YHU\└ PXFK└ 6HQDWRU└ /DQNIRUG└ DQG└ 6HQDWRU└ ,QKRIH◀ └
6HQDWRU└ /DQNIRUG└ \RXUH└ ZHOFRPH└ WR└ WXD\└ EXW└ \RX└ FDQW└ WXD\└ LQ└ WKDW└
VHDW◀ └ 6R◀ ◀ ◀

/$1.)25' └
<RX└ JRW└ LW◀

%$55$662 └
1RZ└ ,└ ZRXOG└ OLNH└ WR└ ZHOFRPH└ $WWRUCH\└ *HQHUDO└ 3UXLWW└ WR└ WKH└ 6HQDWH└
(QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH◀

:HOFRPH◀ └ ,└ LQYLWH└ \RX└ WR└ ILUWW└ LQWURGXFH└ \RXU└ IDPLO\└ DQG└ WKHQ└ SURFHHG└
ZLWK└ \RXU└ WDWHPHQW◀ └ &RQJUDWXODWLRQV└ DQG└ ZHOFRPH◀

358,77 └
*RRG└ PRUQLQJ└ &KDLUPDQ└ %DUUDWR└ 5DQNLQJ└ 0HPEHU└ &DUSHU└ PHPEHUV└
RI└ WKH└ FRPPLWWHH◀ └ ,W└ LV└ DQ└ KRQRU└ DQG└ D└ SULYLCHJH└ WR└ EH└ EHIRUH└ \RX└ WRGD\└ └
/R└ EH└ FRQVLGHUHG└ IRU└ WKH└ SRVLWLRQ└ RI└ (3$└ DGPLQLWUDWRU◀

,└ ILUWW└ ZDQW└ WR└ VD\└ WKDQN└ \RX└ WR└ 6HQDWRU└ ,QKRIH└ DQG└ /DQNIRUG└ IRU└ WKHLU└
RSHQLQJ└ FRPPHQWW◀ └ 6HQDWRU└ ,QKRIH└ KDV└ EHHQ└ D└ PHQWRU└ DQG└ D└ IULHQG└ WR└
PH└ PDQ\└ PDQ\└ \HDUW◀ └ $QG└ KHV└ VSHQW└ D└ CRW└ RI└ WLPH└ WKURXJK└ ┼ ┼ └ ZLWK└ PH└
/KURXJK└ WKLV└ SURFHWW└ LQWURGXFLQJ└ PH└ WR└ PDQ\└ RI└ \RX◀ └ $QG└ ,└ UHDOO\└
DSSUHFLDWH└ KLV└ JXLGDQFH└ DQG└ KLV└ KHOS◀ └ 6HQDWRU└ /DQNIRUG└ ZDV└ D└ IULHQG└
ZHOO└ EHIRUH└ KH└ HQWHUHG└ &RQJUHWW└ DQG└ KHV└ DOUHDG\└ VHUYLQJ└ 2NODKRPD└
DQG└ KLV└ FRXQWU\└ ZLWK└ JUHDW└ GLWWLQFWLRQ◀

0U◀ └ &KDLUPDQ☼ └ \RX└ LQGLFDWHG└ WR└ LQWURGXFH└ P\└ IDPLO\◀ └ ,└ DP└ ECHWHG└ WRGD\☼ └
/R└ KDYH└ P\└ IDPLO\└ LQ└ DWWHQGDQFH└ ZLWK└ PH◀ └ 0\└ ZLIH☼ └ 0DUD\Q☼ └ RI└ ┴ → └ \HDUV☼ └
LV└ LQ└ DWWHQGDQFH☼ └ DORQJ└ ZLWK└ P\└ FKLOGUHQ☼ └ 0F.HQDD└ DQG└ &DGH◀ └ 7KHUHV└ D└
OLWWOH└ FKDQJH└ JRLQJ└ RQ└ LQ└ WKHLU└ OLIH☼ └ DV└ ZHOO◀

0F.HQDD└ LV└ DFWXDOO\└ JUDGXDWLQJ└ IURP└ 2NODKRPD└ 8QLYHUVLWW└ WKLV└ VSULQJ☼ └
DQG└ KHDGLQJ└ LQWR└ 6HQDWRU└ :KLWHKRXVH└ DORQJ└ PDWWHU☼ └ WKH└ 8QLYHUVLWW└ RI└
9LUJLQLD└ ODZ└ VFKRRO◀ └ $QG└ P\└ VRQ└ LV└ JRLQJ└ WR└ EH└ JUDGXDWLQJ└ KLJK└ VFKRRO└
DQG└ KHDGLQJ└ WR└ 2NODKRPD└ 8QLYHUVLWW☼ └ IROORZLQJ└ KLV└ VLWWHUV└ IRRWWHSV☼ └ WR└
EH└ D└ %RRPHU└ 6RRQHU◀

6R└ WKHUHV└ OR\W└ RI└ FKDQJH└ JRLQJ└ RQ└ LQ└ WKHLU└ OLYHV☼ └ OR\W└ RI└ FKDQJH└ JRLQJ└ RQ└
LQ└ P\└ IDPLO\V└ OLIH☼ └ DQG└ OR\W└ RI└ FKDQJH└ JRLQJ└ RQ└ LQ└ WKH└ FRXQWU\◀ └ $QG└ ,└ WKLQN└
/KH└ SHRSOH└ RI└ WKLV└ FRXQWU\└ DUH└ UHDOO\└ KXQJU\└ IRU└ VRPH└ FKDQJH◀ └ $QG└ ZLWK└
FKDQJH└ FRPHV└ DQ└ RSSRUWXQLW\└ IRU└ JURZWK☼ └ DQ└ RSSRUWXQLW\└ WR└ DWWHWV└ KRZ└
ZH└ FDQ└ UHSULRULWL]H☼ └ DV└ D└ QDWLRQ◀

$QG└ ZKHQ└ ,└ SRQGHU└ CHDGLQJ└ WKH└ (3$☼ └ ,└ JHW└ H[FLWHG└ DERXW└ WKH└ JUHDW└ ZRUN└
/R└ EH└ GRQH└ LQ└ EHKDOI└ RI└ RXU└ QDWLRQ☼ └ LQ└ SURWHFWLQJ└ WKH└ WWHZDUGV└ ┼ ┼ └ LQ└ EHLQJ└
D└ JRRG└ WWHZDUG└ RI└ WKH└ QDWXUDO└ UHVRXUFHV└ ZH└ KDYH└ DV└ D└ QDWLRQ◀ └ :KDW└
FRXOG└ EH└ PRUH└ LPSRUWDQW└ WKDQ└ SURWHFWLQJ└ RXU└ QDWLRQV└ ZDWHUV☼ └ LPSURYLQJ└
RXU└ DLU☼ └ DQG└ PDQDJLQJ└ WKH└ CDQG└ WKDW└ ZHYH└ EHHQ└ ECHWHG└ ZLWK└ DV└ D└
QDWLRQ☼ └ DOO└ WKH└ ZKLCH└ SURWHFWLQJ└ WKH└ KHDWK└ DQG└ ZHOIDUH└ RI└ RXU└ SHRSCH"

6R└ LI└ FRQILUPHG☼ └ ,└ ZRXOG└ CHDG└ WKH└ (3$└ ZLWK└ WKH└ IROORZLQJ└ SULQFLSCHV└ LQ└
PLQG◀ └)LUWW☼ └ ZH└ PXWW└ UHMHFW☼ └ DV└ D└ QDWLRQ☼ └ WKH└ IDCWH└ SDUDGLJP☼ └ WKDW└ LI└ \RXUH└
SUR┼ HQHUJ\☼ └ \RXUH└ DQWL┼ HQYLURQPHQW☼ └ DQG└ LI└ \RXUH└ SUR┼ HQYLURQPHQW☼ └
\RXUH└ DQWL┼ HQHUJ\◀ └ ,└ XWWHUO\└ UHMHFW└ WKDW└ QDUUDWLYH◀

,Q└ WKLV└ QDWLRQ☼ └ ZH└ FDQ└ JURZ└ RXU└ HFRQRP\☼ └ KDUYHWW└ WKH└ UHVRXUFHV└ *RG└
KDV└ ECHWHG└ XV└ ZLWK☼ └ ZKLCH└ DOVR└ EHLQJ└ JRRG└ WWHZDUGV└ RI└ WKH└ DLU☼ └ CDQG└ DQG└
ZDWHU└ E\└ ZKLFK└ ZHYH└ EHHQ└ IDYRUHG◀ └ ,W└ LV└ OR\W└ DQ└ HLWKHU↕ RU└ SURSRVLWLRQ◀

1H[W☼ └ ZH└ VKRXOG└ FHCHEUDWH└ WKH└ JUHDW└ SURJUHWV└ ZHYH└ PDGH└ DV└ D└ QDWLRQ└
VLQFH└ WKH└ LQFHSWLRQ└ RI└ WKH└ (3$☼ └ DQG└ WKH└ CDZV└ WKDW└ KDYH└ EHHQ└ SDWHG└ E\└
/KLV└ ERG\☼ └ EXW└ UHFRJQL]H└ WKDW└ ZH└ KDYH└ PXFK└ ZRUN└ WR└ GR◀

7KLUG☼ └ UXCH└ RI└ CDZ└ PDWWHUV◀ └ 3UREHWV└ PDWWHUV◀ └ ,W└ LQVSLUHV└ FRQILGHQFH└ LQ└
/KRVH└ WKDW└ DUH└ UHJXCDWHG◀ └ 7KH└ CDZ└ LV└ WWDWLF☼ └ OR\└ WUDQVLHQW◀ └ 5HJXCDWRUV└ DUH└
VXSSRVHG└ WR└ PDNH└ WKLQJV└ UHJXCDU☼ └ WR└ IDLUO\└ DQG└ HTXLWDEO\└ HQIRUFH└ WKH└
UXCHV☼ └ DQG└ OR\└ SLFN└ ZLQCHUV└ DQG└ OR\HUV◀

$└ UHJXODWRU└ VKRXOG└ QRW└ EH└ IRU└ RU└ DJDLQVW└ DQ\└ VHFWRU└ RI└ RXU└ HFRQRP\◀ └
,QVWHDG└ D└ UHJXODWRU└ RXJKW└ WR└ IROORZ└ WKH└ OD└ LQ└ VHWWLQJ└ XS└ WKH└ UXOHV└ VR└
WKDW└ WKRVH└ ZKR└ DUH└ UHJXODWHG└ FDQ└ SODQ└ DOORFDWH└ UHVRXUFHV└ WR└ PHHW└ WKH└
WDQGDUGV└ YHUVXV└ RSHUDWLQJ└ LQ└ D└ WDWH└ RI└ XQFHUWDLQW└ DQG└ GXUHVV◀

)RXUWK└ IHGHUDOLVP└ PDWWHUV◀ └ ,W└ PDWWHUV└ EHFDXVH└ &RQJUHVV└ VD\V└ VR└ DQG└
EHFDXVH└ ZH└ QHHG└ LW└ WR└ DFKLHYH└ JRRG└ RXWFRPHV└ DV└ D└ QDWLRQ└ IRU└ DLU└ DQG└
ZDWHU└ TXDOLW\◀ └ :H└ QHHG└ WKH└ SDUWQHUVKLS└ RI└ WKH└ WDWHV└ WR└ DFKLHYH└ WKDW◀ └ ,W└ LV└
RXU└ WDWH└ UHJXODWRUV└ ZKR└ RWWHQWLPHV└ EHWW└ XQGHUWDQG└ WKH└ CRFDO└ QHHGV└
DQG└ WKH└ XQLTXHQHW└ RI└ RXU└ HQYLURQPHQWDO└ FKDOOHQJHV◀ └ 3OXV└ RXU└ WDWH└
UHJXODWRUV└ SRWHW└ WKH└ UHVRXUFHV└ DQG└ H[SHUWLVH└ WR└ HQIRUFH└ RXU└
HQYLURQPHQWDO└ ODZV◀

)LWK└ SXEOLF└ SDUWLFLSDWLRQ└ LV└ NH\◀ └ :H└ QHHG└ WR└ KHDU└ DOO└ YRLFHV└ DV└ ZH└ PDNH└
GHFLVLRQV└ LQ└ EHKDOI└ RI└ RXU└ FRXQWU\└ ZLWK└ UHVSHFW└ WR└ HQYLURQPHQWDO└ ODZV◀

7ZR└ IQDO└ WKLQJV└ SHUVRQDOO\◀ └ ,└ WHHN└ WR└ EH└ D└ JRRG└ OLWWHQHU└ WR└ OLWWHQ└ DQG└ WR
QHDG◀ └ <RX└ FDQW└ GR└ RQH└ ZLWKRXW└ WKH└ RWKHU◀ └ /LWWHQ└ WR└ WKRVH└ FDUHHU└ WDII◀ ◀ ◀

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/LWWHQ└ WR└ WKRVH└ FDUHHU└ WDII└ DW└ WKH└ (3$└ DV└ ,YH└ GRQH└ DV└ DWWRUQH\└ JHQHUDO└
RI└ 2NODKRPD└ DQG└ OLWWHQ└ WR└ \RX└ KHUH└ LQ└ &RQJUHVV└ ZLWK└ UHVSHFW└ WR└ WKH└
QHHGV└ RI└ \RXU└ UHVSHFWLYH└ WDWHV└ DQG└ OLWWHQ└ WR└ WKH└ YRLFH└ RI└ DOO└ $PHULFDQV└
DV└ ZH└ VHHN└ WR└ FDUU\└ RXW└ RXU└ GXWLHV└ XQGHU└ WKH└ CDZ◀

/DWWO\└ DQG└ WKLV└ LV└ YHU\└ LPSRUWDQW└ ,└ VHHN└ WR└ VHUYH└ ZLWK└ VHUYLOLW\◀ └
2IWHQWLPHV└ DV└ SROLF\┼ PDNHUV└ \RX└ GHDO└ ZLWK└ YHU\└ FRQWHQWLRXV└ LVXHV◀ └ ,└
KDYH└ DV└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ DV└ ZHOO◀ └ :H└ GHDO└ ZLWK└ ZHLJKW\└
LVXHV└ DQG└ WKHUH└ DUH└ ┼ ┼ └ WKHUH└ SDWWLRQ└ RQ└ ERWK└ VLGHV└ RI└ LVXHV◀

%XW└ ZH└ VKRXOG└ QRW└ VXFFXPE└ WR└ SHUVRQDOL]LQJ└ PDWWHUV◀ └ :H└ VKRXOG└
HQFRXUDJH└ RSHQ└ DQG└ FLYLO└ GLVFRXUVH◀ └ 2QH└ VXFK└ LVXH└ ZKHUH└ FLYLO└
GLVFRXUVH└ LV└ DEVHQW└ LQYROYHV└ FOLPDWH└ FKDQJH◀ └ /HW└ PH└ VD\└ WR└ \RX└
VFLHQFH└ WHOOV└ XV└ WKDW└ WKH└ FOLPDWH└ LV└ FKDQJLQJ└ DQG└ WKDW└ KXPDQ└ DFWLYLW\└ LQ└
\RPH└ PDQQHU└ LPSDFW└ WKDW└ FKDQJH◀

7KH└ DELOLW\└ WR└ PHDVXUH└ ZLWK└ SUHFLVLRQ└ WKH└ GHJUHH└ DQG└ H[WHQW└ RI└ WKDW└
LPSDFW└ DQG└ ZKDW└ WR└ GR└ DERXW└ LW└ DUH└ VXEVHFW└ WR└ FRQWLQXLQJ└ GHEDWH└ DQG└
GLDORJXH└ DQG└ ZHOO└ LW└ VKRXOG└ EH◀ └ 6R└ ZLWK└ WKHVH└ SULQFLSOHV└ LQ└ PLQG└ ,└ WHHN└
/R└ DQVZHU└ \RXU└ TXHVWLRQV└ WRGD\└ DQG└ ,└ DP└ KRQRUHG└ WR└ EH└ KHUH└ WRGD\└ WR└
EH└ FRQVLGHUHG└ IRU└ WKH└ SRVLWLRQ└ RI└ (3$└ DGPLQLWUDWRU◀

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

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:HOO└ WKDQN└ \RX└ YHU\└ PXFK◀ └ :HOFRPH└ WR└ \RXU└ IDPLO\└ DQG└ WKDQN└ \RX└ DQG└ FRQJUDWXODWLRQV└ DJDLQ◀

$WWRUQH\└ *HQHUDO└ 3UXLWW└ \RXYH└ DQVZHUHG└ WKH└ FRPPLWWHH└ TXHVWLRQDLUH◀ └ 7KH└ 8QLWHG└ 6WDWHV└ 2II ILFH└ RI└ *RYHUQPHQW└ (WKLFV└ KDV└ WDWHG└ WKDW└ \RX└ DUH└ TXRWH└ | LQ└ FRPSOLDQFH└ ZLWK└ DSSOLFDEOH└ ODZV└ DQG└ UHJXODWLRQV└ JRYHUQLQJ└ FRQIOLFWV└ RI└ LQWHUHVW◀ |

1RZ└ \RX└ NQRZ└ WKURXJKRXW└ WKLV└ KHDULQJ└ DQG└ ZLWK└ WKH└ TXHVWLRQV└ IRU└ WKH└ UHFRUGV└ RXU└ FRPPLWWHH└ PHPEHUV└ ZLOO└ KDYH└ DQ└ RSSRUWXQLW\└ WR└ CHDUQ└ PRUH└ DERXW└ \RXU└ FRPPLWPHQW└ WR└ SXEOLF└ VHUYDQW└ DQG└ RXU└ QDWLRQ◀ └ ,└ ZRXOG└ DVN└ WKDW└ WKURXJKRXW└ WKLV└ KHDULQJ└ \RX└ SOHDVH└ UHVSRQG└ WR└ WKH└ TXHVWLRQV└ IRU└ WKH└ UHFRUG◀

:LWK└ WKDW└ VDLG└ ,└ KDYH└ WR└ DVN└ WKH└ IROORZLQJ└ TXHVWLRQV└ WKDW└ ZH└ DVN└ RI└ DOO└ QRPLQHHV└ RQ└ EHKDOI└ RI└ WKH└ FRPPLWWHH◀ └ 'R└ \RX└ DJUHH└ LI└ FRQILUPHG└ WR└ DSSHDU└ EHIRUH└ WKLV└ FRPPLWWHH└ RU└ GHVLJQDWHG└ PHPEHUV└ RI└ WKLV└ FRPPLWWHH└ DQG└ RWKHU└ DSSURSULDWH└ FRPPLWWHHV└ RI└ WKH└ &RQJUHVV└ DQG└ SURYLGH└ LQIRUPDWLRQ└ VXEMHFW└ WR└ DSSURSULDWH└ DQG└ QHFHVDU\└ VHFXULW\└ SURWHFWLRQ└ ZLWK└ UHVSHFW└ WR└ \RXU└ UHVSRQVLEOLWLHV"

358,77 └
<HV└ 0U◀ └ &KDLUPDQ◀

%$55$662 └
'R└ \RX└ DJUHH└ WR└ HQVXUH└ WKDW└ WHXWLPRQ\└ EULHILQJV└ GRFXPHQW└ DQG└ HOHFWURQLF└ DQG└ RWKHU└ IRUPV└ RI└ LQIRUPDWLRQ└ DUH└ SURYLGHG└ WR└ WKLV└ FRPPLWWHH└ DQG└ LW└ WDII└ DQG└ RWKHU└ DSSURSULDWH└ FRPPLWWHHV└ LQ└ D└ WLPHO\└ PDQQHU"

358,77 └
<HV└ 0U◀ └ &KDLUPDQ◀

%$55$662 └

$QG└ GR└ \RX└ NQRZ└ RI└ DQ\└ PDWWHUV☼ └ ZKLFK└ \RX└ PD\└ RU└ PD\└ QRW└ KDYH└
GLVFORVHG☼ └WKDW└ PLJKW└ SODFH└ \RX└ LQ└ DQ\└ FRQIOLFW└ RI└ LQWHUHVW└ LI└ \RX└ DUH└
FRQILUPHG"

358,77 └
1R☼ └&KDLUPDQ◀

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7KDQN└ \RX◀ └ -XVW└ D└ FRXSOH└ RI└ TXLFN└ TXHVWLRQV└ EHIRUH└ ZH└ JR└ EDFN└ DQG└
IRUWK◀ └ ,G└ MXVW└ DVN└ LI└ \RX└ FRXOG└ MXVW└ SOHDVH└ GHVFULEH└ \RXU└ HQYLURQPHQWDO└
SKLORVRSK\☼ └RI└ ZKDW└ \RX└ ZRXOG└ GR└ WR└ SURWHFW└ RXU└ HQYLURQPHQW◀

358,77 └
:HOO☼ └ 0U◀ └&KDLUPDQ☼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ VWDWHPHQW☼ └ ,└ EHOLHYH└
WKDW└ WKH└ UROH└ RI└ D└ UHJXODWRU└ ++ └ DQG└ WKLV└ PD\└ QRW└ VRXQG└ WRR└ H[FLWLQJ☼ └ EXW└ LV└
WR└ PDNH└ WKLQJV└ UHJXODU◀ └ $QG└ ,└ WKLQN☼ └ RQH└ RI└ WKH└ ++ └WKH└ GLIILFXOW└ FKDOOHQJHV└
ZH└ VHH☼ └ ZLWK└ LQGLYLGXDOV└ DFURVV└ WKH└ FRXQWU\☼ └ LV└ WKH└ DELOLW\└ ++ └WKH└ LQDELOLW\└
WR└ SUHGLFW☼ └ RU└ NQRZ└ ZKDW└ H[SHFWHG└ RI└ WKHP☼ └ DV└ IDU└ DV└ WKHLU└ REOLJDWLRQV└
XQGHU└ RXU└ HQYLURQPHQWDO└ ODZV◀

$QG└ ++ └ DQG└ ,└ UHDOO\└ EHOLHYH☼ └ 0U◀ └&KDLUPDQ☼ └WKDW└ LI└ FRQILUPHG└ DV└ (3$└
DGPLQLVWUDWRU☼ └WKLV└ SXEOLF└ SDUWLFLSDWLRQ☼ └ FRRSHUDWLYH└ IHGHUDOLVP☼ └ UXOH└ RI└
ODZ└ EHLQJ└WKH└ IRFXV└ RI└ KRZ└ ZH└ GR└ EXVLQHVV└ DW└WKH└ (3$☼ └ LV└ FHQWHU└WR└
UHWXRULQJ└ FRQILGHQFH└ DQG└ FHUWDLQW\└ LQ└WKRVH└WKDW└ DUH└ UHJXODWHG◀

&HDLO\☼ └WKH└ PLVVLRQ└ RI└WKH└ (3$☼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ VWDWHPHQW☼ └
/R└ SURWHFW└ RXU└ QDWXUDO└ UHVRXUFHV☼ └ SURWHFWLQJ└ RXU└ ZDWHU└ TXDOLW\☼ └ LPSURYLQJ└
RXU└ DLU☼ └ KHOSLQJ└ SURWHFW└WKH└ KHDOWK└ DQG└ ZHOIDUH└ RI└ RXU└ FLWL]HQV☼ └ LV└ NH\└WR└
/KH└ CHDGHUVKLS└ RI└WKH└ (3$☼ └ DQG└ ZKHUH└ HQIRUFHPHQW└ LV└ QHFHVVDU\☼ └ D└
YLJRURXV└ HQIRUFHPHQW◀

,YH└ GRQH└WKDW└ DV└ DWWRUQH\└ JHQHUDO└ LQ└ 2NODKRPD◀ └ ,YH└WDNHQ└ YHU\└
FRQWXUXFWLYH└ WWHSV└ DJDLQW└WKRVH└WKDW└ KDYH└ YLRODWHG└WKH└ ODZ◀ └%XW└ ZH└ KDYH└
GRQH└ VR☼ └ ,└WKLQN☼ └ LQ└ D└ YHU\└ GHFLVLYH└ DQG└ ++ └ DQG└ PHDQLQJIXO└ ZD\☼ └ VR└ 0U◀ └
&KDLUPDQ☼ └ ZLWK└WKDW└ LQ└ PLQG◀

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,P└ JRLQJ└ WR└ DVN└ RQH└ RWKHU└ TXHVWLRQ└ DQG└ WKHQ└ ,P└ JRLQJ└ WR└ UHVHUYH└ WKH└ ┼ ┼ └ /KH└ EDODQFH└ RI└ P\└ WLPH└ IRU└ VRPH└ LQWHUVHFWLRQ└ DQG└ TXHVWLRQLQJ└ /KURXJKRXW└ %XW└ WKHUH└ WLOO└ D└ QXPEHU└ RI└ HQYLURQPHQWDO└ SURECHPV└ WKDW└ ,└ VHH└ LQ└ WKH└ FRXQWU\└ DQG└ LQ└ P\└ WDWH└

&RQG└ ZDU└ CHJDF\└ SRODXWLRQ└ LV└ D└ VHULRXV└ SURECHP└ ZKHUH└ FKHPLFDO└ FRPSRXQGV└ DUH└ CHIW└ GHHS└ LQ└ WKH└ VRLO└ IURP└ RXU└ PLOLWDU\└ DFWLYLW\└ \HDUV└ ┼ ┼ └ GHFDGHV└ DJR◀ └ 2WHQ└ WKHUH└ DUH└ GRW└ WKH└ WRROV└ \HW└ DYDLODEOH└ WR└ DGHTXDWHO\└ DGGUHVV└ WKLV└ SRODXWLRQ◀ └ ,I└ FRQILUPHG└ ZRXOG└ \RX└ DGYRFDWH└ LQFUHDVLQJ└ WKH└ (3$V└ IRFXV└ RQ└ LQGRYDWLYH└ WHFKQRORJLFDO└ VRODXWLRQV└ WR└ DGGUHVV└ WKHVH└ DQG└ RWKHU└ HQYLURQPHQWDO└ SURECHPV"

358,77 └
<HV└ 0U◀ └ &KDLUPDQ◀ └ ,Q└ WKLV└ ┼ ┼ └ WKLV└ &RQJUHVV└ WKLV└ SDWW└ &RQJUHVV└ DV└ \RX└ LQGLFDWHG└ LQ└ \RXU└ WDWHPHQW└ DQG└ DV└ 6HQDWRU└ ,QKRIH└ UHFRJQL]HG└ ZLWK└ WKH└ FKDQJHV└ WR└ WKH└ 76&$└ CDZ└ WKHUH└ DUH└ SUROULWLHV└ WKLV└ \HU└ QHZ└ DXWKRULW\└ DFWXDOO\└ WKDW└ EHLQJ└ JLYHQ└ WR└ WKH└ (3$└ DGPLQLWWDWRU└ WR└ RUGHU└ WHXWLQJ└ RQ└ FHUWDLQ└ FKHPLFDOV◀

$V└ ,YH└ VSHQW└ WLPH└ ZLWK└ VRPH└ RI└ WKH└ PHPEHUV└ RQ└ WKLV└ FRPPLWWHH└ 6HQDWRU└ *LOOLEUDQG└ DV└ DQ└ H[DPSOH└ PHQWLRQHG└ 3)2$└ DV└ D└ FRQFHUQ└ ZLWK└ UHVSHFW└ WR└ WKH└ 6DIH└ 'ULQNLQJ└ :DWHU└ $FW└ DORQJ└ ZLWK└ 76&$◀

$QG└ VR└ \HV└ 0U◀ └ &KDLUPDQ└ ,└ EHOLHYH└ WKDW└ WKHUH└ DUH└ SUROULWLHV└ WKDW└ DUH└ NH\└ /R└ LPSURYLQJ└ RXU└ HQYLURQPHQW└ IURP└ &(5&/$└ WR└ 76&$└ DFURVV└ DLU└ TXDOLW\└ ZLWK└ GRQ┼ DWWDLQPHQW└ WR└ DWWDLQPHQW└ DQG└ ZRXOG└ VHHN└ WR└ IRFXV└ DQG└ SULRULWL]H└ WKRVH└ HI IRUWW◀

%$55$662 └
7KDQN└ \RX◀

6HQDWRU└ &DUSHU◀

&$53(5 └
0U◀ └ 3UXLWW└ \RX└ NQRZ└ ZH└ GRQW└ RIWHQ└ KDYH└ WKH└ NLQG└ RI└ GLVUXSWLRQV└ LQ└ WKLV└ URRP└ DQG└ LQ└ WKLV└ EXLOGLQJ└ WKDW└ ZDV└ ZLWQHVVLQJ└ KHUH└ WRGD\◀ └ 7KLV└ LV└ H[WUDRUGLQDU\◀ └ ,W└ GRW└ XQSUHFHGHQWHG└ EXW└ H[WUDRUGLQDU\◀

$QG└ SHRSOH└ PLJKW└ DVN└ └ ZHOO└ ZK\└ ┼ ┼ └ ZK\└ DUH└ IRONV└ VR└ FRQFHUQHG"└ :HOO└ ,OO└ /HOO└ \RX└ ZK\└ WKH\UH└ VR└ FRQFHUQHG◀ └ $QG└ \RXOO└ KDYH└ WR└ JR└ EDFN└ WR└ 0DUFK└ ┼ UG└ └ XS└ LQ└ 'HWURLW└ └ 0LFKLJDQ└ └ ZKHUH└ 3UHVLGHQW┼ (CHFW└ └ WKHQ└ &DQGLGDWH└ 7UXPS└ └ 'RQDOG└ 7UXPS└ VDLG└ WKHVH└ ZRUGV◀

| :HUH└ JRLQJ└ WR└ JHW└ ULG└ RI└ LW└ └ (3$└ └ LQ└ DOPRWW└ HYHU\└ IRUP◀ └ :HUH└ JRLQJ└ WR└ KDYH└ OLWWOH└ WLGELWW└ CHIW└ └ EXW└ ZHUH└ JRLQJ└ WR└ WDNH└ D└ WUHPHQGRXV└ DPRXQW└ RXW◀ | └ 7KDW└ ZKDW└ KH└ VDLG└ GXULQJ└ WKH└ 5HSXEOLFDQ└ SULPDU\◀

$QG└ ZKDW└ GLG└ KH└ VD\└ DWWHU└ WKH└ HCHFWLRQ"└ :HOO└ └ 1RYHPEHU└ ¶ !! WK└ └)R[└ 1HZV└ ZLWK└ &KULV└ :DOOFFH└ └ KH└ VDLG└ └ | (QYLURQPHQWDO└ 3URWHFWLRQ└ └ ZKDW└ WKH\└ GR└ LV└ D└ GLVJUDFH◀ └ (YHU\└ ZHHN└ WKH\└ FRPH└ RXW└ ZLWK└ QHZ└ UHJXODWLRQV◀ |

$QG└ WKHQ└ &KULV└ :DOOFH└ DVNHG└ KLP└ └ | :HOO└ ZKRV└ JRLQJ└ WR└ SURWHFW└ WKH└ HQYLURQPHQW"| └ +H└ VDLG└ └ UHVSRQGHG└ WR└ KLP└ DQG└ VDLG└ └ | :HOO└ └ ZHOO└ ┼ ┼ └ ZHOO└ EH└ ILGH└ ZLWK└ WKH└ HQYLURQPHQW◀ └ :HOO└ EH└ ILGH└ ZLWK└ WKH└ HQYLURQPHQW◀ |

:HOO└ ZHUH└ FRQFHUQHG└ WKDW└ ZH└ ZRQW└ EH└ ILGH└ ZLWK└ WKH└ HQYLURQPHQW◀ └ 6RPHWLPHV└ ZRUGV└ GR└ PDWWHU◀ └ $QG└ RQH└ RI└ WKH└ ┼ ┼ └ RQH└ RI└ WKH└ FRQFHUQV└ WKDW└ ,└ KDYH└ LV└ ┼ ┼ └ LV└ └ KHV└ WKH└ SUHVLGHQW◀ └ <RX└ ZRXOG└ EH└ KLV└ GRPLQHH◀ └ <RX└ ZRXOG└ EH└ KLV└ (3$└ DGPLQLWWUDWRU◀

'RHV└ DOO└ ┼ ┼ └ DOO└ WKH└ WKLQJV└ WKDW└ KH└ VDLG└ LQ└ WKH└ FDPSDLJQ└ └ GR└ WKH\└ MXWW└ JR└ DZD\"└ ,Q└ \RX└ └ KHV└ SXW└ VRPHERG\└ LQ└ SODFH└ ZKR└ KDV└ DFWXDOO\└ GHIXQGHG└ └ RU└ CHG└ WR└ WKH└ GHIXQGLQJ└ RI└ WKH└ HQYLURQPHQWDO└ SURWHFWLRQ└ XQLW└ ZLWKLQ└ \RXU└ RZQ└ DJHQF\◀ └ $QG└ \HW└ \RXYH└ MRLGHG└ LQ└ D└ GR]HQ└ RU└ PRUH└ ODZVXLWW└ └ RYHU└ WKH└ ODWW└ VL[└ \HDUV└ └ HYHU└ VLQFH└ \RXYH└ EHHQ└ DWWRUCH\└ JHQHUDO└ └ LQ└ JRLQJ└ DWWHU└ /KH└ (3$◀

7KDW└ ZK\└ \RX└ KDYH└ WKH└ NLQG└ RI└ FRQFHUQ└ WKDW└ \RXUH└ ZLWQHVVLQJ└ KHUH└ /RGD\└ └ QRW└ MXWW└ RQ└ WKDW└ VLGH└ RI└ WKH└ GDLV└ └ EXW└ RQ└ ┼ ┼ └ RQ└ WKLV└ VLGH└ DV└ ┼ ┼ └ D\ ZHOO◀

<RX└ MXWW└ WRRN└ DQ└ RDWK◀ └ <RX└ UDLVHG└ \RXU└ KDQG└ DQG└ WRRN└ DQ└ RDWK└ WR└ DQVZHU└ /KH└ TXHVWLRQV└ └ TXHVWLRQV└ WKDW└ RXU└ FKDLUPDQ└ DVNHG└ RI└ \RX◀ └ $QG└ RQH└ RI└ /KHP└ ZDV└ D└ TXHVWLRQ└ GHDOLQJ└ ZLWK└ \RXU└ ZLOOLQJQHVV└ WR└ ┼ ┼ └ WR└ UHVSRQG└ WR└ UHDVRQDEOH└ TXHVWLRQV└ WKDW└ DUH└ DVNHG└ RI└ ┼ ┼ └ RI└ \RX◀

2QH└ RI└ WKH└ WKLQJV└ ,└ DVN└ RI└ \RX└ └ ,└ VXEPLWWHG└ D└ CHWWHU└ └ WKDW└ ,└ WKLQN└ \RX└ UHFHLYHG└ LQ└ └ VKRUWW\└ DWWHU└ &KULWWPDV└ └ 'HFHPEHU└ ┼ ┼ └ PD\EH└ 'HFHPEHU└ ┴ ←WK└ └ FORVH└ RI└ EXVLQHVV◀ └ $QG└ LQ└ LW└ └ ,└ DVNHG└ D└ CRW└ RI└ TXHVWLRQV◀ └ ,└ DVNHG└ WKD└ \RX└ WU\└ WR└ UHVSRQG└ E\└ -DQXDU\└ WK◀

<RX└ GLGQW└ UHVSRQG└ WR└ RQH└ RI└ WKHP└ E\└ -DQXDU\└ WK◀ └ <RX└ FHUWDLQ\└ GLGQW└ UHVSRQG└ WR└ PH☼ └ QRW└ HYHQ└ RQH◀ └ 7RGD\V└ KHDULQJ☼ └ ,└ MXVW└ DVNHG└ P\└ WWDII☼ └ KDYH└ \RX└ UHVSRQGHG└ WR└ DQ\└ RI└ WKRVH└ TXHVWLRQV☼ └ LQ└ ZULWLQJ☼ └ WKDW└ ,└ DVNHG└ DOPRWW└ WKUHH└ ZHHNV└ DJR☼ └ DQG└ WR└ P\└ NQRZOHGJH☼ └ QR└ UHVSRQVH└ KDV└ \HW└ EHHQ└ ┼ ┼ └ WKDW└ ZHYH└ UHFHLYHG◀ └ 7KDWW└ ZK\└ ZH└ KDYH└ D└ FRQFHUQ◀ └ 7KDWW└ ZK\└ ZH└ KDYH└ D└ ┼ ┼ └ D└ FRQFHUQ◀

0HUFXU\◀

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,P└ VRUU\"

&$53(5 └
,P└ JRLQJ└ WR└ DVN└ \RX└ ┼ ┼ └ ,P└ JRLQJ└ WR└ WWDUW└ RII└ E\└ WDONLQJ└ DERXW└ PHUFXU\◀ └ ,Q└ ┴ ‼ ¶ ¶ ☼ └ WKH└ (3$└ UHTXLUHG└ GLUW\└ FRDO└ SRZHU└ SODQW└ WR└ FCHDQ└ XS└ PHUFXU\└ DQG└ DLU└ WR[LF└ HPLWWLRQV└ E\└ LWXLQJ└ WKH└ 0HUFXU\└ DQG└ $LU└ 7R[LF└ 6WDQGDUGV└ 5XCH◀

7KLV└ UXCH└ ZLOO└ UHGXFH└ WKH└ PHUFXU\└ DQG└ CHXUR\WR[LQ└ WKDW└ FRQWDPLQDWHV└ RXU└ WWUHDP☼ └ DQG└ RXU└ RFHDQV☼ └ SRODXWHV└ RXU└ ILVK└ DQG└ KDUPV└ RXU└ FKLOGUHQV└ KHDOWK◀ └ $V└ DWWRUCH\└ JHCHUDO☼ └ ,└ EHOLHYH└ \RXYH└ EHHQ└ SDUW└ RI└ DW└ CHDWW└ ¶ ┼ └ CHJDO└ FDVHV└ DJDLQWW└ WKH└ (3$☼ └ LQ└ DW└ CHDWW└ WKUHH└ RI└ WKHVH└ FDVHV☼ └ DJDLQWW└ ΛKH└ (3$V└ UXCHV└ WR└ UHGXFH└ PHUFXU\└ HPLWWLRQV└ IURP└ SRZHU└ SODQWW◀

,V└ WKDW└ FRUUHFW☼ └ MXVW└ \HV└ RU└ QR"

358,77 └
6HQDWRU☼ └ ZH└ KDYH└ EHHQ└ LQYROYHG└ LQ└ OLWLJDWLRQ└ DURXQG└ WKH└ 0$76└ 5XCH◀ ◀ ◀

&$53(5 └
,V└ WKDW└ FRUUHFW☼ └ \HV└ RU└ QR"

358,77 └
$V└ ,└ LQGLFDWHG☼ └ \HV└ ZHYH└ EHHQ└ D└ SDUW└ RI└ OLWLJDWLRQ◀ ◀ ◀

&$53(5 └
7KDQN└ \RX◀

358,77 └
◀ ◀ ◀ └ IROORZLQJ└ WKH└ 0$76└ 5XOH◀

&$53(5 └
,W└ P\└ XQGHUVWDQGLQJ└ WKDW└ DW└ OHDVW└ RQH└ WKHVH└ FDVHV└ DJDLQVW└ WKH└ PHUFXU\└
UXOH└ LV└ WLOO└ SHQGLQJ◀ └ ,V└ WKDW└ FRUUHFW'└ -XVW└ \HV└ RU└ QR◀

358,77 └
,└ EHOLHYH└ VR└ └ 6HQDWRU◀ └ <HV◀

&$53(5 └
,Q└ WKH└ FDVHV└ DJDLQVW└ WKH└ PHUFXU\└ UXOH└ └ \RX└ TXHVWLRQHG└ WKH└ (3$V└
GHWHUPLQDWLRQ└ WKDW└ PHUFXU\└ HPLVVLRQV└ IURP└ SRZHU└ SODQWV└ DUH└ KDUPIXO└ WR└
KHDOWK└ └ DQG└ VKRXOG└ EH└ UHJXODWHG◀

7R└ EH└ FOHDU└ └ KDYH└ \RX└ HYHU└ VXSSRUWHG└ D└ FDVH└ DJDLQVW└ WKH└ (3$└ WKDW└
FODLPHG└ └ TXRWH└ ┼ ┼ └ WKLV└ LV└ D└ TXRWH└ └ | +XPDQ└ H[SRVXUH└ WR└ PHWK\O└ PHUFXU\└
UHVXOWLQJ└ IURP└ FRDO└ ILUHG└ SRZHU└ SODQWV└ LV└ H[FHHGLQJO\└ VPDOO| "└ <HV└ RU└ QR◀

358,77 └
6HQDWRU└ └ WKDWW└ QRW└ D└ \HV└ RU└ QR└ DQVZHU◀ └ $QG└ LI└ ,└ PD\└ ┼ ┼ └ LI└ ,└ PD\◀ ◀ ◀

&$53(5 └
)DLU└ HQRXJK◀

358,77 └
2.◀

&$53(5 └
7KLV└ SRVLWLRQ└ VHHPV└ WR└ TXHVWLRQ└ D└ └ DQ└ (3$└ GHFLVLRQ└ LQ└ ⊥ !! !! !! └ LQ└ ZKLFK└
WKH└ DJHQF\└ GHWHUPLQHG└ └ DWWHU└ DOORWW└ D└ GHFDGH└ RI└ WWXG\└ └ WKDW└ ┼ ┼ └ WKLV└ LV└ D└
TXRWH└ IURP└ WKHP└ └ | 0HUFXU\└ HPLVVLRQV└ IURP└ SRZHU└ SODQWV└ SRVH└ VLJQLILFDQW└
KD]DUGV└ WR└ SXEOLF└ KHDOWK└ DQG└ PXWW└ EH└ UHGXFHG└ | └ FORVH└ TXRWH◀

:RXOG└ \RX└ VD\└ WKH└ CHJDO└ FDVHV└ \RXYH└ VXSSRUWHG└ LQ└ WKH└ SDWW└ GLUHFWO\└
FKDOOHQJHG└ WKLV└ DJHQF\└ ILQGLQJ"└ <HV└ RU└ QR◀

358,77 └
6HQDWRU└ WKH└ ┼ ┼ └ WKH└ FKDOOHQJHV└ ZHYH└ KDG└ DV└ D└ ┼ ┼ └ DV└ D└ ┼ ┼ └ DV└ D└ WWDWH◀ ◀ ◀

&$53(5 └
<HV└ RU└ QR"

358,77 └
◀ ◀ ◀ └ DORQJ└ ZLWK└ WKH└ RWKHU└ WWDWHV◀ ◀ ◀

&$53(5 └
<HV└ RU└ QR"

358,77 └
,I└ ,└ PD\└ 6HQDWRU└ ┼ ┼ └ LI└ ,└ PD\◀

&$53(5 └
-XWW└ ┼ ┼ └ MXWW└ KRQG└ \RXU└ ILUH◀ └ -XWW└ KRQG└ \RXU└ ILUH◀

358,77 └
2.◀

&$53(5 └
7KH└ CHJDO└ SRVLWLRQ└ \RXYH└ WDNHQ└ RQ└ PHUFXU└ KHDOWK└ DOVR└ VHHPV└ WR└ FDOO└ LQ└
TXHVWLRQ└ WKH└ ┴ !! !! ┬ └ WHWWLPRQ└ IURP└ WKHQ└ (3$└ $VVLWDQW└ $GPLQLWUDWRU└ RI└
$LU└ DQG└ 5DGLDWLRQ└ └ -HII└ +RPWHDG└ └ XQGHU└ *HRUJH└ :◀ └ %XVK└ └ VDW└ ULJKW└
ZKHUH└ \RXUH└ VLWWLQJ└ WRGD\└ DQG└ WKLV└ LV└ ZKDW└ KH└ VDLG◀

| (3$└ LV└ UHTXLUHG└ WR└ UHJXODWH└ PHUFXU└ EHFDXVH└ (3$└ GHWHUPLQHG└ WKDW└
PHUFXU└ HPLWWLRQV└ IURP└ SRZHU└ SODQWV└ SRVH└ DQ└ RWKHUZLVH└ XQGXHUHVWHG└
VLJQLILFDQW└ ULVN└ WR└ KHDOWK└ DQG└ WKH└ HQYLURQPHQW└ └ DQG└ EHFDXVH└ FRQWUROV└ └
RSWLRQV└ WR└ UHGXFH└ WKLV└ ULVN└ DUH└ DYDLODEOH◀ |

7KLV└ %XVK└ (3$└ WWDWHPHQW└ RQ└ PHUFXU└ ULVN└ VHHPV└ FRQWUDU└ WR└ WKH└ CHJDO└
DUJXPHQW└ \RX└ VXSSRUWHG└ LQ└ WKH└ SDWW◀ └ ,V└ WKDW└ FRUUHFW'└ <HV└ RU└ QR◀

358,77 └

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +ROGV└ +HDUL3DJH└└ ┬ RI└└

,└ DJUHH└ ZLWK└ ┼ ┼ └ ,└ DJUHH└ ZLWK└ 0U◀ └ +ROPWHDGV└ SRVLWLRQ☼ └ WKDW└ PHUFXU\└ LV└
VRPHWKLQJ└ WKDW└ YHU\└ GDQJHURXV└ WR└ WKH└ HQYLURQPHQW◀ ◀ ◀

&$53(5 └
7KDQN└ \RX└ YHU\└ PXFK◀

358,77 └
◀ ◀ ◀ └ DQG└ VKRXOG└ EH└ UHJXODWHG└ XQGHU└ 6HFWLRQ└ ¶ ¶ ┴ ◀

&$53(5 └
$UH└ \RX└ DZDUH└ WKDW└ WKH└ ODWV└ WKUHH└ DGPLQLWUDWRUV└ KDYH└ SXEOLFO\└ WDWHG└
WKDW└ WKH└ (3$└ LV└ UHTXLUHG└ WR└ UHJXODWH└ PHUFXU\└ IURP└ SRZHU└ SODQWV└ EHFDXVH└
RI└ WKH└ KHDOWK└ ULVNV"└ <HV└ RU└ QR◀

358,77 └
,└ EHOLHYH└ WKDW└ PHUFXU\└ VKRXOG└ EH└ UHJXODWHG└ XQGHU└ 6HFWLRQ└ ¶ ¶ ┴ ◀

&$53(5 └
7KDQN└ \RX└ YHU\└ PXFK◀ └ $FFRUGLQJ└ WR└ WKH└ (3$└ ┼ ┼ └ P\└ WLPH└ LV└ DERXW└ WR└
H[SLUH◀ └ ,OO└ MXWW└ KROG└ ┼ ┼ └ KROG└ LW└ IRU└ WKHUH◀ └ 7KDQN└ \RX└ YHU\└ PXFK☼ └ 0U◀ └ ┼ ┼ └ (
&KDLUPDQ◀

%$55$662 └
7KDQN└ \RX☼ └ 6HQDWRU└ &DUSHU◀

6HQDWRU└ ,QKRIH"

,1+2)(└
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

:HOO☼ └ ,└ GRQW└ WKLQN└ \RX└ KDG└ DGHTXDWH└ WLPH└ WR└ DQVZHU└ VRPH└ RI└ WKH└
TXHWWLRQV└ WKDW└ ZHUH└ DVNHG◀ └ ,V└ WKHUH└ DQ\WKLQJ└ \RXG└ OLNH└ WR└ DGG☼ └ WR└
HODERUDWH└ RQ◀ ◀ ◀

358,77 └

<HV☼ └ 6HQDWRU◀ └ $QG└ WKDQN└ \RX◀ └ ,└ GR└ ZDQW└ WR└ VD\☼ └ WR└ 6HQDWRU└ &DUSHUV└ FRQFHUQ☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ SUHVLGHQW╢ HCHFW└ WDWWHPHQW└ WKURXJKRXW└ WKH└ FDPSDLJQ☼ └ ,└ EHOLHYH└ WKHUH└ LV└ D└ YHU\└ LPSRUWDQW└ URCH└ IRU└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\◀ └ ,Q└ IDFW☼ └ \RX└ DQG└ ,└ WDONHG└ DERXW└ WKDW└ LQ└ ┼ ┼ └ LQ└ \RXU└ RI ILFH◀

,└ EHOLHYH└ WKDW└ WKHUH└ DUH└ DLU└ TXDOLW\└ LVXHV☼ └ DQG└ ZDWHU└ TXDOLW\└ LVXHV☼ └ WKDW└ FURVV└ WDWH└ OLQH☼ └ WKDW└ WKH└ MXULVGLFWLRQ└ RI└ WKH└ (3$☼ └ LVW└ LQYROYHPHQW└ LQ└ SURWHFWLQJ└ RXU└ DLU└ TXDOLW\☼ └ DQG└ LPSURYLQJ└ RXU└ QDWLRQ└ ZDWHUV☼ └ LV└ H[WUHPHO\└ LPSRUWDQW◀ └ $QG└ WKH└ (3$└ KDV└ VHUYHG└ D└ YHU\└ YDOXDECH└ URCH☼ └ KLWWRULFDOO\◀

$IWHU└ DOO☼ └ LW└ ZDV└ 5HSXEOLFDQ└ ZKR└ FUHDWHG└ WKH└ (3$└ XQGHU└ H[HFXWLYH└ RUGHU└ LQ└ WKH└ ¶ → ‼ ☼ └ DQG└ WKLV└ ERG\└ KDV└ SDVVHG└ PDQ\└ SLHFHV└ RI└ CHJLVODWLRQ└ VLQFH└ ΛKH└ ¶ → ‼ V☼ └ WR└ IRFXV└ XSRQ└ LPSURYLQJ└ RXU└ DLU☼ └ LPSURYLQJ└ RXU└ ZDWHU└ TXDOLW\◀ └ $QG└ ZH└ KDYH└ PXFK└ WR└ FHOHEUDWH◀

$FWXDOO\☼ └ WKRVH└ VL[└ FULWHULD└ SROOXWDQWV☼ └ XQGHU└ WKH└ 0$76└ SURJUDP☼ └ VLQFH└ ¶ ← ‼ ☼ └ DUH└ GRZQ└ ├ ┬ └ SHUFHQW◀ └ :H└ KDYH└ PDGH└ SURJUHVV└ DV└ D└ FRXQWU\☼ └ EXW└ ZH└ KDYH└ ZRUN└ WR└ GR☼ └ DQG└ WKH└ (3$└ KDV└ D└ YHU\└ YDOXDECH└ URCH└ LQ└ SDUWQHULQJ└ ZLWK└ WKH└ WDWHV└ WR└ FDUU\└ RXW└ WKRVH└ WWHSV└ WR└ HQVXUH└ LPSURYLQJ└ RXU└ DLU└ TXDOLW\└ DQG└ SURWHFWLQJ└ RXU└ QDWLRQ└ ZDWHUV◀

6R└ 6HQDWRU└ &DUSHU☼ └ ,P└ KRSHIXO└ WKDW☼ └ LQ└ UHVSRQVH└ WR└ \RXU└ FRQFHUQ└ DERXW└ ΛKH└ URCH└ RI└ WKH└ (3$☼ └ ,└ EHOLHYH└ LVW└ D└ YHU\└ YDOXDECH└ URCH◀ └ $QG└ LVW└ VRPHWKLQJ└ ΛKDW└ ZH└ VKRXOG└ IRFXV└ RQ☼ └ DQG└ SDUWQHU└ ZLWK└ RXU└ WDWHV◀

:LWK└ UHVSHFW└ WR└ PHUFXU\☼ └ WKH└ OLWLJDWLRQ└ WKDW└ \RX└ UHIHUUHG└ WR☼ └ WKHUH└ ZDV└ QR└ DUJXPHQW└ WKDW└ ZH└ PDGH☼ └ IURP└ D└ WDWH└ SHUVSHFWLYH☼ └ WKDW└ PHUFXU\└ LV└ QRW└ D└ KD]DUGRXV└ DLU└ SROOXWDQW└ XQGHU└ 6HFWLRQ└ ¶ ¶ ⊥ ◀ └ 2XU└ DUJXPHQW└ IRFXVHG└ XSRQ└ ΛKH└ FRXW╢ EHQHILW└ DQDO\VLV└ WKDW└ WKH└ (3$└ IDLCHG└ WR└ GR◀

$QG└ WKH└ 0LFKLJDQ└ Y◀ └ (3$└ FDVH☼ └ WKH└ 6XSUHPH└ &RXUW└ DFWXDOO\└ DJUHHG◀ └ 6R└ LW└ ZDV└ PRUH└ DERXW└ WKH└ SURFHVV☼ └ DJDLQ☼ └ WKDW└ WKH└ (3$└ ZDV└ VXSSRVHG└ WR└ JR└ ΛKURXJK☼ └ LQ└ UHJXODWLQJ└ PHUFXU\☼ └ WR└ SURYLGH└ FHUWDLQW\└ WKRVH└ LQ└ WKH└ PDUNHWSODFH☼ └ QRW└ D└ WDWHPHQW└ ZLWK└ UHVSHFW└ WR└ ZKHWKHU└ PHUFXU\└ VKRXOG└ EH└ UHJXODWHG└ RU└ QRW└ XQGHU└ 6HFWLRQ└ ¶ ¶ ⊥ ◀

7KDQN└ \RX☼ └ 6HQDWRU└ ,QKRIH◀

,1+2)(└

7KDQN└ \RX☼ └ *HQHUDO◀ └ ,YH└ ┼ ┼ └ ,P└ JODG└ \RX└ EURXJKW└ XS└ WKLV└ WKLQJ└ DERXW└ WKH└
┼ ┼ └ WKH└ &HDQ└ $LU└ $FW◀ └ 7KH└ DPHQGPHQW└ IURP└ ¶ !! ☼ └ ,└ ZDV└ RQH└ RI└ WKH└ FR┼
VSRQVRUV◀ └ ,W└ EHHQ└ LQFUHGLEO\└ VXFFHVVIXO◀ └ ,└ PHDQ☼ └ \RX└ PHQWLRQHG└ WKDW└
ZHYH└ UHGXFHG└ WKRVH└ SRORXVDQW└ E\└ ↑ ┬ └ SHUFHQW☼ └ EXW└ ZKDW└ \RX└ GLGQW└ ┼ ┼ └ ├ ┬ └
SHUFHQW☼ └ ZKDW└ \RX└ GLGQW└ DGG└ ZDV☼ └ WKDW└ ZDV└ LQ└ VSLWH└ RI└ WKH└ IDFW└ WKDW└ ZH└
KDG└ ¶ ↑ ┬ └ SHUFHQW└ LQFUHDVH└ LQ└ RXU└ HFRQRPLF└ DFWLYLW\◀ └ 7KDW└ D└ PDMRU└ WKLQJ◀

,Q└ P\└ LQWURGXFWLRQ☼ └ ,└ PHQWLRQHG└ WKLV└ WKLQJ└ WKDW└ \RX└ GLG└ WKDW└ QR└ RQH└ FRXOG└
ILJXUH└ RXW└ KRZ└ \RX└ GLG└ LW◀ └ ,QYROYHG└ D└ ¶ !! !! ┼ \HDU└ GLVSXWH└ EHWZHHQ└ QRW└ MXW└
/KH└ 6WDWH└ RI└ 2NODKRPD└ DQG└ WKH└ &LW\└ RI└ 2NODKRPD└ &LW\☼ └ DQG└ WKH└
&KRFNFKDZV└ ♂ VLF□ └ DQG└ WKH└ &KLFNDVDZV◀ └ <RX└ ZDQW└ WR└ VKDUH└ ZLWK└ XV└ KRZ└
\RX└ GLG└ WKDW"

358,77 └
:KDW└ DUH└ \RX◀ ◀ ◀

,1+2)(└
<RX└ NQRZ☼ └ WKH\└ WULHG└ IRU└ D└ KXQGUHG└ \HDUV☼ └ DQG└ \RX└ FDPH└ LQ└ DQG└ GLG└ LW└ LQ└
CHW└ WKDQ└ D└ KXQGUHG└ GD\V◀

358,77 └
<HDK☼ └ CHW└ WKDQ└ HLJKW└ PRQWKV└ LQ└ WR└ P\└ DGPLQLWUDWLRQ└ DV└ DWWRUQH\└
JHQHUDO☼ └ ZH└ ZHUH└ VXHG☼ └ DV└ D└ WDWH☼ └ E\└ WKH└ &KRFWDZ└ DQG└ &KLFNDVDZ└
1DWLRQ└ ZLWK└ UHVSHFW└ WR└ ZDWHU☼ └ LQ└ ¶ → └ FRXQWLHV└ LQ└ 6RXWKHDXW└ 2NODKRPD◀

0DQ\└ RI└ \RX☼ └ LI└ \RX└ NQRZ└ DQ\WKLQJ└ DERXW└ ZDWHU└ OLWLJDWLRQ☼ └ LW└ JHQHUDOO\└
/DNHV└ GHFDGHV└ WR└ UHVROYH└ ZDWHU└ OLWLJDWLRQ◀ └ :H└ ZHUH└ DECH└ WR└ JR└ IURP└
$XJXW└ RI└ ┴ !! ¶ ¶ └ XQWLO└ ┴ !! ¶ ├ ☼ └ DQG└ GHJRWLDWH└ DQ└ KLWRULF└ ZDWHU└ ULJKW└
DJUHHPHQW└ ZLWK└ WKRVH└ WZR└ GDWLRQ☼ └ WR└ SURYLGH└ FHUWDLQ└ WR└ WKRVH└ WKDW└ DUH└
UHJXODWHG☼ └ WR└ SURYLGH└ D└ YRLFH└ WR└ WKH└ WULEHV☼ └ LQ└ ┼ ┼ └ ZLWK└ UHVSHFW└ WR└ ZDWHU└
DOORFDWLRQ☼ └ DQG└ ZDWHU└ TXDOLW\◀

$QG└ WKH└ WDWH└ KDV└ PDLQWDLQHG└ LW└ SRVLWLRQ└ RI└ WKH└ DUELWHU└ RI└ KRZ└ WKRVH└
SHUPLW└ DUH└ DOORFDWHG└ DV└ ZHOO◀ └ 6R└ LW└ ZDV└ D└ SDUWQHUVKLS◀ └ ,W└ ZDV└ WKH└ ZD\└
/KLQJV└ RXJKW└ WR└ ZRUN☼ └ ZKHQ└ OLWLJDWLRQ└ RFFXUV☼ └ VLWWLQJ└ DFURW└ WKH└ WDECH└ IURP└
LQGLYLGXDOV☼ └ DQG└ ZRUNLQJ└ WRJHWKHU└ WR└ WU\└ WR└ VROYH└ WKH└ SURECHP◀

$QG└ 6HQDWRU☼ └ ZH└ ZHUH└ DECH└ WR└ DFKLHYH└ WKDW└ LQ└ UHFRUG└ WLPH☼ └ DQG└ ,P└ YHU\└
SURXG└ RI└ ZKDW└ ZH└ GLG☼ └ DV└ D└ WDWH☼ └ DQG└ DV└ WKH└ &KLFNDVDZ└ DQG└ &KRFWDZ└
1DWLRQ└ WRJHWKHU◀

,1+2)(└
<HDK☼ └ WKDW└ JRRG◀ └ , └ WKLQN☼ └ DOVR☼ └ \RX└ JRW└ WKHP└ DOO└ LQ└ RQH└ URRP☼ └ GLGQW└ \RX"

358,77 └
<HV☼ └ VLU◀

,1+2)(└
7KDW└ ZRUNV◀ └ <RX└ PD\└ FULWLFL]H☼ └ DQG└ VRPH└ RI└ WKH└ SHRSCH└ WDONLQJ└ DERXW└
\RXU└ ┼ ┼ └ \RXU└ HQYLURQPHQWDO└ UHFRUG☼ └ , └ ZRXOG└ OLNH└ WR└ EH└ VXUH└ WKDW└ SHRSCH└ DUH└
DZDUH└ RI└ ┼ ┼ └ D└ QXPEHU└ RI└ SHRSCH└ ┼ ┼ └ , └ KDYH└ VRPH└ KHUH☼ └ WKDW└ ,QO└ VXEPLW└ IRU└
/KH└ UHFRUG☼ └ EXW└ D└ JX\└ QDPHG└ (G└)LWH└ LV└ WKH└ YLFH└ SUHVLGHQW└ RI└ 6FHQLF└
5LYHUV└ DQG└ WKH└ ZDWHU└ TXDOLW\└ RI└ WKH└ *5'$◀

7KLV└ LV└ D└ SHUVRQ└ ZKR└ KDV└ UHDOO\└ EHHQ└ DW└ WKH└ IRUHIURQW└ RI└ RXU└ 6FHQLF└
5LYHUV└ SURJUDP◀ └ +H└ SUDLVHV└ \RX☼ └ VD\LQJ└ | , └ IRXQG└ WKDW└ *HQHUDO└ 3UXLWW└ KDV└
DOZD\V└ GRQH└ ULJKW└ E\└ RXU└ VFHQLF└ ULYHUV◀ └ +HV└ GRQH└ HYHU\WKLQJ└
FRQWWUXFWLYH└ WKDW└ KH└ WRQG└ PH└ WKDW└ KH└ ZRXOG└ GR◀ |

7KH└ VDPH└ WKLQJ└ FRPHV└ IURP└ WKH└ 1RUWK└ &DUROLQD└ 'HSDUWPHQW└ RI└
(QYLURQPHQW└ 4XDOLW\☼ └ 'RQDOG└ YDQ└ GHU└ 9DDUW☼ └ KH└ ZURWH☼ └ | 3UXLWW└ LV└
FRPPLWWHG└ WR└ FHDQ└ DLU└ DQG└ FHDQ└ ZDWHU☼ └ DQG└ WR└ UHWRUULQJ└ WKH└ (3$└ WR└ LWV└
RULJLQDO└ PLVVLRQ└ RI└ HQIRUFLQJ└ WKH└ HQYLURQPHQWDO└ ODZV└ ZULWWHQ└ E\└
&RQJUHVV◀ |

-◀ '◀ └ 6WURQJ☼ └ KHDG└ RI└ WKH└ :DWHU└ 5HVRXUFHV└ %RDUG☼ └ KH└ VDLG☼ └ | $WWRUQH\└
*HQHUDO└ 3UXLWW| └ DQG└ KH└ JRHV└ RQ└ DQG└ SUDLVHV└ \RX◀ └ ,G└ OLNH└ WR└ NQRZ└ ZK\└ LW└ LV└
\RX└ KDYH└ EHFRPH└ D└ KHUR└ RI└ WKH└ 6FHQLF└ 5LYHU└ SHRSCH◀

358,77 └
:HOO└ 6HQDWRU☼ └ DV└ \RX└ NQRZ☼ └ 2NODKRPD└ KDV└ HQGXUHG└ PDQ\└ GHFDGHV└ RI└
GLVSXWH☼ └ ZLWK└ UHVSHFW└ WR└ SKRVSKRUXV└ CHYHDV└ LQ└ WKH└ VFHQLF└ ,OOLQRLV└ 5LYHU◀ └
,Q└ IDFW☼ └ WKHUHV└ EHHQ└ OLWLJDWLRQ└ WKDW└ EHHQ└ D└ SDUW└ RI└ WKDW└ GLVSXWH└ IRU└ VRPH└
/LPH◀

7KHUH└ ZDV└ DFWXDOO\└ D└ PHPRUDQGXP└ RI└ XQGHUWDQGLQJ└ WKDW└ $UNDQVDV└ DQG└
2NODKRPD└ HQWHUHG└ LQWR└ DUXQG└ ┴ !! !! ┴ ☼ └ ┴ !! !! ┬ ☼ └ DQG└ WKDW└ PHPRUDQGXP└
H[SLUHG└ GXULQJ└ P\└ WLPH└ DV└ DWWRUQH\└ JHQHUDO◀ └ 7KHUH└ ZHUH└ PDQ\└ LQ└
JRYHUQPHQW└ DW└ WKH└ WLPH└ WKDW└ VDLG└ ZH└ VKRXOG└ MXW└ ZDLW└ RQ└ WKH└ (3$└ WR└
FRPH└ LQ└ DQG└ DGGUHVV└ WKH└ LVXH◀ └ $QG└ , └ FKRVH└ D└ GLIIHUHQW└ SDWK◀

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQG└ +HDUL3DJH╨└ RI└

,└ DFWXDOO\└ UHDFKHG└ RXW└ WR└ P\└ 'HPRFUDW└ FRQHDJXH└ └ 'XWWLQ└ 0F'DQLHO└ └ WKH└
DWWRUQH\└ JHQHUDO└ RI└ WKH└ 6WDWH└ RI└ $UNDQVDV└ └ DQG└ ZH└ ZHUH└ DEOH└ WR└
QHJRWLDWH└ DQ└ DJUHHPHQW└ WKDW└ KDG└ SKRVSKRUXV└ CHYHDV└ VHW└ DW└ !! ◀ !! ┬ → └
VFLHQWLILFDOO\└ GULYHQ└ └ DQG└ HQIRUFHG└ RQ└ ERWK└ VLGHV└ RI└ WKH└ ERUGHU└ └ IRU└ WKH└
ILUWW└ WLPH└ LQ└ KLWRU\◀

$QG└ VR└ ,└ WKLQN└ 0U◀ └)LWH└ LV└ DFWXDOO\└ WKH└ KHDG└ RI└ 6FHQLF└ ,QOLQRLV└ 5LYHUV└
&RPPLWWLRQ└ ♂ VLF□◀ └ +HV└ EHHQ└ FHQWHU└ RQ└ WKLV└ LWXH└ IRU└ D└ QXPEHU└ RI└ \HDUV◀ └
$QG└ ,└ WKLQN└ KLV└ JRRG└ ZRUG└ UHDDWHV└ WR└ WKH└ ZRUN└ WKDW└ ZH└ GLG└ └ LQ└ P\└ RIILFH└ └
ZRUNLQJ└ ZLWK└ 'XWWLQ└ 0F'DQLHO└ WR└ DFKLHYH└ WKDW└ JRRG└ RXWFRPH◀

,1+2)(└
<HDK◀ └ ,└ NQRZ└ P\└ WLPH└ KDV└ H[SLUHG└ └ EXW└ 0U◀ └ &KDLUPDQ└ └ ,G└ OLNH└ WR└ HQWHU└
LQWR└ WKH└ UHFRUG└ └ DW└ WKLV└ SRLQW└ LQ└ WKH└ UHFRUG└ └ WKH└ WWDWHPHQW└ E\└ WKH└
(QYLURQPHQWDO└ ┼ ┼ └ WKH└ '(4└ └ WKDW└ ,└ UHIHUUHG└ WR◀

%$55$662 └
:LWKRXW└ REMHFWLRQ└ └ KHDULQJ└ QRQH◀

6HQDWRU└ :KLWHKRXVH◀

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7KDQN└ └ &KDLUPDQ◀ └ :HOFRPH└ WR└ WKH└ FRPPLWWHH└ └ 0U◀ └ 3UXLWW◀ └ $V└ ZH└
GLVFXWHG└ ZKHQ└ \RX└ DQG└ ,└ PHW└ └ WKH└ RFHDQ└ RII└ RI└ RXU└ RFHDQ└ WWDWH└ DUH└
ZDUPLQJ└ └ GXH└ WR└ IRWLO┼ IXHO┼ GULYHQ└ FOLPDWH└ FKDQJH◀ └ ,W└ LV└ FUDWKLQJ└ RXU└
ILVKHULHV└ └ OLNH└ CREWWHU└ DQG└ ZLQWHU└ ICRXQGHU└ └ DQG└ PDNLQJ└ HDUQLQJ└ D└ OLYLQJ└
KDUGHU└ IRU└ RXU└ ILVKHUPHQ◀ └ ,└ VHH└ GRWKLQJ└ LQ└ \RXU└ FDUHHU└ WR└ JLYH└ WKRVH└
ILVKHUPHQ└ DQ\└ FRQILGHQFH└ WKDW└ \RX└ ZLOO└ FDUH└ RQH└ ELW└ IRU└ WKHLU└ ZHOO┼ EHLQJ└
DQG└ GRW└ MXWW└ WKH└ ZHOO┼ EHLQJ└ RI└ WKH└ IRWLO└ IXHO└ LQGXWWU\◀

,Q└ D└ SURFHW└ WKDW└ \RX└ FRXOG└ UHSOLFDWH└ LQ└ DQ└ 2NODKRPD└ KLJK└ VFKRRO└
VFLHQFH└ CDE└ └ H[FHW└ FDUERQ└ GLR[LGH└ IURP└ IRWLO└ IXHO└ HPLWWLRQV└ LV└ WXUQLQJ└
RXU└ VHDV└ FRUH└ DFLG◀ └ 5KRGH└ ,VODQG└ VKHOO└ ILVKHUPHQ└ DQG└ VKHOOILVK└ JURZHUV└
DUH└ FRQFHUHGG◀ └ ,Q└ P\└ FRQHDJXH└ └ 6HQDWRU└ 0HUNH\V└ WWDWH└ └ WKH\YH└
DOUHDG\└ KDG└ R\WWHU└ VSDW└ ZLSHG└ RXW└ IRU└ EXVLQHVVHV└ E\└ DFLGLILHG└ ZDWHUV◀ └ ,└
VHH└ GRWKLQJ└ LQ└ \RXU└ FDUHHU└ WKDW└ \RX└ ZRXOG└ FDUH└ DW└ DOO└ DERXW└ RXU└ 5KRGH└
,VODQG└ VKHOO└ ILVKHUPHQ◀

,Q└ 5KRGH└ ,VODQG└ └ ZH└ KDYH└ EDG└ DLU└ GD\V◀ └ $QG└ EHFDXVH└ RI└ (3$V└ ZRUN└ └
ΛKH\└ DUH└ IHZHU└ DQG└ IHZHU◀ └ $└ EDG└ DLU└ GD\└ LV└ D└ GD\└ ZKHQ└ SHRSCH└ GULYLQJ└
LQWR└ ZRUN└ KHDU└ RQ└ WKH└ UDGLR└ WKDW└ R]RGH└ IURP└ RXW└ RI└ WWDWH└ VPRNH└ WWDFNV└
KDV└ PDGH└ WKH└ DLU└ LQ└ 5KRGH└ ,VODQG└ GDQJHURXV└ └ DQG└ WKDW└ LQIDQWW└ └ DQG└ WKH└
HDGHUO\└ └ DQG└ SHRSCH└ ZLWK└ EUHDWKLQJ└ GL└ ILFXOWLHV└ VKRXOG└ WWD\└ KRPH└ └ RQ└ DQ└
RWKHUZLVH└ EHDXWLIXO└ GD\◀

%HFDXVH└ WKRVH└ VPRNHWWDFNV└ DUH└ RXW└ RI└ WWDWH└ └ ZH└ QHHG└ (3$└ WR└ SURWHFW└
XV└ └ DQG└ ,└ VHH└ QRWKLQJ└ LQ└ \RXU└ UHFRUG└ WKDW└ ZRXOG└ JLYH└ D└ FRP└ WDNLQJ└ KHU└
FKLOG└ WR└ WKH└ KRVSLWDO└ IRU└ DQ└ DWWKPD└ DWWDFN└ DQ\└ FRPIRUW└ WKDW└ \RX└ ZRXOG└
WDNH└ WKH└ VOLJKWHWW└ LQWHUHWW└ LQ└ KHU◀

$QG└ \RXU└ SDWLRQ└ IRU└ GHYROYLQJ└ SRZHU└ GRZQ└ WR└ WWDWH└ GRHVQW└ KHOS└ XV└ └
EHFDXVH└ RXU└ WWDWH└ UHJXODWRUV└ FDQW└ GR└ DQ\WKLQJ└ DERXW└ DQ\└ RI└ WKRVH└
SURECHPV◀ └ 7KH\└ DOO└ FRPH└ IURP└ RXW└ RI└ WWDWH└ VRXUFHV◀ └ ,Q└ WKLV└ UHVSHFW└ └ ZH└
DUH└ YHU\└ OLNH└ 'HODZDUH◀

2QH└ RI└ WKH└ WKLQJV└ ,G└ OLNH└ WR└ DVN└ \RX└ DERXW└ KHUH└ LV└ WKH└ FRQQHFWLRQ└
EHWZHHQ└ \RX└ DQG└ VRPH└ RI└ WKHVH└ IRWLO└ IXHO└ FRPSDQLHV◀ └ 7KLV└ LV└ + + └ WKHVH└
DUH└ VRPH└ RI└ WKH└ FRPSDQLHV└ WKDW└ KDYH└ VXSSRUWHG└ \RX◀ └ 7KHVH└ DUH└ VRPH└ RI└
ΛKH└ SROLWLFDO└ RUJDQL]DWLRQV└ WKDW└ \RXYH└ UDLVHG└ PRQH\└ IRU◀ └ <RXYH└ UDLVHG└
PRQH\└ IRU└ WKHP└ IRU└ + + └ IRU└ 3UXLWW└ IRU└ DWWRUQH\└ JHQHUDO└ └ FRUUHFW'

358,77 └
<HV└ └ VLU◀ └ ,└ KDYH└ D└ FDPSDLJQ└ FRPPLWWHH└ WKDW└ + + └ \HV◀

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$QG└ 'HYRQ└ (QHUJ\└ └ .RFK└ ,QGXXXULHV└ └ ([[RQ└ 0RELO└ KDYH└ DOO└ PD[HG└ RXW└ WR└
ΛKDW└ DFFRXQW◀ ◀ ◀

358,77 └
,P└ QRW└ DZDUH└ LI└ LWW◀ ◀ ◀

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◀ ◀ ◀ └ DW└ YDULRXV└ WLPHV"

358,77 └
+ + └ PD[HG└ RXW└ RU└ QRW└ └ 6HQDWRU└ └ EXW└ WKH\└ KDYH└ + + └ ,P└ VXUH└ WKH\└ KDYH└ JLYHQ└

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +HDOW3DJH└┬ ¶ RI └┴

/R└ WKH└ ┼ ┼ └ WR└ WKDW└ FRPPLWWHH◀

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2NODKRPD└ 6WURQJ└ 3$&└ LV└ \RXU└ CHDGHUVKLS└ 3$&"

358,77 └
,W└ ZDV└ └ \HV◀

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,W└ ZDV"└ $QG└ VLPLODUO\└ └ WKH\└ JDYH└ PRQH\└ └ WKH\└ PD[HG└ RXW└ WR└ WKDW└
RUJDQL]DWLRQ└ DV└ ZHOO└ └ ZKLFK└ \RX└ FRQWUR"

358,77 └
,P└ QRW└ VXUH└ DERXW└ WKDW└ └ 6HQDWRU◀

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2.◀ └ 7KH\└ FRQWULEXWHG└ WR└ LW'

358,77 └
,P└ HYHQ└ XQVXUH└ DERXW└ WKDW└ └ DV└ ZHOO◀ └ ,└ KDYHQW└ CRRNHG└ DW└ WKDW◀

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<RX└ FRVHG└ \RXU└ VXSHU└ 3$&└ └ /LEHUW\└ ┴ ◀ !! └ EXW└ WKDW└ WRRN└ IRWOO└ IXHO└
FRQWULEXWLRQV└ DV└ ZHOO└ └ FRUUHFW'

358,77 └
7KDW└ ┼ ┼ └ WKDW└ SDUWLFXODU└ HQWLW\└ KDV└ EHHQ└ FRVHG└ └ \HV◀

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1RZ└ └ \RX└ KHOSHG└ UDLVH└ PRQH\└ IRU└ WKH└ 5HSXEOLFDQ└ $WWRUQH\└ *HQHUDOV└
$VVRFLDWLRQ└ ♂ VLF□ └ ZKLCH└ \RX└ ZHUH└ D└ PHPEHU└ RI└ LVW└ H[HFXWLYH└ FRPPLWWHH◀ └
7KH\└ UHFHLYHG└ • ↑ ┬ !! └ !! !! !! └ IURP└ .RFK└ ,QGXVWULHV└ └ • ┬ ↑ !! └ !! !! !! └ IURP└ 0XUUD\└
(QHUJ\└ └ • ¶ ├ !! └ !! !! !! └ IURP└ ([[RQ└ 0RELO└ └ DQG└ • ¶ ┴ ↑ └ !! !! !! └ IURP└ 'HYRQ└ (QHUJ\└ └
D└ FRPSDQ\└ ZKRVH└ CHWWHU└ \RX└ WUDQVSRVHG└ RQWR└ \RXU└ CHWWHUKHDG└ └ DQG└ VHQW└
DV└ DQ└ 2NODKRPD└ DWWRUQH\└ JHQHUDO└ GRFXPHQW◀

KWWS ↕ ↕ ZZZ◀ FT◀ FRP↕ GRF↕ FRQJUHVVLRQDOUHFRUGVRUJ└VW "¶ ┴ SULQWVWUXH ¶ ┼┴ ↕!!

'LG└ \RX└ VRLFLW└ LQ└ \RXU└ URCH└ DW└ WKH└ 5HSXEOLFDQ└ $WWRUCH\└ *HQHUDOV└ $VVRFLDWLRQ└ ♂ VLF□ └ DQ\└ RI└ WKDW└ IXQGLQJ"

358,77 └
,P└ XQDEOH└ WR└ FRQILUP└ LI└ WKH\└ JDYH└ WKRVH└ QXPEHUV└ 6HQDWRU└ WKRVH└ DPRXQW└ WKDW└ \RX└ ┼ ┼ └ WKHUH└ ZHUH└ VHYHUDO└ RQ└ WKH└ OLWW└ WKHUH◀ ◀ ◀ └ C└
:+,7(+286(└ 'LG└ \RX└ VRLFLW└ IXQGLQJ└ IURP└ WKHP└ DV└ ┼ ┼ └ LQ└ \RXU└ URCH└ DW└ /KH└ 5HSXEOLFDQ└ $WWRUCH\└ *HQHUDOV└ $VVRFLDWLRQ└ ♂ VLF□ "

358,77 └
,└ DWWHQGHG└ IXQGUDLVLQJ└ HYHQW└ DV└ DQ└ DWWRUCH\└ JHQHUDO└ DORQJ└ ZLWK└ RWKHU└ DWWRUCH\V└ JHQHUDO└ ZLWK└ UHVSHFW└ WR└ WKH└ 5$*$◀

:+,7(+286(└
$QG└ GLG└ \RX└ VRLFLW'└ 'LG└ \RX└ DVN└ WKHP└ IRU└ PRQH\"

358,77 └
7KDW◀ ◀ ◀

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)RU└ 5$*$"

358,77 └
$V└ ,└ ┼ ┼ └ DV└ ,└ LQGLFDWHG└ ,└ DWWHQGHG└ IXQGUDLVLQJ└ HYHQW└ ZLWK◀ ◀ ◀

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%W└ WKDW└ GLIIHUHQW◀ └ $WWHQGLQJ└ D└ IXQGUDLVLQJ└ LV└ RQH└ WKLQJ◀ └ $VNLQJ└ WKHP└ LV└ P\└ TXHWWLRQ◀ └ 'LG└ \RX└ DVN└ WKHP└ IRU└ PRQH\"

358,77 └
,└ PHDQ└ VSHFLIILFDOO\└ └ \RX└ ZRXOG└ KDYH└ WR└ DVN└ DERXW└ FHUWDLQ└ ┼ ┼ └ FHUWDLQ└ HQWLWLHV◀ └ ,└ GRQW└ NQRZ└ ┼ ┼ └ \RX└ FDQ└ JR└ WKURXJK└ DQ└ HQWLUH└ OLWW◀ ◀ ◀

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*R└ WKURXJK└ WKH└ HQWLWLHV◀ └ .RFK└ ,QGXVWULHV└ 0XUD\└ (QHUJ\└ ([[RQ└ 0RELO└ └

'HYRQ└ (QHUJ\◀

358,77 └
,└ GLG└ QRW└ DVN└ RI└ .RFK└ └ RU└ ┼ ┼ └ RU└ WKDW└ ┼ ┼ └ ZKDW└ ZHUH└ WKH└ RWKHU└ RQHV"

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0XUUD\└ (QHUJ\└ ([[RQ└ 0RELO└ └ 'HYRQ└ (QHUJ\◀

358,77 └
,└ ┼ ┼ └ ,└ KDYH└ QRW└ DVNHG└ WKHP└ IRU└ PRQH\└ └ IRU└ ┼ ┼ └ RQ└ EHKDOI└ RI└ 5$*$◀

:+,7(+286(└
$QG└ WKHQ└ ZH└ KDYH└ ┼ ┼ └ \RX└ VDLG└ WR└ WKH└ &KDLUPDQ└ WKDW└ WKHUH└ LV└ QRWKLQJ└ WKDW└ PLJKW└ SDDFH└ \RX└ LQ└ D└ FRQIOLFW└ RI└ LQWHUHVW└ └ WKDW└ \RX└ KDYH└ QRW└ GLVFORVHG◀ └ <HW└ \RX└ IRXQGHG└ WKH└ 5XOH└ RI└ /DZ└ 'HIHQVH└)XQG└ ZKLFK└ LV└ D└ GDUN└ PRQH\└ RSHUDWLRQ└ WKDW└ VXSSRUWW└ WKH└ 5HSXEOLFDQ└ $WWRUQH\└ *HQHUDO└ $VVRFLDWLRQ└ ♂ VLF□└ DQG└ \RX└ KDYH└ QRW└ GLVFORVHG└ DQ\└ RI└ \RXU└ VROLFLWDWLRQV└ IRU└ WKDW└ HQWLW\└ QRU└ KDYH└ \RX└ GLVFORVHG└ ZKDW└ PRQH\└ ZDV└ UDLVHG└ SXUVXDQW└ WR└ WKRVH└ VROLFLWDWLRQV◀

7KLV└ LV└ DQ└ RUJDQL]DWLRQ└ WKDW└ DSSHDUV└ WR└ KDYH└ D└ PLOOLRQ└ GROODU└ D└ \HDU└ EXGJHW◀ └ 6R└ YHU\└ VXEVWDQWLDO└ IXQGV└ KDYH└ EHHQ└ VROLFLWHG◀ └ ,└ EHOLHYH└ \RX└ ZHUH└ LWW└ FKDLUPDQ◀ └ :LOO└ \RX└ GLVFORVH└ \RXU└ URCH└ LQ└ VROLFLWLQJ└ PRQH\└ DQG└ LQ└ UHFHLYLQJ└ PRQH\└ IRU└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG└ SXUVXDQW└ WR└ \RXU└ VROLFLWDWLRQ"

358,77 └
6HQDWRU└ └ D└ SRLQW└ RI└ FODULILFDWLRQ◀ └ ,└ DPXXDOO\└ GLG└ QRW└ WDUW└ └ QRU└ LQWWLDWH└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG◀ └ 7KDW└ LV└ VRPHWKLQJ└ ,└ GLGQW◀ ◀ ◀

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<RX└ CHG└ LW◀

358,77 └
◀ ◀ ◀ └ GR◀ └ ,YH└ EHHQ└ D└ ┼ ┼ └ DQ└ RIILFHU└ RI└ WKDW└ RUJDQL]DWLRQ◀ ◀ ◀

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2.◀

358,77 └
◀ ◀ ◀ └ IRU└ ┴ !! ¶ ├ ◀

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$Q└ RI ILFHU└ RI └ LW◀

358,77 └
7KHUH└ LV└ DQ└ H[HFXWLYH└ WRDII☼ └ IXQGUDLVHUV└ WKDW└ DFWXDOO\└ FDUU\└ RXW└ WKH└
IXQFWLRQV└ RI └ WKDW└ RUJDQL]DWLRQ◀ └ 7KHUH└ DUH└ PDQ\└ DVSRUGH\V└ JHQHUDO└ WKDW└
VHUYH└ RQ└ WKDW└ ERDUG◀ └ ,W└ QRW└ D└ GHFLVLRQ└ RI └ RQH◀ └ ,W└ D└ ┼ ┼ └ LW└ D└ GHFLVLRQ└ RI └
/KRVH└ WKDW└ KDYH└ EHHQ└ HPSRZHUHG└ WR└ PDNH└ WKRVH└ GHFLVLRQV◀

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?&XW└ \RX└ KDYHQW└ WROG└ XV└ DQ\WKLQJ└ DERXW└ WKDW◀ └ <RX└ KDYHQW└ WROG└ XV◀ ◀ ◀

358,77 └
,└ KDYH└ QR└ DFFHVV◀ ◀ ◀

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◀ ◀ ◀ └ ZKR└ \RX└ DVNHG└ FRQH\◀ ◀ ◀

358,77 └
7KDW└ ┼ ┼ └ WKDW└ D◀ ◀ ◀

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◀ ◀ ◀ └ IURP◀ └ <RX└ KDYHQW└ WROG└ XV└ ZKDW└ WKH\└ JDYH☼ └ LI └ \RX└ DVNHG└ WKHP◀ └ ,W└ D└
FRPSOHWH└ ECDFN└ KRCH☼ └ LQWR└ ZKLFK☼ └ DW└ CHDWW└ D└ PLOOLRQ└ GROODUV└ JRHV◀ └ $QG└
EDVHG└ RQ└ \RXU└ UHFRUG└ RI └ IXQGUDLVLQJ☼ └ LW└ DSSHDUV└ WKDW└ D└ JUHDW└ GHDO└ RI └ \RXU└
IXQGUDLVLQJ└ FRPHV└ IURP└ WKHVH└ RUJDQL]DWLRQV└ ZKR└ DUH└ LQ└ WKH└ HQHUJ\└
VHFWRU└ DQG└ GHYRWHG└ WR└ ILJKWLQJ└ FOLPDWH└ FKDQJH◀

358,77 └

6RPH└ RI└ ZKR└ ┼ ┼ └ VRPH└ RI└ ZKRP└ ,YH└ DFWXDOOO\└ VXHG└ DV└ ZHOO☼ └ 6HQDWRU◀ └ %XW└ ZLWK└ UHVSHFW└ WR└ WKH└ URCH└ WKDW◀ ◀ ◀

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1DPH└ RQH└ \RXYH└ VXHG└ XS└ WKHUH◀

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([[RQ└ 0RELO◀

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5HDOO\"

358,77 └

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0\└ WLPH└ KDV└ H[SLUHG◀ └ :HOO└ SXUVXH└ WKLV└ LQ└ IXUWKHU└ TXHVWLRQLQJ◀

358,77 └

<HDK◀ └ :HUH└ ┼ ┼ └ ZHUH└ LQYROYHG└ LQ└ ┼ ┼ └ DV└ ,└ LQGLFDWHG☼ └ ,└ WKLQN☼ └ LQ└ ┼ ┼ └ LQ└ \RXL RI ILFH☼ └ ZH└ DUH└ LQYROYHG└ LQ└ ┼ ┼ └ DQG└ 6HQDWRU└ ,QKRIH└ PHQWLRQHG└ LW└ LQ└ KLV└ FRPPHQW☼ └ D└ VLWXDWLRQ└ LQ└ 2NODKRPD└ ZKHUH└ PXQWLSOH└ RLO└ DQG└ JDV└ FRPSDQLHV☼ └ &RQRFR3KLOOLSV└ DQG└ RWKHUV☼ └ KDYH└ GHIUDXGHG└ WKH└ WDWHH☼ └ LQ└ FHDQXS☼ └ ZLWK└ UHVSHFW└ WR└ VSLOOV└ WKDW└ KDYH└ RFFXUUHG◀ └ $QG└ ([[RQ└ 0RELO◀ ◀ ◀

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<HDK☼ └ LW└ D└ TXL└ WDP└ IUDXG└ FDVH◀ └ ,W└ KDV└ QRWKLQJ└ WR└ GR└ ZLWK└ WKH└ HQYLURQPHQW◀

358,77 └

6HQDWRU☼ └ ,└ ZRXOG└ ┼ ┼ └ ,└ ZRXOG└ EHJ└ WR└ GLVDJUHH◀

%$55$662 └

, └ WKLQN└ ZHUH└ JRLQJ└ WR└ UHVHUYH└ WKDW└ IRU└ WKH└ VHFRQG└ ┼ ┼ └ IRU└ WKH└ VHFRQG└ URXQG◀

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2U└ ,P└ VRUU\◀ └ +H└ ZDV└ FRPLQJ└ EDFN└ WR└ PH☼ └ VR└ , └ ZDV└ UHVSRQGLQJ◀ └ 7KDQN└
\RX◀

%$55$662 └
%HIRUH└ KHDGLQJ└ WR└ 6HQDWRU└ &DSLWR☼ └ WKHUH└ DUH└ WZR└ DUWLFOHV└ ,QO└ EH└
LQWURGXFLQJ└ LQWR└ WKH└ UHFRUG☼ └ RQH└ IURP└ WKH└ :DOO└ 6WUHHW└ -RXUQDO└ LQ└
6HSWHPEHU☼ └ KHDGOLQHG☼ └ | +LOODU\└ &OLQWRQ└ 5DLVHV└ 0RUH└ WKDQ└ 'RODOG└ 7UXPS└
IURP└ 2LO└ ,QGXVWU\◀ |

7KH└ VHFRQG└ DUWLFOH└ WKDW└ ,QO└ EH└ LQWURGXFLQJ└ IRU└ WKH└ UHFRUG└ LV└ IURP└ 3ROLWLFR☼ └
IURP└ 'HFHPEHU└ ┴ → WK☼ └ E\└ (CHDD└ 6KRUH☼ └ ZKR└ TXRWHV└ $PHULFDQ└ 5LVLQJ└ ♂ VLF□ └
([HFXWLYH└ 'LUHFWRU└ %UDQ└ 5RJHUV☼ └ TXRWH☼ └ | 7KLV└ LV└ D└ SDUWLVDQ└ ILVKLQJ└
H[SHGLWLRQ└ E\└ VL[└ OLEHUDO└ 'HPRFUDWV└ ZKR☼ └ FRPELQHG☼ └ KDYH└ WDNHQ└ PRUH└
WKDQ└ • ¶ ◀ ┴ └ PLOOLRQ└ IURP└ IDU└ CHIW└ HQYLURQPHQWDO└ JURXS☼ └ GHDG└ VHW└ DJDLQWW└ DQ\└
UHIRUPV└ WR└ DQ└ RXW┼ RI┼ FRQWUROO└ (3$◀ |

6HQDWRU└ &DSLWR◀

&$3,72 └
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ☼ └ DQG└ WKDQN└ \RX☼ └ $WWRUQH\└ *HQHUDO└ 3UXLWW☼ └ IRU└
EHLQJ└ KHUH☼ └ IRU└ \RXU└ ZLOOLQJQHVV└ WR└ WKURZ└ \RXU└ KDW└ LQ└ WKH└ ULQJ└ WR└ VHUYH◀ └ ,G└
OLNH└ WR└ TXRWH└ WKH└ UDQNLQJ└ PHPEHU☼ └ ZKHQ└ KH└ VD\V└ LW└ KDUG└ ZRUN☼ └ EHFDXVH└
LW└ LV◀ └ 7KH└ (3$└ LV└ KDUG└ ZRUN◀

%XW└ RQH└ RI└ WKH└ WKLQJV└ \RX└ VDLG└ UHDOO\└ WXUXFN└ PH☼ └ DQG└ , └ ┼ ┼ └ , └ EHOLHYH└ WKDW└ WKH
UXCH└ RI└ CDZ└ GRHV└ PDWWHU◀ └ $QG└ ,P└ KHDUWHQHG└ E\└ \RXU└ ┼ ┼ └ \RXU└ SDVVLRQ└ IRU└
WKDW◀ └ 7KH└ UHJXODWRU\└ RYHU┼ UHDFK└ RI└ WKH└ (3$└ KDV└ FRQWULEXWHG└ WR└ HFRQRPLF└
GHYDXWDWLRQ└ LQ└ P\└ WWDWH└ RI└ :HXW└ 9LUJLQLD└ LQ└ WKH└ ┼ ┼ └ LQ└ P\└ UHJLRQ◀

'DWD└ IURP└ WKH└ 0LCH└ 6DIHWW└ DQG└ +HDOWK└ $GPLQLWWUDWLRQ└ VKRZV└ WKDW└ ├ !! ☼ !! !! !! └
FRDO└ MREV└ KDYH└ EHHQ└ CRWW└ EHWZHHQ└ ┴ !! ¶ ¶ └ DQG└ ┴ !! ¶ ├ ◀ └ 7KRXVDQGV└ RI└ WKHVH└
DUH└ LQ└ :HXW└ 9LUJLQLD◀ └ :HUH└ LQ└ D└ GHVSHUDWH└ VLWXDWLRQ└ LQ└ RXU└ WWDWH└ ULJKW└ QRZ└
EHFDXVH└ RI└ WKLV◀

:H└ KDG└ D└ ILHOG└ KHDULQJ└ LQ└ %HFNCH\☼ └ :HXW└ 9LUJLQLD☼ └ ZKHUH└ RXU└ :98└
HFRQRPLWW☼ └ -RKQ└ 'HVNLQV☼ └ VDLG└ WKDW└ WKH└ FRDO└ LQGXXWU\└ GRZQWXUQ└ KDG└
UHVXOWHG└ LQ└ D└ VL[WK└ RI└ RXU└ 6RXWKHUQ└ :HXW└ 9LUJLQLD└ FRXQWLHV└ EHLQJ└ LQ└ D└
JUHDW└ GHSUHVVLRQ◀

)RU└ WKH└ SDXW└ HLJKW└ \HDUV☼ └ WKH└ (3$V└ JLYHQ└ QR└ LQGLFDWLRQ└ DW└ DOO└ WKDW└ LW└ FDUHV└
DERXW└ WKH└ HFRQRPLF└ LPSDFW└ RI└ LWW└ SROLFLHV◀ └ (YHQ└ WKRXJK└ &RQJUHVV└ KDV└
VDLG☼ └ YHU\└ FOHDUO\☼ └ LQ└ WKH└ &HDQ└ $LU└ $FW☼ └ DQG└ RWKHU└ HQYLURQPHQWDO└ WDXWXWHV☼ └
WKDW└ ZH└ H[SHFW└ MREV└ DQG└ HFRQRPLF└ IDFWRUV└ WR└ EH└ WDNHQ└ LQWR└ DFFRXQW└ ┼ ┼ └
WKDWW└ SDUW└ RI└ WKH└ ODZ☼ └ LQ└ 2FWREHU☼ └ D└ IHGHUDO└ FRXUW└ KHOG└ WKDW└ WKH└ (3$└ KDG└
IDLHG└ WR└ HYDOXDWH└ WKH└ MRE└ LPSDFW└ WR└ WKH└ (3$└ &HDQ└ $LU└ $FW└ DV└ UHTXLUHG└ E\└
┬ ┴ ¶ ♂ D□ └ RI└ WKDW└ DFW☼ └ DQG└ RUGHUHG└ WKH└ (3$└ WR└ VXEPLW└ D└ VFKHGXOH└ IRU└
FRQGXFWLQJ└ WKHVH└ HFRQRPLF└ ┼ ┼ └ WKH└ UHTXLUHG└ MREV└ DQDO\VLV◀

,QFUHGLEO\☼ └ WKH└ (3$└ WRRO└ WKH└ FRXUW└ LW└ ZRXOG└ WDNH└ WZR└ \HDUV└ ┼ ┼ └ WKLV└ ZDV└ MXXW└
WKLV└ SDXW└ ┼ ┼ └ LW└ ZDV└ MXXW└ LQ└ WKH└ ODXW└ VHYHUDO└ ZHHNV☼ └ LW└ ZRXOG└ WDNH└ WZR└ \HDUV└
VXXW└ WR└ FRPH└ XS└ ZLWK└ D└ SODQ└ RQ└ KRZ└ WR└ GR└ WKH└ DQDO\VLV☼ └ ZKLFK☼ └ LQ└ P\└
YLHZ☼ └ LI└ WKDWW└ SDUW└ RI└ WKH└ ODZ└ WKDW└ (3$V└ VXSSRVHG└ WR└ EH└ IROORZLQJ☼ └ WKH\└
VKRXOG└ DOUHDG\└ KDYH└ WKH└ SURWRFROV└ VHW└ XS└ WR└ GR└ DQ└ HI IHFWLYH└ DQG└ DFFXUDWH└
VRE└ DQDO\VLV◀

6R└ WKH└ FRXUW└ UHVSRQGHG└ OLNH└ WKLV◀ └ | 7KLV└ UHVSRQVH└ LV└ ZKROO\└ LQHI ILFLHQW☼ └
XQDFFHSWDEOH└ DQG└ XQHFFHWDU\◀ └ ,W└ HYLGHQFHV└ WKH└ FRQWLQXHG└ KRWWLOLW\└ RQ└
WKH└ SDUW└ RI└ WKH└ (3$└ WR└ WKH└ DFFHSWDQFH└ RI└ WKH└ PLWLRQ└ HXWDEOLVKHG└ E\└
&RQJUHVV◀ |

6R└ ,└ ZRXOG└ DW└ ┼ ┼ └ OLNH└ WR└ DVN└ \RX└ WR└ FRPPLW└ WR└ PH└ WKDW└ ┼ ┼ └ WR└ HQVXUH└ WKDW└ W
(3$└ ZLOO└ IROORZ└ WKH└ ODZ└ LW└ LV└ FKDUJHG└ ZLWK└ LPSOHPHQWLQJ☼ └ DQG└ GR└ WKRVH└
RQJRLQJ└ HYDOXDWLRQ└ RI└ MRE└ ORVVHV└ DQG└ HFRQRPLF└ VKLIWW└ GXH└ WR└ WKH└
UHTXLUHPHQW└ RI└ WKH└ DFW└ DV└ UHTXLUHG└ E\└ WKH└ ODZ◀

358,77 └
6HQDWRU☼ └ DV└ \RX└ LQGLFDWHG☼ └ ,└ UHDOO\└ EHOLHYH└ WKDW└ LWW└ LPSRWDQW└ WKDW└ UXOH└ RI└
ODZ└ LV└ DGKHUHG└ WR☼ └ EHFDXVH└ LW└ LQVSLUHV└ FRQILGHQFH└ LQ└ WKRVH└ WKDW└ DUH└
UHJXODWHG◀ └ ,└ WKLQN☼ └ RIWHQWLPHV☼ └ WKRVH└ WKDW└ DUH└ UHJXODWHG└ GRQW└ NQRZ└ ZKDWW└
H[SHFWHG└ RI└ WKHP◀

7KH\└ ORRN└ DW└ D└ WDXXWH◀ └ 7KH\└ VHH└ WKH└ UHTXLUHPHQWW└ RI└ WKH└ WDXXWH◀ └ $QG└
WKHQ└ WKRVH└ WKDW└ DUH└ UHJXODWLQJ└ DFW└ LQ└ D└ ZD\└ WKDWW└ GRW└ FRQVLWWHQW└ ZLWK└ WKDW└
IUDPHZRUN◀ └ $QG└ VR└ WKH\└ GRQW└ NQRZ└ ZKDWW└ H[SHFWHG└ RI└ WKHP☼ └ DQG└ WKDW└
FDXVHV└ XQFHUWDLQW\☼ └ DQG└ ,└ WKLQN☼ └ SDUDO\VLV☼ └ WR└ D└ FHUWDLQ└ GHJUHH◀

6R└ UXCH└ RI└ CDZ└ LV└ VRPHWKLQJ└ WKDW└ ZH└ VKRXOG└ WDNH└ VHULRXVO\◀ └ ,W└ EHHQ└ DW└ ΛKH└ KHDUW└ RI└ WKH└ OLWLJDWLRQ└ WKDW└ ZH└ KDYH└ LQLWLDWHG└ └ DV└ D└ WDWWH◀ └ $└ CRW└ RI└ WLPH└ ΛKHVH└ FDVHV└ └ DV└ ZH└ ZHUH└ WDONLQJ└ HDUOLHU└ ZLWK└ 6HQDWRU└ &DUSHU└ └ WKHUHV└ D└ SROLF\└ RU└ SROLWLFDO└ NLQG└ RI└ DWWHQWLRQ└ WKDW└ GUDZQ└ WR└ LW◀

⁄&XW└ LW└ UHDOO\└ LV└ DERXW└ SURFHW└ DQG└ UXCH└ RI└ CDZ└ └ DQG└ PDNLQJ└ VXUH└ WKDW└ WKH└ IUDPHZRUN└ WKDW└ WKLV└ ERG\└ &RQJUHW└ KDV└ HXWDEOLVKHG└ └ LV└ UHVSHFWHG└ └ DQG└ HQIRUFHG◀ └ $QG└ VR└ ,└ DSSUHFLDWH└ \RXU└ FRPPHQW◀

&$3,72 └
:HOO└ └ LQ└ ORRNLQJ└ IRU└ WKH└ EDODQFH└ └ ZH└ QHHG└ WR└ KDYH└ ┼ ┼ └ ZH└ QHHG└ WR└ KDYH└ DW└ CHDXW└ D└ FRUUHFW└ DQDO\VLV└ RI└ ZKDW└ WKH└ ┼ ┼ └ WKH└ HFRQRPLF└ LPSOLFDWLRQV└ DUH└ RI└ UHJXODWLRQV◀

,W└ VR└ LPSRUWDQW└ └ DQG└ FULWLFDO\└ LPSRUWDQW└ WKDW└ ZH└ HQIRUFH└ RXU└ HQYLURQPHQWDO└ CDZV└ └ DQG└ WR└ FRQWLQXH└ WR└ NHHS└ RXU└ DLU└ FCHDQ└ DQG└ RXU└ ┼ ┼ └ JHW└ LW└ FCHDQHU└ DQG└ SURWHFW└ RXU└ ZDWHUV◀ └ ,Q└ -DQXDU\└ RI└ ┴ !! ¶ ┤ └ D└ WWRUDJH└ WDCN└ LQ└ &KDUCHWWRQ└ └ :HW└ 9LUJLQLD└ └ ZDV└ FRUUXSWHG└ DQG└ LW└ ZHQW└ LQWR└ WKH└ ULYHU◀

,W└ ZDV└ ULJKW└ E\└ WKH└ ┼ ┼ └ WKH└ ZDWHU└ ICRZ└ RI└ WKH└ ┼ ┼ └ WKH└ PDVRU└ ZDWHU└ VRXUFH└ LQ└ P\└ FRPPXQLW\◀ └ 7KUHH└ KXQGUHG└ WKRXVDQG└ SHRSCH└ KDG└ WR└ GR└ ZLWKRXW└ ZDWHU└ IRU└ VHYHUDO└ ZHHNV◀ └ ,W└ FDXVHG└ D└ CRW└ RI└ DQJXW└ └ HFRQRPLFDOO\└ └ WR└ VPDOO└ EXVLQHVVHV◀ └ ,PDJLQH└ D└ UHWDXUDQW└ CRW└ EHLQJ└ DECH└ WR└ XVH└ ZDWHU└ └ RU└ \RX└ FDQW└ └ \RX└ NCRZ└ └ ZDVK└ \RXU└ FCRWKHV◀ └ <RX└ FRXOGQW└ GR└ DQ\WKLQJ└ ZLWK└ WKH└ ZDWHU◀

⁄&XW└ DOVR└ ┼ ┼ └ DQG└ ┼ ┼ └ DQG└ ,└ VKDUH└ WKLV└ FRQFHUQ└ ┼ ┼ └ FRQFHUQ└ DERXW└ WKH└ KHDOWK└ DQG└ WKH└ CRQJ┼ UDQJH└ LPSOLFDWLRQV└ RI└ ZKDW└ KDSSHQHG└ └ VHYHUDO└ SHRSCH└ └ PXOWLSCH└ LQGLYLGXDOV└ DQG└)UHHGRP└ ,QGXWULHV└ KDYH└ SCHG└ JXLQW\└ LQWR└ HQYLURQPHQWDO└ FULPHV└ LQ└ IHGHUDO└ FRXUW└ └ ZKLFK└ ,P└ YHU\└ SCHDVHG└ DERXW◀

6R└ CHW└ WDCN└ DERXW└ 76&$└ └ EHFDXVH└ LQ└ 76&$└ └ ,└ ZDV└ DECH└ WR└ VXSSRUW└ D└ SURYLVLRQ└ WKDW└ ZRXOG└ VD\└ WKDW└ LI└ \RX└ ┼ ┼ └ LI└ \RXUH└ WWRULQJ└ LQ└ FCRVH└ SUR[LPLW\└ ⁄R└ GULCNLQJ└ ZDWHU└ └ \RX└ KDYH└ WR└ WDNH└ WKDW└ LQWR└ FRQVLGHUDWLRQ└ ZKHQ└ \RXUH└ UHYLHZLQJ└ SRWHQWLDOO\└ KD]DUGRXV└ FKHPLFDOV◀

&DQ└ ZH└ FRXQW└ RQ└ \RX└ WR└ ZRUN└ ZLWK└ WKLV└ FRPPLWWHH└ WR└ PDNH└ VXUH└ WKDW└ WKLV└ ELSDUWLVDQ└ 76&$└ UHIRUP└ ELOO└ LV└ IXOO\└ LPSCHPHQWHG└ └ DQG└ HI ILFLHQWO\└ DQG└ IXOO\"

358,77 └

$EVRORXWHD\☼ └ 6HQDWRU◀ └ ,Q└ IDFW☼ └ ,└ ZRXOG└ FRPPHQG└ WKH└ ZRUN└ RI└ WKLV└ FRPPLWWHH☼ └ ZLWK└ 6HQDWRU└ ,QKRIHV└ CHDGHUWKLS☼ └ LQ└ SDWWLQJ└ WKDW└ XSGDWH└ WR└ WKH└ 76&$└ CHJLVODWLRQ◀ └)RU└ WKH└ ILUWW└ WLPH└ LQ└ KLWRU\☼ └ DV└ \RX└ NQRZ☼ └ WKH└ (3$└ KDV└ WKH└ DELOLW└ WR└ RUGHU└ WHWWLQJ└ WR└ DGGUHVV└ FKHPLFDOV└ WKDW└ DUH└ JRLQJ└ WR└ EH└ HQWHUHG└ LQWR└ WKH└ WWUHDP└ RI└ FRPPHUFH◀

$QG└ WKDW└ D└ YHU\└ ELJ☼ └ VXEWDQWLYH└ FKDQJH└ WKDW└ H[LWW◀ └ 7KHUH└ DUH└ PDQ\└ GHDGOLQHV◀ └ $QG◀ ◀ ◀

&$3,72 └
$QG└ ,└ ZRXOG└ DOR└ DGG☼ └ WKDW└ LQ└ 76&$└ ┼ ┼ └ H[FXVH└ PH└ MXW└ D└ PLQXWH☼ └ EHFDXVH└ ,P└ UXQQLQJ└ RXW└ RI└ WLPH◀ └ ,Q└ 76&$☼ └ ZH└ DFWXDOO\└ H[SDQGHG└ WKH└ (3$V└ UHDFK◀

6R└ ZKHQ└ \RXUH└ DVNHG└ LI└ \RX└ ┼ ┼ └ LI└ ┼ ┼ └ LI└ \RXUH☼ └ \RX└ NQRZ☼ └ ZDQWLQJ└ WR☼ └ \RX└ NQRZ☼ └ JHW└ ULG└ RI└ WKH└ (3$☼ └ RU└ LW└ GRHVQW└ KDYH└ D└ YDOXH☼ └ ZH└ ┼ ┼ └ ,└ YRWHG└ WR└ H[SDQG└ WKDW└ UHDFK└ RI└ (3$☼ └ WR└ PDNH└ VXUH└ WKDW└ ,└ KDYH└ FCHDQ└ ZDWHU☼ └ DQG└ WKDW└ D└ VSLOO└ KDSSHQV└ LQ└ D└ FRPPXQLW└ DURXQG└ WKLV└ FRXQWU\☼ └ RU└ ZKDW└ KDSSHQHG└ LQ└)OLQW☼ └ 0LFKLJDQ☼ └ GRHVQW└ KDYH└ WKH└ IDU╬ UHDFKLQJ└ LPSOLFDWLRQV└ WKDW└ LW└ GRHV◀ └ 7KDQN└ \RX└ YHU\└ PXFK◀

358,77 └
7KDQN└ \RX☼ └ 6HQDWRU◀

%$55$662 └
6HQDWRU└ &DUGLQ◀

&$5',1 └
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW◀ ◀ ◀

358,77 └
*RRG└ PRUQLQJ◀

&$5',1 └
◀ ◀ ◀ └ ZHOFRPH└ WR└ WKH└ FRPPLWWHH◀ └ 7KDQN└ \RX└ IRU└ \RXU└ ZLOOLQJQHW└ WR└ VHUYH└ RXU└ FRXQWU\◀

,└ ZDQW└ WR└ WDON└ DERXW└ WKH└ &KHVDSHDNH└ %D\└ 3URJUDP◀ └ :H└ WDONHG└ DERXW└ WKDW└
LQ└ P\└ RIILFH◀ └ ,└ H[SODLQHG└ WR└ \RX└ DQG└ ,QO└ GR└ LW└ YHU\└ TXLFNO\└ WKDW└ WKLV└ LV└ D
SURJUDP└ WKDW└ ZDV└ GHYHORSHG└ DW└ WKH└ WWDWH└ CHYHO└ ZLWK└ WKH└ WWDWHV└ WKDW└ DUH└ LQ└
WKH└ ZDWHUVKHG└ LQFOXGLQJ└ 'HDZDUH└ ZLWK└ P\└ FROOHDJXH└ 6HQDWRU└ &DUSHU◀

,W└ WKH└ WWDWH└ WKDW└ WKH└ CRFDOV└ KDYH└ GHWHUPLQHG└ KRZ└ LW└ EHWW└ WR└ UHDFK└ WKHLU└
SRODWOLRQ└ WDUJHWW└ LQ└ RUGHU└ WR└ KHS└ SUHVHUYH└ WKH└ &KHVDSHDNH└ %D\◀ └ ,W└ WKH└
CDUJHWW└ HXWXDU\└ LQ└ WKH└ GRUWKHUQ└ KHPLVSKHUH◀ └ ,W└ FULWLFDOO\└ LPSRUWDQW◀ └ ,W└
FRPSOLFDWHG└ GRHVQW└ IOXWK└ LWWHDI└ DV└ ┼ ┼ └ DV└ PDQ\└ ERGLHV└ RI└ ZDWHU└ GRHV◀ └ ,W└
KDV└ D└ UHGXFWLRQ└ RI└ R\WWHU└ FURSV◀ └ 7KHUHV└ VR└ PDQ\└ SURECHPV◀

$OO└ WKH└ WWDNHKROGHUV└ KDYH└ JRWWHQ└ WRJHWKHU◀ └ 7KH\YH└ ZRUNHG└ RXW└ D└ SODQ◀ └
7KH└ IHGHUDO└ JRYHUQPHQW└ LV└ SDUW└ RI└ WKDW└ SODQ◀ └ ,W└ HQIRUFHG└ WKURXJK└ WKH└
70'/└ SURJUDP└ └ DQG└ LW└ KDV└ EHHQ└ DJUHHG└ WR└ E\└ WKH└ CRFDO└ JRYHUQPHQW◀

,W└ ZDV└ FKDOOHQJHG└ └ WKH└ 70'/V└ └ LQFOXGLQJ└ ┼ ┼ └ \RX└ MRLQHG└ WKDW└ CDZVXLW◀ └ 7KH└
6XSUHPH└ &RXUW└ UHIXVHG└ WR└ RYHUWXUQ└ WKH└ FRXUW└ RI└ DSSHDOV└ VXSSRUWLQJ└ WKH└
XVH└ RI└ WKH└ 70'/V◀ └ ,I└ \RX└ DUH└ FRQILUPHG└ └ ZLOO└ \RX└ VXSSRUW└ WKH└ IHGHUDO└ URCH└
LQ└ WKH└ &KHVDSHDNH└ %D\└ 3URJUDP└ └ DV└ HQYLVLRQHG└ E\└ WKH└ SDUWQHUV└ DQG└
WWDNHKROGHUV└ └ LQ└ HQIRUFLQJ└ WKH└ 70'/V└ └ LI└ QHFHVVDU\"

358,77 └
<HV└ └ 6HQDWRU◀ └ $QG└ DV└ ,└ LQGLFDWHG└ LQ└ RXU└ RIILFH└ └ LQ└ RXU└ WLPH└ ┼ ┼ └ WKH└ WLPH└ WKDW
ZH└ KDG└ WRJHWKHU└ └ ,└ UHDOO\└ FRPPHQG└ WKH└ VL[└ WWDWHV└ WKDW└ MRLQHG└ WRJHWKHU└ WR└
DGGUHVV└ WKH└ &KHVDSHDNH└ %D\└ DQG└ WR└ WU\└ WR└ VHW└ D└ CHYHO└ IRU└ ERWK└ SRLQW└
VRXUFH└ DQG└ GRQ┼ SRLQW└ VRXUFH└ WVSH└ RI└ GLVFKDUJH└ LQWR└ WKH└ &KHVDSHDNH└
%D\◀

7KHUH└ ZHUH└ VRPH└ FRQFHUQV└ DERXW└ WKH└ SUHFHGHQW└ └ WKH└ URCH└ WKDW└ (3$└ ZDV└
SOD\LQJ└ └ LQLWLDOOO\◀ └ %XW└ WKURXJK└ WKDW└ OLWLJDWLRQ└ └ WKH└ (3$└ KDV└ DFNQRZOHGJHG└
WKDW└ WKHLU└ URCH└ LV└ FRUH└ LQIRUPDWLRQDO◀ └ $QG└ ┼ ┼ └ DQG└ WKHUH└ ZDV└ FRQFHUQ└ LQ└
2NODKRPD└ DERXW└ WKH└ 0LWLWLSSL└ 5LYHU└ %DVLQ└ └ DQG└ WKH└ SUHFHGHQW└ WKDW└
ZDV└ VHW└ LQ└ WKDW└ PDWWHU└ └ DQG└ WKDW└ ZKDW└ VSDZQHG└ RXU└ OLWLJDWLRQ◀

%XW└ ,└ UHDOO\└ ZDQW└ WR└ HPSKDVL]H└ WR└ \RX└ └ WKDW└ SUHFHW└ UHSUHVHQW└ ZKDW└
WKRXOG└ RFFXU◀ └)RU└ WWDWHV└ WR└ MRLQ└ WRJHWKHU└ └ DQG└ HQWHU└ LQWR└ DQ└ DJUHHPHQW└ WR└
DGGUHVV└ ZDWHU└ TXDOLW└ LWXHV└ └ DQG└ WKHQ└ LQYROYH└ WKH└ (3$└ WR└ VHUYH└ WKH└ URCH└
LW└ VXSSRVHG└ WR└ VHUYH└ └ LV└ VRPHWKLQJ└ WKDW└ WKRXOG└ EH└ FRPPHQGHG└ DQG└
FHOHEUDWHG◀

$QG└ DV└ LW└ UHDWHV└ WR└ HQIRUFLQJ└ WKDW└ 70'/└ ,└ FDQ└ FRPPLW└ WR└ \RX└ WKDW└ LQ└
IDFW└ ,└ ZLOO└ GR└ VR◀

&$5',1 └
3DUW└ RI└WKH└ IHGHUDO└ JRYHUQPHQW└ SDUWQHUVKLS└ LV└WR└ SURYLGH└ UHVRXUFHV◀ └
7KHUH└ DUH└ VHYHUDO└ SURJUDPV└WKDW└ IXQG└ LQLWLDWLYHV└ ZLWKLQ└WKH└ &KHVDSHDNH└
%D\└ ZDWHUVKHG◀ └ 3UREEO\└WKH└ CDUJHW└ LV└WKH└ WDWH└ UHYRYLQJ└ IXQGV└ GHDOLQJ└
ZLWK└ ZDWHUZDWHU◀

:LOO└ \RX└ VXSSRUW└WKH└ IHGHUDO└ JRYHUQPHQW└ SDUWQHUVKLS└WKURXJK└ IXQGLQJ└
ΛKHVH└ SURJUDPV└WKDW└ DUH└ FULWLFDOO\└ LPSRUWDQW└WR└ PDNH└WKH└ DGYDQFHPHQW└
LQ└WKH└ &KHVDSHDNH└ %D\└ ZDWHUVKHG"

358,77 └
<HV☼ └ 6HQDWRU◀ └ ,└ EHOLHYH└WKDW└WKH└ JUDQW└ PDNLQJ└ URCH└ RI└WKH└ (3$☼ └ DV└ ZH└
ΛDONHG└ DERXW└ LQ└ \RXU└ RIILFH☼ └ LV└ YHU\└ LPSRUWDQW└WR└ WDWHV└ DFURVV└WKLV└
FRXQWU\☼ └ ZKHWKHU└ LW└WKH└ UHYROYLQJ└ IXQGV☼ └ RU└WKH└ :,),$└ SRUWLRQV└ RI└ RXU└
WDWXWHV☼ └ EXW└ JUDQW└ PDNLQJ☼ └ LQ└ JHGHUDO☼ └ LV└ YHU\└ LPSRUWDQW☼ └ DQG└ ,└ ZLOO└
FRPPLW└WR└ \RX☼ └ LQ└WKDW└ UHJDUG☼ └WKDW└ ┼ ┼ └WKDW└ ┼ ┼ └ ZRXOG└ ┼ ┼ └ ,└ ZRXOG└ GR└ VR☼ └
UHVSHFW└WR└WKH└ &KHVDSHDNH└ %D\◀

&$5',1 └
,└ ZDQW└WR└ FRQWLQXH└ RQ└ FHDQ└ ZDWHU└ IRU└ RQH└ PRPHQW◀ └ :HYH└ KDG└ VLJQLILFDQW└
SURECHPV└ ZLWK└ VDIH└ GULQNLQJ└ ZDWHU☼ └ DQG└ FHDQ└ ZDWHU◀ └ 7KH└ ┼ ┼ └ CHW└ PH└ DVN└
\RX└ SUHOLPLQDU\└ TXHWWLRQ◀ └ 'R└ \RX└ EHOLHYH└WKHUH└ LV└ DQ\└ VDIH└ CHYHO└ RI└ CHDG└
ΛKDW└ FDQ└ EH└WDNHQ└ LQWR└WKH└ KXPDQ└ ERG\☼ └ SDWLFXODUO\└ D└ \RXQJ└ SHUVRQ"

358,77 └
6HQDWRU☼ └WKDWW└ VRPHWKLQJ└ ,YH└ GRW└ UHYLHZHG☼ └ GRU└ ┼ ┼ └ GRU└ NQRZ└ DERXW◀ └ ,└ ┼ ┼ └ ,└
ZRXOG└ ┼ ┼ └ ,└ ZRXOG└ EH└ YHU\└ FRQFHUQHG└ DERXW└ DQ\└ CHYHO└ RI└ CHDG└ JRLQJ└ LQWR└
ΛKH└ GULQNLQJ└ ZDWHU☼ └ RU└ LQ└ ┼ ┼ └ REYLRXVO\☼ └ KXPDQ└ FRQVXPSWLRQ◀ └ %XW└ ,YH└ GRW└
ORRNHG└ DW└WKH└ VFLHQWLILF└ UHVHDUFK└ RQ└WKDW◀

&$5',1 └
7KH└ &HDQ└ :DWHU└ $FW└ SURYLGHV└ IRU└ D└ IHGHUDO└ JXLGDQFH└ DV└WR└ DFFHSWDECH└
FHDQ└ ZDWHU◀ └ ,W└ HQIRUFHG└ E\└WKH└ WDWHV◀ └ 6R└ P\└ TXHWWLRQ└WR└ \RX☼ └ LQ└
UHJDUGV└WR└ FHDQ└ ZDWHU☼ └ LV└ ZKDW└ WWHSV└ ZLOO└ \RX└ WDNH└WR└ PDNH└ VXUH└WKDW└ RXU└
FKLOGUHQ└ DUH└ VDIH"

:H└ VDZ☼ └ LQ└)OLQW☼ └ 0LFKLJDQ☼ └ D└ WUDJHG└ RFFXU◀ └ :KHUH└ GR└ \RX└ WKLQN└ WKH└ IHGHUDO└ JRYHUQPHQW└ QHHGV└ WR└ WXUQ└WKHQ└ LW└ UHJXODWRU└ URCHV☼ └ WR└ PDNH└ VXUH└ WKDW└ RXU└ FKLOGUHQ└ DUH└ VDIH└ IURP└ ┼ ┼ └ IURP└ CHDG"

358,77 └

:HOO└ ,└ WKLQN☼ └ ZLWK└)OLQW☼ └ 0LFKLJDQ☼ └ LW└ DQ└ H[DPSCH└ RI└ ┼ ┼ └ RU└ GRW└ ┼ ┼ └ D└ GHDD\ UHVSRQVH└ E\└ WKH└ (3$◀ └ 7KHUH└ VKRXOG└ KDYH└ EHHQ└ PRUH└ GRCH└ RQ└ FRUURVLRQ└ FRQWURO└ SURJUDPV☼ └ ZLWK└ WKH└)OLQW☼ └ 0LFKLJDQ└ V\\WWHP◀ └ $V└ \RX└ NQRZ☼ └ XQGHU└ /KH└ &CHDQ└ :DWHU└ $FW☼ └ DQG└ WKH└ 6DIH└ 'ULQNLQJ└ :DWHU└ $FW☼ └ LI└ WKHUH└ DQ└ HPHUJHQF\└ VLWXDWLRQ☼ └ WKH└ (3$└ FDQ└ HQWHU└ DQ└ ┼ ┼ └ DQ└ HPHUJHQF\└ RUGHU└ WR└ DGGUHW└ WKRVH└ NLQGV└ RI└ FRQFHUQV◀

,└ WKLQN└ WKHUH└ VKRXOG└ KDYH└ EHHQ└ D└ PRUH└ IDWW└ UHVSRQVH☼ └ D└ PRUH└ ┼ ┼ └ D└ PRUH└ UDSLG└ UHVSRQVH└ WR└)OLQW☼ └ 0LFKLJDQ◀ └ ,└ WKLQN☼ └ ZLWK└ UHVSHFW└ WR└ ZDWHU└ TXDOLW\☼ └ LW└ LV└ ┼ ┼ └ LW└ LV└ LQIUDWWUXFWXUH◀ └ :DWHU└ LQIUDWWUXFWXUH└ LV└ LPSRUWDQW◀ └ $QG└ ┼ ┼ └ DQG└ DV└ \RX└ LQGLFDWHG☼ └ WKH└ WWDWHV└ SCD\└ D└ YHU\└ YLWDO└ URCH└ LQ└ WKDW└ SURFHVV◀ └ $QG└ WKHUH└ QHHGV└ WR└ EH└ PRUH└ FRRSHUDWLRQ└ EHWZHHQ└ WKH└ (3$└ DQG└ WKH└ WWDWHV└ WR└ HQVXUH└ ZDWHU└ TXDOLW\└ LV└ SURWHFWHG◀

&$5',1 └

-XW└ VR└ ,└ XQGHUWDQG└ LW☼ └ \RX└ KDYH└ ILCHG☼ └ DQG└ SDUWLFLSDWHG└ LQ└ VHYHUDO└ CDZXLW└ DJDLQW└ WKH└ (3$V└ LQYROYHPHQW☼ └ VD\LQJ└ WKDW└ WKH└ CRFDOV└ VKRXOG└ KDYH└ WKH└ UHVSRQVLELOLW\◀ └ ,I└ \RX└ DUH└ FRQILUPHG☼ └ ZLOO└ \RX└ VXSSRUW└ IHGHUDO└ HQIRUFHPHQW☼ └ SDUWLFXCDUO\└ LQ└ PXOW┼ WWDWH└ LWXHV☼ └ ZKHUH└ WKH└ RQO\└ ZD\└ ZH└ FDQ└ JHW└ HQIRUFHPHQW└ LV└ DW└ WKH└ IHGHUDO└ CHYHO"

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,└ EHOLHYH└ WKDW└ LV└ D└ YLWDO└ URCH└ RI└ WKH└ (3$☼ └ DV└ ,YH└ LQGLFDWHG└ LQ└ \RXU└ RI ILFH☼ └ ZLWK└ DLU└ TXDOLW\☼ └ ZDWHU└ TXDOLW\☼ └ LWXHV└ DFURW└ WWDWH└ OLCH◀ └ 7KHUH└ LV└ DQ└ HQIRUFHPHQW└ PHFKDQLVP└ WKDW└ LV└ LPSRUWDQW◀ └ $QG└ ┼ ┼ └ DQG└ ZRXOG└ VHHN└ WR└ GR└ VR└ LI└ FRQILUPHG└ DV└ (3$└ DGPLQLWUDWRU◀

&$5',1 └

7KDQN└ \RX◀

%$55$662 └

7KDQN└ \RX☼ └ 6HQDWRU└ &UGLQ◀

6HQDWRU└)LVFKHU◀

),&+(5 └
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ└ DQG└ WKDQN└ \RX└ 0U◀ └ 3UXLWW└ IRU└ EHLQJ└ KHUH└
/RGD\└ EXW└ DOVR└ IRU└ DFFHSWLQJ└ WKH└ GRPLQDWLRQ◀ └ ,W└ ┼ ┼ └ LW└ LV└ D└ VHUYLFH└ DQG└ D└
VDFULILFH└ QRW└ MXVW└ IRU└ \RX└ EXW└ IRU└ \RXU└ IDPLO\└ DV└ ZHOO└ WR└ WHS└ IRUZDUG└ WR
VHUYH└ WKLV└ FRXQWU\◀ └ 6R└ WKDQN└ \RX└ VLU└ IRU◀ ◀ ◀

358,77 └
7KDQN└ \RX└ 6HQDWRU◀

),&+(5 └
◀ ◀ ◀ └ EHLQJ└ ZLOOLQJ└ WR└ GR└ WKDW◀ └)RU└ \RXU└ WHWWLPRQ\└ , └ GR└ WKDQN└ \RX◀ └ $QG└ ,G└
OLNH└ WR└ ILUWW└ RI└ DOO└ OHW└ \RX└ NQRZ└ WKDW└ 1HEUDVNDQV└ WKH\YH└ EHHQ└ UHDOO\└
DIIHFWHG└ E\└ WKH└ (3$└ LQ└ PDQ\└ LQWDQFHV└ DQG└ ,└ ZLOO└ JLYH└ \RX└ VRPH└
H[DPSOHV└ RI└ WKDW◀

1HEUDVNDV└ SXEOLF└ SRZHU└ XWLOLWLHV└ DUH└ JUDSSOLQJ└ ZLWK└ KRZ└ WKH\└ FRXOG└ HYHU└
FRPSO\└ ZLWK└ WKH└ (3$V└ FDUERQ└ HPLVVLRQ└ UHGXFWLRQ└ PDQGDWHV◀ └ 7KH└ &LWW└ RI└
2PDKD└ LV└ WWUXJJOLQJ└ ZLWK└ WKH└ DJHQF\V└ H[SHQVLYH└ &62└ PDQGDWH└ └ DQG└
GULQNLQJ└ ZDWHU└ DIIRUGDEOLWW◀

1HEUDVND└ IDUPHUV└ DUH└ ZDLWLQJ└ RQ└ QHZ└ FURS└ WHFKQRORJ\└ SURGXFWV└ WKDW└ DUH└
WWXFN└ LQ└ D└ EURNHQ└ UHJXODWRU\└ SURFHVV◀ └ 2XU└ ELRIXHO└ LQYHVWRUV└ DQG└
SURGXFHUV└ DUH└ GHVSHUDWH└ IRU└ FHUWDLQW└ XQGHU└ WKH└ 5)6◀ └ +RPHEXLGHUV└ └
/UDQVSRUWDWLRQ└ WXNHKROGHUV└ DQG└ ORFDO└ FRXQW└ RIILFLDOV└ DUH└ FRQFHUQHG└
DERXW└ WKH└ MXULVGLFWLRQDO└ H[SDQVLRQ└ WR└ FRQWUROO└ RXU└ WXDWHV└ ZDWHU└ UHVRXUFHV◀

&RPPXQLWLHV└ DQG└ VPDOO└ EXVLQHVV└ RZQHUV└ IHDU└ WKDW└ WKH└ (3$V└ R]RQH└
PDQGDWH└ ZLOO└ WXXQW└ SRWHQWLDO└ HFRQRPLF└ GHYHORSPHQW└ DQG└ JURZWK└ LQ└ RXU└
WWDWH◀ └ $V└ D└ UHVXOW└ RI└ WKH└ DFWLYLWW└ URCH└ WKH└ (3$└ KDV└ SCD\HG└ IRU└ WKH└ SDWW└
HLJKW└ \HDUV└ └ IDPLOLHV└ DUH└ FRQFHUQHG└ DERXW└ WKH└ IXWXUH└ RI└ WKHLU└ OLYHOLKRRG◀

:H└ DOO└ ZDQW└ FOHDQ└ DLU◀ └ <RX└ NQRZ└ └ ZH└ DOO└ ZDQW└ FOHDQ└ ZDWHU◀ └ 7KDW└ LV└ RQH└
SRLQW└ WKDW└ ,└ NQRZ└ HDFK└ DQG└ HYHU\└ SHUVRQ└ KHUH└ DJUHHV└ RQ◀ └ %XW└ ZLWK└ WKH└
(3$V└ WUHPHQGRXV└ LPSDFW└ RQ└ $PHULFDQV└ OLYHV└ └ HDFK└ DQG└ HYHU\└ GD\└ LW└ LV└
LPSRUWDQW└ WKDW└ WKH└ DJHQF\└ EH└ RSHQ└ └ WUDQVSDUHQW└ └ DQG└ DQVZHUDECH└ IRU└ LW└
DFWLRQV◀

*LYHQ└ WKHVH└ FRQFHUQV└ DORQJ└ ZLWK└ WKH└ PDQ\└ RWKHUV└ WKDW└ KDYH└ EHHQ└ DQG└ ZLOO└ FRQWLQXH└ WR└ EH└ GLVFXVVHG└ WRGD\└ ZKDW└ WWHSV└ ZLOO└ \RX└ WDNH└ DV└ WKH└ (3$└ DGPLQLWWUDWRU└ WR└ SURYLGH└ UHOLHI└ IRU└ $PHULFDQ└ IDPLOLHV└ WKDW└ DUH└ IDFHG└ WUXO\└ ZLWK└ DQ└ RQVODXJKWW└ RI└ (3$└ UXCHV"

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6HQDWRU└ \RX└ PHQWLRQHG└ RSHQ└ WUDQVSDUHQW└ UXCHPDNLQJ◀ └ 7KHUH└ DUH└ FRQFHUQV└ WKDW└ KDYH└ EHHQ└ H[SUHVVHG└ UHFHQWO\└ ZLWK└ ┼ ┼ └ ZLWK└ UHVSHFW└ WR└ UHJXODWLRQ└ WKURXJK└ OLWLJDWLRQ└ ZKHUH└ JURXSV└ LQLWLDWH└ OLWLJDWLRQ└ DJDLQWW└ WKH└ ┼ ┼ └ ΛKH└ (3$└ DQG└ WKH└ 8QLWHG└ 6ΛDWHV└ JRYHUQPHQW└ DQG└ VHW└ HQYLURQPHQWDO└ SROLF\└ WKURXJK└ VRPHWKLQJ└ FDOOHG└ D└ | VXH└ DQG└ VHWWOH| └ SURFHVV◀

,└ WKLQN└ WKLV└ ERG\└ DV└ ZHOO└ DV└ WKH└ 8◀ 6◀ └ +RXVH└ KDYH└ CRRNHG└ DW└ WKRVH└ NLQGV└ RI└ LVXHV◀ └ $QG└ ZKHQ└ ZH└ WDON└ DERXW└ RSHQ└ WUDQVSDUHQF\└ WKHUH└ D└ UHDVRQ└ ZK\└ WKH└ $GPLQLWWUDWLYH└ 3URFHGXUH└ $FW└ H[LWW◀ └ ,W└ LV└ LQWHQGHG└ WR└ SURYLGH└ QRWLFH└ WR└ WKRVH└ WKDW└ DUH└ JRLQJ└ WR└ EH└ LPSDFWHG└ ZLWK└ UXCHV└ WR└ JLYH└ WKHP└ DQ└ RSSRUWXQLW└ WR└ RI IHU└ FRPPHQW└ DQG└ ┼ ┼ └ DQG└ WR└ LQIRUP└ WKH└ UHJXODWRUV└ RQ└ WKH└ LPSDFW└ RI└ WKRVH└ UXCHV◀

$QG└ WKHQ└ LW└ WKH└ REOLJDWLRQ└ RI└ WKH└ UHJXODWRU└ WR└ WDNH└ WKRVH└ WKLQJV└ LQWR└ FRQVLGHUDWLRQ└ LQ└ ILQDOL]LQJ└ UXCHV◀ └ 2ΛKHUZLVH└ WKH└ DFW└ LQ└ DQ└ DUEWUDU└ DQG└ FDSULFLRXV└ ZD└ $QG└ VR└ LW└ YHU└ LPSRUWDQW└ WKDW└ WKDW└ SURFHVV└ EH└ DGKHUHG└ ΛR└ WR└ JLYH└ YRLFH└ WR└ DOO└ $PHULFDQV└ LQ└ EDDDQFLQJ└ WKH└ HQYLURQPHQWDO└ REMHFWLYHV└ ZH└ KDYH└ EXW└ DOVR└ WKH└ HFFRQRPLF└ KDUP└ WKDW└ UHVXOWW◀

$QG└ WKH└ 6XSUHPH└ &RXUW└ KDV└ VSRNHQ└ DERXW└ WKDW└ UDWKHU└ FRQVLWHQWO\└ RI└ CDWH◀ └ $QG└ ,└ ZRXOG└ VHHN└ WR└ CHDG└ WKH└ (3$└ LQ└ VXFK└ D└ ZD\└ WR└ HQVXUH└ WKDW└ RSHQQHVV└ DQG└ WUDQVSDUHQF\◀

),6&+(5 └

<RX└ NQRZ└ WKH└ ┼ ┼ └ D└ FRXSCH└ RI└ ZHHNV└ DJR└ ZH└ KDG└ D└ ┼ ┼ └ ,└ WKLQN└ ZH└ KHDG└ D└ YHU\└ JRRG└ FRQYHUVDWLRQ└ DERXW└ RXU└ VKDUHG└ YLVLRQ└ IRU└ WKH└ (3$└ WR└ EULQJ└ FRPPRQ└ VHQVH└ DQG└ DFFRXQWDELOLW\└ EDFN└ WR└ WKDW└ DJHQF\◀ └ $QG└ ,└ ┼ ┼ └ ,└ WKLQN└ ΛKDW└ JRLQJ└ WR└ JR└ D└ CRQJ└ ZD\└ LQ└ UHWXUULQJ└ FRQILGHQFH└ LQ└ WKH└ DJHQF\└ E\└ ΛKH└ $PHULFDQ└ SHRSCH◀

2CH└ LVXH└ ZH└ GLG└ GLVFXW└ ZDV└ WKH└ 5HQHZDECH└)XHO└ 6ΛDQGDUG└ DQG└ LW└ LPSRUWDQFH└ WR└ P\└ KRPH└ WWDWH└ RI└ 1HEUDVND◀ └ :H└ DUH└ WKH└ CDUJHXW└ HWKDQRO└ SURGXFHU└ ZHXW└ RI└ WKH└ 0LWRXUL└ 5LYHU◀ └ 2XU└ CHLJKERUV└ WR└ WKH└ HDXW└ 6HQDWRU└ (UQXW└ KRPH└ WWDWH└ WKH└ GR└ CHDG└ WKH└ CDWLRQ└ LQ└ HWKDQRO└ SURGXFWLRQ◀

6R└ KRQRUDEOH└ WKH└ FRQJUHVVLRQDOO└ PDQGDWHG└ WLPHOLQHV└ DQG└ WKH└ YRXPH└ UHTXLUHPHQW└ WKDW└ DUH└ FULWLFDO└ IURP└ DQ└ LQYHVWPHQW└ SRLQW└ RI└ YLHZ└ DQG└ ┼┼└ DQG└ DOVR└ IURP└ D└ SDQQLQJ└ SHUVSHFWLYH└ ,└ WKLQN└ WKDW└ WKLV└ LV└ HVSHFLDOO└ UHOHYDQW└ DQG└ HVSHFLDOO└ GXULQJ└ WKH└ ┼┼└ WKH└ FXUUHQW└ IDUP└ FULVLV└ WKDW└ ZH└ DUH└ VHHLQJ└ DQG└ WKH└ QHJDWLYH└ LPSDFW└ RQ└ ┼┼└ RQ└ SHRSOH└ DQG└ DJULFXOWXUH└ DOO└ DFURVV└ WKLV└ QDWLRQ◀

,Q└ RXU└ PHHWLQJ└ \RX└ GLG└ H[SUHVV└ \RXU└ FRPPLWPHQW└ WR└ PH└ WR└ KRQRU└ WKH└ DDZ◀ └ $QG└ \RX└ HFKRHG└ 3UHVLGHQW┤ HDHFW└ 7UXPSV└ VXSSRUW└ IRU└ WKH└ WWDWXWH└ LWWHOI└ DQG└ D└ WWURQJ└ 592◀ └ $QG└ IRU└ WKH└ UHFRUG└ FDQ└ \RX└ SOHDVH└ RQFH└ DJDLQ└ H[SUHVV└ \RXU└ FRPPLWPHQW└ WR└ XSKROG└ WKH└ FRQJUHVVLRQDO└ LQWHQW└ RI└ /KH└ 5)6"

358,77 └
<HV└ 6HQDWRU◀ └ $QG└ \RX└ VDLG└ LW└ ZHOO└ WR└ KRQRU└ WKH└ LQWHQW└ DQG└ WKH└ H[SUHVVLRQ└ RI└ WKH└ 5HQHZDO└)XHO└ 6WDQGDUG└ WWDWXWH└ LV└ YHU\└ YHU\└ LPSRUWDQW◀ └ ,W└ QRW└ WKH└ MRE└ RI└ WKH└ DGPLQLWWUDWRU└ RI└ WKH└ (3$└ WR└ GR└ DQ\WKLQJ└ RWKHU└ WKDQ└ DGPLQLWWHU└ WKH└ SURJUDP└ DFFRUGLQJ└ WR└ WKH└ LQWHQW└ RI└ &RQJUHVV└ DQG└ ,└ FRPPLW└ WR└ \RX└ WR└ GR└ VR◀

),&+(5 └
$QG└ \RX◀ ◀ ◀

358,77 └
$QG└ WKH└ ZDLYHU└ ┼┼└ DQG└ ,└ ZRXOG└ VD\└ WKLV◀ └ 7KH└ ZDLYHUV└ WKDW└ URXWLQHO└ DUH└ RI IHUHG└ E\└ WKH└ DGPLQLWWUDWRU└ ┼┼└ UHFHQWO└ DQRWKHU└ ZDLYHU└ ZDV└ RI IHUHG◀ └ ,W└ VKRXOG└ EH└ XVHG└ MXGLFLRXVO└ ◀ └ 7KHUH└ D└ UHDVRQ└ ZK└ FRQJUHVV└ SXW└ LQ└ WKDW└ WWDWXWH└ WKRVH└ WWDWXWRU└ REMHFWLYHV◀

7KH└ PDUNHW└ KDV└ FKDQJHG└ VLQFH└ ⊥ !! !! ↑ ☼ └ DQG└ WKH└ ZDLYHU└ DXWKRULW└ WKDW└ EHHQ└ SURYLGHG└ E└ WKLV└ ERG└ LV└ LPSRUWDQW◀ └ %XW└ LW└ ┼┼└ WKDW└ ZDLYHU└ DXWKRULW└ VKRXOG└ EH└ XVHG└ MXGLFLRXVO└ ◀ └ $QG└ WKH└ DFW└ VKRXOG└ EH└ FRPSOLHG└ ZLW└ DQG└ HQIRUFHG└ FRQVLWWHQW└ ZLW└ WKH└ ZLOO└ RI└ &RQJUHVV◀

),&+(5 └
7KDQN└ \RX☼ └ VLU◀ └ $QG└ ,└ ZRXOG└ DVN└ WKDW└ \RX└ DOVR└ WHOO└ XV└ SXEOLFO└ ZKDW└ \RX└ /ROG└ XV☼ └ WKDW└ \RX└ ZLOO└ KRQRU└ WKH└ WLPHOLQHV☼ └ RQ└ WKH└ YRXPH└ CHYHDV└ WKDW└ DUH└ PDQGDWHG└ E└ &RQJUHVV☼ └ DV└ ZHOO◀

358,77 └
<HV◀ └ <HV◀ └ <HV☼ └ 6HQDWRU◀

),6&+(5 └
7KDQN└ \RX└ YHU\└ PXFK◀

%$55$662 └
7KDQN└ \RX☼ └ 6HQDWRU└)LVFKHU◀

6HQDWRU└ 0HUNOH\◀

0(5./(< └
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ 2YHU└ D└ QXPEHU└ RI└ \HDUV☼ └ LQIRUPDWLRQ└ WDUWHG└
SRXULQJ└ LQWR└ (3$└ WKDW└ WKH└ HXWLPDWH└ RI└ WKH└ DPRXQW└ RI└ IXJLWLYH└ PHWKDQH└
HVFDSLQJ└ LQ└ JDV└ DQG└ RLO└ GULOOLQJ☼ └ KDYH└ EHHQ└ GHHSO\└ XQGHUHXWLPDWHG◀ └ ,Q└
⊥ ‼ ¶ ¶ ☼ └ WKH└ (3$└ SXW└ RXW└ LW└ EHXW└ HXWLPDWHV☼ └ EDVHG└ RQ└ WKH└ LQIRUPDWLRQ└ WKDW└
ZDV└ EHLQJ└ SUHVHQWHG◀

$QG└ WKLV└ LV└ UHOHYDQW└ EHFDXVH└ PHWKDQH└ LV└ D└ ┼ ┼ └ D└ JOREDO└ ZDUPLQJ└ JDV☼ └
PRUH└ SRWHQW└ WKDQ└ &2⊥ ◀ └ *DV└ FRPSDQLHV└ GLGQW└ OLNH└ WKLV☼ └ EHFDXVH└ ZHOO☼ └ LW└
SUHVHQWHG└ D└ YLVLRQ└ QDWXUDO└ JDV└ EHLQJ└ PRUH└ GDPDJLQJ☼ └ HQYLURQPHQWDOO\☼ └
/KDQ└ IRONV└ KDG└ SUHYLRXVO\└ XQGHUWRRG◀

'HYRQ└ (QHUJ\└ LV└ RQH└ RI└ WKH└ JURXSV└ WKDW└ VRXJKW└ WR└ FDUW└ GRXEW└ RQ└ WKLV└
VFLHQWLILF└ LQIRUPDWLRQ☼ └ DQG└ WKH\└ FDPH└ WR└ \RX└ WR└ EH└ WKHLU└ VSRNHVSHUVRQ◀ └
$QG└ WKH\└ DVNHG☼ └ ZOOO└ \RX└ EH└ RXU└ PRWWKSLHFH└ LQ└ FDWLQJ└ GRXEW☼ └ DQG└ VHQG└
D└ CHWWHU└ ZH└ KDYH└ GUDIWHG└ WR└ WKH└ (3$"└ $QG└ \RX└ VHQW└ WKDW└ CHWWHU◀

$QG└ ,└ MXWW└ ZDQW└ WR└ DVN☼ └ ILUWW☼ └ DUH└ \RX└ DZDUH└ WKDW└ PHWKDQH└ LV└
DSSUR[LPDWHO\└ ┼ ‼ └ WLPHV└ PRUH└ SRWHQW└ WKDQ└ FDUERQ└ GLR[LGH└ DV└ D└ JOREDO└
ZDUPLQJ└ JDV"

358,77 └
,└ DP☼ └ 6HQDWRU◀ └ ,W◀ ◀ ◀

0(5./(< └
7KDQN└ \RX◀

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +ROGV└ +HDUL3DJH╢ ┴ RI╨└

358,77 └
7KH└ LPSDFW└ RQ└ KXPDQ└ KHDOWK◀ ◀ ◀

0(5./(< └
7KDW└ WKH└ ┼ ┼ └ WKDW└ WKH└ DQVZHU◀ └ <HV◀ └ 7KDQN└ \RX◀ └ ,W└ D└ \HV↕ QR└ TXHVWLRQ◀ └
$QG└ RQ└ D└ ¶ └ WR└ ¶ ‼ └ VFDCH☼ └ KRZ└ FRQFHUQHG└ DUH└ \RX└ DERXW└ WKH└ LPSDFW└ RI└
IXJLWLYH└ PHWKDQH└ LQ└ GULYLQJ└ JOREDO└ ZDUPLQJ"

358,77 └
0HWKDQH☼ └ DV└ \RX└ LQGLFDWHG☼ └ KDV└ D◀ ◀ ◀

0(5./(< └
2QH└ WR└ WHQ└ VFDCH☼ └ KLJKO\☼ └ WHQ☼ └ YHU\└ FRQFHUQHG☼ └ RU└ RQH☼ └ QRW└ VR└ FRQFHUQHG"

358,77 └
7KH└ TXDQWLWLHV└ RI└ PHWKDQH└ LQ└ WKH└ DWPRVSKHUH☼ └ FRPSDUHG└ WR└ &2┴ └ LV└ CHVV☼ └
EXW└ LWV└ IDU└ PRUH└ SRWHQW☼ └ DQG└ LW└ LV└ VLPSCH◀ ◀ ◀

0(5./(< └
$UH└ \RX└ FRQFHUQHG"└ ,P└ DVNLQJ└ DERXW└ \RXU└ CHYHO└ RI└ FRQFHUQ◀

358,77 └
<HV☼ └ \HV◀

0(5./(< └
+LJKO\└ FRQFHUQHG"

358,77 └
,P└ FRQFHUQHG◀

0(5./(< └
7KDQN└ \RX◀ └ 'R└ \RX└ DFNQRZCHGJH└ VHQGLQJ└ WKLV└ CHWWHU└ WR└ WKH└ (3$└ LQ└
2FWREHU└ ┴ ‼ ¶ ¶ "

358,77 └
6HQDWRU☼ └ WKDW└ LV└ D└ CHWWHU└ WKDW└ RQ└ P\└ CHWWHUKHDG☼ └ WKDW└ ZDV└ VHQW└ WR└ WKH└
(3$☼ └ \HV☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ LVXHI◀ ◀ ◀

0(5./(< └
'R└ \RX└ DFNQRZCHGJH└ WKDW└ → └ SHUFHQW└ RI└ WKH└ ZRUGV└ LQ└ WKDW└ CHWWHU└ FDPH└
GLUHFWO\└ IURP└ 'HYRQ└ (QHUJ\"

358,77 └
<RX└ NQRZ☼ └ ,YH└ QRW└ CRRNHG└ DW└ WKH└ ┼ ┼ └ WKH└ SHUFHQWDJH└ RI└ VLPLCDU◀ ◀ ◀

0(5./(< └
7KH└ WWDWHPHQW└ WKDWW└ EHHQ└ DQDO\]HG└ FDQ\└ WLPHV└ LV└ WKDW└ DOO└ RI└ WKH└ ¶ ☼ !! ¶ ├ └
ZRUGV☼ └ H[FHSW└ IRU└ ┬ → └ ZRUGV☼ └ ZHUH└ ZULWWHQ└ GLUHFWO\└ E\└ 'HYRQ└ (QHUJ\◀

358,77 └
6HQDWRU☼ └ WKDW└ ZDV└ D└ WWHS└ WKDW└ ZDV└ WDNLQJ└ DV└ DWWRUCH\└ JHQHUDO☼ └
UHSUHHQWLQJ└ WKH└ LQWHUHWW└ RI└ RXU└ WWDWH◀ └ 2YHU└ ┴ ↑ └ SHUFHQW└ RI└ RXU◀ ◀ ◀

0(5./(< └
<HV◀ └ 6R└ ,└ GLGQW└ DVN└ WKDW└ TXHWWLRQ◀ └ ,└ ZDV└ MXWW└ DVNLQJ└ LI└ \RX└ FRSLHG└ WKH└
CHWWHU☼ └ YLUWXDOO\└ ZRUG└ IRU└ ZRUG◀ └ <RXYH└ DFNQRZCHGJHG└ WKDW└ \HV☼ └ LWW└ LQ└ WKH└ ┼ ┼ └
LWW└ LQ└ WKH└ UHFRUG◀ └ 3HRSCH└ FDQ└ FRXQW└ LWW◀ └ ,WW└ FRUUHFW◀ └ $OO└ ULJKW◀

6R└ D└ SXEOLF└ RIILFH└ LV└ DERXW└ VHUYLQJ└ WKH└ SXEOLF◀ └ 7KHUH└ LV└ D└ SXEOLF└ FRQFHUQ└
RYHU└ WKH└ LPSDFW└ RI└ PHWKDCH└ RQ└ JOREDO└ ZDUPLQJ◀ └ 7KHUH└ LV└ VFLHQWLILF└
UHVHDUFK└ VKRZLQJ└ WKDW└ LWW└ IDU└ FRUH└ GHYDXWDWLQJ└ WKDQ└ DQWLFLSDWHG☼ └ DQG└ IDU└
FRUH└ LV└ CHDNLQJ└ WKDQ└ ┼ ┼ └ EXW└ \RX└ XVHG└ \RXU└ RIILFH└ DV└ D└ GLUHFW└ H[WHQVLRQ└ RI└
DQ└ RLO└ FRPSDQ\☼ └ UDWKHU└ WKDQ└ D└ GLUHFW└ H[WHQVLRQ└ RI└ WKH└ LQWHUHWW└ RI└ WKH└
SXEOLF└ KHDOWK└ RI└ WKH└ SHRSCH└ RI└ 2NODKRPD◀

'R└ \RX└ DFNQRZCHGJH└ WKDW└ \RX└ SUHVHQWHG└ D└ SULYDWH└ RLO└ FRPSDQ\V└ SRVLWLRQ└
UDWKHU└ WKDQ└ D└ SRVLWLRQ└ GHYHORSHG└ E\└ WKH└ SHRSCH└ RI└ 2NODKRPD"

358,77 └
6HQDWRU☼ └ ,└ ┼ ┼ └ ZLWK└ UHVSHFW☼ └ ,└ GLVDJUHH◀ └ 7KH└ HIIRUW└ WKDW└ ,└ WRRN└ DV└ DWWRUCH\└
JHQHUDO└ ZHUH└ UHSUHHQWLQJ└ WKH└ LQWHUHWW└ RI└ WKH└ 6WDWH└ RI└ 2NODKRPD◀

0(5./(< └
(DUOLHU└ \RX└ VDLG└ \RX└ ┼ ┼ └ \RX└ ┼ ┼ └ \RX◀ ◀ ◀

358,77 └
$QG└ WKHUH└ ZDV└ D└ FRQFHUQ└ DERXW└ WKH◀ ◀ ◀

0(5./(< └
1R◀ └ 1R☼ └ H[FXVH└ PH◀ └ ,P└ ┼ ┼ └ ,P└ DVNLQJ└ WKH└ TXHVWLRQV◀ └ <RX└ VDLG└ HDUOLHU☼ └ \RX└
OLWWHQ└ WR└ HYHU\RQH◀ └ ,Q└ GUDIWLQJ└ WKLV└ CHWWHU☼ └ \RX└ WRRN└ DQ└ RLO└ FRPSDQ\V└
SRVLWLRQ☼ └ DQG└ WKHQ☼ └ ZLWKRXW└ FRQVXOWLQJ└ SHRSCH└ ZKR└ KDG└ GLYHUVH└ YLHZV└
DERXW└ WKH└ LPSDFW☼ └ \RX└ VHQW└ LW└ RII◀ └ +RZ└ FDQ└ \RX└ SUHVHQW└ WKDW└ DV└
UHSUHVHQWLQJ└ WKH└ SHRSCH└ RI└ 2NODKRPD└ ZKHQ└ \RX└ VLPSO\└ RQO\└ FRQVXOWHG└
DQ└ RLO└ FRPSDQ\☼ └ WR└ SXVK└ LW└ RZQ└ SRLQW└ RI└ YLHZ└ IRU└ LW└ SULYDWH└ SURILW'

358,77 └
6HQDWRU☼ └ WKHUHV└ DQ└ REOLJDWLRQ└ WKH└ (3$└ KDV☼ └ WR└ IRORZ└ SURFHVVHV└ DV└
HWDEOLVKHG└ E\└ WKLV└ ERG\◀ └ 7KH└ FRWW┼ EHQHILW└ DQDO\VLV☼ └ XQGHU└ 6HFWLRQ└ ¶ ¶ ┴ ☼ └
LV└ VRPHWKLQJ└ WKDW└ WKH\└ KDYH└ WR└ HQJDJH└ LQ◀ └ 7KHUH└ ZDV└ D└ FRQFHUQ└ DERXW└
WKH└ RYHU┼ HWLPDWHG└ SHUFHQWDJHV└ WKDW└ WKH└ (3$└ SXW└ LQ└ WKH└ UHFRUG◀

,W└ ZDV└ D└ UHFRUG┼ EDVHG└ FKDOOHQJH◀ └ 7KDW└ ZDV└ WKH└ H[SUHVVLRQ└ RI└ WKH└ CHWWHU└ WR└
WKH└ (3$☼ └ DQG└ LW└ ZDV└ UHSUHVHQWLQJ└ WKH└ LQWHUHVW└ RI└ DQ└ LQGXVWU\└ LQ└ WKH└ 6WDWH└
RI└ 2NODKRPD☼ └ QRW└ D└ FRPSDQ\◀

0(5./(< └
7KDQN└ \RX◀ └ 6R◀ ◀ ◀

358,77 └
$Q└ LQGXVWU\◀

0(5./(< └
6R└ P\└ TXHVWLRQ└ ZDV☼ └ ZKDW└ RWKHU└ JURXSV☼ └ HQYLURQPHQWDO└ JURXSV☼ └ RU└ RWKHU└
JURXSV☼ └ GLG└ \RX└ FRQVXOW☼ └ VR└ \RX└ KDG└ WKDW└ IXOO└ SHUVSHFWLYH└ EHIRUH└
UHSUHVHQWLQJ└ VLPSO\└ D└ IRU┼ SURILW└ RLO└ FRPSDQ\☼ └ XVLQJ└ \RXU└ RIILFLDO└ RIILFH└
DQG└ \RXU└ RIILFLDO└ CHWWHUKHDG"

358,77 └

7KHUH└ ┼ ┼ └ ,└ ┼ ┼ └ ,└ FRQVXOWHG└ ZLWK└ RWKHU└ HQYLURQPHQWDO└ RIILFLDOV└ LQ└ 2NODKRPD└ WKDW└ UHJXODWH└ WKDW└ LQGXVWU\☼ └ DQG└ CHDUGHG└ IURP└ WKHP☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ FRQFHUQV└ DERXW└ WKH└ HXWLPDWHV└ WKDW└ ZHUH└ SURYLGHG└ E\└ WKH└ (3$◀

0(5./(< └

&RXOG└ \RX└ SURYLGH└ WKLV└ FRPPLWWHH└ ZLWK└ LQIRUPDWLRQ└ VKRZLQJ└ ZKR└ \RX└ FRQVXOWHG☼ └ DQG└ UHSUHVHQWLQJ└ WKLV└ CHWWHU☼ └ VSHFLILFDOO\☼ └ IRU└ 'HYRQ└ (QHUJ\"└ ⅌HFDXVH└ WKH└ LQIRUPDWLRQ└ WKDW└ LQ└ WKH└ SXEOLF└ UHDOP└ RQO\└ VKRZV└ WKDW└ WKH\└ VLPSO\└ VHQW└ \RX└ D└ CHWWHU☼ └ DVNHG└ \RX└ WR└ VHQG└ LW☼ └ DQG└ \RX└ VHQW└ LW☼ └ ZLWKRXW└ TXHWWLRQV◀

358,77 └

<HDK☼ └ ZH└ KDYH└ VHYHQ└ RU└ VR└ LQGLYLGXDOV└ LQ└ RXU└ RIILFH└ WKDW└ DUH└ LQYROYHG└ LQ└ WKHVH└ NLQGV└ RI└ LVXHV☼ └ DQG└ ZH└ ZLOO└ FRQCHFW└ WKH└ LQIRUPDWLRQ└ WKH\└ KDYH└ DQG└ SURYLGH└ LW└ WR└ WKLV└ ERG\☼ └ SXUVXDQW└ WR└ WKH└ FKDLUPDQV└ GLUHFWLRQ◀

0(5./(< └

<RXU└ WWDII└ H[SDQGHG└ VXEWDQWLDOO\└ ZKLCH└ \RX└ ZHUH└ LQ└ FKDUJH☼ └ WR└ ⊥ ↑ ¶ └ WWDII└ PHPEHUV◀ └ :K\└ GR└ \RX└ CHHG└ DQ└ RXWLGH└ RLO└ FRPSDQ\└ WR└ GUDIW└ D└ CHWWHU└ ZKHQ└ \RX└ KDYH└ ⊥ ↑ ‼ └ SHRSCH└ ZRUNLQJ└ IRU└ \RX"

358,77 └

6HQDWRU☼ └ DV└ ,YH└ LQGLFDWHG☼ └ WKDW└ ZDV└ DQ└ HIIRUW└ WKDW└ ZDV└ SURWHFWLQJ└ WKH└ WWDWHV└ LQWHUHWW└ LQ└ PDNLQJ└ VXUH└ WKDW└ ZH└ PDGH└ WKH└ YRLFHV└ RI└ DOO└ 2NODKRPDQV└ KHDUG└ RQ└ D└ YHU\└ LPSRUWDQW└ LQGXWU\└ WR└ RXU└ WWDWH◀ ◀ ◀

0(5./(< └

<RX└ VDLG└ WKDW◀ ◀ ◀

358,77 └

◀ ◀ ◀ └ FRQFHUQLQJ└ UHFRUG◀ ◀ ◀

0(5./(< └

◀ ◀ ◀ └ DOO└ KHDUG☼ └ EXW└ \RX└ RQO\└ VHQW└ LW└ RQ└ EHKDOI└ RI└ D└ VLQJCH└ YRLFH☼ └ WKH└ RLO└ FRPSDQ\◀ └ 7KDQN└ \RX◀

?&$55$662 └

,└ WWLOO└ KDYH└ VRPH└ WLPH└ UHPDLQLQJ└ IURP└ P\└ TXHVWLRQLQJ◀ └ $UH└ WKHUH└ DQ\WKLQJ└ WKDW└ \RXG└ OLNH└ WR└ DGG└ └ WKDW└ \RX└ KDYHQW└ IHDW└ \RXYH└ KDG└ D└ FKDQFH└ └ LQ└ WHUPV└ RI└ DQVZHULQJ└ IXOO\└ └ VRPH└ RI└ WKH└ DUHDV└ RI└ WKH└ TXHVWLRQLQJ"

358,77 └

,└ WKLQN└ └ 6HQDWRU└ └ WKDW└ WKH└ FDUL ILFDWLRQ└ └ WKDW└ WKH└ ┼ ┼ └ WKH└ CHWWHU└ WKDW└ ZDV└ VHQW└ /R└ WKH└ (3$└ ZDV└ QRW└ VHQW└ RQ└ EHKDOI└ RI└ DQ\└ RQH└ FRPSDQ\◀ └ 7KLV└ ZDV└ QRW└ SDUWLFXODU└ WR└ 'HYRQ└ (QHUJ\└ └ QRW└ SDUWLFXODU└ WR└ &KHVDSHDNH└ └ QRW└ SDUWLFXODU└ /R└ RWKHU└ FRPSDQLHV└ LQ└ RXU└ WWDWH◀ └ ,W└ ZDV└ SDUWLFXODU└ WR└ DQ└ LQGXVWU\◀

7KH└ 6WDWH└ RI└ 2NODKRPD└ KDV└ DQ└ RLO└ DQG└ JDV└ LQGXVWU\└ WKDW└ LV└ YLEUDQW└ WR└ RXU└ WWDWH└ └ DV└ \RX└ PLJKW└ LPDJLQH└ └ MXVW└ OLNH└ PDQ\└ RI└ \RX└ KDYH└ LQGXVWU\└ LQ└ \RXU└ WWDWH◀ └ 7KHUH└ ZDV└ FRQFHUQ└ H[SUHVVHG└ E\└ WKDW└ LQGXVWU\└ └ PDQ\└ IRONV└ LQ└ WKDW└ LQGXVWU\└ └ DERXW└ WKH└ RYHU┼ HVWLPDWLQJ└ WKDW└ RFFXUUHG└ ZLWK└ WKDW└ PHWKDQH└ UXCH◀

7KDW└ ZDV└ WKH└ FRPPXQLFDWLRQ└ WR└ WKH└ (3$◀ └ ,W└ ZDV└ WKH└ SRVLWLRQ└ RI└ WKH└ WWDWH└ └ QRW└ WKH└ SRVLWLRQ└ RI└ DQ\└ RQH└ FRPSDQ\◀

?&$55$662 └

7KDQN└ \RX◀ └ 6HQDWRU└ 0RUDQ◀

025$1 └

&KDLUPDQ└ └ WKDQN└ \RX└ YHU\└ PXFK◀

*HQHUDO└ 3UXLWW└ └ ZHOFRPH└ WR└ WKH└ FRPPLWWHH◀ └ ,└ WKDQN└ \RX└ IRU└ \RXU└ SXEOLF└ VHUYLFH◀ └ ,P└ JRLQJ└ WR└ VHH└ LI└ ,└ FDQ└ JHW└ WKURXJK└ WKUHH└ DUHDV└ LQ└ WKH└ ILYH└ PLQXWHV└ WKDW└ ,└ KDYH◀

)LUWW└ RI└ DOO└ └ :2786└ └ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV└ └ GHVSLWH└ WKHUH└ EHLQJ└ DQ└ LQVXQFWLRQ└ DJDLQWW└ WKH└ HQIRUFHPHQW└ RI└ WKH└ :2786└ UXCH└ └ ,P└ WROG└ WKDW└ (3$└ 5HJLRQ└ → └ WKH└ UHJLRQ└ LQ└ ZKLFK└ .DQVDV└ LV└ SDUW└ └ WKRVH└ UHJLRQDO└ LQVSHFWRUV└ KDYH└ LQFUHDVHG└ WKHLU└ LQVSHFWLRQ└ RI└ VPDOOHU└ DQLPDO└ IHHGLQJ└ RSHUDWLRQV◀

8QDLNH└ PDQ\└ WWDWHV└ └ .DQVDV└ KDV└ D└ ZHOO┼ HVWDEOLVKHG└ WWDWH└ SHUPLW└ V\WWHP└ IRU└ VPDOO└ IDFLOLWLHV└ └ DV└ ZHOO└ DV└ WKH└ GHHJDWHG└ DXWKRULWW└ XQGHU└ WKH└ &HDQ└ :DWHU└ $FW◀ └ 5DWKHU└ WKDQ└ FRRUGLQDWH└ └ WKH└ (3$└ ┼ ┼ └ UDWKHU└ WKDQ└ FRRUGLQDWLQJ└

ZLWK└ WKH└ WDWH└ DJHQF\☼ └ WKH└ (3$└ KDV└ HQJDJHG└ LQ└ LWW└ RZQ└ LQVSHFWLRQV└ DQG└ LWW└ RZQ└ HQIRUFHPHQW└ RQ└ WKHVH└ VPDOO└ IDFLOLWLHV☼ └ RIWHQ└ FRQIOLFWLQJ└ ZLWK└ WDWH└ SHUPLWWLQJ└ LQ└ WKH└ HQIRUFHPHQW└ SURFHVV◀

,Q└ WKHVH└ DFWLRQV☼ └ WKH└ (3$└ KDV└ FODLPHG└ MXULVGLFWLRQ└ RYHU└ IHDWXUHV└ OLNH└ JUDW└ ZDWHUZ\V☼ └ FXOYHUWW└ XQGHU└ FRXQW└ URDGV☼ └ XQFRQGHFWHG└ WR└ WKH└ IHHGLQJ└ RSHUDWLRQ☼ └ DQG└ QRW└ VLWXDWHG└ LQ└ RU└ QHDU└ DQ└ ERG└ RI└ ZDWHU◀

*HQHUDO└ 3UXLWW☼ └ ZKDW└ ZRXOG└ \RXU└ GLUHFWLRQ└ EH└ WR└ WKH└ (3$└ WDII☼ └ WR└ 5HJLRQ└ → └ DQG└ RWKHUV☼ └ LQ└ UHJDUG└ WR└ WKHLU└ DFWLRQV└ HQIRUFLQJ└ :2786└ ZKLCH└ DQ└ LQMXQFWLRQ└ LV└ LQ└ SODFH"

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:HOO└ 6HQDWRU☼ └ DV└ \RX└ LQGLFDWHG└ + + └ DQG└ ,└ GR└ ZDQW└ WR└ DFNQRZCHGJH☼ └ WKH└ VDPH└ FRQFHUQV└ KDYH└ EHHQ└ H[SUHVVHG└ E\└ WKRVH└ LQGLYLGXDOV└ LQ└ 2NOOKRPD└ DQG└ GL IIHUHQW└ JURXSV☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ + + └ WKH└ :2786└ GHILQLWLRQ└ WKDW└ KDV└ EHHQ└ RI IHUHG└ E\└ WKH└ (3$☼ └ WKDW└ LV└ VXEMHFW└ WR└ D└ + ¶ + WDWH└ FKDOOHQJH☼ └ ΛKDW└ ZDV└ FRQVRLGDWHG└ WKHUH└ EHIRUH└ WKH└ 6L[WK└ &LUFXLW◀ └ $QG└ DV└ \RX└ LQGLFDWHG☼ └ WKHUH└ KDV└ EHHQ└ D└ WWD\└ RI└ HQIRUFHPHQW└ DJDLQWW└ WKDW└ SDUWLFXODU└ UXCH◀

7KH└ 6XSUHPH└ &RXUW└ DFWXDOO\☼ └ ODWW└)ULGD\☼ └ WRRN└ XS└ D└ PDWWHU└ RI└ MXULVGLFWLRQ└ RQ└ WKDW└ + + └ RQ└ WKDW└ FDVH☼ └ VR└ WKDW└ DGGV└ VRPH└ FRPSOH[LW\└ WR└ WKLV◀ └ %XW└ ,└ WKLQN└ ΛKH└ URCH└ RI└ WKH└ (3$☼ └ SURVSHFWLYHD\☼ └ LV└ WR└ + + └ WR└ VHHN└ WR└ SURYLGH└ FODULW\└ RQ└ + RQ└ ZKDW└ WKH└ WUXH└ GHILQLWLRQ☼ └ ZKDW└ WKH└ EHWW└ GHILQLWLRQ└ LV☼ └ ZLWK└ UHVSHFW└ WR└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6ΛDWHV◀

$V└ \RX└ NQRZ☼ └ WKHUH└ LV└ PXFK└ ICH[LELOLW\└ DQG└ GLVFUHWLRQ└ WKHUH☼ └ JLYHQ└ WR└ WKH└ (3$☼ └ LQ└ D└ VHULHV└ RI└ FDVHV└ WKDW└ CHDG└ XS└ WR└ WKH└ 5DSDCRV└ GHFLVLRQ☼ └ WKDW└ KDYHQW└ SURYLGHG└ D└ WUHPHQGRXV└ DPRXQW└ RI└ FODULW\◀ └ 7KH└ EHWW└ WKLQJ└ WKH└ (3$└ FDQ└ GR☼ └ JRLQJ└ IRUZDUG☼ └ LV└ WR└ UHWXDEOLVK└ WKDW└ FODULW\└ \R└ WKDW└ WDWHV└ DQG└ LQGLYLGXDOV└ NQRZ└ ZKDW└ H[SHFWHG└ RI└ WKHP└ LQ└ FRPSOLDCFH◀

025$1 └

*HQHUDO☼ └ WKDQN└ \RX◀ └ ,└ GRQW└ WKLQN└ ,└ QHHG└ WR└ + + └ WR└ UHPLQG└ \RX☼ └ LQ└ SDUWLFXODU☼ DERXW└ WKH└ URCH└ WKDW└ WWDWHV└ SOD\└ LQ└ FCHDQ└ ZDWHU◀

%XW└ ,└ + + └ EXW└ ,└ ZRXOG└ WDNH└ D└ PRPHQW└ WR└ KLJKOLJKW└ VRPHWKLQJ└ WKDW└ LV└ RIWHQ☼ └ ,└ ΛKLQN☼ └ IRUJRWWHQ└ LQ└ WKH└ UHJXODWRU\└ ZRUOG└ RI└ ZDWHU☼ └ ZDWHU└ TXDOLW\☼ └ LV└ WKH└ 'HSDUWPHQW└ RI└ $JULFXOWXUH☼ └ WKH└ QDWXUDO└ UHVRXUFH└ FRQVHUYDWLRQ└ VHUYLFH└ LQ└ ZKLFK└ CDQGRZCHUV└ DUH└ DVVLWWHG☼ └ WKURXJK└ WKH└ 'HSDUWPHQW└ RI└ $JULFXOWXUH☼ └

LQ└ LPSURYLQJ└ ZDWHU└ TXDOLWW└ DQG└ ZDWHU└ TXDQWLWW└ └ LQ└ D└ YHU└ SDUWQHUVKLS┼ RULHQWHG└ └ CRFDO└ HIIRUW└ └ WKDW└ LV└ VLJQLILFDQWO└ GLIIHUHQW└ WKDQ└ WKH└ WUHPHQGRXV└ UHDFK└ IURP└ WKH└ (3$└ LQ└ :DVKLQJWRQ└ └ '◀ &◀ └ DV└ FRPSDUHG└ WR└ WKH└ CRFDO└ HIIRUW└ E└ CDQGRZCHUV└ └ WKHPVHOYHV└ └ WR└ ZRUN└ ZLWK└ 86'$└ WR└ VROYH└ SURECHPV◀

/HW└ PH└ PRYH└ WR└ P└ VHFRQG└ TXHVWLRQ◀ └ ,W└ UHYROYHV└ WKH└)OLQW└ +LOOV◀ └ 7KDW└ D└ QDWLYH└ JUDVVCDQG└ LQ└ RXU└ WDWH◀ └ 7KH└ RZCHUV└ RI└ WKRVH└ JUDVVCDQGV└ ┼ ┼ └ WKHMH└ DUH└ WKRXVDQGV└ RI└ DFUHV└ RI└ JUDVV└ └ WKH└ EXUQ└ WKH└ SUDLULH└ LQ└ WKH└ HDUO└ └ VSULQJ└ └ IRU└ SXUSRVHV└ RI└ UHJHQHUDWLRQ└ RI└ WKDW└ JUDVV◀

,W└ LV└ CHDUCHG└ IURP└ WKH└ ,QGLDQV◀ └ /LJKWQLQJ└ XVHG└ WR└ EH└ WKH└ PHWKRG└ E└ ZKLFK└ /KDW└ JUDVVCDQG└ EXUCHG└ └ CHVV└ VR└ GRZ└ └ ZLWK└ WKH└ VHWWCHPHQW└ WKDW└ KDYH└ RFFXUUHG└ RI└ RXU└ FRXQWU└ └ $QG└ DV└ D└ UHVXOW└ RI└ WKDW└ DQXDO└ EXUQLQJ└ └ WKDW└ LV└ HFFRCRJLFDOO└ GHVLUDECH└ └ WKHUH└ LV└ WLPHV└ LQ└ ZKLFK└ D└ FLW└ └ HYHQ└ RCH└ RI└ RXU└ RZ└ └ :LFKLWD└ └ IRU└ H[DPSCH└ └ LV└ CR└ CRQJHU└ LQ└ LW└ ┼ ┼ └ CR└ CRQJHU└ LQ└ ┼ ┼ └ LW└ EHHQ└ CRQ┼ DWWDLCPHQW└ XQCHU└ WKH└ &CHDQ└ $LU└ $FW◀

$QG└ ,└ UDLVH└ WKLV└ LWXH└ WR└ \RX└ └ LQ└ DVNLQJ└ WKDW└ \RX└ ZRUN└ ┼ ┼ └ LI└ \RX└ DUH└ FRQIILUPHG└ └ \RX└ ZRUN└ WR└ ┼ ┼ └ ZLWK└ WKH└ 6NDWH└ RI└ .DQDV└ └ LQ└ RXU└ CRFDO└ HIIRUW└ WR└ PDCDJH└ WKH└ EXUQLQJ└ RI└ WKH└ QDWLRQDO└ JUDVVCDQGV└ └ LQ└ D└ ZD└ WKDW└ LV└ DGYDQWDJHRXV└ WR└ ZLOGOLIH└ KDELWDW└ └ DW└ WKH└ VDPH└ WLPH└ └ LV└ GRCH└ LQ└ D└ WLPHD└ IDVKLRQ└ DW└ DSSURSULDWH└ WLPHV└ └ LQ└ DSSURSULDWH└ DPRXQW└ WKDW└ SUHVHUYHV└ WKH└ DLU└ TXDOLW└ └ EW└ DJDLQ└ CRW└ D└ KHDY┼ KDQGHG└ DSSURDFK└ └ WKDW└ RCH┼ VL]H└ VROXWLRQ└ RU└ D└ EDQ└ ILW└ WKH└ FLUFXPWDQFH◀

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,I└ FRQIILUPHG└ └ 6HQDWRU└ └ ,└ CRN└ IRUZDUG└ WR└ ZRUNLQJ└ ZLWK└ \RX└ RQ└ WKDW└ LWXH◀

025$1 └

,└ WKDQN└ \RX└ IRU└ WKDW◀ └ $QG└ ILQDOO└ └ ,└ ZDQW└ WR└ KLJKOLJKW└ D└ VPDOO└ WRZQ└ LQ└ .DQDV└ QDPHG└ 3UHW└ 3UDLULH└ └ D└ WSLFDO└ QDPH└ └ RU└ D└ SHUIHFW└ QDPH└ IRU└ D└ WRZQ└ LQ└ RXU└ WDWH◀ └ 3UHW└ 3UDLULH└ └ .DQDV└ KDV└ D└ SRSXODWLRQ└ RI└ DERXW└ → !! !! └ SHRSCH◀

)RU└ VHYHUDO└ GHFDGHV└ └ EHFDXVH└ RI└ WKH└ CHHG└ WR└ ┼ ┼ └ EHFDXVH└ RI└ KLJK└ QLWUDWHV└ LQ└ WKH└ ZDWHU└ └ WKH└ FLW└ V└ ZDWHU└ CHYHDV└ ┼ ┼ └ ,└ GLGQW└ VD└ WKDW└ YHU└ ZHOO◀ └ %HFDXVH└ RI└ KLJK└ CHYHDV└ RI└ QLWUDWH└ LQ└ WKH└ FLW└ ZDWHU└ V└ WWHP└ └ WKH└ FLW└ KDV└ SURYLGHG└ IUHH└ ERWWCHG└ ZDWHU└ WR└ LW└ FLWL]HQV◀

$QG└ P\└ TXHVWLRQ└ WR└ \RX└ LV☼ └ QRZ└ WKH└ (3$└ LV└ GLVDOORZLQJ└ WKDW└ SUDFWLFH└ DQG└ UHTXLULQJ└ WKH└ FLW\└ WR└ VSHQG└ DSSUR[LPDWHO\└ • ┴ ◀ ┤ └ PLOOLRQ☼ └ DQG└ UDLVH└ WKH└ UDWHV└ RI└ RXU└ UHVLGHQW└ RI└ WKDW└ FRPPXQLW\└ E\└ • ← ‼ └ D└ PRQWK☼ └ ZKLCH└ WKH└ FRPPXQLW\└ VHHPLQJO\└ LV└ VDWLVILHG└ ZLWK└ WKH└ VROXWLRQ└ RI└ WKH└ FLW\└ SURYLGLQJ└ DQ└ DOWHUQDWLYH└ WR└ WKH└ H[SHQVH└ RI└ D└ QHZ└ ZDWHU└ WUHDWPHQW└ SODQW◀

,└ DVN└ WKLV└ TXHVWLRQ└ DV☼ └ DJDLQ☼ └ DV└ DQ└ H[DPSCH└ RI└ ZKHUH└ D└ ULJLG└ GHFLVLRQ☼ └ DV└ FRPSDUHG└ WR└ D└ FRPPXQLW\┤ EDVHG└ GHFLVLRQ☼ └ VHHPV└ WR└ SUHYDLO└ DW└ WKH└ (3$☼ └ DQG└ ZRXOG└ JLYH└ \RX└ DQ└ RSSRUWXQLW\└ WR└ FRQILUP└ WR└ PH└ ZKDW└ ,└ KRSH└ \RX└ ZRXOG└ VD\└ LV└ WKDW└ \RX└ ZLOO└ ZRUN└ ZLWK└ FRPPXQLWLHV◀

<RX☼ └ DV└ DQ└ 2NOOKRPDQ☼ └ DQG└ PH└ DV└ D└ .DQVDQ☼ └ DQG└ PDQ\└ RI└ WKH└ PHPEHUV└ RI└ WKLV└ FRPPLWWHH☼ └ UHSUHVHQW└ CRW└ RI└ FRPPXQLWLHV└ LQ└ ZKLFK└ WKH└ SRSXODWLRQ└ LV└ LQXIILFLHQW└ WR└ PHHW└ ┼ ┼ └ WR└ EH└ DECH└ WR└ SD\└ IRU└ WKH└ FRWW└ RI└ ZDWHU└ RU└ VHZHU└ WUHDWPHQW◀ └ :H└ QHHG└ ILQDQFLDO└ UHVRXUFHV└ WR└ DFFRPSOLVK└ WKDW☼ └ EXW└ ZH└ DOVR└ QHHG└ FRPPRQ┤ VHQVH└ VROXWLRQV└ WR└ WKH└ SURECHP◀

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6HQDWRU☼ └ ,└ QRRN└ IRUZDUG└ WR└ ZRUNLQJ└ ZLWK└ RQ└ WKDW└ LVXH└ DV└ ZHOO└ DV└ WKH└ RWKHU◀ └ 7KHUH└ ZDV└ D└ VD\LQJ└ LQ└ WKH└ HQYLURQPHQWDO└ VSDFH☼ └ QDWLRQDO└ WDQGDUGV☼ └ QHLJKERUKRRG└ VROXWLRQV◀ └ $QG└ ,└ WKLQN└ LVW└ LPSRUWDQW└ IRU└ WKH└ (3$└ DGPLQLWWUDWRU☼ └ WKRVH└ LQ└ :DVKLQJWRQ☼ └ WR└ CHDUQ☼ └ DV└ ,└ LQGLFDWHG└ ┼ ┼ └ DV└ ,└ VDLG└ LQ└ P\└ RSHQLQJ└ WDWWPHQW☼ └ WR└ OLWHQ└ DQG└ CHDUQ└ IURP└ WKRVH☼ └ IURP└ \RX☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ QHHGV└ RI└ \RXU└ FRPPXQLW\└ DQG└ \RXU└ WDWWH☼ └ DQG└ FRODERUDWH└ ZLWK└ \RX└ DQG└ ORFDO└ RIILFLDOV└ WR└ DFKLHYH└ JRRG└ RXWFRPHV◀

025$1 └

,└ QRRN└ IRUZDUG└ WR└ HGXFDWLQJ└ \RX└ RQ└ EHKDOI└ RI└ .DQVDV◀

%$55$662 └

7KDQN└ \RX☼ └ 6HQDWRU└ 0RUDQ◀

6HQDWRU└ %RRNHU◀

%22.(5 └

*RRG└ PRUQLQJ☼ └ 0U◀ └ 3UXLWW◀

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*RRG└ PRUQLQJ☼ └ 6HQDWRU└ %RRNHU◀

?22.(5 └
,└ KDYH└ D└ CHWWHU└ WKDW└ ,└ UHDG☼ └ WKDW└ \RX└ VHQW└ WR└ WKH└ FRPPLWWHH└ CDWW└ \HDU☼ └ DQG└ \RX└ VDLG└ WKDW└ WKH└ 2NCDKRPD└ DWWRUQH\└ JHQHUDO☼ └ \RX└ VDLG☼ └ | ,└ DP└ UHVSRQVLEOH└ IRU└ SURWHFWLQJ└ WKH└ ZHOIDUH└ RI└ 2NCDKRPD└ FLWL]HQV◀ | └ ,└ DVXPH└ ΛKDW└ WWLOO└ FRUUHFW☼ └ DQG└ \RX└ EHOLHYH└ WKDW'

358,77 └
<HV☼ └ 6HQDWRU◀

?22.(5 └
$QG└ GXULQJ└ WKH└ SDWW└ VL[└ \HDUV☼ └ LQ└ SXUXXLW└ RI└ WKDW☼ └ LI└ \RX└ CRRN└ DW└ WKH└ UHFRUG└ RI└ WKH└ CDZXXLW└ \RX└ ILCHG└ DJDLQW└ WKH└ (3$☼ └ \RXYH└ KDG└ ┼ ┼ └ \RX└ MRLQHG└ RU└ ILCHG└ ¶ ┤ └ CDZXXLW└ DJDLQW└ WKH└ (3$☼ └ FKDOOHQJLQJ└ FHDQ└ DLU└ DQG└ FHDQ└ ZDWHU└ UXCHV☼ └ \HV"

358,77 └
:HYH└ EHHQ└ LQYROYHG└ LQ└ PXOWLSCH└ SLHFHV└ RI└ OLWLJDWLRQ☼ └ 6HQDWRU◀

?22.(5 └
<HDK☼ └ EXW└ ,P└ CRRNLQJ└ DW☼ └ VSHFLILFDOO\☼ └ ¶ ┤ ☼ └ DQG└ 0U◀ └ &KDLUPDQ☼ └ ,G└ OLNH└ WR└ SXW└ WKRVH└ ¶ ┤ └ CDZXXLW└ LQWR└ WKH└ UHFRUG☼ └ ZKHUH└ \RX└ VSHFLILFDOO\└ FKDOOHQJHG└ ΛKH└ (3$└ RQ└ DLU└ TXDOLW\◀ └ $QG└ CHW└ PH└ MXWW└ JR└ WKURXJK└ VRPH└ RI└ WKRVH◀

?$55$662 └
:LWKRXW└ REMHFWLRQ◀

?22.(5 └
7KDQN└ \RX☼ └ VLU◀

7R└ UHIUHMK└ \RXU└ UHFROOHFWLRQ☼ └ \RX└ ILCHG└ WZR└ CDZXXLW└ FKDOOHQJLQJ└ WKH└ (3$└ 0HUFXU\└ DQG└ $LU└ 7R[LFV└ 6ΛDQGDUGV◀ └ <RX└ ILCHG└ D└ CDZXXLW└ FKDOOHQJLQJ└ WKH└ (3$V└ ⊥ ‼ ¶ ↑ └ 1DWLRQDO└ $PELHQW└ $LU└ 4XDOLW\└ 6ΛDQGDUGV└ IRU└ 2]RQH◀ └ <RX└ ILCHG└ IRXU└ CDZXXLW└ FKDOOHQJLQJ└ WKH└ (3$V└ &CHDQ└ 3RZHU└ 3CDQ◀

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +HDUL3DJH╗ ├ RI└

<RX└ KDYH└ VXHG└ WR└ FKDOOHQJH└ WKH└ (3$V└ ¶ ¶ ¶ ♂ E□ └ WWDQGDUGV└ IRU└ FDUERQ└
GLR[LGH└ HPLWWLRQV└ IURP└ QHZ└ SRZHU└ SODQWW◀ └ $QG└ \RX└ DOVR└ VXHG└ WR└
FKDOOHQJH└ WKH└ (3$V└ IHGHUDO└ LPSOHPHQWDWLRQ└ SODQ└ IRU└ 2NOOKRPD└ XQGHU└
/KH└ 5HJLRQDO└ +D\HV└ UXOH◀ └ <RXUH└ IDPLOLDU└ ZLWK└ WKRVH└ └ ,└ LPDJLQH"

358,77 └
<HV└ └ 6HQDWRU◀

?22.(5 └
$QG└ \RX└ ILQHG└ D└ QDZVXLWW└ FKDOOHQJLQJ└ WKH└ (3$└ &LRVV┼ 6WDWH└ $LU└ 3RODXWLRQ└
UXOH└ └ VRPHWKLQJ└ └ LQ└ 1HZ└ -HUVH\└ └ ZHUH└ YHU\└ FRQFHUQHG└ ZLWK◀ └ $QG└ DUH└ \RX└
DZDUH└ WKDW└ WKDW└ UXOH└ └ ZKLFK└ \RX└ ORVW└ └ LQ└ WKDW└ VXLW└ └ VFLHQWLWW└ HXWLPDWH└ WKDW└
/KDW└ └ DORQH└ └ SUHYHQWW└ ┤ !! !! └ !! !! !! └ DWWKPD└ DWWDFNW└ └ QDWLRQDOO\└ └ HDFK└ \HDU◀ └ $UH└
\RX└ DZDUH└ RI└ WKRVH└ H[SODQDWLRQV"

358,77 └
<HV└ └ <RXU└ +RQRU◀ └ 2U└ \HV└ └ 6HQDWRU◀ └ 0D\└ ,└ RI IHU└ D◀ ◀ ◀

?22.(5 └
,└ DSSUHFLDWH└ \RXU└ SURPRWLQJ└ PH└ WR└ MXGJH◀

♂ /$8*+7(5□

?22.(5 └
/HW└ PH└ FRQWLQXH└ └ 0U◀ └ 3UXLWW◀ └ ,└ GRQW└ KDYH└ WKDW└ PXFK└ WLPH◀

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2.◀

?22.(5 └
6R└ HDFK└ RI└ WKHVH└ QDZVXLWW└ WKDW└ ,└ MXWW└ ZHQW└ WKURXJK└ └ DQG└ WKDW└ ZH└
DQDO\]HG└ └ DOO└ RI└ WKHP└ FKDOOHQJH└ DWWHPSWW└ E\└ WKH└ (3$└ WR└ UHGXFH└ DLU└
SROOXWLRQ◀ └ ,Q└ DOO└ RI└ WKHP└ └ H[FHSW└ RQH└ └ \RX└ ILQHG└ WKRVH└ QDZVXLWW└ MRLQLQJ└ ZLWK└
SROOXWLQJ└ FRPSDQLHV└ WKDW└ ZHUH└ DOVR└ VXLQJ└ WKH└ (3$◀

$QG└ VR└ LQ└ DGGLWLRQ└ WR└ ILOLQJ└ WKRVH└ CDZVXLWW└ ZLWK└ VRPH└ RI└ WKH└ SRODXWLQJ└ FRPSDQLHV└ RU└ DW└ CHDWW└ RCH└ WKDW└ KDYH└ QRZ└ EHHQ└ VSHFLILFDOO\└ PHQWLRQHG└ E\└ WZR└ RI└ P\└ ┼ ┼ └ WZR└ RI└ P\└ FROCHDJXHV└ └ \RX└ XVHG└ VXEWDQWLDO└ SRUWLRQV└ RI└ ΛKH└ CHWWHUV└ IURP└ WKRVH└ FRPSDQLHV└ SXW└ WKHP└ RQ└ \RXU└ RI ILFLDO└ DWWRUCH\└ JHQHUDO└ CHWWHUKHDG◀

$QG└ ZKDW└ ZDV└ VRUW└ RI└ VXUSULVLQJ└ WR└ PH└ LV└ WKDW└ └ ZKHQ└ \RXYH└ EHHQ└ DVNHG└ DERXW└ WKLV└ LQ└ WKH└ SXEOLF└ └ \RX└ EDVLFDOO\└ UHSUHVHQWHG└ WKDW└ WKDWW└ DFWKDOO\└ FDOCHG└ UHSUHVHQWDWLYH└ JRYHUQPHQW└ LQ└ P\└ YLHZ└ RI└ WKH└ ZRUDG◀ └ <RXU└ ΛHXWLPRQ\└ KHUH└ VD\V└ WKDW└ \RX└ ZHUH└ UHSUHVHQWLQJ└ LQGXWUW\◀ └ <RX└ ZHUH└ UHSUHVHQWLQJ└ WKH└ SRODXWHUV◀

$QG└ VR└ ZLWK└ DOO└ RI└ WKHVH└ CDZVXLWW└ \RX└ ILCHG└ └ DQG└ ZLWK└ DOO└ RI└ WKHVH└ CHWWHUV└ └ OLNH└ WKLV└ RCH└ └ ZULWWHQ└ WR└ WKH└ (3$└ RQ└ EHKDOI└ RI└ WKH└ LQGXWULHV└ WKDW└ DUH└ FDXVLQJ└ WKH└ SRODXWLRQ└ └ LW└ VHHPV└ FCHDU└ WR└ PH└ WKDW└ REYLRXVO\└ WKH└ IDFW└ SDWWHUQ└ └ RQ└ UHSUHVHQWLQJ└ SRODXWHUV└ └ LV└ FCHDU└ └ WKDW└ \RX└ ZRUNHG└ YHU\└ KDUG└ RQ└ EHKDOI└ RI└ WKHVH└ LQGXWULHV└ └ WKDW└ KDYH└ WKHLU└ SURILWW└ H[WHUQDOL]H└ ┼ ┼ └ QHJDWLYH└ H[WHUQDOLWLHV└ └ DUH└ WKHUH└ SRODXWLRQ◀

$QG└ VR└ └ ,└ MXWW└ KDYH└ D└ TXHWWLRQ└ IRU└ \RX└ └ VSHFLILFDOO\└ DERXW└ WKH└ FKLOGUHQ└ RI└ 2NODKRPD◀ └ 'R└ \RX└ NQRZ└ KRZ└ PDQ\└ NLGV└ LQ└ 2NODKRPD└ └ URXJKO\└ └ KDYH└ DWΛKPD"

358,77 └
,└ GR└ QRW└ └ 6HQDWRU◀

%22.(5 └
:HOO└ └ DFFRUGLQJ└ WR└ GDWD└ SXEOLVKHG└ E\└ WKH└ GRQSDUWLVDQ└ ┼ ┼ └ YHU\└ GRQSDUWLVDQ└ JURXS└ └ WKH└ $PHULFDQ└ /XQJ└ $VWRFLDWLRQ└ └ PRUH└ WKDQ└ ¶ ¶ ¶ └ !! !! !! └ FKLOGUHQ└ LQ└ 2NODKRPD└ └ ZKLFK└ LV└ PRUH└ WKDQ└ ¶ !! └ SHUFHQW└ └ PRUH└ WKDQ└ ¶ └ LQ└ ¶ !! └ RI└ DOO└ WKH└ NLGV└ LQ└ 2NODKRPD└ └ KDYH└ DWΛKPD◀ └ 7KDW└ RCH└ RI└ WKH└ KLJKHWW└ DWΛKPD└ UDWHV└ LQ└ WKH└ HQWLUH└ 8QLWHG└ 6ΛDWHV└ RI└ $PHULFD◀

1RZ└ └ WKLV└ LV└ D└ FULVLV└ └ VLPLCDU└ GDWD└ └ IRU└ ZKHUH└ ,└ ZDV└ PD\RU└ └ DQG└ ,└ FDQ└ WHOO└ \RX└ ILUWΛKDQG└ WKH└ GHYDWΛDWLQJ└ LPSDFW└ WKDW└ NLGV└ ZLWK└ ┼ ┼ └ WKDW└ DWΛKPD└ KDV└ RQ└ FKLOGUHQ└ DQG└ IDPLOLHV└ └ DI IHFWLQJ└ WKHLU└ HFFRQRPLF└ ZHOOEHLQJ◀ └ 3DUHQW└ ZKR└ KDYH└ WR└ ZDWFK└ WKHLU└ FKLOGUHQ└ WWUXJJCH└ WR└ EUHDWKH◀ └ 3HRSCH└ WKDW└ KDYH└ ΛR└ PLW└ ZRUN└ └ UXVKLQJ└ WKHLU└ NLGV└ WR└ WKH└ KRVSLWDO◀

2QH└ LQ└ WHQ└ NLGV└ KDYLQJ└ D└ GLVHDVH└ PLWLQJ└ VFKRRO└ LV└ D└ VLJQLILFDQW└ SURECHP◀ └ $QG└ VR└ \RX└ KDYH└ EHHQ└ ZULWLQJ└ CHWWHUV└ RQ└ EHKDOI└ RI└ SRODXWLQJ└ LQGXWUULHV◀ └ ,└ ZDQW└ WR└ DVN└ \RX└ KRZ└ PDQ\└ CHWWHUV└ GLG└ \RX└ ZULWH└ WR└ WKH└ (3$└ DERXW└ WKLV└ KHDOWK└ FULVLV"

,I└ WKLV└ LV└ UHSUHVHQWDWLYH└ JRYHUQPHQW└ GLG└ \RX└ UHSUHVHQW└ WKRVH└ FKLOGUHQ"└ ,└ ZDQW└ WR└ NQRZ└ ZKDW└ DFWLRQV└ \RXYH└ WDNHQ└ LQ└ WKH└ SDVW└ VL[└ \HDUV└ LQ└ \RXU└ FDSDFLW\└ RI└ SUHVHFWRU└ RI└ WKH└ ZHDIDUH└ RI└ 2NODKRPD└ FLWL]HQV└ WR└ SUHVHFW└ WKDW└ ZHDIDUH└ RI└ WKRVH└ ¶ ¶ ¶ └ FKLOGUHQ└ + + └ RYHU└ ¶ ¶ ¶ └ !! !! !! └ FKLOGUHQ◀

'LG└ \RX└ HYHU└ CHW└ DQ\└ RI└ WKHP└ ZULWH└ CHWWHUV└ RQ└ \RXU└ CHWWHUKHDG└ WR└ WKH└ (3$└ DQG└ GLG└ \RX└ HYHQ└ ILCH└ RCH└ CDZVXLW└ RCH└ CDZVXLW└ RQ└ EHKDOI└ RI└ WKRVH└ NLGV└ WR└ UHGXFH└ WKH└ DLU└ SRODXWLRQ└ LQ└ \RXU└ WDWH└ DQG└ KHOS└ WKHP└ WR└ KDYH└ D└ KHDOWK\└ OLIH"

358,77 └
6HQDWRU└ ,YH└ DFWXDOO\└ SURYLGHG└ D└ OLWW└ RI└ FDVHV└ WR└ WKH└ &KDLUPDQ└ ZLWK└ UHVHFW└ WR└ HQIRUFHPHQW└ WWHSV└ ZHYH└ WDNHQ└ LQ└ PXQWLSCH└ SLHFHV└ RI└ HQYLURQPHQWDO└ OLWLJDWLRQ◀ └ %XW└ CHW└ PH└ VD\└ WR└ \RX└ ZLWK└ UHVSHFW└ WR└ FURW+ WWDWH└ DLU└ SRODXWLRQ└ DQG└ VRPH└ RI└ WKH└ FDVHV└ \RX└ UHIHUUHG└ WR└ WKH└ WWDWH└ KDV└ /R└ KDYH└ DQ└ LQWHUHWW└ EHIRUH└ LW└ FDQ└ EULQJ└ WKRVH└ FDVHV└ DV└ \RX└ NQRZ◀

<RX└ FDQW└ MXW└ EULQJ└ D└ CDZVXLW└ LI└ \RX└ GRQW└ KDYH└ WWDQGLQJ└ LI└ WKHUHV└ QRW└ EHHQ└ VRPH└ LQMXU\└ WR└ WKH└ 6WDWH└ RI└ 2NODKRPD◀ └ $QG└ HDFK└ RI└ WKRVH└ FDVHV└ EHIRUH◀ ◀ ◀

?22.(5 └
0\└ WLPHV└ H[SLUHG└ EXW└ LI└ ,└ FRXOG└ MXW└ VD\└ LQMXU\└ FCHDLO\└ DWWKPD└ LV└ /ULJJHUHG└ DQG└ FDXVHG└ E\└ DLU└ SRODXWDQWW◀ └ &CHDLO\└ WKHUH└ LV└ DQ└ DLU└ SRODXWLRQ└ SURECHP◀ └ $QG└ WKH└ IDFW└ WKDW└ \RX└ KDYH└ QRW└ EURXJKW└ VXLWW└ DW└ DQ\└ RI└ WKH└ CHYHO└ /R└ ZKLFK└ \RXYH└ UHSUHVHQWHG└ WKH└ LQGXWUULHV└ WKDW└ DUH└ FDXVLQJ└ WKH└ SRODXWLRQ└ LV└ UHDOO\└ SURECHPDWLF└ ZKHQ└ \RXUH└ JRLQJ└ WR└ VLW└ LQ└ D└ SRVLWLRQ└ WKDW└ LV└ QDWLRQDOO\└ VXSSRVHG└ WR└ EH└ DI IHFWLQJ└ WKLV└ UHDOWW◀ └ $QG└ DWWKPD└ LQ└ RXU└ FRXQWU\└ LV└ WKH└ QXPEHU└ RCH└ UHDVRQ└ ZK\└ FKLOGUHQ└ LQ└ $PHULFD└ KHDOWK└ UHDVRQ└ ZK\└ FKLOGUHQ└ LQ└ $PHULFD└ PLW└ VFKRRO◀

0U◀ └ &KDLUPDQ└ WKDQN└ \RX◀

?$55$662 └

7KDQN└ \RX└ YHU\└ PXFK◀ └ ,G└ VXEPLW└ IRU└ WKH└ UHFRUG└ ILUWW└ DQ└ DWWLFCH└ IURP└ WKH└
7XOVD└ :RUOG└ IURP└ 6FRWW└ 7KRPSVRQ◀ └ 7KH└ KHDGOLQH└ LV└ | (3$└ :LOO└ %H└ LQ└
*RRG└ +DQGV└ ZLWK└ 6FRWW└ 3UXLWW◀ | └ 6FRWW└ 7KRPSVRQ└ LV└ WKH└ H[HFXWLYH└ GLUHFWRU└
RI└ WKH└ 2NODKRPD└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\◀

,W└ WDONV└ DERXW└ WKH└ H[FHOOHQW└ ZRUN└ GRQH└ DQG└ HQGV└ ZLWK└ WKH└ TXRWH└ | (3$└
ZLOO└ EH└ LQ└ JRRG└ KDQGV└ ZLWK└ 6FRWW└ 3UXLWW◀ | └ 7KH└ + + └ ,└ ZRXOG└ SRLQW└ RXW└ WKDW└
EHWZHHQ└ ⊥ !! !! ┤ └ DQG└ ⊥ !! !! ← └ DQG└ ZHOO└ VXEPLW└ WKLV└ IRU└ WKH└ UHFRUG└ WKH└ PRWW└
UHFHQW└ HPSOR\HUV└ RI└ WKH└ 2EDPD└ DGPLQLWWUDWLRQV└ VHQLRU└ (3$└ RI ILFLDOV└
VXHG└ WKH└ (3$└ ZLWK└ ¶ ⊥ └ CDZVXLWW└ DW└ CHDWW└ LQ└ WKH└ WLPH└ WKDW└ ZKHQ└ *HRUJH└
:◀ └ %XVK└ ZDV└ LQ└ KLV└ VHFRQG└ WHUP└ LQFOXGLQJ└ /LVD└ -DFNVRQ└ $VVLWWDQW└
$GPLQLWWUDWRU└ &\QWKLD└ *LCHV└ └ *LCD└ 0F&DUWK\└ DQG└ 6WHSKHQ└ 2ZHQV◀ └ 7KH\└
ZHUH└ SHWLWLRQHUV└ DQG└ SCDLQWLIIV└ ILOLQJ└ VXLWW└ DJDLQWW└ WKH└ (3$◀

$QG└ ILQDOO\└ ,OO└ VXEPLW└ D└ + + └ DQ└ HGLWRULDO└ ZKHUH└ + + └ WR└ SRLQW└ RXW└ WKDW└ + + └
IURP└ WKH└ + + └ EDFN└ WR└ WKH└ 7XOVD└ :RUOG└ | 2YHU└ WKH└ SDWW└ VL[└ \HDUV└ 3UXLWW└
CHJDO└ WHDP└ KDV└ FRQVLWHQWO\└ VKRZQ└ GHIHUHQFH└ WR└ WKH└ CHJDO└ H[SHUWLVH└ DQG└
SURIHVVLRQDOV└ DW└ '(4└ | └ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\◀ └ 7KLV└
ZDV└ ZULWWHQ└ E\└ WKH└ H[HFXWLYH└ GLUHFWRU◀

| 0RUH└ LPSRUWDQWO\└ | └ KH└ VDLG└ └ | ,└ FDQQRW└ UHFDOO└ DQ└ LQWDQFH└ ZKHUH└ WKH\└ GLG└
QRW└ DOORZ└ XV└ WR└ SXUVXH└ CHJDO└ DFWLRQ└ ZKHQ└ GHHPHG└ CHFHVDU\◀ | └ $QG└ WKHQ└
ILQDOO\└ IURP└ 0LNH└ 7XUSHQ└ ZKR└ LV└ WKH└ IRUPHU└ FKDLUPDQ└ RI└ WKH└ 2NODKRPD└
'HPRFUDWLF└ 3DUW\└ KH└ VDLG└ | 7KH└ MRE└ DW└ WKH└ (3$└ LV└ WKH└ HVVHQWLDO└ PLWLRQ└
RI└ JXDUDQWHHLQJ└ FCHDQ└ DLU└ DQG└ FCHDQ└ ZDWHU◀ └ 3UXLWW└ KDV└ CHYHU└
FRPSURPLVHG└ WKRVH└ FULWLFDO└ FRPSRCHQWW└ RI└ D└ KHDOWK\└ SRSXODWLRQ└ ZLWK└ DQ\└
DFWLRQV└ KH└ KDV└ WDNHQ◀ |

6HQDWRU└ 5RXQGV◀

5281'6 └
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

:HOFRPH└ $WWRUCH\└ *HQHUDO└ 3UXLWW◀

358,77 └
7KDQNW└ 6HQDWRU└ 5RXQGV◀

5281'6 └

,└ QRWLFHG└ WKDW└ ┼ ┼ └ WKDW└ \RX└ GLGQW└ KDYH└ WKH└ RSSRUWXQLW\☼ └ LQ└ WKH└ WLPH└ DOORWWHG└ IRU└ 6HQDWRU└ %RRNHUV└ TXHVWLRQ◀ └ :RXOG└ \RX└ FDUH└ WR└ ILQLVK└ \RXU└ UHVSRQVH☼ └ ZLWK└ UHJDUG└ WR└ WKH└ ┼ ┼ └ WKH└ URCH└ WKDW└ WKH└ WDWXWH└ KDYH☼ └ DQG└ WKHLU└ DELOLW\└ WR└ HLWKHU└ SDUWLFLSDWH└ LQ└ D└ VXLW☼ └ DQG└ ZKHWKHU└ RU└ QRW└ WKH\└ KDYH└ WDQGLQJ"└ :RXOG└ \RX└ OLNH└ WR└ ILQLVK└ \RXU└ WKRXJKWV└ RQ└ WKDW'

358,77 └
7KDQN└ \RX☼ └ 6HQDWRU◀

$QG└ 6HQDWRU☼ └ DV└ ,└ LQGLFDWHG└ LQ└ RXU└ RIILFH☼ └ LQ└ \RXU└ RIILFH☼ └ ZKHQ└ ZH└ VSHQW└ /LPH└ WRJHWKHU☼ └ WKH└ HQIRUFHPHQW└ URCH└ LQ└ WKH└ 6WDWH└ RI└ 2NODKRPD└ LV└ GLIIHUHQW└ /NDQ└ RWKHU└ WDWHV☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\☼ └ WKH└ 2NODKRPD└ :DWHU└ 5HVRXUFHV└ %RDUG◀ └ :H└ KDYH└ PXOWLSOH└ DJHQFLHV└ ┼ ┼ └ WKH└ 'HSDUWPHQW└ RI└ $JULFXOWXUH☼ └ WKDW└ KDYH└ IURQW┼ └ OLQH└ HQIRUFHPHQW└ DXWKRULW\└ ZLWK└ UHVSHFW└ WR└ RXU└ HQYLURQPHQWDO└ CDZV◀

7KH└ URCH└ WKDW└ ZH└ SOD\☼ └ LQ└ P\└ RIILFH☼ └ CDUJHD\└ LV└ D└ JHQHUDO└ FRXQVHO└ URCH◀ └ :H└ SURYLGH└ JXLGDQFH└ DQG└ GLUHFWLRQ└ WR└ WKRVH└ DJHQFLHV◀ └ 7KHUH└ DUH└ PDQ\└ FDVHV└ ZH└ KDYH└ LQLWLDWHG└ LQ└ FRQVXOWDWLRQ└ ZLWK└ WKHP☼ └ EXW└ ┼ ┼ └ EXW└ PDLQO\☼ └ /NRVH└ DJHQFLHV└ HQIRUFH└ DFWLRQV└ DW└ WKHLU└ CHYHD◀ └ 0DQ\└ RI└ WKRVH└ DJHQFLHV└ KDYH└ GR]HQV└ RI└ DWWRUQH\V└ RQ└ WKHLU└ WDII☼ └ DQG└ D└ JHQHUDO└ FRXQVHO└ LQ└ WKHLU└ RZQ└ ULJKWV☼ └ EULQJLQJ└ WKRVH└ HQIRUFHPHQW└ DFWLRQV◀

<RX└ PHQWLRQHG└ VHYHUDO└ RI└ WKH└ FDVHV☼ └ IURP└ 0$76└ WR└ FCHDQ└ ┼ ┼ └ FURW┼ └ WDWH└ DLU└ SROOXWLRQ└ DQG└ WKH└ UHWW◀ └ ,└ EHOLHYH└ WKH└ &URW┼ 6WDWH└ $LU└ 3ROOXWLRQ└ 5XCH└ LV└ D└ YHU\└ LPSRUWDQW└ WDWXWH└ WKDW└ (3$└ VKRXOG└ HQIRUFH◀ └ ,└ EHOLHYH└ WKDW└ LI└ WKHUH└ GRZQZLQG└ WDWHV└ WKDW└ DUH└ FRQWULEXWLQJ└ WR└ GRQ┼ └ DWWDLQPHQW└ LQ└ XS└ ┼ ┼ └ RU└ ,P└ \RUU\☼ └ XSZLQG└ WDWHV└ WKDW└ DUH└ FRQWULEXWLQJ└ WR└ GRQ┼ DWWDLQPHQW└ LQ└ GRZQZLQG└ WDWHV☼ └ WKDW└ WKHUH└ VKRXOG└ EH└ UHVSRQVLELOLW\└ IRU└ WKRVH└ WDWHV◀

:H└ KDYH└ WKDW└ LVXH└ ZLWK└ 7H[DV└ DW└ WLPHV◀ └ $QG└ VR☼ └ WKH└ CDZXLW└ ZDV└ GRW└ TXHVWLRQLQJ└ WKH└ DXWKRULW\└ RI└ WKH└ (3$└ WR└ UHJXODWH└ XQGHU└ WKH└ &URW┼ └ 6WDWH└ $LU└ 3ROOXWLRQ└ UXCH☼ └ LW└ ZDV└ PRUH└ WKDW└ WKH\└ ZHUH└ WU\LQJ└ WR└ DVHVV└ GDPDJHV└ DJDLQVW└ FHUWDLQ└ WDWHV└ WKDW└ ZHUH└ LQ└ H[FHVV└ RI└ WKHLU└ DOORFDWHG└ VKDUH◀

6R└ HDFK└ RI└ WKRVH└ FDVHV☼ └ ,└ ZRXOG└ DVN└ \RX└ WR└ UHPHPEHU☼ └ ,P└ DQ└ DGYRFDWH└ LQ└ EHKDOI└ RI└ WKH└ 6WDWH└ RI└ 2NODKRPD◀ └ 7KHUH└ D└ WDWHV└ LQWHUHVW☼ └ DV└ 6HQDWRU└ 5RXQGV└ LQGLFDWHG☼ └ WKDW└ KDV└ WR└ EH└ LQ└ SOD\◀ └ 7R└ VD\└ WKDW└ DQ\└ RI└ WKRVH└ FDVHV└ LV└ DERXW└ DQ\└ RQH└ ┼ ┼ └ DQ\└ RQH└ FRPSDQ\☼ └ LV└ MXW└ VLPSO\└ GRW└ ULJKW◀

7KHUHV└ QR└ SDUHQ└ SDWULDH└ WDQGLQJ└ WKDW└ ,└ KDYH└ DV└ DWWRUQH\└ JHQHUDO└ WR└ EULQJ└ D└ FDVH└ RQ└ EHKDOI└ RI└ D└ SULYDWH└ FLWL]HQ└ RU└ D└ FRPSDQ\◀ └ 7KHUH└ KDV└ WR└ EH└ D└ WDQGLQJ└ DQ└ LQMXU\└ WR└ WKH└ WDWHV└ LQWHUHWW└ WR└ EULQJ└ WKRVH└ FDVHV◀ └ $QG└ VR└ ,└ ZRXOG└ DVN└ \RX└ WR└ FRQVLGHU└ WKDW└ DV└ ZH└ JR└ WKURXJK└ WKRVH└ FDVHV└ \RX└ PHQWLRQHG└ HDUOLHU◀

7KDQN└ \RX└ 6HQDWRU└ 5RXQGV◀

5281'6 └

7KDQN└ \RX◀ └ 7KDQN└ ┼ ┼ └ WKDQN└ \RX◀ └ $QG└ WKDQN└ \RX└ VLU└ IRU└ \RXU└ UHVSRQVH└ └ \RXU└ FRPSOHWH└ UHVSRQVH◀ └ $OVR└ DV└ WKH└ FKDLUPDQ└ RI└ WKH└ VXEFRPPLWWHH└ RQ└ RYHUVLJKW└ RI└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ ,YH└ KDG└ WKH└ RSSRUWXQLW\└ WR└ ORRN└ DW└ WKHLU└ ┼ ┼ └ WKHLU└ EDVLV└ IRU└ WKH└ ZD\└ WKDW└ WKH\└ PDNH└ WKHLU└ GHFLVLRQV└ NQRZQ└ DQG└ WKH└ ORJLF└ WKH└ XVH└ LQ└ JHWWLQJ└ WR└ WKRVH└ GHFLVLRQV◀

:H└ KDG└ D└ FKDQFH└ WR└ WDON└ DERXW└ LW└ LQ└ P\└ RIILFH└ WKH└ RWKHU└ GD\└ DQG└ RQH└ RI└ WKH└ LWHPV└ WKDW└ ,└ EURXJKW└ XS└ ZDV└ WKH└ IDFW└ WKDW└ ZH└ DFWXDOO\└ KDG└ UHFHLYHG└ FRPPHQWV└ IURP└ WKH└ 6PDOO└ %XVLQHVV└ $GPLQLWUDWLRQ└ 2IILFH└ RI└ DGYRFDF\└ └ D└ FRS\└ RI└ ZKLFK└ ,YH└ JRWWHQ└ 0U◀ └ &KDLUPDQ└ ,G└ OLNH└ WR└ KDYH└ SXW└ LQWR└ WKH└ UHFRUG◀ └ 7KDQN└ \RX◀

$QG└ ZLWK└ WKLV└ WKLV└ ZDV└ D└ CHWWHU└ WKDW└ ZDV└ VHQW└ WR└ WKH└ (3$└ LQ└ 2FWREHU└ RI└ └ !! ¶ ┤ └ UHTXHWWLQJ└ WKDW└ WKH└ (3$└ ZLWKGUDZ└ WKH└ SURSRVHG└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ UXCH└ WKH└ :2786└ UXCH└ DQG└ UHYDOXDWH└ WKH└ LPSDFW└ WKH└ UXCH└ ZRXOG└ KDYH└ RQ└ $PHULFDQ└ VPDOO└ EXVLQHWV◀ └ 1RZ└ WKLV└ LV└ D└ IHGHUDO└ DJHQF\└ UHTXHWWLQJ└ WKH└ (3$└ WDNH└ D└ VHFRQG└ ORRN└ DW└ D└ SURSRVHG└ UXCH◀

7KH└ (3$└ UHIXVHG└ WKLV└ UHTXHWW└ DQG└ LWXHG└ WKH└ ILQDO└ UXCH└ WKDW└ ZH└ KDYH└ ORGD\◀ └ :KDW└ DUH└ \RXU└ WKRXJKW└ RQ└ WKLV"└ $QG└ ZRXOG└ \RX└ LI└ \RX└ DUH└ DSSURYHG└ └ DQG└ ┼ ┼ └ DQG└ EHFRPH└ WKH└ CH[W└ DGPLQLWUDWRU└ RI└ (3$└ └ ZRXOG└ \RX└ ORNH└ D└ VHFRQG└ ORRN└ DW└ ZKHWKHU└ RU└ GRW└ WKH\└ KDG└ D└ YDOLG└ UHDVRQ└ IRU└ KDYLQJ└ ORKH└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ UXCH└ FRQVLGHUHG└ DJDLQ"

358,77 └

,└ WKLQN└ └ 6HQDWRU└ └ WKH└ UHVSRQVH└ RI└ WKH└ 6L[WK└ &LUFXLW└ └ DQG└ ZKHUH└ ZH└ DUH└ SUHVHQWO\└ └ ZLWK└ WKH└ OLWLJDWLRQ└ └ WKHUH└ DUH└ GHILQLWHO\└ QHHG└ ┼ ┼ └ WKHUH└ GHILQLWHO\└ D└ QHHG└ WR└ DGGUHW└ WKDW└ RQ└ D└ SURVSHFWLYH└ EDVLV◀ └ +LWWRULFDOO\└ └ DV└ \RX└ NQRZ└ └ XQGHU└ WKH└ &HDQ└ :DWHU└ $FW└ └ DQG└ HYHQ└ EHIRUH└ WKH└ &HDQ└ :DWHU└ ZDV└ SDVVHG└ └ WKH└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV└ HTXDOOH└ 1DYLJDEOH└ :DWHUV└ └ QDYLJDEOH┼ LQ┼ IDFW└ ZDWHUV◀

:H└ NQRZ└ IURP└ D└ FRXSOH└ RI└ FDVHV└ WKDW└ CHG└ XS└ WR└ WKH└ PRWW└ UHFHQW└ FDVH└ 5DSDQRV└ WKDW└ WKH└ &HDQ└ :DWHU└ $FW└ LV└ VLPSO\└ PRUH└ WKDQ└ QDYLJDEOH╫ └ LQ╫ IDFW└ EXW└ ZKDW└ WKDW└ PRUH└ LV└ KDV└ WR└ EH└ GHWHUPLQHG└ DQG└ DVVHVVHG◀

$QG└ VR└ DV└ ,└ LQGLFDWHG└ HDUOLHU└ WR└ DQRWKHU└ 6HQDWRUV└ TXHVWLRQ└ WKH└ PRWW└ LPSRUWDQW└ WKLQJ└ LV└ WR└ SURYLGH└ FHUWDLQW\└ WR└ PDNH└ VXUH└ WKDW└ WKH└ &HDQ└ :DWHU└ $FW└ KHOSV└ WKRVH└ DW└ WKH└ WDWH└ CHYHO└ NQRZ└ ZKHUH└ WKH└ ERXQGDULHV└ DUH└ RI└ ZKHUH└ WKH\└ KDYH└ MXULVGLFWLRQ└ DQG└ ZKHUH└ WKH\└ GRQW└ VR└ WKDW└ ZH└ FDQ└ KDYH└ UHJXODWLRQV└ WKDW└ DUH└ IDLU└ DQG└ HTXLWDEOH└ DQG└ XQFHUWDLQW\└ LV└ QRW└ FUHDWHG◀

?281'6 └

,Q└ WKH└ CDZVXLWV└ WKDW└ \RX└ KDYH└ EURXJKW└ DJDLQVW└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ RQ└ EHKDOI└ RI└ WKH└ 6WDWH└ RI└ 2NODKRPD└ ZRXOG└ LW└ EH└ IDLU└ WR└ VD\└ WKDW└ D└ QXPEHU└ RI└ WKRVH└ DUH└ EDVHG└ XSRQ└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ IDLOLQJ└ WR└ IROORZ└ LWV└ RZQ└ UXOHV└ DQG└ WKH└ SURPXOJDWLRQ└ RI└ WKRVH└ UXOHV"

358,77 └

<HV◀ └ <HV└ 6HQDWRU◀ └ ,└ WKLQN└ ZKHWKHU└ LW└ WKH└ 0$76└ FDVH└ RU└ WKH└ &HDQ└ 3RZHU└ 3ODQ└ FDVH└ RU└ WKH└ :2786└ FDVH└ RU└ D└ PXOWLWXGH└ RI└ FDVHV└ WKH└ FRXUW└ KDYH└ DJUHHG└ WKDW└ WKH└ (3$└ KDV└ H[FHHGHG└ LWV└ DXWKRULW\└ WKDW└ WKH└ (3$└ KDV└ QRW└ DFWHG└ ZLWKLQ└ WKH└ IUDPHZRUN└ WKDW└ &RQJUHVV└ KDV└ HVWDEOLVKHG└ └ LQ└ SHUIRUPLQJ└ WKH└ URCH└ WKDW└ LW└ VXSSRVHG└ WR└ SHUIRUP◀

7KDW└ WKH└ UHDVRQ└ ,└ PHQWLRQHG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW└ WKDW└ SURFHVV└ PDWWHUV└ UXOH└ RI└ ODZ└ PDWWHUV◀ └)HGHUDOLVP└ PDWWHUV◀ └ $QG└ ,P└ ┼ ┼ └ WKRVH└ LVVXHV└ PDWWHU└ EHFDXVH└ &RQJUHVV└ KDV└ VDLG└ VR◀ └ ,W└ LV└ &RQJUHVV└ ZKR└ JLYHV└ DXWKRULW\└ WR└ WKH└ (3$◀ └ 7KH└ (3$└ LV└ DQ└ DGPLQLVWUDWLYH└ DJHQF\◀ └ ,W└ QRW└ D└ CHJLVODWLYH└ ERG\◀

$QG└ VR└ LW└ LPSRUWDQW└ IRU└ WKDW└ DJHQF\└ WR└ DFW└ ZLWKLQ└ IUDPHZRUN└ └ ZLWKLQ└ WKH└ VXEVWDQWLYH└ DXWKRULW\└ WKDW└ &RQJUHVV└ KDV└ SURYLGHG└ LW└ └ LQ└ GRLQJ└ LW└ MRE◀ └ $QG└ LQ└ ┼ ┼ └ LQ└ CHDGLQJ└ WKH└ (3$└ └ LI└ FRQILUPHG└ └ ,└ WKLQN└ └ LI└ \RX└ ┼ ┼ └ LI└ ,└ GR└ WKDW└ HI IHFWLYHD\└ └ LW└ ZLOO└ SURYLGH└ FRQILGHQFH└ └ FHUWDLQW\└ WR└ WKRVH└ WKDW└ DUH└ UHJXODWHG└ └ WR└ NQRZ└ ZKDW└ H[SHFWHG└ RI└ WKHP└ └ DQG└ LPSURYH└ RXU└ DLU└ └ LPSURYH└ RXU└ ZDWHU└ EHFDXVH└ RI└ WKDW◀

5281'6 └

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

%$55$662 └
7KDQN└ \RX└ └ 6HQDWRU└ 5RXQGV◀

6HQDWRU└ 0DUNH\◀

0$5.(< └
7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀ └ 7KLV└ PRUQLQJ└ └ 12$$└ └ 1$6$└ KDV└ GHFDUHG└
┴ ‼ ¶ ├ └ WKH└ KRWWHWW└ \HDU└ LQ└ WKH└ ¶ ┬ → ┼ \HDU╢ ROG└ UHFRUG└ WKDW└ KDV└ EHHQ└ N HSW◀ └
'RDOG└ 7UXPS└ KDV└ FDOOHG└ JOREDO└ ZDUPLQJ└ D└ KRD[└ FDXVHG└ E\└ WKH└
&KLQHVH◀ └ 'R└ \RX└ DJUHH└ WKDW└ JOREDO└ ZDUPLQJ└ LV└ D└ KRD["

358,77 └
,└ GR└ QRW└ └ 6HQDWRU◀

0$5.(< └
6R└ 'RDOG└ 7UXPS└ LV└ ZURQJ"

358,77 └
,└ GR└ QRW└ EHOLHYH└ WKDW└ FOLPDWH└ FKDQJH└ LV└ D└ KRD[◀

0$5.(< └
2.◀ └ 7KDWW└ LPSRUWDQW└ IRU└ WKH└ SUHVLGHQW└ WR└ KHDU◀ └ 0U◀ └ 3UXLWW└ └ \RXYH└ PDGH└ D└
FDUHHU└ ZRUNLQJ└ RQ└ EHKDOI└ RI└ WKH└ IRWLO└ IXHO└ LQGXWWU\└ WR└ HYLVFHUDWH└
UHJXODWLRQV└ GHVLJHG└ WR└ SURWHFW└ SXEOLF└ KHDOWK└ DQG└ WKH└ HQYLURQPHQW◀ └ <RX└
KDYH└ VXHG└ WKH└ (3$└ ¶ └ WLPHV└ WR└ WWRS└ FHDQ└ DLU└ DQG└ ZDWHU└ SURWHFWLRQV◀

(LJKW└ RI└ WKRVH└ FDVHV└ DUH└ WWLOO└ RQJRLQJ└ LQFOXGLQJ└ \RXU└ OLWLJDWLRQ└ WKDW└
FKDOOHQJHV└ FULWLFDO└ UXOHV└ WKDW└ UHGXFH└ CHYHDV└ RI└ KD]DUGRXV└ VPRJ└ PHUFXU\└
DQG└ FDUERQ└ SROOXWLRQ◀ └ $V└ (3$└ DGPLQLWWUDWRU└ \RX└ ZRXOG└ EH└ LQ└ D└ SRVLWLRQ└
/R└ VHUYH└ DV└ SDLQWLII└ └ GHIHQGDQW└ MXGJH└ DQG└ MXU\└ RQ└ WKHVH└ RQJRLQJ└ HLJKW└
ODZVXLWW└ └ DQG└ WKDW└ ZRXOG└ EH└ ZURQJ◀

,Q└ \RXU└ HWKLFV└ DJUHHPHQW└ └ \RX└ KDYH└ VDLG└ WKDW└ \RX└ ZRXOG└ QRW└ SDUWLFLSDWH└
LQ└ DQ\└ PDWWHU└ WKDW└ LV└ RQJRLQJ└ OLWLJDWLRQ└ ZLWKLQ└ RQH└ \HDU◀ └ %XW└ 0U◀ └ 3UXLWW└ └
LVQW└ LW└ FRUUHFW└ WKDW└ WKHVH└ ODZVXLWW└ PD\└ YHU\└ ZHOO└ FRQWLQXH└ IRU└ PXFK└ ORQJHU└
/KDQ└ RQH└ \HDU"

358,77 └
:HOO└ 6HQDWRU└ ,└ KDYH└ WKH└ CHWWHU└ IURP└ WKH└ HWKLFV└ FRXQVHO└ DW└ WKH└ (3$└ DQG└ ΛKH└ RQH╪ \HDU└ WLPH└ SHULRG└ LV└ LQWHQGHG└ WR└ DGGUHVV└ FRYHUHG└ HQWLWLHV└ └ HQWLWLHV└ ΛKDW└ ,└ VHUYH└ LQ└ ┼ ┼ └ LQ└ FKDLUPDQVKLS└ └ RU└ D└ RIILFHU└ FDSDFLWW└ └ WKH└ 6RXWKHUQ└ 7KHRORJLFDO└ 6HPLQDU\└ └ WKH└ :LQGRZV└ 0LQLVWU\◀ └ 7KRVH└ HQWLWLHV└ DUH└ FRYHUHG└ HQWLWLHV◀

6R└ LI└ WKHUH└ LV└ D└ PDWWHU└ WKDW└ DULVHV└ EHIRUH└ WKH└ (3$└ ZLWKLQ└ D└ RQH╪ └ \HDU└ SHULRG└ └ D└ SDUWLFXODU└ PDWWHU└ └ D└ VSHFLILF└ FDVH└ WKDW└ LQYROYHV└ WKRVH└ HQWLWLHV└ └ ΛKHQ└ D└ UHFXVDO└ ZRXOG└ EH└ LQ└ RUGHU◀ └ %XW└ WKDW└ UHDOO└ WKH└ ┼ ┼ └ WKH└ IRFXV└ RI└ WKH└ RQH╪ \HDU└ WLPHOLQH◀

0$5.(< └
%XW└ ZLOO└ \RX└ DJUHH└ WR└ UHFXVH└ \RXUVHOI└ IURP└ WKRVH└ CDZXLWW└ ZKLFK└ \RX└ EURXJKW└ └ DV└ WKH└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ └ DJDLQW└ WKH└ (3$└ └ QRW└ MXW└ IRU└ RQH└ \HDU└ └ EXW└ IRU└ WKH└ HQWLUHW└ RI└ WKH└ WLPH└ WKDW└ \RX└ DUH└ WKH└ DGPLQLWWUDWRU└ RI└ WKH└ (3$◀ └ :LOO└ \RX└ FRPPLW└ WR└ GRLQJ└ WKDW'

358,77 └
6HQDWRU└ ,└ ┼ ┼ └ IRU└ FDUUW└ ,└ ┼ ┼ └ ,└ ┼ ┼ └ ,└ WKLQN└ WKDW└ LW└ LPSRUWDQW└ WR└ QRW└ RQH╪ \HDU└ WLPH└ SHULRG└ DJDLQ└ LV└ IRU└ WKRVH└ FRYHUHG└ HQWLWLHV└ WKDW└ ZHUH└ KLJKOLJKWHG└ LQ└ WKH└ (3$└ CHWWHU◀ └ :LWK└ UHVSHFW└ WR└ SHQGLQJ└ OLWLJDWLRQ└ ┼ ┼ └ ZLWK└ UHVSHFW└ WR└ SHQGLQJ└ OLWLJDWLRQ└ └ WKH└ (3$└ HWKLFV└ FRXQVHO└ KDV└ LQGLFDWHG└ └ ZLWK└ UHVSHFW└ WR└ SDUWLFXODU└ PDWWHUV└ DQG└ VSHFLILF└ SDUWLHV└ └ WKHUH└ ZLOO└ EH└ DQ└ RSSRUWXQLW\└ WR└ JHW└ FRXQVHO└ IURP└ WKH└ (3$└ DW└ WKDW└ SRLQW└ └ WR└ GHWHUPLQH└ ZKDW└ WHSV└ FRXOG└ EH└ WDNHQ└ WR└ DYRID└ DSSHDUDQFHV└ RI└ LPSURSULHW\◀

0$5.(< └
6R└ \RX└ ZLOO└ QRW└ ┼ ┼ └ DUH└ \RX└ VD\LQJ└ WKDW└ \RX└ ZLOO└ QRW└ UHFXVH└ \RXUVHOI└ IURP└ ΛKH└ DFWXDO└ PDWWHUV└ ZKLFK└ \RX└ DUH└ VXLQJ└ WKH└ (3$└ RQ└ ULJKW└ QRZ└ └ DV└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ └ IRU└ WKH└ WLPH└ WKDW└ \RX└ DUH└ WKH└ KHDG└ RI└ WKH└ (3$"

358,77 └
,P└ QRW└ VD\LQJ└ WKDW◀ └ ,P└ QRW└ ┼ ┼ └ ,P└ QRW└ VD\LQJ└ WKDW└ DW└ DOO└ └ 6HQDWRU◀

0$5.(< └

<RX└ DUH└ VD\LQJ└ WKDW◀ └ :LOO└ \RX└ UHFXVH└ \RXUVHOI"

358,77 └
,P└ VD\LQJ└ WKDW└ ┼ ┼ └ WKDW└ WKH└ (3$└ HWKLFV└ FRXQVHO└ KDV└ LQGLFDWHG└ WKRVH└ FDVHV└
ZLOO└ UHTXLUH└ D└ UHYLHZ└ E\└ WKH└ (3$└ HWKLFV└ FRXQVHO└ └ DQG└ ┼ ┼ └ DQG└ LI└ LW└ LQYROYHV└
D└ SDUWLFXODU└ PDWWHU└ ZLWK└ D└ VSHFLILF└ SDUW└ └ WKHQ└ UHFXVDO└ ZRXOG└ SRWHQWLDOOO└
EH└ LQ└ RUGHU◀ └ $QG└ ,└ ZRXOG└ IROORZ└ WKH└ JXLGDQFH└ DQG└ FRXQVHO└ RI└ WKH└ (3$└
HWKLFV◀ ◀ ◀

0$5.(< └
,└ MXWW└ WKLQN└ WKLV└ LV└ D└ ┼ ┼ └ WKLV└ LV└ D└ FHDU└ OLGH└ IRU└ WKH└ $PHULFDQ└ SXEOLF└ └ JLYH
\RXU└ UHFRUG└ IURP└ 2NODKRPD└ RI└ VXLQJ└ WKH└ (3$└ RQ└ DOO└ RI└ WKHVH└ PDWWHUV└ └
WKDW└ LI└ \RX└ GRQW└ DJUHH└ WR└ UHFXVH└ \RXUVHOI└ └ WKHQ└ DJDLQ└ └ \RX└ EHFRPH└
SDDLQWLII└ └ GHIHQGDQW└ └ MXGJH└ DQG└ MXU\└ RQ└ WKH└ FDVHV└ WKDW└ \RXUH└ EULQJLQJ└ └ WKDW└
┼ ┼ └ ULJKW└ QRZ└ └ DV└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ └ DJDLQW└ WKH└ (3$◀

$QG└ WKDW└ ┼ ┼ └ WKH└ (3$└ LV└ IRU└ DOO└ RI└ WKH└ SHRSOH└ RI└ WKH└ 8QLWHG└ 6WDWHV└ └ QRW└ MXW└
WKH└ IRWOO└ IXHO└ LQGXWU\└ RI└ 2NODKRPD◀ └ 6R└ \RXUH└ QRW└ FRPPLWWLQJ└ ┼ ┼ └ DQG└ ,└
WKLQN└ WKDW└ D└ ELJ└ PLWDNH└ └ 0U◀ └ 3UXLWW└ └ WR└ UHFXVH└ \RXUVHOI└ IURP└ WKRVH└
FDVHV◀ └ ,W└ LV└ FULWLFDO◀

$QG└ PRUHRYHU└ └ \RX└ DOVR└ DUH└ LQ└ D└ SRVLWLRQ└ WR└ LQLWLDWH└ UHJXODWLRQV└ WKDW└ FRXOG└
RYHUWXUQ└ VPRJ└ SUWHFWLRQV└ └ FDUERQ└ SRODXWLRQ└ SUWHFWLRQV└ WKDW└ DUH└ ULJKW└
QRZ└ RQ└ WKH└ ERRNV└ └ WKDW└ \RX└ DUH└ VXLQJ└ └ DV└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD└ └
WR└ RYHUWXUQ◀ └ :RXOG└ \RX└ FRPPLW└ WR└ QRW└ UHJXODWLQJ└ └ SURPXOJDWLQJ└ QHZ└
UHJXODWLRQV└ LQ└ DQ\└ RI└ WKH└ DUHDV└ ZKHUH└ \RX└ └ ULJKW└ QRZ└ └ DUH└ VXLQJ└ WKH└
(3$"└ :RXOG└ \RX└ PDNH└ D└ FRPPLWPHQW└ WKDW└ \RX└ ZRXOG└ UHFXVH└ \RXUVHOI└
IURP└ GRLQJ└ WKDW'

358,77 └
/HW└ PH└ ┼ ┼ └ CHW└ PH└ EH└ FHDU└ └ 6HQDWRU└ └ EHFDXVH└ ZH└ WDONHG└ DERXW└ WKLV└ LQ└ \RXU└
RIILFH◀ └ $QG└ ,└ YHU\└ PXFK└ HQMR\HG└ WKH└ FRQYHUVDWLRQ└ ZH└ KDG└ WKHUH└ └ LQ└
DGGLWLRQ└ WR└ WKLV└ DUHD└ WKDW└ ZH└ WDONHG└ DERXW◀ └ ,└ KDYH└ HYHU\└ ZLOOLQJQHVV└ DQG└
GHVLUH└ WR└ ┼ ┼ └ WR└ ┼ ┼ └ WR└ UHFXVH└ └ DV└ GLUHFWHG└ E\└ (3$└ HWKLFV└ FRXQVHO◀

$QG└ LI└ ┼ ┼ └ DQG└ LI└ GLUHFWHG└ WR└ GR└ VR└ └ ,└ ZLOO└ └ LQ└ IDFW└ └ GR└ VR└ └ WR└ UHFXVH└ LQ
FDVHV◀ └ 7KHUH└ LV└ D└ GLIIHUHQW┼ ┼ └ GLIIHUHQFH└ └ DV└ \RX└ NQRZ└ └ EHWZHHQ└ SHQGLQJ└
OLWLJDWLRQ└ LQ└ D└ SDUWLFXODU└ PDWWHU└ └ ZLWK└ VSHFLILF└ SDUWLHV└ └ DQG└ SURVSHFWLYH└
UXOHPDNLQJ◀ └ 5XOHPDNLQJ└ JRHV└ WKURXJK└ D└ SURFHVV◀ └ 5XOHPDNLQJ◀ ◀ ◀

0$5.(< └
/RRN└ DW┼ ┼ └ \RXUH└ WKH└ ┼ ┼ └ ZKDW┼ WKH└ $PHULFDQ└ SHRSCH└ DUH└ H[SHFWLQJ└ KHUH☼ └ LV└
/KDW┼ (3$└ GRHVQW┼ WXUQ└ LQWR└ HYHU\└ SRODXWHUV└ DDD\◀ └ 7KH└ RQO\└ ZD\└ WR└ HQXUH└
/KDW┼ LV└ IRU└ \RX└ WR└ UHFXUH└ \RXUVHOI└ IURP└ WKH└ FDVHV└ WKDW┼ \RX└ KDYH└ EURXJKW☼ └
EHFDXVH└ PRW┼ RI└ WKHP└ DUH└ WR└ RYHUWXUQ└ WKH└ FCHDQ└ DLU☼ └ FCHDQ└ ZDWHU☼ └ VPRJ└
UHJXODWLRQV◀

6R└ WR└ FUHDWH└ DQ└ DSSHDUDQFH└ RI└ LQGHSHQGHQFH☼ └ LW└ FULWLFDO└ WKDW┼ \RX└ UHFXUH└
\RXUVHOI◀

358,77 └
$QG└ ,└ ZLOO└ ┼ ┼ └ ,└ ZLOO└ UHFXUH◀ ◀ ◀

0$5.(< └
2WKHUZLVH└ ┼ ┼ └ RWKHUZLVH☼ └ KRQHVW\☼ └ SHRSCH└ DUH└ JRLQJ└ WR└ WKLQN└ WKDW┼ LW└ QRW┼
VXW┼ WKH└ IR[└ JXDUGLQJ└ WKH└ KHQKRXVH☼ └ LW└ WKH└ IR[└ GHVWUR\LQJ└ WKH└ KHQKRXVH◀

358,77 └
$QG└ WKDW◀ ◀ ◀

0$5.(< └
⅌HFDXVH└ \RX└ ┼ ┼ └ \RX└ KDYHQW┼ GLVDQFHG└ \RXUVHOI└ IURP└ WKH└ DFWXDO└ OLWLJDWLRQ└
/KDW┼ \RX└ KDYH└ LQLWLDWHG└ RQ└ PRW┼ RI└ WKH└ NH\└ LVXHV└ WKDW┼ \RX└ DUH└ QRZ└ JRLQJ└
/R└ KDYH└ UHVSRQVLEOLOLW\└ IRU└ SURWHFWLQJ☼ └ LQ└ WHUPV└ RI└ WKH└ SXEOLF└ KHDOWK└ RI└ WKH└
HQWLUH└ FRXQWU\◀

358,77 └
$QG└ 6HQDWRU☼ └ ,└ FDQ└ VD\└ WR└ \RX☼ └ XQHTXLYRFDOO\☼ └ ,└ ZLOO└ UHFXVH└ DV└ GLUHFWHG└
E\└ (3$└ HWKLFV└ FRXQVHO◀

0$5.(< └
$QG└ ,P└ VD\LQJ└ WR└ \RX☼ └ LV└ WKDW┼ \RX└ VKRXOG└ MXW┼ WXUW┼ RXW┼ VD\LQJ☼ └ ,P└ JRLQJ└
/R└ UHFXVH└ P\VHOI└ IURP└ DQ\WKLQJ└ WKDW┼ UHODWHV└ WR└ DQ\└ OLWLJDWLRQ└ WKDW┼ ,└ KDYH└
LQLWLDWHG☼ └ DV└ WKH└ DWWRUQH\└ JHQHUDO└ RI└ 2NODKRPD☼ └ WKDW┼ TXHXWLRQV└ WKH└ FCHDQ└
DLU☼ └ FCHDQ└ ZDWHU☼ └ FOLPDWH└ FKDQJH☼ └ RU└ VPRJ☼ └ RU└ PHUFXU\└ SURWHFWLRQV└ ZKLFK└
DUH└ ULJKW┼ QRZ└ RQ└ WKH└ ERRNV☼ └ WKDW┼ WKH└ (3$└ LV└ KRQRUHG└ WR└ ┼ ┼ └ WR└ SURWHFW◀

$QG└ LI└ \RX└ GRQW└ GR└ WKDW└ └ WKHQ└ ZHUH└ JRLQJ└ WR└ KDYH└ D└ IXQGDPHQWDO└ FRQIOLFW└
RI└ LQWHUHVW└ WKDW└ LV└ SUHVHQWHG└ E\└ \RXU└ SUHVHQFH└ DV└ WKH└ DGPLQLVWUDWRU└ RI└ WKH└
(3$◀ └ ,W└ MXVW└ JHW└ GRZQ└ WR└ EHLQJ└ D└ PDWWHU└ DV└ VLPSOH└ DV└ WKDW◀

%$55$662 └
7KH└ VHQDWRUV└ WLPH└ KDV└ H[SLUHG◀ └ 7KDQN└ \RX└ └ 6HQDWRU└ 0DUNH\◀

)RU└ FDUULILFDWLRQ└ └ ZLOO└ \RX└ IXOO\└ IROORZ└ WKH└ DGYLFH└ RI└ WKH└ (3$└ HWKLFV└
FRXQVHO"

358,77 └
<HV└ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └
7KDQN└ \RX◀ └ -XVW└ IRU└ DGGLWLRQDO└ FDUULILFDWLRQ└ └ UHJDUGLQJ└ FRQIOLFW└ RI└ LQWHUHVW└ └
,└ QRWH└ WKH└ CHWWHU└ WR└ WKLV└ FRPPLWWHH└ └ RQ└ -DQXDU\└ ┤ WK└ └ DQG└ ,└ DP└ VXEPLWWLQJ└
WR└ WKH└ UHFRUG└ └ | :H| └ ┼ ┼ └ WKLV└ LV└ WKH└ 2IILFH└ RI└ *RYHUQPHQW└ (WKLFV└ └ | EHOLHYH└
WKDW└ WKLV└ QRPLQHH└ LV└ LQ└ FRPSOLDQFH└ ZLWK└ DSSOLFDEOH└ ODZV└ DQG└ UHJXODWLRQV└
JRYHUQLQJ└ FRQIOLFW└ RI└ LQWHUHVW◀ |

$QG└ WKHQ└ WKHUH└ ZDV└ D└ CHWWHU└ \HWWHUGD\└ IURP└ :DWHU└ 6KDXE└ └ GLUHFWRU└ └
2IILFH└ RI└ *RYHUQPHQW└ (WKLFV└ └ UHVSRQGLQJ└ WR└ D└ CHWWHU└ IURP└ 6HQDWRU└ &DUSHU└
DQG└ RWKHU└ (3:└ 'HPRFUDWW└ └ UHJDUGLQJ└ $WWRUQH\└ *HQHUDO└ 3UXLWW└ DQG└
SRWHQWLDO└ FRQIOLFW└ RI└ LQWHUHVW└ └ DQG└ WKH\└ VD\└ └ | ,I└ WKH└ 2IILFH└ RI└ *RYHUQPHQW└
(WKLFV└ KDV└ WUDQVPLWWHG└ D└ FHUWLILHG└ ILQDQFLDO└ GLVFORVXUH└ UHSRUW└ └ DQG└ DQ└
HWKLFV└ DJUHHPHQW└ WR└ WKH└ 6HQDWH| └ ┼ ┼ └ ZKLFK└ WKH\└ KDYH└ └ | LW└ PHDQV└ WKH└ 2IILFH└
RI└ *RYHUQPHQW└ (WKLFV└ LV└ VDWLVILHG└ WKDW└ DOO└ ILQDQFLDO└ FRQIOLFW└ RI└ LQWHUHVW└
KDYH└ EHHQ└ LGHQWLILHG└ DQG└ UHVROYHG◀ |

6HQDWRU└ (UQXW◀

(5167 └
7KDQN└ \RX└ └ 0U◀ └ &KDLU◀

7KDQN└ \RX└ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ └ IRU└ DSSHDULQJ└ LQ└ IURQW└ RI└ XV└ WRGD\◀ └ ,└
HQMR\HG└ RXU└ ┼ ┼ └ RXU└ FRQYHUVDWLRQ└ └ ERWK└ RQ┼ RQ┼ RQ└ └ DQG└ WKHQ└ LQ└ D└ JURXS└
VHWWLQJ└ └ DV└ ZHOO◀ └ $QG└ ,└ ZRXOG└ OLNH└ WR└ JR└ EDFN└ DQG└ UHYLVLW└ RXU└ GLVFXVVLRQ└ RQ└
WKH└ 5)6◀

$V└ \RX└ NQRZ☼ └ ,RZD└ LV└ KRPH└ WR└ ┤ ┬ └ HWKDQRO└ UHILGHULHV◀ └ :H└ DUH└ WKH└ CDUJHWV└
SURGXFHU└ RI└ HWKDQRO└ ZHWW└ RU└ HDWW└ RI└ WKH└ 0LWRXUL└ 5LYHU◀ └ 3UHVLGHQW╪ HCHFW└
7UXPS└ UHLWHUDWHG└ KLV└ VXSSRUW└ IRU└ ELRIXHDV└ ZKLCH└ KH└ ZDV└ FDPSDLJQLQJ└
DFURW└ ,RZD└ DQG└ DOO└ DFURW└ WKH└ 0LGZHWW◀ └ $QG└ WKRVH└ DUHDV└ RI└ WKH└ FRXQWU\└
RYHUZKHOPLQJO\└ VXSSRUWHG└ KLV└ FDQGLGDF\☼ └ DQG└ CHG└ WR└ KLV└ YLFWRU\◀

$QG└ WKDQN└ \RX└ IRU└ WWDWLQJ☼ └ RQFH└ DJDLQ☼ └ WKDW└ \RX└ ZRXOG└ KRQRU└ KLV└
FRPPLWPHQW└ WR└ ELRIXHDV└ E\└ FDUU\LQJ└ RXW└ WKH└ 5)6└ DV└ LQWHQGHG└ E\└
&RQJUHWV◀ └ 3ROLF\└ FHUWDLQW\└ LV└ NH\└ IRU└ HFRQRPLF└ JURZWK☼ └ DQG└ WKLV└
\RPHWKLQJ└ WKDW└ ZH└ GLVFXWHG└ LQ└ P\└ RIILFH◀

8QIRUWXQDWHO\☼ └ DV└ D└ UHVXOW└ RI└ XQFHUWDLQW\└ VXUURXQGLQJ└ WKH└ (3$V└
UHCHZDECH└ IXHO└ YROXPH└ WDUJHWW└ LQ└ ┴ !! ¶ ┤ ☼ └ ┴ !! ¶ ↑ └ DQG└ ┴ !! ¶ ├ ☼ └ VHFRQG╪ └
JHCHUDWLRQ└ ELRIXHO└ LQYHXWPHQW└ GHFUHDVHG☼ └ DQG└ SURSRVHG└ SURVHFW└ PRYHG└
RYHUVHDV◀ └)RUWXQDWHO\☼ └ WKH└ (3$└ KDV└ UHFHQWO\└ FKDQJHG└ LW└ FRXUVH└ DQG└
UHCHDVHG└ XSGDWHG└ YROXPH└ WDUJHW└ IRU└ WKH└ 5)6☼ └ WKDW└ PHHW└ WKH└ CHYHDV└
SURVFULEHG└ E\└ &RQJUHWV◀

,I└ FRQILUPHG└ DV└ DGPLQLWWUDWRU☼ └ ZKDW└ ZLOO└ \RX└ GR└ WR└ FRQWLQXH└ WR└ SURYLGH└
FHUWDLQW\☼ └ VR└ WKDW└ LQYHXWPHQW└ FDQ└ FRQWLQXH└ WR└ KDSSHQ☼ └ ULJKW└ KHUH└ DW└ KRPH└
LQ└ WKH└ 8QLWHG└ 6WDWHV"

358,77 └
<RX└ NQRZ☼ └ 6HQDWRU☼ └ DV└ \RX└ LQGLFDWHG└ LQ└ RXU└ PHHWLQJ☼ └ WKH└ LPSRUWDQFH└ RI└
WKH└ LQIUDWXUXFWXUH└ LQYHXWPHQW└ WKDW└ KDV└ RFFXUUHG☼ └ DQG└ UHOLDQFH└ XSRQ☼ └ WKH└
CDZ└ ZDV└ SDWHG└ LQ└ ┴ !! !! ↑ └ DQG└ XSGDWHG└ LQ└ ┴ !! !! → ◀ └ $QG└ DV└ ,└ LQGLFDWHG└ HDUOLHU└
WR└ 6HQDWRU└)LVFKHUV└ TXHXWLRQ☼ └ WKH└ CDWLWXGH└ GLVFUHWLRQ└ WKDW└ KDV└ EHHQ└ JLYHQ└
WR└ WKH└ (3$└ DGPLQLWWUDWRU☼ └ ZLWK└ UHVSHFW└ WR└ ZDLYLQJ└ WKRVH└ WWDWXWRU\└ WDUJHWW☼ └
WKRXOG└ EH└ MXGLFLRXVO\└ XVHG◀

,W└ WKRXOGQW└ EH└ DXWRPDWLF◀ └ ,W└ WKRXOG└ EH└ VRPHWKLQJ└ WKDW└ WKH└ (3$└
DGPLQLWWUDWRU└ VHHNV└ WR└ FRPSO\└ ZLWK└ DQG└ DGHUH└ WR☼ └ EHFDXVH└ RI└ WKH└ ZLOO└ RI└
WKLV└ ERG\◀ └ $QG└ VR└ ,└ WKLQN└ WKRVH└ ZDLYHUV☼ └ REYLRXVO\☼ └ DUH└ LQ└ RUGHU☼ └ EXW└ ZLWK└
UHVSHFW└ WR└ PDUNHW└ FRQGLWLRQV☼ └ ZH└ KDYH└ CHW└ FRQVXPSWLRQ└ WRGD\☼ └ IXHO└
HIILFLHQW└ YHKLFCHV☼ └ PDUNHW└ FRQGLWLRQV└ KDYH└ FKDQJHG└ VLQFH└ ┴ !! !! ↑ ◀

⁄&XW└ GHVSLWH└ WKDW☼ └ WKH└ (3$└ DGPLQLWWUDWRU└ VKRXOG└ GRW└ XVH└ WKDW└ WR└
XQGHUPLQH└ RU└ WR└ VRPHKRZ└ SXW└ LQWR└ TXHXWLRQ☼ └ WKH└ FRPPLWPHQW└ PDGH└ E\└
WKLV└ ERG\└ LQ└ WKH└ 5HCHZDECH└)XHO└ 6WDQGDUGV└ WWDWXWH◀

(5167 └

7KDQN└ \RX└ IRU└ \RXU└ FRPPLWPHQW└ WR└ WKH└ 5)6└ DQG└ WKH└ LQWHQWLRQ└ RI└
&RQJUHVV◀ └ ,└ DOVR└ ZDQW└ WR└ WRXFK└ RQ└ DQ└ LVXH└ \RX└ PHQWLRQHG└ LQ└ \RXU└
/HWWLPRQ\☼ └ ZKLFK└ LV└ WKH└ CHYHO└ RI└ IHDU└ DQG└ GLVWUXVW└ PDQ\└ IRONV└ KDYH└ RI└ WKH└
(3$◀ └ :KHQ└ ,P└ KRPH└ LQ└ ,RZD☼ └ ,└ KRXW└ WRZQ└ KDOOV└ DOO└ DFURVV└ WKH└ WDWH☼ └ DQG└
VXXW└ ZDQW└ WR└ KHDU└ ZKDW└ JRLQJ└ RQ└ LQ└ WKHLU└ FRPPXQLWLHV◀

$QG└ ZKDW└ ,└ KHDU☼ └ ZLWKRXW└ IDLO☼ └ DW└ WKHVH└ WRZQ└ KDOOV☼ └ LV└ WKDW└ IRONV└ DUH└
IUXWWUDWHG└ ZLWK└ WKH└ (3$└ DQG└ WKH└ | JRVFKD| └ PHQWDOLW\└ WKDW└ KDV└ WWHPPHG└
IURP└ WKH└ DJHQF\◀ └ 0\└ FRQWWLXXHQW└ WHOO└ PH└ WKH└ (3$└ LV└ RXW└ WR└ JHW└ WKHP☼ └
UDWKHU└ WKDQ└ ZRUN└ ZLWK└ WKHP☼ └ DQG└ WKHUH└ LV└ D└ KXJH└ CDFN└ RI└ WUXWW└ EHWZHHQ└
PDQ\└ RI└ P\└ FRQWWLXXHQW└ DQG└ WKH└ (3$◀

$QG└ LI└ ZH└ WDNH└ D└ CRRN└ VSHFLILFDOO\└ DW└ WKH└ :2786└ UXCH☼ └ ,RZDQV└ WUXO\└ IHHO└
/KDW└ WKH└ (3$└ LJCRUHG└ WKHLU└ FRPPHQW└ DQG└ FRQFHUQV☼ └ WKUHZ└ WKHP└ XQGHU└
/KH└ UXJ☼ └ DQG└ WKHQ└ MXXW└ PRYHG└ IRUZDUG◀ └ :H└ NQRZ└ QRZ└ WKDW└ WKH└ (3$└ UHOLHG└
RQ└ JLPPLFN\└ PDW└ H╢ PDLOV└ DQG└ VRFLDO└ PHGLD└ HYHQW└ WR└ SURS└ XS└ WKHLU└
PHVDJH☼ └ DQG└ WKHQ└ WKH\└ XVHG└ WKRVH└ WDFWLFV└ WR└ LQVLQXDWH└ WKDW└ DQ\RQH└ ZKR└
KDG└ UHDVRQDEOH└ FRQFHUQV└ DERXW└ WKH└ :2786└ UXCH└ DUH└ VRPHKRZ└ LQ└ IDYRU└
RI└ GLUW\└ ZDWHU☼ └ ZKLFK└ LV└ DEVROXWHO\└ ULGLFXORXV◀

$QG└ WKLV└ W\SH└ RI└ FXOWXUH└ WKDW└ ZDV└ FUHDWHG└ XQGHU└ WKH└ 2EDPD└
DGPLQLWWUDWLRQ└ KDV└ GR└ SDDFH☼ └ KDV└ GR└ SDDFH└ KHUH◀ └ 6R└ 0U◀ └ 3UXLWW☼ └ ZKDW└ GR└
\RX└ SDDQ└ WR└ GR└ LQ└ \RXU└ ILUWW└ GD\V└ DV└ WKH└ DGPLQLWWUDWRU└ WR└ LPSURYH└ WKH└
UHDWLRQVKLSV└ (3$└ KDV└ ZLWK└ WKH└ KDUG╢ ZRUNLQJ└ IRONV└ DFURVV└ WKH└ FRXQWU\"

358,77 └
:HOO└ 6HQDWRU☼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW☼ └ WKLV└ SDUDGLJP└ WKDW└
ZH└ OLYH└ ZLWKLQ└ WRGD\☼ └ LI└ \RXUH└ SUR╢ HQHUJ\☼ └ \RXUH└ DQWL╢ HQYLURQPHQW☼ └ LI└
\RXUH└ SUR╢ HQYLURQPHQW☼ └ \RXUH└ DQWL╢ HQHUJ\☼ └ LV└ VRPHWKLQJ└ WKDW└ ,└ WKLQN└ LV└
VXXW└ D└ IDOVH└ GDUUDWLYH◀ └ :H└ ╢ ╢ └ ZH└ FDQ└ GR└ EHWWHU└ WKDQ└ WKDW◀

,Q└ IDFW☼ └ WKLV└ FRXQWU\└ KDV└ VKRZQ└ IRU└ GHFDGHV└ WKDW└ ZH└ FDQ└ JURZ└ RXU└
HFRQRP\☼ └ DQG└ EH└ D└ JRRG└ WWHZDUG└ RI└ RXU└ DLU☼ └ CDQG└ DQG└ ZDWHU◀ └
&RRSHUDWLYH└ IHGHUDOLVP└ LV└ DW└ WKH└ KHDUW└ RI└ PDQ\└ RI└ WKH└ HQYLURQPHQWDO└
WWDWXWHV└ WKDW└ KDYH└ EHHQ└ SDWHG└ E\└ WKLV└ ERG\◀ └ $QG└ WKH└ UHDVRQ└ IRU└ WKDW└ LV☼ └
LW└ WKH└ WWDWHV☼ └ PDQ\└ WLPHV☼ └ WKDW└ KDYH└ WKH└ UHVRXUFHV☼ └ WKH└ H[SHUWLVH☼ └ DQG└
XQGHUWDQGLQJ└ ZKDW└ WKH└ XQLTXH└ FKDOOHQJHV└ DUH└ IRU└ WKH└ HQYLURQPHQW☼ └ LQ└
LPSURYLQJ└ RXU└ ZDWHU└ DQG└ RXU└ DLU◀

,W└ QRW└ WKDW└ WKH└ GRQW└ FDUH└ DERXW└ LW◀ └ 6HQDWRU└ :KLWHKRXVH└ LQGLFDWHG└ D└ GHYRONWLRQ└ RI└ DXWKRULWW└ WR└ WKH└ WDWHV└ ZRXOG└ FUHDWH└ D└ SURFHP◀ └ 7KDW└ QRW└ ZKDW└ ,P└ DGYRFDWLQJ◀ └ $QG└ ,└ WKLQN└ ZH└ KHDU└ LQ└ WKH└ PDUNHWSODFH└ └ ZH└ QHHG└ D└ SDUWQHUVKLS└ └ D└ WUXH└ SDUWQHUVKLS└ └ EHWZHHQ└ WKH└ (3$└ └ LQ└ SHUIRUPLQJ└ LW└ URCH└ └ DORQJ└ ZLWK└ WKH└ WDWHV└ └ LQ└ SHUIRUPLQJ└ WKHLUV◀

$QG└ LI└ ZH└ KDYH└ WKDW└ SDUWQHUVKLS└ └ DV└ RSSRVHG└ WR└ SXQLWKPHQW└ └ DV└ RSSRVHG└ /R└ XQFHUWDLQW└ └ DQG└ GXUHW└ WKDW└ ZH└ FXUUHQWO└ VHH└ LQ└ WKH└ PDUNHWSODFH└ └ ,└ /KLQN└ ZHOO└ KDYH└ EHWWHU└ DLU└ └ EHWWHU└ ZDWHU└ TXDOLW└ DV└ D└ UHVXOW◀

(5167 └
7KDQN└ \RX◀ └ ,└ ORRN└ IRUZDUG└ WR└ WKDW└ SDUWQHUVKLS└ DQG└ WUDQVSDUHQF\◀

7KDQN└ \RX└ 0U◀ └ &KDLU◀

?$55$662 └
7KDQN└ \RX└ 6HQDWRU└ (UQW◀

6HQDWRU└ 'XFNZRUWK◀

'8&.:257+ └
7KDQN└ \RX◀

0U◀ └ 3UXLWW└ └ ,P└ ┼ ┼ └ ,└ ZDQW└ WR└ FDULI└ └ \RXU└ UHVSRQVH└ WR└ 6HQDWRU└ (UQW└ RQ└ WKLV└ ZKRCH└ FRQJUHVVLRQDO└ LQWHQW└ └ ZKHQ└ LW└ FRPHV└ WR└ WKH└ 5)6◀ └ :KDW└ ,└ ZDQW└ WR└ NQRZ└ └ DQG└ ZKDW└ WKH└ SHRSCH└ RI└ ,QOLGRLV└ ┼ ┼ └ ZH└ DUH└ DOVR└ D└ JUHDW└ SURGXFHU└ RI└ HWKDQRO◀ └ $QG└ ZKDW└ ZH└ QHHG└ WR└ NQRZ└ LV└ ZKHUH└ H[DPWO└ └ \RX└ WDQG└ RQ└ WKH└ 5)6◀

$UH└ \RX└ WKH└ DWWRUQH└ JHQHUDO└ ZKR└ RQ└ WKUHH└ \HDUV└ DJR└ └ VLGHG└ ZLWK└ ELJ└ RLO└ WR└ VCDP└ WKH└ 5)6"└ <RX└ ┼ ┼ └ DQG└ ,└ TXRWH└ └ VDLG└ WKDW└ | 5)6└ ZDV└ XQZRUNDECH└ | └ DQG└ DOVR└ WKDW└ LW└ ZDV└ D└ | ICDZHG└ SURJUDP◀ |

6R└ ,P└ D└ OLWWCH└ FRQIXVHG└ RQ└ ZKDW└ \RXUH└ VD\LQJ└ WRGD\└ └ EHFDXVH└ DUH└ \RX└ /KDW└ ┼ ┼ └ DUH└ \RX└ WKDW└ 0U◀ └ 3UXLWW└ └ RU└ DUH└ \RX└ WKH└ 6FRWW└ 3UXLWW└ WRGD\└ └ ZKR└ LV└ VD\LQJ└ DOO└ WKH└ ULJKW└ WKLQJV└ LQ└ WKLV└ FRQILUPDWLRQ└ KHDULQJ└ DQG└ LQ└ WKHVH└ PHWLQJV└ WR└ WU\└ WR└ UHDWXUH└ SUR┼ 5)6└ WDWHV└ E\└ UHSHDWLQJ└ QLFH┼ VRXQGLQJ└ └ EXW└ XQWLPDWHD\└ YDJXH└ DQG└ KRORZ└ PDQWUD└ └ WKDW└ LI└ FRQILUPHG└ └ \RX└ ZRXOG└ HQIRUFH└ WKH└ 5)6└ CDZ└ DV└ ZULWWHQ└ E\└ &RQJUHW◀

$V└ \RX└ DQG└ ,└ DUH└ TXLWH└ ZHOO└ DZDUH└ RI☼└ VXFK└ D└ WDWWHPHQW└ HVVHQWLDOO\└ GRGJHV└ WKH└ FULWLFDO└ LVVXH└ IRU└ ELRIXHDV└ SURGXFHUV└ DQG└ ZRUNHUV☼└ EHFDXVH└ XQGHU└ WKH└ CDZ☼└ WKH└ (3$└ KDV└ FRQVLGHUDEOH└ GLVFUHWLRQ└ WR└ DGMXVW└ WKH└ UHQHZDEOH└ YROXPH└ REOLJDWLRQ└ LQ└ D└ PDQQHU└ WKDW└ \RX└ ZRXOG└ DUJXH└ LV└ FRQVLDU\└ WR└ FRQJUHVVLRQDO└ LQWHQW☼└ \HV└ PD\└ EH└ FRPSOLDQW└ ZLWK└ WKH└ H[SOLFLW└ ODQJXDJH└ RI└ WKH└ WDXXWH◀

6R└ DV└ (3$└ DGPLQLWWUDWRU☼└ \RX└ FRXOG└ WULOO└ WHFKQLFDOO\└ EH└ LQ└ FRPSOLDQW└ ZLWK└ &RQJUHVV☼└ ZLWK└ WKH└ CDZ☼└ EXW└ DFWXDOO\└ EH└ ZRUNLQJ└ DJDLQWW└ LW◀└ $QG└ \RXU└ DQVZHUV└ WRGD\└ KDYH└ QRW└ FDUULLHG└ WKDW◀└ 6R└ P\└ TXHWWLRQ└ WR└ \RX☼└ 0U◀└ 3UXLWW☼└ LV└ WKLV◀

:KLFK└ VSHFLILF└ DFWLRQV└ KDV└ (3$└ WDNHQ└ VLQFH└ ⊥ !! !! → ☼└ ZKLCH└ DGPLQLWWHULQJ└ WKH└ 5)6☼└ WKDW└ \RX☼└ LQ└ \RXU└ YLHZ☼└ DUH└ QRW└ FRQVLWWHQW└ ZLWK└ FRQJUHVVLRQDO└ LQWHQW'└ &DQ└ \RX└ CDPH└ DQ\"

358,77└
7KDQN└ \RX☼└ 6HQDWRU◀└ 7KH└ DGPLQLWWUDWRU└ DQG└ WKH└ (3$└ URXWLQHO\└ PLVHV└ WKH└ WDXXWRU\└ WDUJHWW☼└ LQ└ SXEOLVKLQJ└ WKRVH└ HDFK└ \HDU☼└ FUHDWLQJ└ JUHDW└ XQFHUWDLQW└ LQ└ WKH└ PDUNHWSODFH◀└ ,Q└ IDFW☼└ VRPH└ ┼ ┼└ LQ└ VRPH└ \HDUV☼└ WKH\YH└ PLVHG└ WKH└ ┼ ┼└ WKH\YH└ PLVHG└ WKH└ WLPHOLQH☼└ DV└ IDU└ DV└ VXEPLWWLQJ└ WKRVH└ ARUJHWW☼└ E\└ RYHU└ D└ \HDU☼└ LQ└ VRPH└ FDVHV☼└ RYHU└ WZR└ \HDUV◀

'8&.:257+└
2.◀└ 6R└ CHW└ PH└ ┼ ┼└ CHW└ PH└ DVN└ \RX└ WKLV☼└ WKHQ◀└ <HV└ RU└ QR☼└ GR└ \RX└ EHOLHYH└ ARDW└ &RQJUHVV└ LQWHQGHG└ IRU└ WKH└ 5)6└ WR└ LQFUHDVH└ WKH└ DPRXQW└ RI└ UHQHZDEOH└ IXHO└ ECHQGHG└ LQ└ RXU└ QDWLRQV└ OLTXLG└ WUDQVSRUWDWLRQ└ IXHO└ VXSSO\"└ <HV└ RU└ QR◀

358,77└
:LWKRXW└ TXHWWLRQ◀└ <HV◀

'8&.:257+└
:LWKRXW└ TXHWWLRQ"

358,77└
<HV◀

'8&.:257+ └
$QG└ ULJKW◀ └ 0\└ VHFRQG└ TXHVWLRQ└ WKHQ└ └ LV└ \HV└ RU└ QR└ └ GR└ \RX└ EHOLHYH└
&RQJUHVV└ LQWHQGHG└ IRU└ WKH└ 5)6└ WR└ EH└ D└ WDEOH└ SROLF\└ WKDW└ GULYHV└ SULYDWH└
LQYHVWPHQW└ LQ└ WKH└ UHGHZDEOH└ HQHUJ\└ LQGXVWU\"

358,77 └
<HV◀

'8&.:257+ └
$QG└ ILQDOO\└ LI└ FRQILUPHG└ ZLOO└ \RX└ FRPPLW└ WR└ RSSRVLQJ└ DQ\└ DQG└ DOO└
SURSRVDOV└ WR└ PRYH└ WKH└ SRLQW└ RI└ REOLJDWLRQ└ XQGHU└ WKH└ 5)6└ SURJUDP└ IURP└
UHILQHUV└ WR└ EOHQGHUV"

358,77 └
6HQDWRU└ DV└ \RX└ NQRZ└ WKH└ (3$└ LV└ DFWXDOO\└ LQYROYHG└ LQ└ D└ FRPPHQW└ SHULRG└
RQ└ WKDW└ YHU\└ LVVXH◀ └ $QG└ WR└ SUHVXGJH└ WKH└ RXWFRPH└ RI└ WKDW└ └ ,└ WKLQN└ └ ZRXOG└
EH└ ┼ ┼ └ ,└ ZRXOG└ QRW└ EH└ DEOH└ WR└ GR└ ┼ ┼ └ WR└ GR└ WKDW◀ └ 7KHUH└ DUH└ PDQ\└ DVSHFWV└ RI└
WKH└ SURJUDP└ └ IURP└ WKH└ WUDGLQJ└ SURJUDP└ └ WKH└ PRQLWRULQJ└ RI└ IUDXG└ LQ└ WKH└
V\VWHP└ └ WKDW└ QHHG└ WR└ EH└ EHWWHUO\└ ┼ ┼ └ EHWWHU└ DGPLQLWUDWHG└ E\└ WKH└ (3$◀

7KHVH└ KDYH└ EHHQ└ DGPLQLWUDWLRQ└ LVXHV◀ └ 7KH└ (3$└ KDV└ FUHDWHG└
XQFHUWDLQW\◀ └ :H└ WDONHG└ DERXW└ LW└ PLQXWHV└ DJR└ ┼ ┼ └ D└ PLQXWH└ DJR└ └ ZLWK└ WKH└
VHQDWRU└ └ DERXW└ WKH└ DPRXQW└ RI└ LQYHVWPHQW└ WKDW└ JRQH└ LQWR└ WKH└
LQIUDVWUXFWXUH└ EHFDXVH└ RI└ WKH└ ┴ !! !! ↑ └ ODZ◀

7KRVH└ LQGLYLGXDOV└ QHHG└ WR└ KDYH└ FHUWDLQW\└ DQG└ FRQILGHQFH└ WKDW└ WKH└ 5)6└ LV└
JRLQJ└ ┼ ┼ └ LV└ JRLQJ└ WR└ EH└ HQIRUFHG└ DQG└ DGPLQLWHUHG└ SXUVXDQW└ WR└ WKH└
GHVLUHV└ RI└ &RQJUHVV◀ └ 7KDW◀ ◀ ◀

'8&.:257+ └
5LJKW◀ └ %XW└ LI└ \RX└ ZHUH└ WR└ GR└ WKDW└ └ WKHQ└ \RX└ ZRXOG└ DFWXDOO\└ KDYH└ WR└ DQVZHU└
┼ ┼ └ \RX└ ZRXOG└ KDYH└ WR└ DQVZHU└ \HV└ └ EHFDXVH└ WR└ PRYH└ WKH└ 5)6└ SURJUDP└
IURP└ UHILQHUV└ WR└ ECHQGHUV└ LV└ DFWXDOO\└ RQH└ RI└ WKRVH└ ZD\V└ WKDW└ \RX└ FDQ└
DFWXDOO\└ XQGHUPLQH└ WKH└ 5)6└ WDQGEUGV└ DV└ LQWHQGHG└ E\└ &RQJUHVV└ └ ZKLFK└
\RX└ \RXUVHOI└ MXVW└ GRZ└ VDLG└ ZDV└ LQWHQGHG└ WR└ LQFUHDVH└ WKH└ DPRXQW└ RI└
ELRIXHOV└ ECHQGHG└ LQWR└ WKH└ IXHO└ VXSSO\└ RI└ WKH└ 8QLWHG└ 6WDWHV◀

7KLV└ LV└ P\└ SURECHP◀ └ <RX└ ┼ ┼ └ RQ└ WKH└ RCH└ KDQG☼ └ \RXU└ HQWLUH└ WUDFN└ UHFRUG└
VKRZV└ \RX└ WR└ EH└ VRPHRCH└ ZKR└ RSSRVHV└ WKH└ 5)6☼ └ DQG└ \HW└ KHUH☼ └ LQ└ IURQW└
RI└ &RQJUHVV☼ └ DQG└ LQ└ PHWLQJV└ ZLWK└ VHQDWRUV☼ └ \RX└ DUH└ JLYLQJ└ WKHVH└ YDJXH└
DQVZHUV└ WKDW└ VRXQG└ ULJKW└ ZKHQ└ LW└ FRPHV└ WR└ WKH└ 5)6☼ └ EXW└ UHDOO\└ RSHQV└ DOO└
\RUW└ RI└ EDFN└ GRRUV└ IRU└ \RX└ WR└ RSSRVH└ WKH└ 5HQHZDECH└)XHO└ 6WDQGDUG◀

$QG└ WKDW└ LV└ YHU\└ WUXECHVRPH☼ └ EHFDXVH└ DOO└ DFURW└ WKH└ 0LGZHVW└ ┼ ┼ └ \RX└
NQRZ☼ └ IRU└ WKRVH└ RI└ XV└ ZKR└ KDYH└ IRXJKW└ WR└ WWUHQJWKHQ└ QDWLRQDO└ VHFXULWW└ E\└
CHWWHQLQJ└ RXU└ FRXQWU\└ GDQJHURXV└ GHSHQGHQFH└ RQ└ IRUHLJQ└ RLO☼ └ ,P└ UHDOO\└
LQFUHGLEO\└ FRQFHUQHG└ DERXW└ WKH└ IXWXUH└ RI└ WKH└ 5)6└ DQG└ $PHULFDQ┼
SURGXFHG└ ELRIXHOV└ XQGHU└ D└ 6FRWW└ 3UXLWW┼ CHG└ (3$◀

$QG└ ,P└ DOVR└ LQFUHGLEO\└ FRQFHUQHG└ DERXW└ ZKDW└ \RXUH└ JRLQJ└ WR└ GR└ LQ└
WHUPV└ RI└ SURWHFWLQJ└ WKH└ HQYLURQPHQW◀ └ ,Q└ \RXU└ DQVZHU└ WR└ RCH└ RI└ P\└
FRCHDJXHW└ DERXW└ ZKDW└ WKH└ URCH└ RI└ WKH└ (3$└ LV☼ └ ZKDW└ LV└ WKH└ MRE└ RI└ WKH└ (3$☼ └
RCH└ RI└ WKH└ ILUWW└ TXHWWLRQV└ \RX└ JRW☼ └ \RX└ VSHQW└ ILYH└ PLQXWHV└ WDONLQJ└ EHIRUH└
\RX└ DFWXDOO\└ VDLG☼ └ SURWHFW└ WKH└ HQYLURQPHQW◀

<RX└ WDONHG└ DOO└ DERXW└ UHGXFLQJ└ (3$V└ LQIOXHQFH└ RYHU└ WWDWHV└ IRU└ D└ JRRG└ ILYH└
PLQXWHV└ EHIRUH└ \RX└ DFWXDOO\└ JRW└ WKH└ HQYLURQPHQW◀ └ $QG└ WKHQ└ IRU└ P\└
IDUPHUV☼ └ P\└ FRUQ└ DQG└ VR\EHDQ└ SURGXFHUV└ IRU└ P\└ ELRIXHO└ LQGXWWU\☼ └ WKH└
5)6└ LV└ FULWLFDO└ LQ└ RUGHU└ WR└ FRQWLQXH└ WKDW◀

$QG└ ,└ ZRXOG└ UDWKHU└ EXUQ└ $PHULFDQ└ PDGH☼ └ $PHULFDQ└ FRUQ└ ┼ ┼ └ JURZQ└ FRUQ└
DQG└ VR\EHDQ└ LQ└ P\└ JDV└ WDQN☼ └ WKDQ└ ,└ ZRXOG└ RLO└ IURP└ WKH└ 0LGGCH└ (DWW◀ └ ,YH└
DOHDG\└ EHHQ└ WR└ D└ ZDU└ IRXJKW└ RYHU└ RLO└ LQ└ WKH└ 0LGGCH└ (DWW☼ └ DQG└ ,└ GRQW└
LQWHQG└ WR└ DOORZ└ XV└ WR└ FRQWLQXH└ WR└ GR└ WKDW☼ └ ZKLFK└ LV└ ZK\└ WKH└ 5)6└ LV└ VR└
FULWLFDO☼ └ GRW└ MXWW└ IRU└ WKH└ MREV└ LQ└ ,OOLGRLV☼ └ GRW└ MXWW└ WR└ VXSSRUW└ ,OOLGRLV└
DJULFXOWXUH☼ └ EXW└ IRU└ RXU└ QDWLRQDO└ VHFXULWW☼ └ ZKHQ└ LW└ FRPHV└ WR└ ZKHUH└ ZHUH└
JRLQJ└ WR└ JHW└ RXU└ HQHUJ\└ VXSSO\◀

,P└ RXW└ RI└ WLPH◀ └ 7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

?$55$662 └
7KDQN└ \RX☼ └ 6HQDWRU└ 'XFNZRUWK◀

358,77 └
,I└ ,└ PD\"└ 6HQDWRU☼ └ CHW└ ┼ ┼ └ CHW└ PH└ VD\└ WR└ \RX☼ └ WKH└ URCH└ RI└ WKH└ DGPLQLWWUDWRU└ F
WKH└ (3$└ LV└ WR└ HQIRUFH└ DQG└ DGPLQLWHU└ WKH└ 5)6└ SURJUDP└ WR└ FDUU\└ RXW└ WKH└
REMHFWLYHV└ RI└ WKDW└ WWDWXWH◀ └ 7KRVH└ WDUJHWW└ WKDW└ KDYH└ EHHQ└ SXW└ LQ└ WKDW└
WWDWXWH└ E\└ WKLV└ ERG\└ CHHG└ WR└ EH└ UHVSHFWHG◀

7KH└ GLVFUHWLRQ└ DXWKRULWLW└ └ WKH└ ZDLYHU└ DXWKRULWL└ RI└ WKH└ DGPLQLWWUDWRU└ QHHGV└
WR└ EH└ MXGLFLRXVO└ XVHG└ WR└ DGGUHVV└ WKRVH└ FRQFHUQV└ WKDW└ ZHUH└ WDONHG└
DERXW◀ └ $QG└ VR└ ,└ GRQW└ ZDQW└ \RX└ WR└ KDYH└ DQ└ FRQFHUQ└ DERXW└ WKH└ ┼ ┼ └ WKH└
LQWHQW└ └ REMHFWLYH└ RU└ ZLOO└ └ LI└ FRQILUPHG└ └ RI└ FDUU\LQJ└ RXW└ WKH└ 5)6└ PDQGDWH└ RU└
WKH└ WDWXWH└ LQ└ LWW└ ZKRCH◀

'8&.:257+ └
7KDW└ YHU\└ DQVZHU└ FRQFHUQV└ PH└ └ EHFDXVH└ \RXYH└ QRW└ DFWXDOO\└ VDLG└ WKDW└
\RXU└ JRLQJ└ WR└ WWLFN└ ZLWK└ LW◀

%$55$662 └
,G└ OLNH└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ └ WZR└ ┼ ┼ └ RQH└ └ D└ CHWWHU└ IURP└ WKH└ $PHULFDQ└
)DUP└ %XUHDX└)HGHUDWLRQ└ └ ZKLFK└ WWURQJO\└ VXSSRUWW└ WKH└ GRPLQDWLRQ└ RI└
6FRWW└ 3UXLWW└ DV└ DGPLQLWWUDWRU└ RI└ WKH└ 8◀ 6◀ └ (QYLURQPHQWDO└ 3URWHFWLRQ└
$JHQF\└ └ DQG└ XUJHV└ D└ YRWH└ LQ└ IDYRU└ RI└ KLV└ FRQILUPDWLRQ◀

7KH└ VHFRQG└ LV└ D└ CHWWHU└ IURP└ WKH└ 'HPRFUDW└ DWWRUQH\└ JHQHUDO└ RI└ WKH└ 6WDWH└
RI└ $UNDQVDV└ └ IRUPHU└ 'HPRFUDW└ $WWRUQH\└ *HQHUDO└ 'XWLQ└ 0F'DQLHO└ └ ZKR└
KDV└ WKLV└ WR└ VD\└ DERXW└ $WWRUQH\└ *HQHUDO└ 6FRWW└ 3UXLWW└ ZRUN└ RQ└ WKH└ WWHP└
SKRVSKRUXV└ CHYHDV└ LQ└ WKH└ ,OOLQRLV└ 5LYHU└ ZDWHUVKHG◀

+H└ VDLG└ └ | 5HFHQW└ SUHW└ DFFRXQW└ UHJDUGLQJ└ WKHVH└ HI IRUW└ XQIDLUO\└
PLVFKDUDFWHUL]H└ WKH└ ZRUN└ WKDW└ ZDV└ GRQH└ E\└ *HQHUDO└ 3UXLWW└ DQG└ KLV└ WHDP◀ └
+H└ ZDV└ D└ WWDXQFK└ GHIHQGHU└ RI└ VRXQG└ VFLHQFH└ DQG└ JRRG└ SROLF\└ └ DV└
DSSURSULDWH└ WRROV└ WR└ SURWHFW└ WKH└ HQYLURQPHQW└ RI└ KLV└ WWDWH◀ └ ,└ VDZ└ ILUWKDQG└
KRZ└ *HQHUDO└ 3UXLWW└ ZDV└ DECH└ WR└ EULGJH└ SROLWLFDO└ GLYLGHV└ └ DQG└ PDQDJH└
PXOWLSCH└ DJHQF\└ DJHQGDV└ └ WR└ UHDFK└ DQ└ RXWFRPH└ WKDW└ ZDV└ KHUDOGHG└ E\└
PRXW└ FUHGLECH└ REVHUYHUV└ DV└ ERWK└ SRVLWLYH└ DQG└ KLWWRULFDO◀ |

6HQDWRU└ %RR]PDQ◀

%22=0$1 └
7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

$QG└ WKDQN└ \RX└ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ └ IRU└ \RXU└ ZLOOLQJQHVV└ WR└ VHUYH└ └
DQG└ \RXU└ IDPLO\◀ └ ,└ WKLQN└ HYHU\ERG\└ DW└ WKH└ GDLV└ KHUH└ UHDOL]HV└ WKDW└ WKHVH└
UHDOO\└ DUH└ IDPLO\└ DI IDLUV└ WKDW└ WUXO\└ DI IHFW└ HYHU\RQH◀

,Q└ UHFHQW└ \HDUV└ └ WKH└ (3$└ KDV└ PDGH└ LW└ LQFUHDVLQJ└ GLIILFXOW└ IRU└ $UNDQVDV└ /R└ PDQDJH└ LW└ GHOHJDWHG└ QDWLRQDO└ SRODXWDQW└ GLVFKDUJH└ HOLPLQDWLRQ└ V\VWHP◀ └ 7KH└ ┼ ┼ └ WRR└ RIWHQ└ └ WKH└ SHUPLW└ └ UXCHPDNLQJ└ └ RU└ R/KHU└ DFWLRQ└ VHQW└ WR└ (3$└ IRU└ UHYLHZ└ └ DUH└ UHWXUQHG└ ZLWK└ GHPDQG└ IDU└ PRUH└ UHWULFWLYH└ └ DGGLWLRQDO└ H[SHQVLYH└ GDWD└ FROOHFWLRQ└ UHTXLUHG└ └ DQG└ R/KHU└ FRWWO\└ RQHURXV└ UHTXLUHPHQW◀

1HZ└ CHDGHUKLS└ DW└ (3$└ KDV└ DQ└ RSSRUWXQLW\└ WR└ FRUUHFW└ WKLV└ FRHUFLYH└ IHGHUDOLVP└ └ DQG└ LQWHDG└ └ UHWXUH└ FRRSHUDWLYH└ IHGHUDOLVP└ └ DV└ LQWHQGHG◀ └ 7KH└ WXDWHV└ KDYH└ WKH└ H[SHUWLVH└ DQG└ CRFDO└ NQRZCHGJH└ CHFHVDU\└ WR└ DGPLQLWHU└ HQYLURQPHQWDO└ SURJUDPV◀

0U◀ └ 3UXLWW└ └ (3$└ KDV└ WKH└ RSSRUWXQLW\└ WR└ SCD\└ D└ VLJQLILFDQW└ URCH└ LQ└ VXSSRUWLQJ└ D└ PRYH└ EDFN└ WR└ FRRSHUDWLYH└ IHGHUDOLVP◀ └ &DQ└ \RX└ SCHDVH└ H[SCDLQ└ KRZ└ \RX└ SCDQ└ WR└ FKDQJH└ WKH└ (3$┼ WXDWH└ G\CDPLF"└ 0\└ H[SHULHQFH└ ZLWK└ (3$└ ┼ ┼ └ DQG└ EHLQJ└ RQ└ 7UDQVSRUWDWLRQ└ LQ└ WKH└ +RXVH└ └ EHLQJ└ UDQNLQJ└ PHPEHU└ RQ└ :DWHU└ WKHUH└ └ UDQNLQJ└ PHPEHU└ LQ└ WKH└ 6HQDWH└ LV└ └ WKH└ (3$└ LV└ ┼ ┼ └ /KHLU└ DWWLWXGH└ LV└ └ ZHUH└ ZLWK└ \RX└ └ XQCHW└ \RX└ FRPH└ RXW└ ZLWK└ D└ ILQGLQJ└ WKDW└ LV└ FRQWUDU\└ └ DQG└ WKHQ└ ZHUH└ JRLQJ└ WR└ GR└ LW└ RXU└ ZD\◀ └ 6R└ FDQ└ \RX└ DGGUHW└ /KDW'

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,└ WKLQN└ └ WZR└ WKLQJV└ └ 6HQDWRU◀ └ 2CH└ └ DV└ ZH└ LQGLFDWHG└ HDUOLHU└ └ UXCH└ RI└ CDZ└ DQG└ PDNLQJ└ VXUH└ WKDW└ WKH└ DXWKRULW\└ JUDQWHG└ WR└ WKH└ WXDWHV└ └ XQGHU└ WXDWH└ LPSCHPHQWDWLRQ└ SCDQV└ └ GHCHJDWLRQ└ XQGHU└ FHWDLQ└ FCHDQ└ ZDWHU└ SURYLVLRQV└ └ /KDW└ WKDW└ UHVSHFWHG◀

?&XW└ DOVR└ └ ,└ WKLQN└ WKH└ (3$└ CHHGV└ WR└ SURYLGH└ PRUH└ DVVLWDQFH└ WR└ WKH└ WXDWHV└ └ LQ└ ZRUNLQJ└ LQ└ SDUWCHUVKLS└ └ DQG└ EH└ SURDFWLYH◀ └ 7KRVH└ UHJLRQDO└ DGPLQLWWUDWRUV└ WKDW└ ZH└ KDYH└ DFURW└ WKH└ FRXQWU\└ CHHG└ WR└ EH└ VHHQ└ DV└ SDUWCHUV└ └ DQG└ GRW└ DGYHUWDULHV◀

$QG└ VR└ ,└ WKLQN└ └ UHWXRULQJ└ WKDW└ FRQILGHQFH└ └ UHWXRULQJ└ WKDW└ UHDWLRQVKLS└ └ DQG└ VHHNLQJ└ WR└ GR└ VR└ └ LV└ YHU\└ └ YHU\└ LPSRUWDQW└ LQ└ FDUU\LQJ└ RXW└ WKLV└ SDUWCHUVKLS└ /KDW└ ZH└ NQRZ└ WKDW└ H[LWW└ RQ└ WKH└ YDULRXV└ HQYLURQPHQWDO└ WXDWXWHV◀

?22=0$1 └

9HU\└ JRRG◀ └)RU└ WKH└ SDWW└ HLJKW└ \HDUV└ └ (3$└ KDV└ DFWHG└ DV└ D└ SROWLFDO└ DUP└ RI└ /KH└ 2EDPD└ DGPLQLWWUDWLRQ└ WLPH└ └ DQG└ WLPH└ DJDLQ◀ └ :HYH└ VHHQ└ UXCHV└ GHYHORSHG└ GRW└ EDVHG└ RQ└ VRXQG└ VFLHQFH└ └ EXW└ RQ└ SROWLFDO└ LGHRCRJ\◀

:KHQ└ UXCHV└ KDYH└ EHHQ└ UHCHDVHG└ WWDWHV└ DQG└ SULYDWH└ VHFWRU└ DQG└ HYHQ└ &RQJUHVV└ KDYH└ KDG└ WURXEOH└ JHWWLQJ└ (3$└ WR└ VKRZ└ WKH└ VFLHQFH└ WKDW└ KHOSHG└ GHYHORS└ WKHVH└ UXCHV◀ └ 8QGHU└ \RXU└ CHDGHUVKLS└ FDQ└ ZH└ H[SHFW└ (3$└ WR└ EH└ PRUH└ WUDQVSDUHQW'

,Q└ RWKHU└ ZRUGV└ KRZ└ WKH└ UXCHV└ DUH└ EHLQJ└ GHYHORSHG└ WKH└ VFLHQFH└ EHKLQG└ WKHP◀ └ $QG└ \RXYH└ FRQWLQXDOO\└ DDXGHG└ WR└ WKLV└ DQG└ ,└ WKLQN└ LWW└ VR└ LPSRUWDQW└ DV└ DGPLQLWWUDWRU└ RI└ WKH└ (3$└ FDQ└ ZH└ FRXQW└ RQ└ \RX└ WR└ EDVH└ DOO└ RI└ \RXU└ GHFLVLRQV└ RQ└ WKH└ UXCH└ RI└ CDZ└ GRW└ RQ└ WKH└ DGPLQLWWUDWRUV└ RU└ HYHQ└ \RXU└ RZQ└ SROLWLFDO└ LGHRORJ\"

358,77 └
$EVROXWHO\└ 6HQDWRU◀ └ ,Q└ UHVSRQVH└ WR└ WKH└ CDWWHU└ SDUW└ RI└ \RXU└ TXHVWLRQ└ WKDW└ SXEOLF└ SDUWLFLSDWLRQ└ LV└ LPSRUWDQW◀ └ 7KHUH└ D└ UHDVRQ└ ZK\└ LQ└ UXCHPDNLQJ└ WKDW└ \RX└ WDNH└ FRPPHQW◀ └ 7KHUH└ D└ UHDVRQ└ DV└ ,└ LQGLFDWHG└ HDUOLHU└ WR└ 6HQDWRU└ (UQXW└ WKDW└ \RX└ LQYROYH└ WKRVH└ WKDW└ DUH└ LPSDFWHG└ E\└ UXCHPDNLQJ└ EHFDXVH└ \RX└ ZDQW└ WR└ XQGHUVWDQG└ WKH└ LPSDFW└ ERWK└ HFRQRPLFDOO\└ DQG└ RWKHUZLVH└ DQG└ WKH└ EHCHILW└ RI└ WKH└ HQYLURQPHQW└ DV└ ZHOO└ DV└ PDNLQJ└ VXUH└ WKDW└ \RX└ FUDIW└ UXCHV└ DQG└ UHJXODWLRQV└ WKDW└ WDNH└ DOO└ WKRVH└ WKLQJV└ LQWR└ FRQVLGHUDWLRQ◀

6R└ KHUULQJ└ WKH└ YRLFHV└ RI└ DOO└ $PHULFDQV└ LQ└ WKDW└ UXCHPDNLQJ└ SURFHVV└ └ UHVSRQGLQJ└ WR└ WKRVH└ FRPPHQW└ LQ└ WKH└ UHFRUG└ EHIRUH└ UXCHV└ DUH└ ILQDOL]HG└ └ /UDQVSDUHQF\└ └ REMHFWLYLW\└ └ D└ FRPPLWPHQW└ WR└ SURFHVV└ └ LV└ YHU\└ LPSRUWDQW└ └ LQ└ P\└ YLHZ└ └ RI└ UHXWRULQJ└ WKH└ FRQILGHQFH└ RI└ WKH└ $PHULFDQ└ SHRSOH└ LQ└ WKH└ UXCHPDNLQJ└ SURFHVVHV└ WKDW└ RFFXU└ KHUH└ LQ└ :DVKLQJWRQ└ └ '◀ &◀

%22=0$1 └
6R└ DJDLQ└ └ UHCHDVLQJ└ WKH└ ┼ ┼ └ WKH└ VFLHQWLILF└ GDWD└ EHKLQG└ WKDW└ ZRXOG└ EH└ \RPHWKLQJ└ WKDW└ \RXG└ YHU\└ PXFK└ VXSSRUW'

358,77 └
<HV└ └ 6HQDWRU◀

%22=0$1 └
9HU\└ PXFK◀ └ 7KH└ SURECHP└ WKDW└ WKH└ (3$└ └ (3:└ FRPPLWWHH└ KDV└ IDFHG└ ZLWK└ /KH└ FXUUHQW└ DGPLQLWWUDWLRQ└ LV└ D└ CDFN└ RI└ FRPPXQLFDWLRQ◀ └ 7LPH└ DQG└ WLPH└ DJDLQ└ └ (3$└ HLWKHU└ GLG└ GRW└ UHVSRQG└ WR└ TXHVWLRQV└ IURP└ FRPPLWWHH└

PHPEHUV☼ └ RU└ DW└ WKH└ YHU\└ CHDWW☼ └ WRRN└ PRQWKV└ WR└ UHVSRQG◀ └ 8QGHU└ \RXU└
CHDGHUVKLS☼ └ FDQ└ ZH└ H[SHFW└ WKH└ (3$└ WR└ JHW└ FRPPLWWHH└ PHPEHUV└ DQZHUV└
LQ└ ┼ ┼ └ LQ└ D└ WLPHO\└ IDVKLRQ"

358,77 └
<HV☼ └ 6HQDWRU◀ └ $V└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW☼ └ OLWWHQLQJ└ LV└ DQ└
LPSRUWDQW└ URCH└ RI└ CHDGHUVKLS☼ └ DQG└ OLWWHQLQJ└ WR└ WKH└ YRLFHV└ RI└ WKH└ IRONV└ KHUH└
LQ└ &RQJUHVV◀ └ $V└ ,└ ZHQW└ WKURXJK└ DQG└ PHW└ ZLWK└ PDQ\└ RI└ \RX☼ └ WKURXJK└ WKLV└
SURFHVV☼ └ WKHUH└ ZHUH└ LWXHV└ SDUWLFXCDU└ WR└ \RXU└ WDWH☼ └ WKDW└ \RX└ PDGH└ PH└
DZDUH└ RI◀

$QG└ ,☼ └ LI└ FRQILUPHG└ DV└ (3$└ DGPLQLWWUDWRU☼ └ VHHN└ WR└ EH└ YHU\└ DFWLYH└ LQ└
OLWWHQLQJ└ WR└ WKH└ CHHGV☼ └ ZLWK└ UHVSHFW└ WR└ \RXU└ YDULRXV└ WDWHV☼ └ DQG└ UHVSRQG└
/R└ WKLV└ ERG\└ ZLWK└ UHVSHFW└ WR└ TXHWWLRQV◀

%22=0$1 └
/HW└ PH└ MXWW└ FRPPHQW└ RQ└ WKH└ ┼ ┼ └ RQ└ WKH└ $UNDQVDV┼ 2NDKRPD└ LWXHW◀ └ ,└ ZDV└
WKH└ FRQJUHVVPDQ└ LQ└ WKDW└ GLWWULFW◀ └ $QG└ VR└ ,└ LQKHULWHG└ WKDW└ LQ└ ⊥ !! !! ¶ ◀ └ ,G└ EHHQ└
ZRUNLQJ└ RQ└ WKLV└ IRU└ ¶ ↑ └ \HDUV◀ └ $QG└ ,└ DSSUHFLDWH└ \RX└ DQG└ $WWRUQH\└ *HQHUDO└
0F'DQLHO└ GRLQJ└ D└ YHU\└ JRRG└ MRE└ RI└ JHWWLQJ└ WKLQJV└ GRQH◀

2Q└ WKH└ RWKHU└ KDQG☼ └ WKH└ LGHD└ WKDW└ VRPHKRZ└ \RX└ ZHUH└ VRIW└ ┼ ┼ └ LQ└ IDFW☼ └ ,└
ZRXOG└ DUJXH└ WKDW└ \RX└ ┼ ┼ └ \RX└ NQRZ☼ └ WKDW└ WKH└ DJUHHPHQW└ WKDW└ ZDV└ UHDFKHG└
ZDV└ ZD\└ WRR└ UHWWULFWLYH☼ └ DQG└ LV└ SUEEDEO\└ RQH└ RI└ WKH└ PRWW└ UHWWULFWLYH└
ZDWHUVKHGV☼ └ DV└ IDU└ DV└ SKRVSKRUXV└ UHTXLUHPHQWW☼ └ RI└ DQ\└ SODFH└ LQ└ WKH└
8QLWHG└ 6WDWHV◀

358,77 └
:HOO☼ └ DV└ \RX└ NQRZ☼ └ 6HQDWRU☼ └ LQ└ WKDW└ SURFHVV☼ └ ZH└ DFWXDOO\└ VHHFWHG└ D└
ELRCRJLWW└ IURP└ %D\CRU└ 8QLYHUVLW\└ WR└ HQJDJH└ LQ└ D└ VFLHQWLILF└ WXXG\└ RQ└ ZKDW└
WKH└ SKRVSKRUXV└ CHYHDV└ VKRXOG└ EH☼ └ WKH└ QXPHULF└ TXDOLW\└ RI└ WKH└ ZDWHU◀ └ $QG└
LW└ ZDV└ GHWHUPLCHG☼ └ DW└ WKH└ HQG└ RI└ WKDW└ SURFHVV☼ └ WKDW└ !! ◀ !! ┬ → └ ZDV└ WKH└ ULJKW└
WDQGDUG☼ └ DQG└ LV└ QRZ└ HQIRUFHDECH└ RQ└ ERWK└ VLGHV└ RI└ WKH└ ERUGHU☼ └ IRU└ WKH└
ILUWW└ WLPH└ LQ└ KLWWRU\◀ └ 6R└ LW└ LV└ D└ YHU\└ LPSRUWDQW└ RXWFRPH◀

%22=0$1 └
1R☼ └ ,└ XQGHUWDQG◀ └ $QG└ ,└ FRPPHQG└ \RX└ RQ└ WKH└ SURFHVV◀ └ ,└ MXWW└ ┼ ┼ └ \RX└
NQRZ☼ └ WKH└ LPSOLFDWLRQ└ KHUH└ LV└ VRPHKRZ☼ └ \RX└ NQRZ☼ └ \RX└ ZHUH└ ┼ ┼ └ \RX└
FDPH└ XS└ ZLWK└ D└ GHDO└ WKDW└ ZDV└ ┼ ┼ └ ZDV└ WRR└ VRIW◀ └ $QG└ LI└ DQ\WKLQJ☼ └ ,└ ZRXOG└

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQG└ +HDUL3DJH└ ┴ RI└

DUUXH└ WKDW└ LW└ ZDV└ SHUKDSV└ D└ OLWWOH└ ELW└ WRR└ KDUVK◀ └ 6R└ ┼ ┼ └ EXW└ ,└ GR└ DSSUHFLDWH└
/KH└ SURFHVV◀ └ ,└ NQRZ└ WKDW└ \RX└ DQG└ RXU└ ┼ ┼ └ RXU└ IRUPHU└ DWWRUQH\└ JHQHUDO└ ZHUH└
DEOH└ WR└ GR└ VRPHWKLQJ└ WKDW└ KDG└ EHHQ└ JRLQJ└ RQ└ IRU└ GHFDGHV◀

358,77 └
7KDQN└ \RX└ └ 6HQDWRU◀

?22=0$1 └
5HDOO\└ DSSUHFLDWH└ LW◀

?$55$662 └
:HOO└ \RXYH└ EHHQ└ DW└ LW└ QRZ└ IRU└ DERXW└ WZR└ KRXUV◀ └ ,I└ \RX└ FDQ└ WWD\└ ZLWK└ XV└
/LOO└ ZH└ ILQLVK└ WKH└ ILUWW└ URXQG└ RI└ TXHWWLRQLQJ└ └ ZH└ KDYH└ DERXW└ ILYH└ RU└ VL[└
DGGLWLRQDO└ TXHWWLRQV└ FRPLQJ◀ └ 6HQDWRU└ +DUULV└ LV└ QH[W└ └ DQG└ WKHQ└ ZHOO└ EUHDN└
DW└ DERXW└ ¶ ┴ ┬ !! └ LI└ WKDWW└ DOO└ ULJKW└ ZLWK└ HYHU\ERG\◀

&$53(5 └
$VN└ WKH└ ┼ ┼ └ ULJKW└ ┼ ┼ └ XQDQLPRXV└ FRQVHQW└ └ PDNH└ D└ XQDQLPRXV└ FRQVHQW└
UHTXHVW└ └ 0U◀ └ &KDLUPDQ◀

?$55$662 └
<HV└ └ VLU◀

&$53(5 └
,G└ OLNH└ WR└ DVN└ XQDQLPRXV└ FRQVHQW└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ WKH└ CHJDO└ EULHI└
DJDLQVW└ WKH└ 0HUFXU\└ DQG└ $LU└ 7R[LFV└ 5XOH└ └ ZKLFK└ 0U◀ └ 3UXLWW└ VXSSRUWHG└ └
DQG└ WWDWHG└ LQ└ WKDW└ EULHI└ └ DQG└ ,QO└ MXWW└ TXRWH└ └ LW└ VD\V└ └ | +XPDQ└ H[SRVXUH└ WR└
PHWK\O└ PHUFXU\└ UHVXOWLQJ└ IURP└ FRDO┼ ILUHG└ HOHFWULRJHQHUDWLQJ└ XWLOLWLHV└ LV└
H[FHHGLQJO\└ VPDOO└ | └ FORVH└ TXRWH◀ └ 7KDW└ WKH└ TXRWH◀

,└ DOVR└ DVN└ XQDQLPRXV└ FRQVHQW└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ D└ UHFHQW└ DUWLFOH└
/KDW└ TXRWHV└ └ ,└ WKLQN└ └ WKH└ 1HZ└ <RUN└ 7LPHV◀ └ ,W└ TXRWHV└ D└ ┤ !! ┼ \HDU└ FDUHHU└
HPSOR\HH└ RI└ WKH└ 2NODKRPD└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\└ └ WKDW└
KDV└ KLP└ VD\LQJ└ WKHVH└ ZRUGV└ └ | +H| └ ┼ ┼ └ 0U◀ └ 3UXLWW└ └ | KDV└ DGYRFDWHG└ DQG└
WWRRG└ XS└ IRU└ WKH└ SURILWW└ RI└ EXVLQHVVHV└ └ EH└ LW└ SRXQWU\└ FRPSDQLHV└ RU└ WKH└
HQHUJ\└ LQGXWWU\└ DQG└ RWKHU└ SRODXWHUV└ └ DW└ WKH└ H[SHQVH└ RI└ SHRSOH└ ZKR└ KDYH└
/R└ GULQN└ WKH└ ZDWHU└ RU└ EUHDWKH└ WKH└ DLU◀ |

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQG└ +HDUL3DJH└ └ RI└

2NHU└ ┼ ┼ └ RNHU└ WDWHPHQW└ KDYH└ EHHQ└ LQWURGXFHG└ IRU└ WKH└ UHFRUG└ └ VD\LQJ└
TXLWH└ D└ GLIIHUHQW└ WKLQJ└ DERXW└ 0U◀ └ 3UXLWW◀ └ ,└ WKLQN└ LW└ RQO\└ IDLU└ WR└ JR└ WR└
VRPHRQH└ ZKRV└ ZRUNHG└ WKHUH└ IRU└ ┤ !! └ \HDUV└ DQG└ KDV└ TXLWH└ D└ GLIIHUHQW└ YLHZ└
NDQ└ WKH└ RQH└ WKDW└ KHV└ ┼ ┼ └ KH└ ┼ ┼ └ RXU└ ZLWQHVV└ KDV└ H[SUHVVHG◀ └ 7KDQN└ \RX◀

%&55&662 └
:LWKRXW└ REMHFWLRQ◀

6HQDWRU└ +DUULV◀

+&55,6 └
7KDQN└ \RX└ &KDLUPDQ◀

0U◀ └ 3UXLWW└ DV└ DQ└ DWWRUQH\└ JHQHUDO└ ,└ NQRZ└ DV└ D└ IRUPHU└ DWWRUQH\└ JHQHUDO└
RI└ &DOLIRUQLD└ WKDW└ ZH└ DV└ DWWRUQH\V└ JHQHUDO└ KDYH└ VHYHUDO└ GXWLHV└ ZKLFK└
LQFOXGH└ UHSUHVHQWLQJ└ RXU└ FOLHQWV└ WDWH└ DJHQFLHV└ DQG└ DOVR└ WKH└ GLVFUHWLRQ└
DQG└ SRZHU└ WR└ LQLWLDWH└ OD]VXLWV└ LQ└ RXU└ LQGHSHQGHQW└ FDSDFLW\└ DV└ DWWRUQH\V└
JHQHUDO◀ └ :RXOG└ \RX└ DJUHH└ ZLWK└ WKDW'

358,77 └
6RPH└ WDWHV└ SURYLGH└ PRUH└ OD]LWXGH└ WKDW└ WKDQ└ RNHUV◀

+&55,6 └
'RHV└ \RXU└ WDWH"

358,77 └
2XU└ WDWH└ KDV└ QRW└ SURYLGHG└ FRQWLWXWLRQDOO\└ DV└ PXFK└ DXWKRULW\└ DV└ RNHU└
WDWHV└ WR◀ ◀ ◀

♂ &52667$/.□

+&55,6 └
+DYH└ \RX└ QHYHU└ ┼ ┼ └ KDYH└ \RX└ QHYHU└ H[HUFLVHG└ \RXU└ LQGHSHQGHQW└ FDSDFLW\└
DV└ DWWRUQH\└ JHQHUDO└ WR└ EULQJ└ D└ CHJDO└ DFWLRQ"

358,77 └

6HQDWRU└ ,└ ZRXOG└ KDYH└ WR└ NQRZ└ PRUH└ VSHFLILFV└ DERXW└ ZKDW└ \RXUH└
UHIHUULQJ└ WR◀ └ %XW└ LQ└ UHVSRQVH└ WR└ \RXU└ TXHVWLRQ└ LW└ GRHV└ YDU\└
FRQVLGHUDEO\◀ ◀ ◀

♂ &52667$/.□

+$55,6 └
+DYH└ \RX└ HYHU└ H[HUFLVHG└ \RXU└ LQGHSHQGHQW└ FDSDFLW\└ DV└ WKH└ DWWRUQH\└
JHQHUDO└ RI└ \RXU└ WDWH└ WR└ LQLWLDWH└ D└ CHJDO└ DFWLRQ"

358,77 └
2XU└ OLWLJDWLRQ◀ ◀ ◀

+$55,6 └
<HV└ RU└ QR"

358,77 └
7KH└ OLWLJDWLRQ└ WKDW└ ZHYH└ HQJDJHG└ LQ└ CDUJHD\└ KDYH└ EHHQ└ FRQVXOWDWLRQ└
ZLWK└ DJHQFLHV└ WKDW◀ ◀ ◀

+$55,6 └
/DUJHD\"└ 6R└ \RX└ KDYH└ DOVR└ H[HUFLVHG└ \RXU└ LQGHSHQGHQW└ FDSDFLW\└ DV└ WKH└
DWWRUQH\└ JHQHUDO└ RI└ \RXU└ WDWH◀ └ ,V└ WKDW└ FRUUHFW└ RU└ QRW"

358,77 └
,└ PD\└ KDYH└ 6HQDWRU◀ └ ,└ GRQW└ ┼ ┼ └ ,└ GRQW◀ ◀ ◀

+$55,6 └
<RX└ GRQW└ NQRZ◀ ◀ ◀

358,77 └
<HV◀

+$55,6 └
◀ ◀ ◀ └ LI└ \RX└ KDYH└ RU└ QRW"└ <RX└ KDYH└ EHHQ└ DWWRUQH\└ JHQHUDO└ IRU└ \RXU└ WDWH└ IRU└
DOPRWW└ VHYHQ└ \HDUV◀ └ ,V└ WKDW└ FRUUHFW"

358,77 └
$SSURDFKLQJ└ WKDW└ └ \HV◀ └ 6L[└ \HDUV└ └ DFWXDOOO\◀

+$55,6 └
$QG└ ,YH└ UHDG└ WKDW└ \RX└ KDYH└ LQLWLDWHG└ └ DQG└ LW└ KDV└ EHHQ└ PHQWLRQHG└ EHIRUH└ └
¶┼ └ ODZVXLWW└ LQ└ \RXU└ LQGHSHQGHQW└ FDSDFLW└ DV└ WKH└ DWWRUQH└ JHQHUDO└ RI└
2NODKRPD◀ └ $QG└ DSSDUHQWO└ └ VHYHQ└ RI└ WKRVH└ FDVHV└ KDYH└ EHHQ└ UHVROYHG└ └
VL[└ RI└ ZKLFK└ \RX└ KDYH└ CRWW◀

0└ TXHWWLRQ└ LV└ └ ,└ KHDU└ WKDW└ \RX└ DUH└ D└ CRYHU└ RI└ EDVHEDOO◀ └ :KDW└ ZRXOG└ \RXU└
EDWWLQJ└ DYHUDJH└ WKHQ└ EH"

358,77 └
,W└ ZDV└ JHQHUDOO└ DERYH└ ┬ !! !! └ ZKLFK└ LV└ SUHWW└ JRRG└ IRU└ D└ VHFRQG└ EDVHPDQ◀

+$55,6 └
<HDK◀ └ 0└ FDOFXODWLRQ└ LV└ └ LW└ ¶┼ ┴ ◀ └ *RLQJ└ ┼ ┼ └ PRYLQJ└ RQ└ └ ZRXOG└ \RX└ DJUHH└
/KDW└ DWWRUQH└V└ └ ZKR└ KDYH└ WKH└ UHVSRQVLELOLW└ IRU└ GRLQJ└ WKH└ ZRUN└ RI└ MXWWLFH└ └
DQG└ SUWLFXODU└ DV└ DQ└ DWWRUQH└ JHQHUDO└ └ WKDW└ ZH└ PDNH└ GHFLVLRQV└ EDVHG└
RQ└ SURSULHW└ DQG└ LPSURSULHW└"└ :H└ PDNH└ GHFLVLRQV└ EDVHG└ RQ└ ZKDW└ LV└ GRW└
RQD└ DQ└ DFWXDO└ FRQIOLFW└ └ EXW└ ZKDW└ LV└ DQ└ DSSHDUDQFH└ RI└ FRQIOLFW◀ └ :RXOG└ \RX└
DJUHH└ WKDWW└ LPSRUWDQW'

358,77 └
,└ EHOLHYH└ WKDWW└ LPSRUWDQW└ └ 6HQDWRU◀

+$55,6 └
2.◀ └ $QG└ VR└ └ RQ└ WKLV└ LWXH└ RI└ ZKHWKHU└ RU└ GRW└ \RX└ ZRXOG└ EH└ UHFXVHG└ LI└ \RX└
DUH└ GRPLQDWHG└ DQG└ DFWXDOO└ YRWHG└ LQ└ DV└ WKH└ DGPLQLWUDWRU└ RI└ WKH└ (3$└ └
\RX└ KDYH└ VDLG└ WKDW└ \RX└ ZLOO└ UHFXVH└ \RXUHOI└ IURP└ WKH└ FDVHV└ \RXU└ RI ILFH└
KDV└ EHHQ└ LQYROYHG└ ZLWK└ LI└ GLUHFWHG└ WR└ GR└ WKDW◀ └ 'R└ \RX└ DJUHH└ WKDW└ \RX└ DOVR└
KDYH└ WKH└ GLVFUHWLRQ└ WR└ UHFXVH└ \RXUHOI└ IURP└ WKRVH└ FDVHV"

358,77 └
,└ ┼ ┼ └ ,└ EHOLHYH└ └ 6HQDWRU└ └ WKH└ UXCHV└ RI└ SURIHVVLRQDO└ FRQGXFW└ └ LQ└ DGGLWLRQ└ WR└
/KH└ UHYLHZ└ WKDW└ 2*(└ └ HWKLFV└ FRXQVHO└ DQG◀ ◀ ◀

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +ROGV└ +HDUL3DJH└ ┴ RI└

+$55,6 └
'R└ \RX└ EHOLHYH└ WKDW└ \RX└ KDYH└ WKH└ GLVFUHWLRQ└ WR└ UHFXVH└ \RXUVHOI└ IURP└ WKH└
FDVHV└ WKDW└ \RX└ ZHUH└ LQYROYHG└ ZLWK└ DV└ DWWRUQH\└ JHQHUDO"

358,77 └
,└ WKLQN└ LWW└ DFWXDOO\└ WWURQJHU└ WKDQ└ WKDW☼ └ 6HQDWRU◀ └ ,└ DFWXDOO\└ KDYH└ DQ└
REOLJDWLRQ☼ └ LQ└ WKRVH└ LQWDQFHV☼ └ DV└ GLUHFWHG└ E\└ HWKLFV└ FRXQVHO◀ └ $QG└ WKDWW└
WKH└ UHDVRQ└ ,└ LQGLFDWHG└ HDUOLHU☼ └ WKDW└ ,└ ZLOO◀ ◀ ◀

+$55,6 └
,QGHSHQGHQW└ RI└ DQ\└ GLUHFWLRQ└ IURP└ HWKLFV└ FRXQVHO☼ └ GR└ \RX└ DJUHH└ \RX└
KDYH└ WKH└ GLVFUHWLRQ└ WR└ UHFXVH└ \RXUVHOI└ IURP└ WKRVH└ FDVHV"

358,77 └
,└ EHOLHYH└ WKDW└ LWW└ LPSRUWDQW└ WR└ PDLQWDLQ◀ ◀ ◀

+$55,6 └
,P└ DVNLQJ└ DERXW└ ZKHWKHU└ RU└ QRW└ \RX└ DFWXDOO\└ KDYH└ WKH└ GLVFUHWLRQ☼ └ WKH└
SRZHU☼ └ WR└ UHFXVH└ \RXUVHOI◀

358,77 └
3DUW└ RI└ ┼ ┼ └ SDUW└ RI└ WKH◀ ◀ ◀

+$55,6 └
'R└ \RX└ GLVDJUHH└ RU└ DJUHH└ ZLWK└ WKDW'

358,77 └
3DUW└ RI└ WKH└ GLVFUHWLRQ└ ┼ ┼ └ SDUW└ RI└ ┼ ┼ └ WKHUHV└ D└ GLVFUHWLRQ└ WR└ UHFXVH◀

+$55,6 └
&CHDUO\◀ └ <RXUH└ IDPLOLDU└ ZLWK◀ ◀ ◀

358,77 └
,└ MXWW└ ZDQW└ WR◀ ◀ ◀

KWWS ↕ ↕ ZZZ◀ FT◀ FRP↕ GRF↕ FRQJUHVVLR┼DQWUDQVFULSWW "¶ ┴ SULQWWUXH ¶ ┼ ↕!!
ED_001863D_00006896-00082

+$55,6 └
◀ ◀ ◀ └ WKH└ FHDQ└ ┼ ┼ └ \RXUH└ IDPLOLDU└ ZLWK└ WKH└ &HDQ└ $LU└ $FW☼ └ \HV"

358,77 └
,P└ VRUU\☼ └ 6HQDWRU"

+$55,6 └
<RX└ DUH└ IDPLOLDU└ ZLWK└ WKH└ &HDQ└ $LU└ $FW'

358,77 └
, └ DP◀

+$55,6 └
$QG└ DV└ \RX└ PD\└ NQRZ☼ └ 6HFWLRQ└ ┴ !! ☼ └ 6XEGLYLVLRQ└ %└ RI└ WKH└ &HDQ└ $LU└ $FW└
UHFRJQL]HV└ &DOLIRUQLDV└ DXWKRULWW└ WR└ LWXH└ DLU└ SRODXWLRQ└ WDQGDUGV└ IRU└ QHZ└
PRWRU└ YHKLFHV└ WKDW└ JR└ DERYH└ DQG└ EH\RQG└ IHGHUDO└ WDQGDUGV◀

7KH└ (3$└ KDV└ KLWRULFDOO\└ UHFRJQL]HG└ &DOLIRUQLDV└ DXWKRULWW└ WR└ LWXH└ QHZ└
PRWRU└ YHKLFH└ SRODXWLRQ└ WDQGDUGV└ WKDW└ JR└ DERYH└ DQG└ EH\RQG└ IHGHUDO└
WDQGDUGV◀ └ ,Q└ \RXU└ RSHQLQJ└ WDWHPHQW☼ └ \RX└ ZULWH☼ └ | ,W└ LV└ QRW└ (3$V└ PLWLRQ└
/R└ EH└ DJDLQWW└ VHFWRUV└ RI└ LQGXWUW\☼ └ LQ└ JHQHUDO☼ └ RU└ DJDLQWW└ SDUWLFXODU└ WDWHV◀ |

:LOO└ \RX└ FRPPLW☼ └ WKHQ☼ └ WR└ XSKROGLQJ└ WKDW└ VDPH└ WDQGDUG└ LQ└ UHFRJQL]LQJ└
&DOLIRUQLDV└ DXWKRULWW└ WR└ LWXH└ LWW└ RZQ└ QHZ└ PRWRU└ YHKLFH└ DLU└ SRODXWLRQ└
WDQGDUGV"

358,77 └
1RZ└ 6HQDWRU☼ └ DV└ \RX└ LQGLFDWHG☼ └ &DOLIRUQLD└ ZDV└ DFWXDOO\└ UHJXODWLQJ└ WKRVH└
WDQGDUGV└ EHIRUH└ WKH└ (3$└ ZDV└ DFWXDOO\└ FUHDWHG☼ └ ZKLFK└ LV└ ZK\└ WKH└
&DOLIRUQLD└ ZDLYHU└ H[LWW☼ └ XQGHU└ WDWXWH◀

+$55,6 └
'R└ \RX└ DJUHH└ WR└ XSKROG└ WKDW└ VDPH└ WDQGDUG└ WKDW└ KDV└ EHHQ└ KHOG└ E\└ \RXU└
SUHYLRXV└ ┼ ┼ └ SUHYLRXV◀ ◀ ◀

358,77 └

,└ DJUHH└ WR└ UHYLHZ└ WKDW└ DV└ HDFK◀ ◀ ◀

+$55,6 └
◀ ◀ ◀ └ DGPLQLWWUDWRUV"

358,77 └
◀ ◀ ◀ └ DGPLQLWWUDWRU└ EHIRUH└ PH└ KDV◀ └ ,WW└ EHHQ└ JUDQWHG└ DW└ WLPHV☼ └ DQG└ GHQLHG└ DW└ /LPHV◀

+$55,6 └
'R└ \RX└ DJUHH└ WR└ XSKROG└ LW'└ 5HYLHZLQJ└ DQG└ XSKROGLQJ└ DUH└ WZR└ GLIIHUHQW└ SRLQWV◀

358,77 └
6HQDWRU☼ └ DV└ \RX└ NQRZ☼ └ DGPLQLWWUDWRUV└ LQ└ WKH└ SDWW└ KDYH└ QRW└ JUDQWHG└ WKH└ ZDLYHU☼ └ DQG└ LQ└ IDFW☼ └ KDYH└ JUDQWHG└ WKH└ ZDLYHU◀ └ 7KDW└ D└ UHYLHZ└ SURFHW└ /KDW└ ZLOO└ EH└ FRQGXFWHG◀ ◀ ◀

♂ &52667$/.□

+$55,6 └
:KDW└ LV└ \RXU└ LQWHQWLRQ☼ └ VLU"

358,77 └
,└ GRQW└ NQRZ└ ZLWKRXW└ JRLQJ└ WKURXJK└ WKH└ SURFHW└ WR└ GHWHUPLQH└ WKDW☼ └
6HQDWRU◀ └ $QG└ ZRXOG└ ┼ ┼ └ RQH└ ┼ ┼ └ RQH└ ZRXOG└ QRW└ ZDQW└ WR└ SUHXXPH└ WKH└ RXWFRPH◀

+$55,6 └
,Q└ WKH└ ¶ ┤ └ FDVHV└ WKDW└ KDYH└ EHHQ└ SUHYLRXVO\└ PHQWLRQHG☼ └ LQ└ HDFK└ RI└ WKRVH└ FDVHV☼ └ UHJXODWHG└ FRPSDQLHV└ ZHUH└ DOVR└ D└ SDUW└ WR└ \RXU└ VXLWW◀ └ ,V└ WKDW└ FRUUHFW"

358,77 └
,Q└ VRPH└ LQVWDQFHV☼ └ \HV◀

+$55,6 └
,Q└ PRWW└ RI└ WKHP◀ └ &DQ└ \RX└ QDPH└ D└ IHZ└ LQWDQFHV└ LQ└ ZKLFK└ \RX└ KDYH└ ILCHG└
D└ CDZVXLW└ LQ└ \RXU└ LQGHSHQGHQW└ FDSDFLW└ DV└ DWWRUQH└ JHQHUDO└ DJDLQW└ D└
FRUSRUDWH└ HQWLW└ IRU└ YLRODWLQJ└ WWDWH└ RU└ IHGHUDO└ SROOXWLRQ└ CDZV"

358,77 └
6HQDWRU└ , └ KDYH└ D└ OLW└ KHUH└ WKDW└ EHHQ└ SURYLGHG└ WR◀ ◀ ◀

+$55,6 └
&DQ└ \RX└ QDPH└ WKHP└ SCHDVH"

358,77 └
6XUH◀ └ 7KHUHV└ D└ OLW└ WKDW└ ┼ ┼ └ WKDW└ KDV└ EHHQ◀ ◀ ◀

+$55,6 └
&DQ└ \RX└ QDPH└ RQH"

358,77 └
<HV◀ └ 7KH└ ┼ ┼ └ WKH└ ILUW└ LV└ WKH└ 0DKDUG└ (JJ└)DUP└ LQYROYLQJ└ D└ &$7+2└ ♂ SK□ └
VLWXDWLRQ└ DQG└ D└ FCHDQXS└ RI└ D└ CDUJH└ KHQ└ RSHUDWLRQ└ WKDW└ DI IHFWHG└ ZDWHU└
TXDOLW└ &HDFR└ 0DQXIDFWXULQJ◀ ◀ ◀

♂ &52667$/.□

+$55,6 └
'LG└ \RX└ ILCH└ D└ CDZVXLW└ LQ└ WKDW└ FDVH└ VLU"

358,77 └
, └ ┼ ┼ └ , └ GLG└ 6HQDWRU◀

+$55,6 └
2.◀ └ $QG└ ZKDW└ ZDV└ WKH└ RXWFRPH└ RI└ WKDW└ FDVH"

358,77 └
:H└ UHFHLYHG└ D└ JRRG└ RXWFRPH└ DJDLQW└ WKHP◀

+$55,6 └
$QG└ WKH└ QDPH└ RI└ WKDW└ HQWLW└ ZDV└ ZKDW'

358,77 └
0DKDUG└ (JJ└)DUP◀

+$55,6 └
$QG└ FDQ└ \RX└ QDPH└ DQ└ R\KHU└ FDVHV└ ZKHUH└ \RX└ KDYH└ DFWXDOO└ ILCHG└ D└
QDZVXLW└ DJDLQWW└ D└ FRUSRUDWH└ HQWLW└ IRU└ YLRODWLQJ└ IHGHUDO└ SRODXWLRQ└ QDZV"

358,77 └
,Q└ IDFW└ └ WKDW└ FDVH└ ZDV└ EURXJKW└ LQ└ FRQQHFWLRQ└ ZLWK└ WKH└ (3$◀ └ $QG└ ,└ ZDQW└ WR└
DGGUHV└ VRPHWKLQJ└ └ 6HQDWRU◀ └ (DUOLHU└ └ ZKHQ└ \RX└ VD\└ LQGHSHQGHQW└
FDSDFLW└ └ WKRVH└ FDVHV└ WKDW└ \RX└ UHIHUUHG└ WR└ └ WKH└ OLW└ RI└ FDVHV└ ZHUH└ DV└ DQ└
H[WHQVLRQ└ RI└ WKH└ '(4└ LQ└ WKH└ 6XDWH└ RI└ 2NODKRPD└ └ DQ└ H[WHQVLRQ└ RI└ WKH└
DJHQFLHV└ DW└ WKH└ IHGHUDO└ + + └ WKH└ WXDWH└ CHYHD└ └ WKDW└ KDG└ DXWKRULW└ └ JUDQWHG└ WR└
/KHP└ E\└ WKLV└ ERG\└ WKDW└ ZH└ ZHUH◀ ◀ ◀

♂ &52667$/.□

+$55,6 └
$QG└ ,└ XQGHUWDQG└ + + └ ,└ XQGHUWDQG└ WKDW└ URCH└ └ DV└ D└ IRUPHU└ DWWRUCH└ JHQHUDO└ └
EXW└ WKDW└ LV└ \RX└ UHSUHVHQWLQJ└ \RXU└ FOLHQW◀ └ ,P└ DVNLQJ└ DERXW└ \RXU└
LQGHSHQGHQW└ FDSDFLW└ DV└ WKH└ DWWRUCH└ JHQHUDO└ RI└ \RXU└ WDWH◀ └ /HW└ PRYH└
RQ◀

2Q└ WKH└ LVXH└ RI└ PHUFXU└ ◀ ◀ ◀

?&$55$662 └
,└ ZRXOG└ + + └ ,└ ZRXOG└ + + └ ,└ ZRXOG└ VXJJHW└ WKDW└ WKH└ VHQDWRU└ WLPH└ KDV└ H[SLUHG◀

+$55,6 └
7KDQN└ \RX◀

?&$55$662 └
,Q└ WHUPV└ RI└ PRYLQJ└ RQ◀ └ 7KDQN└ \RX◀

,└ ZRXOG└ OLNH└ WR└ LQWURGXFH└ IRU└ WKH└ UHFRUG└ DQ└ LQGHSHQGHQW└ ┼ ┼ └ D└ CHWWHU└ E\└
-◀ '◀ └ 6WURQJ└ ZKR└ LV└ WKH└ GLUHFWRU└ RI└ WKH└ 2NOCKRPD└ 'HSDUWPHQW└ RI└ :LOGOLIH└
&RQVHUYDWLRQ└ ZKR└ LQ└ UHIHUHQFH└ WR└ WKH└ VXEPLWWLRQ└ UHFHQWO\└ E\└ WKH└
UDQNLQJ└ PHPEHU└ PDNHV└ UHIHUHQFH└ WR└ WKH└ ┼ ┼ └ WKDW└ IRUPHU└ HPSOR\HH└ ZKR└
LV└ UHWLUHG└ IURP└ WKH└ 6WDWH└ RI└ 2NOCKRPD└ DQG└ LV└ FXUUHQWO\└ VHUYLQJ└ DV└ YLFH└
FKDLUPDQ└ RI└ WKH└ 2NOCKRPD└ FKDSWHU└ RI└ WKH└ 6LHUUD└ &OXE◀

6R└ WKDW└ WKH└ UHIHUHQFHV└ DUH└ IURP└ QRZ└ VRPHRQH└ ZKR└ LV└ QR└ QRQJHU└ D└ WDWH└
HPSOR\HH└ EXW└ WKH└ YLFH└ FKDLUPDQ└ RI└ WKH└ 2NOCKRPD└ FKDSWHU└ RI└ WKH└ 6LHUUD└
&OXE◀ └ %XW└ WKLV└ CHWWHU└ IURP└ 0U◀ └ 6WURQJ└ JRHV└ WR└ WDON└ DERXW└ WKH└ HIIRUW└ E\└
$WWRUQH\└ *HQHUDO└ 3UXLWW└ └ ZKR└ VD\V└ └ |)RU└ WKH└ SDWW└ VL[└ \HDUV└ └ *HQHUDO└
3UXLWW└ KDV└ EHHQ└ LQWWUXPHQWDO└ LQ└ PDQ\└ RI└ RXU└ VXFFHVVHV└ └ DQG└ KDV└ QHYHU└
DVNHG└ PH└ WR└ FRPSURPLVH└ UHJXODWRU\└ HIIRUWV└ WR└ EHQHILW└ LQGXVWU\◀ |

+H└ VD\V└ └ | 2Q└ WKH└ FRQWUDU\└ └ DOO└ RI└ RXU└ SURVHFWV└ DQG└ FDVHV└ WKDW└ LQYROYHG└ KLV└
RIILFH└ ZHUH└ JLYHQ└ WDII└ VXSSRUW└ DW└ WKH└ KLJKHVW└ CHYHO└ └ DQG└ PRUH└ RIWHQ└ WKDQ└
QRW└ └ UHVXOWHG└ LQ└ PRUH└ WUULQJHDW└ HQYLURQPHQWDO└ SURWHFWLRQ◀ └ +H└ KDV└ EHHQ└ D└
WWURQJ└ DOO\└ LQ└ GHIHQGLQJ└ RXU└ DELOLW\└ WR└ FRQWLQXH└ WKH└ JUHDW└ SURJUHVV└ WKDW└ ZH└
PDGH└ LQ└ SURWHFWLQJ└ 2NOCKRPDV└ HQYLURQPHQW◀ |

&$53(5 └
0U◀ └ &KDLUPDQ└ └ PD\└ ,└ DVN└ LQ└ UHVSRQVH└ └ CHW└ PH└ MXWW└ DVN└ IRU└ XQDQLPRXV└
FRQVHQW└ WR└ └ IRU└ WKH└ UHFRUG└ ┼ ┼ └ DQG└ WKLV└ LV└ RQ└ EHKDOI└ RI└ 6HQDWRU└ :KLWHKRXVH└ └
UHEXWWDO└ DUJXPHQW└ ┼ ┼ └ DUWLFOHV└ IRU└ 0U◀ └ 3UXLWW└ FODLP└ RQ└ OLWLJDWLRQ└ DJDLQWW└
IRWWLO└ FRPSDQLHV◀

7RSOLGH└ SRLQWW└ IURP└ WKHVH└ DUWLFOHV└ DUH└ RQH└ WKDW└ WKH└ DUH└ IUDXG└ FDVHV└ └
ILUWW└ DQG└ IRUHPRWW◀ └ 6HFRQG└ └ VRPH└ ZHUH└ EURXJKW└ E\└ KLV└ SUHGHFHVVRU└ └
'UHZ└ (GRQGVRQ◀ └ 7KH└ FDVH└ ┼ ┼ └ WKLUG└ SRLQW└ └ FDVH└ DJDLQWW└ %3└ ZDV└ ILCHG└
DQG└ CHIW└ GRUPDQW└ └ DW└ CHDWW└ SHU└ ((└ SXEOLFDWLRQ◀ └ $QG└ DOVR└ WKDW└ 0U◀ └ 3UXLWW└
IRXJKW└ DJDLQWW└ WKH└ SDWWLFLSDWLRQ└ RI└ WWDWH└ ZKLWWOHEORZHUV└ LQ└ WKH└ OLWLJDWLRQ◀ └
7KDW└ ZDV└ D└ UHIHUHQFH└ WR└ D└ TXL└ WDP└ DFWLRQ◀ └ 7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └
:LWKRXW└ REMHFWLRQ◀

6HQDWRU└ 6XOOLYDQ◀

68//,9$1 └
7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

$QG└ *HQHUDO└ 3UXLWW└ LWW└ JRRG└ WR└ VHH└ \RX└ DJDLQ◀ └ 7KDQN└ \RX└ IRU└ \RXU└ ZLOOLQJQHVV└ WR└ VHUYH◀

358,77 └
7KDQN└ \RX└ 6HQDWRU◀

68//,9$1 └
$QG└ WR└ \RXU└ IDPLO\◀ └ $V└ \RX└ NQRZ└ LWW└ D└ WHDP└ HI IRUW└ VR└ ,└ ZDQW└ WR└ WKDQN└ /NHP└ DV└ ZHOO◀

,└ DSSUHFLDWHG└ \RXU└ RSHQLQJ└ WDWHPHQW└ SDUWLFXODUO\└ \RXU└ ┼ ┼ └ \RXU└ ZULWWHQ└ WDWHPHQW◀ └ $QG└ ,└ ZDQW└ WR└ HPSKDVL]H└ ZH└ DOO└ ZDQW└ FHDQ└ DLU◀ └ :H└ DOO└ ZDQW└ FHDQ└ ZDWHU◀ └ 0\└ WDWH└ RI└ $DVND└ KDV└ VRPH└ RI└ WKH└ FHDQHVW└ DLU└ FHDQHVW└ ZDWHU└ SULWWLGH└ HQYLURQPHQW└ OLWHUDOO\└ LQ└ WKH└ ZRUOG◀

?&XW└ \RXU└ HPSKDVLV└ RQ└ WKH└ DELOLW\└ WR└ GR└ ERWK└ WR└ JURZ└ DQ└ HFRQRP\└ WR└ GHYHORS└ RXU└ UHVRXUFHV└ UHVSRQVLEO\└ DQG└ SURWHFW└ WKH└ HQYLURQPHQW└ ,└ WKLQN└ LV└ YHU\└ YHU\└ LPSRUWDQW└ DQG└ ,└ DSSUHFLDWH└ WKDW└ IRFXV◀ └ ,└ EHOLHYH└ WKH└ (3$└ QHHGV└ D└ VHULRXV└ FRXUVH└ FRUUHFWLRQ◀ └ $V└ 6HQDWRU└ (QJW└ WDONHG└ DERXW└ └ /NHUHV└ D└ CRW└ RI└ DQJHU└ HYHQ└ IHDU└ RI└ WKLV└ DJHQF\└ WKURXJKRXW└ PDQ\└ SDUW└ RI└ /NH└ FRXQWU\◀

$QG└ ,└ EHOLHYH└ \RX└ DUH└ WKH└ ULJKW└ SHUVRQ└ WR└ SURYLGH└ WKDW└ FRXUVH└ FRUUHFWLRQ└ DQG└ GR└ VRPHWKLQJ└ WKDW└ LV└ YHU\└ LPSRUWDQW└ ZKLFK└ LV└ UHJDLQ└ WKH└ WUXW└ RI└ WKH└ $PHULFDQ└ SHRSOH└ WKDW└ ,└ WKLQN└ KDV└ EHHQ└ CRW└ LQ└ D└ CRW└ RI└ SCDFHV└ LQ└ $PHULFD└ EHFDXVH└ RI└ WKH└ RYHU┼ UHDFK└ EHFDXVH└ RI└ WKH└ CDFN└ RI└ IRFXVLQJ└ RQ└ WKH└ CDZ◀

6R└ WKHUHV└ EHHQ└ D└ CRW└ RI└ GLVFXVVLRQ└ WKLV└ PRUQLQJ└ DERXW└ FRRSHUDWLYH└ IHGHUDOLVP◀ └ $QG└ FDQ└ \RX└ H[SODLQ└ LW└ LQ└ D└ OLWWOH└ PRUH└ GHWDLO"└ ,V└ WKDW└ \RXU└ /NHUP└ RU└ LV└ WKDW└ D└ WHUP└ WKDW└ ┼ ┼ └ GLG└ \RX└ FRPH└ XS└ ZLWK└ WKDW"└ 2U└ LV└ WKDW└ \RPHWKLQJ└ WKDW└ ZDV└ DFWXDOO\└ GLUHFWHG└ E\└ &RQJUHVV"

358,77 └
'LUHFWHG└ E\└ &RQJUHVV└ 6HQDWRU◀

68//,9$1 └

$QG└ VR☼ └ LQ└ WKH└ &HDQ└ $LU└ $FW└ DQG└ WKH└ &HDQ└ :DWHU└ $FW☼ └ ZKR└ ZDV└ JLYHQ└ ┼ ┼ └ ZKDW└ HQWLW\☼ └ LQ└ RXU└ 5HSXEOLFDQ└ IRUP└ RI└ JRYHUQ└ ZDV└ ┼ ┼ └ JRYHUQPHQW☼ └ ZDV└ JLYHQ└ WKH└ SULPDU\└ UHVSRQVLELOLW\└ RYHU└ FHDQ└ DLU└ DQG└ FHDQ└ ZDWHU└ LQ└ WKH└ 8QLWHG└ 6WDWHV"

358,77 └
:HOO└ DV└ \RX└ NQRZ☼ └ 6HQDWRU☼ └ XQGHU└ WKH└ &HDQ└ $LU└ $FW☼ └ WKHUH└ DUH└ VRPH└ ┼ ┼ └ /NHUHV└ VRPHWKLQJ└ FDOOHG└ WDWH└ LPSOHPHQWDWLRQ└ SODQV☼ └ WKDW└ WKH└ (3$└ DQG└ /NH└ WDWHV└ UHYLHZ└ WRJHWKHU◀ └ %XW└ WKH└ WDWHV└ KDYH└ WKDW└ UHVSRQVLELOLW\◀ ◀ ◀

68//,9$1 └
6R└ LV└ LW└ DQ◀ ◀ ◀

358,77 └
◀ ◀ ◀ └ RI└ DGRSWLQJ└ D└ SODQ◀

68//,9$1 └
,VQW└ LW└ FRUUHFW☼ └ DFWXDOO\└ LQ└ WKH└ ODZ☼ └ LW└ VD\V◀ ◀ ◀

358,77 └
,W└ LV◀

68//,9$1 └
◀ ◀ ◀ └ WKH└ SULPDU\└ UHVSRQVLELOLW\☼ └ XQGHU└ WKH└ &HDQ└ $LU└ $FW└ DQG└ FHDQ└ ZDWHU└ ┼ ┼ └ DQG└ ZKR└ GLUHFWHG└ WKDW'

358,77 └
&RQJUHVV◀

68//,9$1 └
2.◀ └ 6R└ ZKHQ└ \RXUH└ WDONLQJ└ DERXW└ FRRSHUDWLYH└ IHGHUDOLVP☼ └ WKDW└ QRW└ VRPH└ 6FRW└ 3UXLWW┼ LQYHQWHG└ ┼ ┼ └ \RX└ DUH└ IRFXVLQJ└ RQ└ WKH└ LQWHQW└ RI└ WKH└ &RQJUHVV"

358,77 └

3UREDEO\└ PRUH└ VR└ WKDQ└ DQ\└ WDWXWHV└ WKDW└ KDYH└ EHHQ└ DGRSWHG└ E\└
&RQJUHVV└ KLWRULFDOO\└ WKH└ HQYLURQPHQWDO└ WDWXWHV└ WKDW└ ZH└ NQRZ└ IURP└
FHQDQ└ ZDWHU└ WR└ FHQDQ└ DLU└ WR└ 6DIH└ 'ULQNLQJ└ :DWHU└ $FW└ LQ└ PDQ\└ SLHFHV└ RI└
CHJLVODWLRQ└ &RQJUHVV└ KDV└ EHHQ└ YHU\└ H[SOLFLW└ YHU\└ VSHFLILF└ LQ└ VD\LQJ└ WKDW└
FRRSHUDWLYH└ IHGHUDOLVP└ WKH└ URCH└ RI└ WKH└ WDWHV└ LV└ LPSRUWDQW└ VKRXOG└ EH└
UHVSHFWHG└ DQG└ VKRXOG└ EH└ HPSKDVL]HG◀

68//,9$1└
6R└ CHW└ PH└ ┼ ┼ └ CHW└ PH└ VKRZ└ \RX└ D└ FKDUW└ KHUH◀ └ 7KLV└ LV└ WKH└ :DWHUV└ RI└ WKH└
8◀ 6◀ └ DQG└ WKH└ WDWHV└ DQG└ HQWLWLHV└ WKDW└ VXHG└ WR└ WWRS└ WKDW└ UXCH└ └ ┬ ┴ └
'HPRFUDW└ DQG└ 5HSXEOLFDQ└ DQG└ ,QGHSHQGHQW◀ └ 'R└ \RX└ WKLQN└ WKLV└ LV└ DQ└
H[DPSCH└ RI└ FRRSHUDWLYH└ IHGHUDOLVP"└ $QG└ LI└ GRW└ └ LI└ \RXUH└ FRQILUPHG└ ZKDW└
DUH└ \RX└ JRLQJ└ WR└ GR└ WR└ JHW└ EDFN└ WR└ ZKDW└ LV└ GRW└ D└ 6FRWW└ 3UXLWW└ LGHD└ LWW└ WKH└
GLUHFW└ GLUHFWLRQ└ RI└ WKH└ &RQJUHW└ RI└ WKH└ 8QLWHG└ 6WDWHV"

358,77└
6HQDWRU└ ZKHQ└ \RX└ ┼ ┼ └ ZKHQ└ \RX└ WKLQN└ DERXW└ WKH└ UHDWLRQWKLS└ EHWZHHQ└ WKH└
(3$└ DQG└ WKH└ WDWHV└ WKH└ WDWHV└ DUH└ GRW└ PHUH└ YHWHDV└ RI└ IHGHUDO└ ZLOO◀ └ 7KH\└
GRQW└ H[LWW└ VLPSO\└ WR└ FDUU\└ RXW└ IHGHUDO└ GLFWDWHV└ IURP└ :DWKLQJWRQ└ └ '◀ &◀ └
7KHUH└ DUH└ VXEWDQWLYH└ UHTXLUHPHQWW└ REOLJDWLRQW└ DXWKRULWW└ MXULVGLFWLRQ└
JUDQWHG└ WR└ WKH└ WDWHV└ XQGHU└ HQYLURQPHQWDO└ WDWXWHV◀

7KDW└ QHHGV└ WR└ EH└ UHVSHFWHG◀ └ :KHQ└ LWW└ GRW└ UHVSHFWHG└ └ WKDW└ LV└ ZKDW└
\SDZQHG└ PRWW└ RI└ WKLV└ OLWLJDWLRQ└ WKDW└ KDV└ EHHQ└ UHIHUHQFHG└ KHUH└ WRGD\◀ └
$QG└ ZK\└ GRHV└ LW└ VSDZQ└ LW'└ %HFDXVH└ LW└ PDWWHUV◀ └ ,W└ PDWWHUV└ WKDW└ WKH└ WDWHV└
SDUWLFLSDWH└ LQ└ WKH└ ZD\└ WKDW└ &RQJUHW└ KDV└ GLUHFWHG└ └ DQG└ WKH\YH└ EHHQ└
XQDECH└ WR└ GR└ VR└ IRU└ D└ QXPEHU└ RI└ \HDUW◀

68//,9$1└
6R└ DJDLQ└ └ FRRSHUDWLYH└ IHGHUDOLVP└ └ \RXUH└ FDUU\LQJ└ RXW└ WKH└ ZLOO└ RI└
&RQJUHW└ ZKHQ└ \RXUH└ IRFXVHG└ RQ└ WKDW└ LWXH"

358,77└
7KDW└ H[DFWO\└ ULJKW◀ └ 7KH└ H[SHUWLVH└ └ WKH└ UHVRXUFHW└ └ WKH└ NQRZCHGJH└ └ WKH└
DZDUHQHW└ RI└ KRZ└ WR└ IL[└ HQYLURQPHQWDO└ LWXHW└ DW└ WKH└ CRFDO└ CHYHD└ └ LV└
\RPHWKLQJ└ WKDW└ LPSRUWDQW└ IRU└ WKH└ HQWLUH└ FRXQWU\└ WR└ NQRZ◀

68//,9$1└

6R└ ,└ DP└ D└ IRUPHU└ DWWRUQH\└ JHQHUDO└ P\VHOI☼└ ZKR└ KDV└ VXHG└ WKH└ (3$◀└ $QG└ VRPH└ RI└ P\└ FROOHDJXHV└ RQ└ WKH└ RWKHU└ VLGH└ RI└ WKH└ DLVCH☼└ \RX└ NQRZ☼└ MXGJH└ %RRNHUV└ FRPPHQW└ ┼┼└ ,└ WKLQN└ KH└ WULHG└ WR└ HTXDWH└ D└ OLWWOH└ ELW☼└ VXLQJ└ WKH└ (3$☼└ QRW└ FDULQJ└ IRU└ 2NODKRPDV└ FKLOGUHQ◀└ 'R└ \RX└ FDUH└ DERXW└ 2NODKRPDV└ FKLOGUHQ"

358,77└
:LWKRXW└ TXHVWLRQ◀└ ,YH└ JRW└ D└ FRXSOH└ VLWWLQJ└ EHKLQG└ PH◀

68//,9$1└
)RXUWHQ└ ODZVXLWV└ ┼┼└ DQG└ DJDLQ☼└ 6HQDWRU└ %RR]PDQ└ PHQWLRQHG└ WKLV☼└ ZKDW└ KDV└ EHHQ└ WKH└ SULPDU\└ IRFXV└ RI└ WKRVH└ ODZVXLWV"└ ,W└ GRW└ WKDW└ \RX└ GRQW└ FDUH└ DERXW└ WKH└ HQYLURQPHQW☼└ LV└ LW'

358,77└
$EVROXWHO\└ QRW◀└ ,└ PHDQ☼└ LW└ VRPH└ ┼┼└ ,└ FDUH└ YHU\└ PXFK└ DERXW└ WKH└ HQYLURQPHQW◀└ ,W└ WR└ UHWXUH└ WKH└ ┼┼└ WKH└ UHDWLRQKLS☼└ DQG└ HQVXUH└ WKH└ UHDWLRQKLS└ WKDW└ &RQJUHVV└ KDV└ GLUHFWHG☼└ WKH└ URCH└ RI└ WKH└ WDWHV└ LQ└ LPSURYLQJ└ RXU└ HQYLURQPHQW◀

7KHUHV└ DQ└ LGHD└ LQ└ ┼┼└ LQ└ :DVKLQJWRQ☼└ WKDW└ WKH└ WDWHV☼└ WKRVH└ LQ└ 2NODKRPD☼└ RU└ LQ└ $DMND☼└ RU└ RWKHU└ SDUW└ RI└ WKH└ FRXQWU\☼└ GRQW└ FDUH└ DERXW└ WKH└ ZDWHU└ ZH└ GULQN└ RU└ WKH└ DLU└ ZH└ EUHDWKH◀└ 7KH└ IDUPHUV└ DQG└ UDQFKHUV☼└ WKRVH└ LQ└ LQGXWU\└ LQ└ WKH└ 6WDWH└ RI└ 2NODKRPD└ WKDW└ ,P└ ┼┼└ PRXW└ RI└ WKHP└ DUH└ YHU\└ FRPPLWWHG└ WR└ WKDW◀└ :KHQ└ WKH\└ KDYH└ GRW└ EHHQ☼└ ZH└ KDYH└ WDNHQ└ HQIRUFHPHQW└ DFWLRQ└ DJDLQXW└ WKHP◀

68//,9$1└
$QG└ ┼┼└ DQG└ MXXW└ RQH└ ILQDO└ TXHVWLRQ◀└ $QG└ D└ CRW└ RI└ P\└ FROOHDJXHV└ RQ└ WKH└ RWKHU└ VLGH└ RI└ WKH└ DLVCH└ VSHQG└ D└ CRW└ RI└ WLPH└ ┼┼└ DQG└ ,└ WKLQN└ 6HQDWRU└ 6DQGHUV└ LV└ XS└ QH[W☼└ YLOLI\LQJ└ WKH└ RLO└ DQG└ JDV└ LQGXWU\☼└ DV└ VRPHKRZ└ EDG└ DFWRUV☼└ SROOXWHUV◀└ $FFRUGLQJ└ WKH└ $PHULFD└ 3HWUROHXP└ ,QVWLWXWH☼└ ┬ ├ ┤ ☼ !! !! !! └ 2NODKRPDQV└ ZRUN└ LQ└ WKH└ RLO└ DQG└ JDV└ LQGXWU\└ RU└ UHDWHG└ VHUYLFH└ VHFWRUV◀

$UH└ WKHVH└ SHRSOH└ EDG└ DFWRUV"└ $UH└ WKH\└ SROOXWHUV"└ &RXOG└ \RX└ GHVFULEH└ ┼┼└ \RX└ WDON└ DERXW└ WKH└ JRRG└ SHRSOH└ LQ└ \RXU└ ZULWWHQ└ WDWHPHQW◀└ :KR└ DUH└ WKHVH└ SHRSOH"└ $QG└ DUH└ \RX└ UHSUHVHQWLQJ└ WKHP☼└ ZKHQ└ \RXUH└ EULQJLQJ└ WKHVH└ NLQG└ RI└ DFWLRQV"└ $UH└ WKH\└ HYLO└ SHRSOH"

358,77 └

1R☼ └ 6HQDWRU◀ └ 7KH\UH└ ┼ ┼ └WKH\└ ZDQW└ WR└ FRPSO\└ ZLWK└ WKH└ CDZ◀ └ 7KH\└ ZDQW└ WR└ NQRZ└ ZKDW└ H[SHFWHG└ RI└ WKHP◀ └ 7KH\└ FDUH└ DERXW└ WKH└ DLU└ WKH\└ EUHDWKH☼ └ DQG└ WKH└ ZDWHU└ WKH\└ GULQN☼ └ DQG└ WKH\└ ZDQW└ WR└ PDNH└ VXUH└ WKDW└ WKH└ (3$└ LV└ SDUWQHULQJ└ ZLWK└ WDWH└ DJHQFLHV└ DQG└ LQGXWU\└ WR└ HQVXUH└ WKDW└ WKDW└ RXWFRPH└ RFFXUV◀

68//,9$1 └

$QG└ DUHQW└ WKHVH└ KXQGUHGV└ RI└ WKRXVDQGV└ RI└ SHRSOH└ SDUW└ RI└ WKDW└ LQGXWU\"

358,77 └

$EVROXWHO\◀ └ ,Q└ IDFW☼ └ ┴ ↑ └ SHUFHQW└ RI└ RXU└ HQWLUH└ WDWH└ EXGJHW└ LQ└ 2NODKRPD└ LV└ IURP└ WKDW└ LQGXWU\◀ └ 7KLV└ LV└ D└ WDWH└ FRQFHUQ◀ └ $QG└ PRUH└ WKDQ└ WKDW☼ └ ZH└ KDYH└ VLJQLILFDQW└ UHJXODWLRQ└ RYHU└ WKLV└ LQGXWU\◀ └ 2XU└ &RUSRUDWLRQ└ &RPPLVVLRQ└ KDV└ RYHUVLJKW└ RYHU└ PDQ\└ RI└ WKHVH└ LVXHV◀ └ $QG└ VR└ ZH└ KDYH└ UHJXODWRU\└ ERGLHV☼ └ IURP└ '(4└ WR└ WKH└ &RUSRUDWLRQ└ &RPPLVVLRQ☼ └ WR└ RWKHUV☼ └ WKDW└ DUH└ LQYROYHG└ LQ└ PDNLQJ└ VXUH└ WKDW└ WKH└ DLU└ ZH└ EUHDWKH└ DQG└ WKH└ ZDWHU└ ZH└ GULQN└ LV└ ┼ ┼ └ LV└ FOHDU☼ └ LQ└ WKH└ 6WDWH└ RI└ 2NODKRPD◀

68//,9$1 └

7KDQN└ \RX◀

7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └

6HQDWRU└ *LOOLEUDQG◀

*,//,%5$1' └

7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

7KDQN└ \RX☼ └ 0U◀ └ 3UXLWW☼ └ IRU└ EHLQJ└ ZLOOLQJ└ WR└ VHUYH└ WKLV└ DGPLQLWUDWLRQ☼ └ IRU└ \RXU└ LQWHUHVW└ LQ└ SXEOLF└ VHUYLFH☼ └ DQG└ \RXU└ SDWW└ SXEOLF└ VHUYLFH◀

358,77 └

7KDQN└ \RX☼ └ 6HQDWRU◀

*,//,%5$1' └
,└ ZDQW└ WR└ WDON└ WR└ \RX└ DERXW└ VRPH└ RI└ WKH└ FRQWWLWXHQWW└ LQ└ P\└ WWDWH└ DQG└ WKH└ FKDOOHQJHV└ └ WKH└ YHU\└ UHDO└ FKDOOHQJHV└ ZH└ IDFH◀ └)LUWW└ └ ZH└ KDG└ PLOOLRQV└ RI└ SHRSOHV└ OLYHV└ XSHQGHG└ ZLWK└ VXSHU└ WWRUP└ 6DQG└ └ ,└ PHDQ└ PLOOLRQV└ RI└ SHRSOH◀ └ :H└ KDG└ SDUHQWW└ ZKR└ OWW└ WKHLU└ FKLOGUHQ└ └ ZKR└ GUZQHG└ └ EHFDXVH└ RI└ VXUJHV└ RI└ ZDWHU└ FRPLQJ└ WKURXJK└ WKHLU└ KRPHV└ └ WKURXJK└ WKH└ WWUHHWW◀

7KH└ ┼ ┼ └ WKH└ GHYDWWDWLRQ└ ZDV└ OLWHUDOO└ XQSDUDOOHOHG└ LQ└ P└ WWDWH◀ └ ,W└ ZDV└ MXWW└ \RPHWKLQJ└ ZH└ KDG└ QHYHU└ VHHQ└ EHIRUH◀ └ $QG└ ZH└ DUH└ JRLQJ└ WR└ EH└ OHRNLQJ└ WR└ \RX└ WR└ SUWHFW└ WKHVH└ IDPLOLHV└ └ DQG└ SUWHFW└ WKHVH└ FRPPXQLWLHV└ └ EHFDXVH└ ZH└ NQRZ└ └ ZLWK└ JOREDO└ FOLPDWH└ FKDQJH└ └ WKH└ LQFLGHQFH└ RI└ VXSHU└ WWRUPV└ DQG└ YLROHQW└ ZHDWKHU└ LPSDFWW└ LV└ FKDQJHG◀ └ ,WW└ YHU\└ └ YHU\└ GLIIHUHQW◀

$QG└ \RXYH└ DOUHDG\└ WROG└ IRONV└ WKDW└ \RX└ GR└ EHOLHYH└ WKDW└ JOREDO└ FOLPDWH└ FKDQJH└ LV└ UHDO◀ └ ,W└ KDV└ EHHQ└ FRWW└ E\└ ┼ ┼ └ FDXVHG└ E\└ KXPDQ└ DFWLYLWW◀ └ 'R└ \RX└ EHOLHYH└ DOVR└ WKDW└ VHD└ OHYHOV└ DUH└ ULVLQJ"

358,77 └
6HQDWRU└ └ ,└ EHOLHYH└ WKDW└ WKH└ (3$└ └ DGGUHWVLQJ└ WKLV└ LWXH└ EHFDXVH└ RI└ WKH└ 0DW└ Y◀ └ (3$└ FDVH└ └ DQG└ WKH└ HQGDQJHUHQW└ ILQGLQJ└ └ KDV└ REOLJDWLRQV└ WR└ DGGUHW└ WKH└ &2└ └ LWXH◀ └ 7KH└ ┼ ┼ └ LQ└ GRLQJ└ VR└ └ WKH└ QHHG└ WR└ LQYROYH└ WKH└ SUFHWVHV└ DV└ VHW└ XS└ E└ &RQJUHW◀ └ $QG└ ┼ ┼ └ DQG└ ┼ ┼ └ DQG└ VR└ ,└ WKLQN└ LW└ YHU└ LPSRUWDQW└ WR└ GR└ ERWK◀

*,//,%5$1' └
%XW└ ┼ ┼ └ EXW└ \RXYH└ WWXGLHG└ WKLV└ LWXH└ RI└ VHD└ OHYHOV◀ └ <RX└ GR└ UHDOL]H└ WKH└ DUH└ ULVLQJ◀ └ $QG└ LW└ RQH└ RI└ WKH└ UHDVRQ└ ZK└ WKHVH└ WWRUP└ VXUJHV└ ZHUH└ VR└ KLJK└ └ DQG└ GHYDWWDWLQJ└ FRPPXQLWLHV└ DOO└ DFURW└ 1HZ└ <RUN└ &LW◀ └ 6R└ ,└ QHHG└ \RX└ WR└ EH└ YLJLODQW└ └ EHFDXVH└ OLYHV└ DUH└ DW└ WWDNH◀ └ $QG└ ,└ WKLQN└ \RX└ KDYH└ WKH└ SXUYLHZ└ /R└ GR└ WKDW◀ └ :LOO└ \RX└ EH└ YLJLODQW'

358,77 └
6HQDWRU└ └ ZH└ ZLOO└ REYLRXVO└ DGGUHW└ WKRVH└ LWXHV└ WKDW└ ZH└ WDONHG└ DERXW└ LQ└ \RXU└ RIILFH◀ └ $QG└ ,└ DSSUHFLDWH└ \RXU└ SDWLRQ└ RQ└ WKLV└ LWXH◀

*,//,%5$1' └

2QH└ RI└ WKH└ RWKHU└ LWXHV└ WKDW└ ZH└ WDONHG└ DERXW└ └ WKDW└ ,└ WKLQN└ LV└ HTXDOO\└ DV└ FRQFHUQLQJ└ └ LV└ LWXHV└ RI└ PHUFXU\└ WKDW└ KDYH└ EHHQ└ UDLVHG└ └ DERXW└ DWWKPD└ UDWHV└ WKDW└ KDYH└ EHHQ└ UDLVHG└ └ DERXW└ JURXQG└ ZDWHU└ SRONXWHG◀ └ ,YH└ CRRNHG└ DW└ \RXU└ UHFRUG◀ └ 0RWW└ RI└ WKH└ CDZXLWW└ \RX└ ILCHG└ DV└ DWWRUCH\└ JHQHUDO└ ZHUH└ UHCDWHG└ WR└ EXVLCHWHV└ └ VSHFLILFDOO\└ ZKDW└ ZDV└ LPSRWDQW└ IRU└ \RXU└ WDWWH└ LQ└ /HUPV└ RI└ HPSOR\HUV└ DQG└ EXVLCHWHV◀

$QG└ WKH└ IHZ└ CDZXLWW└ \RX└ GLG└ ILCH└ DERXW└ KXPDQ└ VDIHW\└ ZHUH└ IHZ└ DQG└ IDU└ EHWZHHQ◀ └ %XW└ WKLV└ URCH└ DV└ WKH└ KHDG└ RI└ WKH└ (3$└ └ \RXUH└ JRLQJ└ WR└ KDYH└ D└ PXFK└ PRUH└ LPSRWDQW└ URCH└ WR└ SCD\◀ └ $QG└ ,└ ZDQW└ WR└ WDON└ VSHFLILFDOO\└ DERXW└ PHUFXU\◀ └ ,I└ \RX└ EHOLHYH└ WKDW└ PHUFXU\└ LV└ D└ WKUHDW└ WR└ SXEOLF└ KHDOWK└ └ EXW└ RSSRVH└ WKH└ UHPHG\└ RI└ UHGXFLQJ└ PHUFXU\└ DLU└ SRONXWLRQ└ IURP└ SRZHU└ SODQWW└ EHFDXVH└ LWW└ WRR└ FRWWO\└ └ ZKDW└ WKHQ└ GR└ \RX└ WKLQN└ \RX└ VKRXOG└ GR└ └ RU└ ZKDW└ VKRXOG└ EH└ GRCH└ WR└ DGGUHW└ WKH└ PHUFXU\└ SRONXWLRQ"

358,77 └

/HW└ PH└ VD\└ └ 6HQDWRU└ └ PHUFXU\└ LV└ VRPHWKLQJ└ ┼ ┼ └ LW└ LV└ D└ KD]DUGRXV└ DLU└ SRONXWDQW└ XQGHU└ 6HFWLRQ└ ¶ ¶ ⊥ ◀ └ ,W└ LV└ VRPHWKLQJ└ WKDW└ WKH└ (3$└ KDV└ DXWKRULW└ /R└ UHJXODWH└ DQG└ VKRXOG└ UHJXODWH◀ └ ,W└ VKRXOG└ GR└ VR└ └ WKRXJK└ └ ZLWKLQ└ WKH└ ┼ ┼ └ WKH└ IUDPHZRUN└ HXWDEOLVKHG└ E\└ WKLV└ ERG\◀ └ $QG└ WKH└ 6XSUHPH└ &RXUW└ VDLG└ WKDW└ /KH└ (3$└ GLG└ QRW└ IROORZ└ WKH└ FRXW┼ EHCHILW└ REOLJDWLRQ◀

,W└ QRW└ WKDW└ WKH└ ┼ ┼ └ WKH└ EHCHILW└ KDYH└ WR└ RXWZHLJK└ WKH└ FRW◀ └ ,W└ MXW└ WKDW└ /KH\└ VLPSO\└ GLGQW└ HQJDJH└ LQ└ D└ SURSHU└ UHFRUG┼ EDVHG└ VXSSRUW└ IRU└ WKHLU└ UXCH◀ └ $QG└ VR└ WKDW└ ┼ ┼ └ WKDW└ JRHV└ EDFN└ WR└ HDUOLHU└ TXHWLRQV└ ZLWK└ RWKHU└ VHQDWRUV└ DERXW└ WKH└ SURFHW└ PDWWHULQJ└ └ EHLQJ└ FRPPLWWHG└ WR└ WKH└ UXCH└ RI└ CDZ└ DQG└ WKH└ UXCHFDNLQJ└ DXWKRULW└ WKDW└ &RQJUHW└ KDV└ JLYHQ└ WKH└ (3$└ └ LQ└ PDNLQJ└ VXUH└ /KDW└ └ DV└ UXCHV└ DUH└ SDWHG└ └ WKDW└ WKH\└ FDQ└ EH└ XSKHDG└ LQ└ FRXW◀

*,//,%5$1' └

?%XW└ ,└ QHHG└ \RX└ DOVR└ WR└ EH└ ZRUUHG└ DERXW└ KXPDQ└ KHDOWK◀ └ ,└ ┼ ┼ └ ,└ XQGHUWDQG└ /KHUHV└ D└ FRW◀ └ %XW└ ZKHQ└ \RXUH└ WDONLQJ└ DERXW└ OLYHV└ └ DQG└ \RXUH└ WDONLQJ└ DERXW└ FKLOGUHQ└ ZKR└ FDQW└ EUHDWKH└ ┼ ┼ └ ,YH└ EHQ└ WR└ WKH└ HPHUJHQF\└ URRP└ DW└ ⊥ └ LQ└ WKH└ PRUQLQJ└ ZLWK└ D└ FKLOG└ ZKR└ FDQW└ EUHDWKH◀ └ ,W└ D└ KRUULECH└ WKLQJ◀

:HYH└ KDG└ FKLOGUHQ└ GLH└ LQ└ 1HZ└ <RUN└ &LW\└ └ EHFDXVH└ QRQH└ RI└ WKHLU└ /HDFKHUV└ └ QR└ DGPLQLWWUDWRUV└ LQ└ WKH└ VFKRRO└ NQHZ└ ZKDW└ WR└ GR└ ZKHQ└ D└ FKLOG└ KDV└ DQ└ DWWKPD└ DWWDFN◀ └ ,W└ D└ KXJH└ SURECHP◀ └ 6R└ ,└ QHHG└ \RX└ WR└ FDUH└ DERXW└

KXPDQ└ KHDOWK└ └ DQG└ ┼ ┼ └ DQG└ UHDOO└ EHOLHYH└ WKDW└ WKH└ FRWW└ └ ZKHQ└ KXPDQ└ KHDOWK└ LV└ DW└ ULVN└ └ ZKHQ└ SHRSOH└ DUH└ G\LQJ└ └ LV└ IDU└ KLJKHU└ WKDQ└ LW└ LV└ WKH└ FRWW└ W /KDW└ SRORXWHU└ WR└ FKHDQ└ XS└ WKH└ DLU└ └ DQG└ FKDQJH└ WKHLU└ SURFHVVHV◀

,└ QHHG└ \RX└ WR└ IHHO└ LW└ └ DV└ LI└ \RXU└ FKLOGUHQ└ └ VLWWLQJ└ EHKLQG└ \RX└ └ DUH└ WKH└ RQHV└ LQ└ WKH└ HPHUJHQF\└ URRP◀ └ ,└ QHHG└ \RX└ WR└ NQRZ└ LW◀

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$QG└ 6HQDWRU└ └ ,└ ZRXOG└ VD\└ WR└ \RX└ └ WKHUH└ DUH└ FHUWDLQ└ LQWDQFHV└ ZKHUH└ FRWW└ FDQW└ HYHQ└ EH└ FRQVLGHUHG└ └ DV└ \RX└ NQRZ◀ └ 7KRVH└ FULWHULD└ SRORXWDQW└ └ XQGHU└ DQ└ DFW└ └ SURJUDP└ └ FRWW└ LV└ QRW└ HYHQ└ D└ IDFWRU└ └ EHFDXVH└ KXPDQ└ KHDOWK└ LV└ WKH└ IRFXV◀

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6R└ QHW└ WDON└ DERXW└ WKDW◀ └ 6R└ \RX└ DQG└ ,└ SUHYLHZHG└ WKLV└ LQ└ P\└ RIILFH◀ └ :H└ KDYH└ D└ KRUULEOH└ SUREOHP└ LQ└ 1HZ└ <RUN└ 6WDWH└ └ ZLWK└ 6XSHUIXQG└ VLWHV└ └ DQG└ ZLWK└ JURXQG└ ZDWHU└ WKDW└ LV└ SRORXWHG◀ └ :H└ KDYH└ 3)2$└ LQ└ RXU└ ZDWHU◀ └ :H└ KDYH└ WKH└ QDUUHWW└ 38%└ 6XSHUIXQG└ VLWH└ LQ└ WKH└ 8QLWHG└ 6WDWHV└ LQ└ WKH└ +XGVRQ└ 5LYHU◀

:KHQ└ IDPLOLHV└ ZKR└ GRQW└ KDYH└ PRQH\└ ILVK└ LQ└ WKH└ +XGVRQ└ 5LYHU└ └ WKH\└ HDW└ /KRVH└ ILVK◀ └ 7KH\└ JHW└ LOO◀ └ ,W└ LV└ KRUULEOH◀ └ 7KH└ FRQWDPLQDQW└ DUH└ UHDO◀ └ 7KH\└ DUH└ SHUYDVLYH└ └ DQG└ WKH\└ DUH└ GHXWUR\LQJ└ OLYHV◀ └ 7KH\UH└ DOVR└ GHXWUR\LQJ└ WKH└ HFRQRP\└ └ EHFDXVH└ ZKHQ└ \RX└ KDYH└ FRQWDPLQDQW└ DOO└ RYHU└ WKH└ SODFH└ └ \RX└ FDQW└ VHOO└ \RXU└ KRXVH◀ └ <RX└ FDQW└ SXW└ LQ└ LQGXVWULHV└ WKDW└ DUH└ UHO\LQJ└ RQ└ /RXULVP◀

,W└ D└ KXJH└ SUREOHP◀ └ 6R└ 3)2$└ LV└ DQ└ H[DPSOH└ RI└ D└ ┼ ┼ └ RI└ D└ FKHPLFDO└ WKDW└ QHHGV└ WR└ EH└ WHXWHG◀ └ ,└ QHHG└ \RX└ WR└ SXW└ LW└ QXPEHU└ RQH└ RQ└ \RXU└ OLWW└ └ WR└ WHXW└ LW◀ └ $QG└ LI└ LW└ LV└ WKH└ FDUFLQRJHQ└ WKDW└ PDQ\└ VFLHQWLWW└ KDYH└ VDLG└ LW└ LV└ └ LW└ QHHGV /R└ EH└ EDQQHG◀

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7KH└ 76&$└ DXWKRULW\└ WKDW└ EHHQ└ JUDQWHG└ E\└ WKLV└ ERG\└ ┼ ┼ └ \RX└ DQG└ ,└ WDONHG└ DERXW└ WKDW└ LQ└ \RXU└ RIILFH└ └ 3)2$└ QHHGV└ WR└ EH└ DGGUHVVHG└ TXLFNO\└ HYHQ└ XQGHU└ WKH└ 6DIH└ 'ULQNLQJ└ :DWHU└ $FW└ DV└ ZHOO◀

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:LOO└ \RX└ FRPPLW└ WR└ GRLQJ└ WKDW└ ZRUN"

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<HV◀

*,//,%5$1' └
7KDQN└ \RX◀

7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └
7KDQN└ \RX☼ └ 6HQDWRU◀

6HQDWRU└ +DUSHU◀

+$53(5 └
0U◀ └ &KDLUPDQ☼ └ ,└ KDYH└ D└ XQDQLPRXV└ FRQVHQW└ UHTXHVW└ ,G└ OLNH└ WR└ VXEPLW└ IRU└
ΛKH└ UHFRUG◀ └ 2QH└ ┼ ┼ └ DQG└ WKLV└ LV└ VRUW└ RI└ LQ└ UHVSRQVH└ WR└ D└ TXHVWLRQ└ UDLVHG└ E\└
6HQDWRU└ +DUULV◀ └ $QG└ 0U◀ └ 3UXLWW☼ └ LQ└ KLV└ UHVSRQVH└ WR└ D└ TXHVWLRQ└ RQ└ ZKHWKHU└
KH└ KDG└ HYHU└ ILCHG└ D└ CDZVXLW└ DJDLQWW└ D└ FRUSRUDWH└ HQWLW\└ IRU└ YLRODWLQJ└ WDWH└
RU└ IHGHUDO└ SRODXWLRQ☼ └ DSSDUHQWO\└ ZDV└ QRW└ FRUUHFW◀

,└ ZDQW└ WR└ MXXW└ VXEPLW└ IRU└ WKH└ UHFRUG☼ └ D└ OLWW└ RI└ FDVHV└ WKDW└ KDYH└ EHHQ└ DFWLYH└
XQGHU└ 0U◀ └ 3UXLWW└ CHDGHUVKLS◀ └ $QG└ QRWLFH└ ZKLFK└ RQHV└ ZHUH└ WDUJHWHG└ E\└ KLV└
SUHGHFHVVRU◀ └ $QG└ LW└ VKRZV└ WKDW└ WKH└ FDVH└ LQ└ ZKLFK└ KH└ PHQWLRQHG└ LQ└ KLV└
H[FKDQJH└ ZLWK└ 6HQDWRU└ +DUULV☼ └ ,└ WKLQN└ LW└ ZDV└ WKH└ HJJ└ FDVH☼ └ ZDV└ LW└ 0DKDUG└
┼ ┼ └ 0DKDUG└ HJJ└ FDVH☼ └ DFWXDOO\└ ZDV└ LQLWLDWHG☼ └ QRW└ E\└ 0U◀ └ 3UXLWW☼ └ EXW└ E\└ ┼ ┼ └ E
KLV└ SUHGHFHVVRU◀ └ 7KDQN└ \RX◀

%$55$662 └
:LWKRXW└ REMHFWLRQ◀

$QG└ ,G└ OLNH└ WR└ VXEPLW└ WR└ WKH└ UHFRUG☼ └ DV└ ZHOO☼ └ KDYLQJ└ KHDUG└ WKDW└ VRPH└ RI└
P\└ 'HPRFUDWLF└ FROOHDJXHV└ KDYH└ H[SUHVVHG└ WKHLU└ FRQFHUQV└ WKDW└ $WWRUQH\└
*HQHUDO└ 3UXLWW└ LV└ QRW└ RSHQ└ WR└ WKH└ ILQGLQJ└ RI└ VFLHQFH☼ └ HVSHFLDOO\└ DV└ LW└
UHODWHV└ WR└ FOLPDWH└ FKDQJH☼ └ WKLV└ LV└ QRW└ VR◀ └ ,G└ OLNH└ WR└ FDOO└ WKH└ FRPPLWWHHV└
DWWHQWLRQ└ WR└ D└ CHWWHU└ E\└ WKH└ ┼ ┼ └ WKH└ &RUQZDOO└ $OOLDQFH└ IRU└ WKH└ 6WHZDUGVKLS└ RI└
&UHDWLRQ◀

7KH└ CHWWHU└ LV└ VLJQHG└ E\└ ¶┬ !! └ VFLHQWLWW└ └ HFRQRPLWW└ └ CHJDO└ VFKRDUW└ └ SROLF\└
H[SHUW└ └ UHDLJLRXV└ CHDGHUW└ └ DQG└ RYHU└ ┴┬ !! └ RWKHU└ FLWL]HQ└ └ XUJLQJ└ $WWRUQH\└
*HQHUDO└ 3UXLWW└ FRQILUPDWLRQ◀ └ 7KH└ JURXS└ LQFOXGHV└ 'DYLG└ /HJDWHV└ ZKR└ D└
3K◀ '◀ └ LQ└ FOLPDWRRJ\└ └ SURIHVRU└ RI└ FOLPDWRRJ\└ DQG└ JHRJUDSK\└ DW└ WKH└
8QLYHUVLW\└ RI└ 'HDZDUH◀

7KH└ DXWKRU└ SUDLVHV└ 3UXLWW└ └ WDWLQJ└ └ | 0U◀ └ 3UXLWW└ KDV└ DOR└ GHPRQWUDWHG└
XQGHUWDQGLQJ└ RI└ DQG└ RSHQ┤ PLQGHGQHV└ WRZDUG└ VFLHQWLILF└ LQYLJKW└
FUXFLDO└ WR└ WKH└ IRUPXODWLRQ└ DQG└ LPSOHPHQWDWLRQ└ RI└ HQYLURQPHQWDO└
UHJXODWLRQ◀ |

7KH└ RUJDQL]DWLRQ└ IRXQGHU└ DQG└ GDWLRQDO└ VSRNHVPDQ└ └ &DOYLQ└ %HLVGHU└ └ LV└
TXRWHG└ LQ└ WKH└ SUHW└ UHGHDW└ DQRXQFLQJ└ WKH└ CHWWHU└ DV└ VD\LQJ└ WKH└
IRORZLQJ└ └ | 6RPH└ HQYLURQPHQWDO└ DFWLYLWW└ DUH└ GHWHUPLQHG└ WR└ SUHYHQW└ 0U◀ └
3UXLWW└ FRQILUPDWLRQ└ └ SDLQWLQJ└ KLP└ DV└ D└ VFLHQFH└ GHQLHU└ RU└ D└ FOLPDWH└
FKDQJH└ GHQLHU◀ |

0U◀ └ %HLVGHU└ FRQWLQXHV└ └ | +H└ LV└ GHLWKHU◀ └ +HV└ D└ VROG└ └ FRPPRQ┤ └ VHQVH└
DWWRUQH\└ JHQHUDO└ ZKR└ ZLOO└ EULQJ└ PXFK└ GHHGHG└ UHIRUP└ WR└ WKH└ (3$◀ | └
:LWKRXW└ REMHFWLRQ└ └ WKH└ CHWWHU└ ZLOO└ EH└ VXEPLWWHG└ IRU└ WKH└ UHFRUG◀

6HQDWRU└ :LFNHU◀

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7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ└ DQG└ 0U◀ └ 5DQNLQJ└ 0HPEHU◀ └ ,└ WKLQN└ LWW└ EHHQ└ D└
JRRG└ KHDULQJ└ VR└ IDU└ └ WKDW└ ZH└ KDYH└ D└ CRW└ RI└ LQIRUPDWLRQ└ WKDW└ ZLOO└ └ WKDWOO└ EH└
UHDWXULQJ└ WR└ WKH└ $PHULFDQ└ SHRSOH◀

2QH└ WKLQJ└ ,└ ┼┼ └ ,└ GR└ REMHFW└ WR└ └ WKRXJK└ └ LWW└ VRPHWKLQJ└ WKDWW└ KDSSHQHG└ IRU└
\HDUW└ VLQFH└ ,YH└ EHHQ└ D└ PHPEHU└ RI└ WKLV└ FRPPLWWHH└ └ DQG└ WKDWW└ VRPHKRZ└
/R└ ┼┼ └ WR└ OLWW└ SROLWLFDO└ FRQWULEXWLRQW└ DQG└ ┼┼ └ DQG└ VXJJHWW└ WKDW└ VRPHKRZ└ WKH\└
PDNH└ DQ└ LQGLYLGXDO└ VXWSHFW└ RU└ ┼┼ └ RU└ CRW└ TXDOLILHG◀

0\└ GHDU└ IULHQG└ IURP└ 5KRGH└ ,VODQG└ VKRZHG└ D└ SRWWHU└ └ DQG└ VKRZHG└ VRPH└
FRQWULEXWLRQW└ └ DQG└ VXJJHWWHG└ WKDW└ EDWHG└ RQ└ WKRWH└ FRQWULEXWLRQW└ └ IURP└
FRPSDQLHW└ OLNH└ 6RXWKHUQ└ &RPSDQ\└ └ IRU└ H[DPSOH└ └ ZKRW└ FRQWULEXWHG└ WR└
P\└ FDPSDLJQ└ └ WKDW└ KLW└ DSSURSULDWHQHW└ IRU└ WKH└ MRE└ VKRXOG└ EH└ ┼┼ └ VKRXOG└
EH└ FKDOOHQJHG◀

$QG└ VR└ ,P└ JODG└ WKDW└ WKH└ FKDLUPDQ└ KDG└ DGHG└ WR└ WKH└ UHFRUG└ └ WKLW└ DUWLFOH└
IURP└ 6HS/WHPEHU└ ┼ └ IURP└ WKH└ :DOO└ 6WUHHW└ -RXUQDO└ └ 6HS/WHPEHU└ ┼ └ RI└ CDWW└
\HDU└ └ SRLQWLQJ└ RXW└ WKH└ 'HPRFUDWLF└ SUHVLGHQWLDO└ FDQGLGDWH└ └ +LOODU\└ &OLQWRQ└ └

UDLVHG└ VLJQLILFDQWO\└ PRUH└ PRQH\└ WKDQ└ 'RQDOG└ 7UXPS└ IURP└ WKH└ RLO└ DQG└
JDV└ LQGXVWU\◀ └ ,QGLYLGXDOV└ ZKR└ ZRUNHG└ IRU└ RLO└ DQG└ JDV└ FRPSDQLHV└ GRQDWHG└
• ¶┤ ☼ ‼ ‼ ‼ └WR└ 0U◀ └ 7UXPSV└ *23└ FDPSDLJQ└ DV└ RI└ WKH└ GDWH└ RI└ ┼┼ └ RI└ -XO\└ ┬ ‼
FRPSDUHG└ ZLWK└ • ↑ ┴ ↑ ☼ ‼ ‼ ‼ └WR└ 0UV◀ └ &OLQWRQ◀

0U◀ └ &KDLUPDQ└ ,P└ JDG└ \RX└ SXW└ WKLV└ LQ└ WKH└ UHFRUG◀ └ $QG└ SUHVXPDEO\└
EDVHG└ RQ└ WKDW└ DUJXPHQW└ +LOODU\└ &OLQWRQ└ ZRXOG└ EH└ VXVSHFW└ ZHUH└ WKH└ WR└
KDYH└ EHHQ└ QRPLQDWHG└ IRU└ WKH└ SRVLWLRQ└ RI└ KHDGLQJ└ WKH└ (3$◀

1RZ└ 0U◀ └ $WWRUQH\└ *HQHUDO└ CHW└ WDON└ DERXW└ WWDWHV└ DV└ SDUWQHUV◀ └ $QG└ ,└
HQMR\HG└ \RXU└ H[FKDQJH└ ZLWK└ 6HQDWRU└ &UXLQ└ DERXW└ WKH└ &KHMDSHDNH└ %D\└
3URJUDP◀ └ $V└ ,└ XQGHUWDQG└ \RX└ DFWXDOO\└ DSSODXG└ WKH└ &KHMDSHDNH└ %D\└
3URJUDP└ DQG└ SDUWLFXODUO\└ WKH└ ZD\└ WKH└ (3$└ ZRUNHG└ ZLWK└ WWDWHV└ DV└
SDUWQHUV◀ └ ,V└ WKDW└ FRUUHFW└ $QG└ FRXOG└ \RX└ HQODUJH└ RQ└ WKDW└

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6HQDWRU└ ,└ ┼┼ └ ,└ DEVROXWHO\└ DSSODXG└ WKH└ HIIRUW└ E\└ WKH└ WWDWHV└ WR└ MRLQ└ WRJHWKHU└
LQ└ D└ VL[┼ WWDWH└ FRDOLWLRQ└ WR└ DGGUHVV└ WKH└ TXDOLW\└ RI└ WKH└ &KHMDSHDNH└ %D\└
ZDWHU└ TXDOLW\◀ └ 7KDW└ ZKDW└ ZH└ GLG└ LQ└ $UNDQVDV└ 2NDKRPD└ DQG└ $UNDQVDV└
GLG└ ZLWK└ WKH└ VFHQLF└ ,OOLQRLV└ 5LYHU└ WKDW└ DOUHDG\└ EHHQ└ WDONHG└ DERXW└ ZLWK└
6HQDWRU└ %RR]PDQ└ DQG└ R\WKHUV◀

$QG└ VR└ ,└ WKLQN└ WKH└ HIIRUW└ WKDW└ WKH\└ HQJDJHG└ LQ└ ZDV└ VRPHWKLQJ└ WKDW└ R\WKHU└
WWDWHV└ RXJKW└ WR└ PRGHO◀ └ $QG└ WKH└ (3$└ FDPH└ DORQJVLGH└ └ DQG└ WRRN└ WKDW└
70'/└ DQG└ LV└ SURYLGLQJ└ DVVLWDQFH└ WR└ WKRVH└ VL[└ WWDWHV└ └ ZLWK└ UHVSHFW└ WR└
/KDW└ DJUHHPHQW◀

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1RZ└ ZLWK└ UHJDUG└ WR└ WKH└ &HDQ└ 3RZHU└ 3DQ└ DQG└ WKH└ ZDWHUV└ RI└ WKH└ 8QLWHG└
6WDWHV└ UXCHW└ ZKHUH└ GLG└ WKRVH└ UHJXODWLRQV└ JR└ ZURQJ└ LQ└ WKLV└ UHVSHFW'

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:HOO└ ZLWK└ UHVSHFW└ WR└ WKH└ &HDQ└ 3RZHU└ 3DQ└ └ LQ└ WKH└ FDVH└ DV└ WKH└ 6XSUHPH└
&RXUW└ KDV└ DFWXDOO\└ VDLG└ ┼┼ └ LW└ ZDV└ DQ└ XQSUHFHGHQWHG└ WWHS└ WKDW└ WKH└
6XSUHPH└ &RXUW└ WRRN◀ └ 1HYHU└ LQ└ KLWRU\└ KDG└ WKH└ 6XSUHPH└ &RXUW└ LWXHG└ D└
WWD\└ DJDLQWW└ D└ UXCH└ OLNH└ WKH└ &HDQ└ 3RZHU└ 3DQ◀ └ $QG└ WKH\└ GLG└ VR└ EHFDXVH└
RI└ WKH└ OLNHOLKRRG└ RI└ VXFFHVV└ RQ└ WKH└ PHULWW└ └ LQ└ WKH└ VHQVH└ WKDW└ WKH└ &HDQ└
3RZHU└ 3DQ└ GLGQW└ ┼┼ └ GLG└ QRW└ UHICHFW└ WKH└ DXWKRULWW└ RI└ &RQJUHVV└ JLYHQ└ WR└ WKH└
(3$└ WR└ UHJXODWH└ &2┴ ◀

$V└ DQ└ H[DPSOH└ └ ZLWK└ UHVSHFW└ WR└ SRZHU└ JHQHUDWLRQ└ └ WKHUH└ KDV└ WR└ EH└ D└
VLJQLILFDQW└ ILQDQJ└ WKDW└ LW└ SRVHV└ ULVN└ WR└ SXEOLF└ KHDOWK└ DQG└ ZHOIDUH◀ └ 7KH└
GLG└ QRW└ GR└ WKDW◀ └ 7KH└ GLG└ QRW└ JR└ WKURXJK└ WKH└ SURSHU└ SURFHVVHV└ RI└ LQVLGH└
WKH└ IHQFH└ DQG└ UHJXODWLRQV└ RI└ IDFLOLWLHV└ └ SRZHU└ JHQHUDWLRQ└ IDFLOLWLHV◀ └ 6R└
WKRVH└ PDWWHUV└ └ 6HQDWRU└ └ DUH└ DERXW└ UXCH└ RI└ QDZ◀ └ $QG└ WKH└ VDPH└ LV└ WUXH└ ZLWK└
WKH└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV└ UXCH◀

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1RZ└ └ \RX└ NQRZ└ └ DQG└ ,└ KDYH└ QRW└ GHDYHG└ LQWR└ WKLV└ DV└ DQ└ DWWRUQH\└ └ DV└ \RX└
KDYH└ └ EXW└ ,└ FDQ└ WHOO└ \RX└ WKDW└ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\└ LQ└
P\└ WDWH└ WRG└ PH└ YHU\└ HPSKDWLFDOO\└ └ WKDW└ WKH└ &HDQ└ 3RZHU└ 3DQ└ ZRXOG└
SXW└ XV└ RXW└ RI└ EXVLQHVV└ └ EHFDXVH└ ZH└ ┼ ┼ └ ZH└ ZRXOG└ QRW└ KDYH└ KDG└ DQ└
DQWHUQDWLYH└ WR└ WKH└ FRDO└ WKDW└ ZH└ XVH◀ └ $QG└ ┼ ┼ └ DQG└ ┼ ┼ └ DQG└ VR└ ,└ KRSH└ ZH└ FDQ└
FRQWLQXH└ WR└ PDNH└ SURJUHVV└ RQ└ WKLV└ LVXH◀

/HW└ PH└ DVN└ \RX└ DERXW└ ZRRG└ SURGXFW◀ └)HGHUDO└ JRYHUQPHQW└ EX\V└ D└ QRW└ RI└
OXPEHU└ └ XVHV└ D└ QRW└ RI└ ZRRG└ LQ└ FRQWXUXFWLRQ└ └ DQG└ SURFXUHV└ D└ QRW└ RI└ ZRRG◀ └
7KHUH└ DUH└ WDQGDUGV└ FHUWLI\LQJ└ WKDW└ WKH└ IRUHXW└ DUH└ DSSURSULDWH◀ └ 2QH└ LV└
WKH└ $PHULFDQ└ 7UHH└)DUP└ 6\VWHP◀ └ $QRWKHU└ LV└ WKH└ 6XWDLQDEOH└)RUHXWU\└
,QLWLDWLYH◀

(3$└ VHHPV└ WR└ OLNH└ D└ FHUWLILFDWLRQ└ SURJUDP└ FDOOHG└ WKH└)6&└ └ WKH└)RUHXW└
6WHZDUGVKLS└ &RXQFLO◀ └ 3URHCHP└ LV└ └ ZLWK└ ┼ ┼ └ ZLWK└ WKLV└ ┼ ┼ └ WKLV└ FHUWLILFDWLRQ└
SURJUDP└ └ LW└ H[FOXGHV└ !! └ SHUFHQW└ RI└ WKH└ OXPEHU└ JURZQ└ LQ└ WKH└ 8QLWHG└
6WDWHV└ RI└ $PHULFD◀

:H└ KDYH└ KDG└ D└ QRW└ RI└ DFWLYLW\└ RQ└ ERWK└ VLGHV└ RI└ WKH└ DLVCH└ └ LQ└ FKDOOHQJLQJ└
WKLV◀ └ $QG└ ┼ ┼ └ DQG└ ,└ REMHFW└ └ DOVR└ └ WR└ D└ VR┼ FDOOHG└ LQWHULP└ UHFRPPHQGDWLRQ└ └
PDGH└ E\└ (3$└ LQ└ WKLV└ UHJDUG◀ └ $V└ IDU└ DV└ ,P└ FRQFHUQHG└ └ LW└ LV└ GLVFULPLQDWLRQ└
DJDLQWW└ GRPHWWLF└ ZRRG◀ └ $QG└ QRZ└ WKH\└ ┼ ┼ └ WKH\└ KDYH└ FRPH└ EDFN└ DQG└ WRG└
XV└ WKDW└ WKLV└ LQWHULP└ UHFRPPHQGDWLRQ└ LV└ XQGHU└ UHYLHZ◀

&RXOG└ \RX└ FRPPHQW└ DERXW└ ERWK└ RI└ WKHVH└ └ WKH└ LGHD└ RI└ DQ└ LQWHULP└
UHFRPPHQGDWLRQ└ EHLQJ└ LPSRVHG└ RQ└ DQ└ HQWLUH└ LQGXWXU\└ └ DQG└ DOVR└ JLYH└ XV└
DQ\└ WKRXJKWW└ \RX└ KDYH└ DERXW└ XVLQJ└ WKH└)RUHXW└ 6WHZDUGVKLS└ &RXQFLO└
FHUWLILFDWLRQ└ PRGHO└ DV└ RSSRVHG└ WR└ WKHVH└ RWKHU└ SHUIHFWO\└ JRRG└ 6XWDLQDEOH└
)RUHXWU\└ ,QLWLDWLYH└ DQG└ $PHULFDQ└ 7UHH└)DUP└ 6\VWHP"

?$55$662 └
$QG└ LI└ ,└ FRXOG└ DVN└ \RX└ WR└ LW└ EULHIO\└ └ DV└ WKH└ VHQDWRUV└ WLPH└ LV└ DERXW└ XS◀

358,77 └

6HQDWRU└ DV└ \RX└ DQG└ ,└ GLVFXVVHG└ LQ└ RXU└ PHHWLQJ└ ,P└ YHU\└ FRQFHUQHG└ DERXW└ WKH└ QDWXUH└ LVXH└ DQG└ ┼┼└ DQG└ PDNLQJ└ VXUH└ WKDW└ DOO└ YRLFHV└ DUH└ FRQVLGHUHG└ LV└ VRPHWKLQJ└ WKH└ (3$└ DGPLQLVWUDWRU└ VKRXOG└ GR└ DQG└ ,└ ZRXOG└ VHHN└ WR└ GR└ LI└ FRQILUPHG◀

:LWK└ UHVSHFW└ WR└ WKH└ LQWHULP└ WHS└ ,└ WKLQN└ WKDW└ WKHUH└ LV└ D└ FRQFHUQ└ WKDW└ PDQ\└ KDYH└ RIIHUHG└ WKURXJKRXW└ WKH└ ┼┼└ WKURXJKRXW└ WKH└ QDW└ VHYHUDO└ \HDUV└ WKDW└ UHJXODWRUV└ LQ└ :DVKLQJWRQ└ GRW└ MXW└ WKH└ (3$└ DUH└ VHHNLQJ└ WR└ XVH└ JXLGDQFH└ RU└ RWKHU└ WHSV└ WR└ DYRLG└ ZKDW└ ZRXOG└ EH└ FDOOHG└ IRUPDO└ UXOHPDNLQJ└ WKDW└ &RQJUHVV└ KDV└ REOLJDWHG└ WKRVH└ DJHQFLHV└ WR└ SHUIRUP└ WR└ HQVXUH└ H[DFWO\└ ZKDW└ \RX└ MXW└ GHVFULEHG└ WKDW└ DOO└ YRLFHV└ DUH└ KHDUG◀

$QG└ ┼┼└ DQG└ WKDW└ XQIRUWXQDWH└ ZKHQ└ DJHQFLHV└ GR└ WKDW└ EHFDXVH└ WKDW└ DQ└ DEXVH└ RI└ WKH└ SURFHVV◀

%$55$662 └

7KDQN└ \RX└ VLU◀

:,&.(5 └

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

%$55$662 └

6HQDWRU└ 6DQGHUV◀

6$1'(56 └

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ $QG└ ,└ DSRORJL]H└ IRU└ EHLQJ└ OD WH└ EXW└ ZH└ ZHUH└ DW└ D└ KHDULQJ└ ZLWK└ &RQJUHVVPDQ└ 3ULFH└ ZKR└ LV└ WKH└ QRPLQHH└ IRU└ ++6└ DQG└ SHUKDSV└ QRW└ D└ JUHDW└ LGHD└ WR└ KDYH└ LPSRUWDQW└ QRPLQDWLQJ└ KHDULQJV└ DW└ H[DFWO\└ WKH└ VDPH└ WLPH◀ └ 6R└ ,└ DSRORJL]H└ IRU└ QRW└ EHLQJ└ KHUH└ HDUOLHU◀

0\└ RIILFH└ KDV└ UHFHLYHG└ D└ JUHDW└ GHDO└ RI└ FRPPHQW└ IURP└ SHRSOH└ LQ└ WKH└ 6WDWH└ RI└ 9HUPRQW└ ZKLFK└ WDNHV└ HQYLURQPHQWDO└ SURWHFWLRQ└ YHU\└ VHULRXVO\└ └ DV└ ZHOO└ DV└ IURP└ DOO└ RYHU└ WKH└ FRXQWU\◀ └ $QG└ WKH└ IHDU└ LV└ WKDW└ WKH└ QRPLQDWLRQ└ RI└ 0U◀ └ 3UXLWW└ LV└ D└ QRPLQDWLRQ└ GHVLJQHG└ WR└ SURWHFW└ WKH└ IRVVLO└ IXHO└ LQGXVWU\└ DQG└ QRW└ WKH└ HQYLURQPHQW◀

,└ ZRXOG└ OLNH└ WR└ DVN└ 0U◀ └ 3UXLWW└ D└ TXHVWLRQ◀ └ ,└ ┼ ┼ └ DV└ ,└ XQGHUVWDQG└ LW└ └ HDUOLHU└ /KLV└ KHDULQJ└ └ \RX└ VDLG└ WKDW└ 0U◀ └ 7UXPS└ ZDV└ ZURQJ└ LQ└ VXJJHVWLQJ└ ┼ ┼ └ LQ└ WDWLQJ└ RYHU└ DQG└ RYHU└ DJDLQ└ └ WKDW└ FOLPDWH└ FKDQJH└ ZDV└ D└ TXRWH└ XQTXRWH└ | KRD[◀ | └ ,V└ WKDW└ └ LQ└ IDFW└ └ WKH└ FDVH"

358,77 └
7KDW└ LV└ FRUUHFW└ └ 6HQDWRU◀

6$1'(56 └
2.◀ └ /HW└ PH└ DVN└ \RX└ WKLV◀ └ $V└ \RX└ PD\└ NQRZ└ └ VRPH└ → └ SHUFHQW└ RI└ VFLHQWLWW└ └ ZKR└ KDYH└ ZULWWHQ└ DUWLFOHV└ IRU└ SHHU└ UHYLHZHG└ MRXUQDOV└ └ KDYH└ FRQFOXGHG└ WKDW└ FOLPDWH└ FKDQJH└ LV└ UHDO◀ └ ,W└ LV└ FDXVHG└ E\└ KXPDQ└ DFWLYLWW◀ └ $QG└ LW└ LV└ DOUHDG\└ FDXVLQJ└ GHYDVWDWLQJ└ SUREHPV└ LQ└ RXU└ FRXQWU\└ DQG└ DURXQG└ WKH└ ZRUOG◀ └ 'R└ \RX└ EHOLHYH└ WKDW└ FOLPDWH└ FKDQJH└ LV└ FDXVHG└ E\└ WKH└ HPLWWLRQ└ └ E\└ FDUERQ└ HPLWWLRQV└ └ E\└ KXPDQ└ DFWLYLWW"

358,77 └
6HQDWRU└ └ DV└ ,└ LQGLFDWHG└ ┼ ┼ └ \RX└ ZHUHQW└ LQ└ KHUH└ GXULQJ└ P\└ RSHQLQJ└ WDWHPHQW└ └ EXW└ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW└ └ FLPDWH└ ┼ ┼ └ WKH└ FLPDWH└ LV└ FKDQJLQJ└ └ DQG└ WKDW└ WKHUH└ ┼ ┼ └ KXPDQ└ DFWLYLW\└ FRQWULEXWHV└ WR└ WKDW└ LQ└ VRPH└ PDQQHU◀

6$1'(56 └
,Q└ VRPH└ PDQQHU"

358,77 └
<HV└ └ VLU◀

6$1'(56 └
1LQH└ ┼ VHYHQ└ SHUFHQW└ RI└ WKH└ VFLHQWLWW└ ZKR└ ZURWH└ DUWLFOHV└ LQ└ SHHU└ UHYLHZHG└ MRXUQDOV└ EHOLHYH└ WKDW└ KXPDQ└ DFWLYLW└ LV└ WKH└ IXQGDPHQWDO└ UHDVRQ└ ZH└ DUH└ VHHLQJ└ FOLPDWH└ FKDQJH◀ └ <RX└ GLVDJUHH└ ZLWK└ WKDW"

358,77 └

,└ EHOLHYH└ WKH└ DELOLWW└ WR└ PHDVXUH└ ZLWK└ SUHFLVLRQ└ WKH└ GHJUHH└ RI└ KXPDQ└ DFWLYLWW└ LPSDFW└ RQ└ WKH└ FOLPDWH└ LV└ VXEMHFW└ WR└ PRUH└ GHEDWH└ RQ└ ZKHWKHU└ WKH└ FOLPDWH└ LV└ FKDQJLQJ└ RU└ ZKHWKHU└ KXPDQ└ DFWLYLWW└ FRQWULEXWHV└ WR└ LW◀

6$1'(56 └
:KLCH└ \RX└ DUH└ GRW└ FHUWDLQ└ WKH└ YDWW└ PDMRULWW└ RI└ VFLHQWLWW└ DUH└ WHOOLQJ└ XV└ WKDW└ LI└ ZH└ GR└ GRW└ JHW└ RXU└ DFW└ WRJHWKHU└ DQG└ WUDQVIRUP└ RXU└ HQHUJ\└ V\WWHP└ DZD\└ IURP└ IRWLO└ IXHO└ WKHUH└ LV└ D└ UHDO└ TXHWWLRQ└ DV└ WR└ WKH└ TXDOLW└ RI└ WKH└ SODQHW└ WKDW└ ZH└ DUH└ JRLQJ└ WR└ EH└ CHDYLQJ└ RXU└ FKLOGUHQ└ DQG└ RXU└ JUDQGFKLOGUHQ◀

6R└ \RX└ DUH└ DSSO\LQJ└ IRU└ D└ MRE└ DV└ DGPLQLWWUDWRU└ IRU└ WKH└ (3$└ WR└ SURWHFW└ RXU└ HQYLURQPHQW◀ └ 2YHUZKHOPLQJ└ PDMRULW└ RI└ VFLHQWLWW└ WD\└ ZH└ KDYH└ DFW└ ┼ ┼ └ JRW└ WR└ DFW└ EROGO\└ DQG└ \RXUH└ WHOOLQJ└ PH└ WKDW└ WKHUH└ CHHGV└ WR└ EH└ PRUH└ GHEDWH└ RQ└ WKLV└ LWXH└ DQG└ WKDW└ ZH└ WKRXOG└ GRW└ EH└ DFWLQJ└ EROGO\"

358,77 └
1R└ 6HQDWRU◀ └ ,└ ┼ ┼ └ DV└ ,YH└ LQGLFDWHG└ FOLPDWH└ ┼ ┼ └ WKH└ FOLPDWH└ LV└ FKDQJLQJ◀ └ $QG└ KXPDQ└ DFWLYLW└ LPSDFW└ WKDW◀

6$1'(56 └
?&W└ \RX└ KDYHQW└ WROG└ PH└ ZK\└ ┼ ┼ └ ZK\└ \RX└ WKLQN└ WKH└ FOLPDWH└ LV└ FKDQJLQJ◀

358,77 └
:HOO└ 6HQDWRU└ WKH└ MRE└ RI└ WKH└ DGPLQLWWUDWRU└ LV└ WR└ FDUU\└ RXW└ WKH└ WDWXWHV└ DV└ SDWHG└ E\└ WKLV└ ERG\└ DQG└ WR└ FRPSO\└ ZLWK└ WKH◀ ◀ ◀

6$1'(56 └
:K\└ LV└ WKH└ FOLPDWH└ FKDQJLQJ"

358,77 └
6HQDWRU└ LQ└ UHVSRQVH└ WR└ WKH└ &2┴ └ LWXH└ WKH└ (3$└ DGPLQLWWUDWRU└ LV└ FRQWUDLQHG└ E\└ WDWXWHV◀ ◀ ◀

6$1'(56 └
,P└ QRW└ ┼ ┼ └ ,P└ DVNLQJ└ \RX└ D└ SHUVRQDO└ RSLQLRQ◀

358,77 └
0\└ ┼ ┼ └ P\└ SHUVRQDO└ RSLQLRQ└ LV└ ┼ ┼ └ LV└ LPPDWHULDO◀ ◀ ◀

6$1'(56 └
5HDOO\"

358,77 └
◀ ◀ ◀ └ WR└ WKH└ MRE└ RI└ ┼ ┼ └ WR└ WKH└ MRE└ RI└ FDUU\LQJ└ RXW◀ ◀ ◀

6$1'(56 └
<RX└ DUH└ JRLQJ└ WR└ EH└ WKH└ KHDG└ RI└ WKH└ DJHQF\└ WR└ SURWHFW└ WKH└ HQYLURQPHQW└ └
DQG└ \RXU└ SHUVRQDO└ IHHOLQJV└ DERXW└ ZKHWKHU└ FOLPDWH└ FKDQJH└ LV└ FDXVHG└ E\└
KXPDQ└ DFWLYLW\└ DQG└ FDUERQ└ HPLVVLRQV└ LV└ LPPDWHULDO"

358,77 └
6HQDWRU└ ,YH└ DFNQRZOHGJHG└ WR└ \RX└ WKDW└ WKH└ KXPDQ└ DFWLYLW\└ LPSDFWV└ WKH◀ ◀ ◀

6$1'(56 └
,PSDFWV"

358,77 └
<HV◀

6$1'(56 └
6FLHQWLILF└ FRPPXQLW\└ GRHVQW└ WHOO└ XV└ LW└ LPSDFWV◀ └ 7KH\└ VD\└ LW└ LV└ WKH└ FDXVH└
RI└ FOLPDWH└ FKDQJH◀ └ :H└ KDYH└ WR└ WUDQVIRUP└ RXU└ HQHUJ\└ V\VWHP◀ └ 'R└ \RX└
EHOLHYH└ ZH└ KDYH└ WR└ WUDQVIRUP└ RXU└ HQHUJ\└ V\VWHP└ LQ└ RUGHU└ WR└ SURWHFW└ WKH└
SODQHW└ IRU└ IXWXUH└ JHQHUDWLRQV"

358,77 └
,└ EHOLHYH└ WKH└ (3$└ KDV└ D└ YHU\└ LPSRUWDQW└ URO└ LQ└ UHJXODWLQJ└ WKH└ HPLVVLRQ◀ ◀ ◀

6$1'(56 └
<RX└ GLGQW└ DQVZHU└ P\└ TXHVWLRQ◀

358,77 └
◀◀◀└RI└&2┴◀

6$1'(56 └
'R└ \RX└ EHOLHYH└ ZH└ KDYH└ WR└ WUDQVIRUP└ RXU└ HQHUJ\└ V\VWHP└ DZD\└ IURP└
IRVVLO└ IXHO└ WR└ GR└ ZKDW└ WKH└ VFLHQWLILF└ FRPPXQLW\└ LV└ WHOOLQJ└ XV└ LQ└ RUGHU└ WR└
PDNH└ VXUH└ WKDW└ WKLV└ SODQW└ LV└ KHDOWK\└ IRU└ RXU└ FKLOGUHQ└ DQG└ JUDQGFKLOGUHQ"

358,77 └
6HQDWRU└ ,└ EHOLHYH└ WKDW└ WKH└ DGPLQLWUDWRU└ KDV└ D└ YHU\└ LPSRUWDQW└ URCH└ WR└
SHUIRUP└ LQ└ UHJXODWLQJ└ &2┴◀

6$1'(56 └
&DQ└ \RX└ WHOO└ PH└ DV└ ,└ WKLQN└ DOO└ RI└ XV└ NQRZ└ 2NOCKRPD└ KDV└ EHHQ└ VXEMHFWHG└
/R└ D└ UHFRUG┤ EUHDNLQJ└ QXPEHU└ RI└ HDUWKTXDNHV◀ └ 6FLHQWLWW└ LQ└ 2NOCKRPD└ ┼┼└
RU└ VFLHQWLWW└ VD\└ WKDW└ 2NOCKRPDV└ DOPRWW└ FHUWDLQ└ WR└ KDYH└ PRUH└
HDUWKTXDNHV└ ZLWK└ KHLJKWHQHG└ ULVN└ RI└ D└ CDUJH└ TXDNH└ SUREDECH└ WR└ HQGXUH└
IRU└ D└ GHFDGH└ DQG└ WKDW└ WKH└ FDXVH└ RI└ WKLV└ LV└ IUDFNLQJ◀

&DQ└ \RX└ SRLQW└ PH└ ┼┼└ SLFNLQJ└ XS└ RQ└ 6HQDWRU└ +DUULV└ GLVFXVVLRQ└ ZLWK└ \RX└ └
FDQ└ \RX└ SRLQW└ PH└ WR└ DQ\└ RSLQLRQ└ WKDW└ \RX└ ZURWH└ DQ\└ HQIRUFHPHQW└
DFWLRQV└ \RX└ WRRN└ DJDLQWW└ WKH└ FRPSDQLHV└ WKDW└ ZHUH└ LQVHFWLQJ└ ZDWWH└
IUDFNLQJ└ ZDWHU"

358,77 └
6HQDWRU└ CHW└ PH└ VD\└ ,P└ YHU\└ FRQFHUQHG└ DERXW└ WKH└ FRQQHFWLRQ└ EHWZHHQ└
DFWLYLW\└ LQ└ 2NOCKRPD└ DQG◀◀◀

6$1'(56 └
$QG└ WKHUHIRUH└ \RX└ PXWW└ KDYH└ WDNHQ└ DFWLRQ└ └ ,└ JXHVV◀ └ &DQ└ \RX└ WHOO└ PH└ ZKR└
\RX└ ILQHG└ IRU└ GRLQJ└ WKLV└ LI└ \RXUH└ YHU\└ FRQFHUQHG"

358,77 └
7KH└ &RUSRUDWLRQ└ &RPPLWWLRQ└ LQ└ 2NOCKRPD└ LV└ YHXWHG└ ZLWK└ WKH└
VXULVGLFWLRQ◀ └ $QG└ WKH└ KDYH└ DFWXDOO└ DFWHG└ RQ└ WKDW◀

6$1'(56 └
$QG└ \RX└ KDYH└ PDGH└ SXEOLF└ WDWHPHQWV└ H[SUHVVLQJ└ \RXU└ GHHS└ FRQFHUQ└
DERXW└ WKLV"

358,77 └
:H└ KDYH└ ZRUNHG└ ZLWK└ ┼ ┼ └ WKHUH└ DUH└ WZR◀ ◀ ◀

6$1'(56 └
<RX└ KDYH└ PDGH└ SXEOLF└ WDWHPHQWV└ ┼ ┼ └ \RXUH└ LQ└ D└ WDWH└ ZKLFK└ LV└ VHHLQJ└ D└
UHFRUG╢ EUHDNLQJ└ QXPEHU└ RI└ HDUWKTXDNHV◀ └ <RXUH└ WKH└ DWWRUQH\└ JHQHUDO◀ └
2EYLRXVO\☼ └ \RX└ KDYH└ WRRG└ XS└ DQG└ VDLG└ \RX└ ZLOO└ GR└ HYHUWWKLQJ└ \RX└ FDQ└ WR└
WRS└ IXWXUH└ HDUWKTXDNHV└ DV└ D└ UHVXOW└ RI└ IUDFNLQJ"

358,77 └
6HQDWRU☼ └ ,YH└ DFNQRZOHGJHG└ WKDW└ ,P└ FRQFHUQHG└ DERXW◀ ◀ ◀

6$1'(56 └
<RX└ DFNQRZOHGJHG└ WKDW└ \RX└ DUH└ FRQFHUQHG"

358,77 └
<HV◀

6$1'(56 └
<RXU└ WDWH└ LV└ KDYLQJ└ D└ UHFRUG└ QXPEHU└ RI└ ┼ ┼ └ ZHOO☼ └ LI└ WKDW└ WKH└ NLQG└ RI└
DGPLQLWWUDWRU└ IRU└ WKH└ (3$└ ┼ ┼ └ \RXU└ WDWHV└ KDYLQJ└ D└ UHFRUG╢ EUHDNLQJ└
QXPEHU└ RI└ HDUWKTXDNHV◀ └ <RX└ DFNQRZOHGJH└ \RX└ DUH└ FRQFHUQHG◀ └ ,I└ WKDW└
/KH└ NLQG└ RI└ (3$└ DGPLQLWWUDWRU└ \RX└ ZLOO└ EH☼ └ \RXUH└ QRW└ JRLQJ└ WR└ JHW└ P\└
YRWH◀

%&55$662 └
6HQDWRU└ ,QKRIH◀

,1+2)(└

0U◀ └ &KDLUPDQ└ \RX└ VHH└ D└ UHTXHVW◀ └ ,└ DVN└ DW└ WKLV└ SRLQW└ LQ└ WKH└ UHFRUG└ ┼ ┼ └ DW└ ^KLV└ SRLQW└ LQ└ WKH└ UHFRUG└ WKDW└ ZH└ UHSUHVHQW└ WKH└ :DOO└ 6WUHHW└ -RXUQDO└ RS┼ HG└ SLHFH└ WKDW└ ZDV└ ZULWWHQ└ E\└ WZR└ RXWXDQGLQJ└ VFLHQWLWW└ FDOOHG└ | 7KH└ 0\WK└ RI └ ^KH└ &OLPDWH└ &KDQJH└ → └ 3HUFHQW◀ |

?$55$662 └
:LWKRXW└ REMHFWLRQ◀

,└ KDYH└ D└ OLWWOH└ ELW└ WLPH└ CHIW└ LQ└ P\└ TXHVWLRQLQJ└ IURP└ WKH└ ILUW└ URXQG◀ └ ,└ MXW└ └ ZDQWHG└ WR└ WDON└ DERXW└ VRPH└ RI└ WKH└ FRQFHUQV└ RI└ RYHU┼ └ UHJXODWLRQ└ DQG└ CHW└ PH└ DVN└ GR└ \RX└ KDYH└ WKH└ VDPH└ FRQFHUQV└ RI└ WKH└ RYHU┼ └ UHJXODWLRQ└ RI└ 8◀ 6◀ └ PDQXIDFWXULQJ└ RYHU└ WKH└ CDW└ HLJKW└ \HDUV"└ ,└ EHOLHYH└ LW└ H[SRUWHG└ PDQXIDFWXULQJ└ MREV└ RYHUHDV└ MREV└ WKDW└ JR└ ZLWK└ WKHP└ LQ└ WHUPV└ RI└ WKH└ PDQXIDFWXULQJ└ RI└ WKRVH└ JRRGV└ WR└ SDFHV└ OLNH└ &KLQD└ DQG└ ,QGLD└ WKDW└ DUH└ JRLQJ└ WR└ SURGXFH└ WKRVH└ SURGXFW└ LQ└ D└ CHW└ HQYLURQPHQWDOO\└ IULHQGO\└ ZD\◀

$QG└ \RXG└ DJUHH└ ZLWK└ ┼ ┼ └ DJUHH└ ZLWK└ WKLV└ QRWLRQ└ WKDW└ WKLV└ DSSURDFK└ KDUPV└ QRW└ MXW└ RXU└ ┼ ┼ └ WKH└ HQYLURQPHQW└ EXW└ DOVR└ RXU└ RZQ└ 8◀ 6◀ └ HFRQRP\"

358,77 └
,└ EHOLHYH└ 6HQDWRU└ WKDW└ LW└ SXW└ XV└ DW└ DQ└ HFRQRPLF└ GLVDGYDQWDJH└ ZKHQ└ ZH└ GRQW└ KHDU└ DOO└ YRLFHV└ LQ└ WKH└ UXCHPDNLQJ└ SURFHW└ ZLWK└ UHVSHFW└ WR└ WKHVH└ LWXHV◀ └ $EVROXWHD\◀

?$55$662 └
,G└ DOVR└ OLNH└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ RQH└ DQ└ ┼ ┼ └ D└ RS┼ HG└ RQ└ &11└ E\└ -HE└ ?XVK└ VD\LQJ└ | 6FRW└ 3UXLW└ LV└ UHDG\└ WR└ WXLQ└ DURXQG└ WKH└ (3$└ WKDW└ ,└ FDQQRW└ ^KLQN└ RI└ D└ SHUVRQ└ PRUH└ VXLWHG└ WR└ CHDG└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ WKDQ└ 2NODKRPD└ $WWRUQH\└ *HQHUDO└ 6FRW└ 3UXLW◀ └ +H└ KDV└ DFNQRZOHGJHG└ KXPDQ└ LPSDFW└ RQ└ WKH└ FOLPDWH└ DQG└ VXSSRUW└ D└ UREXW└ GLVFXVVLRQ└ DERXW└ LW└ HI IHFW└ DQG└ ZKDW└ WKH└ JRYHUQPHQW└ VKRXOG└ DQG└ VKRXOGQW└ GR└ WR└ DGGUHVV└ LW◀ |

$QG└ WKHQ└ DOVR└ VXEPLWWLQJ└ IRU└ WKH└ UHFRUG└ D└ ┼ ┼ └ D└ UHSRUW└ WKDW└ ┼ ┼ └ WKDW└ ,└ GLG└ [
D└ UDQNLQJ└ PHPEHU└ RI└ WKH└ 6XEFRPPLWWHH└ RQ└ &OHDQ└ $LU└ DQG└ 1XFOHDU└
6DIHW└ RI└ WKLV└ FRPPLWWHH└ ┼ ┼ └ WKLV└ ZDV└ D└ FRXSOH└ RI└ \HDUV└ DJR└ FDOOHG└ | 5HG└
7DSH└ 0DNLQJ└ $PHULFDQV└ 6LFN◀ |

,└ SXW└ WKLV└ WRJHWKHU└ DV└ D└ SK\VLFLDQ└ ZKHUH└ ZH└ WDON└ DERXW└ XQHPSOR\PHQW└ OROJ┼ WHUP└ XQHPSOR\PHQW└ LQFUHDVHV└ WKH└ OLNHOLKRRG└ RI└ KRVSLWDO└ YLVLWV└ LOOQHVVHV└ SUHPDWXUH└ GHDWKV└ LQ└ FRPPXQLWLHV└ GXH└ WR└ MRECHVQHVV└ ,W└ KXUWV└ FKLOGUHQ└ KHDWK└ KXUWV└ IDPLO\└ ZHOO┼ EHLQJ└ DQG└ TXRWH└ VFLHQWLWW└ ZKR└ SRLQW└ ^KDW└ WKH└ XQHPSOR\PHQW└ UDWH└ LV└ ZHOO┼ └ HXWDEOLVKHG└ DV└ D└ ULVN└ IDFWRU└ IRU└ HOHYDWHG└ LOOQHVV└ DQG└ PRUWDOLW\└ UDWHV└ LQ└ HSLGHPLRORJLFDO└ WXGLHV└ SHUIRUPHG└ VLQFH└ WKH└ ← ‼ V◀

$QG└ DGGLWLRQDOO\└ └ WKHUH└ LV└ LQIOXHQFLQJ└ RQ└ PHQWDO└ GLVRUGHUV└ └ RQ└ VXLFLGH└ └ DOFRKRO└ DEXVH└ └ DOFRKROLVP◀ └ :H└ DOVR└ VHH└ LW└ ZLWK└ VSRXVH└ DEXVH└ └ GUXJ└ DEXVH└ └ VR└ WKDW└ WKH└ UHJXODWLRQV└ WKDW└ FRPH└ RXW└ RI└ WKH└ (3$└ └ WKDW└ GR└ FXW└ LQWR└ HPSOR\PHQW└ RI└ KDUG┼ ZRUNLQJ└ $PHULFDQV└ └ DFWXDOO\└ FRQWULEXWH└ WR└ D└ GHWHULRUDWLRQ└ RI└ WKHLU└ KHDOWK◀ └ ,└ GRQW└ NQRZ└ LI└ \RX└ KDYH└ DQ\└ FRPPHQWW└ RQ└ ^KDW└ └ RU└ ZKDW└ \RX└ PD\└ KDYH└ VHHQ└ LQ└ 2NODKRPD└ DW└ WLPHV└ RI└ XQHPSOR\PHQW◀

358,77 └
6HQDWRU└ ZH└ KDYH└ VHHQ└ VLPLODU└ LVXHV└ LQ└ 2NODKRPD◀ └ :H└ KDYH└ SUHVFULSWLRQ└ GUXJ└ DEXVH└ WKDW└ RFFXUV└ DW└ UDWHV└ WKDW└ DUH└ XQSUHFHGHQWHG└ └ DV└ LQ└ RWKHU└ SDUWW└ RI└ WKH└ FRXQWU\◀ └ $QG└ VR└ WKHUH└ LV└ D└ VLPLODU└ FRQFHUQ└ WKDW└ ZH└ KDYH└ LQ└ 2NODKRPD◀

%&$55$662 └
,W└ LV└ ┼ ┼ └ ,└ DSSUHFLDWH└ \RXU└ ┼ ┼ └ \RXU└ SDWLHQFH└ └ \RXU└ KRQHVWW└ └ \RXU└ IRUWKULJKW└ SUHVHQWDWLRQ└ WKLV└ PRUQLQJ◀ └ :H└ DUH└ JRLQJ└ WR└ JR└ WR└ D└ VHFRQG└ URXQG◀ └ ,└ QRZ└ KDYH└ D└ ¶ ⊥ └ ┼ ┼ └ DERXW└ ¶ ⊥ ┤ ↑ ◀

,I└ LW└ DOO└ ULJKW└ ZLWK└ \RX└ └ 5DQNLQJ└ 0HPEHU└ &DUSHU└ └ ZHOO└ FRPH└ EDFN└ LQ└ DQ└ KRXU◀ └ :HOO└ WDNH└ DQ└ KRXU└ EUHDN└ DQG└ FRPH└ EDFN└ DQG└ UHVXPH└ LQ└ WKH└ VHFRQG└ URXQG└ RI└ TXHVWLRQLQJ└ DW└ ¶ ┤ ↑ ◀ └ 7KH└ FRPPLWWHH└ LV└ LQ└ UHFHVV◀

358,77 └
7KDQN└ \RX└ └ 6HQDWRU◀

♂ 5(&(66□

%&$55$662 └

:HOO└ UHVXPH└ WKH└ FRQILUPDWLRQ└ KHDULQJ└ IRU└ 6FRWW└ 3UXLWW└ (3$└
$GPLQLVWUDWRU◀ └ $QG└ $VVRLCH\└ *HQHUDO└ 3UXLWW└ CHW└ PH└ MXW└ WDUW└ E\└ VD\LQJ└ └
VRPHWLPHV└ \RX└ JHW└ D└ FKDQFH└ WR└ VLW└ GRZQ└ RYHU└ OXQFK└ └ DQG└ \RX└ VD\└ └ | ,YH└
EHHQ└ DQVZHULQJ└ TXHVWLRQV└ IRU└ WZR└ DQG└ D└ KDOI└ KRXUV◀ └ <RX└ NQRZ└ └ ,└ ZLVK└ ,└
KDG└ VDLG└ VRPHWKLQJ└ GLIIHUHQWO\└ DERXW└ VRPHWKLQJ└ RU└ RWKHU◀ | └ $QWKLQJ└ WKDW└
\RXG└ OLNH└ WR└ FDULI\"

358,77 └
-XW└ RQH└ SRLQW└ RI└ FDULILFDWLRQ└ └ LQ└ UHVSRQVH└ WR└ 6HQDWRU└ :KLWHKRXVH└
TXHVWLRQV└ WKLV└ PRUQLQJ└ DERXW└ GLIIHUHQW└ HQYLURQPHQWDO└ HQIRUFHPHQW└ WWHSV└
ZHYH└ WDNHQ◀ └ :LWK└ UHVSHFW└ WR└ WKH└ CHDN\└ XQGHUJURXQG└ WRUDJH└ DQG└ GRXECH╫
GLSSLQJ└ LQ└ RXU└ WDWH└ └ ,YH└ LQLWLDWHG└ RIILFLDOO\└ WKUHH└ FDVHV└ WKHUH└ ZLWK└
UHVSHFW└ WR└ 9DCHUR└ └%3└ └ DQG└ &RCRFR◀

([[RQ└ DQG└ D└ QXPEHU└ RI└ RWKHU└ FDVHV└ DUH└ WLOO└ LQ└ VHWWOHPHQW└ GLVFXVVLRQV└ └
DQG└ VR└ WKRVH└ FDVHV└ KDYH└ GRW└ PDWHULDOL]HG└ LQ└ DFWXDO└ OLWLJDWLRQ└ MXW└ \HW◀

?$55$662 └
7KDQN└ \RX└ IRU└ WKDW└ FDULILFDWLRQ◀ └ $QWZD\└ └ D└ FRXSCH└ RI└ TXLFN└ TXHVWLRQV◀ └ ,Q└
ΛKH└ FLW\└ RI└ &KH\HQCH└ └ :\RPLQJ└ └ LW└ ZDV└ GLVFRYHUHG└ WKDW└ WULFKORURHWK\CHQH└ └
ΛKDW└ D└ FKHPLFDO└ WKDW└ EHHQ└ XVHG└ E\└ WKH└ PLOLWDU\└ WR└ GHJUHDVH└ WKH└
HQJLQHV└ RI└ URFNHW└ PRWRUV└ └ ZDV└ VHHSLQJ└ LQWR└ WKH└ FLWLHV└ GULQNLQJ└ ZDWHU└
VXSSO\◀

7KH└ $UP\└ &RUSV└ RI└ (QJLQHHUV└ └ ZKLFK└ ZDV└ LQ└ FKDUJH└ RI└ D└ QHDUE\└ IRUPHU└
$WODV└ QXFOHDU└ PLWLCH└ VLWH└ └ UHIXVHG└ WR└ HYHQ└ DGPLW└ WKDW└ WKH└ VLWH└ ZDV└ WKH└
FDXVH└ RI└ WKH└ SRODWLRQ◀ └ ,└ IRXJKW└ WKH└ &RUSV└ RQ└ WKLV└ WR└ GR└ WHWWLQJ└ QHHGHG└ └ WR└
SURYH└ ZKDW└ ZDV└ REYLRXV└ WR└ HYHU\RQH└ ZKR└ CRRNHG└ DW└ LW◀ └ 7KH└ WHWW└ UHVXOW└
VKRZHG└ D└ CDUJH└ SOXPH└ FRPLQJ└ IURP└ WKH└ $WODV└ VLWH└ GLUHFWO\└ LQWR└ WKH└ FLW\V└
ZHDOV◀

7KH└ FRXUW└ LV└ QRZ└ DGGUHVVLQJ└ WKH└ SRODWLRQ└ RI└ WKH└ FLW\V└ ZDWHU└ VXSSO\◀ └ ,W└
QRZ└ SURWHFWHG└ WKURXJK└ D└ WWDWH╫ RI╪ WKH╫ DUW└ ZDWHU└ WUHDWPHQW└ IDFLOLW\└ WKDW└
LQWWDOOHG└ E\└ WKH└ FRUSV◀ └ %XW└ └ FDQ└ \RX└ JLYH└ PH└ D└ ┼ ┼ └ SHUKDSV└ DQ└ H[DPSCH└
ZKHQ└ \RX└ VHUYHG└ DV└ 2NOOKRPD└ 6ΛDWH└ $WRUCH\└ *HQHUDO└ ZKHUH└ \RX└ ZHQW└
DWHU└ SRODXWHUV└ └ DQG└ \RX└ KHDG└ WKHP└ DFFRXQWDECH└ LQ└ WKDW└ VDPH└ ZD\"

358,77 └

<HV☼ └ 6HQDWRU◀ └ $V└ ,└ LQGLFDWHG└ HDUOLHU└ ┼ ┼ └ DQG└ ,└ WKLQN└ WKLV└ ZDV└ LQGLFDWHG└ LQ└ ┼ ┼
LQ└ ┼ ┼ └ LQ└ WKLV└ PRUQLQJV└ WHVWLPRQ\☼ └ ,└ PHQWLRQHG└ WKH└ FDVH└ ZLWK└ WKH└
♂ LQDXGLECH□ └ SURGXFLQJ└ ♂ LQDXGLECH□☼ └ DQG└ WKDW└ ZDV└ VRPHWKLQJ└ WKDW└ ZH└
DFWXDOO\└ LQLWLDWHG◀ └ ,└ NQRZ└ WKHUH└ ZDV└ VRPH└ TXHVWLRQ└ WKDW└ 6HQDWRU└ &DUSHU└
UDLVHG└ LQ└ WKDW└ UHJDUG◀

7KDW└ ZDV└ ERWK└ LQ└ UHVSHFW└ WR└ IHGHUDO└ DQG└ WDWH└ YLRODWLRQV└ DQG└ ZH└ DFWXDOO\└
\RLCHG└ WKH└ WDWH└ RI└ 7H[DV└ DQG└ WKH└ (3$└ LQ└ WKDW└ HQIRUFHPHQW└ DFWLRQ◀ └ %XW☼ └
,YH└ VXEPLWWHG└ IRU└ WKH└ UHFRUG☼ └ DV└ \RX└ NQRZ☼ └ D└ OLWW└ RI└ FDVHV└ ZKHUH└ ZHYH└
ZRUNHG└ ZLWK└ WKH└ :LOOLIH└ &RPPLWWLRQ└ LQ└ 2NODKRPD☼ └ WKH└ '(4☼ └ DURXQG└
♂ LQDXGLECH□ └ PDWWHUV└ DQG└ HQIRUFHPHQW└ RI└ RXU└ WDWH└ ODZV◀

%$55$662 └
7KH└ ┼ ┼ └ LVW└ LQWHUHWWLQJ◀ └ :KDW└ ZDV└ WURXEOLQJ└ WR└ PDQ\└ RI└ XV└ LQ└ WKH└ SUHYLRXV└
DGPLQLWWUDWLRQ└ ZDV└ ZKHQ└ RIILFLDOV└ ZLWKLQ└ WKH└ 2EDPD└ DGPLQLWWUDWLRQ└ ZHQW└
WR└ H[WUDRUGLQDU\└ CHQJWKV└ WR└ DYRLG└ GLVFORVLQJ└ WKHLU└ RIILFLDO└ ZULWWHQ└
FRPPXQLFDWLRQV└ XQGHU└ WKH└)UHHGRP└ RI└ ,QIRUPDWLRQ└ $FW◀ └ 7KLV└ LV└ WKH└ ODZ└
WKDW└ DOORZV└ SXEOLF└ DFFHVV└ WR└ JRYHUQPHQW└ UHFRUGV◀

)RU└ H[DPSOH└ (3$└ DGPLQLWWUDWRU└ /LVD└ -DFNVRQ☼ └ DW└ WKH└ WLPH☼ └ XVHG└ DQ└ (3$└
HPDLO└ DFFRXQW└ XQGHU└ WKH└ QDPH└ RI└ 5LFKDUG└ :LQGVRU└ ┼ ┼ └ 5LFKDUG└ :LQGVRU☼ └
DV└ RSSRVHG└ WR└ KHU└ RZQ└ HPDLO└ DFFRXQW◀ └ $QG└ VR☼ └ LI└ FRQILUPHG☼ └ ZLOO└ \RX└
UHIUDLQ└ IURP└ WDNLQJ└ DQ\└ VXFK└ DFWLRQ└ WKDW└ PDNHV└ LW└ GLIILFXOW└ RU└ LPSRVLEOH└
IRU└ WKH└ SXEOLF└ WR└ DFFHVV└ \RXU└ RIILFLDO└ ZULWWHQ└ FRPPXQLFDWLRQV└ XQGHU└ WKH└
)UHHGRP└ RI└ ,QIRUPDWLRQ└ $FW'└ 358,77 └ <HV☼ └ 0U◀ └ &KDLUPDQ◀ └ $QG└ DV└ ,└
LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ WDWWHPHQW☼ └ ,└ UHDOO\└ EHOLHYH└ WKDW└ ♂ LQDXGLECH□ └
SDWWLFLSDWLRQ☼ └ WUDQVSDUHQF\☼ └ DQG└ UXCHPDNLQJ└ LV└ YHU\└ LPSRWDQW☼ └ DQG└ ,└ WKLQN└
WKDW└ H[WHQGV└ WR└ WKLV└ PDWWHU└ DV└ ZHOO◀ └ %$55$662 └ ,└ ZLOO└ UHVHUYH└ WKH└
UHPLQGHU└ ┼ ┼ └ UHPDLQGHU└ RI└ P\└ WLPH◀ └ 6HQDWRU└ &DUSHU◀

&$53(5 └
7KDQNV◀ └ 7KDQNV☼ └ 0U◀ └ &KDLUPDQ◀ └ :H└ ┼ ┼ └ DV└ ┼ ┼ └ DV└ ZH└ GLVFXVVHG└ EHIRUH☼ └
\RXUH└ SDUW└ RI└ ┼ ┼ └ ,└ WKLQN└ ┼ ┼ └ DW└ CHDWW└ WKUHH└ ODZVXLWV☼ └ 0U◀ └ 3UXLWW◀ └ ,└ WKLQN└ F
SHQGLQJ└ RQ└ WKH└ ┼ ┼ └ WKH└ (3$V└ HIIRUW└ WR└ UHGXFH└ PHUFXU\└ HPLVVLRQV└ IURP└
SRZHU└ SODQW◀

$QG└ ZH└ NQRZ└ WKDW└ ↑ !! └ SHUFHQW└ RI└ RXU└ QDWLRQV└ PHUFXU\└ HPLWWLRQV└ FRPH└
IURP└ ┼ ┼ └ IURP└ SRZHU└ SODQWW◀ └ 1RW└ QXFOHDU└ SODQWW└ └ EXW└ JHQHUDOO\└ IRWLO└ IXHO└
SODQWW└ └ CDUJHO\└ FRDO└ ILUH└ SODQWW◀ └ :H└ NQRZ└ WKDW└ WKHUH└ DUH└ PRUH└ ILVK└
FRQVXPSWLRQ└ DGYLVRULHV└ LQ└ WKH└ 8◀ 6◀ └ IRU└ PHUFXU\└ WKDQ└ ,└ WKLQN└ DOO└ RWKHU└
FRQWDPLQDQW└ FRPELQHG└ └ LQFOXGLQJ└ LQ└ \RXU└ KRPH└ WDWH└ RI└ 2NODKRPD◀

,I└ \RX└ EHOLHYH└ WKDW└ WKH└ (3$└ VKRXOG└ QRW└ PRYH└ IRUZDUG└ RQ└ WKH└ ┼ ┼ └ WKH└
0HUFXU\└ DQG└ $LU└ 7R[LFV└ UXOH└ └ KRZ└ GR└ WWDWHV└ FOHDQ└ XS└ PHUFXU\"└ :KDW└ GR└
\RX└ WKLQN└ DUH└ WKH└ KHDOWK└ LPSDFW└ RI└ PHUFXU\└ HPLWWLRQV"

358,77 └
6HQDWRU└ └ ,└ DFWXDOO\└ KDYH└ QRW└ WWDWHG└ WKDW└ ,└ EHOLHYH└ WKH└ (3$└ VKRXOG└ QRW└
PRYH└ IRUZDUG└ RQ└ UHJXODWLQJ└ PHUFXU\└ RU└ ┼ ┼ └ RU└ DGRSWLQJ└ UXOHPDNLQJ└ LQ└ WKDW└
UHJDUG◀ └ 2XU└ ┼ └ RXU└ FKDOOHQJH└ ZDV└ ZLWK└ UHJDUG└ WR└ WKH└ SURFHVV└ WKDW└ ZDV└
XVHG└ LQ└ WKDW└ FDVH└ └ DQG└ KRZ└ LW└ ZDV└ QRW└ FRPSOLFLW└ ZLWK└ WKH└ WWDWXWHV└ DV└
GHILQHG└ E\└ &RQJUHVV◀

6R└ └ WKHUH└ LV└ QRW└ D└ WWDWHPHQW└ └ QRU└ D└ EHOLHI└ WKDW└ ,└ KDYH└ └ WKDW└ PHUFXU\└ LV└
VRPHWKLQJ└ WKDW└ VKRXOGQW└ EH└ UHJXODWHG└ XQGHU└ VHFWLRQ└ ¶ ¶ ⊥ └ DV└ D└ KD]DUGRXV└
DLU└ SROOXWDQW◀ └ ,└ KDYH└ └ DV└ \RX└ NQRZ┼ ┼ └ WKDW└ LV└ D└ ┼ ┼ └ WKDW└ VHFWLRQ└ GHDOV└ ZLWK└
GLUHFWO\└ KHDOWK└ FRQFHUQV└ RI└ RXU└ FLWL]HQV◀

7KDW└ WKH└ UHDVRQ└ ZK\└ WKHUH└ LV└ FRQWUROOHG└ WHFKQRORJ\└ WKDW└ LV└ YHU\└
KHLJKWHGHG└ LQ└ WKDW└ WWDWXWH└ └ 0D[LPXP└ $FKLHYDEOH└ &RQWUROO└ 7HFKQRORJ\└
/KDW└ ┼ └ WKDW└ LV└ UHTXLUHG◀ └ $QG└ VR└ └ ,└ EHOLHYH└ WKDW└ PHUFXU\└ VKRXOG└ EH└ GHDOW└
ZLWK└ DQG└ GHDOW└ ZLWK└ LQ└ D└ PDQQHU└ LQ└ D└ PDQQHU└ ZD\└ E\└ WKH└ (3$└ └ EXW└ VXEVHFW└ WR└ WKH└
SURFHVHV└ WKDW└ WKLV└ ERG\└ KDV└ RXWOLQHG◀

&$53(5 └
6HQDWRU└ ♂ LQDXGLEOH□ └ DQG└ ,└ ZRUNHG└ WRJHWKHU└ IRU└ D└ QXPEHU└ RI└ \HDUV└ RQ└
&OHDU└ 6NLHV└ CHJLVODWLRQ◀ └ 7KH└ *HRUJH└ %XVK└ $GPLQLWWUDWLRQ└ KDG└ SURSRVHG└
&OHDU└ 6NLHV└ GHDOLQJ└ ZLWK└ VXOIXU└ GLR[LGH└ └ QLWURXV└ R[LGH└ └ DQG└ PHUFXU\◀ └ $QG└
VHYHUDO└ FROOHDJXHV└ RI└ P\└ RZQ└ └ LQFOXGLQJ└ 6HQDWRU└ $OH[DQGHU└ ZRUNHG└ RQ└
CHJLVODWLRQ└ VLPLODU◀

2QH└ RI└ WKH└ GLIIHUHQFHV└ EHWZHHQ└ ZKDW└ ZH└ SURSRVHG└ DQG└ WKH└ %XVK└
$GPLQLWWUDWLRQ└ SURSRVHG└ └ ZDV└ ZLWK└ UHVSHFW└ WR└ UHGXFLQJ└ WKH└ HPLWWLRQV└ RI└
PHUFXU\◀ └ ,└ GRQW└ UHFDOO└ H[DFWO\└ ZKDW└ WKH└ %XVK└ SURSRVDO└ FDOOHG└ IRU└ LQ└ WHUPV└
RI└ HPLWWLRQ└ UHGXFWLRQV└ IURP└ ┼ ┼ └ IURP└ SRZHU└ SODQWW└ └ DQG└ RWKHUV└ IURP└
PHUFXU\└ EXW└ LW└ ZDVQW└ YHU\└ DJJUHVVLYH◀

,└ SURSRVHG└ D└ ┼ ┼ └ D└ UHGXFWLRQ└ RI└ ← ‼ └ SHUFHQW└ RYHU└ D└ FHUWDLQ└ QXPEHU└ RI└ \HDUV◀ └ 6HQDWRU└ $QH[DQGHU└ VDLG└ KH└ WKRXJKW└ WKDW└ IRQV└ FRXOG└ GR└ EHWWHU└ WKDQ└ ← ‼ └ SHUFHQW└ DQG└ KH└ SURSRVHG└ ‼ └ SHUFHQW└ UHGXFWLRQ└ VFKHGXOH◀

:H└ KDG└ OLWHUDOO\└ KHUH└ DW└ WKLV└ WDEOH└ └ ZLWQHVVHV└ IURP└ XWLOLWLHV└ └ DQG└ RQH└ ZLWQHVV└ IURP└ D└ WUDGH└ DVVRFLDWLRQ└ └ UHSUHVHQWLQJ└ WHFKQRORJ\└ FRPSDQLHV└ /NDW└ IRFXVHG└ RQ└ UHGXFLQJ└ HPLVVLRQV└ RI└ KDUPIXO└ VXEVWDQFHV└ LQWR└ RXU└ DLU└ DQG└ WR└ RXU└ ZDWHU◀ └ (YHU\└ XWLOLW\└ UHSUHVHQWDWLYH└ VDLG└ └ | :H└ FDQQRW└ PHHW└ DQ└ ← ‼ └ SHUFHQW└ UHGXFWLRQ└ LQ└ PHUFXU\◀ |

7KH└ ZLWQHVV└ IURP└ WKH└ WUDGH└ DVVRFLDWLRQ└ UHSUHVHQWLQJ└ WKH└ ┼ └ WKH└ LQGXVWU\└ └ LQ└ ZKLFK└ ┼ ┼ └ DQG└ WKLV└ LV└ MXVW└ WR└ WU\└ WR└ UHGXFH└ HPLVVLRQV└ OLNH└ PHUFXU\└ ┼ ┼ └ VDLG QRW└ RQO\└ FDQ└ ZH└ PHHW└ ┼ ┼ └ LQGXVWU\└ FDQ└ ZH└ PHHW└ WKRVH└ UHGXFWLRQV└ RYHU└ WKH└ \WLSXODWHG└ SHULRG└ RI└ WLPH└ └ WKH\└ FDQ└ H[FHHG└ WKHP◀ └ $V└ LW└ WXUQV└ RXW└ └ WKH\└ H[FHHGHG└ WKHP◀

7KH\└ DFWXDOO\└ GLG└ EHWWHU└ WKDQ└ ← ‼ └ SHUFHQW◀ └ 6KH└ GLG└ EHWWHU└ WKDQ└ ‼ └ SHUFHQW◀ └ 7KH\└ GLG└ LW└ PRUH└ TXLFNO\└ WKDQ└ ,└ WKLQN└ ZDV└ DQWLFLSDWHG◀ └ ,V└ WKDW└ LQWXUXFWLYH└ /R└ \RX└ LQ└ DQ\└ ZD\└ RQ└ WKLV└ TXHVWLRQ"

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,V└ WKDW└ ZKDW"└ ,P└ VRUU\◀

&$53(5 └
,QWXUXFWLYH└ WR└ \RX◀ └ ,V└ WKHUH└ DQ\└ CHWRQ└ WKHUH└ IRU└ \RX└ RU└ IRU└ XV└ IURP└ WKDW└ H[SHULHQFH"

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:HOO└ DV└ ,YH└ LQGLFDWHG└ 6HQDWRU└ ,└ UHDOO\└ EHOLHYH└ WKDW└ LW└ LPSRUWDQW└ WKDW└ LW└ D└ SDUWQHUVKLS└ EHWZHHQ└ WKH└ (3$└ DQG└ WKH└ WXDWHV◀ └ ,└ PDGH└ UHIHUHQFH└ WR└ WKH└ SKUDVH└ HDUOLHU└ └ | QDWLRQDO└ WXDQGDUGV└ DQG└ GHLJKERUKRRG└ VROXWLRQV◀ |

,└ ┼ ┼ └ ,└ WKLQN└ WKDW└ WKDW└ VKRZV└ WKDW└ WKH└ (3$└ FDQ└ EH└ LQYROYHG└ └ DQG└ VKRXOG└ EH└ LQYROYHG└ └ LQ└ VHWWLQJ└ WXDQGDUGV└ └ VHWWLQJ└ REMHFWLYH└ └ VFLHQFH┼ └ EDVHG└ WXDQGDUGV└ └ WR└ LPSURYH└ DLU└ TXDOLW\└ DQG└ SURWHFWLQJ└ WKH└ KHDOWK└ RI└ RXU└ FLWL]HQV└ └ EXW└ DOVR└ EH└ D└ PHDQLQJIXO└ SDUWQHU└ ZLWK└ WKH└ WXDWHV└ LQ└ LPSOHPHQWLQJ└ WKRVH└ CDZV◀

&$53(5 └

/HW└ PH└ MXXW└ WWRS└ \RX└ WKHUH☼ └ SCHDVH◀ └ 7KH└ ┼ ┼ └ ,└ OLNH└ WR└ VD\☼ └ | ,Q└ DGYHUWLW\└ OLI-
RSSRUWXQLW\◀ | └ 7KDW└ GRW└ PH◀ └ 7KDW└ $CEHUW└ (LQXWHLQ◀ └%XW└ WKH└ ┼ ┼ └ WKHUH└ LV└
HFRQRPLF└ DGYDQWDJH└ WR└ EH└ JDLQHG└ IURP└ FCHDQLQJ└ XS└ SRQXWLRQ◀ └ :HYH└
VHHQ└ LW◀

7KHUHV└ FRPSDQLHV└ WKDW└ ZRUNHG└ RQ└ WKH└ PHUFXU\└ HPLWWLRQV☼ └ WKH\└ PDGH└
PRQH\└ GRLQJ└ WKDW└ ┼ ┼ └ LQWDOOLQJ└ WKDW└ WHFKQRORJ\└ DURXQG└ WKH└ ZRUOG◀ └ 6LPLODUO\└
/KHUH└ KDV└ EHHQ└ PRQH\└ PDGH└ IURP└ 'LHVHO└ (PLWWLRQ└ 5HGXFWLRQ└ $FW◀ └ 7KH└
$PHULFDQ└ WHFKQRORJ\└ UHGXFLQJ└ HPLWWLRQV└ IURP└ ┼ ┼ └ IURP└ ROG└ GLHVHO└ ┼ ┼ └
GLHVHO└ HQJLQHV◀

+DYH└ \RX└ ┼ ┼ └ GR└ \RX└ HYHU└ JLYH└ DQ\└ WKRXJKW└ WR└ WKDW☼ └ WKH└ HFRQRPLF└ JDLQ☼ └ WKH└
HFRQRPLF└ DGYDQWDJH└ WKDW└ FDQ└ ICRZ└ IURP└ GHYHORSLQJ└ WKDW└ WHFKQRORJ\└ WR└
UHGXFH└ HPLWWLRQV"└ ,└ DFWXDOO\└ WKLQN└ WKDW└ VRPH└ UHJXODWLRQV☼ └ FCHDU└
UHJXODWLRQ└ ┼ ┼ └ DQG└ ,OO└ QHYHU└ IRUJHW└ D└ FRQYHUVDWLRQ└ ZH└ KDG└ ZLWK└ ┼ ┼ └ ZKHQ└ ZH└
ZHUH└ ZRUNLQJ└ RQ└ RXU└ &CHDU└ 6NLHV└ CHJLVODWLRQ☼ └ DGGUHVVLQJ└ IRUHLJQ└
SRQXWDQWV☼ └ PHHWLQJ└ ZLWK└ D└ EXQFK└ RI└ XWLOLW\└ &(2V☼ └ DQG└ ZHUH└ WDONLQJ└ DERXW└
KRZ└ WR└ JR└ IRUZDUG└ RQ└ WKLV└ ┼ ┼ └ WKDW└ LWXH◀

$QG└ DW└ WKH└ HQG└ RI└ WKH└ FRQYHUVDWLRQ☼ └ RQH└ RI└ WKH└ XWLOLW\└ &(2V☼ └ ,└ WKLQN└ LW└ ZDV└
♂ LQDXGLECH□☼ └ ROGHU└ IHOORZ☼ └ DQG└ ,└ GRQW└ UHPHPEHU└ ZKHUH└ KHV└ IURP☼ └ EXW└ KH└
VDLG└ ┼ ┼ └ DW└ WKH└ HQG└ RI└ WKH└ GD\☼ └ KH└ VDLG☼ └ | +HUHV└ ZKDW└ \RX└ QHHG└ WR└ GR◀ | └ ┼ ┼
\RX☼ └ XV☼ └ &RQJUHVV☼ └ &3$└ ┼ ┼ └ | <RX└ QHHG└ WR└ WHOO└ XV└ ZKDW└ WKH└ UXCHV└ DUH└ JRQQD└
EH◀ └ <RX└ QHHG└ WR└ JLYH└ XV└ VRPH└ WLPH☼ └ VRPH└ ICH[LELOLW\◀ └ $QG└ \RX└ QHHG└ WR└ JHW└
RXW└ RI└ WKH└ ZD\◀ | └ 7KDW└ ZKDW└ KH└ VDLG◀

7HOO└ XV└ ZKDW└ WKH└ UXCHV└ DUH└ JRLQJ└ WR└ EH☼ └ JLYH└ XV└ VRPH└ ICH[LELOLW\☼ └ DQG└ JHW└
RXW└ RI└ WKH└ ZD\◀ └ 'R└ \RX└ EHOLHYH└ WKDW└ DFWXDOO\└ VHWWLQJ└ WXDQGDUGV└ ┼ ┼ └
ZKDWHYHU└ LW└ KDSSHQV└ WR└ EH☼ └ ZLWK└ PHUFXU\└ UHGXFWLRQV└ ZLWK└ ♂ LQDXGLECH□ └
WXDQGDUGV☼ └ ZLWK└ IXHO└ HIILFLHQF\└ UHTXLUHPHQWW☼ └ WKDW└ DFWXDOO\└ VHWWLQJ└ WKRVH└
WXDQGDUGV☼ └ PDNLQJ└ LW└ FCHDU☼ └ WKDW└ ZH└ DFWXDOO\└ SURYLGH└ FHUWDLQW\└ DQG└
DFWXDOO\└ RSHQ└ WKH└ GRRU└ IRU└ HFRQRPLF└ ┼ ┼ └ HFRQRPLF└ SURGXFWLYLW\└ ┼ ┼ └
SURGXFWLRQ"

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,└ GR☼ └ 6HQDWRU☼ └ DFWXDOO\◀

&$53(5 └
&DQ└ \RX└ JLYH└ XV└ DQ└ H[DPSCH└ ZKHUH└ \RX└ DFWXDOO\└ VDZ└ WKDW└ KDSSHQ└ ┼ ┼ └
ZHUH└ KHDSIXO└ LQ└ PDNLQJ└ WKDW└ KDSSHQ"

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,Q└ 2NODKRPD┼ ┼ └WKLV└ LV└ QRW└ ZLGHD\└ NQRZQ└ EHFDXVH└ ZH└ DUH└ NQRZQ└ DV└ DQ└ RLO└ DQG└ JDV└ WDWH└ EXW└ ┼ ┼ └EXW└ LQ└WKH└ JHQHUDWLRQ└ RI└ HQHUWLFLW\└ LQ└ RXU└ WDWH└ └ ¶ → SHUFHQW└ RI└ RXU└ HQHUWLFLW\└ LV└ JHQHUDWHG└WKURXJK└ ZLQG◀ └ $QG└ VR└ └ ZHYH└ KDG└ D└ KHDY\└ HPSKDVLV└ RQ└ UHQHZDEOHV◀ └ $QG└WKDW└ SXW└ XV└ LQ└WRS└WKUHH└ RI└WKH└ FRXQWU\◀

$QG└ VR└ └ RXU└ FRUSRUDWLRQ└ FRPPLWWLRQ└ ┼ ┼ └ ,└ DFWXDOO\└ KDYH└ REOLJDWLRQV└WR└ DSSHDU└ EHIRUH└WKH└ &RUSRUDWLRQ└ &RPPLWWLRQ└ └ LQ└WKH└ VHWWLQJ└ RI└ UDWHV◀ └ 6R└ └ DV└ XWLOLW\└ FRPSDQLHV└ DUH└ ORRNLQJ└ DW└ FRGLI\LQJ└WKHLU└ IDFLOLWLHV└WR└ FRPSO\└ ZLWK└ HQYLURQPHQWDO└ WDWXWHV└ └WKHUH└ LV└ JUHDW└ GLVFXVVLRQ└ DERXW└ KRZ└WR└ GR└ WKDW└ PRUH└ HFFRQRPLFDOO\└ └ DQG└WR└ DFKLHYH└WKH└ ┼ ┼ └WKH└ DLU└ TXDOLW\└ REMHFWLYHV└ ZH└ KDYH└ XQGHU└ (3$└ PDQGDWHV└ DQG└ WDWH└ PDQGDWHV◀

$QG└ VR└ └ ,YH└ EHHQ└ YHU\└ LQYROYHG└ LQ└WKDW└ SURFHVV└ └WKURXJK└WKDW└ SDUW└ RI└ P\└ RI ILFH◀

&$53(5 └

7KDQNV◀ └ 7KDQNV└ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └

7KDQN└ \RX└ └ 6HQDWRU└ &DUSHU◀ └ 6HQDWRU└ &DSLWR◀

&$3,72 └

7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀ └ 7KDQN└ \RX└ DJDLQ└ EHIRUH└ EHLQJ└ EHIRUH└ XV└ DQG└ FRQJUDWXODWLRQV└ RQ└ \RXU└ QRPLQDWLRQ◀

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7KDQN└ \RX└ └ 6HQDWRU◀

&$3,72 └

<RX└ NQRZ└ └ ,└WKLQN└WKDW└ DV└ \RX└ FDQ└WHOO└ IURP└WKLV└ FRPPLWWHH└ DQG└ UHDOO\└WKH└ FRXQWU\└ └ LV└ GLYLGHG└ RQ└ D└ QRW└ RI└WKH└ LWXHV└ LQ└ DQG└ DURXQG└ LQYROYLQJ└ ZKDW└ \RXUH└ HQGHDYRULQJ└WR└ KHDGOLQH└ KHUH└ DW└WKH└ (3$◀ └ %XW└ ,└WKLQN└WKDW└ XQGHUWDQGLQJ└ RQH└ DQRWKHU└ LV└ H[WUHPHO\└ LPSRUWDQW└ QR└ PDWWHU└ KRZ└ PDQ\└ /LPHV└ ,└ PLJKW└ VD\└WKH└ VDPH└WKLQJ└ DQG└ VRPHERG\└ HOVH└ RQ└WKH└ RWKHU└ VLGH└ PLJKW└ VD\└WKH└ VDPH└WKLQJ◀

,W- JLYHV└ PH└ D└ JUHDWHU└ XQGHUVWDQGLQJ└ RI└ ZKHUH└ WKH└ OLYH└ DQG└ KRZ└ WKH└ ┼ ┼ └
KRZ└ WKH└ WKLQN└ WKH└ EHWW- ZD└ WR└ SXUXH└ HQYLURQPHQWDO└ LVXHV└ DUH◀ └ 6R└ LQ└
WKH└ FURZG└ WKDW- MRLQHG└ XV└ KHUH└ DWWHU└ OXQFK└ DUH└ VHYHUDO└ FRDO└ PLQHUV└ ZKR└
WUDYHOHG└ DOO└ PRUQLQJ└ ┼ ┼ └ KDYH└ EHHQ└ ZDLWLQJ└ LQ└ WKH└ KDOO└ DQG└ PDGH└ VRPH└
QHZ└ IULHQGV└ LQ└ WKH└ DXGLHQFH└ WKHUH└ DQG└ ,└ ZDQW└ WR└ WKDQN└ WKHP└ IRU└ FRPLQJ◀

%HFDXVH└ WKRVH└ DUH└ WKH└ IDFHV└ RI└ WKH└ LVXHV└ WKDW- ,└ WU\└ WR└ DGGUHVV└ ZKHQ└
ZHUH└ WDONLQJ└ DERXW- WKH└ GLIIHUHQW- IDFHWV└ RI└ WKH└ UHJXODWRU\└ HQYLURQPHQW-
WKDW- ZH└ VHH└ WKDWW└ EHHQ└ SXW- IRUWK└ RYHU└ WKH└ ODWW- VHYHUDO└ \HDUV◀

6R└ WKLV└ TXHWWLRQ└ IRU└ \RX└ DOO◀ └ ,Q└ P\└ YHU\└ ILUWW- KHDULQJ└ DV└ D└ &QLWHG└ 6WDWHV└
6HQDWRU└ RQ└ WKLV└ FRPPLWWHH└ ZH└ KDG└ WKH└ $VVLWWDQW- $GPLQLWUDWRU└ -DQHW└ └
0F&DEH└ └ VKH└ FDPH└ WR└ WHWWLI\└ DERXW- (3$└ &2└ └ UXCHV◀

:KHQ└ ,└ SUHVHG└ KHU└ DERXW- ZK\└ LQ└ WKH└ SXEOLF└ PHHWLQJV└ RQ└ WKH└ H[LWLQJ└
SDQW- UXCHV└ (3$└ KDG└ QRW- ERWKHUHG└ WR└ FRPH└ WR└ :HWW- 9LUJLQLD└ RU└ IRU└ WKDW-
PDWWHU└ DQ\└ RI└ WKH└ RWKHU└ WDWHV└ WKDW- PRWW- KHDYLO\└ UHO\└ RQ└ FRDO└ IRU└
HQHUWULFLW\└ JHQHUDWLRQ└ WKLV└ LV└ ZKDW- VKH└ VDLG◀ └ $QG└ ,└ TXRWH└ └ | :H└ WULHG└ WR└
ZKHQ└ ZH└ ZHUH└ VFKHGXOLQJ└ QDWLRQDO└ CHYHO└ PHHWLQJV└ ZH└ ZDQWHG└ WR└ KDYH└
WKRVH└ LQ└ CRFDWLRQV└ ZKHUH└ SHRSCH└ ZHUH└ FRPIRUWDECH└ FRPLQJ◀ |

:HOO└ └ 0U◀ └ $WWRUCH\└ *HQHUDO└ ,└ ZDQW- \RX└ WR└ EH└ FRPIRUWDECH└ FRPLQJ└
DQ\ZKHUH└ LQ└ WKLV└ FRXQWU\└ WR└ WDON└ DERXW- ┼ ┼ └ ZKHWKHU└ LVW└ 5KRGH└ ,VODQG└ RU└
ZKHWKHU└ LVW└ :HWW- 9LUJLQLD└ └ $QDWND└ ┼ ┼ └ SHRSCH└ QHHG└ WR└ NQRZ└ WKDW- \RXUH└
QLWHQLQJ└ DQG└ \RX└ FDUH└ └ DQG└ WKDW- \RXUH└ XQGHUWDQGLQJ└ WKH└ UDPLILFDWLRQV└
IRU└ WKH└ GHFLVLRQV└ WKDW- \RX└ PDNH◀

6R└ WKLV└ GLGQW- VLW- YHU\└ ZHOO└ IRU└ PH◀ └ :H└ KDG└ D└ PHHWLQJ└ DWWHU└ WKDW- LQ└
%HFNCH\└ └ :HWW- 9LUJLQLD└ └ ZKLFK└ LV└ WKH└ ELUWKSODFH└ RI└ WKH└ UDQNLQJ└ PHPEHU└
DQG└ ZH└ KDG└ %R└ &RSCH\└ WKHUH└ └ ZKR└ ZDV└ D└ CDLG└ RII└ FRDO└ PLQHU◀ └ +H└ WDONHG└
DERXW- DOO└ WKH└ KDUGVKLSV└ RI└ KLV└ IULHQGV└ DQG└ QHLJKERUV◀

:H└ KDG└ WKH└ FRXQW\└ FRPPLWWLRQHU└ ZKR└ WDONHG└ DERXW- WKH└ CRW└ RI└ UHYHQXH└
WR└ WKH└ FRXQW\└ DQG└ KRZ└ LVW└ LPSDFWLQJ└ WKH└ VFKRRO└ V\WWHPV└ └ DQG└ WKH└ UHDO└
HWWDWH└ YDOXHV└ └ DQG└ WKH└ EDQNUXSWFLHV└ RI└ DOO└ RI└ WKH└ GLIILFXQW- FRDO└ FRPSDQLHV└ └
DQG└ SHRSCH└ ZKR└ KDYH└ EHHQ└ RXW- RI└ ZRUN◀

6R└ ,└ ZRXOG└ LPSCRUH└ \RX└ WR└ FRPPLW- WRGD\└ WR└ YLVLW- :HWW- 9LUJLQLD└ └ ERWK└ VLGHV└
RI└ :HWW- 9LUJLQLD└ DQG└ WR└ WDON└ WR└ RXU└ FRDO└ PLQHUV└ DQG└ WKHLU└ IDPLOLHV◀ └ 7R└ WDON└
DERXW- ZKDW- WKH└ MRE└ DQG└ HFRQRPLF└ LPSDFWW└ └ DQG└ KRZ└ ZH└ FDQ└ ZRUN└
WRJHWKHU└ ZLWK└ ERWK└ VLGHV└ WR└ WU\└ WR└ JHW- WR└ WKH└ LQWHQGHG└ JRDO└ RI└ FCHDCHU└ DLU└ └
DQG└ FCHDCHU└ ZDWHU◀

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6HQDWRU└ ,└ UHDOO└ DSSUHFLDWH└ \RX└ VKDULQJ└ WKDW└ DQG└ WKDW└ WKH└ UHDVRQ└ ,└ PHQWLRQ└ LQ└ P└ RSHQLQJ└ WDWWPHQW└ WKH└ LPSRUWDQFH└ RI└ OLWWHQLQJ└ DQG└ CHDGLQJ◀ └ 7KLV└ SURFHW└ WKDW└ ,YH└ EHHQ└ D└ SDUW└ RI└ REYLRXVO└ LV└ YHU└ QHZ└ EXW└ ,└ VSHQW└ WLPH└ ZLWK└ HDFK└ RI└ \RX└ PDQ└ RI└ \RX└ LQ└ LQGLYLGXDO└ PHHWLQJV└ DQG└ 6HQDWRU└ *LOOLEUDQG└ WDONHG└ DERXW└ LWXHV└ WKDW└ ZHUH└ LPSRUWDQW└ WR└ KHU└ DURXQG└ &(5&/$◀

<RX└ FLWHG└ FRQFHUQV└ DQG└ LWXHV└ WKDW└ DUH└ LPSRUWDQW└ WR└ \RX└ LQ└ :HXW└ 9LUJLQLD◀ └ ,└ WKLQN└ LWW└ D└ YHU└ LPSRUWDQW└ LI└ FRQILUPHG└ DV└ DGPLQLWUDWRU└ WKDW└ ,└ VSHQG└ WLPH└ UHVSRQGLQJ└ CHDUQLQJ└ DQG└ OLWWHQLQJ└ WR└ \RX└ DQG└ \RXU└ UHVSHFWLYH└ WDWWHV└ DQG└ WU\LQJ└ WR└ EH└ KHOSIXO└ ZLWK└ UHJDUG└ WR└ WKH└ HQYLURQPHQWDO└ LWXHV└ WKDW└ \RX└ IDFH◀

&$3,72 └

7KDQN└ \RX◀ └ 7KDQN└ \RX└ WKDW└ PHDQV└ D└ CRW◀ └ 7KDQN└ \RX◀ └ ,└ ZRXOG└ OLNH└ WR└ JHW└ \RPH└ FDUULIFDWLRQ└ RQ└ D└ WRSLF└ WKDW└ NLQG└ RI└ KDV└ EHHQ└ FRPLQJ└ XS└ DQG└ FRPLQJ└ XS└ DERXW└ KRZ└ PDQ└ WLPHV└ \RX└ DV└ WKH└ $WWRUCH└ *HQHUDO└ KDYH└ VXHG└ WKH└ (3$◀ └ $QG└ \RX└ EHJDQ└ \RXU└ WDWWHPHQW└ E└ VD└ LQJ└ WKDW└ └ | 7KH└ UXCH└ RI└ CDZ└ LV└ YHU└ LPSRUWDQW└ WR└ \RX◀ |

$QG└ WKHQ└ \RX└ WDONHG└ DERXW└ VHYHUDO└ RI└ WKH└ FDVHV└ DQG└ SUREDEO└ PRXW└ RI└ WKH└ FDVHV└ WKDW└ \RX└ EURXJKW└ IRUZDUG└ LV└ CRW└ FKDOOHQJLQJ└ WKH└ UHJXODWLRQV└ VR└ PXFK└ DV└ WKH└ SURFHW└ RU└ ZKHWKHU└ WKH└ UXCH└ RI└ CDZ└ KDV└ EHHQ└ RYHUWWHSSHG└ LQ└ WKH└ ERXQGDULHV└ RI└ WKH└ (3$└ KDV└ EHHQ└ WKH└ ┼ ┼ └ LQWHQW└ RI└ &RQJUHW└ E└ CHJLVODWLQJ└ WR└ WKH└ (3$└ KDV└ EHHQ└ RYHUWWHSSHG◀

$QG└ WKH└ FRXUW└ KDYH└ DJUHHG└ LQ└ VRPH└ FDVHV└ └ WKDW└ WKLV└ LV└ WKH└ FDVH◀ └ &RXOG└ \RX└ NLQG└ RI└ UHWDWH└ WKDW└ SRVLWLRQ└ RQ└ WKH└ ┼ ┼ └ RQ└ WKH└ GLIIHUHQW└ DFWLRQV"

358,7 └

:HOO└ └ 6HQDWRU└ └ DV└ ,YH└ LQGLFDWHG└ └ ,└ WKLQN└ LQ└ UHVSRQVH└ WR└ 6HQDWRU└ 6XOOLYDQ└ └ SUREDEO└ PRUH└ VR└ WKDQ└ PRW└ WDWWWHV└ WKDW└ DUH└ SDVHG└ E└ &RQJUHW└ └ WKLV└ ERG└ KDV└ UHFRJQL]HG└ WKH└ YHU└ LPSRUWDQW└ DQG└ YLEUDQW└ URCH└ WKH└ WDWWHV└ SCD└ LQ└ SDUWCHUVKLS└ ZLWK└ WKH└ (3$└ DW└ LPSCHPHQWLQJ└ DQG└ HQIRUFLQJ└ RXU└ HQYLURQPHQWDO└ WDWWWHV◀

$QG└ PDQ└ RI└ \RX└ KDYH└ WDONHG└ DERXW└ WKDW└ LQ└ \RXU└ RIILFHV◀ └ +RZ└ \RXU└ '(4└ ZRUNV└ DW└ WKH└ 5HJLQDO└ $GPLQLWWUDWRU◀ └ $QG└ ┼ ┼ └ DQG└ ┼ ┼ └ VR└ ZKHQ└ ZH└ WDON└ DERXW└ UXCH└ RI└ CDZ└ DV└ \RX└ GHDO└ ZLWK└ PHUFXU└ DV└ \RX└ GHDO└ ZLWK└ &2└ └ DV└ \RX└ GHDO└

ZLWK└ ZDWHU└ LVVXHV└ DURXQG└ ZKDW└ LV└ WKH└ GHILQLWLRQ└ DQG└ LQ└ WKRVH└ FDVHV└ LVW└
LPSRUWDQW└ WKDW└ \RX└ GR└ VR└ FRQVLWHQW└ ZLWK└ WKH└ IUDPHZRUN└ WKDWW└ EHHQ└
HVWDEOLVKHG└ E\└ WKLV└ ERG\☼└ DQG└ LVW└ UHVSHFWHG◀

%HFDXVH└ WKDW└ JLYHV└ FRQILGHQFH└ WR└ WKH└ SHRSOH└ DUH└ UHJXODWLQJ◀└ <RX└ NQRZ☼└
ZKHQ└ \RX└ KDYH└ DQ└ DGPLQLWWUDWLYH└ DJHQF\└ RI└ DQ\└ VVSH└ WKDW└ DFWW└
LQFRQVLWHQW└ RU└ WULHV└ WR└ HQGDUJH└ LVW└ DXWKRULWW\☼└ LW└ UHDOO\└ GRHVQW└ LQVSLUH└
FRQILGHQFH☼└ LQ└ WKRVH└ WKDW└ DUH└ UHJXODWHG◀

<RXUH└ VHHLQJ└ D└ PDWWHU└ RI└ SLFNLQJ└ ZLQQHUV└ DQG└ ORVHUV☼└ DQG└ EHLQJ└ DJDLQWW└
FHUWDLQ└ WKLQJV☼└ DV└ RSSRVHG└ WR└ SURWHFWLQJ└ SHRSOH└ DQG└ VR└ WKDW└ UXOH└ RI└ ODZ└ LV└
QRW└ VRPHWKLQJ└ WKDWW└ DFDGHPLF└ LQ└ P\└ YLHZ◀└ ,WW└ QRW└ VRPHWKLQJ└ WKDWW└ MXWW└
CHJDO◀└ ,└ WKLQN└ LVW└ LPSRUWDQW└ WR└ HQVXULQJ└ JRRG└ RXWFRPHV└ DV└ IDU└ DV└
LPSURYLQJ└ RXU└ DLU└ DQG└ SURWHFWLQJ└ RXU└ ZDWHUV◀

&$3,72└
7KDQN└ \RX◀

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6HQDWRU└ :KLWHKRXVH◀

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7KDQN└ \RX☼└ &KDLUPDQ◀└ 0U◀└ 3UXLWW☼└ ZKHQ└ ZH└ CHIW└ RII└ ZH└ ZHUH└ WDONLQJ└ DERXW└
/KLQJV└ WKDW☼└ WR└ TXRWH└ WKH└ &KDLUPDQ☼└ | PLJKW└ SODFH└ WR└ \RX└ LQ└ D└ FRQIOLFW└ RI└
LQWHUHWW☼└ EXW└ KDYH└ QRW└ EHHQ└ GLVFORVHG|└ DQG└ ZH└ ZHUH└ WDONLQJ└ DERXW└ WKH└
GDUN└ PRCH\└ RSHUDWLRQ└ WKDW└ VXSSRUWW└ WKH└ 5HSXEOLFDQ└ $WWRUCH\└ *HQHUDOV└
$VVRFLDWLRQ◀

%HIRUH└ ZH└ JHW└ EDFN└ LQWR└ WKDW☼└ CHW└ PH└ DVN└ \RX└ WKLV└ DV└ D└ K\SRWKHWLFDO☼└ LI└ \RX└
KDG└ UDLVHG└ VLJQLILFDQW└ DPRXQW└ RI└ PRCH\└ IRU└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└
)XQG└ IURP└ FRUSRUDWLRQV└ ZKR└ ZLOO└ EH└ VXEMHFW└ WR└ (3$V└ UHJXODWLRQ☼└ EHIRUH└
(3$☼└ ZLWK└ PDWWHUV└ EHIRUH└ (3$☼└ PLJKW└ WKDW└ SODFH└ \RX└ LQ└ D└ FRQIOLFW└ RI└
LQWHUHWW'

358,77└

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +ROGV└ +◀[3DJH¶ ¶└→R┼└

7KH└ ┼ ┼ └WKH└ (3$└ HWKLFV└ FRXQFLO└ KDV└ VDLG└ ┼ ┼ └DQG└ E\└WKH└ ZD\└WKHVH└ DUH└
FDUHHU└ LQGLYLGXDOV└ DV└ \RX└ NQRZ☼ └ 6HQDWRU◀ └ $GMXWLQJ└ D└ IHZ└ LV└ D└ FDUHHU└
SHUVRQ└ DW└ (3$└ HWKLFV└ DQG└ VR└ DV└WKH\YH└ UHYLHZHG└WKHVH└ SRWHQWLDO└
FRQIOLFWW└WKH\└ ┼ ┼ └WKH\└ KDYH└ ┼ ┼ └ ,YH└ GLVFORVHG└ DOO└ HQWLWLHV└WKDW└ ,YH└ EHHQ└
DIILOLDWHG└ ZLWK└ ┼ ┼

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,└ XQGHUWWDQG└WKDW☼ └ EXW└ ,P└ DVNLQJ└ \RX└ LI└ \RX└WKLQN└ LW└ PLJKW└ SODFH└ \RX└ LQ└ D└
FRQIOLFW└ RI└ LQWHUHWW└ EHFDXVH└ ZH└ ERWK└ XQGHUWWDQG└WKDW└WKH└ HWKLFV└ UXCHV└WKDW└
WKH└ (3$└ LV└ HQIRUFLQJ└ SUH┼ GDWHV└ &LWL]HQV└ 8QLWHG☼ └ SUH┼ GDWH└ GDUN└ PRQH\└
DQG└WKH\YH└ VDLG└ LQ└WKH└ CHWWHU└WKH\└ DUHQW└ HYHQ└ ORRNLQJ└ DW└WKDW└ EHFDXVH└
WKH\└ GRQW└ KDYH└WKH└ DXWKRULW\└WR◀

7KDW└ GRHVQW└ PHDQ└ LW└ QRW└ D└ FRQIOLFW└ RI└ LQWHUHWW◀ └ ,W└ PHDQV└WKDW└WKH└
UHJXODWRU\└ DXWKRULW\└ RQ└ JRYHUQPHQW└ HWKLFV└ KDVQW└ FDXJKW└ XS└ ZLWK└WKLV└
SRWW└ &LWL]HQV└ 8QLWHG└ GDUN└ PRQH\└ ZRUOG◀ └ 0\└ TXHWWLRQ└ LV☼ └ \RXUH└ D└ ODZ\HU☼ └
\RX└ NQRZ└ FRQIOLFW└ RI└ LQWHUHWW☼ └ \RXYH└ EHHQ└ DQ└ $WWRUQH\└ *HQHUDO◀

0LJKW└ LW└ EH└ D└ FRQIOLFW└ RI└ LQWHUHWW└ ZLWKLQ└ \RXU└ GHILQLWLRQ└ RI└WKH└WHUP└ LI└ \RX└
KDG└ UDLVHG└ VLJQLILFDQW└ DPRXQW└ RI└ PRQH\└ IRU└WKLV└ 5XCH└ RI└ /DZ└ 'HIHQVH└
)XQG└ DQG└WKH\└ KDG└ EXVLQHV└ EHIRUH└ ┼ ┼ └DQG└WKH\OO└ KDYH└ EXVLQHV└ EHIRUH└
(3$└ ZLWK└ \RX"└ ,V└WKDW└ D└ SRWHQWLDO└ FRQIOLFW└ RI└ LQWHUHWW"

358,77 └
,└WKLQN└ MXWW└ LQ└ ┼ ┼ └ LI└ \RX└ DFWXDOO\└ GLG└ DGGUHVV└WKRVH└ HQWLWLHV└WR└WKH└ GHJUHH└
WKDW└ ,└ ZDV└ QHYHU└ RQ└ RIILFHU└ RI└WKH└ VXSHU└ IXQG└WKDW└ \RX└ ┼ ┼ └WKH└ VXSHU└ SDFN└
WKDW└ \RX└ UHIHUUHG└WR└ HDUOLHU☼ └WKH└ /LEHUW\└ ┴ ◀ !! ☼ └ DQG└ VR└WKH\└ ORRNHG└ DW└WKRVH└
┼ ┼

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7KH└ TXHWWLRQ└ ZDV└ IXQG┼ UDLVLQJ

358,77 └
7KH\└ ORRNHG└ DW└WKRVH└ HQWLWLHV└ ┼ ┼

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7KDW└WKH└ TXHWWLRQ└ ZH└ GRQW└ KDYH└ DQ\└ DQVZHUV└ RQ☼ └ LV└ ZKDW└ \RX└ UDLVHG◀

KWWS ↕ ↕ ZZZ◀ FT◀ FRP↕ GRF↕ FRQJUHVVLR┼DQWUDQVFULSWW "¶ ┴ SULQWWUXH ¶ ┼┴ ↕!!
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7KH└ CRRNHG└ DW└ WKRVH└ HQWLWLHV└ WR└ GHWHUPLQH└ ZKDW└ WKH└ QDWXUH└ RI└ P└ UHDWLRQVKLS└ ZDV└ DQG└ WKHQ└ LQGLFDWHG└ WKDW└ WKRVH└ ZRXOG└ KDYH└ WR└ EH└ HYDOXDWHG└ LQ└ WKH└ IXWXUH└ DV└ FDVHV└ DURVH◀ └ $QG└ ┼ ┼

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5LJKW└ QRZ└ WKH└ &KDLUPDQ└ DVNHG└ \RX└ D└ TXHVWLRQ└ ZKLFK└ LV└ DUH└ WKHUH└ PDWWHUV└ WKDW└ PLJKW└ SDFH└ \RX└ LQ└ D└ FRQIOLFW└ RI└ LQWHUHVW└ WKDW└ \RX└ KDYH└ QRW└ GLVFORVHG◀ └ <RX└ DQVZHUHG└ | 1R◀ | └ 0LJKW└ QRW└ KDYLQJ└ UDLVHG└ VLJQLILFDQW└ PRQH\└ CHW└ VD\└ D└ PLOOLRQ└ GROODUV◀

/HW└ VD\└ \RX└ PDGH└ D└ FDOO└ WR└ 'HYRQ└ (QHUJ\└ DQG└ VDLG└ | ,└ GLG└ \RXU└ CHWWHU└ IRU└ \RX└ ♂ LQDXGLECH□ └ QHHGV└ D└ CRW└ RI└ PRQH\└ ZHYH└ JRW└ WKLV└ GDUN└ PRQH\└ /KLQJ└ ZKHUH└ ZH└ FDQ└ CDXQGHU└ \RXU└ LGHDWLW└ FCHDQ└ RII└ LW└ DQG└ WKH└ PRQH\└ ZLOO└ JR└ LQWR└ ♂ LQDXGLECH□◀ └ ,└ QHHG└ D└ PLOOLRQ└ EXFNV└ RXW└ RI└ \RX◀ └ 0LJKW└ WKDW└ QRW└ FUHDWH└ D└ FRQIOLFW└ RI└ LQWHUHVW└ IRU└ \RX└ LI└ WKDW└ ZHUH└ WKH└ IDFW"

358,77 └

0V◀ └)HZ└ ♂ SK□ └ KDV└ LQGLFDWHG└ └ LQ└ KHU└ CHWWHU└ WR└ PH└ └ ┼ ┼ └ DJDLQ└ WKHMH└ DUH└ FDUHHU└ LQGLYLGXDOV└ DW└ (3$└ HWKLFV└ ┼ ┼ └ WKDW└ LI└ D└ SDUWLFXCDU└ PDWWHU└ LQYROYLQJ└ VSHFLILF└ SDUWLHV└ DULVH└ LQ└ WKH└ IXWXUH└ LW└ ZLOO└ EH└ HYDOXDWHG└ DW└ WKDW└ SRLQW└ ┼ ┼

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+RZ└ ZLOO└ WKH\└ NQRZ└ LI└ \RX└ DUH└ CRW└ ZLOOLQJ└ WR└ GLVFORVH└ WKDW└ \RX└ UDLVHG└ WKH└ K\SRWKHWLFDO└ PLOOLRQ└ GROODUV└ IURP└ 'HYRQ└ (QHUJ\"

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:HOO└ └ WKRVH└ DUH└ CRW└ HYHQ└ FRYHUHG└ HQWLWLHV└ XQGHU└ KHU└ CHWWHU└ DW└ WKLV└ ┼ ┼

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7KDW└ P└ SRLQW└ └ EXW└ WKDW└ PD\└ YHU\└ ZHOO└ FUHDWH└ D└ FRQIOLFW└ RI└ LQWHUHXW└ └ PLJKWQW└ LW"

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6HQDWRU└ └ ,└ GLG└ CRW└ VHUYH└ LQ└ DQ└ RIILFHU└ FDSDFLW└ DW└ WKDW└ HQWLW◀ └ ,Q└ IDFW└ ┼ ┼

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<RXYH└ VDLG└ WKDW└ DOUHDG\└ WRR◀ └ %XW└ WKDW└ ┼ ┼ └ WKDW└ DOVR└ GRW└ WKH└ TXHVWLRQ◀ └ 7KH└ TXHVWLRQ└ LV└ D└ YHU\└ VLPSOH└ RQH└ └ GLG└ \RX└ UDLVH└ PRQH\└ IRU└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG└ IURP└ HQWLWLHV└ WKDW└ ZLOO└ DSSHDU└ EHIRUH└ (3$└ DV└ SRWHQWLDO└ GHIHQGDQWV└ DQG└ VXEMHFW└ WR└ UHJXODWLRQ└ DQG└ LI└ VR└ └ KRZ└ PXFK└ └ DQG└ ZKDW└ GLG└ \RX└ WHOO└ WKHP"└ $QG└ ZKDW└ GLG└ \RX└ DVN"└ ,W└ VHHPV└ WR└ PH└ WKDWW└ GRW└ DQ└ XQXVXDO└ RU└ ┼ ┼

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7KH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG└ └ DFFRUGLQJ└ WR└ 0V◀ └)HZ└ └ ZRXOG└ GHHG└ WR└ EH└ D└ SDUW└ LQ└ WKH└ IXWXUH└ IRU└ WKDW└ WR└ EH└ DQ└ LWXH◀ └ 7KDWW└ ZKDW└ VKHV└ LQGLFDWHG└ LQ└ KHU└ CHWWHU└ WR└ PH◀ └ $W└ WKH└ WLPH└ └ LI└ LWXHV└ DULVH└ LQ└ WKH└ IXWXUH└ ,└ ZL VHHN└ WKH└ FRXQVHO└ RI└ (3$└ HWKLFV└ └ LQYROYH└ WKH└ DGYLFH└ RI└ WKRVH└ FDUHHU└ IRONV└ └ DQG└ PDNH└ D└ GHFLVLRQ└ └ DQG└ UHFXVH└ LI└ GHFHWVDU\◀ └ 7KDW└ LV└ VRPHWKLQJ└ ,└ FRPPLW└ WR└ GRLQJ◀

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┤&XW└ └ DW└ WKLV└ SRLQW└ ┼ ┼ └ DW└ WKLV└ SRLQW└ └ ZKDW└ ,└ GHGXFH└ IURP└ \RXU└ WWDWHPHQW└ LV└ WKDW└ LI└ WKDW└ VHW└ RI└ K\SRWKHWLFDO└ IDFWW└ ZHUH└ WUXH└ └ LI└ \RX└ KDG└ UDLVHG└ D└ PLOOLRQ└ GROODUV└ IURP└ D└ ELJ└ HQHUJ\└ FRUSRUDWLRQ└ WR└ JR└ WKURXJK└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG└ └ WR└ VXSSRUW└ \RXU└ HIIRUWW└ DW└ ♂ LQDXGLECH□ └ WKDW└ WKDW└ LV└ GRW└ VRPHWKLQJ└ DQ\ERG\└ VKRXOG└ FDUH└ DERXW└ HYHQ└ LI└ WKDW└ FRUSRUDWLRQ└ LV└ EHIRUH└ \RX└ DW└ (3$└ DQG└ VXEMHFW└ WR└ \RXU└ UHJXODWLRQ└ ┼ ┼

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2K└ └ ,└ WKLQN└ LWW└ VRPHWKLQJ└ WKDW└ LI└ SUHVHQWHG└ LQ└ WKH└ IXWXUH└ └ WKDW└ ZRXOG└ ┼ ┼ └ ♂ LQDXGLECH□ └ D└ IHZ└ └ P\VHOI└ ┼ ┼ └ (3$└ HWKLFV└ ZRXOG└ HYDOXDWH└ WKDW└ DQG└ ,└ ZRXOG└ ND└ WKH└ DSSURSULDWH└ WWHSV└ WR└ UHFXVH└ LI└ ┼ ┼

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┤&XW└ └ KRZ└ ZRXOG└ LW└ EH└ SUHVHQWHG└ LQ└ WKH└ IXWXUH└ LI└ \RX└ DUH└ GRW└ ZLOOLQJ└ WR└ SUHVHQW└ LW└ GRZ"└ :K\└ ZRXOG└ LW└ PDWWHU└ LQ└ WKH└ IXWXUH└ DQG└ GRW└ GRZ"

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,I└ WKHUH└ LV└ D└ PDWWHU└ ┼ ┼ └ D└ FDVH└ WKDW└ FRPHV└ EHIRUH└ WKH└ (3$V└ DXWKRULWLW◀ └ 7KDW└ ZRXOG└ EH└ VRPHWKLQJ└ ┼ ┼ └ WKHUHV└ RQJRLQJ└ └ DV└ \RX└ NQRZ└ └ 6HQDWRU└ └ 0V◀ └)HZ└ LQGLFDWHG└ WKLV└ LQ└ KHU└ CHWWHU└ ┼ ┼ └ WKHUHV└ RQJRLQJ└ REOLJDWLRQV└ WKDW└ ,└ ZLOO└ KDYH└ LI└ FRQILUPHG└ DV└ DGPLQLWWUDWRU└ WR└ EULQJ└ WKRVH└ NLQGV└ RI└ PDWWHUV└ WR└ WKH└ DWWHQWLRQ└ RI└ (3$└ HWKLFV◀

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:HOO└ IRU└ ZKDW└ LW└ ZRWK└ ,└ WKLQN└ WKDW└ WKH└ 6HQDWH└ KDV└ D└ URCH└ LQ└ SROLFLQJ└ WKLV└ DV└ ZHOO◀ └ 7KDW└ WKH└ ZKRCH└ SXUSRVH└ RI└ DGYLFH└ DQG└ FRQVHQW└ └ DQG└ WKH└ UHDVRQ└ /KHUH└ DUH└ WKHVH└ JRYHUQPHQW└ HWKLFV└ ILOLQJV└ └ LV└ VR└ WKDW└ ZH└ FDQ└ CRRN└ DW└ WKLV└ H[DFW└ TXHVWLRQ◀

$QG└ WKH└ IDFW└ WKH\└ KDYHQW└ EHHQ└ XSGDWHG└ WR└ WDNH└ LQWR└ DFFRXQW└ GDUN└ PRCH\└ DQG└ DOO└ RI└ WKHVH└ ELJ└ SROLWLFDO└ RUJDQL]DWLRQV└ WKDW└ KDYH└ EHHQ└ FUHDWHG└ ZLWK└ GDUN└ PRCH\└ └ GRHVQW└ WDNH└ DZD\└ RXU└ 6HQDWH└ REOLJDWLRQ└ WR└ ILQG└ RXW└ ZKDW└ FRQIOLFW└ RI└ LQWHUHWW└ \RX└ ZLOO└ EULQJ└ WR└ WKH└ SRVLWLRQ└ RI└ $GPLQLWWUDWRU◀ └ $QG└ LW└ JLYHV└ PH└ YHU\└ OLWWCH└ FRPIRUW└ WKDW└ \RXUH└ GRW└ ZLOOLQJ└ WR└ DQVZHU└ WKRVH└ TXHWWLRQV└ KHUH◀

0\└ WLPH└ KDV└ H[SLUHG◀ └ ,OO└ FRQWLQXH└ LQ└ RWKHU└ URXQGV◀

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7KDQN└ \RX└ YHU\└ PXFK└ └ 6HQDWRU└ :KLWHKRXVH◀ └ ,└ ZRXOG└ OLNH└ WR└ LQWUGXFH└ └ IRU└ /KH└ UHFRUG└ └ DQ└ DUWLFCH└ └ WKH└ &WRFLDWH└ 3UHVV└ LQ└ WKH└ 6HDWWCH└ 7LPHV└ KHDGOLCHG└ └ | (WKLFV└ 2IILFLDOV└ &CHDU└ 7UXPS└ (3$└ 1RPLCHH◀ |

,W└ VD\V└ └ | 7KH└ 2IILFH└ RI└ *RYHUQPHQW└ (WKLFV└ RQ└ 0RQGD\└ └ UHCHDVHG└ WKH└ SHUVRQDO└ ILQDQFLDO└ GLVFORVXUH└ UHSRUW└ IRU└ 6FRWW└ 3UXLWW└ └ FXUUHQWO\└ 2NOCKRPDV└ &WWRUCH\└ *HQHUDO◀ └ 7KH└ ┼ ┼ └ WKH└ (WKLFV└ 2IILFH└ DI ILUPHG└ WKDW└ 3UXLWW└ GLVFORVXUHV└ FRPSO\└ ZLWK└ DSSOLFDECH└ IHGHUDO└ CDZV└ DQG└ UXCHV◀

+LV└ ILQDQFHV└ └ LW└ VD\V└ └ DUH└ DPRQJ└ WKH└ CHDWW└ FRPSOLFDWHG└ RI└ 7UXPSV└ FDELCHW└ GRPLCHHV◀ | └ 6HQDWRU└ %RR]PDQ◀

%22=0$1└

7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀ └ ,└ ┼ ┼ └ ,└ UHDOO\└ GR└ ILQG└ LW└ LUROLF└ ┼ ┼ └ LUROLF└ DQG└ K\SRFULWLFDO└ WKDW└ ZHUH└ LQ└ D└ VLWXDWLRQ└ WKDW└ P\└ IULHQGV└ RQ└ WKH└ R/WKHU└ VLGH└ RI└ /KH└ DLVCH└ RI└ WKLV└ FRPPLWWHH└ XVLQJ└ WKHLU└ GHILQLWLRQ└ RI└ GDUN└ PRCH\└ DV└ HCHFW└ RI ILFLDOV└ KDYH└ OLWHUDOO\└ UDLVHG└ PLOOLRQV└ RI└ GROOUV└ RI└ VR┼ FDOCHG└ GDUN└ PRCH\◀

7KH└ ┼ ┼ └ ,G└ OLNH└ WR└ WDON└ D└ OLWWOH└ ELW└ DERXW└ VRPH└ RI└ WKH└ RYHU└ UHJXODWRU\└ EXUGHQ└ /NDW└ WKH└ WDWHV└ DUH└ IDFLQJ◀ └ $LU└ TXDOLW\└ LQ└ $UNDQVDV└ └ LV└ DPRQJ└ VRPH└ RI└ WKH└ FHDQHVW└ LQ└ WKH└ QDWLRQ└ GHVSLWH└ WKH└ SURJUHVV└ WKDW└ WKDW└ WKH└ WDWH└ KDV└ PDGH└ └ ORRNLQJ└ IRUZDUG└ WU\└ WR└ GR└ WKH└ ULJKW└ WKLQJ◀ └ 7KH└ 5HJLRQDO└ +D]H└ IHGHUDO└ SDQ└ LV└ JRLQJ└ WR└ SURGXFH└ D└ WUHPHQGRXV└ HFRQRPLF└ EXUGHQ└ RQ└ HP◀

,└ WKLQN└ LW└ D└ SULPH└ H[DPSOH└ RI└ WKH└ KDSKD]DUG└ UHJXODWRU\└ DWPRVSKHUH└ ZH└ /NDW└ ZHYH└ KDG└ LQ└ WKH└ SDWW└ └ ZLWK└ OLWWOH└ LQSXW└ IURP└ WKH└ WDWHV└ DQG└ WDNHKROGHUV◀ └)RU└ \HDUV└ WKH└ UHJXODWRU\└ FHUWDLQW\└ KDV└ SUHYHQWHG└ EXVLQHVVHV└ IURP└ KLULQJ└ QHZ└ HPSOR\HHV└ └ WWKQWLQJ└ HFRQRPLF└ JURZWK◀

,Q└ IDFW└ WKH└ 1DWLRQDO└ 6PDOO└ %XVLQHVV└ $VVRFLDWLRQ└ WKDW└ ZDV└ MXWW└ UHCHDVHG└ └ IRXQG└ WKDW└ PRUH└ WKDQ└ KDOI└ RI└ VPDOO└ EXVLQHVVHV└ KDYH└ KHDG└ RII└ RQ└ KLULQJ└ EHFDXVH└ WKH\└ GRQW└ NQRZ└ ZKDW└ WKH└ UXCHV└ DUH└ JRQQD└ EH◀

&DQ└ \RX└ ┼ ┼ └ \RXYH└ PHQWLRQHG└ VHYHUDO└ WLPHV└ ┼ ┼ └ FDQ└ \RX└ WDON└ D└ OLWWOH└ ELW└ PRUH└ DERXW└ WKH└ LPSDFW└ WKDW└ \RXYH└ VHHQ└ LQ└ UHJDUG└ WR└ UHJXODWRU\└ XQFHUWDLQW\└ LQ└ WKH└ WDWH└ RI└ 2NODKRPD"└ 7KH└ H[SHULHQFHV└ \RXYH└ KDG◀

358,77 └
6HQDWRU└ └ WKH└ YLVLELOLW\└ SURJUDP└ └ ZHYH└ KDG└ VLPLODU└ FKDOOHQJHV└ LQ└ 2NODKRPD◀ └ 7KH└ 5HJLRQDO└ $LGV└ 3URJUDP└ XQGHU└ WKH└ &HDQ└ $LU└ $FW└ └ WKDW└ VHFWLRQ└ RI└ WKH└ &HDQ└ $LU└ $FW└ LV└ UHDOO\└ TXLWH└ D└ ELW└ GLIIHUHQW└ WKDQ└ RWKHU└ SURYLVLRQV└ RI└ WKH└ &HDQ└ $LU└ $FW◀ └ ,W└ JLYHV└ SURPLVH└ WR└ WKH└ WDWHV└ LQ└ DGRSWLQJ└ SDQV└ WR└ LQFUHDVH└ RU└ LPSURYH└ YLVLELOLW\◀

7KDW└ SDUWLFXODU└ VHFWLRQ└ RI└ WKH└ CDZ└ VD\V└ WKDW└ E\└ WKH└ \HDU└ ┴ !! ├ ┤ ☼ └ WKDW└ ZH└ VKRXOG└ KDYH└ QDWXUDO└ YLVLELOLW\└ LQ└ VRPH└ NH\└ DUHDV└ DFURVV└ WKH└ FRXQWU\◀ └ 2NODKRPD└ VHYHUDO└ \HDUV└ DJR└ ┼ ┼ └ DFWXDOO\└ LQ└ ┴ !! ¶ !! ☼ └ XQGHU└ D└ GLIIHUHQW└ DGPLQLVWUDWLRQ☼ └ ERWK└ *RYHUQRU└ DQG└ $WWRUQH\└ *HQHUDO└ VXEPLWWHG└ D└ WDWH└ LPSOHPHQWDWLRQ└ SDQ└ WKDW└ EHDW└ WKDW└ GHDGOLQH└ E\└ GHFDGHV◀

%XW└ GHVSLWH└ WKDW☼ └ WKH└ (3$└ FDPH└ LQ└ DQG└ UHMHFWHG└ WKDW└ WDWH└ LPSOHPHQWDWLRQ└ SDQ└ DQG└ IRUFHG└ D└ IHGHUDO└ LPSOHPHQWDWLRQ└ SDQ└ RQ└ WKH└ WDWH☼ └ FRWWLQJ└ FRQVXPHUV└ TXLWH└ D└ ELW└ RI└ PRQH\◀ └ 2QH└ WKLQJ└ WKDW└ ,└ ZRXOG└ DGG└ WKDW└ ,└ GLGQW└ WDON└ DERXW└ HDUOLHU☼ └ ZH└ WDONHG└ DERXW└ ┼ ┼ └ ZH└ WDONHG└ DERXW└ FRRSHUDWLYH└ IHGHUDOLVP└ DQG└ WKH└ LPSRUWDQFH└ RI└ SDUWQHUVKLS◀

,└ WDONHG└ DERXW└ WKDW◀ └ <RXYH└ WDONHG└ DERXW└ WKDW◀ └ 8QGHU└ WKLV└ SDWW└ DGPLQLWWUDWLRQ└ WKH└ XVH└ RI└ IHGHUDO└ LPSOHPHQWDWLRQ└ SODQV☼ └ LI└ \RX└ FRPELQH└ 3UHVLGHQW└ %XVK☼ └ 3UHVLGHQW└ &OLQWRQ└ DQG└ 3UHVLGHQW└ *HRUJH└ :◀ └ %XVK☼ └ ΛKRVH└ WKUHH└ DGPLQLWWUDWLRQV└ FRPELQHG☼ └ WKH\└ LWXHG└ ILYH└ IHGHUDO└ LPSOHPHQWDWLRQ└ SODQV└ XQGHU└ WKH└ &HDQ└ $LU└ $FW☼ └ LQ└ WKUHH└ DGPLQLWWUDWLRQV◀

7KLV└ DGPLQLWWUDWLRQ└ KDV└ LWXHG└ ↑ ├ ◀ └ 6R└ LW└ VKRZV└ DQ└ DWWLWXGH└ RI└ LQGLIIHUHQFH◀ └ $Q└ DWWLWXGH└ RI└ WU\LQJ└ WR└ EH└ GLFWDWRULDO└ LQ└ VRPH└ UHVSHFWV└ ΛRZDUG└ WKH└ WWDWHV└ URCH└ RU└ PDQLSXODWLYH└ RI└ WKH└ WWDWHV└ URCH└ LQ└ D└ ZD\└ WKDW☼ └ ,└ WKLQN☼ └ FRXQWHUSURGXFWLYH└ IRU└ DLU└ TXDOLW\◀

?22=0$1 └
6R☼ └ ZKHQ└ \RX└ DQG└ IHOORZ└ $WWRUQH\└ *HQHUDOV☼ └ R/WKHU└ WWDNHKROGHUV└ VXH└ WKH└)HGHUDO└ *RYHUQPHQW└ ZKHWKHU└ LW└ 5HJLRQDO└ +D]H└ RU└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ RU└ ZKDWHYHU☼ └ \RXU└ JRDO└ LV└ GR└ WR└ GR└ DZD\└ ZLWK└ UHJXODWLRQ☼ └ \RXU└ JRDO└ LV└ WR└ PDNH└ LW└ VXFK└ WKDW└ WKH└ (3$└ IROORZ└ WKHLU└ UHJXODWRU\└ DXWKRULWW◀ └ ,V└ WKDW└ FRUUHFW'

358,77 └
<HV☼ └ 6HQDWRU◀ └ $QG└ LQ└ DQ└ H[DPSOH└ ,└ SURYLGHG└ WR└ \RX☼ └ ZKHUH└ WKH└ WWDWH└ LPSOHPHQWDWLRQ└ SODQ└ RI└ 2NODKRPD└ WKDW└ ZDV└ UHVHFWHG└ ZH└ DFWXDOO\└ VDWLVILHG└ ΛKH└ WWDWXWRU\└ PDQGDWH☼ └ LW└ ZDV└ XQGHU└ WKH└ UHJLRQDOL]HG└ SURJUDP◀

:H└ UHDFKHG└ QDWXUDO└ YLVLELOLW\└ D└ FRXSOH└ GHFDGHV└ DKHDG└ RI└ VFKHGXOH◀ └ 7KH└ PHWKRGRORJ\└ WKDW└ ZDV└ XVHG☼ └ WKH└ (3$└ MXW└ VLPSO\└ GLVDJUHHG└ ZLWK└ LW◀ └ $QG└ VR☼ └ WKH\└ XVHG└ WKHLU└ DXWKRULW\└ WR└ GLVSODFH└ WKDW└ WWDWH└ SODQ☼ └ FRWWLQJ└ FRQVXPHUV└ LQ└ WKH└ WWDWH└ KXQGUHGV└ RI└ PLOOLRQV└ RI└ GROODUV└ LQ└ LQFUHDVHG└ XWLOLW\└ FRWW◀

?22=0$1 └
2QH└ RI└ WKH└ WKLQJV└ WKDW└ ┼ ┼ └ WKDW└ ,└ WKLQN└ ZHYH└ VHHQ└ DOVR└ LQ└ WKH└ CDW└ HLJKW└ \HDUV└ LV└ WUHPHQGRXV└ PLWLRQ└ FUHHS└ RQ└ WKH└ SDUW└ RI└ WKH└ (3$└ ZKHUH└ WKH\└ KDYH└ JRWWHQ└ LQWR└ DUHDV└ ZKHUH└ WKH\└ GRQW└ KDYH└ WKH└ H[SHUWLVH◀

7KH\└ GRQW└ KDYH└ WKH└ ┼ ┼ └ WKH☼ └ \RX└ NQRZ☼ └ WKH└ ZHOO└ H[SHUWLVH└ ,└ WKLQN└ ZRXOG└ EH└ ΛKH└ EHWW└ ZRUG☼ └ LQ└ UHJDUGV└ WR└ FRPLQJ└ RXW└ ZLWK└ VRPH└ RI└ WKH└ WKLQJV└ WKH\YH└ GRQH└ ZKHUH└ WKH\└ CDFN└ MXULVGLFWLRQ└ DQG└ KDYHQW└ UHDOO\└ EHHQ└ LQ└ WKH└ SDWW◀

&DQ└ ZH└ FRXOW└ RQ└ \RX└ WR└ ZRUN└ ZLWK└ WKH└ R\KHU└ DJHQFLHV└ WR└ WDNH└ WKHLU└ H[SHUWLVH└ LQWR└ FDUHIXO└ FRQVLGHUDWLRQ└ DV└ ZH└ FRPH└ RXW└ ZLWK└ WKH└ UXOHV└ DQG└ UHJXODWLRQV"

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,└ WKLQN└ LQWHUDJHQF\└ FRRSHUDWLRQ└ LV└ YHU\☼ └ YHU\└ LPSRUWDQW◀ └ 2EYLRXVO\└ ZLWK└ UXCHPDNLQJ└ WKDW└ VRPHWKLQJ└ WKDW└ RFFXUV☼ └ DQG└ VKRXOG└ RFFXU☼ └ ,└ WKLQN☼ └ LQ└ D└ YHU\└ FRODERUDWLYH└ ZD\◀ └ $QG└ VR└ \HV☼ └ 6HQDWRU☼ └ ,└ EHOLHYH└ LW└ YHU\└ LPSRUWDQW└ DV└ WKH└ (3$└ FRQGXFW└ LW└ EXVLQHVV☼ └ WKDW└ LW└ ZRUNV└ ZLWK└ WKH└ FRUH└ ┼ ┼ └ ZRUNV└ ZLWK└ R\KHU└ DJHQFLHV└ DW└ WKH└ IHGHUDO└ CHYHO└ WR└ HQVXUH└ WKDW└ LW└ GRLQJ└ DOO└ LW└ FDQ└ /R└ DGYDQFH└ DQG└ SURWHFW└ ZDWHU└ TXDOLW\└ DQG└ DLU└ TXDOLW\◀ └ %XW☼ └ GR└ VR└ LQ└ WKH└ IUDPHZRUN└ HW\DEOLVKHG└ E\└ &RQJUHVV◀

?22=0$1 └
$QG☼ └ GRHV└ LW└ IHHO└ OLNH└ LW└ WKH└ XQWLPDWH└ GHFLGHU☼ └ DJDLQ☼ └ ZKHQ└ WKH\└ \RPHWLPHV└ GR└ QRW└ KDYH└ WKH└ H[SHUWLVH└ RI└ WKH└ R\KHU└ DJHQFLHV"

358,77 └
<HV☼ └ 6HQDWRU◀ └ ,└ DJUHH◀

?22=0$1 └
7KDQN└ \RX◀

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7KDQN└ \RX◀

?22=0$1 └
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀

?$55$662 └
7KDQN└ \RX☼ └ 6HQDWRU└ %RR]PDQ◀ └ 6HQDWRU└ 0HUNCH\◀

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7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW☼ └ DUH└ \RX└ ┼ ┼ └ DUH└ \RX└ IDPLOLDU└ ZLWK└ WKLV└ SUHFH└ RI└ PHGLFDO└ HTXLSPHQW'

358,77 └
<HV└ DQ└ LQKDCHU└ LW└ CRRNV└ OLNH"

0(5./(< └
<HV└ DQ└ DWWKPD└ LQKDCHU◀ └ 7KH└ ┼ ┼ └ DUH└ \RX└ IDPLOLDU└ ZLWK└ KRZ└ PDQ\└
$PHULFDQV└ KDYH└ DWWKPD"

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1R└ └ 6HQDWRU└ └ ,P└ QRW◀

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:HOO└ └ LW└ DERXW└ ¶ └ RXW└ RI└ ¶ !! └ $PHULFDQV└ LQFOXGLQJ└ RYHU└ → └ PLOOLRQ└ FKLOGUHQ└ └
VR└ LW└ D└ SUHWW\└ VLJQLILFDQW└ KHDOWK└ SUREOHP└ DFURVV└ WKH└ FRXQWU\└ DQG└ ,└ NQRZ└ ,└
KDYH└ EHHQ└ IRUWXQDWH└ QRW└ WR└ KDYH└ DWWKPD└ └ EXW└ VRPH└ IRONV└ ,└ NQRZ└ ZKR└
KDYH└ DQG└ KDYH└ DWWKPD└ DWWDFNV└ IHHO└ OLNH└ WKH\UH└ VXIIRFDWLQJ└ DQG└
VRPHWLPHV└ WKH\└ JR└ LQWR└ FULVLV◀

3HRSOH└ JR└ LQWR└ FULVLV└ ZLWK└ DWWKPD└ └ VRPHWLPHV└ WKH\└ ┼ ┼ └ WKH\└ GLH└ IURP└ LW└ └ VR└
LW└ D└ WHUULI\LQJ└ FRQGLWLRQ◀ └ $QG└ └ WKH└ (3$└ LQ└ 2FWREHU└ ┴ !! ¶ ↑ └ WWLHQJWKHQHG└
WKH└ QDWLRQDO└ DPELHQW└ DLU└ TXDOLW\└ WWDQGDUGV└ IRU└ JURXQG┤ └ CHYHO└ R]RQH◀

7KH\└ WWLHQJWKHQHG└ LW└ WR└ → !! └ SDUW└ SHU└ ELOOLRQ└ DGMXVWLQJ└ LW└ IURP└ → ↑ └ SDUW└ SHU└
ELOOLRQ└ └ EHFDXVH└ WKH\└ DUJXHG└ LW└ ZDV└ DQ└ DWWDLQDECH└ WWDQGDUG└ WKDW└ ZRXOG└
VDYH└ ┬ └ WR└ ├ └ ELOOLRQ└ GRODUV└ └ DQG└ LQ└ DGGLWLRQ└ RI└ FRXUWH└ └ JUHDWO\└ LPSURYHV└ WKH└
TXDOLW\└ RI└ OLIH└ E\└ GLPLQLVKLQJ└ WKH└ DPRXQW└ RI└ ┼ ┼ └ RI└ DWWKPD└ DWWDFNV└ DQG└ ┼ ┼ └
DQG└ GHDWKV◀ └ $QG└ └ \RX└ FKDOOHQJH└ WKLV◀

<RX└ ┼ ┼ └ \RX└ CDXQFKHG└ D└ CDZVXLW└ DJDLQWW└ WKLV└ ┼ ┼ └ WKLV└ WWDQGDUG◀ └ $QG└ └ ZDV└ WKH└
EDVLV└ RI└ \RXU└ CDZVXLW└ FRWW┤ EHQHILW└ DQDO\VLV└ └ WKDW└ WKH\└ GLGQW└ IRORZ└ WKHLU└
SURFHW"

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,W└ ZDV└ QRW└ └ 6HQDWRU◀ └ $V└ \RX└ NQRZ└ └ XQGHU└ WKH└ 1DVK└ ♂ SK□ └ 3URJUDP└ └ WKH└
:KLWPDQ└ ♂ SK□ └ 'HFLVLRQ└ VD\V└ FRWW└ FDQQRW└ EH└ FRQVLGHUHG└ LQ└ D└ FULWHULD└
SRODXWDQW◀

0(5./(< └
$QG└ ZKDW└ ZDV└ WKH└ WWDQGDUG└ WKDW└ \RX└ ZHUH└ FKDOOHQJLQJ"

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,W┴ ZDV└ D└ UHFRUGV└ EDVHG└ FKDOOHQJH└ WKDW┴ WKH└ QHHG└ WR└ ┼ ┼ └ WR└ ┼ ┼ └ WR└ UDWFKHW┴ GRZQ└ IURP└ → ↑ └ SDUW└ SHU└ ELOOLRQ└ WR└ → ‼ └ SDUW└ SHU└ ELOOLRQ└ ┼ ┼ └ DV└ \RX└ NQRZ└ WKH└ → ‼ └ SDUW└ SHU└ ELOOLRQ└ KDG└ RQO\└ EHHQ└ LQ└ WKH└ RSHUDWLRQ└ IRU└ WZR└ \HDUV◀ └ $QG└ ,└ ΛKLQN└ 6HQDWRU└ LW└ LPSRUWDQW┴ IURP└ D└ SULRULW\└ SHUVSHFWLYH◀ └ $└ UHVRXUFH└ SHUVSHFWLYH└ RI└ WKH└ (3$└ ZKHQ└ ┤ ‼ └ SHUFHQW┴ RI└ WKH└ FRXQWU\└ LV└ LQ└ QRQDWWDLQPHQW┴ IRU└ RQH└ RI└ WKRVH└ FULWHULD└ SRODWDQW└ SHUKDSV└ WKHUH└ VKRXOG└ EH└ IRFXV└ RQ└ KRZ└ WR└ PHHW┴ WKH└ CHYHD└ DOUHDG\└ LQ└ WDWWWH└ RU└ DOUHDG\└ LQ└ UXCH└ ┼ ┼

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<RX└ FKDOOHQJH└ WKLV└ EDVHG└ RQ└ WKH└ DWWDLQDELOLW\└ WDQGDUG"└ ,└ DOUHDG\└ NQRZ└ ΛKDW┴ ┼ ┼

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,W┴ ZDV└ D└ UHFRUGV└ EDVHG└ FKDOOHQJH└ \HV◀

0(5./(< └

,W└ DWWDLQDELOLW\└ WDQGDUG◀ └ $QG└ WKHUH└ ZHUH└ QXPHURXV└ JURXSV└ WKDW┴ ┼ ┼ └ WKDW┴ ZHLJKHG└ LQ└ DQG└ VDLG└ │ 1R└ └ WKLV└ LV└ WRWDOO\└ DWWDLQDECH◀ │ └ $QG└ └ ,QO└ VXEPLW┴ D└ OLW IRU└ WKH└ UHFRUG└ └ RI└ WKDW└ └ 0U◀ └ &KDLUPDQ◀

?$55$662 └

:LWKRXW┴ REMHFWLRQ◀

0(5./(< └

$QG└ └ WKH└ NH\└ WR└ WKLV└ LV└ WKDW┴ E\└ LPSOHPHQWLQJ└ WKDW┴ ┼ ┼ └ E\└ WKH└ WLPH└ LW└ LPSOHPHQWHG└ ┼ ┼ └ LW┴ ZRXOG└ VDYH└ DQXDOO\└ ┴ ┬ ‼ ✡ ‼ ‼ ‼ └ ┼ ┼ └ DQ└ HXWLPDWH└ RI└ FRXUVH└ ┼ ┼ └ DWWKPD└ DWWDFNV└ DPRQJ└ FKLOGUHQ└ └ ¶ ├ ‼ ✡ ‼ ‼ ‼ └ PLWHG└ VFKRRO└ GD\V└ └ D└ ΛUHPHQGRXV└ QXPEHU└ RI└ PLWHG└ ZRUNGD\V└ └ ├ ┬ ‼ └ HPHUJHQF\└ URRP└ YLVLW└ DQG└ ┬ ┤ ‼ └ FDVHV└ RI└ DFXWH└ EURQFKLWLV◀

?&XW└ └ LW┴ DOVR└ ZRXOG└ VDYH└ ┼ ┼ └ EHXW┴ HXWLPDWH└ ┼ ┼ └ ┬ ┴ ‼ └ WR└ ├ ├ ‼ └ SUHPDWXUH└ GHDWKV◀ 6R└ KHUH└ LV└ VRPHWKLQJ└ WKDW┴ SURIRXQGO\└ DI IHFW└ WKH└ KHDOWK└ RI└ IRONV└ LQ└ 2NODKRPD└ DQG└ IRONV└ DFURW└ WKH└ FRXQWU\└ └ IRONV└ LQ└ P\└ KRPH└ WDWH└ RI└ 2UHJRQ◀

6RPHWKLQJ└ WKDW└ H[SHUW└ DWWHU└ H[SHUW└ VDLG└ LV└ IXOO\└ DWWDLQDEOH└ DQG└ \RX└ FKDOOHQJH└ LW└ QRW└ RQ└ D└ SURFHW└ LWXH└ WKDW└ LV└ QRW└ RQ└ ZKHWKHU└ RU└ QRW└ WKHUH└ ZDV└ D└ FRWW┤ EHQHILW└ DQDO\VLV└ └ EHFDXVH└ DV└ \RX└ ULJKWO\└ SRLQWHG└ RXW└ └ FRWW└ LV└ QRW└ DOORZHG└ WR└ EH└ D└ IDFWRU└ └ EXW└ ZKHWKHU└ LW└ ZDV└ DWWDLQDEOH◀

6R└ └ ZK\└ ILJKW└ VR└ KDUG└ RQ└ WKH└ VLGH└ RI└ WKH└ RLO└ LQGXVWU\"└ 5DWKHU└ WKDQ└ ILJKWLQJ└ RQ└ WKH└ VLGH└ RI└ WKH└ KHDOWK└ RI└ WKH└ SHRSOH└ RI└ 2NDKRPD"└ 358,77 └ 6HQDWRU└ └ CHW└ PH└ VD\└ WR└ \RX└ ZLWK└ UHVSHFW└ WR└ WKH└ 1$6+└ SURJUDP└ └ ZKHQ└ \RX└ CRRN└ DW└ /KH└ QRQDWWDLQPHQW└ ZH└ KDYH└ LQ└ WKLV└ FRXQWU\└ └ LW└ SUHVHQWV└ DURXQG└ ┤ !! └ SHUFHQW◀ └ ,└ WKLQN└ LQFUHDVLQJ└ WKH└ QRQDWWDLQPHQW└ SHUFHQWDJH└ └ DV└ RSSRVHG└ WR└ IRFXVLQJ└ UHVRXUFHV└ WR└ JHW└ QRQDWWDLQPHQW└ LQWR└ DWWDLQPHQW└ └ LV└ D└ YHU\└ LPSRUWDQW└ URCH└ RI└ WKH└ (3$◀

:H└ VKRXOG└ WDNLQJ└ WKRVH└ PDUJLQDO└ DQG└ PRGHUDWH└ DUHDV└ LQ└ RXU└ PDS└ └ WKDW└ DUH└ QRQDWWDLQPHQW└ └ DQG└ ZRUN└ ZLWK└ CRFDO└ RI ILFLDOV└ └ WKRVH└ FRXQWLHV└ └ WKURXJK└ FRQWRULQJ└ DQG└ DVLWDQFH└ WR└ KHOS└ PRYH└ IURP└ QRQDWWDLQPHQW└ WR└ DWWDLQPHQW◀ └ 7KDW└ LV└ D└ YHU\└ LPSRUWDQW└ JRDO└ RI└ WKH└ (3$◀ └ ,Q└ HDFK└ RI└ WKHVH└ ┤ ┤

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7KDQN└ \RX◀ └ 7KDQN└ \RX◀ └ <RXYH└ PDGH└ \RXU└ SRLQW└ FCHDU◀ └ ,└ MXW└ VLPSO\└ GLVDJUHH└ ZLWK└ \RX◀ └ 1RQH└ RI└ WKHVH└ WDQGDUGV└ ZKHQ└ WKH\└ DUH└ VHW└ DUH└ DWWDLQHG◀ └ 7KDW└ LV└ WKH└ SRLQW◀ └ ,W└ LV└ DQ└ REVHFWLYH└ WR└ EH└ ZRUNHG└ DW└ RYHU└ WLPH◀ └ 7KHUH└ ZDV└ D└ WWUDWHJ\└ WKDW└ WKLV└ PLJKW└ WDNH└ XQWLO└ ┴ !! ┴ ↑ └ WR└ EH└ IXOO\└ LPSOHPHQWHG◀

?&W└ └ LQ└ WKH└ FRXUVH└ RI└ CD\LQJ└ RXW└ WKDW└ YLVLRQ└ DQG└ KDYLQJ└ IRONV└ DFURVV└ WKH└ FRXQWU\└ ZRUN└ WRZDUGV└ WKDW└ YLVLRQ└ └ \RX└ HQG└ XS└ VDYLQJ└ D└ WUHPHQGRXV└ DPRXQW└ RI└ PRCH\└ DQG└ D└ WUHPHQGRXV└ DPRXQW└ RI└ OLYHV◀

$QG└ ,└ DV└ D└ 6HQDWRU└ IURP└ 2UHJRQ└ └ ILJKWLQJ└ IRU└ WKH└ TXDOLW\└ RI└ OLIH└ RI└ 2UHJRQLDQV└ └ GHHSO\└ UHVHW└ IRONV└ ILJKWLQJ└ IRU└ RLO└ LQGXVWU\└ └ WKDW└ DUH└ WU\LQJ└ WR└ GDPDJH└ WKH└ KHDOWK└ RI└ P\└ FRQWLWXHQWW└ └ DQG└ $PHULFDQV└ DFURVV└ WKLV└ FRXQWU\◀ └ ,W└ LV└ D└ TXHWWLRQ└ RI└ YDOXHV◀

$QG└ YDOXLQJ└ SURILWW└ RI└ FRPSDQLHV└ RYHU└ WKH└ KHDOWK└ RI└ RXU└ FLWL]HQV└ LV└ D└ FKDUDFWHU└ LWXH└ DQG└ WKDW└ LV└ ZKDW└ WKHVH└ KHDULQJV└ DUH└ DOO└ DERXW◀ └ :H└ DUH└ FKDUJHG└ ZLWK└ +DPLOWRQ└ └ WR└ GHWHUPLCH└ ZKHWKHU└ RU└ QRW└ DQ└ LQGLYLGXDO└ LV└ RI└ ILW└ FKDUDFWHU◀ └ 7R└ PH└ WKLV└ LV└ D└ FKDUDFWHU└ LWXH└ ┤ ┤ └ YDOXLQJ└ SURILWW└ RYHU└ SHRSOHV└ KHDOWK◀ └ 7KDQN└ \RX└ └ 0U◀ └ &KDLU◀

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7KDQN└ \RX☼ └ 6HQDWRU└ 0HUNOH\◀ └ ,P└ VXEPLWWLQJ└ IRU└ WKH└ UHFRUG└ D└ UHSRUW└ E\└ /KH└ 1DWLRQDO└ %DDFN└ &KDPEHU└ RI└ &RPPHUFH└ HQWLWOHG└ | 3RWHQWLDO└ ,PSDFW└ RI└ 3URSRVHG└ (3$└ 5HJXODWLRQV└ RQ└ /RZ└ ,QFRPH└ *URXSV└ DQG└ 0LGRULW\◀ |

7KH└ UHSRUW└ JRHV└ IURP└ ┴ !! ¶ ↑ ☼ └ JRHV└ RQ└ WR└ VD\└ WKDW☼ └ (3$└ UHJXODWLRQV└ LQFOXGLQJ└ LW└ UHJXODWLRQ└ RQ└ FDUERQ└ GLR[LGH└ HPLWWLRQV└ ZRXOG└ UHVXOW└ LQ└ WKH└ \HDU└ ┴ !! ┴ !! ☼ └ QHDUO\└ ┴ !! !! ☼ !! !! !! └ ECDFN└ MREV└ ZRXOG└ EH└ CRWW└ DQG└ PRUH└ WKDQ└ ┬ !! !! ☼ !! !! !! └ +LVSDQLF└ MREV└ ZRXOG└ EH└ CRWW└ DQG└ DGGLWLRQDOO\└ WKHUH└ ZRXOG└ EH└ FRPPHQFHPHQW└ ZLWK└ WKLV└ D└ PHGLXP└ KRXVHKROG└ LQFRPH└ VLJQLILFDQW└ GHFUHDVHV└ WKURXJKRXW└ WKH└ FRPPXQLWLHV└ OLVWHG└ LQ└ WKH└ UHSRUW◀ └ 6HQDWRU└)LVFKHU◀

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7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ $QG└ ZHUH└ ┼ ┼ └ KHUH└ ZH└ JR└ DJDLQ└ RQ└ URXQG└ WZR☼ └ \R└ ,└ DP└ KDSS\└ WKDW└ ZH└ KDYH└ DQ└ RSSRUWXQLW\└ WR└ FRQWLQXH└ TXHWXLRQLQJ└ ZLWK└ \RX└ *HQHUDO└ 3UXLWW◀ └ 1HEUDVND☼ └ PXFK└ OLNH└ 2NODKRPD└ LV└ D└ UXUDO└ WDWH└ DQG└ ZLWK└ PDQ\└ FDVHV└ WKH└ FRVHWW└ WRZQ└ RU└ WKH└ QHLJKERU└ FDQ└ EH└ CRFDWHG└ PLCHV└ DQG└ VRPHWLPHV└ KRXUV└ DZD\◀

,Q└ 1HEUDVND└ RQH└ RI└ IRXU└ MREV└ LV└ GLUHFWO\└ WLHG└ WR└ SURGXFWLRQ└ DJULFXOWXUH◀ └ 8QGHU└ WKLV└ DGPLQLWWUDWLRQ└ IDUPHUV└ DQG└ UDQFKHUV└ IHDW└ HVSHFLDOO\└ WDUJHWHG└ E\└ WKH└ (3$◀ └)RU└ H[DPSOH☼ └ LQ└ ┴ !! ¶ ¶ └ DQG└ ┴ !! ¶ ┴ ☼ └ (3$└ UHJLRQ└ VHYHQ└ FRQGXFWHG└ DHULDO└ VXUYHLOODQFH└ RU└ IO\RYHUV└ RI└ IHHG└ \DUGV└ LQ└ P\└ WWDWH◀ └ :KLCH└ IO\LQJ└ RYHU└ P\└ WWDWH└ WKH└ (3$└ GRFXPHQWHG└ WKHMH└ IDFLOWLHV└ ZLWK└ SKRWRJUDSKV◀

7KLV└ ZDV└ YHU\└ GLVFRQFHUWLQJ└ WR└ PH└ JLYHQ└ WKDW└ PDQ\└ OLYHXWRFN└ SURGXFHUV└ LQ└ 1HEUDVND└ DOVR└ OLYH└ DQG└ UDLVH└ WKHLU└ IDPLOLHV└ RQ└ WKHMH└ SURSHUWLHV◀ └ 1RW└ RQO\└ ZHUH└ WKHMH└ SURGXFHUV└ GRW└ LQIRUPHG└ EHIRUHKDQG☼ └ EXW└ WKH└ (3$└ KDV└ DOUHDG\└ GHCHJDWHG└ WKH└ DXWKRULW\└ WR└ FDUU\└ RXW└ WKH└ &CHDQ└ :DWHU└ $FW└ LQ└ 1HEUDVND└ WR└ WKH└ 6WDWH└ 'HSDUWPHQW└ RI└ (FRQPLF└ ┼ ┼ └ RU└ (QYLURQPHQWDO└ 4XDOLW\◀

:KDW└ ZLOO└ \RX└ GR└ WR└ HQVXUH└ WKDW└ WKH└ (3$└ WXLFNV└ WR└ LW└ FRUH└ PLVVLRQ└ DQG└ IXUWKHUPRUH☼ └ KRZ└ ZLOO└ \RX└ ZRUN└ ZLWK└ WKH└ UHJXODWHG└ FRPPXQLW\└ LQFOXGLQJ└ DJULFXOWXUH└ WR└ EXLOG└ WUXW└ DPRQJ└ FRQWLWXHQFLHV└ WKDW└ KDYH└ EHHQ└ ,└ ZRXOG└ \D\└ WKH└ VXEMHFW└ RI└ EXOO\LQJ└ WDFWLFV└ E\└ WKLV└ (3$└ WKDW└ ZH└ KDYH└ QRZ"└ 358,77 └ 6HQDWRU☼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW└ VRPH└ FRUH└ /KHPHV└ LI└ FRQILUPHG└ DV└ DGPLQLWWUDWRU└ WKDW└ ,└ ZRXOG└ VHHN└ WR└ FRPSO\└ ZLWK◀ └

2QH└ LV└ SXEOLF└ SDUWLFLSDWLRQ└ └ IXOO└ SDUWLFLSDWLRQ└ WR└ HQVXUH└ WKDW└ DOO└ YRLFHV└ DUH└ KHDUG└ DV└ WKH└ (3$└ FRQGXFWV└ LWV└ DFWLYLWLHV└ ZLWK└ UHVSHFW└ WR└ UXCHPDNLQJ└ SDUWLFXODUO\◀

$QG└ ,└ WKLQN└ WKDW└ SHUKDSV└ ZKDW└ \RX└ DUH└ UHIHUULQJ└ WR└ LV└ D└ ODFN└ RI└ WKDW└ YRLFH└ └ RU└ RSSRUWXQLWV└ LQ└ WKH└ CDWW└ VHYHUDO└ \HDUV◀ └ $QG└ VR└ └ ,└ ZRXOG└ ZRUN└ WR└ EXLOG└ D└ FRODERUDWLYH└ UHDWLRQKLS└ ZLWK└ WKRVH└ WWDWHV└ DV└ ,YH└ LQGLFDWHG◀

,└ WKLQN└ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLWW└ DW└ WKH└ WWDWH└ CHYHO└ DUH└ YDXDECH└ SDUWQHUV└ WKDW└ ZH└ QHHG└ WR└ UHXWRUH└ WKHLU└ FRQILGHQFH└ LQ└ WKH└ SDUWQHUKLS└ ZLWK└ WKH└ (3$└ DQG└ WKHQ└ VHHN└ WR└ OLWWHQ└ WR└ WKH└ FRPPXQLWW└ FRQFHUQV└ LQ└ DGGUHVVLQJ└ DQG└ UHVSRQGLQJ└ WR└ HQYLURQPHQWDO└ LVXHV/

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7KDQN└ \RX◀ └ ,Q└ RQH└ RI└ KHU└ H[LW└ LQWHUYLHZV└ (3$└ $GPLQLWWUDWRU└ *LQD└ 0F&DUWK\└ KDV└ DGPLWWHG└ WKDW└ VKH└ KDV└ KDG└ D└ EDG└ UHDWLRQKLS└ ZLWK└ DJULFXOWXUH└ DQG└ ZLWK└ WKH└ DJULFXOWXUDO└ FRPPXQLWW└ DQG└ VKH└ OLWWHG└ LW└ DV└ RQH└ RI└ KHU└ UHJUHWW◀

,└ WKLQN└ D└ EDG└ UHDWLRQKLS└ LV└ DQ└ XQGHUWDWHPHQW└ LQ└ WKLV└ FDVH◀ └ 7KLV└ DGPLQLWWUDWRU└ (3$└ SKLORVRSK\└ LV└ GLDPHWULFDOO\└ RSSRVHG└ WR└ WKH└ LGHD└ WKDW└ IDUPHUV└ FDQ└ EH└ JRRG└ WWHZDUGV└ RI└ RXU└ CDQG└ └ RXU└ ZDWHU└ └ RXU└ HQYLURQPHQW└ DQG└ LQWHDG└ LW└ VHHPHG└ WKDW└ WKLV└ DGPLQLWWUDWRU└ (3$└ ZDQWHG└ WR└ UHJXODWH└ DQG└ LQ└ VRPH└ FDVHV└ LW└ CRRNHG└ OLNH└ WKH└ ZDQWHG└ WR└ SUHYHQW└ IDUPLQJ◀

7KH└ DJULFXOWXUDO└ FRPPXQLWW└ LV└ CRRNLQJ└ IRUZDUG└ WR└ D└ CHZ└ CHDGHUWKLS└ ZLWK└ WKH└ (3$└ DQG└ ZRUNLQJ└ ZLWK└ \RX◀ └ $QG└ 0U◀ └ &KDLUPDQ└ └ ,└ KDYH└ KHUH└ VRPH└ WWDWHPHQW└ IURP└ DJULFXOWXUH└ RI ILFLDOV└ DQG└ JURXSV└ WKDW└ ,└ ZRXOG└ OLNH└ LQVHUWHG└ LQWR└ WKH└ UHFRUG◀

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:LWKRXW└ REMHFWLRQ◀

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$QG└ LI└ ,└ PD\└ └ ,└ ZRXOG└ FORVH└ E\└ TXRWLQJ└ D└ IHZ└ RI└ WKRVH◀ └ -LP└ 5HHVH└ WKH└ 2NODKRPD└ 6HFUHWDU\└ RI└ $JULFXOWXUH└ VD\V└ WKDW└ └ | 6FRWW└ 3UXLWW└ ZLOO└ FRQWLQXHG└ (3$V└ HIIRUW└ WR└ SURWHFW└ RXU└ HQYLURQPHQW└ EXW└ ZLWK└ UHVSHFW└ WRZDUGV└ CDQG└ RZQHUV└ WD[SD\HUV└ PXQLFLSDOWLHV└ EXVLQHVVHV└ DQG└ &RQJUHVV◀ |

7KDW└ LV└ QLFH└ WR└ KHDU└ └ VLU◀ └ 7UR\└ 6\ODZDWHU└ └ 1HEUDVND└ &DWWOHPDQ└ 3UHVLGHQW└ \WDWHG└ └ | 6LPSO\└ SXW└ └ 0U◀ └ 3UXLWW└ VHHV└ FOHDUO\└ WKDW└ DJULFXOWXUH└ DQG└ HQYLURQPHQW└ DUH└ QRW└ RSSRVLQJ└ WHUPV└ └ EXW└ UDWKHU└ └ WKH\└ DUH└ FRPSOHPHQWDU\◀

+H└ ZLOO└ ZRUN└ WR└ FXOWLYDWH└ WKH└ UHDWLRQVKLSV└ └ ZKLFK└ ZLOO└ CHDG└ WR└ WKH└ 8QLWHG└ 6WDWHV└ CHDGLQJ└ LQ└ IRRG└ DQG└ ILEHU└ SURGXFWLRQ└ └ ZKLCH└ LPSURYLQJ└ WKH└ HQYLURQPHQW└ LQ└ ZKLFK└ LW└ LV└ DFFRPSOLVKHG◀ | └ $JDLQ└ └ ,└ DP└ KDSS\└ WR└ + + └ WR└ CRRN└ IRUZDUG└ WR└ WKDW└ UHDWLRQVKLS└ EHLQJ└ HXWDEOLVKHG└ DJDLQ└ └ VR└ WKDW└ DOO└ SDUW└ RI└ RXU└ VRFLHW\└ KHUH└ LQ└ WKLV└ FRXQWU\└ FDQ└ SDUWLFLSDWH└ DQG└ UHFHLYH└ WKH└ UHFRJQLWLRQ└ WKDW└ ZH└ DUH└ JRRG└ WWHZDUGV└ RI└ WKH└ CDQG◀

,I└ FRQILUPHG└ └ ZKDW└ + + └ ZKDW└ ZLOO└ EH└ \RXU└ UHDWLRQVKLS└ ZLWK└ WKH└ DJULFXOWXUDO└ FRPPXQLW\"└ $UH└ \RX└ JRLQJ└ WR└ HQIRUFH└ FXUUHQW└ CDZV└ └ DQG└ ZLOO└ \RX└ DOVR└ UHVSHFW└ WKH└ OLPLW└ WKDW└ ZH└ KDYH└ RQ└ WKRVH└ CDZV"

358,77 └
<HV└ └ RQ└ ERWK└ DFFRXQW└ └ 6HQDWRU◀ └ $QG└ DOVR└ WKH└ WKHPH└ WKDW└ ,└ PHQWLRQHG└ LQ└ P\└ RSHQLQJ└ WWDWHPHQW└ WKDW└ ,└ ZRXOG└ KLJKOLJKW└ DJDLQ└ └ LV└ WKDW└ ZH└ + + └ ZH└ QHHG└ /R└ UHMHFW└ WKLV└ SDUDGLJP└ WKDW└ LI└ \RXUH└ SUR┼ └ HQHUJ\└ \RXUH└ DQWL┼ HQYLURQPHQW└ └ LI└ \RXUH└ SUR┼ HQYLURQPHQW└ └ \RXUH└ DQWL┼ └ HQHUJ\◀

,└ EHOLHYH└ WKDW└ ZH└ DV└ D└ FRXQWU\└ KDYH└ GHPRQWWUDWHG└ └ ZHYH└ PDGH└ JUHDW└ SURJUHW└ VLQFH└ WKH└ ¶ → !! V└ LPSURYLQJ└ RXU└ DLU└ TXDOLW\└ DQG└ SURWHFWLQJ└ RXU└ ZDWHUV◀ └ :H└ FDQ└ JURZ└ DQ└ HFRQRP\└ DQG└ DOVR└ SURWHFW└ DQG└ EH└ D└ JRRG└ WWHZDUG└ RI└ RXU└ HQYLURQPHQW◀ └ $QG└ ZH└ QHHG└ WR└ UHWWRUH└ WKDW└ SURSHU└ EDODQFH└ DQG└ FRPPLWPHQW└ WR└ ERWK└ └ DV└ ZH└ VHHN└ WR└ GR└ RXU└ MRE◀

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7KDQN└ \RX◀ └ $V└ ,└ + + └ DV└ ,└ VDLG└ HDUOLHU└ └ HYHU\└ PHPEHU└ RI└ WKLV└ FRPPLWWHH└ EHOLHYHV└ LQ└ FOHDQ└ DLU└ └ FOHDQ└ ZDWHU◀ └ :H└ ZDQW└ DQ└ HQYLURQPHQW└ WKDW└ LV└ + + └ WKDW└ LV└ UHVSHFWHG└ ZKHUH└ ZH└ FDQ└ PDQDJH└ RXU└ QDWXUDO└ UHVRXUFHV└ LQ└ D└ UHVSRQVLEOH└ PDQQHU└ └ VR└ WKDQN└ \RX└ └ VLU◀

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<HV└ └ 0DDP◀

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7KDQN└ \RX└ └ 6HQDWRU└)LVFKHU◀ └ 6HQDWRU└ &DUGLQ◀

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7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW☼ └ ,└ ZDQW└ WR└ WU\└ WR└ JHW└ \RXU└ XQGHUWDQGLQJ☼ └ ,└ KHDUG└ \RX└ VD\└ WKDW└ \RX└ ZDQWHG└ WR└ VHH└ WKH└ UHJXODWLRQV└ DQG└ ODZV└ SUHGLFWDEOH☼ └ VR└ WKDW└ WKH└ WWDNHKROGHUV└ NQRZ└ H[DFWO\└ ZKDW└ LV└ UHTXLUHG☼ └ VR└ WKHUHV└ ODFN└ RI└ ┼ ┼ └ WKHUHV└ GR└ FRQIXVLRQ◀ └ 6R└ ,└ ZDQW└ WR└ FRQFHQWUDWH└ RQ└ WKH└ ZDWHUV└ RI└ WKH└ 8◀ 6◀

?HFDXVH☼ └ HYHU└ VLQFH└ WKH└ 6XSUHPH└ &RXUW└ GHFLVLRQV☼ └ WKHUH└ KDV└ EHHQ└ DQ└ XQFHUWDLQW\└ DV└ WR└ ZKDW└ ZDWHUV└ DUH└ LQ└ IDFW└ VXEMHFW└ WR└ UHJXODWLRQ└ E\└ WKH└ IHGHUDO└ JRYHUQPHQW└ DQG└ ZKDW└ ZDWHUV└ DUH└ GR\◀ └ 'R└ \RX└ EHOLHYH└ WKDW☼ └ WKDW└ FDUULW\└ VKRXOG└ EH└ VHW└ E\└ WWDWWWH☼ └ RU└ VKRXOG└ LW└ EH└ VHW└ E\└ UHJXODWLRQV└ IURP└ WKH└ (3$"

358,77 └

6HQDWRU☼ └ ,└ WKLQN└ LW└ D└ JUHDW└ ┼ ┼ └ D└ JUHDW└ TXHVWLRQ☼ └ DQG└ \RX└ CRRN└ DW└ WKH└ VHULHV RI└ FDVHV└ JRLQJ└ EDFN└ WR└ %D\YLHZ☼ └ DOO└ WKH└ ZD\└ EDFN└ WR└ 5DSDQRV◀ └ ,└ WKLQN└ WKDW└ \RXUH└ H[DFWO\└ ULJKW◀ └ 7KH└ GHILQLWLRQ└ LQ└ WKH└ &HDQ└ :DWHU└ $FW└ VD\V└ WKDW└ QDYLJDEOH└ ZDWHUV☼ └ DUH└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV◀ └ 7KDW└ GRHVQW└ SURYLGH└ D└ JUHDW└ GHDO└ RI└ FDUULW└ WR└ WKRVH└ WKDW└ DGPLQLWHU└ WKH└ CDZ◀

$QG└ ,└ WKLQN└ WKH└ (3$└ WDNLQJ└ WWHSV└ WR└ SURYLGH└ FDUULW└ LV└ LPSRUWDQW☼ └ DEVHQW└ &RQJUHV└ UHVSRQGLQJ◀ └ 6R└ ,└ ┼ ┼ └ ,└ WKLQN└ WKDW└ SHUKDSV└ WKHUH└ LV└ D└ WLPH└ DQG└ SDFH└ IRU└ $UWLFCH└ ,└ UHVSRQVH☼ └ &RQJUHVLRQDO└ UHVSRQVH└ WR└ ZKDW└ WKLV└ ERG\└ PHDQV└ ZKHQ└ LW└ VD\V└ QDYLJDEOH└ ZDWHUV☼ └ RU└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV◀

&$5',1 └

$QG☼ └ RI└ FRXUVH☼ └ WKH└ &RQJUHW☼ └ IRU└ ZKDWHYHU└ UHDVRQ☼ └ IRU└ D└ CRQJ└ SHULRG└ RI└ /LPH☼ └ KDV└ GRW└ EHHQ└ DECH└ WR└ UHVSRQG└ DV└ WR└ ZKDW└ ZH└ WKLQN└ WKH└ GHILQLWLRQ└ RI└ /KH└ ZDWHUV└ RI└ WKH└ 8◀ 6◀ └ VKRXOG└ EH◀ └ 7KH└ $GPLQLWWDWLRQ└ GLG└ FRPH└ IRUZDUG└ ZLWK└ SURSRVHG└ UHJXODWLRQV☼ └ ZKLFK└ ZHUH└ UHVLWWHG└ E\└ PDQ\└ RI└ WKH└ WWDNHKROGHUV└ WKDW└ \RX└ DUH└ DZDUH└ RI◀

+RZ└ ZRXOG└ \RX└ ┼ ┼ └ ZKDW└ GLG└ ┼ ┼ └ ZKDW└ ZRXOG└ ┼ ┼ └ KRZ└ ZRXOG└ \RX└ GHILGH└ WKH└ ZDWHUV└ RI└ WKH└ 8◀ 6◀ "└ :KDW└ ZDV└ ZURQJ└ LQ└ WKH└ UHJXODWLRQ"└ ,└ GRQW└ ZDQW└ WR└ JR└ /KURXJK└ DOO└ WKH└ GHWDLOV☼ └ EXW└ WHOO└ PH☼ └ \RX└ NQRZ☼ └ ZKHUH└ GR└ \RX└ WKLQN└ ZH└ VKRXOG└ UHJXODWH"

<RX└ DOUHDG\└ VDLG└ PRUH└ WKDQ└ MXWW└ QDYLJDECH☼ └ VR└ ZKDW└ ┼ ┼ └ ZKDW└ ┼ ┼ └ KRZ└ GR└ ZH└ GHILGH└ LW"└ +RZ└ GR└ \RX└ GR└ LW"└ :KHUH└ GLG└ WKH└ $GPLQLWWDWLRQ└ JR└ ZURQJ"

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7KH└ FKDOOHQJH☼ └ XS└ XQWLO└ QRZ☼ └ ZLWK└ UHVSHFW└ WR└ WKH└ FXUUHQW└ UXOH☼ └ WKLV└ LQYROYHV└ DFWXDOO\└ DQ└ HUURU└ FDVH☼ └ WKH└ 8◂ 5◂ └ FDVH└ ZKHUH└ -XVWLFH└ 6FDOLD└ WDONHG└ DERXW└ WKH└ FRXQWHUEDODQFH└ WR└ 0DVVDFKXVHWWV└ (3$└ ZKHUH└ WKH└ VWHSV└ WDNHQ└ E\└ WKH└ (3$└ WR└ WDNH└ WKH└ HQGDQJHUPHQW└ ILQGLQJ└ LQ└ ┴ ‼ ‼ └ WKDW└ GHDOW└ ZLWK└ PRELOH└ ┼ ┼ └ 7LWOH└ ,,└ PRELOH└ VRXUFHV◂

$QG└ WKHQ└ OLQN└ WKDW└ RYHU└ WR└ WKH└ 36'└ SURJUDP└ ZDV└ VRPHWKLQJ└ WKDW└ -XVWLFH└ 6FDOLD└ VDLG☼ └ WUDQVIRUPHG└ WKH└ VWDWXWH└ DQG└ ZDV└ QRW└ ODZIXO└ RU└ FRQVWLWXWLRQDO◂ └ ,└ WKLQN└ WKH└ VDPH└ WKLQJ└ SHUKDSV└ LV└ JRLQJ└ RQ└ ZLWK└ WKH└ FXUUHQW└ UXOH☼ └ WKDW└ WKHUH└ UHDOO\└ LVQW└ ┼ ┼ └ ZKHQ└ \RX☼ └ ZKHQ└ \RX└ DUH└ FODVVLI\LQJ└ GU\└ FUHHN└ EHGV└ LQ└ 6RXWKHDVW└ 2NODKRPD└ WKDW└ DUH└ GU\└ ‼ └ SHUFHQW└ RI└ WKH└ \HDU☼ └ DV└ D└ ZDWHU└ RI└ WKH└ 8QLWHG└ 6WDWHV☼ └ WKDW└ FOHDU└ LV└ VRPHWKLQJ└ WKDW└ LV└ ◂ ◂ ◂

&$5',1 └

6LU☼ └ WKH└ DGPLQLVWUDWLRQ└ LQ└ LWV└ UHJXODWLRQ└ KDG└ FHUWDLQ└ H[FHSWLRQV└ WKDW└ WULHG└ WR└ GHDO└ ZLWK└ WKDW◂ └ <RX└ REYLRXVO\└ GLGQW└ WKLQN└ WKRVH└ H[FHSWLRQV└ ZHUH└ FOHDU└ HQRXJK"

358,77 └

:HOO☼ └ DFWXDOO\└ WKH└ 6L[WK└ &LUFXLW└ VDLG└ WKDW☼ └ WKDW└ WKRVH└ FODULILFDWLRQV└ ZHUH└ QRW└ VXIILFLHQW◂ └ ,└ ZRXOG└ DJUHH└ ZLWK└ \RX└ 6HQDWRU└ &DUGLQ└ WKDW└ ,└ EHOLHYH└ WKH└ FODULW\└ DURXQG└ WKLV└ GHILQLWLRQ☼ └ WKH└ MXULVGLFWLRQ└ RI└ WKH└ (3$└ LV└ HVVHQWLDO└ WR└ JHW└ ULJKW└ DQG└ WR└ DGGUHVV◂

$QG└ DV└ ,└ LQGLFDWHG└ HDUOLHU└ WR└ VRPH└ TXHVWLRQV☼ └ WKH└ 6XSUHPH└ &RXUW└ LV└ DFWXDOO\└ WDNHQ└ XS└ D└ PDWWHU└ IURP└ ODVW└)ULGD\☼ └ LWV└ PRUH└ MXULVGLFWLRQDO└ DQG└ QRW└ PHULWV└ EDVHG☼ └ EXW└ WKH└ UHVSRQVH└ E\└ &RQJUHVV☼ └ WKH└ UHVSRQVH└ WR└ SURYLGH└ FODULW\└ SHUKDSV└ LV└ D└ YHU\└ LPSRUWDQW└ VWHS└ WR└ WDNH◂

&$5',1 └

:HOO☼ └ ,└ ZDQW└ WR└ SXUVXH└ WKLV└ DQG└ ,└ WKLQN└ PD\EH└ DVN└ TXHVWLRQV└ IRU└ WKH└ UHFRUG└ DV└ WR└ VSHFLILF└ SURYLVLRQV└ WKDW└ \RX└ EHOLHYH└ VKRXOG└ EH└ LQ└ WKDW└ UXOH└ WKDW└ ZRXOG└ EH└ WKDQ└ WKH└ SURSRVHG└ UXOH└ DQG└ ,└ DSSUHFLDWH└ UHVSRQVH└ WR└ WKDW└ VR└ ZH└ FDQ└ WU\└ WR└ VHH└ ZKHUH└ ZHUH└ KHDGLQJ└ LQ└ \RXU└ WKRXJKW└ SURFHVV└ DV└ WR└ KRZ└ \RX└ GHILQH└ WKH└ UHJXODWHG└ ZDWHUV└ RI└ WKH└ 8◂ 6◂ └ 7KDW└ ZRXOG└ EH└ KHOSIXO└ WR└ XV◂

358,77 └

$QG└ ┼ ┼ └ DQG└ ,└ WKLQN└ 6HQDWRU└ └ WKH└ UHDVRQ└ WKDW└ GL ILFXOW└ └ DV└ \RX└ NQRZ└ LV└ EHFDXVH└ LQ└ WKDW└ SURFHVV└ └ ZKDWHYHU└ SURFHVV└ WKDW└ ZRXOG└ WDNH└ ┼ ┼ └ WDNH└ SODFH└ └ WKDW└ ZRXOG└ EH└ UXCH└ PDNLQJ└ └ ZKLFK└ PHDQV└ WKDW└ WKHUHG└ EH└ FRPPHQW└ DQG└ ◀ ◀ ◀

&$5',1 └

:HOO└ └ ,└ XQGHUVWDQG└ WKDW◀ └ ,P└ QRW└ WU\LQJ└ WR└ JHW└ HYHU\└ ,└ GRWWHG└ └ HYHU└ 7└ ┼ ┼ └ MXW ZDQW└ WR└ JHW└ \RXU└ SKLORVRSK\└ DV└ WR└ ZKHUH└ WKH└ ZDWHUV└ RI└ WKH└ 8◀ 6◀ └ OLQHV└ ZRXOG└ EH└ GUDZQ└ DQG└ ZKHUH└ \RX└ WRRN└ H[FHSWLRQ└ WR└ WKH└ UHJXODWRU\└ HI IRUWW└ RI└ WKH└ 2EDPD└ DGPLQLWWUDWLRQ◀

/HW└ PH└ JHW└ WR└ WKH└ VHFRQG└ SRLQW└ └ LI└ ,└ PLJKW└ RQ└ IUDFNLQJ◀ └)UDFNLQJV└ DQ└ LQWHUHWWLQJ└ DUHD└ EHFDXVH└ LWW└ WDWH└ UHJXODWHG└ SULQFLSDOO\◀ └ 7KHUH└ YHU\└ IHZ└ IHGHUDO└ UHJXODWLRQV◀ └ 7KHUH└ EHHQ└ ┼ ┼ └ DQG└ P\└ WDWH└ KDV└ JDV└ GHSRVLWW└ WKDW└ FRXOG└ EH└ VXEMHFW└ WR└ IUDFNLQJ└ DQG└ 3HQQV\OYDQLD└ └ RXU└ GHLJKERULQJ└ WDWH└ KDV└ GRQH└ WKDW◀

7KHUH└ EHHQ└ VRPH└ SURECHPV└ ZLWK└ SRODXWLQJ└ ┼ ┼ └ SRODXWLRQ└ LQ└ ZDWHU◀ └ :H└ NQRZ└ DERXW└ WKH└ JDV└ UHCHDVHV└ └ LWW└ DOUHDG\└ EHHQ└ WDONHG└ DERXW◀ └ 7KHUH└ VRPH└ FRQFHUQ└ SDWWLFXODUO\└ ZLWK└ GHHS└ ZHOO└ GULOOLQJ└ WKDW└ ZKHQ└ \RX└ LQMHFW└ WKH└ IOXLGV└ EDFN└ LQWR└ WKH└ FDYLWLHV└ WKDW└ LW└ PD\└ FDXVH└ LQWDELOLW\◀

,Q└ \RXU└ WDWH└ └ ,└ NQRZ└ WKHUH└ ZHUH└ D└ QRW└ RI└ HDUWKTXDNHV◀ └ 7KHUHYH└ EHHQ└ /DONLQJ└ DERXW└ KRZ└ └ ZKHWKHU└ WKHVH└ HDUWKTXDNHV└ ZHUH└ PRWLYDWHG└ E\└ WKH└ IUDFNLQJ└ DFWLYLWLHV└ RU└ QRW◀ └ +RZ└ ZHOO└ KDYH└ WKH└ WDWHV└ UHJXODWHG└ IUDFNLQJ└ DQG└ ZKHUH└ GR└ \RX└ VHH└ WKH└ IHGHUDO└ URCH└ VKRXOG└ EH└ LQ└ SURWHFWLQJ└ RXU└ HQYLURQPHQW└ IURP└ IUDFNLQJ"

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:HOO└ └ ,└ WKLQN└ ┼ ┼ └ ,P└ JODG└ \RXYH└ PHQWLRQHG└ WKH└ WDWH└ URCH└ EHFDXVH└ ZHYH└ DFWXDOO\└ EHHQ└ UHJXODWLQJ└ K\GUDXOLF└ IUDFNLQJ└ LQ└ 2NODKRPD└ VLQFH└ WKH└ ODWH└ ¶ ┼ ‼ V└ └ HDUO\└ ¶ ↑ ‼ V◀ └ ,W└ ┼ ┼ └ LW└ QRW└ D└ QHZ└ SURFHVV◀ └ +RUL]RQWDO└ GULOOLQJ└ L EXW└ WKH└ K\GUDXOLF└ IUDFWXULQJ└ SURFHVV└ LV└ QRW└ DQG└ PDQ\└ WDWHV└ KDYH└ EHHQ└ YHU\└ DJJUHVVLYH└ DW└ UHJXODWLQJ└ IRU└ D└ QXPEHU└ RI└ GHFDGHV◀

:LWK└ UHVSRQVH└ WR└ ┼ ┼ └ UHVSRQVH└ WR└ WKH└ VHLVPLF└ LVXH└ WKDW└ \RXUH└ WDONLQJ└ DERXW└ └ WKH└ HDUWKTXDNHV└ LQ└ 2NODKRPD└ └ WKH└ &RUSRUDWLRQ└ &RPPLVVLRQ└ KDV└ DFWXDOO\└ GHFDUHG└ RII└ OLPLW└ FHUWDLQ└ GULOOLQJ└ DFWLYLW\└ LQ└ KRW└ VSRW└ DUHDG\◀ └ 7KH\YH└ WDNHQ└ D└ YHU\└ DJJUHVVLYH└ DSSURDFK◀

$QG└ ,└ WRR└ VKDUH└ WKHLU└ FRQFHUQ◀ └ ,YH└ EHHQ└ LQ└ FRQYHUVDWLRQ└ ZLWK└ WKH└
FRPPLWWLRHUV└ DW└ WKH└ &RUSRUDWLRQ└ &RPPLWWLRQ◀ └ 7KDW└ ZKR└ KDV└
VXULVGLFWLRQ└ LQ└ WKLV└ PDWWHU◀ └ $QG└ WKH└ KDYH└ WDNHQ└ DJDLQ└ YHU└ PHDQLQJ└ IXO└
WWHSV└ WR└ GHFDUH└ RII└ OLPLW└ FHUWDLQ└ GULOOLQJ└ DFWLYLW└ WR└ WU└ WR└ VHH└ LI└ LW└ ZLOO└ LV
KHOS└ UHGXFH└ WKH└ QXPEHU└ RI└ HDUWKTXDNHV└ KDSSHQLQJ└ LQ└ 2NODKRPD└ DQG└ LW└
KDV└ KHOSHG◀

&$5',1 └
7KDQN└ \RX◀ └ 7KDQN└ 0U◀ └ ◀ ◀ ◀

?$55$662 └
7KDQN└ \RX◀ └ 7KDQN└ 0U◀ └ ┼ ┼ └ WKDQN└ \RX└ 6HQDWRU└ &DUGLQ◀ └ 6HQDWRU└ ,QKRIH"

,1+2)(└
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ ,└ KDYH└ WZR└ XQLTXH└ 6HQDWH└ UHTXHWW└ └ VR└ GRQW└
WWDUW└ P└ FORFN└ \HW◀ └ 2QH└ LV└ └ ,└ UHDOO└ EHOLHYH└ DQG└ SHUKDSV└ ,P└ D└ OLWWOH└ ELW└
VHQVLWLYH└ WR└ WKLV└ EXW└ WKDW└ └ 0U◀ └ 3UXLWW└ LQWHJULW└ KDV└ EHHQ└ SXW└ LQWR└ TXHWWLRQ└
ZLWK└ WKH└ DFFXXDWLRQV└ RI└ FRQWULEXWLRQV└ WR└ KLV└ FDPSDLJQ◀

,G└ OLNH└ WR└ NHHS└ LQ└ PLQG└ WKDW└ DQWKRXJK└ WKH└ RLO└ LQGXWU└ LV└ D└ KXJH└ LQGXWU└ LQ└
WKH└ 8QLWHG└ 6WDWH└ RI└ 2NODKRPD◀ └ 7KH└ KDYH└ WKLQJV└ FDOOHG└ 3$&V└ ZKHUH└ WKH└
PLGGOH└ LQFRPH└ SHRSOH└ ZLOO└ VD└ └ HW└ └ ZH└ DUH└ ┼ ┼ └ \RX└ NQRZ└ └ WKH└ VXSSRUWHG└
PH└ DOVR◀

?&W└ ,└ ZRXOG└ ┼ ┼ └ ,└ WKLQN└ WKDW└ ZH└ QHHG└ WR└ KDYH└ LQ└ WKH└ UHFRUG└ WKDW└ WKHUH└ DUH└
VRPHWKLQJV└ WKDW└ DUH└ JRLQJ└ RQ└ WKDW└ VKRXOG└ QRW└ EH└ JRLQJ└ RQ└ └ DQG└ WKLV└
DII HFWW└ WKH└ 'HPRFUDWW└ DQG└ QRW└ WKH└ 5HSXEOLFDQV◀ └ 7KHUHV└ D└ JX└ QDPHG└ └
7RP└ 6WHU└ ♂ SK□ └ DQG└ ,P└ JRLQJ└ WR└ SXW└ WKLV└ LQ└ WKH└ UHFRUG└ └ ZKR└ DFWXDOO└ VDLG└
KH└ ZDV└ JRLQJ└ WR└ SXW└ • ¶ !! !! └ PLOOLRQ└ LQWR└ FDPSDLJQV└ RI└ WKH└ LQGLYLGXDOV└
WDONLQJ└ DERXW└ WKH└ JOREDO└ ZDUPLQJ└ DQG└ ZKDW└ WKH└ H[SHFWHG◀ └ ,└ ┼ ┼ └ LQ└ ┴ !! ¶ ├ └
KH└ GLGQW└ GR└ WKDW◀

+H└ RQO└ SXW└ LQ└ ┼ ┼ └ ,P└ VRUU└ └ ¶ ┤ └ ┼ ┼ └ • → ↑ └ PLOOLRQ└ RI└ KLV└ RZQ└ PRQH└◀ └ ,Q└ ┴
KH└ ZDV└ WKH└ CDUJHW└ FRQWULEXWRU└ SXWWLQJ└ LQ└ • ← ├ └ PLOOLRQ└ RI└ KLV└ RZQ└ PRQH└◀ └
,P└ QRW└ JRLQJ└ WR└ UHDG└ WKLV└ EHFDXVH└ LW└ GRHV└ UHIOHFW└ WKH└ QDPHV└ RI└ SHRSOH└
ZKR└ DUH└ DW└ WKLV└ GDLV◀ └ ,└ DVN└ WKDW└ WKLV└ └ \RX└ NQRZ└ └ WR└ FRQVHQW└ WR└ WKLV└ EHLQJ└
HQWHUHG└ LQWR└ WKH└ UHFRUG◀

?$55$662 └

:LWKRXW- REMHFWLRQ◀

,1+2)(└
$QRWKHU└ WKLQJ└ ┼ ┼

&$53(5 └
,G└ UHDOO\└ OLNH└ WR└ REMHFW- ┼ ┼ └ ,└ QHHG└ WR└ DVN└ IRU└ D└ FODULILFDWLRQ└ IURP└ P\└ IULHQG└ IURP└ 2NODKRPD◀ └ 7KH└ ┼ ┼ └ WKH└ PRQLHV└ WKDW- \RXUH└ UHIHUULQJ└ WR☼ └ ZHUH└ WKRVH└ GRQDWLRQV└ WKDW- ZHUH└ GLVFORVHG☼ └ IXOO\└ GLVFORVHG"

,1+2)(└
2K└ \HV☼ └ ,└ EHOLHYH└ WKH\└ ZHUH◀

&$53(5 └
7KHQ└ WKDW- GRHV└ QRW- VRXQG└ OLNH└ GDUN└ PRQH\└ WR└ PH◀

,1+2)(└
:HOO☼ └ DOO└ ULJKW◀ └ $Q\ZD\└ RQ└ WKH└ CDWW- TXHXWLRQ└ WKDW- ┼ ┼ └ WKDW- 0U◀ └ 3UXLWW- KDG└ FRQFHUQLQJ└ WKH└ HDUWKTXDNHV☼ └ ,G└ OLNH└ WR└ PDNH└ WKLV└ D└ SDUW- RI└ WKH└ UHFRUG☼ └ EHFDXVH└ ,P└ VXUSULVHG☼ └ \RX└ JX\V└ WKDW- WKH└ 2NODKRPD└ &RUSRUDWLRQ└ &RPPLWWLRQ└ KDV└ UHDOO\└ IRFXVHG└ LQ└ RQ└ WKLV└ WKLQJ└ DQG└ WDONHG└ ┼ ┼ └ DQG└ WDONHG└ DERXW- WKLV└ LV└ ZDXWH└ ZDWHU└ DQG└ GLVSRVDO└ ZHOOV└ WKDW- ZHUH└ FRQFHUQHG└ ZLWK◀

7KH\└ FODPSHG└ GRZQ└ RQ└ LW- DQG└ \RXUH└ H[DFWO\└ ULJKW- LQ└ \RXU└ UHVSRQVH└ WR└ WKH└ TXHXWLRQ☼ └ H[FHSW- \RX└ GLGQW- JR└ IDU└ HQRXJK◀ └ ,Q└ ┴ !! ¶ ├ ☼ └ WKH\└ DFWXDOO\└ UHGXFHG└ WKH└ HDUWKTXDNHV└ E\└ ┬ ¶ └ SHUFHQW◀ └ $QG└ VR└ ZH└ DUH└ GRLQJ☼ └ LQ└ WKH└ WDWH└ RI└ 2NODKRPD└ VRPHWKLQJ└ WKDW- LV└ ┼ ┼ └ LV└ ┼ ┼ └ ZHYH└ EHHQ└ FRPSOHPHQWHG└ DERXW☼ └ WKH└ IDFW- WKDW- ZH└ DUH└ WDNLQJ└ WKH└ ┼ ┼ └ WDNLQJ└ WKHMH└ ┼ ┼ └ WKHMH└ DFWLRQV◀ └ 6R
,G└ OLNH└ WR└ PDNH└ WKLV└ DV└ D└ SDUW- ◀ ◀ ◀

?$55$662 └
:LWKRXW- REMHFWLRQ◀

,1+2)(└

◀ ◀ ◀ └ RI └ WKH└ UHFRUG◀ └ 1RZ☼ └ WKH└ RWKHU└ WKLQJ└ , └ ZDQW└ WR└ EULQJ└ RXW☼ └ DQG└ ,YH└ GRQH└ WKLV└ EHIRUH└ EXW└ , └ ZDQW└ JRLQJ└ WR└ GR└ LW└ XQWLO└ SHRSCH└ NHSW└ WDONLQJ└ DERXW└ WKH└ VFLHQWLWW└ DQG└ DOO└ WKH└ VFLHQFHV☼ └ DQG└ DOO└ WKH└ VFLHQWLWW└ ┼ ┼ └ DQG└ , └ NQRZ└ WKDW└ SHRSCH└ ZDQW└ WR└ EHOLHYH└ WKDW◀

?&XW└ , └ UHPHPEHU└ VR└ ZHOO☼ └ \RX└ NQRZ└ ┼ ┼ └ JR└ DKHDG└ DQG└ WDONW└ WKH└ FORFN☼ └ WKDW└ ILQH└ ┼ ┼ └ , └ UHPHPEHU└ VR└ ZHOO└ ┼ ┼

♂ 81.12:1□ └
:H└ MXWW└ ZDQW└ WR└ PDNH└ VXUH└ WKDW└ WKH└ FORFN└ GRHVQW└ MXWW└ JHW└ WWRSSHG└ IRU└ WKH└ 5HSXEOLFDQ└ DQG└ UXQ└ IRU└ XV◀

,1+2)(└
<RXUH└ ┼ ┼ └ \RXUH◀ ◀ ◀

♂ 81.12:1□ └
:HOFRPH└ IRUPHU└ FKDLU└ ◀ ◀ ◀

,1+2)(└
<HDK☼ └ \RXUH└ D└ ┼ ┼ └ \RX└ DUH└ DCHUW☼ └ , └ ZRXOG└ VD\└ WKDW└ WR└ P\└ IULHQG◀

♂ /$8*+7(5□

,1+2)(└
$Q\ZD\☼ └ , └ FDQ└ UHPHPEHU└ ZKHQ└ , └ ZDV└ JRLQJ└ WR└ JR└ RYHU└ WR└ ┼ ┼ └ ZLWK└ HYHU\└ \HDU└ WKH└ 8◀ 1◀ └ KDV└ D└ ELJ└ SDUW☼ └ WKH\└ LQYLWH└ HYHU\RQH└ WR└ FRPH└ ┼ ┼ └ FRPH└ LQ└ DQG☼ └ , └ ZDV└ JRLQJ└ WR└ JR└ WR└ &RSHQKDJHQ└ WR└ EH└ WKH└ RQH└ PDQ└ WDWWK└ VTXDG☼ └ ZKLFK└ , └ GLG└ DQG└ , └ ZHQW└ RYHU└ WKHUH◀

?&XW└ GXULQJ└ WKDW└ WLPH☼ └ ULJKW└ EHIRUH└ , └ CHW☼ └ , └ DVNHG└ WKH└ DGPLQLWWUDWRU└ RI└ WKH└ (3$☼ └ WKH└ MRE└ WKDW└ \RXUH└ , └ EHOLHYH└ JRLQJ└ WR└ KDYH☼ └ /LVD└ -DFNVRQ☼ └ , └ VDLG☼ └ , └ KDYH└ D└ IHHOLQJ└ RQFH└ , └ CHDYH└ WRZQ└ \RXUH└ JRLQJ└ WR└ FRPH└ XS└ ZLWK└ DQ└ HQGDQJHUPHQW└ ILQGLQJ└ DQG└ \RXUH└ JRLQJ└ WR└ JLYH└ \RX└ MXWWLILFDWLRQ└ IRU└ JHWWLQJ└ LQYROYHG└ LQ└ WKLV└ ┼ ┼ └ LQ└ WKLV└ LWXH◀

$QG└ VKH└ VPLCHG☼ └ VR└ , └ FRXOG└ WHOO└ LW└ ZDV└ WUXH◀ └ $QG└ , └ VDLG└ WKDW└ ZKHQ└ \RX└ GR└ ΛKLV☼ └ LW└ KDV└ WR└ EH└ EDVHG└ RQ└ VFLHQFH◀ └ 7HOO└ PH└ WKH└ VFLHQFH└ WKDW└ \RX└ DUH└ JRLQJ└ WR└ XVH└ IRU└ WKLV◀ └ $QG└ VKH└ VDLG☼ └ ZLWK└ WKH└ ,3&&☼ └ ,QWHUJRYHUQPHQWDO└ 3DQHO└ RQ└ &OLPDWH└ &KDQJH◀

1RZ☼ └ DV└ OXFN└ ZRXOG└ KDYH└ LW☼ └ LQ└ P\└ OXFN☼ └ QRW└ WKHLUV☼ └ ULJKW└ DWWHU└ WKDW└ LV└ ZKHQ
&OLPDWH╫ JDWH└ FDPH☼ └ DQG└ WKDW└ ZKHQ└ LW└ ZDV└ GLVFOVHG└ WKDW└ WKH└
LQGLYLGXDOV☼ └ WKH└ VFLHQWLWW└ LQ└ ,3&&└ ULJJHG└ WKH└ QXPEHUV└ DQG└ FDPH└ XS└ ZLWK└
VXFK└ DQ└ RXWUDJHRXV└ OLH└ LQ└ WHUPV└ RI└ ZKDW└ FDXVHV└ JOREDO└ ZDUPLQJ☼ └ DOO└ RI└
WKDW└ DQG└ ,OO└ MXW└ UHDG└ D└ FRXSOH└ RI└ WKHP└ KHUH◀

2QH└ RI└ WKH└ SK\VLFLWW└ LQ└ WKH└ ,3&&└ VDLG☼ └ | &OLPDWH╫ JDWH└ ZDV└ D└ IUDXG└ RQ└ D└
VFDOH└ ,YH└ QHYHU└ VHHQ└ EHIRUH◀ | └ &OLYH└ &RRN└ ZLWK└ WKH└)LQDQFLDO└ 7LPHV└ VDLG☼ └
| 7KH└ FORVHGPLQGHGQHVV└ RI└ WKHVH└ VXSSRVHG└ PHQ└ RI└ VFLHQFH└ LV└ VXUSULVLQJ└
HYHQ└ WR└ PH☼ └ WKH└ WWLQN└ RI└ LQWHOOHFWXDO└ FRUUXSWLRQ└ LV└ RYHUSRZHULQJ◀ |

$QG└ WKH└ 8◀ 1◀ └ ┼ ┼ └ WKH└ 8◀ .◀ └ 7HOHJUDSK☼ └ WKDW└ RQH└ RI└ WKH└ OUJHWW└ LQ└ WKH└ 8◀ .◀ ☼
WKH└ SXEOLFDWLRQV☼ └ LW└ VDLG☼ └ | ,W└ WKH└ ZRUWW└ VFLHQWLILF└ VFDQGDO└ RI└ RXU└
JHQHUDWLRQ◀ | └ 1RZ☼ └ QREG\└ WDONV└ DERXW└ WKDW◀ └ %XW└ WKDW└ WKH└ VFLHQFH└ WKDW└
WKH\└ DUH└ WDONLQJ└ DERXW☼ └ DQG└ ,└ UHDO\└ EHOLHYH└ LW└ QHFHVVDU\└ WR└ KDYH└ WKDW└ DV└
D└ SDUW└ RI└ WKLV└ UHFRUG└ RI└ WKLV└ PHWLQJ◀

1RZ☼ └ *HQHUDO└ 3UXLWW☼ └ WKH└ ┼ ┼ └ LQ└ ┴ !! ¶ ┴ ☼ └ WKH└ (3$└ DQG└ WKH└ 1DWLRQDO└ +LJKZD\└
7UDIILF└ 6DIHW\└ $GPLQLWWUDWLRQ└ LWXHG└ XSGDWH└ ┼ ┼ └ XSGDWHG└ IXHO└ HFRQRP\└
WWDQGDUGV└ WKDW└ ZHUH└ WKH└ UHVXOW└ RI└ D└ FRPSURPLVH└ DQG└ WKDW└ FRPSURPLVH└
ZDV└ EHWZHHQ└ WKH└ 2EDPD└ DGPLQLWWUDWLRQ☼ └ WKH└ DXWRPDNHUV└ LQ└ WKH└ WWDWH└ RI└
&DOLIRUQLD◀ └ 5LJKW'

$QG└ WKH└ SDUW└ RI└ WKLV└ GHDO└ UHTXLUHG└ D└ UHYLHZ└ RI└ WKHVH└ UHJXODWLRQV└ LQ└ ┴ !! ¶ ← └
EHIRUH└ ┼ ┼ └ WKHVH└ DUH└ WKHLU└ ZRUGV☼ └ QRW└ PLQH└ ┼ ┼ └ EHIRUH└ DQ\└ QHZ└ WWDQGDUGV└
ZHUH└ SXW└ LQ└ SODFH◀ └ $WW└ CRVLQJ└ WKH└ HQHFWLRQ└ KRZHYHU☼ └ WKH└ 2EDPD└
DGPLQLWWUDWLRQ└ EURNH└ WKH└ GHDO└ E\└ SUHPDWXUHO\└ LWXLQJ└ QHZ└ UHJXODWLRQV◀

7KLV└ GHFLVLRQ└ ZDV└ PDGH└ XQH[SHFWHGO\└ DQG└ ZHOO└ RYHU└ D└ \HDU└ EHIRUH└ WKH└
(3$└ VDLG└ WKDW└ WKH\G└ PDNH└ WKH└ GHWHUPLQDWLRQ◀ └ 7KLV└ VKRUWHQHG└ D└ WLPH└
IUDPH└ DQG└ SURFHW└ LV└ FRQFHUQLQJ◀ └ 6R☼ └ 0U◀ └ &KLUPDQ☼ └ ,└ GR└ DVN└
XQDQLPRXV└ FRQVHQW└ WKDW└ WKH└ SUHYLRXV└ (3$└ WLPHOLQH└ IRU└ WKH└ H[SHFWHG└
DFWLRQ└ RQ└ WKH└ PLG╫ WHUP└ UHYLHZ└ EH└ LQFOXGHG└ LQ└ WKH└ UHFRUG◀

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:LWKRXW└ REMHFWLRQ◀

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$QG└ $WWRUQH\└ *HQHUDO└ 3UXLWW☼ └ DV└ DGPLQLWWUDWRU☼ └ ZLOO└ \RX└ CRRN└ LQWR└ WKLV└
PDWWHU└ WR└ VHH└ ZKHWKHU└ WKLV└ H[WUHPH└ DFWLRQ└ ZDV└ DSSURSULDWH└ RU└ D└ KDWW\└
SROLWLFDO└ GHFLVLRQ"

358,77 └
6HQDWRU└ DV└ \RX└ LQGLFDWHG└ WKH└ REOLJDWLRQ└ ZDV└ WR└ PHHW└ WKH└ 1RYHPEHU└
┴ !! !! ← └ PLG┤ WHUP└ UHYLHZ└ ┼ ┼ └ ┴ !! ¶ ← └ PLG┤ WHUP└ UHYLHZ└ DQG└ ,└ WKLQN└ WKH└ WWXG\└ WKI
ZDV└ FRPSOHWHG└ LW└ ZDV└ ILQLVKHG└ 'HFHPEHU└ ┬ !! WK└ DQG└ WKH\└ LWXHG└ WKHLU└
ILQGLQJV└ ZLWKLQ└ ¶┤ └ GD\V◀

7KDW└ WLPH└ SHULRG└ LV└ VRPHWKLQJ└ └ ,P└ QRW└ VXUH└ WKDW└ WKDW└ QRUPDOO\└ KDSSHQV└
DV└ IDU└ DV└ WKH└ WLPH└ └ WKH└ YHQRFLW\└ RI└ ¶┤ └ GD\V└ └ EXW└ LW└ PHULWV└ UHYLHZ└ DQG└ ,└
ZRXOG└ UHYLHZ└ WKDW└ └ \HV◀

,1+2)(└
:HOO└ └ WKH└ IROORZ└ XS└ TXHVWLRQ└ ZRXOG└ EH└ └ ZRXOG└ \RX└ FRPPLW└ WR└ VLVWLQJ└ GRZQ└
ZLWK└ WKH└ 7UDQVSRUWDWLRQ└ 6HFUHWDU\└ (QDLGH└ &KDR└ └ DQG└ ┼ ┼ └ ,YH└ DOUHDG\└ WDONHG└
/R└ KHU└ DERXW└ WKLV└ LQFLGHQWDOO\└ └ ERWK└ RI└ WKHP└ ZLOO└ EH└ FRQILUPHG└ └ ,P└
FRQYLQFHG└ DQG└ \RXUH└ ZRUNLQJ└ WR└ DGGUHVV└ WKH└ LPSDFW└ RI└ WKH└ (3$└
GHFLVLRQ└ RQ└ DXWRPRELOH└ PDQXIDFWXUHUV└ DQG└ FRQVXPHUV└ ◀ ◀ ◀

358,77 └
<HV◀

,1+2)(└
◀ ◀ ◀ └ DQG└ ZRUNHG└ ZLWK└ KHU└ RQ└ WKDW└ ┼ ┼ └ LQ└ WKDW└ LWXH◀

358,77 └
$EVROXWHO\◀

,1+2)(└
$OO└ ULJKW◀ └ 9HU\└ JRRG◀ └ 7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

%&$55$662 └
7KDQN└ \RX└ └ 6HQDWRU◀ └ 6HQDWRU└ %RRNHU"

%22.(5 └
7KDQN└ \RX└ YHU\└ PXFK◀ └ 7KDQN└ \RX└ 0U◀ └ 3UXLWW◀ └ ,└ MXW└ ZDQW└ WR└ MXPS└ LQWR└ RQH└
RI└ WKH└ DUHDV└ WKDW└ \RXYH└ VDLG└ LV└ D└ SULQFLSOH└ SDUW└ RI└ RQH└ RI└ \RXU└
DFKLHYHPHQWV◀ └ ,Q└ \RXU└ RSHQLQJ└ WDWWHPHQW└ └ \RX└ VDLG└ └ WKDW└ DV└ DWWRUQH\└

JHQHUDO└ \RX└ FRQIUROWHG└ ZLWK└ DQ└ LPSRUWDQW└ ZDWHU└ TXDOLW\└ LVVXH└ RQ└ WKH└ VFHQLF└ ,OOLQRLV└ 5LYHU└ DERXW└ WKH└ KLJK└ SKRVSKRUXV└ CHYHOV└ WKDW└ ZHUH└ FDXVLQJ└ D└ UDQJH└ RI└ SUREOHP└ WKDW└ FRPH└ IURP└ WKH└ PDQXUH└ SULQFLSDOO\└ IDUP└ DQLPDOV◀

$QG└ \RX└ JR└ RQ└ WR└ WDONH└ WKDW└ WKLV└ ZDV└ DQ└ KLWRULF└ DJUHHPHQW└ WR└ FOHDQ└ XS└ WKH└ ULYHU◀ └ ,W└ ZDV└ LQ└ \RXU└ RSHQLQJ└ WDONHPHQW└ DQG└ D└ QXPEHU└ RI└ WKH└ GRFXPHQWV└ WKDW└ \RX└ SURYLGHG◀ └ <RX└ DOVR└ GHVFULEHG└ WKH└ DJUHHPHQW└ ZLWK└ $UNDQVDV└ DV└ DQ└ LPSRUWDQW└ DJUHHPHQW└ WR└ UHGXFH└ WKH└ SROOXWLRQ◀

$JDLQ└ WKDW└ ZDV└ D└ UHVXOW└ IURP└ SRXOWU\└ JURZHUV└ DQG└ ,P└ TXRWLQJ└ \RX└ DFWXDOO\└ GLUHFWO\└ | 7KDW└ ZDV└ RFFXUULQJ└ DV└ D└ UHVXOW└ RI└ SROOXWLRQ└ IURP└ SRXOWU\└ JURZHUV◀ | └ $UH└ \RX└ IDPLOLDU└ ZLWK└ WKLV"

358,77 └
<HV└ DOVR└ GLVFKDUJH└ IURP└ PXQLFLSDOLWLHV└ LQ└ 1RUWKZHVW└ $UNDQVDV└ DV└ ZHOO└ └
/KDW└ ◀ ◀ ◀

%22.(5 └
,└ WKLQN└ WKDW└ DQ└ LPSRUWDQW└ SRLQW└ └ \HV◀

358,77 └
<HDK◀

%22.(5 └
,└ ZRXOG└ OLNH└ WR└ DVN└ \RX└ MXVW└ VRPH└ TXHVWLRQ└ DERXW└ WKLV└ EXW└ ,└ WKLQN└ LVW└ LPSRUWDQW◀ └ ,└ UHDOO\└ GXJ└ LQWR└ WKLV└ DQG└ GLG└ VRPH└ UHVHDUFK◀ └ &DQ└ \RX└ KROG└ ┼ ┼ └ KROG└ WKLV└ XS◀ └ ,└ MXVW└ ZDQW└ WR└ JR└ WKURXJK└ ZLWK└ P\└ FRONHDJXH└ ZKDW└ WKH└ IDFW└ SDWWHUQ└ LV└ WKDW└ CHDG└ WR└ ZKDW└ ┼ ┼ └ WKLV└ PRPHQW└ ZKHUH└ \RX└ LQWHUYHQHG◀

$QG└ LW└ UHDOO\└ WDUWW└ ZLWK└ D└ 6XSUHPH└ &RXUW└ GHFLVLRQ└ ZD\└ EDFN└ LQ└ ¶ ┴ ☼ └ $UNDQVDV└ Y◀ └ 2NODKRPD◀ └ ,└ LPDJLQH└ \RXUH└ IDPLOLDU└ ZLWK└ WKH└ 6XSUHPH└ &RXUW└ GHFLVLRQ☼ └ WKDW└ WKH└ UHVXOW└ EHWZHHQ└ WKRVH└ WZR└ WDWHV└ WKDW└ KHOG└ WKDW└ EDVLFDOO\└ XS└ ULYHU└ WDWHV☼ └ VXFK└ LQ└ $UNDQVDV└ PXW└ FRPSO\└ ZLWK└ WKH└ ZDWHU└ TXDOLW\└ WDQGDUGV└ WKDW└ DUH└ DGRSWHG└ E\└ GRZQULYHU└ WDWHV└ DQG└ WKHQ└ DSSURYHG└ E\└ WKH└ (3$◀

<RXUH└ IDPLOLDU└ ZLWK└ WKDW'

358,77 └

,P└ IDPLOLDU└ ZLWK└ WKH└ OLWLJDWLRQ☼ └ \HV◀

%22.(5 └

6R└ ┼ ┼ └ VR└ DWWHU└ WKDW└ 6XSUHPH└ &RXUW└ GHFLVLRQ└ HI IHFWLYH└ -XO\└ ¶ ☼ └ ┴ ‼ ‼ ┴ ☼ └

2NODKRPD└ DFWXDOO\└ GLG└ DGRSW└ D└ ◀ ‼ ┬ → └ ZDWHU└ TXDOLW\└ WDQGDUG└ IRU└

SKRVSKRUXV└ DQG└ LPSRUWDQW\└ WKH\└ JDYH└ D└ GHFDGH☼ └ WHQ└ \HDU└ SKDVH└ LQ└

SHULRG└ EHIRUH└ IXOO└ FRPSOLDQFH└ ZDV└ UHTXLUHG◀ └ $QG└ WKHQ└ LQ└ ┴ ‼ ‼ ┬ ☼ └ \RXU└

SUHGHFHVVRU└ 'UHZ└ (GPRQGVRQ└ GHJUDWHG└ DJUHHPHQW└ ZLWK└ $UNDQVDV☼ └

ZKLFK└ ,YH└ UHDG└ FDOOHG└ WKH└ 6WDWHPHQW└ RI└ -RLQW└ 3ULQFLSOHV└ DQG└ $FWLRQV◀

0U◀ └ &KDLU☼ └ ,G└ OLNH└ WR└ HQWHU└ WKDW└ IRU└ WKH└ UHFRUG◀

%$55$662 └

:LWKRXW└ REMHFWLRQ◀

%22.(5 └

$QG└ WKHQ└ LQ└ ┴ ‼ ‼ ┬ ☼ └ WR└ JLYH└ PRUH└ WHHWK└ WR└ WKLV└ ┼ ┼ └ WKLV└ JRHV└ WR└ ZKDW└ \RX└

ZHUH└ VD\LQJ└ DERXW└ PXQLFLSDOLWLHV☼ └ LW└ FUHDWHG└ SKRVSKRUXV└ OLPLW└ IRU└

PXQLFLSDO└ GLVFKDUJHV◀ └ $QG└ WKDW└ ┴ ‼ ‼ ┬ └ DJUHHPHQW└ DOVR└ WKDW└ ,YH└ UHDG└

/KURXJK☼ └ DOVR└ WWDWHV└ WKDW└ 2NODKRPD└ ZLOO└ UHHYDOXDWH└ WKH└ ◀ ‼ ┬ → └ FULWHULD└ IRU└

/RWDO└ SKRVSKRUXV└ LQ└ 2NODKRPDV└ ULYHUV└ E\└ ┴ ‼ ¶ ┴ ◀

$QG└ WKHQ☼ └ WKLV└ LV└ D└ ELJ└ SDUW└ LQ└ DFFRUGDQFH└ ZLWK└ WKH└ ┼ ┼ └ ZLWK└ WKH└ LQWXUXFWLRQ☼ └

/KH└ PDQGDWHV└ RI└ WKH└ 6XSUHPH└ &RXUW☼ └ WKH└ (3$└ JDYH└ LW└ DSSURYDO└ WR└

2NODKRPDV└ ◀ ‼ ┬ → └ SKRVSKRUXV└ WWDQGDUG◀ └ 7KLV└ ZDV└ FULWLFDO└ EHFDXVH└

XQGHU└ WKH└ 6XSUHPH└ &RXUW└ GHFLVLRQ☼ └ QRZ└ 2NODKRPD└ KDG└ WR└ ┼ ┼ └ KDG└ D└ ZDWHU└

TXDOLW\└ WWDQGDUG└ DSSURYHG└ E\└ WKH└ (3$└ WKDW└ ZDV└ QRZ└ HQIRUFHDEOH└ DJDLQWW└

XS└ WWDWHV└ OLNH└ $UNDQVDV◀

1RZ☼ └ CHW└ IDW└ IRUZDUG└ WR└ $SULO└ ┴ ‼ ¶ ┴ ◀ └ 2NODKRPDV└ :DWHU└ 5HVRXUFHV└

%RDUG└ UHYLHZHG└ WKH└ EHW└ VFLHQWLILF└ LQIRUPDWLRQ└ DYDLODEOH└ LQ└ ┴ ‼ ¶ ┴ ◀ └ ,W└

UHHYDOXDWHG└ DQG└ UHDIILUPHG└ WKH└ ◀ ‼ ┬ → └ SKRVSKRUXV└ WWDQGDUG◀ └ 0U◀ └ &KDLU☼ └ ,└

ZDQW└ WR└ SXW└ LQ└ DQ└ H[HFXWLYH└ VXPPDU\└ RI└ WKDW└ UHYLHZ◀

%$55$662 └

:LWKRXW└ REMHFWLRQ◀

%22.(5 └

$QG└ WKH└ RQ└ -XQH└ ┬ !! ☼ └ ┴ !! ¶ ┴ ☼ └ WKH└ WHQ└ \HDU└ SKDVH└ LQ└ JRLQJ└ EDFN└ WR└ WKH└ 6XSUHPH└ &RXUW└ GHFLVLRQ☼ └ WKH└ DFWLRQV└ E\└ 2NODKRPD☼ └ WKH└ WHQ└ \HDU└ SKDVH└ LQ└ SHULRG└ ZDV└ FRPSOHWHG└ LQ└ IXOO└ FRPSOLDQFH└ ZLWK└ WKH└ ◀ !! ┬ → └ EHFDPH└ UHTXLUHG◀ └ ,W└ EHFDPH└ QRZ└ ZKDW└ ZDV└ UHTXLUHG└ E\└ ┼ ┼ └ E\└ WKH└ WWDWHV◀

6R└ MXWW└ WR└ UHFDS└ DOO└ RI└ WKLV└ EHFDXVH└ LWW└ D└ CRW☼ └ ┴ !! └ \HDUV☼ └ 2NODKRPDV└ (3$└ DSSURYHG└ D└ ◀ !! ┬ → └ SKRVSKRUXV└ WWDQGDUG☼ └ PRUH└ WKDQ└ WZR└ GHFDGHV└ LQ└ WKH└ PDNLQJ◀ └ ,W└ KDV└ MXWW└ EHHQ└ UHDIILUPHG└ E\└ WKH└ 2NODKRPD└ :DWHU└ 5HVRXUFHV└ %RDUG☼ └ DQG└ WKHQ└ WKH└ WHQ└ \HDU└ FRPSOLDQFH└ SHULRG└ SKDVH└ LQ└ KDG└ H[SLUHG◀

$QG└ VR└ ZKHQ└ \RX└ VDLG└ WKDW└ \RX└ KDG└ HQWHUHG└ LQWR└ D└ VHFRQG└ DJUHHPHQW└ ZLWK└ $UNDQVDV└ WKDW└ LQ└ \RXU└ ZRUGV☼ └ | :DV└ D└ KLWWRULF└ DJUHHPHQW└ WR└ FOHDQ└ XS└ /KH└ ULYHU☼ └ WKDW└ ZRXOG└ UHGXFH└ SRODXWLRQ└ IURP└ SRXOWU\└ JURZHUV◀ |

$QG└ WKLV└ LV└ WKH└ TXHVWLRQ└ WKDW└ ,└ KDYH└ VLQFHUHO\☼ └ ,└ SXOOHG└ WKDW└ ┴ !! !! !! └ DJUHHPHQW└ DQG└ UHDG└ LW└ ┼ ┼ └ H[FXVH└ PH└ ┼ ┼ └ WKH└ ┴ !! ¶ ┬ └ DJUHHPHQW└ DQG└ UHDG└ LW└ DQG└ LW└ ZDV└ WXQQLQJ└ WR└ VHH└ WKDW└ LW└ DFWXDOO\└ GLGQW└ WDNH└ DQ\└ WWHSV└ WR└ UHGXFH└ SRODXWLRQ└ EXW└ DFWXDOO\└ RQO\└ SURSRVHV└ DQRWKHU└ XQGHFHWVDU\└ WXG\└ DQG└ DWWHPPW└ WR└ VXVSHQG└ FRPSOLDQFH└ WKDW└ ZDV└ WZR└ GHFDGHV└ LQ└ WKH└ PDNLQJ└ ZLWK└ WKH└ ◀ !! ┬ → └ WWDQGDUG◀

,W└ VXVSHQGHG└ FRPSOLDQFH└ IRU└ \HW└ DQRWKHU└ WKUHH└ \HDUV└ RI└ SRODXWLRQ◀ └ ,VQW└ /KDW└ WUXH└ WKDW☼ └ WKDWW└ ZKDW└ WKH└ DJUHHPHQW└ GLG"

358,77 └

,W└ LVQW☼ └ 6HQDWRU◀ └ 7KHUH└ ZDV└ DFWXDOO\└ QR└ HQIRUFHPHQW└ RI└ WKH└ ◀ !! ┬ → └ WWDQGDUG└ /DNLQJ└ SODFH└ RQ└ $UNDQVDW└ VLGH└ RI└ WKH└ ERUGHU◀ └ 7KH└ UHDVRQ└ ┼ ┼ └ \RX└ UHIHU└ WR└ /KH└ PHRUDQGXP└ RI└ XQGHUWDQGLQJ◀ └ ,└ DFWXDOO\└ KDYH└ D└ VHFRQG└ WWDWHPHQW└ RI└ SULQFLSOHV└ KHUH└ EHIRUH└ PH☼ └ DV└ ZHOO◀

7KDW└ H[SLUHG└ LQ└ ┴ !! ¶ ┴ ☼ └ ¶ ┬ └ WLPH└ IUDPH└ DQG└ WKDWW└ ZKDW└ SUHVHQWHG└ P\└ RIILFH└ ZLWK└ WKH└ RSSRUWXQLWW└ WR└ JR└ WR└ $UNDQVDV└ WR└ HQVXUH└ WKDW└ WKH└ ◀ !! ┬ → └ WWDQGDUG└ ZRXOG└ DFWXDOO\└ EH└ HQIRUFHG└ IURP└ D└ WWDWH└ CDZ└ SHUVSHFWLYH└ RQ└ WKDW└ VLGH└ RI└ /KH└ ERUGHU◀

7KDW└ KDG└ GHYHU└ WDNHQ└ SODFH└ LQ└ KLWWRU\◀ └ <RX└ PHQWLRQHG└ WKH└ (3$◀ └ 7KHUH└ ZDV└ QR└ HQIRUFHPHQW└ DXWKRULWW└ WKDW└ KDG└ WDNHQ└ SODFH└ RQ└ WKDW└ SKRVSKRUXV└ CHYHO└ E\└ WKH└ (3$◀ └ 2NODKRPD└ KDG└ LW└ DV└ \RX└ ┼ ┼ └ DV└ \RXYH└ LQGLFDWHG└ DV└ D└ WWDQGDUG└ EXW└ LW└ ZDV└ QRW└ EHLQJ└ HQIRUFHG└ XSWWUHDP└ LQ└ $UNDQVDV└ DQG└ WKDWW└ ZKDW└ WKH└ DJUHHPHQW└ DGGUHWWHV◀

%22.(5 └

0U◀ └ 3UXLWW└ └ VR└ , └ GRQW└ KDYH└ WKH└ VHQLRULWW└ RU└ WKH└ WDWXUH└ RU└ WKH└ JUDQGFKLOGUHQ└ RI└ 6HQDWRU└ ,QKRIH└ └ VR└ , └ FDQW└ JR└ RYHU└ P└ WLPH◀ └ %XW└ , └ ZLOO└ WD└ WKLV└ └ LQ└ P└ QH[W└ URXQG└ └ , └ ZLOO└ JR└ EDFN└ LQWR└ WKLV└ EHFDXVH└ WKH└ GRFXPHQW└ GRQW└ VHHP└ FRQVLWWHQW└ DW└ DOO└ ZLWK└ ZKDW└ WRX└ VD└LQJ└ DQG└ ,G└ OLNH└ LQ└ P└ QH[W└ URXQG└ RI└ TXHXWLRQLQJ└ WR└ JR└ LQWR└ D└ OLWWOH└ ELW└ GHHSHU└ LQWR└ WKLV└ KLWWRULF└ WHWWOHPHQW◀ └ 7KDQN└ WRX└ 0U◀ └ &KDLU◀

%$55$662 └

7KDQN└ WRX└ 6HQDWRU└ %RRNHU◀ └ , └ ZRXOG└ LQWURGXFH└ IRU└ WKH└ UHFRUG└ DQ└ DUWLFOH└ WKDW└ DSSHDUHG└ LQ└ WKH└ 7XOVD└ :RUOG└ └WKLV└ SDWW└ -DQXDU└ └ ¶ ⊥ ⌠ └ ⊥ ‼ ¶ → ⌠ └ JRLQJ└ ZD└ EH└RQG└WKH└ ⊥ ‼ └ WHDU└ RI└WKDW└ SDQHO└ EXW└ RI└WKH└ VOLGH◀

%XW└ ┬ ┬ └ WHDU└ └ DQG└ LWW└ E└ (G└)LWH└ ZKR└ VHUYHG└ DV└WKH└ DJHQF└ DGPLQLWWUDWRU└ RI└WKH└ 2NODKRPD└ 6FHQLF└ 5LYHUV└ &RPPLWWLRQ└ IURP└ 6HSWHPEHU└ ¶ ← ┬ └ XQWLO└ -XQH└ ⊥ ‼ ¶ ├ ⌠ └ ┬ ┬ └ WHDU◀ └ $QG└ KLV└ WWDWHPHQW└ LQ└WKLV└ RS├ HG└WKDW└ KH└ ZURWH└ LV└ | , └ KDYH└ IRXQG└WKDW└ 3UXLWW└ KDV└ DOZD└V└ GRQH└ ULJKW└ E└ RXU└ VFHQLF└ ULYHUV◀

+H└ KDV└ IRU└WKH└ ILUWW└WLPH└ HYHU└ KH└ KDV└ JRWWHQ└WKH└ WDWH└ RI└ $UNDQVDV└ ZKLFK└ KDSSHQV└WR└ KDYH└ SDUW└ RI└WKH└ WWUHDPV└ ZHYH└ GHVLJQDWHG└ DV└ VFHQLF└ ULYHUV└ RULJLQDWLQJ└ LQ└ DQG└ ICRZLQJ└WKURXJK└WKHLU└ WWDWH└WR└ DJUHH└WR└ 2NODKRPDV└ 6FHQLF└ 5LYHUV└ 3KRVSKRUXV└ 6WDQGDUG└ DQ└ LQFUHGLEOH└ HQYLURQPHQWDO└ DFFRPSOLVKPHQW└ └WKH└ HI IHFW└ RI└ ZKLFK└ FDQQRW└ EH└ XQGHUWWDWHG◀ | └ 6HQDWRU└ 5RXQGV"

5281'6 └

7KDQN└ WRX└ 0U◀ └ &KDLUPDQ◀ └ $WWRUQH└ *HQHUDO└ 3UXLWW└ └ LQ└ $XJXWW└ RI└ ⊥ ‼ ¶ ├ ⌠ └ WKH└ (3$└ ,QVSHFWRU└ *HQHUDO└ IRXQG└WKDW└WKH└ (3$└ KDG└ IDLHG└WR└ IROORZ└ WKURXJK└ ZLWK└ LWW└ FRPPLWPHQW└WR└ XSGDWH└ LWW└ ⊥ ‼ ¶ ‼ └ /LIHF└FH└ $QDO└VLV└ IRU└ FRUQ└ HWKDQRO└ DQG└ KDV└ DOWR└ IDLHG└WR└ SHUIRUP└ LWW└ CHJDOO└ UHTXLUHG└ FRPSUHKHQVLYH└ WWXG└ RQ└WKH└ HQYLURQPHQWDO└ HI IHFWW└ RI└WKH└ 5)6⌠ └WKH└ 5HQHZDEOH└)XHO└ WDQGDUG◀ └ (3$V└ LQIRUPDWLRQ└ RQ└ HWKDQROV└ OLIH└ F└FH└ HPLWWLRQV└ LV└ LQDFFXUDWH└ DQG└ LWW└ RXWGDWHG◀

7RGD\V└ EHXW└ DYDLODEOH└ VFLHQFH└ VKRZV└ WKDW└ EOHQGLQJ└ HWKDQRO└ LQWR└
JDVROLQH└ FDQ└ VLJQLILFDQWO\└ UHGXFH└ JUHHQKRXVH└ JDVHV◀ └ +RZHYHU└ └ WKH└ (3$└
KDV└ IDLOHG└ WR└ XSGDWH└ LWW└ RZQ└ VFLHQFH└ ZLWK└ PRXW└ UHFHQW└ EHXW└ VFLHQFH└ WKDW└
LV└ DYDLODEOH└ DQG└ FRQWLQXHV└ WR└ UHO\└ RQ└ RXWGDWHG└ └ LQDFFXUDWH└ VFLHQFH└ ZKHQ└
VHWWLQJ└ QDWLRQDO└ SROLF\└ UHJXODWRU\└ ELRIXHDV└ SROLF\◀

:KDW└ DUH└ \RXU└ WKRXJKWW└ RQ└ WKH└ (3$└ UHO\LQJ└ RQ└ RXWGDWHG└ └ LQDFFXUDWH└
VFLHQFH└ WR└ VHW└ IHGHUDO└ UHJXODWRU\└ SROLF\"

358,77 └
6HQDWRU└ └ ,└ WKLQN└ LWW└ WKH└ REOLJDWLRQ└ RI└ WKH└ (3$└ LQ└ WDNLQJ└ WWHSV└ └ UXCHPDNLQJ└
DQG└ RWKHUZLVH└ └ WR└ HQVXUH└ WKDW└ LW└ KDV└ WKH└ PRXW└ XS┤ WR┤ GDWH└ └ REMHFWLYH└
VFLHQWLILF└ GDWD└ SRWWLECH◀

5281'6 └
/HW└ PH└ IROORZ└ XS└ D└ OLWWOH└ ELW◀ └ 7KH└ FXUUHQW└ (3$└ SURFHW└ IRU└ FRQVLGHULQJ└ RI└
WKH└ VFLHQWLILF└ LQIRUPDWLRQ└ XQGHUSLQQLQJ└ PDWRU└ UHJXODWLRQV└ └ ,└ EHOLHYH└ └ LV└
IODZHG└ DQG└ LW└ XQEDODQFHG◀ └)RU└ H[DPSOH└ └ WKH└ 6FLHQWLILF└ $GYLVRU\└ %RDUG└ └
RU└ WKH└ 6$%└ LV└ WR└ SURYLGH└ VFLHQWLILF└ DGYLFH└ WR└ WKH└ (3$└ DGPLQLWWUDWRU└ DQG└
&RQJUHW└◀

?%XW└ WKHUH└ LV└ D└ VLJQLILFDQW└ ODFN└ RI└ JHRJUDSKLF└ GLYHUVLW└ LQ└ WDWH└ DQG└ ORFDO└
DQG└ WULEDO└ UHSUHVHQWDWLRQ└ RQ└ WKH└ 6$%◀ └ &DQ└ \RX└ H[SODLQ└ WR└ XV└ ZKDW└ \RXU└
YLHZV└ DUH└ RQ└ WKH└ DJHQF\└ VFLHQFH└ DQG└ ZKDW└ \RX└ HQYLVLRQ└ DV└ WKH└ UROH└ RI└
DJHQF\└ VFLHQFH└ DW└ WKH└ (3$"

358,77 └
6HQDWRU└ └ DV└ \RX└ DQG└ ,└ WDONHG└ DERXW└ LQ└ RXU└ PHHWLQJ└ └ ,└ WKLQN└ LWW└ LPSRUWDQW└
WR└ KDYH└ WKDW└ JHRJUDSKLFDO└ UHSUHVHQWDWLRQ└ EHWWHU└ UHSUHVHQWHG└ └ DQG└ ┤ ┤ └ DQG└
WKDW└ WKHUHV└ VRPH└ FRQIOLFW└ RI└ LQWHUHVW└ DSSOLFDWLRQ└ ZLWK└ WKH└ 6FLHQFH└
$GYLVRU\└ %RDUG└ WKDW└ QHHG└ WR└ EH└ DGGUHVVHG└ └ DV└ ZHOO◀

$QG└ DOVR└ └ LW└ WKH└ &HDQ└ $LU└ 6FLHQFH└ $GYLVRU\└ &RPPLWWHH└ └ ZKLFK└ LV└ D└
WWDQGLQJ└ FRPPLWWHH└ RI└ WKH└ 6FLHQFH└ $GYLVRU\└ %RDUG◀

5281'6 └

,YH└ JRW└ D└ FKDUW└ WKDW└ VKRZV└ WKH└ JHRJUDSKLF└ PDNHXS└ RI└ WKH└ ⊥ ‼ ¶ ↑ └
FKDUWHUHG└ 6$%◀ └ 2I└ WKH└ ↑ ┤ └ PHPEHUV☼ └ WKH└ PDVRULWW└ RI└ WKHP└ FRPH└ IURP└
(DWW└ RU└ :HWW└ &RDWW└ WDWHV◀ └ &DQ└ \RX└ JHW└ WKDW└ FKDUW└ IRU└ PH☼ └ SCHDVH"└ ,YH└
DOVR└ JRW└ D└ FKDUW└ WKDW└ VKRZV└ WKH└ QXPEHU└ RI└ WDWHV└ WKDW└ KDYH└ JRYHUQPHQW└
UHSUHVHQWDWLYHV└ RQ└ WKH└ 6$%◀

+RZ└ ZRXOG└ \RX└ EURDGHQ└ WKH└ JHRJUDSKLF└ VFRSH└ RI└ 6$%└ PHPEHUV└ WR└
PDNH└ FHUWDLQ└ WKDW└ WDWHV└ DQG└ YDULRXV└ JRYHUQPHQWDO└ HQWLWLHV└ DUH└
UHSUHVHQWHG"└ 7KH└ RQH└ RQ└ WKH└ CHIW└ VKRZV└ WKH└ EODFN└ GLYHUVLW\└ ZLWK└ UHJDUG└
/R└ WKH└ DFWXDO└ PHPEHUV└ RQ└ WKH└ ERDUG☼ └ DQG└ WKH└ RQH└ RQ└ WKH└ ULJKW└ DFWXDOO\└
VKRZV└ WKDW└ ZH└ KDYH└ D└ JUDQG└ WRWDO└ RI└ WZR└ WDWHV└ ZLWK└ UHSUHVHQWDWLRQ└ IRU└
WDWH└ DQG└ CRFDO└ XQLW└ RI└ JRYHUQPHQW└ RQ└ WKRVH└ ERDUGV

358,77 └
6HQDWRU☼ └ LI└ FRQILUPHG☼ └ LW└ LV└ DQ└ LWXH☼ └ DV└ ,YH└ LQGLFDWHG☼ └ DQG└ ZH└ WDONHG└
DERXW└ LQ└ \RXU└ RIILFH☼ └ WKDW└ LV└ LPSRUWDQW└ WR└ DGGUHW└ WR└ HQXUH└ WKDW└ WKHUH└
FRQILGHQFH└ WKDW☼ └ DV└ VFLHQFH└ LV└ GULYLQJ└ UXCHPDNLQJ└ WKDW└ LW└ REMHFWLYH└ DQG└
/KDW└ LW└ WHWKHUHG└ WR└ WKH└ UXCHW└ WKDW└ DUH└ DGRSWHG└ E\└ WKH└ (3$◀

6R└ WKLV└ LV└ D└ YHU\└ LPSRUWDQW└ LWXH└ WKDW└ QHHGV└ WR└ EH└ HYDOXDWHG└ DQG└
GLVFXWHG└ DQG└ WR└ HQXUH└ WKH└ HIILFDF\└ RI└ WKH└ VFLHQFH└ WKDW└ RFFXUV└ DW└ WKH└
(3$◀

5281'6 └
:RXOG└ \RX└ FRPPLW└ WR└ XV└ WKDW└ \RX└ ZRXOG└ PDNH└ LW└ DQ└ HIIRUW└ WR└ VHH└ WKDW└ WKH└
6FLHQFH└ $GYLVRU\└ %RDUG└ DFWXDOO\└ UHICHFW└ VRPH└ IDLUQHW└ ZLWK└ UHJDUG└ WR└
JHRJUDSKLF└ GLYHUVLW\☼ └ DV└ ZHOO└ DV└ UHFRJQL]LQJ└ WKH└ LPSRUWDQW└ URCH└ WKDW└ CRFDO└
DQG└ UHJLRQDO└ JRYHUQPHQW☼ └ WDWH└ DQG└ CRFDO└ JRYHUQPHQW└ KDYH└ LQ└
GHWHUPLQLQJ└ RU└ DW└ CHDW└ SDWWLFLSDWLQJ└ LQ└ WKHVH└ ERDUGV└ DQG└ FRPPLWWLRQW"

358,77 └
,I└ FRQILUPHG☼ └ ,└ CRRN└ IRUZDUG└ WR└ ZRUNLQJ└ ZLWK└ \RX└ RQ└ WKDW└ LWXH◀

5281'6 └
7KDQN└ \RX◀ └ /HW└ PH└ MXW└ ILQLVK└ UHDO└ TXLFND\└ ZLWK└ MXW└ RQH└ RWKHU└ LWHP☼ └ DQG└ ,└
┤ ┤ └ ,└ EHOLHYH└ OLWHQHG└ D└ CRW└ WR└ DQG└ ,└ ┤ ┤ └ ZKHWKHU└ \RXH└ ZRUNLQJ└ RQ└ EHKDOI└ RI└
LQGXWUHV☼ └ ZKHWKHU└ \RXH└ ZRUNLQJ└ RQ└ EHKDOI└ RI└ WKH└ IRONV└ IUP└ 2NODKRPD☼ └
\RXU└ URCH└ DV└ DQ└ DGPLQLWUDWRU└ ZLWK└ UHJDUG└ WR└ FCHDQ└ DLU☼ └ ZDWHU└ DQG└ VR└ IRUWK◀

$V└ WKH└ DWWRUQH\└ JHQHUDO└ └ \RX└ UHSUHVHQWHG└ WKH└ LQWHUHVWV└ RI└ \RXU└ WDWHV└ └ ERWK└ \RXU└ WDWHV└ HFRQRP\└ DQG└ \RXU└ WDWHV└ HQYLURQPHQW◀ └ %RW└ MXWW└ EHFDXVH└ \RX└ DUH└ SUR┼ HFRQRPLF└ GHYHORSPHQW└ DQG└ SUR┼ HFRQRPLF└ GHYHORSPHQW└ JURZWK└ GRHV└ QRW└ PHDQ└ WKDW└ \RX└ KDYH└ WR└ EH└ DQWL┼ HQYLURQPHQW◀

3UHVHUYLQJ└ WKH└ HQYLURQPHQW└ DQG└ SUHVHUYLQJ└ WKH└ HFRQRP\└ └ ,└ GRQW└ EHOLHYH└ DUH└ PXWXDOOO\└ H[FOXVLYH◀ └ ,└ GRQW└ WKLQN└ \RXYH└ JRW└ WR└ FKRRVH└ EHWZHHQ└ WKH└ /NZR◀ └ +RZ└ ZRXOG└ \RX└ EDODQFH└ HFRQRPLF└ JURZWK└ ZLWK└ PDNLQJ└ FHUWDLQ└ WKDW└ ZH└ KDYH└ FOHDQ└ DLU└ DQG└ FOHDQ└ ZDWHU"

358,77 └

,└ WKLQN└ SDUW└ RI└ LW└ LQKHUHQW└ LQ└ WKH└ WDWXWHV└ DQG└ WKH└ SURFHW└ WKDW└ WKH└ (3$└ LV└ VXSSRVHG└ WR└ FRQGXFW◀ └ ,└ NQRZ└ WKDW└ VRPHWLPHV└ UXCHPDNLQJ└ LV└ VHHQ└ DV└ VRPHWKLQJ└ WKDW└ GRW└ WHUULEO\└ LPSRUWDQW└ RU└ ┼ ┼ └ RU└ VRPHWKLQJ└ ODERULRXV◀

%XW└ WKH└ UHDVRQ└ UXCHPDNLQJ└ └ WKH└ UHDVRQ└ &RQJUHW└ KDV└ VDLG└ WKDW└ \RX└ WDNH└ ┼ ┼ └ \RX└ RI IHU└ GRWLFH└ RQ└ D└ SURSRVHG└ UXCH└ DQG└ \RX└ WDNH└ FRPPHQW└ └ LV└ LW└ QHHGHG└ WR└ PDNH└ VXUH└ DOO└ YRLFHV└ DUH└ KHDUG└ DQG└ WKDW└ WKHUH└ LV└ DQ└ LQIRUPHG└ GHFLVLRQ└ WKDW└ UHJXODWRUV└ DUH└ PDNLQJ└ EHIRUH└ WKH\└ IILQDOL]H└ UXCHV└ └ EHFDXVH└ RI└ WKH└ LPSDFW└ LW└ KDV└ RQ└ WKH└ HFRQRP\└ DQG└ RQ└ WKH└ HQYLURQPHQW└ LQ└ WKLV└ LQWDQFH◀

6R└ └ UXCHPDNLQJ└ LV└ VRPHWKLQJ└ WKDW└ ZH└ VKRXOG└ WDNH└ VHULRXVO\└ DQG└ WKDW└ ZH└ VKRXOG└ GR└ VR└ FRQVLWHQW└ ZLWK└ WKH└ IUDPHZRUN└ RXWOLQHG└ E\└ &RQJUHW└ VR└ /NDW└ DOO└ WKRVH└ YRLFHV└ DUH└ KHDUG└ WKDW└ \RXUH└ UHIHUULQJ└ WR└ └ 6HQDWRU└ └ LQ└ ┼ ┼ └ LQ└ /NH└ UXCHPDNLQJ└ SURFHW◀

5281'6 └

7KDQN└ \RX◀ └ 7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

%$55$662 └

7KDQN└ \RX└ YHU\└ PXFK└ └ 6HQDWRU└ 5RXQGV◀ └ 6HQDWRU└ 0DUNH\"

0$5.(< └

7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW└ └ HDUOLHU└ WRGD\└ \RX└ VDLG└ WKDW└ WKH└ (3$└ KDV└ DQ└ LPSRUWDQW└ URCH└ LQ└ UHJXODWLQJ└ FDUERQ└ GLR[LGH└ EHFDXVH└ RI└ WKH└ ┴ ‼ ‼ → └ ODQGPDUN└ 6XSUHPH└ &RXUW└ UXOLQJ└ LQ└ 0DVVDFKXVHWWV└ Y◀ └ (3$◀

7KH└ (3$└ DGPLQLWWUDWRUV└ IRU└ ERWK└ 3UHVLGHQW└ %XVK└ DQG└ 3UHVLGHQW└ 2EDPD└
PDGH└ D└ GHFLVLRQ└ WKDW└ FDUERQ└ SROOXWLRQ└ SRVHV└ D└ GDQJHU└ WR└ $PHULFD☼ └
RWKHUZLVH└ NQRZQ└ DV└ WKH└ (QGDQJHUPHQW└)LQGLQJ◀ └ :LOO└ \RX└ SURPLVH└ WR└
NHHS└ RQ└ WKH└ ERRNV└ WKH└ VFLHQWLILF└ ILQGLQJ└ WKDW└ FDUERQ└ SROOXWLRQ└ SRVHV└ D└
GDQJHU└ WR└ WKH└ $PHULFDQ└ SXEOLF└ KHDOWK└ DQG└ ZHOIDUH"

358,77 └
7ZR└ WKLQJV☼ └ 6HQDWRU◀ └)LUWW☼ └ ZLWK└ UHVSHFW└ WR└ 0DVV◀ └ Y◀ └ WKH└ (3$☼ └ WKH└
6XSUHPH└ &RXUW└ VDLG└ WR└ WKH└ (3$└ WKDW└ WKH\└ KDG└ WR└ PDNH└ D└ GHFLVLRQ└ ┼ ┼

0$5.(< └
7KDWV└ ULJKW◀

358,77 └
◀ ◀ ◀ └ WR└ GHWHUPLQH└ ZKHWKHU└ &2┴ └ SRVHG└ D└ ULVN◀ └ $QG☼ └ DV└ \RX└ LQGLFDWHG☼ └ LQ└
┴ ‼ ‼ └ WKH\└ GLG└ VR◀ └ 7KDW└ LV└ WKH└ ODZ└ RI└ WKH└ ODQG☼ └ WKRVH└ WZR└ FDVHV◀ └ 7KHUHV└
DQ└ REOLJDWLRQ└ RI└ WKH└ (3$└ DGPLQLWWUDWRU└ WR└ GR└ KLV└ RU└ KHU└ MRE└ LQ└ IXOILOOLQJ└
0DVV◀ └ Y◀ └ (3$└ LQ└ WKDW└ (QGDQJHUPHQW└)LQGLQJ└ IURP└ ┴ ‼ ‼ ◀

0$5.(< └
6R└ \RX└ ZLOO└ NHHS└ WKDW└ VFLHQWLILF└ ILQGLQJ└ RQ└ WKH└ ERRNV"

358,77 └
7KH└ (QGDQJHUPHQW└)LQGLQJ└ LV└ WKHUH└ DQG└ QHHGV└ WR└ EH└ HQIRUFHG└ DQG└
UHVSHFWHG◀

0$5.(< └
2.◀ └ $QG└ \RX└ ZLOO└ QRW└ UHYLHZ└ WKDW└ VFLHQWLILF└ ILQGLQJ"

358,77 └
7KHUHV└ QRWKLQJ└ WKDW└ ,└ NQRZ└ WKDW└ ZRXOG└ FDXVH└ D└ UHYLHZ└ DW└ WKLV└ SRLQW◀

0$5.(< └

7KDW└ YHU\└ JRRG◀ └ 0DVVDFKXVHWWV└ Y◀ └ (3$└ PDGH└ LW└ SRVVLEOH└ IRU└ WDWHV└ OLNH└ &DOLIRUQLD└ DQG└ 0DVVDFKXVHWWV└ WR└ VHW└ KLJKHU└ WDQGDUGV└ IRU└ WKH└ IXHO└ HFRQRP\└ RI└ YHKLFOHV└ XVLQJ└ WKHLU└ DXWKRULWY└ XQGHU└ WKH└ &OHDQ└ $LU└ $FW◀ └ 7KLV└ LV└ D└ SRZHUIXO└ WRRO└ IRU└ WDWHV└ WR└ UHGXFH└ HPLVVLRQV└ DQG└ DGGUHVV└ JORREDO└ ZDUPLQJ◀

$V└ D└ GLUHFW└ UHVXOW└ RI└ WKH└ &OHDQ└ $LU└ $FW└ DXWKRULWY└ FRPELQHG└ ZLWK└ P\└ ⊥ ‼ ‼ → └)XHO└ (FRQRP\└ /DZ☼ └ WKH└ 2EDPD└ $GPLQLWWUDWLRQ└ UHDFKHG└ DQ└ KLWWRULF└ DJUHHPHQW└ ZLWK└ WKH└ DXWR└ LQGXWWU\└ VXSSRUW└ WR└ LQFUHDVH└ IXHO└ HFRQRP\└ WDQGDUGV└ WR└ ↑ ┤ ◀ ↑ └ PLOHV└ SHU└ JDOORQ└ E\└ ⊥ ‼ ⊥ ↑ ◀

7KRVH└ WDQGDUGV└ DUH└ SURVHFWHG└ WR└ UHGXFH└ RXU└ GHSHQGHQFH└ RQ└ IRUHLJQ└ RLO└ E\└ PRUH└ WKDQ└ ⊥ └ PLOOLRQ└ EDUUHOV└ D└ GD\☼ └ SUHYHQW└ ├ └ ELOOLRQ└ WRQV└ RI└ FDUERQ└ SRONXWLRQ☼ └ DQG└ VDYH└ FRQVXPHUV└ PRUH└ WKDQ└ • ¶ ◀ → └ WWLOOLRQ└ DW└ WKH└ JDV└ SXPS└ EHFDXVH└ WKHLU└ FDUV└ ZLOO└ EH└ VR└ PXFK└ PRUH└ HI ILFLHQW◀

7KRVH└ WDQGDUGV└ DUH└ DOVR└ XQGHDVKLQJ└ D└ 7HVOD└ UHYROXWLRQ☼ └ FHDQ└ HQHUJ\└ YHKLFOHV└ DOO└ DFURVV└ WKH└ FRXQWU\◀ └ 7HQ└ WKRXVDQG└ SHRSOH└ DUH└ JRLQJ└ WR└ EH└ HPSOR\HG☼ └ IRU└ H[DPSOH☼ └ LQ└ 1HYDGD☼ └ LQ└ WKLV└ WHFKQRORJ\└ DUHD◀

<RXYH└ VDLG└ WKDW└ \RX└ ZDQW└ WDWHV└ WR└ SOD\└ D└ ODUJHU└ UROH└ LQ└ HQYLURQPHQWDO└ UHJXODWLRQ◀ └ ,Q└ \RXU└ ⊥ ‼ ¶ ↑ └ WHWWLPRQ\└ EHIRUH└ WKH└ +RXVH└ 6FLHQFH└ &RPPLWWHH☼ └ \RX└ ZURWH└ TXRWH☼ └ | 7KH└ (3$└ ZDV└ QHYHU└ LQWHQGHG└ WR└ EH└ RXU└ QDWLRQ└ IURQWOLQH└ HQYLURQPHQWDO└ UHJXODWRU◀ └ 7KH└ WDWHV└ ZHUH└ WR└ KDYH└ UHJXODWRU\└ SULPDF\◀ |

?&XW└ HDUOLHU└ WRGD\☼ └ \RX└ ZRXOGQW└ FRPPLW└ WR└ PDLQWDLQLQJ└ &DOLIRUQLD└ DQG└ 0DVVDFKXVHWWV└ DQG└ R\KHU└ WDWHV└ DELOLW\└ WR└ EH└ UHJXODWRU\└ ♂ VLF□ └ SULPDF\└ DV└ /KH└ CHDGHUV└ RI└ WKH└ HI IRUW└ WR└ SURWHFW└ WKHLU└ RZQ└ WDWHV└ WR└ GR└ ZKDW└ LV└ EHWW└ IRU└ JORREDO└ ZDUPLQJ└ LQ└ WKHLU└ RZQ└ WDWHV◀

6R└ ,P└ JRLQJ└ WR└ DVN└ \RX└ DJDLQ◀ └ :LOO└ \RX└ VXSSRUW└ WKH└ WDWWWRU\└ ULJKW└ RI└ WDWHV└ WR└ GR└ PRUH└ WR└ UHGXFH└ GHSHQGHQFH└ RQ└ IRUHLJQ└ RLO☼ └ UHGXFH└ JORREDO└ ZDUPLQJ└ SRONXWLRQ☼ └ VDYH└ PRQH└ DW└ WKH└ JDV└ SXPSV☼ └ DQG└ FUHDWH└ WHQV└ RI└ /KRXVDQGV☼ └ KXQGUHGV└ RI└ WKRXVDQGV└ RI└ MREV└ LQ└ WKH└ FHDQ└ FDU└ MRE└ EXVLQHW"

358,77 └

,└ WKLQN└ └ 6HQDWRU└ └ JHQHUDOO\└ WKH└ DQVZHU└ WR└ WKDW└ ZRXOG└ EH└ \HV◀ └ %XW└ └ LQ└ DSSOLFDWLRQ└ ZLWK└ WKH└ &DOLIRUQLD└ ZDLYHU└ WKDW└ ZDV└ GLVFXVVHG└ HDUOLHU└ └ WKDW└ DQ└ DGMXGLFDWRU└ SURFHVV└ WKDW└ ,└ FDQW└ SUHMXGJH└ ZKDW└ ZRXOG└ RFFXU└ WKHUH◀ └ $V└ \RX└ NQRZ└ └ SUHYLRXV└ DGPLQLWWUDWRUV└ KDYH└ HLWKHU└ JUDQWHG└ RU└ GHQLHG└ WKDW└ EDVHG└ XSRQ└ D└ UHFRUG└ WKDW└ ZDV└ PDGH◀

,└ GR└ UHVSHFW└ DQG└ GR└ EHOLHYH└ WKDW└ WXDWHV└ KDYH└ D└ YHU\└ LPSRUWDQW└ URCH◀ └ :HYH└ DFNQRZCHGJHG└ WKDW└ RU└ ,YH└ DFNQRZCHGJHG└ WKDW└ WRGD\└ ZLWK└ UHVSHFW└ /R└ WKH└ &KHVDSHDNH└ %D\└ VLWXDWLRQ└ └ DV└ DQ└ H[DPSCH◀ └ $QG└ VR└ └ ,└ ZLOO└ CRRN└ DW└ /KDW└ LWXH└ OLNH└ R/KHUV└ └ WR└ PDNH└ VXUH└ WKDW└ LW└ UHVSHFWHG└ EXW└ DOVR└ LV└ FRQVLWWHQW└ ZLWK└ WKH└ WXDWXWRU\└ IUDPHZRUN└ WKDW└ \RXYH└ RXWOLCHG◀

0$5.(< └
'R└ \RX└ VXSSRUW└ WKH└ CDZ└ WKDW└ VD\V└ WKDW└ &DOLIRUQLD└ KDV└ D└ ULJKW└ WR└ DVN└ IRU└ D└ ZDLYHU"

358,77 └
,W└ WXDWXWRU\└ DQG└ VRPHWKLQJ└ WKH└ DGPLQLWWUDWRU└ KDV└ DQ└ REOLJDWLRQ└ WR└ GR◀ └ 6R└ └ \HV└ └ ,└ GR└ UHVSHFW└ LW◀

0$5.(< └
'R└ \RX└ VXSSRUW└ WKH└ FXUUHQW└ &DOLIRUQLD└ ZDLYHU└ IRU└ JUHHQKRXVH└ JDV└ WXDQGDUGV"

358,77 └
6HQDWRU└ └ WKDW└ ZKDW└ ZRXOG└ EH└ HYDOXDWHG└ DQG└ ,└ WKLQN└ LW└ YHU\└ GLIILFXOW└ DQG└ ZH└ VKRXOGQW└ SUHMXGJH└ WKH└ RXWFRPH└ LQ└ WKDW└ UHJDUG└ LI└ FRQILUPHG└ DV└ DGPLQLWWUDWRU◀

0$5.(< └
6R└ └ \RXUH└ TXHXWLRQLQJ└ WKH└ FXUUHQW└ ZDLYHU"└ <RX└ GRQW└ WKLQN└ WKH\UH└ HQWLWCHG└ WR└ WKH└ FXUUHQW└ ZDLYHU◀

358,77 └
:HOO└ └ WKH└ ZDLYHU└ LV└ VRPHWKLQJ└ WKDW└ JUDQWHG└ RQ└ DQ└ DQQXDO└ EDVLV└ DQG└ WKH└ DGPLQLWWUDWRU└ ZRXOG└ EH└ UHVSRQVLECH└ IRU└ PDNLQJ└ WKDW└ GHFLVLRQ◀

0$5.(< └
<HS◀ └ $QG└ VR└ └ \RX└ VD\└ \RXUH└ JRLQJ└ WR└ UHYLHZ└ LW'

358,77 └
<HV└ └ 6HQDWRU◀

0$5.(< └
<HDK◀ └ $QG└ ZKHQ└ \RX└ VD\└ UHYLHZ└ └ ,└ KHDU└ XQGR└ └ \RX└ NQRZ└ └ WKH└ ULJKW└ RI└
WKH└ WDWHV◀ └ $QG└ ,└ WKLQN└ WR└ D└ FHUWDLQ└ H[WHQW└ WKDW└ ┼┼ └ LW└ WURXEOHVRPH└ └
EHFDXVH└ REYLRXVO\└ ZKDW└ ZHYH└ KHDUG└ DOO└ GD\└ LV└ KRZ└ PXFK└ \RX└ VXSSRUW└
WWDWHV└ ULJKW└ ZKHQ└ LW└ FRPHV└ WR└ WKHVH└ LWXHV◀

┼&XW└ QRZ└ ZKHQ└ LW└ FRPHV└ WR└ WKH└ ULJKW└ RI└ &DOLIRUQLD└ RU└ 0DVDFKXVHWW└ DQG└
RWKHU└ WDWHV└ WR└ EH└ DECH└ WR└ UHGXFH└ FDUERQ└ SROOXWLRQ└ └ \RXUH└ VD\LQJ└ \RXUH└
JRLQJ└ WR└ UHYLHZ└ WKDW◀ └ 6R└ └ P\└ SURECHP└ UHDOO\└ JRHV└ WR└ WKLV└ GRXECH└ WWDQGDUG└
WKDW└ LV└ FUHDWHG└ WKDW└ ZKHQ└ \RX└ VXH└ IURP└ WKH└ 2NDKRPD└ SHUVSHFWLYH└ └ IURP└
WKH└ RLO└ DQG└ JDV└ LQGXWWU\└ SHUVSHFWLYH└ DQG└ \RX└ UHSUHVHQW└ 2NDKRPD└ └ \RX└
VD\└ WKH\└ KDYH└ D└ ULJKW└ WR└ GR└ ZKDW└ WKH\└ ZDQW└ WR└ GR└ LQ└ WKH└ WWDWH└ RI└
2NDKRPD◀

┼&XW└ ZKHQ└ LW└ FRPHV└ WR└ 0DVDFKXVHWW└ RU└ LW└ FRPHV└ WR└ &DOLIRUQLD└ DQG└ LW└
FRPHV└ WR└ WKH└ TXHXWLRQ└ RI└ WKRVH└ WWDWHV└ ZDQWLQJ└ WR└ LQFUHDVH└ WKHLU└
SURWHFWLRQ└ IRU└ WKH└ HQYLURQPHQW└ └ SURWHFW└ WKHLU└ ┼┼ └ WKHLU└ YLFWLPL]DWLRQ└ IURP└
FDUERQ└ SROOXWLRQ└ └ \RX└ VD\└ WKHUH└ └ \RXUH└ JRLQJ└ WR└ UHYLHZ◀

$QG└ ,└ WKLQN└ WKDW└ WKH└ KLWWRU\└ RI└ WKH└ DJHQF\└ LQ└ JUDQWLQJ└ UHYLHZV└ WKDW└ KDYH└
EHHQ└ QHFHVVDU\└ IRU└ 0DVDFKXVHWW└ └ IRU└ &DOLIRUQLD└ DQG└ RWKHU└ WWDWHV└ WR└
LPSURYH└ WKH└ HQYLURQPHQW└ └ DUH└ WWLOO└ YDOLG◀ └ 7KH└ VFLHQFH└ KDVQW└ FKDQJHG◀

7KH└ QHZ└ FOHDQ└ HQHUJ\└ WHFKQRORJLHV└ KDYH└ GRW└ FKDQJHG◀ └ 7KH└ GDQJHU└ WR└
WKH└ SXEOLF└ IURP└ HQYLURQPHQWDO└ H[SRVXUH└ WR└ FDUERQ└ SROOXWLRQ└ KDV└ GRW└
FKDQJHG◀ └ $QG└ VR└ IURP└ RXU└ SHUVSHFWLYH└ └ \RX└ NQRZ└ └ ZH└ ┼┼ └ ZH└ DUH└ IHDUIXO└ RI└
ZKDW└ D└ UHYLHZ└ ZRXOG└ DFWXDOO\└ UHVXOW└ LQ◀ └ $QG└ IURP└ P\└ SHUVSHFWLYH└ └ ,└ WKLQN└
LW└ JRLQJ└ WR└ CHDG└ WR└ \RX└ XQGRLQJ└ WKDW└ ┼┼

┼&$55$662 └
7KH└ 6HQDWRUV└ WLPH└ KDV└ H[SLUHG◀

0$5.(< └

┼ ┼ └ ULJKW└ RI└ WKH└ WDWHV└ WR└ EH└ DEOH└ WR└ SURYLGH└ WKDW└ SURWHFWLRQ◀

?$55$662 └

7KDQN└ \RX└ 6HQDWRU└ 0DUNH\◀ └ ,P└ JRLQJ└ WR└ LQWURGXFH└ IRU└ WKH└ UHFRUG└ D└ UHSRUW└ IURP└ WKH└ 1DWLRQDO└ (QHUJ\└ $VVLWDQW└ 'LUHFWRUV└ $VVRFLDWLRQ◀ └ 7KHVH└ DUH└ WKH└ WDWH└ RIILFLDOV└ ZKR└ RYHUVHH└ WKH└ ILQDQFLDO└ DVVLWDQFH└ SURJUDPV└ IRU└ SHRSOH└ WR└ KHDW└ WKHLU└ KRPHV◀

7KH└ UHSRUW└ VD\V└ WKDW└ ZKHQ└ HQHUJ\└ SULFHV└ JR└ XS└ └ WKH└ KLJKHU└ HQHUJ\└ SULFHV└ UHVXOW└ LQ└ ┴ ┤ └ SHUFHQW└ RI└ WKH└ UHFLSLHQW└ ZKR└ JR└ ZLWKRXW└ IRRG└ IRU└ DW└ CHDWW└ D└ GD\└ └ ┬ → └ SHUFHQW└ JR└ ZLWKRXW└ PHGLFDO└ RU└ GHQWDO└ FDUH└ └ ┬ ┤ └ SHUFHQW└ GLGQW└ ILOO└ D└ SUHVFULSWLRQ└ DQG└ ¶ └ SHUFHQW└ KDG└ VRPHRQH└ LQ└ WKHLU└ KRPH└ EHFRPH└ VLFN└ EHFDXVH└ WKH└ KRXVH└ ZDV└ FROG└ GXH└ WR└ LQFUHDVHG└ HQHUJ\└ FRWWW◀ └ 6HQDWRU└ (UQW'

(5167 └

7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ $JDLQ└ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ └ WKDQN└ \RX└ IRU└ EHLQJ└ KHUH└ WRGD\◀ └ ,└ ZRXOG└ OLNH└ WR└ JR└ EDFN└ WR└ VRPHWKLQJ└ WKDW└ D└ FROOHDJXH└ └ 6HQDWRU└ 'XFNZRUWK└ PHQWLRQHG└ HDUOLHU└ WRGD\└ DQG└ WKDWW└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ◀

7KH└ SURSRVDO└ WR└ FKDQJH└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ└ XQGHU└ WKH└ 5)6└ LV└ DQ└ H[DPSOH└ RI└ D└ UHJXODWRU\└ FKDQJH└ WKDW└ ZRXOG└ GHWDELOL]H└ WKH└ SROLF\└ HQYLURQPHQW└ LI└ DGRSWHG◀ └ $QG└ └ ZKDW└ LQWHUHWLQJ└ ZLWK└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ└ └ ZH└ KDYH└ WZR└ VLGHV└ WKDW└ QRUPDOO\└ RSSRVH└ HDFK└ RWKHU└ WKDW└ KDYH└ DFWXDOO\└ FRPH└ WRJHWKHU◀

6R└ └ ERWK└ ELRIXHO└ SURGXFHUV└ DQG└ WKH└ $PHULFDQ└ 3HWUROHXP└ ,QVWLWXWH└ RSSRVH└ ΛKLV└ FKDQJH└ └ ERWK└ JURXSV◀ └ $QG└ ,└ ZRXOG└ OLNH└ WR└ VXEPLW└ D└ CHWWHU└ IRU└ WKH└ UHFRUG└ VKRZLQJ└ WKH└ XQLWHG└ RSSRVLWLRQ└ WR└ PRYLQJ└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ◀ └ 0U◀ └ &KDLU└ └ LI└ ZH└ FRXOG└ KDYH└ WKDW└ HQWHUHG└ LQWR└ WKH└ UHFRUG◀

?$55$662 └

:LWKRXW└ REMHFWLRQ◀

(5167 └

$QG└ ,G└ OLNH└ WR└ UHYLVLW└ WKLV└ └ LI└ \RX└ FDQ└ └ \HV└ RU└ QR└ └ DV└ DGPLQLWWUDWRU└ └ ZLOO└

RSSRVH└ FKDQJHV└ WR└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ"

358,77 └

6HQDWRU└ DV└ \RX└ DQG└ ,└ LQGLFDWHG└ ┼ ┼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ PHWLQJ└ ZLWK└ \RX└ DQG└ ,└ WKLQN└ LQ└ UHVSRQVH└ WR└ 6HQDWRU└ 'XFNZRUWK└ HDUOLHU└ WKHUHV└ D└ FRPPRQ└ SHULRG└ LQ└ SURFHVV└ GRZ└ DW└ WKH└ (3$└ DERXW└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ◀ └ ,└ WKLQN└ SUHVXGJLQJ└ \RX└ NQRZ└ WKH└ RXWFRPH└ RI└ WKDW└ SURFHVV└ DW└ WKLV└ SRLQW└ LV└ XQZLVH◀

,└ FDQ└ VD\└ WR└ \RX└ DV└ ,└ VDLG└ WR└ \RX└ LQ└ WKH└ RIILFH└ DQ\└ WWHSV└ WKDW└ ,└ ZRXOG└ WDNH└ DV└ (3$└ DGPLQLWWUDWRU└ ZLWK└ UHVSHFW└ WR└ DQ\└ LWXHV└ DV└ IDU└ DV└ WKH└ 5,1└ SURJUDP└ WKH└ PRQLWRULQJ└ RI└ WKDW└ SURJUDP└ 3RLQW└ RI└ 2EOLJDWLRQ└ DOO└ WKHVH└ YDULRXV└ LWXHV└ WKDW└ ZH└ GLVFXW└ WKH└ MRE└ RI└ WKH└ (3$└ DGPLQLWWUDWRU└ LV└ WR└ PDNH└ VXUH└ WKDW└ WKH└ WDWXWH└ LV└ XSKHOG└ DQG└ HQIRUFHG└ DQG└ GRW└ XQGHUPLQHG◀

7KH└ YLWDOLW\└ RI└ WKH└ 5)6└ SURJUDP└ KDV└ EHHQ└ GHILQHG└ E\└ &RQJUHVV└ GDWLQJ└ EDFN└ WR└ ⊥ !! !! ↑ ◀ └ $Q\└ WWHSV└ WKDW└ WKH└ (3$└ DGPLQLWWUDWRU└ WDNHV└ GHHGV└ WR└ EH└ GRQH└ LQ└ VXFK└ D└ ZD\└ WR└ IXUWKHU└ WKH└ REMHFWLYHV└ RI└ &RQJUHVV└ LQ└ WKDW└ WDWXWH└ └ GRW└ XQGHUPLQH└ WKH└ REMHFWLYHV└ RI└ &RQJUHVV└ LQ└ WKDW└ WDWXWH◀

(5167 └

:HOO└ ,└ GR└ DSSUHFLDWH└ \RX└ EHLQJ└ REMHFWLYH└ DQG└ ,P└ VXUH└ WKDW└ 6HQDWRU└ 'XFNZRUWK└ DQG└ ,└ ZLOO└ CRRN└ IRUZDUG└ WR└ FRQWLQXLQJ└ WR└ HGXFDWH└ \RX└ RQ└ WKRVH└ LWXHV◀ └ 6R└ WKDQN└ \RX└ YHU\└ PXFK◀

,└ ZRXOG└ OLNH└ WR└ VKRZ└ D└ FKDUW└ RI└ WKH└ WDWH└ RI└ ,RZD└ DQG└ ,└ ZRXOG└ OLNH└ WR└ JR└ EDFN└ WR└ VRPH└ RI└ 6HQDWRU└ &DUGLQV└ FRPPHQW└ DERXW└ ZKR└ VKRXOG└ GHILQH└ ZKDW└ WKH└ H[SDQGHG└ GHILQLWLRQ└ RI└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ LV◀

6R└ WKLV└ LV└ D└ FKDUW└ RI└ WKH└ 6WDWH└ RI└ ,RZD└ DQG└ DV└ \RX└ FDQ└ VHH└ ZLWK└ WKH└ H[SDQGHG└ GHILQLWLRQ└ DV└ SURYLGHG└ E\└ WKH└ (3$└ → └ SHUFHQW└ RI└ WKH└ 6WDWH└ RI└ ,RZD└ LV└ QRZ└ FRQVLGHUHG└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ 6R└ LI└ \RX└ ZHUH└ LQ└ DQ└ DUHD└ OLNH└ PLGH└ 6RXWKZHWW└ ,RZD└ KHUH└ ULJKW└ GRZQ└ KHUH└ ,└ OLYH└ LQ└ D└ :DWHU└ RI└ WKH└ 8◀ 6◀ └ 0RWW└ RI└ WKH└ WDWH└ LV└ FRYHUHG└ E\└ WKH└ :DWHUV└ RI└ WKH└ 8◀ 6◀

$QG└ ,└ EULQJ└ WKDW└ XS└ EHFDXVH└ LQ└ D└ PRPHQW└ ,P└ JRLQJ└ WR└ VKRZ└ \RX└ DQRWKHU└ SLFWXUH└ RI└ WKH└ FRQVHTXHQFHV└ RI└ WKH└ (3$└ GHILQLQJ└ ZKDW└ D└ :DWHU└ RI└ WKH└ 8◀ 6◀ └ LV◀ └ /DWW└ &RQJUHVV└ WKLV└ FRPPLWWHH└ H[DPLQHG└ WKH└ VFRSH└ RI└ WKH└)HGHUDO└ &HDQ└ :DWHU└ $FW└ MXULVGLFWLRQ└ (3$└ DQG└ WKH└ &RUSV└ RI└ (QJLQHHUV└ FODLP└ WRGD\└ HYHQ└ ZLWKRXW└ WKH└ QHZ└ :2786└ UXCH◀

7KH└ FRPPLWWHH└ IRXQG└ WKDW└ (3$└ DQG└ WKH└ &RUSV└ DUH└ DOUHDG\└ H[SDQGLQJ└ /KHLU└ MXULVGLFWLRQ└ XVLQJ└ WKH└ FRQFHSW└ WKDW└ WKH\└ FRGLILHG└ LQ└ :2786☼└ WKH\└ DUH└ MXWW└ GRLQJ└ LW└ E\└ D└ FDVH╢ E\╢ FDVH└ EDVLV◀└ 7KH└ MXULVGLFWLRQDO└ FODLPV└ WKDW└ DUH└ DOUHDG\└ EHLQJ└ PDGH└ DUH└ YHU\└ WUXEOLQJ◀

)RU└ H[DPSOH☼└ WKH└ 2EDPD└ (3$└ WRQG└ WKH└ SXEOLF└ WKDW└ WKH\└ ZLOO└ QRW└ UHJXODWH└ SXGGOHV◀└ 7KH\└ ZLOO└ QRW└ UHJXODWH└ SXGGOHV◀└ +RZHYHU☼└ ZH└ CHDUQHG└ WKDW└ WKH└ &RUSV└ LV└ DOUHDG\└ UHJXODWLQJ└ SXGGOHV└ E\└ FODLPLQJ└ WKDW└ D└ SXGGOH└ LQ└ D└ JUDYHO└ SDUNLQJ└ QRW└ LV└ LQ└ TXRWHV☼└ | D└ GHJUDGHG└ ZHWODQG☼└ D└ GHJUDGHG└ ZHWODQG| ☼└ D└ GHJUDGHG└ ZHWODQG◀

7KH└ 2EDPD└ (3$└ DOVR└ WRQG└ IDUPHUV└ QRW└ WR└ ZRUU\└ DERXW└ EHLQJ└ UHJXODWHG└ EHFDXVH└ RUGLQDU\└ IDUPLQJ└ DFWLYLWLHV└ KDYH└ D└ WWDWXWRU\└ H[HPSWLRQ◀└ :H└ CHDUQHG└ WKDW└ WKH└ &RUSV└ RI└ (QJLQHHUV└ DQG└ WKH└ 'HSDUWPHQW└ RI└ -XWWLFH└ KDYH└ GHFLGHG└ WKDW└ SOZLQJ└ LV└ QRW└ DQ└ RUGLQDU\└ IDUPLQJ└ DFWLYLWW◀└ ([SODLQ└ WKDW└ WR└ P\└ GHDU└ GHFHDVHG└ JUDQGIDWKHU└ DQG└ P\└ IDWKHU☼└ ZKRV└ DFWLYLWLHV└ LQ└ IDUPLQJ└ LQFOXGH└ SOZLQJ◀

$FFRUGLQJ└ WR└ WKH└ 2EDPD└ DGPLQLWWUDWLRQ☼└ DQ\└ SOZLQJ└ WKDW└ SXVKHV└ VRLO└ LQWR└ IXUURZV└ LV└ QRW└ H[HPSW└ IDUPLQJ└ DFWLYLW\└ EHFDXVH└ WKH└ WRSV└ RI└ SOZHG└ IXUURZV└ FDQ└ GU\└ RXW◀└ $FFRUGLQJ└ WR└ D└ EULHI└ ILCHG└ E\└ WKH└ 8QLWHG└ 6WDWHV└ LQ└ TXRWHV☼└ | 7KH└ IXUURZ└ WRSV└ QRZ└ VHUYH└ DV└ VPDOO└ PRXQWDLQ└ UDQJHV◀ |

5LJKW└ WKHUH└ IRONV☼└ | VPDOO└ PRXQWDLQ└ UDQJHV◀ | └ | 7KHVH└ IXUURZ└ WRSV└ QRZ└ SURYLGH└ FRQGLWLRQV└ WKDW└ DUH└ QRW└ FRQGXFLYH└ WR└ JURZWK└ DQG└ GHYHORSPHQW└ RI└ ZHWODQG└ SODQW└ VSHFLHV◀└ 7KH\└ DUH└ PDQ\└ XSODQGV☼| └ HQG└ TXRWH◀

7KLV└ LV└ D└ SLRWXUH└ RI└ WKHVH└ VPDOO└ PRXQWDLQ└ UDQJHV└ IURP└ WKH└ JRYHUQPHQW└ H[SHUW└ UHSRUW◀└ 0U◀└ 3UXLWW☼└ ZLOO└ \RX└ FRPPLW└ WR└ PH└ WKDW└ LI└ FRQILUPHG☼└ (3$└ ZLOO└ ZRUN└ ZLWK└ WKH└ &RUSV└ DQG└ '2-└ WR└ PDNH└ VXUH└ WKDW└ IHGHUDO└ DJHQFLHV└ \WWRS└ WU\LQJ└ WR└ UHJXODWH└ RUGLQDU\└ IDUPLQJ└ SUDFWLFHV◀

358,77 └
<HV☼└ 6HQDWRU◀

(5167 └
7KDQN└ \RX└ IRU└ WKDW└ YHU\└ FRQFLVH└ DQVZHU◀└ 7KDQN└ \RX☼└ 0U◀└ &KDLU◀

%&55&662 └

7KDQN└ \RX☼ └ 6HQDWRU└ (UQXW◀ └ 6HQDWRU└ 'XFNZRUWK"

'8&.:257+ └
7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW☼ └ ,└ MXWW└ ZDQW└ WR└ ◀ ◀ ◀

358,77 └
<HV☼ └ 6HQDWRU◀

'8&.:257+ └
,└ ZDQW└ WR└ FRPH└ EDFN└ WR└ WKLV└ TXHVWLRQ└ DJDLQ◀ └ $QG└ CHW└ PH└ MXWW└ WHOO└ \RX☼ └ ,└ SOD\HG└ VHFRQG└ EDVH☼ └ DV└ ZHOO◀ └ 7KLV└ LV☼ └ \RX└ NQRZ☼ └ WKLV└ LV└ D└ KDQJLQJ└ FXUYH└ EDOO◀ └ <RX└ FDQ└ NQRFN└ WKLV└ RXW└ RI└ D└ SDUN└ ZLWK└ D└ \HV☼ └ DOO└ ULJKW"

:LOO└ \RX└ FRPPLW☼ └ \HV└ RU└ QR☼ └ WR└ UHYHUVLQJ└ WKH└ (3$V└ FXUUHQW└ LQWHUSUHWDWLRQ└ WKDW└ DYDLODEHH└ LQIUDWXUXFWXUH└ VKRXOG└ OLPLW└ WKH└ UHTXLUHPHQW└ WR└ EHQG└ ELRIXHDV└ LQWR└ RXU└ IXHO└ VXSSO\└ JLYHQ└ WKDW└ LW└ UXQV└ FRXQWHU└ WR└ FRQJUHVVLRQDO└ LQWHQW"

358,77 └
,└ ZLOO└ QRW└ WDNH└ DQ\└ WWHSV└ WR└ XQGHUPLQH└ WKH└ REMHFWLYHV└ DQG└ WKH└ WDXWXWH└ RI└ WKH└ 5)6└ DV└ DGPLQLWWUDWRU☼ └ DV└ (3$◀

'8&.:257+ └
6R☼ └ DUH└ \RX└ FRPPLWWLQJ└ ┼ ┼ └ ZLOO└ \RX└ FRPPLW└ WR└ RSSRVLQJ└ DQ\└ DWWHPSWW└ WR└ PRYH└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ└ IURP└ WKH└ IDUPHU☼ └ WKH└ VR\EHDQ└ SURGXFHUV☼ └ WKH└ FRUQ└ SURGXFHUV☼ └ DQG└ ELRIXHO└ PDQXIDFWXUHUV☼ └ DZD\└ IURP└ WKHP└ DQG└ WRZDUGV└ WKH└ ECHQGHUV☼ └ EHFDXVH└ WKDW└ ZRXOG└ EH└ FRXQWHU└ WR└ FRQJUHVVLRQDO└ LQWHQW"

358,77 └
6HQDWRU☼ └ WKDW└ LV└ VRPHWKLQJ└ DV└ ,YH└ LQGLFDWHG◀ └ 7KHUH└ LV└ DQ└ RSHQ└ FRPPHQW└ SHULRG└ RQ└ WKDW└ YHU\└ LWXH◀ └ $QG☼ └ LI└ FRQILUPHG☼ └ ,└ ZRXOG└ EH└ GHDOLQJ└ ZLWK└ WKDW└ LWXH└ DQG└ QHHG└ WR└ UHVSRQG└ WR└ WKH└ FRPPHQW└ WKDW└ KDYH└ EHHQ└ PDGH└ DV└ SDUW└ RI└ WKH└ UHFRUG◀

,W└ ZRXOG└ EH└ XQZLVH└ WR└ SUHVXGJH└ WKDW└ RXWFRPH◀ └ ,└ FDQ└ VD\└ WR└ \RX└ WKDW└ DQ\└ WWHSV└ WKDW└ ,└ ZRXOG└ WDNH└ DV└ DGPLQLWWUDWRU└ ZRXOG└ EH└ LQ└ IXUWKHUDQFH└ RI└ WKH└ 5)6└ DQG└ QRW└ WR└ XQGHUPLQH└ WKH└ 5)6◀

'8&.:257+ └
%XW└ WKH└ FRPPHQW└ SHULRG└ KDV└ GRWKLQJ└ WR└ GR└ ZLWK└ FRQJUHVVLRQDO└ LQWHQW◀ └
(DUOLHU└ WRGD\☼ └ \RX└ VDLG└ WKDW└ \RX└ ZRXOG└ DELGH└ E\└ FRQJUHVVLRQDO└ LQWHQW◀ └
1RZ☼ └ WKH└ FRQJUHVVLRQDO└ LQWHQW└ LV└ WR└ NHHS└ WKDW└ 3RLQW└ RI└ 2EOLJDWLRQ└ ZLWK└ WKH└
\R\EHDQ└ DQG└ FRUQ└ SURGXFHUV└ DQG└ WKH└ ELRIXHO└ PDQXIDFWXUHUV☼ └ GRW└ WR└ PRYH└
DZD\└ IURP└ LW└ UHJDUGOHVV└ RI└ ZKDW└ WKH└ RSHQ└ FRPPHQW└ SHULRG└ VD\V◀

6R☼ └ \RXUH└ VD\LQJ└ WKDW└ \RXUH└ ZLOOLQJ└ ┼ ┼ └ WKDW└ \RXU└ DQVZHU└ LV└ QR☼ └ EHFDXVH└
\RX└ ZRXOG└ EH└ RSHQ└ WR└ PRYLQJ└ LW└ DZD\└ IURP└ WKH└ VR\EHDQ└ DQG└ FRUQ└
JURZHUV☼ └ WKH└ IDUPHUV☼ └ WRZDUGV└ WKH└ ECHQGHUV☼ └ LI└ WKDW└ ZKDW└ WKH└ FRPPHQW└
SHULRG└ ┼ ┼ └ LI└ WKDW└ LV└ ZKDW└ FRPHV└ RXW└ RI└ WKH└ FRPPHQW└ SHULRG"└ ,V└ WKDW└ ZKDW└
\RXUH└ VD\LQJ"└ $QG└ WKDW└ ZRXOG└ EH└ DJDLQW└ FRQJUHVVLRQDO└ LQWHQW☼ └ WKRXJK◀

358,77 └
6HQDWRU☼ └ ,└ WKLQN└ PD\EH└ ZHUH└ ┼ ┼ └ ZLWK└ UHVSHFW└ WR└ FRQJUHVVLRQDO└ LQWHQW└ DQG└
WKH└ WDXWXWH☼ └ WKH└ LQWHQW☼ └ DV└ IDU└ DV└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ☼ └ LV└ GRW└ DGGUHVVHG└
LQ└ WKH└ WDXWXWH└ LWVHOI◀ └ 7KDW└ LV└ D└ GHFLVLRQ└ DQG└ WKH└ DGPLQLWUDWRU└ KDV└ EHHQ└
LQYROYHG└ LQ└ WKDW└ SURFHVV└ KLWRULFDOO\◀ └ ,W└ EHHQ└ VXEMHFW└ WR└ PXFK└
GLVFXVVLRQ◀ └ ,Q└ IDFW☼ └ WKH└ (3$└ KDV└ GHDOW└ ZLWK└ WKLV└ LVXH└ EHIRUH◀

:KDW└ ,P└ VD\LQJ└ WR└ \RX└ LV☼ └ LVW└ WKH└ MRE└ RI└ WKH└ DGPLQLWUDWRU└ WR└ HQIRUFH└ WKH└
SURJUDP☼ └ WR└ DGPLQLWHU└ WKH└ SURJUDP☼ └ WR└ HQXUH└ WKDW└ WKH└ LQWHQW└ RI└
&RQJUHVV└ DV└ IDU└ DV└ WKH└ 5)6└ LV└ XSKHOG◀ └ ,└ ZLOO└ GR└ WKDW◀

7R└ SUHVXGJH└ WKH└ RXWFRPH└ RI└ WKDW└ SDUWLFXODU└ FRPPHQW└ SHULRG└ LV└ VRPHWKLQJ└
WKDW└ ,└ FDQW└ GR└ DQG└ VKRXOGQW└ GR└ DW└ WKLV└ SRLQW◀ └ ,└ ZRXOG└ QHHG└ WR└ UHVSRQG└ WR└
WKDW└ RQD\└ DIWHU└ EHLQJ└ FRQILUPHG└ DQG└ JRLQJ└ WKURXJK└ WKH└ UHVW└ RI└ WKH└
SURFHVV◀

'8&.:257+ └
6R☼ └ \RXUH└ VD\LQJ└ WKDW└ \RX└ ZRXOG└ EH└ RSHQ└ WR└ PRYLQJ└ WKH└ 3RLQW└ RI└
2EOLJDWLRQ└ DZD\└ IURP└ WKH└ FRUQ└ DQG└ VR\EHDQ└ SURGXFHUV└ DQG└ HWKDQRO└
PDQXIDFWXUHUV"

358,77 └
,P└ VD\LQJ└ ◀ ◀ ◀

'8&.:257+ └

,I└ WKDW└ LV└ ZKDW└ WKH└ ┼┼└ LI└ WKDW└ LV└ ZKDW└ WKH└ RSHQ└ FRPPHQW└ SHULRG└ VD\V☼└ LI└ ΛKDW└ WKH└ UHVXOW☼└ WKHQ└ \RX└ ZRXOG└ EH└ RSHQ└ WR└ PRYLQJ└ LW└ DZD\└ IURP└ WKH└ IDUPHUV"

358,77└

1R☼└ ,P└ VD\LQJ☼└ 6HQDWRU☼└ WKDW└ DQ\└ DFWLRQ└ WDNHQ└ DV└ DGPLQLWWUDWRU└ WKDW└ ZRXOG└ MHRSDUGL]H└ DQG└ HQGDQJHU└ WKH└ 5)6└ DV└ LQWHQGHG└ E\└ &RQJUHVV☼└ ,└ ZRXOG└ QRW└ WDNH◀└ 7KDW└ LV└ GLIIHUHQW└ IURP└ SUHVXGJLQJ└ DQ└ RXWFRPH└ LQ└ WKDW└ SDUWLFXODU└ PDWWHU◀

'8&.:257+└

⁄&XW└ WKH└ LQWHQW└ RI└ &RQJUHVV└ LV└ WR└ NHHS└ WKH└ 3RLQW└ RI└ 2EOLJDWLRQ└ ZLWK└ WKH└ SURGXFHUV◀

358,77└

7KDW└ VRPHWKLQJ└ ,P└ QRW└ DZDUH└ RI☼└ 6HQDWRU◀

'8&.:257+└

2.◀└ :HOO☼└ CHW└ PRYH└ RQ└ WR└ ┼┼└ ,P└ YHU\└ FRQFHUQHG└ DQG└ ZHOO└ IRORZ└ XS└ ZLWK└ ΛKLV└ LQ└ WKH└ IXWXUH◀└ /HW└ JR└ WR└ VDIH└ GULQNLQJ└ ZDWHU◀└ ,└ VLW└ RQ└ RYHUVLJKW└ JRYHUQPHQW└ ┼┼└ ,└ VDW└ RQ└ *RYHUQPHQW└ 2YHUVLJKW└ FRPPLWWHH└ LQ└ WKH└ +RXVH└ ZKHUH☼└ LQ└ D└ ELSDUWLVDQ└ PDQQHU☼└ ZH└ H[SORUHG└ ZKDW└ KDSSHQHG└ LQ└)OLQW☼└ 0LFKLJDQ◀

$QG└ ,└ ZDV└ DFWXDOO\└ IODEEHUJDWWHG└ HDUOLHU└ WRGD\└ ZKHQ☼└ LQ└ UHVSRQVH└ WR└ P\└ FROOHDJXH☼└ 6HQDWRU└ &UXLQ☼└ ZKHWKHU└ \RX└ EHOLHYH└ WKHUHV└ DQ\└ VDIH└ CHYHO└ RI└ CHDG└ WKDW└ FKLOGUHQ└ FDQ└ FRQVXPH◀└ <RX└ UHVSRQGHG└ E\└ VD\LQJ☼└ DQG└ ,└ TXRWH☼└ | 6HQDWRU☼└ WKDW└ LV└ QRW└ VRPHWKLQJ└ ,YH└ UHYLHZHG└ RU└ NQRZ└ DERXW◀└ ,└ EHOLHYH└ ΛKHUHV└ VRPH└ FRQFHUQ└ EXW└ ,└ KDYH└ QRW└ CRRNHG└ LQWR└ WKH└ VFLHQWLILF└ UHVHDUFK└ RQ└ WKDW◀ |

<RXUH└ DERXW└ WR└ EHFRPH└ WKH└ (3$└ DGPLQLWWUDWRU◀└ <RXUH└ VHHNLQJ└ WR└ EH└ WKH└ (3$└ DGPLQLWWUDWRU└ DQG└ \RXYH└ QRW└ CRRNHG└ LQWR└ WKH└ LVXXH└ RI└ CHDG└ LQ└ RXU└ GULQNLQJ└ ┼┼└ LQ└ RXU└ GULQNLQJ└ ZDWHU└ VXSSO\"└ ,└ WKLQN└ WKDW└ WKDW└ LV└ VRPHWKLQJ☼└ HVSHFLDOO\└ LQ└ WKH└ DIWHUPDWK└ RI└)OLQW☼└ LV└ ┼┼└ LV└ D└ VHULRXV└ RYHUVLJKW└ RQ└ \RXU└ SDUW◀

+DYH└ \RX└ HYHQ└ WXGLHG└ WKH└)OLQW└ ZDWHU└ FULVLV└ LQ└ SUHSDULQJ└ IRU└ WKLV└ KHDULQJ"└ $QG└ GR└ WKH└ QDPHV└ 0DU\└ *DGH└ DQG└ 6XVDQ└ +HGPDQ└ ULQJ└ D└ EHOO└ /NR└ \RX"

358,77 └

7KH└ VLWXDWLRQ└ LQ└ SRLQW└ DV└ ,└ LQGLFDWHG└ HDUOLHU└ └ WKH└ (3$└ VKRXOGYH└ DFWHG└ PRUH└ H[SHGLWLRXVO\└ LQ└ UHVSRQGLQJ└ WR└)OLQW└ DQG└ GLG└ QRW◀ └ 7KHUH└ ZDV└ LQGLFDWLRQ└ DW└ WKH└ UHJLRQDO└ OHYHO└ WKDW└ WKHUH└ ZHUH└ FRQFHUQV└ DQG└ WKHUH└ ZDV└ QRW└ D└ UHVSRQVH◀

$QG└ ,└ WKLQN└ WKDW└ WKH└ (3$└ EHDUV└ UHVSRQVLELOLWL└ IRU└ ZKDW└ KDSSHQHG└ LQ└)OLQW└ DQG└ ZRXOG└ VHHN└ WR└ └ LQ└ WKH└ IXWXUH└ └ DYRLG└ WKRVH└ NLQG└ RI└ VLWXDWLRQV└ E\└ EHLQJ└ PRUH└ SURDFWLYH└ WKURXJK└ WKH└ UHJLRQDO└ DGPLQLWUDWRUV└ DQG└ WKH└ WDWHV└ DQG└ PXQLFLSDOLWLHV└ LQ└ HQVXULQJ└ WKH└ TXDOLWL└ RI└ RXU└ GULQNLQJ└ ZDWHU◀

'8&.:257+ └

$V└ (3$└ DGPLQLWUDWRU└ └ ZLOO└ \RX└ FRPPLW└ WR└ DSSRLQWLQJ└ D└ SHUPDQHQW└ UHJLRQDO└ DGPLQLWUDWRU└ WR└ WKH└ 0LGZHXW└ UHJLRQ└ WKDW└ ZLOO└ EH└ EDVHG└ RXW└ RI└ &KLFDJR└ EXW└ WKH└ FRYHU└ 0LFKLJDQ"

:H└ KDYH└ LWXHV└ ZLWK└ CHDG└ LQ└ *DCHVEXUJ└ └ ,OOLQRLV└ └ IRU└ H[DPSCH◀ └ $QG└ ZLOO└ \RX└ JLYH└ WKHP└ WKH└ UHVSRQVLELOLWL└ DQG└ WKH└ DELOLWL└ WR└ DFW└ SURDFWLYHO\└ VR└ WKDW└ /NH\└ FDQ└ WWHS└ LQ└ ZKHQ└ WKH\└ VHH└ WKDW└ WKH└ WDWH└ LV└ QRW└ GRLQJ└ LWW└ MRE└ LQ└ SURWHFWLQJ└ WKH└ VDIH└ ZDWHU└ GULQNLQJ└ VXSSO\└ IRU└ LWW└ FLWL]HQV"

358,77 └

$V└ \RX└ NQRZ└ └ 6HQDWRU└ └ WKH└ (3$└ ┼ ┼ └ DQG└ WKH└ DQVZHU└ LV└ \HV◀ └ 7KH└ (3$└ KDV└ HPHUJHQF\└ RUGHU└ DXWKRULWL└ WR└ UHVSRQG└ WR└ VLWXDWLRQV└ OLNH└ \RX└ GHVFULEHG◀ └ $QG└ ,└ WKLQN└ WKH└ (3$└ VKRXOG└ WWHS└ LQ└ └ LQ└ WKRVH└ VLWXDWLRQV└ LQ└ D└ YHU\└ PHDQLQJIXO└ ZD\◀

'8&.:257+ └

7KDW└ JRRG└ QHZV└ EHFDXVH└ WKH\└ GLG└ QRW└ GR└ LW└ LQ└ WKH└ FDVH└ RI└)OLQW◀ └ 7KDQN└ \RX◀ └ ,P└ RXW└ RI└ WLPH└ └ 0U◀ └ &KDLUPDQ◀

%&55&662 └

7KDQN└ \RX└ YHU\└ PXFK◀ └ ,└ ZRXOG└ OLNH└ WR└ LQWURGXFH└ IRU└ WKH└ UHFRUG└ DQ└ DUWLFOH└ IURP└ WKH└ 2NOOKRPDQ└ E\└ 5LFN└ *UHHQ◀

$QG└ WR└ UHDG☼ └ LW└ VD\V☼ └ -◀ '◀ └ 6WURQJ☼ └ 'LUHFWRU└ RI└ WKH└ 6WDWH└ :LOGOLIH└
&RQVHUYDWLRQ└ 'HSDUWPHQW└ VD\V└ RI└ $WWRUQH\└ *HQHUDO└ 3UXLWW☼ └ TXRWH└
| $WWRUQH\└ *HQHUDO└ 3UXLWW└ KDV└ EHHQ└ D└ UHDOO\└ JRRG└ SDUWQHU└ DQG└ DOO\└ LQ└
PDNLQJ└ VXUH└ ZH└ KDYH└ DGHTXDWH└ SURWHFWLRQV└ LQ└ SODFH└ IRU└ WKH└ TXDOLW\└ DQG└
TXDQWLW\└ RI└ ZDWHU☼ └ VDLG└ 6WURQJ| ☼ └ ZKR└ SUHYLRXVO\└ CHDG└ WKH└ 2NODKRPD└
:DWHU└ 5HVRXUFHV└ %RDUG└ DQG└ ZDV└ 6WDWH└ 6HFUHWDU\└ RI└ WKH└ (QYLURQPHQW◀

,└ KDYH└ QHYHU└ VHHQ└ KLP└ SXW└ XV└ LQ└ D└ SRVLWLRQ└ ZKHUH└ ZH└ KDG└ WR└ FRPSURPLVH└
DQ\WKLQJ└ WR└ SURWHFW└ WKH└ ZDWHUV└ RI└ 2NODKRPD◀ | └ 6HQDWRU└ %RR]PDQ"

%22=0$1 └
7KDQN☼ └ 0U◀ └ &KDLUPDQ◀ └ $QG└ ,└ ZDQW└ WR└ JR└ WKURXJK└ ┼ ┼ └ DJDLQ☼ └ REYLRXVO\☼ └
&RQJUHVVPDQ└ LQ└ WKH└ GLWXULFW└ ZLWK└ WKH└ $UNDQVDV☼ └ 2NODKRPD☼ └ ,OOLQRLV└ ULYHU└
VLWXDWLRQ◀ └ ,└ ZDV└ HCHFWHG└ LQ└ D└ VSHFLDO└ HCHFWLRQ└ LQ└ ┴ !! !! ¶ └ DQG└ LQKHULWHG└ WKLV◀ └
7KLV└ KDV└ EHHQ└ JRLQJ└ RQ└ IRU└ DERXW└ WHQ└ \HDUV◀ └ ,Q└ ┴ !! !! ¶ ☼ └ IURP└ WKDW└ WLPH└ RQ└
XQWLO└ UHFHQWO\└ ZHYH└ SUREDEO\└ ZRUNHG└ RQ└ WKLV☼ └ LW└ VHHPV└ OLNH└ HYHU\└ ZHHN◀

%XW└ ZKDW└ KDSSHQHG└ ZDV☼ └ LQ└ ┴ !! !! ┬ ☼ └ WKH└ (3$└ FDPH└ RXW└ DQG└ VDLG└ WKDW└ WKH└
WWDQGDUG└ ZDV└ VXFK└ WKDW└ E\└ ┴ !! ¶ ┬ ☼ └ WKH└ ULYHU└ QHHGHG└ WR└ EH└ ┼ ┼ └ KDYH└
DWWDLQPHQW└ RI└ ◀ !! ┬ → └ WWDQGDUG└ RI└ SKRVSKRUXV◀ └ $UNDQVDV└ ZRUNHG└ YHU\☼ └
YHU\└ KDUG☼ └ FKDQJHG└ RXW└ DOO└ RI└ LW└ WUHDWPHQW└ SODQW└ LQ└ WKDW└ DUHD◀ └ 7KDW└ RQH└
RI└ WKH└ IDWWHXW└ JURZLQJ└ DUHDV└ LQ└ WKH└ FRXQWU\◀

$JDLQ☼ └ \RX└ NQRZ☼ └ WKH└ UDWHSD\HUV└ SD\└ IRU└ DOO└ WKDW☼ └ KDXCHG└ RXW└ FKLFNHQ└ OLWWHU└
DQG└ DOO└ WKRVH└ NLQG└ RI└ WKLQJV☼ └ DQG└ PDGH└ D└ GUDPDWLF└ LPSURYHPHQW└ LQ└ WKH└
DWWDLQPHQW◀ └ 7KH└ SUREOHP└ ZDV☼ └ WKRXJK☼ └ $UNDQVDV☼ └ DQG└ \RX└ PHQWLRQHG└
DJDLQ☼ └ P\└ JRRG└ IULHQG☼ └ 6HQDWRU└ %RRNHU☼ └ DQG└ KH└ LV└ D└ JRRG└ IULHQG☼ └
PHQWLRQHG└ D└ CRW└ DERXW└ 2NODKRPD☼ └ WKLV└ DQG└ WKDW◀ └ $UNDQVDV└ CHYHU└ DJUHHG└
/R└ DQ\└ RI└ WKDW◀

6R└ WKH\└ ZHUH└ JRLQJ└ IRUZDUG└ EXW└ WKH\└ IHQW└ OLNH└ WKH\└ FRXOG└ CRW└ REWDLQ└
/KH└ ◀ !! ┬ → └ WWDQGDUG└ EHFDXVH└ WKH└ ILUXW└ CDWLRQDO└ ULYHU└ LV└ LQ└ $UNDQVDV☼ └ WKH└
%XIIDCR└ 5LYHU☼ └ DQG└ LW└ ZDV└ CRW└ DW└ ◀ !! ┬ → ◀ └ $QG└ LW└ SULWWLCH◀ └ 6R☼ └ ZHQW└ ZLWK└
JRRG└ IDLWK◀

,Q└ ┴ !! ¶ !! └ ┼ ┼ └ LQ└ ┴ !! !! ↑ ☼ └ ,└ EHOLHYH☼ └ WKH└ DWWRUQH\└ JHQHUDO└ LQ└ 2NODKRPD└ VXHG└ ┼
VXHG└ $UNDQVDV◀ └ 7KDW└ ZDV└ ┼ ┼ └ DQG└ \RX└ FDQ└ FRUUHFW└ PH└ LI└ ,P└ ZURQJ└ RQ└
VRPH└ RI└ WKHVH└ WKLQJV└ ┼ ┼ └ EXW└ LQ└ ┴ !! ¶ !! ☼ └ WKDW└ FDVH└ ZDV└ ┼ ┼ └ ZDV☼ └ DOO└ RI└ WKLV└
ZDV└ SXW└ LQ└ SODFH└ EXW└ WKH└ IHGHUDO└ MXGJHV└ CHYHU└ UXCHG└ RQ└ LW◀ └ 6R└ LW└ ZDV└ RSHQ◀

:H└ IDWW└ IRUZDUG☼ └ ┴ ‼ ¶ ┬ └ LV└ DUULYLQJ◀ └ $UNDQVDV└ GRHV└ WWLOO└ QRW└ DJUHH└ WKDW└
WKH└ ◀ ‼ ┬ → └ WWDQGDUG└ LV└ WKH└ DSSURSULDWH└ RQH☼ └ VR└ WKH\└ ZHUH└ VTXDULQJ└ RII└
JHWWLQJ└ UHDG\└ WR└ VXH└ HDFK└ RWKHU└ DJDLQ◀ └ $QG└ $WWRUQH\└ *HQHUDO└ 3UXLWW☼ └
$WWRUQH\└ *HQHUDO└ 0F'DQLHO☼ └ D└ 'HPRFUDW└ LQ└ P\└ WWDWH☼ └ JRW└ WRJHWKHU└ DQG└
VDLG☼ └ KH\☼ └ \RX└ NQRZ☼ └ CHWW└ QRW└ ZDWWH└ D└ WRQ└ RI└ PRQH\└ ZLWK└ ODZ\HUV◀

/HWW☼ └ \RX└ NQRZ☼ └ XVH└ VFLHQFH└ DQG└ WKLQJV└ OLNH└ WKLV└ WR└ ILJXUH└ WKLV└ RXW◀ └ 6R└
WKH\└ FKRVH└ D└ QHXWUDO└ VLWH☼ └ %D\CRU└ 8QLYHUVLW\☼ └ ZKLFK└ KDV└ DQ└ H[FHOOHQW└
ZDWHU└ GHSDUWPHQW◀ └ 7KH\└ FDPH└ LQ☼ └ GLG└ D└ WWXG\└ DQG└ WKHQ└ FDPH└ EDFN└ DQG└
VDLG└ ◀ ‼ ┬ → └ LV└ WWDQGDUG└ DQG└ ULJKW└ QRZ└ WKH└ WWDWHV└ DUH└ OLYLQJ└ ZLWK└ WKDW◀

6R☼ └ LW└ UHDOO\└ ZDV└ ┼ ┼ └ LW└ ZDV└ D└ WUHPHQGRXV└ HIIRUW☼ └ WRRN└ D└ ORQJ└ WLPH☼ └ DQG└ LW└
ZDV└ D└ YHU\☼ └ YHU\└ GLIILFXOW└ VLWXDWLRQ◀ └ 6R☼ └ \RX└ NQRZ☼ └ ,└ DSSODXG└ \RX◀ └ ,└ ZDQW└
WR└ SXW└ LQ└ WKH└ UHFRUG└ D└ CHWWHU└ IURP└ RXU└ IRUPHU└ $WWRUQH\└ *HQHUDO└ 0F'DQLHO└
WKDW└ DJDLQ└ RXWOLQHV└ WKLV└ DQG└ ZDV└ YHU\☼ └ YHU\└ FRPSOLPHQWDU\└ RI└ WKH└
$WWRUQH\└ *HQHUDO◀

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:LWKRXW└ REMHFWLRQ◀

%22=0$1 └
7KDQN└ \RX◀ └ /HW└ PH└ MXWW└ TXRWH└ RQH└ RI└ WKH└ ILQDO└ SDUDJUDSKV☼ └ | 5HFHQW└ SUHVV└
DFFRXQWW└ UHJDUGLQJ└ WKHMH└ HIIRUWW└ XQIDLUO\└ PLVFKDUDFWHUL]H└ WKH└ ZRUN└ WKDW└
ZDV└ GRQH└ E\└ *HQHUDO└ 3UXLWW└ DQG└ KLV└ WHDP◀

+H└ ZDV└ D└ WWDXQFK└ GHIHQGHU└ RI└ VRXQG└ VFLHQFH└ DQG└ JRRG└ SROLF\└ DV└
DSSURSULDWH└ WRROV└ WR└ SURWHFW└ WKH└ HQYLURQPHQW└ RI└ WKLV└ WWDWH◀ └ ,└ VDZ└ ILUWWKDQG└
KRZ└ *HQHUDO└ 3UXLWW└ ZDV└ DECH└ WR└ EULGJH└ SROLWLFDO└ GLYLGHV└ DQG└ PDQDJH└
PXOWLSOH└ DJHQF\└ DJHQGDV└ WR└ UHDFK└ DQ└ RXWFRPH└ WKDW└ ZDV└ KHUDOGHG└ E\└
PRWW└ FUHGLECH└ REVHUYHUV└ DV└ ERWK└ SRVLWLYH└ DQG└ KLWWRULF◀ |

$QG└ ,└ WKLQN☼ └ DJDLQ☼ └ DV└ VRPHERG\└ WKDW└ ZDV└ LQWLPDWHO\└ LQYROYHG└ LQ└ WKDW☼ └
PRUH└ LQYROYHG└ WKDQ└ ,└ ZDQWHG└ WR└ EH└ LQ└ WKLQJV☼ └ WKDW└ LW└ UHDOO\└ ZDV└ D└ KHURLF└
HIIRUW└ E\└ \RXUVHOI└ DQG└ WKH└ SHRSOH└ LQ└ $UNDQVDV└ WU\LQJ└ WR└ UHVROYH☼ └ \RX└
NQRZ☼ └ D└ GLIILFXOW└ VLWXDWLRQ◀

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7KDQN└ \RX☼ └ 6HQDWRU◀

%22=0$1 └
7KDQN└ \RX◀ └ 7KDW└ UHDOO└ DOO└ , └ KDYH└ 0U◀ └ &KDLU◀

%$55$662 └
7KDQN└ \RX└ YHU└ PXFK└ 6HQDWRU◀ └ 6HQDWRU└ 6XOOLYDQ"

68//,9$1 └
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ└ DQG└ *HQHUDO└ 3UXLWW◀ └ , └ ZDQWHG└ WR└ IRFXV└ RQ└ ┼ ┼ └
\RX└ NQRZ└ , └ WDONHG└ HDUOLHU└ D└ QXPEHU└ RI└ XV└ WDONHG└ HDUOLHU└ DERXW└ WKH└
IUXXWUDWLRQV└ WKDW└ WKH└ $PHULFDQ└ SHRSOH└ KDYH└ ZLWK└ WKH└ (3$◀ └ :H└ WDONHG└
DERXW└ DQJHU◀ └ 6HQDWRU└ (UQXW└ WDONHG└ DERXW└ IHDU◀ └ , └ EHOLHYH└ LW└ H[WHQGV└ WR└ D└
FRXSOH└ RI└ UHDVRQV└ XQGHUOLQJ└ WKDW◀

2QH└ LV└ WKH└ DJHQF\└ FXUUHQWO\└ IHHOV└ WKDW└ LW└ HPSRZHUHG└ WR└ UHJXODWH└ OLWHUDOO\└
HYHU\└ QRRN└ DQG└ FUDQQ\└ RI└ $PHULFDQ└ OLIH◀ └ $QG└ UHDOWHG└ WR└ WKDW└ └ WKH└ VHHP└
/R└ KDYH└ YHU\└ OLWWOH└ UHVSHFW└ IRU└ WKH└ UXOH└ RI└ ODZ◀ └ 6R└ CHW└ PH└ WRXFK└ RQ└ WKRVH◀

6HQDWRU└ (UQXW└ WDONHG└ DERXW└ WKH└ :2786└ UXOH└ DQG└ WKH└ ┼ ┼ └ OLWHUDOO\└ └ WKH└
(3$V└ FODLPHG└ WKH└ DELOLW\└ WR└ UHJXODWH└ SXGGOHV◀ └ $V└ D└ WDWH└ ZLWK└ ┼ ┼ └ SUH╢
:2786└ E\└ WKH└ ZD\└ ┼ ┼ └ ├ ↑ └ SHUFHQW└ RI└ $PHULFDV└ ZHWODQGV└ LQ└ $DMND└ └ ZH└
KDYH└ YHU\└ VLJQLILFDQW└ FRQFHUQV└ DERXW└ WKLV◀

%XW└ , └ ZDQWHG└ WR└ DFWXDOO\└ DGGUHVV└ DQ└ HDUOLHU└ FRPPHQW└ E\└ 6HQDWRU└
:KLWHKRXVH└ └ ZKHUH└ KH└ VDLG└ WKDW└ WKHUH└ GRWKLQJ└ LQ└ \RXU└ UHFRUG└ WKDW└
VKRZV└ WKDW└ \RX└ KDYH└ WKH└ EDFNJURXQG└ WR└ KHOS└ $PHULFDV└ ILVKLQJ└ LQGXXWU\◀

:HOO└ , └ FRXOGQW└ GLVDJUHH└ PRUH└ ZLWK└ 6HQDWRU└ :KLWHKRXVH└ └ ZKRV└ D└ IULHQG└
DQG└ FROOHDJXH◀ └ 0\└ WDWH└ KDV└ D└ ILVKLQJ└ LQGXXWU\└ └ OLNH└ 5KRGH└ ,VODQGV◀ └ ,W└ D└
OLWWOH└ ELJJHU◀ └ 6L[W\└ SHUFHQW└ RI└ DOO└ WKH└ VHD└ OLIH└ └ WKDW└ FRQVLGHUHDEO\└ ELJJHU◀ └
7KDQN└ \RX◀ └ 0U◀ └ &KDLUPDQ└ └ ZRXOG└ \RX└ SOHDVH└ DFNQRZOHGJH└ WKDW└ IRU└ WKH└
UHFRUG◀

♂ /$8*+7(5□

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:LWK└ QR└ REMHFWLRQ◀

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$OPRWW└ ├ !! └ SHUFHQW└ RI└ DOO└ VHDIRRG└ KDUYHVWHG└ LQ└ WKH└ 8QLWHG└ 6WDWHV└ FRPHV└
IURP└ WKH└ ZDWHUV└ RI└ $ODVND└ DQG└ LWW└ FRQVLGHUHG└ WKH└ EHWW└ PRWW└
VXWDLQDEOH└ EHWW└ PDQDJHG└ IURP└ DQ└ HQYLURQPHQWDO└ WDQGSRLQW└ ILVKHU\└ LQ└
WKH└ ZRUOG◀ └ $QG└ \RX└ NQRZ└ ZKDW└ WKH└ QXPEHU└ RQH└ LWXXH└ WKH└ WRS└ LWXXH└ RI└
WKH└ ILVKHUPHQ└ RI└ $ODVND└ LV"└ (3$└ RYHUUHDFK◀

6R└ CHW└ PH└ JLYH└ \RX└ D└ VSHFLILF└ H[DPSCH◀ └ 7KLV└ LV└ D└ UHJXODWLRQ◀ └ ,WW└ ⊥ !! !! └
SDJHV└ RQ└ $PHULFDV└ ILVKHUPDQ└ WKH└ XQWLPDWH└ VPDOO└ EXVLGHVPHQ└ DQG└
ZRPHQ◀ └ 7KLV└ DFWXDOO\└ UHTXLUHV└ ┼ ┼ └ HYHU\└ ILVKHUPDQ└ LQ└ $ODVND└ └ FRPPHUFLDO└
ILVKHUPDQ└ └ UHTXLUHV└ D└ GLVFKDUJH└ SHUPLW└ WR└ OLWHUDOO\└ KRWH└ RII└ WKH└ GHFN└ RI└ D└
VKLS◀

7KLQN└ DERXW└ WKDW◀ └ ,I└ \RXUH└ JXWWLQJ└ D└ ILVK└ DQG└ ILVK└ JXWW└ RU└ SLHFHV└ RI└ D└ ILVK└
IDOO└ RQ└ WKH└ GHFN└ RI└ \RXU└ VKLS└ DQG└ \RX└ KRWH└ LW└ GRZQ└ └ ILVK└ EDFN└ LQWR└ WKH└
ZDWHU└ RI└ WKH└ RFHDQ└ └ \RX└ QHHG└ D└ SHUPLW└ └ ⊥ !! !! └ SDJHV◀ └ 7KLV└ LV└ WKH└ NLQG└ RI└
WKLQJ└ ZKHUH└ WKH└ WUXWW└ EHWZHHQ└ $PHULFDQV└ DQG└ WKH└ (3$└ KDV└ HURGHG└ VR└
PXFK└ EHFDXVH└ RI└ WKHVH└ NLQG└ RI└ LWXHV◀

,I└ FRQILUPHG└ └ ZLOO└ \RX└ ZRUN└ ZLWK└ PH└ DQG└ RWKHUV└ RQ└ WKLV└ FRPPLWWHH└ WR└
PDNH└ VXUH└ WKDW└ WKHVH└ NLQG└ RI└ UHJXODWLRQV└ DUH└ EDODQFLQJ└ HQYLURQPHQWDO└
QHHGV└ ZLWK└ MREV└ WKDW└ DUH└ VR└ LPSRUWDQW└ <RXYH└ PHQWLRQHG└ LW└ DV└ D└ FRWW◀ └
:LOO└ \RX└ ZRUN└ ZLWK└ XV└ RQ└ WKDW└ DQG└ ZRXOG└ \RX└ FDUH└ WR└ FRPPHQW└ RQ└ D└
UHJXODWLRQ└ OLNH└ WKLV"└)LVK└ EDFN└ LQWR└ WKH└ RFHDQ└ UHTXLULQJ└ D└ SHUPLW◀

&RQJUHWW└ E\└ WKH└ ZD\└ └ KDV└ H[WHQGHG└ WKLV└ WZLFH└ └ PHDQLQJ└ WULHG└ WR└ ┼ ┼ └ WKH└
LPSCHPHQWDWLRQ└ RI└ WKLV◀ └ 6R└ WKHUH└ ELSDUWLVDQ└ DJUHHPHQW└ WKDW└ ZH└ QHHG└ WR└
GR└ VRPHWKLQJ└ DERXW└ WKLV└ RYHUUHDFK◀ └ :RXOG└ \RX└ FDUH└ WR└ FRPPHQW└ RQ└
WKLV"

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6HQDWRU└ └ ,└ WKLQN└ LWW└ H[HPSCDU\└ RI└ D└ CDFN└ RI└ SULRULWW◀ └ ,└ PHDQ└ └ ZH└ KDYH└
PDQ\└ ┼ ┼ └ OLNH└ ,└ LQGLFDWHG└ HDUOLHU└ └ ┤ !! └ SHUFHQW└ RI└ RXU└ FRXQWU\└ LV└ LQ└ GRQ┼
DWWDLQPHQW└ XQGHU└ WKH└ 1$$46└ SURJUDP◀ └ :H└ KDYH└ RYHU└ ¶ ┬ !! !! └ FLUFCH└ VLWHV└
LQ└ WKLV└ FRXQWU\└ WKDW└ CHHG└ DWWHQWLRQ└ WR└ PRYH└ WKRVH└ DUHDV└ LQWR└ UHPHGLDWLRQ└
DQG└ UHWWRUH└ WKRVH└ DUHDV└ IRU└ HQYLURQPHQWDO┼ └ UHCDWHG└ LWXHV◀

$QG└ VR└ └ ,└ WKLQN└ LQ└ VRPH└ UHVSHFWW└ ZKDW└ \RX└ FLWH└ WKHUH└ LV└ MXWW└ PLWHG└
SULRULWLHV└ └ RI└ WU\LQJ└ WR└ IRFXV└ RQ└ VRPHWKLQJ└ OLNH└ WKDW└ DV└ RSSRVHG└ WR└
IRFXVLQJ└ RQ└ WKHVH└ RWKHU└ DUHDV└ WKDW└ ZLOO└ UHDOO\└ LPSURYH└ WDQJLEO\└ WKH└
HQYLURQPHQWDO└ SURWHFWLRQV└ IRU└ RXU└ SHRSCH└ DFURW└ WKH└ FRXQWU\◀

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/HW- PH└ WDON└ QH[W- DERXW- WKH└ UXOH└ RI└ CDZ└ └ DQG└ ,P└ JCDG└ \RX└ HPSKDVL]HG└ LW- DV└ D└ SULRULW\◀ └ ,└ EHOLHYH└ LW└ UHDOO\└ RQH└ RI└ WKH└ SULQFLSOH└ UHDVRQV└ ZK\└ DJDLQ└ /KHUHV└ VXFK└ D└ CDFN└ RI└ WUXW- EHWZHHQ└ WKH└ $PHULFDQ└ SHRSOH└ DQG└ WKH└ (3$◀ └ ?%XW└ └ LW└ QRW- MXW- D└ 5HSXEOLFDQ└ LWXH◀

$V└ D└ PDWWHU└ RI└ IDFW└ └ WKHUHV└ D└ QXPEHU└ RI└ H[DPSOHV└ ZKHUH└ WKLV└ LV└ YLHZHG└ DV└ D└ ELSDUWLVDQ└ LWXH└ WKDW- ZH└ QHHG└ WR└ DGGUHW◀ └ <RX└ PD\└ KDYH└ VHHQ└ ZLWK└ UHJDUG└ WR└ WKH└ &HDQ└ 3RZHU└ 3CDQ└ └ /DXUHQFH└ 7ULEH└ QRW- NQRZQ└ DV└ D└ WUXQJ└ WXDXQFK└ 5HSXEOLFDQ└ +DUYDUG└ /DZ└ SURIHVRU└ WXDWHG└ | 7KH└ (3$└ LV└ DWWHPSWLQJ└ WR└ H[HUFLVH└ CDZPDNLQJ└ WKDW- EHORQJV└ WR└ WKH└ &RQJUHW└ DQG└ WXGLFLDO└ SRZHU└ WKDW- EHORQJV└ WR└ WKH└ IHGHUDO└ FRXUWV◀

(3$└ LV└ DWWHPSWLQJ└ DQ└ XQFRQWLWXWLRQDO└ WUL IHFWD└ XVXUSLQJ└ WKH└ SUHURJDWLYHV└ RI└ WKH└ WDWHV└ &RQJUHW└ DQG└ WKH└ IHGHUDO└ FRXUWV└ DOO└ DW- RQFH└ ZLWK└ LW└ &HDQ└ 3RZHU└ 3CDQ◀ | └ 7KHQ└ KH└ WDWHG└ | %XQQLQJ└ WKH└ FRQWLWXWLRQ└ VKRXOG└ GRW- EHFRPH└ SDUW- RI└ RXU└ 1DWLRQDO└ (QHUJ\└ 3RLF\◀ |

<RXYH└ EHHQ└ LQYROYHG└ LQ└ VRPH└ RI└ WKHVH└ FDVHV└ └ WKH└ &HDQ└ 3RZHU└ 3CDQ└ └ /KH└ :DWHUV└ RI└ WKH└ 8◀ 6◀ └ ,Q└ ERWK└ RI└ WKHVH└ FDVHV└ └ FRXUWV└ KDYH└ WXD\HG└ WKH└ (3$V└ UXOH◀ └ :K\└ GR└ \RX└ WKLQN└ WKDW- WKH└ FRXUWV└ KDYH└ GRQH└ WKDW- DQG└ GR└ \RX└ /KLQN└ WKH└ UXOH└ RI└ CDZ└ └ WKDW- KDV└ EHHQ└ LJGRUHG└ E\└ WKH└ (3$└ LV└ VRPHWKLQJ└ /KDW- \RX└ QHHG└ WR└ ┼ ┼ └ WKDW- \RX└ LI└ ┼ ┼ └ LI└ FRQILUPHG└ └ WKDW- \RX└ ZLOO└ ZRUN└ RQ└ WR└ UHJDLQ└ WKH└ WUXW- EHWZHHQ└ WKH└ (3$└ DQG└ WKH└ $PHULFDQ└ SHRSOH◀

358,77 └

<RX└ NQRZ└ └ DV└ ,└ LQGLFDWHG└ └ 6HQDWRU└ └ HDUOLHU└ └ ,└ WKLQN└ DW- WLPHV└ └ SHUKDSV└ /KRVH└ LQ└ CDZ└ DQG└ WKH└ FRXUWV└ └ WKH\└ CRRN└ DW- UXOH└ RI└ CDZ└ DV└ VRPHWKLQJ└ WKDW└ DFDGHPLF└ DQG└ WHFKQLFDO◀ └ %XW- LW└ UHDO└ └ DQG└ LW- DI IHFW└ SHRSOH└ LQ└ YHU\└ UHDO└ ZD\V◀

:KHQ└ \RX└ KDYH└ DJHQFLHV└ RI└ DQ\└ W\SH└ WKDW- DFW- LQFRQ/LWWHQW- ZLWK└ WKH└ WDWXWRU\└ DXWKRULW\└ JLYHQ└ WR└ WKHP└ E\└ &RQJUHW◀ └ ,W- FUHDWHV└ WKH└ NLQG└ RI└ XQFHUWDLQ\└ WKDW- \RXH└ WDONLQJ└ DERXW◀ └ 3HRSOH└ GRQW- NQRZ└ ZKDW└ H[SHFWHG└ RI└ WKHP└ DQG└ SDUDO\VLV└ KDSSHQV◀

$QG└ └ VR└ └ UXOH└ RI└ CDZ└ LV└ LPSRUWDQW- WR└ HFFRRPLF└ GHYHORSPHQW◀ └ ,W└ LPSRUWDQW- /R└ VHQG└ PHVDJHV└ RI└ FHUWDLQW◀ └ ,W└ LPSRUWDQW- VR└ WKDW- SHRSOH└ FDQ└ SODQ└ DQG└ DOORFDWH└ UHVRXUFHV◀ └ 7KHUH└ DUH└ PDQ\└ CDZV└ WKDW- SHRSOH└ CRRN└ DW- DQG└ VD\└ └ ZHOO└ └ ,└ GRQW- UHDOO\└ OLNH└ WKDW◀

²&XW└ └ VR└ CRQJ└ DV└ WKH└ NCRZ└ LW└ H[SHFWHG└ RI└ WKHP└ └ WKH└ FDQ└ SCDQ└ DQG└
DOORFDWH└ UHVRXUFHV└ WR└ FRPSO└ └ $QG└ ,└ WKLQN└ WKDW└ ZKDW└ LPSRUWDQW└ DERXW└
UXCH└ RI└ CDZ◀

68//,9$1 └
$QG└ DV└ ┼ ┼ └ DQG└ DV└ RCH└ RI└ WKH└ CHDG└ OLWLJDWRUV└ RQ└ WKH└ :2786└ UXCH└ DQG└ WKH└
&CHDQ└ 3RZHU└ 3CDQ└ DQG└ WKH└ IDFW└ WKDW└ WKH└ 6XSUHPH└ &RXUW└ DQG└ WKH└ 6L[WK└
&LUFXLW└ KDG└ SXW└ WWD\V└ RQ└ WKRVH└ UXCHV└ └ ZKDW└ GR└ \RX└ WKLQN└ WKDW└ LQGLFDWHV└ WKH└
&RXUW└ YLHZ└ LV└ RI└ WKRVH└ WZR└ UXCHV└ LWXHG└ E\└ WKH└ (3$└ └ DW└ WKLV└ PRPHQW'

358,77 └
:HOO└ └ LW└ XQSUHFHGHQWHG└ IRU└ WKH└ 6XSUHPH└ &RXUW└ WR└ KDYH└ GRQH└ ZKDW└ WKH└
GLG└ LQ└ WKH└ &CHDQ└ 3RZHU└ 3CDQ◀

68//,9$1 └
1HYHU└ KDSSHQHG└ LQ└ WKH└ KLWWRU\◀

358,77 └
1HYHU└ KDSSHQHG└ LQ└ WKH└ KLWWRU\└ RI└ MXULVSUXGHQFH└ EHIRUH└ WKH└ 8◀ 6◀ └
6XSUHPH└ &RXUW◀ └ 7KDW└ VD\V└ D└ CRW◀

68//,9$1 └
7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀

²&$55$662 └
7KDQN└ \RX└ YHU\└ PXFK◀ └ 6HQDWRU└ 0RUDQ"

025$1 └
0U◀ └ &KDLUPDQ└ └ ,G└ \LHOG└ WR└ VRPHERG\└ DKHDG└ RI└ PH└ LI└ ,└ FDQ└ KDYH└ ┼ ┼ └ LI└
WKH\G└ \LHOG└ EDFN└ WR└ PH└ IRU└ WKH└ CH[W└ TXHVWLRQ◀

²&$55$662 └

7KDW┴ ZRXOG└ ┼ ┼ └ WKDW┴ ZRXOG└ EH└ ILQH◀ └ ,└ KDYH└ VRPH└ WLPH└ WKDW┴ ,└ KDYHQW┴ JRWWHQ└
/R└ \HW└ └ LQ└ WKLV└ VHFRQG└ URXQG└ DQG└ ZH└ ZLOO└ JR└ VKRUWO\└ WR└ D└ WKLUG└ URXQG◀ └ ,└
ZDQWHG└ WR└ WDON└ D└ OLWWOH└ DERXW┴ WKH└ 0HUFXU\└ 5XOH└ WKDW┴ WKH└ 6XSUHPH└ &RXUW┴
RYHUWXUQHG◀ └ 7KH\└ RYHUWXUQHG└ WKH└ (3$V└ 0HUFXU\└ 5XOH└ ILQGLQJ└ WKDW┴ WKH└
(3$└ GLG└ QRW┴ DSSURSULDWH└ FRQVLGHU└ WKH└ FRXWW└ RI└ WKH└ UXOH◀

1RWLQJ└ WKDW┴ E\└ ┼ ┼ └ EHWZHHQ└ WKH└ WLPH└ WKDW┴ WKH└ UXOH└ ZDV└ LVXHG└ DQG└ WKH└
6XSUHPH└ &RXUW┴ GHFLVLRQ└ WKUHH└ \HDUV└ SDWW└ └ WKH└ (3$└ $GPLQLWWUDWRU└ └ *LQD└
0F&DUWK\└ └ ZDV└ RQ└ D└ WHOHYLVLRQ└ VKRZ└ D└ FRXSOH└ RI└ GD\V└ EHIRUH└ WKH└
6XSUHPH└ &RXUW┴ PDGH└ LWW└ UXOLQJ◀ └ $QG└ WKH\└ VDLG└ └ | :HOO└ └ ZKDW┴ LI└ WKH└
6XSUHPH└ &RXUW┴ VD\V└ \RX└ ZHUH└ ZURQJ"|

$QG└ └ HVVHQWLDOO\└ └ VKH└ VDLG└ └ | :HOO└ └ WKH└ PDVRULW\└ RI└ WKH└ SRZHU└ SODQW└ KDYH└
DOUHDG\└ GHFLGHG└ DQG└ LQYHVWHG└ LQ└ D└ SDWK└ ◀ ◀ ◀ | └ ┼ ┼ └ EHFDXVH└ LW└ EHHQ└ WKUHH└
\HDUV└ ┼ ┼ └ | ◀ ◀ ◀ └ WR└ DFKLHYH└ FRPSOLDQFH└ ZLWK└ WKH└ 0HUFXU\└ $LU└ 7R[LF└ 6WDQGDUGV◀

,Q└ RWKHU└ ZRUGV└ └ VKH└ KDG└ DOUHDG\└ JRWWHQ└ KHU└ UHVXOW┴ HYHQ└ WKRXJK└ ZKDW┴ VKH└
KDG└ GRQH└ ZDV└ IRXQG└ E\└ WKH└ FRXUW└ WR└ EH└ LOOHJDO◀ └ 6R└ └ ,G└ DVN└ \RXU└ WKRXJKW└
RQ└ KHU└ WWDWHPHQW┴ DQG└ GR└ \RX└ EHOLHYH└ WKDW┴ KHU└ WWDWHPHQW┴ VKRZV└ UHVSHFW┴
IRU└ WKH└ UXOH└ RI└ ODZ"

358,77 └
:HOO└ └ 6HQDWRU└ └ WKLV└ LV└ VSHFXODWLRQ└ WR└ D└ FHUWDLQ└ GHJUHH└ DQG└ RQH└ RI└ P\└
IDYRULWH└ SKLORVRSKHUV└ LV└ <RJL└ %HUUD└ DQG└ KH└ VD\V└ WKDW┴ SUHGLFWLRQV└ DUH└
SUHWW\└ WRXJK└ └ SDUWLFXODU\└ DERXW┴ WKH└ IXWXUH◀

$QG└ VR└ ,└ GRQW┴ ZDQW┴ WR└ EH└ WRR└ VSHFXODWLYH└ KHUH└ EXW┴ ZKHQ└ \RX└ ORRN└ DW┴ WKH└
UHVSRQVH└ RI└ WKH└ 6XSUHPH└ &RXUW┴ DQG└ WKH└ &HDQ└ 3RZHU└ 3DQ└ └ ,└ WKLQN└
DUUHD\└ WKH└ UHDVRQ└ WKH\└ DFWHG└ LQ└ DQ└ XQSUHFHGHQWHG└ ZD\└ LV└ EHFDXVH└ RI└
ZKDW┴ \RX└ MXWW┴ DGGUHWWHG└ └ 0U◀ └ &KDLUPDQ└ └ WKDW┴ LQ└ UHVSRQVH└ WR└ WKH└
0LFKLJDQ└ Y◀ └ (3$└ FDVH└ └ WKHUH└ ZDV└ VRPH└ FRPPHQW└ PDGH└ WKDW┴ WKH\└ KDG└
DFKLHYHG└ WKH└ RXWFRPH└ └ GHVSLWH└ WKH└ IDFW┴ WKDW┴ LW┴ DFWHG└ LQFRQVLWWHQW┴ ZLWK└ WKH└
IUDPHZRUN└ XQGHU└ WKH└ ODZ◀

6R└ └ ,└ WKLQN└ UXOH└ RI└ ODZ└ LV└ VRPHWKLQJ└ └ DV└ ,└ LQGLFDWHG└ WR└ 6HQDWRU└ 6XOOLYDQ└ └ LV└
QRW┴ VRPHWKLQJ└ WKDW┴ ZH└ ┼ ┼ └ WKDW└ DFDGHPLF◀ └ ,└ WKLQN└ LW└ PHDQLQJ IXO◀ └ ,W┴
LQVSLUHV└ FRQILGHQFH└ LQ└ WKRVH└ WKDW┴ DUH└ UHJXODWHG◀

,W┴ JLYHV└ WKHP└ DWWXUDQFH└ WKDW┴ UHJXODWRUV└ DUH└ DFWLQJ└ FRQVLWWHQW┴ ZLWK└ WKHLU└
DXWKRULWW└ DQG└ DOORZV└ WKHP└ WR└ SODQ└ DQG└ DOORFDWH└ UHVRXUFHV└ WR└ PHHW┴ WKH└
WWDQGDUGV└ DQG└ PHHW┴ WKH└ REMHFWLYHV└ WKDW┴ &RQJUHVV└ DQG└ UHJXODWRUV└
HWWDEOLVK◀

%$55$662 └
6HQDWRU└ 0RUDQ"

025$1 └
0U◀ └ &KDLUPDQ└ └ WKDQN└ \RX└ YHU\└ PXFK◀ └ *HQHUDO└ └ \RX└ FDQ└ VHH└ E\└ ZKHUH└ ,└
VLW└ RQ└ WKH└ GDLV└ WKDW└ ,└ KDYHQW└ EHHQ└ LQ└ WKH└ 6HQDWH└ D└ WHUULEO\└ CRQJ└ WLPH└ EXW└
RQH└ RI└ P\└ FDXVHV└ XSRQ└ P\└ DUULYDO└ DQG└ GLVFRYHU\└ RI└ KRZ└ WKH└ 6HQDWH└
ZRUNV└ LV└ WR└ WU\└ WR└ ZRUN└ ZLWK└ P\└ FROOHDJXHV└ WR└ UHDWWHUW└ FRQJUHWVLRQDO└
DXWKRULWLHV◀

$QG└ LQ└ P\└ YLHZ└ └ WKHUHV└ D└ QXPEHU└ RI└ ZD\V└ ZH└ FDQ└ GR└ WKDW◀ └ 2QH└ └
&RQJUHVV└ FRXOG└ TXLW└ SDVVLQJ└ KXJH└ SLHFHV└ RI└ CHJLVODWLRQ└ DQG└ GHOHJDWLQJ└
DXWKRULWLHV└ WR└ DJHQFLHV└ DQG└ GHSDUWPHQWV◀ └ $QRWKHU└ RQH└ WKDW└ ZH└ FRXOG└
SXUVXH└ DQG└ ,└ KRSH└ ZH└ ZLOO└ WKLV└ \HDU└ LV└ DQ└ DSSURSULDWLRQV└ SURFHVV└ E\└
ZKLFK└ ZH└ KDYH└ WKH└ RSSRUWXQLWW└ WR└ LQIOXHQFH└ GHFLVLRQV└ PDGH└ DW└ WKH└
(QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ DQG└ HYHU\└ RWKHU└ DJHQF\└ DQG└
GHSDUWPHQW◀

$QG└ RQH└ RI└ WKH└ WKLQJV└ ┼ ┼ └ DQG└ ZH└ GR└ WKDW└ E\└ GHYHORSLQJ└ D└ UHDWLRQWKLS└ ZLWK└
DQ└ DJHQF\└ KHDG└ NQRZLQJ└ WKDW└ ┼ ┼ └ DQG└ ,└ JXHVV└ SDUW└ RI└ WKDW└ LV└ WKDW└
PHPEHUV└ RI└ &RQJUHVV└ QHHG└ WR└ EHFRPH└ JUHDWHU└ ┼ ┼ └ KDYH└ JUHDWHU└ CHYHOV└ RI└
H[SHUWLVH└ RQ└ WKH└ VXEMHFW└ PDWWHU└ RI└ WKHLU└ MXULVGLFWLRQ◀

2QH└ RI└ WKH└ VXEFRPPLWWHHV└ ,└ FKDLU└ LV└ LQ└ WKH└ &RPPHUFH└ &RPPLWWHH└ DQG└ LW└
KDV└ MXULVGLFWLRQ└ RYHU└ WKH└ 1DWLRQDO└ +LJKZD\└ 6DIHW\└ ┼ ┼ └ 7UDIILF└ 6DIHW\└
$GPLQLWWUDWLRQ◀ └ 7KH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ MXWW└ CDWW└ ZHHN└
ILQDOL]HG└ LWW└ JUHQKRXVH└ JDV└ WDQGDUGV└ IRU└ OLJKW└ GXW└ FDUV└ DQG└ WUXFNV└ IRU└
┴ ‼ ┴ ┴ └ WR└ ┴ ↑ ◀

1RZ└ └ WKH└ CDZ└ VD\V└ WKDW└ LW└ WR└ FRRUGLQDWH└ WKDW└ HIIRUW└ ZLWK└ WKH└ 1DWLRQDO└
+LJKZD\└ 7UDIILF└ 6DIHW\└ $GPLQLWWUDWLRQ└ └ DQG└ WKDW└ DJHQF\└ LV└ WWLOO└
GHYHORSLQJ└ LW└ RZQ└ SURFHW└ WR└ GHWHUPLQH└ DSSURSULDWH└ IXHO└ WDQGDUGV◀

,└ UDLVH└ WKLV└ DV└ DQ└ H[DPSOH└ RI└ ZKHUH└ └ RQFH└ DJDLQ└ WZR└ DJHQFLHV└ LQWXUXFWHG└
E\└ &RQJUHW└ WR└ ZRUN└ WRJHWKHU└ WR└ ILQG└ D└ VROXWLRQ└ RU└ WKH└ ULJKW└ DQVZHU└ WR└ DQ└
LWXH└ └ LJRUHG└ WKH└ CDZ◀ └ ,└ DWXPH└ \RX└ ZRXOG└ DWXUH└ PH└ RU└ PHPEHUV└ RI└
WKLV└ FRPPLWWHH└ WKDW└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\└ WR└ WKH└ EHWW└ RI└
\RXU└ DELOLW\└ ZLOO└ REH\└ WKH└ CDZ◀

%XW└ ,└ DOVR└ DWXPH└ WKDW└ \RX└ DUH└ ZLOOLQJ└ WR└ DWXUH└ PH└ WKDW└ ZKHQ└ GLUHFWHG└ E\└ WKH└ CDZ└ WR└ FRRSHUDWH└ ZLWK└ RWKHU└ DJHQFLHV└ WR└ KDYH└ WKH└ LQSXW└ RI└ DQ└ DJHQF\└ WKDW└ RXU└ VXEFRPPLWWHH└ KDV└ MXULVGLFWLRQ└ RYHU└ └ DV└ D└ SHUVRQ└ LQ└ WKH└ 6HQDWH└ UHVSRQVLEOH└ IRU└ WKHVH└ LVXHV└ └ ,└ JR└ WR└ WKH└ DJHQF\└ WKDW└ ,└ KDYH└ WKH└ PRXW└ LQIOXHQFH└ RYHU└ DQG└ WKH\└ VD\└ ZHOO└ └ WKH└ (3$└ KDV└ DOUHDG\└ GRQH└ LWW└ ^KLQJ◀

,└ DWXPH└ ZH└ FDQ└ EULQJ└ WKRVH└ NLQG└ RI└ SUDFWLFHV└ WR└ DQ└ HQG"

358,77 └
$EVROXWHO\└ └ 6HQDWRU◀ └ ,└ WKLQN└ WKDW└ LQWHUDJHQF\└ GLVFXVVLRQ└ └ WKDW└ FRODERUDWLRQ└ WR└ HQVXUH└ WKDW└ WKHUH└ LV└ PHDQLQJIXO└ GLVFXVVLRQ└ └ UHYLHZ└ RI└ DFWLRQ└ WDNHV└ SODFH◀ └ ,└ ZDQW└ WR└ VSHDN└ JHQHUDOO\└ WR└ \RXU└ GHCHJDWLRQ└ UHIHUHQFH└ EHFDXVH└ ,└ GR└ WKLQN└ WKDW└ WKDW└ LV└ D└ YHU\└ LPSRUWDQW└ LVXH└ WKDW└ \RX└ UDLVH◀

,└ WKLQN└ D└ OW└ RI└ WLPHV└ ZKDW└ KDV└ KDSSHQHG└ LV└ WKDW└ &RQJUHVV└ KDV└ VSRNHQ└ LQ└ YHU\└ JHQHUDO└ ZD\V└ ┼┼└ ,OO└ GRW└ VD\└ YDJXH└ EXW└ DSSURDFKLQJ└ YDJXHQHVV└ └ DQG└ JLYLQJ└ FDUWH└ EODQFKH└ RU└ VXEWDQWLDO└ DXWKRULWW└ WR└ DJHQFLHV└ ZLWKRXW└ SURYLGLQJ└ WKH└ NLQG└ RI└ IUDPHZRUN└ WKDW└ QHFHVDU\└ IRU└ WKHP└ WR└ PDNH└ WKHLU└ GHFLVLRQ◀ └)URP└ D└ VHSDUDWLRQ└ RI└ SRZHUV└ LVXH└ └ LW└ WKLQN└ WKDW└ YHU\└ LPSRUWDQW◀

,└ WKLQN└ LW└ YHU\└ LPSRUWDQW└ IRU└ &RQJUHVV└ └ $UWLFOH└ ¶ └ WR└ H[HUFLVH└ LW└ DXWKRULWW└ /R└ JLYH└ WKH└ GLUHFWLRQ└ WR└ WKHVH└ DJHQFLHV└ KRZ└ WKH\└ VKRXOG└ FRQGXFW└ WKHLU└ EXVLQHVV◀ └ 6HQDWRU└ &DUGLQ└ LQ└ KLV└ FRPPHQW└ DQG└ TXHWLRQV└ HDUOLHU└ DERXW└ /KH└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV└ UXOH└ └ ,└ WKLQN└ WKDW└ LV└ D└ SURECHP└ SUHVHQWHG└ CDUUHD\└ EHFDXVH└ WKH└ GHILQLWLRQ└ RI└ ZDWHUV└ RI└ WKH└ 8QLWHG└ 6WDWHV└ LQ└ WKH└ \WDWXWH└ LV└ VR└ ELJ└ DQG└ VR└ JHQHUDO└ └ LW└ FUHDWHV└ XQFHUWDLQW\◀

$QG└ VR└ ,└ WKLQN└ PDNLQJ└ VXUH└ WKDW└ &RQJUHVV└ SHJIRUPV└ LW└ URCH└ DQG└ WKH└ H[HFXWLYH└ EUDQFK└ SHJIRUPV└ LW└ URCH└ LQ└ HQIRUFLQJ└ CDZV└ DQG└ ZH└ WU\└ WR└ GR└ CHW└ GHCHJDWLRQ└ DQG└ UHVSHFW└ VHSDUDWH└ RI└ SRZHUV└ LV└ YHU\└ └ YHU\└ LPSRUWDQW◀

025$1 └
,└ DSSUHFLDWH└ \RXU└ UHDWXUDQFH└ RI└ KRZ└ \RX└ ZRXOG└ FRQGXFW└ └ LI└ FRQILUPHG└ └ ^KH└ DJHQF\◀ └ ,W└ DOVR└ LV└ D└ UHICHFWLRQ└ XSRQ└ WKH└ CHHG└ IRU└ &RQJUHW└ WR└ GR└ LW└ \RE└ EHWWHU└ DQG└ SHUKDSV└ └ ,└ JXHWHG└ \RXG└ KDYH└ GRWKLQJ└ WR└ GR└ ZLWK└ WKDW◀

²&XW- IRU└ PH└ DQG└ P\└ FROOHDJXHV☼└ ZH└ QHHG└ WR└ EH└ PXFK└ PRUH└ SUHFLVH└ DQG└ FOHDU└ LQ└ CHJLVODWLRQ└ DQG└ PXFK└ PRUH└ OLNHO\└ WR└ GHDO└ LQ└ VPDOOHU└ ELW- VL]HG└ SLHFHV└ VR└ WKDW- WKH└ ┼ ┼ └ WRR└ RIWHQ└ ,└ WKLQN└ &RQJUHVV└ LV└ LQWHUHVWHG└ ┼ ┼ └ ,└ GRQW- ZDQW- WR└ EH└ GHURJDWRU\└ WR└ DQ\└ ┼ ┼ └ DQ\└ RI└ P\└ FROOHDJXHV◀

²&XW- WRR└ RIWHQ└ ZH└ ORRN└ IRU└ WKH└ KHDGOLQH└ WKDW- ZHYH└ VROYHG└ D└ SURECHP└ DQG└ \HW- ZHYH└ ┼ ┼ └ ZH└ FRPSODLQ└ DERXW- ZKDW- DQ└ DJHQF\V└ GHFLVLRQV└ DUH└ DQG└ ZHYH└ JLYHQ└ WKHP└ VR└ PXFK└ DXWKRULWW☼└ WKH\└ KDYH└ WKH└ DELOLW\└ WR└ PDNH☼└ ZKDW- ,└ ZRXOG└ FRQVLGHU☼└ DQG└ VRPH└ RI└ XV└ PD\└ FRQVLGHU└ D└ EDG└ GHFLVLRQ◀

358,77 └
$QG└ WKHUH└ DUH└ LPSRUWDQW- WWHSV└ WKDW- KDYH└ EHHQ└ WDNHQ◀ └ :HYH└ PHQWLRQHG└ 7$6.$└ WKLV└ PRUQLQJ☼└ ZKHUH└ \RX└ KDG└ GRQH└ MXWW- WKDW- GXULQJ└ WKLV└ SDWW- \HDU◀ └ $QG└ VR└ ,└ WKLQN└ WKDW☼└ WKDWW└ D└ YHU\└ LPSRUWDQW- LWHP└ WKDW- \RX└ UDLVH☼└ 6HQDWRU◀

025$1 └
7KDQN└ \RX◀ └ 7KDQN└ \RX☼└ 0U◀ └ &KDLUPDQ◀

²&$55$662 └
7KDQN└ \RX└ YHU\☼└ 6HQDWRU└ 0RUDQ◀ └ :HOO└ QRZ└ PRYH└ WR└ D└ WKLUG└ URXQG└ RI└ TXHWWLRQV└ DQG└ $WWRUQH\└ *HQHUDO└ 3UXLWW☼└ \RXYH└ MXWW- PHQWLRQHG└ 7$6.$◀ └ <RX└ VHQW- D└ CHWWHU└ WR└ WKLV└ FRPPLWWHH└ LQ└ $SULO└ ┴ ‼ ¶ ↑ └ VXSSRUWLQJ└ WKH└)UDQN└ /DXWHQEHUJV└ &KHPLFDO└ 6DIHWW\└ $FW◀

,Q└ IDFW- WKH└ WLPLQJ└ RI└ \RXU└ CHWWHU└ ZDV└ CHW└ WKDQ└ D└ PRQWK└ DIWHU└ WKH└ ELOO└ ZDV└ LQWURGXFHG☼└ DQG└ \RX└ ZHUH└ WKH└ ILUWW- DWWRUQH\└ JHQHUDO└ LQ└ WKH└ 8QLWHG└ 6WDWHV└ /R└ VXSSRUW- WKH└ ELOO◀ └ 7KH└ ELOO└ XOWLPDWHD\└ UHFHLYHG└ RYHUZKHOPLQJ└ ELSDUWLVDQ└ VXSSRUW- LQ└ &RQJUHW◀

,W- ZLOO└ EH└ \RXU└ MRE└ WR└ LPSOHPHQW- WKH└ ELSDUWLVDQ└ UHIRUPV└ DQG└ HQVXUH└ ZH└ KDYH└ FRQVLWWHQW- UHJXODWLRQ└ WKURXJKRXW- WKH└ FRXQWU\◀ └ :RXOG└ \RX└ GLVFXW└ /KH└ SODQV└ WKDW- \RX└ PLJKW- KDYH└ WR└ LPSOHPHQW- WKLV└ CHJLVODWLRQ└ DQG└ ZLOO└ \RX└ FRPPLW- WR└ LPSOHPHQWLQJ└ WKH└ CHJLVODWLRQ└ LQ└ D└ WLPHO\└ PDWWHU"

358,77 └
6HQDWRU└ DQG└ 0U◀ └ &KDLUPDQ☼└ \HV☼└ ,└ WKLQN└ LQ└ UHVSRQVH└ WR└ REOLJDWLRQV└ RI└ WKH└ (3$☼└ WKLV└ ERG\└ KDV└ SXW- WLPHOLQHV└ EHIRUH└ WKH└ (3$└ WR└ FDUU\└ RXW- FHUWDLQ└ UXOHPDNLQJ☼└ WKH└ 3ULRULWL]DWLRQ└ 5XOH☼└ WKH└ 5LVN└ (YDOXDWLRQ└ 5XOH☼└ IHHV└ WKDW- QHHG└ WR└ EH└ HWWDEOLVKHG☼└ DOO└ WKRVH└ DUH└ PLG┼└ WHUP└ LQ└ ┴ ‼ ¶ → ◀

$QG└ ,└ WKLQN└ WKH└ PDWWHU└ RI└ WKH└ (3$└ DGPLQLVWUDWRU└ VKRXOG└ ┼ ┼ └ PDNLQJ└ WKDW└ D└ SULRULWL└ DW└ WKH└ DJHQF\◀ └ ,└ DOVR└ WKLQN└ WKDW└ LQ└ UHVSRQVH└ WR└ 6HQDWRU└ *LOOLEUDQG└ HDUOLHU└ DQG└ RWKHUV└ KDYH└ UDLVHG└ WKLV└ └ WRR└ └ WKHUH└ DUH└ FHUWDLQ└ ♂ LQDXGLECH□ └ WKDW└ QHHG└ WR└ EH└ DGGUHVVHG└ LQ└ HYDOXDWLQJ└ WKDW└ OLWLQJ└ XQGHU└ 76&$└ RU└ SHUKDSV└ WKH└ 6DIH└ 'ULQNLQJ└ :DWHU└ $FW└ DV└ ZHOO◀

$QG└ VR└ ,└ WKLQN└ WKHUH└ VSHFLILF└ DFWLRQV└ WKDW└ QHHG└ WR└ EH└ WDNHQ└ EXW└ DOVR└ WKH└ UXCHPDNLQJ└ SURFHVV└ DQG└ WKH└ GHDGOLQHV└ EHLQJ└ DGKHUHG└ WR◀

?$55$662 └
7KH└ ┼ ┼ └ \RX└ PDGH└ UHIHUHQFH└ WR└ ┼ ┼ └ DQG└ ,└ GLG└ LQ└ P\└ RSHQLQJ└ WDWHPHQW└ DV└ ZHOO└ WR└)OLQW└ DQG└ WKHUH└ ZDV└ VRPH└ JLYH└ DQG└ WDNH└ RQ└)OLQW└ D└ OLWWOH└ HDUOLHU◀ └ 7KH└ RWKHU└ WKLQJ└ ,└ EURXJKW└ XS└ ZDV└ WKH└ *ROG└ .LQJ└ 0LGH└ VSLOO└ LQ└ &RORUDGR└ └ DQ└ HQYLURQPHQWDO└ GLVDVWHU└ FDXVHG└ E\└ WKH└ (3$◀

/DWW└)ULGD\└ └ WKH└ (3$└ DQQRXQFHG└ WKDW└ LW└ KDV└ GHQLHG└ DOO└ FODLPV└ IRU└ WKH└ • ¶ ◀ ┴ └ ELOOLRQ└ LQ└ CRWW└ LQFRPH└ └ CRW└ RI└ XVH└ RI└ SURSHUW\└ DQG└ GDPDJHV└ WR└ WKH└ EXVLQHVVHV└ DQG└ WKH└ SURSHUW\└ VXIIHUHG└ E\└ → ┬ └ WULEHV└ └ E\└ CDQG└ RZQHUV└ └ CRFDO└ EXVLQHVVHV└ └ CRFDO└ JRYHUQPHQW└ DV└ D└ UHVXOW└ RI└ WKH└ VSLOO◀

7KH└ (3$V└ H[FXVH└ ZDV└ LW└ CHJDO└ LQWHUSUHWDWLRQ└ RI└ WKH└)HGHUDO└ 7RUW└ &ODLPV└ $FW◀ └ $FFRUGLQJ└ WR└ WKH└ (3$└ └ LI└ D└ IHGHUDO└ DJHQF\└ KXUW└ VRPHRQH└ WKURXJK└ D└ GLVFUHWLRQDU\└ DFWLRQ└ └ WKHQ└ WKH└)HGHUDO└ 7RUW└ &ODLPV└ $FW└ GRHV└ CRW└ DSSO\◀

1RZ└ WKLV└ GRHVQW└ HYHQ└ VRXQG└ ULJKW└ WR└ PH◀ └ 6R└ LI└ FRQILUPHG└ └ ZLOO└ \RX└ FRPPLW└ WKDW└ \RXOO└ UHYLHZ└ WKDW└ GHFLVLRQ└ DQG└ XVH└ ZKDWHYHU└ DXWKRULW\└ LV└ DYDLODEOH└ WR└ \RX└ XQGHU└ WKH└ CDZ└ WR└ KHOS└ WKH└ SHRSOH└ WKDW└ KDYH└ EHHQ└ KDUPHG└ E\└ WKH└ (3$V└ CHJOLJHQFH◀

358,77 └
<HV└ └ 0U◀ └ &KDLUPDQ◀

?$55$662 └
7KDQN└ \RX◀ └ 6HQDWRU└ &DUSHU"

&$53(5 └

7KDQN└ YHU└ PXFK◀ └ $└ TXHVWLRQ◀ └ 0U◀ └ &KDLUPDQ└ , └ NQRZ└ \RX└ GLG└ QRW└ XVH└ ZKHQ└ \RX└ ┼ ┼ └ KDYH└ \RX└ ┼ ┼ └ ZKHQ└ \RX└ WDUWHG└ WKLV└ URXQG└ RI └ WKH└ TXHVWLRQ└ └ \RX└ GLG└ QRW└ XVH└ OLNH└ ┴ └ PLQXWHV└ DQG└ ┬ ‼ └ VHFRQGV└ RI └ \RXU└ WLPH◀ └ $QG└ ZKHQ└ \RX└ ┼ ┼ └ ZKHQ└ \RX└ FRPPHQW└ OLNH└ \RXYH└ MXWW└ FRPPHQWHG└ DUH└ \RX└ GUDZLQJ└ GRZQ└ RQ└ WKDW└ ┴ └ PLQXWHV└ DQG└ ┴ ‼ └ VHFRQGV"

%$55$662 └
,└ WKLQN└ ,└ MXWW└ ┼ ┼ └ \HV└ └ WKDW└ ZDV└ ┼ ┼ └ WKDW└ ZDV└ ┼ ┼ └ ,└ QRZ└ LQ└ WKH└ WKLUG└ URXQG└ TXHVWLRQLQJ◀ └ <HV└ └ VLU◀

&$53(5 └
$QG└ ULJKW◀

%$55$662 └
$QG└ WKHQ└ ,└ ZRXOG└ UHICHFW└ WKH└ IDFW└ WKDW└ CRRNLQJ└ EDFN└ DW└ (3$└ QRPLQDWLRQ└ KHDULQJ└ SURFHVVHV└ └ ZKHQ└ *LQD└ 0F&DUWK\└ ZDV└ QRPLQDWHG└ DQG└ FDPH└ WR└ WKLV└ FRPPLWWHH└ └ &KDLUPDQ└ %DUEDUD└ %R[HU└ └ WZR└ URXQGV└ └ ILUVW└ URXQG└ ILYH└ PLQXWHV└ └ VHFRQG└ URXQG└ WZR└ PLQXWHV◀ └ :HUH└ QRZ└ LQ└ WKH└ WKLUG└ URXQG└ RI └ ILYH└ PLQXWHV◀

6R└ ,└ WKLQN└ WKDW└ WKH└ &KDLUPDQ└ KDV└ WULHG└ WR└ OLWWHQ└ WR└ RXU└ ┼ ┼ └ LQ└ IRU└ RXU└ GLVFXVVLRQV└ DQG└ ZLWK└ RWKHU└ PHPEHUV└ WR└ PDNH└ VXUH└ WKDW└ DOO└ WKH└ 'HPRFUDWV└ DQG└ HYHU\└ PHPEHU└ KDG└ D└ FKDQFH└ WR└ DVN└ DV└ PDQ\└ TXHVWLRQV◀ ◀ ◀

&$5'1 └
7KDQN└ \RX└ IRU└ WKDW└ FDULILFDWLRQ◀

%$55$662 └
◀ ◀ ◀ └ DV└ WKH\└ KDG◀

&$5'1 └
7KDQN└ \RX◀ └ ,└ ZDQW└ WR└ JR└ EDFN└ WR└ VRPHWKLQJ└ WKDW└ ZDV└ VDLG└ E\└ RQH└ RI └ RXU└ FROOHDJXHV└ ZLWK└ UHVSHFW└ WR└ (3$└ DQG└ DFWXDOO\└ YLVLWLQJ└ WDUWHV└ DQG└ SDUWLFLSDWLQJ└ LQ└ PHHWLQJV└ LQ└ WKRVH└ WDUWHV└ ZLWK└ UHVSHFW└ WR└ WKH└ FRPELQHG└ SRZHU└ SODQ◀

$QG└ ,└ WKLQN└ LW└ ZDV└ VDLG└ WKDW└ LW└ ZDVQW└ :HXW└ 9LUJLQLD☼ └ P\└ QDWLYH└ WWDWH☼ └
QDWLYH└ WWDWH└ RI└ P\└ IULHQG└ IURP└ :HXW└ 9LUJLQLD└ ZDV☼ └ WKDW└ ZDV└ QRW└ YLVLWHG◀ └
:HYH└ KHDUG└ VLQFH└ WKHQ└ IURP└ -RH└ *RIIPDQ☼ └ ZKR└ LV└ WKH└ FRXQVHO└ WR└ -DQHW└
0F&DLQ◀ └ -DQHW└ LV└ WKH└ (3$└ DVVLWWDQW└ DGPLQLWWUDWRU└ IRU└ DLU☼ └ DV└ \RX└ PD\└
NQRZ☼ └ WKDW└ KH└ VDLG└ KH└ SHUVRQDOO\└ SDUWLFLSDWHG└ LQ└ PHHWLQJV◀

2Q└ D└ &HDQ└ 3RZHU└ 3DQ└ LQ└ :HXW└ 9LUJLQLD└ DOVR└ LQ└ .HQWXFN\☼ └)ORULGD☼ └
7H[DV☼ └ 3HQQV\OYDQLD☼ └ 1HYDGD☼ └ :DVKLQJWRQ☼ └ 2UHJRQ☼ └ &DOLIRUQLD☼ └
:\RPLQJ☼ └ 1RUWK└ 'DNRWD☼ └ &RORUDGR☼ └ ,OOLQRLV☼ └ DQG└ ,└ WKLQN└ 1HEUDVND◀ └ ,└ ZURWH└
D└ CHWWHU└ WR└ *LQD└ 0F&DLWK\└ RQ└ -DQXDU\└ ¶ ¶ ◀

<RX└ PD\└ UHFDOO☼ └ 0U◀ └ 3UXLWW☼ └ ,└ ZURWH└ D└ CHWWHU└ WR└ \RX☼ └ ,└ WKLQN└ RQ└ 'HFHPEHU└
⊥ ← └ DQG└ SRVHG└ D└ VHULHV└ RI└ TXHXWLRQV└ WR└ \RX└ DQG└ DVNHG└ IRU└ \RXU└ UHVSRQVHV└
E\└ -DQXDU\└ ☼ └ DQG└ ,└ KDYH└ \HW└ WR└ UHFHLYH└ WKRVH└ ┼ ┼ └ WKRVH└ UHVSRQVHV◀ └ $QG└ ,└
ZURWH└ D└ CHWWHU└ WR└ KHU└ RQ└ -DQXDU\└ ¶ ¶ ☼ └ WR└ DJDLQ└ WR└ *LQD└ 0F&DLWK\└ DQG└ WR└
$VVLWWDQW└ 6HFUHWDU\└ 'DUF\└ RI└ WKH└ ┼ ┼ └ WKH└ 'HSDUWPHQW└ RI└ WKH└ $UP\◀

$QG└ ,└ ┼ ┼ └ ,└ ZURWH└ EHFDXVH└ ZHUH└ JHWWLQJ└ RXU└ KHDULQJ└ LQ└ ┼ ┼ └ RQ└ RXU└ RIILFH└ D└
ZKRCH└ OLWW└ RI└ ┼ ┼ └ RI└ DVFHUWDLQV└ DERXW└ WKH└ ZDWHUV└ RI└ WKH└ 8◀ 6◀ └ $QG└ ,└ WKLQN└ WKLV
LV└ PD\EH└ DQ└ LQWWUXFWLYH└ IRUXP└ IRU└ DOO└ RI└ XV◀ └ +HUHV└ WKH└ WKLQJV└ WKDW└ ZH└
ZHUH└ KHDULQJ└ DQG└ DOO└ WKHVH└ SHRSCH└ MXWW└ FDOOLQJ└ LQ└ ┼ ┼ └ LQ└ 'HDZDUH└ DQG└ CHG└
XV└ WR└ DVN└ WKHVH└ TXHXWLRQV◀

2CH└ RI└ WKH└ TXHXWLRQV└ ZDV☼ └ DUH└ WKH└ (3$└ DQG└ WKH└ &RUSV└ FXUUHQWO\└
LPSOHPHQWLQJ└ CHZ└ &HDQ└ :DWHU└ 5XCH"└ $QG└ WKH└ DVFHUWDLQ└ ZDV└ WKDW└
LQGHHG└ WKDWW└ EHHQ└ KDSSHQLQJ◀ └ 6R└ ZH└ DVN☼ └ LV└ WKDW└ UHDOO\└ WKH└ FDVH◀ └ $QG└
WZR└ GD\V└ CDWHU☼ └ WZR└ GD\V└ CDWHU└ ZH└ UHFHLYHG└ D└ UHVSRQVH☼ └ | 1R☼ └ WKH└
DJHQFLHV└ DUH└ QRW└ QRZ└ LPSOHPHQWLQJ└ WKH└ CHZ└ &HDQ└ :DWHU└ 5XCH◀

,PSOHPHQWDWLRQ└ RI└ WKH└ CHZ└ UXCH└ ZDV└ WHPSRUDU\└ WWD\HG└ E\└ WKH└ 6L[WK└
&LUFXLW└ &RXUW└ RI└ $SSHDOV◀ └ $QG└ 6HSWHPEHU└ ⊥ ‼ ¶ ↑ ☼ └ WKH└ DJHQFLHV└
LPPHGLDWHD\└ GLUHFWHG└ WKHLU└ ILHOG└ RIILFHV└ WR└ WWRS└ XVLQJ└ WKH└ CHZ└ UXCH└ DQG└
LQWWHDG└ UHVXPH└ LPSOHPHQWLQJ└ UHJXODWLRQV└ LQ└ LQWHUSUHWLQJ└ WKH└ JXLGDQFH└
SULRU└ WR└ WKH└ CHZ└ UXCH◀ └ 7KDW└ ZDV└ RCH└ RI└ WKH└ TXHXWLRQV└ ZH└ DVNHG◀

:H└ DOVR└ DVNHG☼ └ EHFDXVH└ ZHUH└ KHDULQJ└ DVFHUWDLQV└ RWKHUZLVH└ E\└ WKH└ (3$└
DQG└ &RUSV└ FXUUHQWO\└ SXUVLQJ└ HQIRUFHPHQW└ DFWLRQV└ SXUVXDQW└ WR└ WKH└ CHZ└
&HDQ└ :DWHU└ 5XCH◀ └ $QG└ ZH└ JRW└ RQ└ WKH└ VDPH└ GDWH☼ └ -DQXDU\└ ¶ ┬ └ WKLV└
UHVSRQVH☼ └ WKH\└ VDLG☼ └ | 1R☼ └ WKH└ DJHQFLHV└ DUH└ QRW└ SXUVXLQJ└ DQ└
HQIRUFHPHQW└ DFWLRQV└ SXUVXDQW└ WR└ WKH└ CHZ└ &HDQ└ :DWHU└ 5XCH☼ └ DQG└ ZLOO└ QRW└
HQIRUFH└ WKLV└ UXCH└ XQCHW└ DQG└ XQWLO└ WKH└ 6L[WK└ &LUFXLW└ &RXUW└ $SSHDOV└ WWD\V└ LV└
OLIWHG◀

7KH└ QH[W└ TXHVWLRQ└ ZH└ DVNHG└ EHFDXVH└ ZHUH└ KHDULQJ└ DVFHUWDLQ└
RWKHUZLVH└ GRHV└ DQ\WKLQJ└ LQ└ WKH└ &HDQ└ :DWHU└ 5XOH└ UHYRNH└ RU└ RWKHUZLVH└
PRGLI\└ WKH└ &HDQ└ :DWHU└ $FW└ WDXWRUL\└ DQG└ UHJXODWRU\└ H[HPSWLRQV└ IRU└
IDUPLQJ└ DQG└ UDQFKLQJ◀└ 5HVSRQVH└ WZR└ GD\V└ DWHU└ -DQXDU\└ ¶┬└ ZDV└ |└ 1R└
WKH└ &HDQ└ :DWHU└ 5XOH└ PDNHV└ DEVROXWHO\└ QR└ FKDQJHV└ WR└ GRUPDO└ IDUPLQJ└
UDQFKLQJ└ DQG└ IRUHVWU\└ H[HPSWLRQV└ HXWDEOLVKHG└ XQGHU└ WKH└ &HDQ└ :DWHU└
$FW└ LQ└ LPSOHPHQWLQJ└ UHJXODWLRQV◀

6R└ TXHVWLRQ└ QXPEHU└ IRXU◀└ 6RPH└ KDYH└ FODLPHG└ WKDW└ DDGRZGHUV└ ZLOO└ QR└
ORQJHU└ EH└ DEOH└ WR└ UHO\└ RQ└ WKH└ &HDQ└ :DWHU└ $FW└ WDXWRUL\└ DQG└ UHJXODWRU\└
H[HPSWLRQV└ IRU└ IDUPLQJ└ DQG└ UDQFKLQJ└ VKRXOG└ WKH└ &HDQ└ :DWHU└ 5XOH└ JR└
LQWR└ HIIHFW└ EHFDXVH└ ZKLOH└ WKH└ WDXWWH└ DQG└ UHJXODWLRQV└ UHPDLQ└ XQFKDQJHG└
WKH└ DJHQF\└ KDV└ DDUUZHG└ WKH└ ┼┼└ WKRVH└ H[HPSWLRQV└ LQ└ SUDFWLFH└ WKURXJK└
WKH└ DFWLRQV└ LQ└ WKH└ ILHOG◀

,V└ WKDW└ WUXH"└ $QG└ WKH└ DQVZHU└ LV└ VXUSULVLQJO\└ |└ 7KH└ DVFHUWDLQ└ RI└ WKH└
DJHQFLHV└ KDYH└ DDUUZHG└ DSSOLFDWLRQ└ RI└ WKH└ WDXWWRU\└ DQG└ UHJXODWRU\└
H[HPSWLRQV└ IRU└ IDUPLQJ└ UDQFKLQJ└ DQG└ IRUHVWU\└ LV└ XQWUXH◀

7KH└ DJHQFLHV└ KDYH└ WDNHQ└ QR└ WHVV└ LQWHQGHG└ WR└ UHGXFH└ WKH└ VFRSH└ RI└ WKH└
H[HPSWLRQV└ DQG└ ZH└ KDYH└ QRW└ REVHUYHG└ FKDQJHV└ E\└ ILHOG└ RIILFHV└ LQ└ WKH└
ZD\└ WKH\└ LQWHUSUHW└ RU└ LPSOHPHQW└ WKHVH└ H[HPSWLRQV◀└ ,Q└ IDFW└ WKH└ &RUSV└ KDV└
UHHPSKDVL]HG└ SXEOLFO\└ WKDW└ WKHVH└ H[HPSWLRQV└ DUH└ VHOI┼└ LPSOHPHQWLQJ◀

)DUPHUV└ UDQFKHUV└ DQG└ IRUHVWHUV└ DUH└ QRW└ UHTXLUHG└ WR└ JHW└ DSSURYDO└ IURP└
WKH└ DJHQF\└ SULRU└ WR└ XVLQJ└ WKH└ H[HPSWLRQV◀ |└ ,└ UDLVH└ WKLV└ EHFDXVH└
VRPHWLPHV└ ZKDW└ SHRSOH└ DVVHUW└ WR└ EH└ WUXH└ VRPHWLPHV└ LVW└ RYHU└ WKH└
,QWHUQHW└ VRPHWLPHV└ LVW└ RQ└ WHOHYLVLRQ└ VRPHWLPHV└ LVW└ LQ┼┼└ RQ└ WKH└ UDGLR└
QHZVSDSHUV◀└ $VFHUWDLQ└ DUH└ PDGH└ DQG└ LQ└ WKLV└ FDVH└ WKHUHV└ D└ ZKROH└ CRQJ└
OLWW└ RI└ DVFHUWDLQ└ WKDW└ DUH└ PDGH└ QRQH└ RI└ WKHP└ DUH└ WUXH◀

7KH\└ DUH└ GLVWRUWLRQV└ XQWUXH└ LV└ DERXW└ ZKDW└ WKH└ (3$└ LV└ GRLQJ└ ZLWK└ UHVSHFW└
WR└ D└ UHJXODWLRQ└ WKDW└ ZDV└ WXD\HG◀└ $QG└ ,└ ZRXOG└ DVN└ WR└ IRU└ WKH└ UHFRUG└ 0U◀└
&KDLUPDQ└ WR└ EH└ DEOH└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ WKH└ TXHVWLRQV└ WKDW└ ZH└
SRVHG└ WR└ (3$└ RQ└ -DQXDU\└ ¶¶└ DQG└ DOVR└ WKH└ UHVSRQVHV└ WKDW└ ZH└ KDYH└
UHFHLYHG◀

%&55&662└
:LWKRXW└ REVHFWLRQ◀

&&53(5└

7KDQN└ \RX◀

%$55$662 └
6HQDWRU└ ,QKRIH"

&$53(5 └
,P└ QRW└ WKURXJK◀

%$55$662 └
2K└ └ ,P└ VRUU\◀ └ 7KDQN└ \RX└ DQG└ JR└ ULJKW└ DKHDG◀

&$53(5 └
,└ ZDV└ WKDQNLQJ└ \RX└ IRU└ HQWHULQJ└ LW└ IRU└ UHFRUG◀

%$55$662 └
<RX└ KDYH└ ┴ !! └ ┼ ┼ └ CHW└ JR└ EDFN└ IRU└ WKH└ ┴ ┬ └ VHFRQG└ UHDLQLQJ◀

&$53(5 └
2K└ └ WKDQN└ ◀ └ ,G└ OLNH└ WR└ CRRN└ DW└ D└ FKDUW└ └ LI └ \RX└ GRQW└ PLQG◀ └ 7KLV└ LV└ D└ UHSRUW└
/KLV└ LV└ D└ UHSRUW└ FDUG◀ └ &DQ└ \RX└ UDLVH└ LW└ XS"└ <HDK└ └ WKDQN└ \RX◀ └ 7KLV└ LV└ D└
UHSRUW└ FDUG└ WKDW└ OLWW└ ¶ → └ FRXQWLHV◀ └ +RZ└ PDQ\└ FRXQWLHV└ GR└ \RX└ KDYH└ LQ└
2NODKRPD"

358,77 └
6HYHQ└ ┼ ┼

&$53(5 └
6HYHQW\┼ VHYHQ◀

♂ /$8*+7(5□

358,77 └
0U◀ └ &KDLUPDQ└ FDQ└ ,└ UHIHU└ WR└ 6HQDWRU└ ,QKRIH└ RQ└ WKHVH└ TXHVWLRQV"

%$55$662 └

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +HW 3DJH¶ →└¶R└ └└

<HDK☼ └ \HDK☼ └ \HDK◀

&$53(5 └
,└ ZDV└ ZDWFKLQJ└ ┼ ┼ └ KLV└ OLSV└ DUH└ DSSDUHQWO\└ PRYLQJ└ ZKHQ└ \RX└ VSHDN☼ └ VR◀

♂ 81.12:1□ └
,W└ ULJKW└ KHUH◀

&$53(5 └
$OO└ ULJKW☼ └ WKDQN└ \RX◀ └ $W└ WKH└ VDPH└ WLPH└ \RXYH└ EHHQ└ VXLQJ└ (3$└ RQ└ LW└
R]RQH└ WDQGDUGV☼ └ DOO└ WKH└ FRXQWLHV└ LQ└ 2NODKRPD☼ └ IRU└ LW└ GDWD└ LV└ FROOHFWLQJ└
HDUQHG└ DQ└)└ IURP└ WKH└ $PHULFDQ└ /XQJ└ $VVRFLDWLRQ└ IRU└ QRW└ PHHWLQJ└ R]RQH└
KHDOWK└ WDQGDUG◀

<RX└ KDYH└ ├ !! └ FRXQWLHV└ WKDW└ WKH└ ZLOO└ KDYH☼ └ WKH└ $PHULFDQ└ /XQJ└
$VVRFLDWLRQ└ GRHVQW└ KDYH└ GDWD└ RQ└ SURJUHVV└ PDGH└ RU└ QRW└ PDGH└ ZLWK└
UHVSHFW└ WR└ R]RQH◀ └ 7KHVH└ DUH└ WKH└ RQHV└ ZH└ KDYH└ LQIRUPDWLRQ└ RQ☼ └ ¶ → └ ┼ ┼ └
RQH☼ └ ¶ → └ FRXQWLHV└ IURP└ 0DGHLUD└ WR└ 7XOVD◀ └ <RX└ OLYH└ LQ└ 7XOVD☼ └ ,└ VXVSHFW☼ └
\RXUH└ LQ└ 7XOVD└ FRXQW\"

358,77 └
<HV☼ └ VLU◀

&$53(5 └
<HDK☼ └ WKH\└ DOO└ JRW└)V◀ └ 7KH\└ JRW└)V◀ └ 7KLV└ LV└ OLWW└ \HDU☼ └ ┴ !! ¶ ├ ◀ └ 0\└ TXHVWLRQ└
/R└ \RX└ LV☼ └ ZKDW└ GLG└ \RX└ GR└ DERXW└ LW'└ :KDW└ GLG└ \RX└ GR└ DERXW└ EHIRUH└ RU└
VLQFH"

358,77 └
6HQDWRU☼ └ WZR└ WKLQJV☼ └ RQH└ ┼ ┼

&$53(5 └
6RPHWLPHV└ SHRSOH└ ZLOO└ EHOLHYH└ ZKDW└ ZH└ VD\◀ └ 7KH\└ ZDQW└ WR└ ┼ ┼ └ WKH\└ PD\└
QRW└ EHOLHYH└ ZKDW└ ZH└ VD\☼ └ EXW└ WKH\OO└ EHOLHYH└ ZKDW└ ZH└ GR◀ └ :KDW└ KDYH└ \RX└
GRQH└ DERXW└ WKLV"

358,77 └

<HV└ VR└ 6HQDWRU└ WZR└ WKLQJV◀ └ ,└ UHDOO└ EHOLHYH└ WKHUH└ QHHGV└ WR└ EH└ D└ /UHPHQGRXV└ HIIRUW└ PDGH└ E└ FRQWLHV└ DFURVV└ WKLV└ FRQWU└ WR└ PRYH└ QRQ┼ DWWDLQPHQW└ LQWR└ DWWDLQPHQW◀ └ 2YHU└ ┤ !! └ SHUFHQW└ RI└ WKH└ FRQWU└ ┼ ┼ └ RU└ SUHVHQWO└ ┤ !! └ SHUFHQW└ RI└ WKH└ FRQWU└ DSSUR[LPDWHO└ LV└ LQ└ QRQ┼ DWWDLQPHQW└ DQG└ WKHUH└ QHHGV└ WR└ EH└ JUHDW└ SULRULWL]DWLRQ└ ZLWK└ WKH└ (3$└ DQG└ RFDO└ RIILFLDOV└ LQ└ DFKLHYLQJ└ DWWDLQPHQW◀ └ 6HFRQGO└ WKH└ (3$└ ◀ ◀ ◀

&$53(5 └

%XW└ WKDW└ ZDVQW└ P└ TXHXWLRQ◀ └ 0└ TXHXWLRQ└ 0U◀ └ 3UXLWW└ ZDV└ ZKDW└ GLG└ \RX└ GR└ DERXW└ WKDW◀ └ <RXYH└ JRW└ ¶ → └ FRQWLHV└ LQ└ ZKLFK└ WKH└ KDYH└ WKH└ GDWD└ IURP└ DWW└ \HDU◀ └ :KDW└ GLG└ \RX└ GR└ DERXW└ LW└ EHIRUH└ RU└ VLQFH◀ └ 7KDW└ ZKDW└ ,P└ DVNLQJ└ \RX◀

358,77 └

$V└ ,YH└ LQGLFDWHG└ └ \RX└ NQRZ└ └ DV└ LQGLFDWHG└ LQ└ RXU└ FHHWLQJ└ └ LQGLYLGXDO└ └ WKH└ SULPDU└ HQIRUFHPHQW└ UHVSRQVLELOLW└ LQ└ 2NODKRPD└ ZLWK└ UHVSHFW└ WR└ DLU└ TXDOLW└ SHUPLW└ DQG└ WKH└ UHXW└ LV└ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW◀

$QG└ WKHUH└ KDYH└ EHHQ└ DFWLRQ└ WDNHQ└ E└ '(4└ DQG└ WKH└ FRQWLQXDO└ ZRUN└ ZLWK└ WKRVH└ FRQWLHV└ WR└ UHDFK└ DWWDLQPHQW◀ └ $QG└ ZH└ SURYLGH└ JHQHUDO└ FRQVHO└ DGYLVH└ WR└ WKDW└ DJHQF└ LQ└ WKH└ SHUIRUPDQFH└ RI└ WKHLU└ URCH◀

&$53(5 └

,P└ ┼ ┼ └ ,P└ QRW└ WKH└ DWWRUQH└ JHQHUDO└ RI└ 'HDZDUH└ DQG└ ,└ KDYH└ QR└ LQWHQWLRQ└ WR└ EH└ EXW└ LI└ ¶ → └ RI└ RXU└ WDWHV└ ┼ ┼ └ ¶ → └ RI└ RXU└ FRQWLHV└ LQ└ 'HDZDUH└ ┼ ┼ └ ZH└ RQO└ KDYH└ WKUHH└ └ EXW└ LI└ ¶ → └ RI└ WKHP└ RU└ LI└ DOO└ WKUHH└ RI└ WKHP└ JRW└)V└ └ ,└ SUREDEO└ ┼ ZRXOG└ GR└ VRPHWKLQJ└ DERXW└ LW◀ └ 7KDQN└ \RX◀

%$55$662 └

6HQDWRU└ ,QKRIH"

,1+2)(└

7KDQN└ \RX☼ └ 0U◀ └ &KDLUPDQ◀ └ &RQJUHVV└ UHFHQWO\└ SDVVHG└ D└ ELSDUWLVDQ└ ELOO☼ └
PDQ\└ RI└ XV└ XS└ KHUH└ VXSSRUWHG└ LW◀ └ ,└ NQRZ└ ,└ GLG◀ └ $V└ SDUW└ RI└ WKH└ :DWHU└
,QIUDVWUXFWXUH└ %LOO└ WR└ DOORZ└ WWDWHV└ WR└ CHDG└ LPSOHPHQWDWLRQ└ DQG└
HQIRUFHPHQW└ RI└ (3$V└ FRDO└ DVK└ UXOH└ WKURXJK└ WKH└ WWDWH┼ EDVHG└ SHUPLW└
SURJUDP◀

7KDW└ UXOH└ LV└ DOUHDG\└ LQ└ HI IHFW└ DQG└ LW└ LPSRUWDQW└ WKDW└ WKH└ (3$└ PRYH└
TXLFNO\└ RQ└ WKLV◀ └ ,I└ \RX└ DUH└ FRQI LUPHG☼ └ DUH└ \RX└ JHW└ ULJKW└ RQ└ WKLV└ WKLQJ"

358,77 └
<HV☼ └ 6HQDWRU└ ,QKRIH◀

,1+2)(└
$OO└ ULJKW◀ └ 6XH└ DQG└ VHWWOH☼ └ ZH└ DOO└ NQRZ└ ZKDW└ WKDW└ LV◀ └ :H└ NQRZ└ WKDW└ WKH└
JURXSV☼ └ PD\EH└ VRPH└ RI└ WKH└ HQYLURQPHQWDOLWW☼ └ H[WUHPLWW└ JURXSV└ ZLOO└ ILCH└
CDZVXLW└ DQG└ DJDLQW└ WKH└ (3$◀ └ 7KH└ (3$☼ └ LQWHDG└ RI└ GHIHQGLQJ└ DJDLQW└
ΛKH└ CDZVXLW└ ZLOO└ HQWHU└ LQWR└ D└ ┼ ┼ └ D└ UHVROXWLRQ└ EHKLQG└ FORVHG└ GRRUV└ ZLWKRXW└
DQ\└ SXEOLF└ LQSXW└ RU└ SDUWLFLSDWLRQ◀

7KHVH└ VHWWOHPHQW└ UHVXOW└ LQ└ CHZ└ VHW└ RI└ CHJDOO\└ ELQGLQJ└ SULRULWLHV└ DQG└
GXWLHV└ IRU└ WKH└ (3$└ WKDW└ DFKLHYH└ WKH└ GHPDQGV└ RI└ VSHFLDO└ LQWHUHWW◀ └ &DQ└
\RX└ VKDUH└ \RXU└ WKRXJKW└ RQ└ VXH└ DQG└ VHWWOH"

358,77 └
6HQDWRU☼ └ WKLV└ LWXH└ FDPH└ XS└ HDUOLHU☼ └ DQG└ LW└ D└ FRQFHUQ└ EHFDXVH└ LW└
UHJXODWLRQ└ WKURXJK└ OLWLJDWLRQ└ DQG└ DQ\└ WLPH└ WKDW└ \RX└ ┼ ┼ └ WKHUH└ D└ SDFH└ IRU└
FRQVHQW└ GHFUHHV└ LQ└ RXU└ OLWLJDWLRQ└ V\WWHP◀

?&W└ WR└ XVH└ D└ FRQVHQW└ GHFUHH└ WR└ E\SDW└ &RQJUHW☼ └ E\SDW└ WKH└ UHJXODWRU\└
UHTXLUHPHQW└ EHLQJ└ SDFHG└ XSRQ└ WKRVH└ DJHQFLHV└ WR└ HQJDJH└ LQ└
UXCHPDNLQJ└ WKRXJK└ OLWLJDWLRQ└ LV└ VRPHWKLQJ└ ,└ WKLQN└ VKRXOG└ QRW└ RFFXU◀

,1+2)(└
$QG└ WKDW└ WKH└ SDUW└ WKDW└ GLG└ QRW└ FRPH└ XS└ HDUOLHU☼ └ DQG└ ,└ DSSUHFLDWH└ WKDW└
YHU\└ PXFK◀ └ $QG└ WKHQ└ CDWWO\☼ └ WKH└ FRW└ RI└ UHJXODWLRQV◀ └ $V└ \RX└ NQRZ☼ └ WKH└
6XSUHPH└ &RXUW└ RYHUWXUCHG└ (3$V└ PHUFXU\└ DQG└ DLU└ WR[LFLWLHV└ WKDW└ PHW└ WKH└
UXCH└ LQ└ ⊥ ‼ ¶ ↑ └ EHFDXVH└ WKH└ (3$└ IDLCHG└ WR└ LJQRUH└ WKH└ IDFW└ WKDW└ WKH└ FRW└ ZDV└
• ◀ ├ └ ELOOLRQ└ DQQXDOO\└ RI└ WKH└ UXCH◀

1RZ└ LQ└ IDFW└ └ WKH└ (3$└ UHJXODWRU└ LVVXHG└ UXOHV└ RYHU└ WKH└ SDWW└ HLJKW└ \HDUV└ ΛKDW└ DUH└ YHU\└ FRWWO└ IRU└ RXU└ LQGXVWULHV└ DQG└ RXU└ MRE└ FUHDWRUV◀ └ $FFRUGLQJ└ WR└ ΛKH└ &56└ ┼ ┼ └ QRZ└ WKH└ &56└ └ ZKHQ└ WKH└ PDNH└ DQ└ HYDOXDWLRQ└ DUH└ PXFK└ PRUH└ FRQVHUYDWLYH◀ └ 7KH└ ILJXUH└ LWW└ DQZD└ D└ YHU└ FRQVHUYDWLYH└ ILJXUH◀

└└ %XW└ WKH└ VDLG└ └ WKH└ &HDQ└ 3RZHU└ 3DQ└ LW└ ZRXOG└ EH└ DW└ CHDWW└ • ↑ └ ELOOLRQ└ WR└ • ← ╵ ELOOLRQ└ D└ \HDU◀ └ 7KH└ ILJXUH└ ,YH└ KHDUG└ RQ└ WKDW└ DUH└ IDU└ JUHDWHU└ EHFDXVH└ LW└ ZRXOGQW└ EH└ WKDW└ PXFK└ GLIIHUHQFH└ WKDQ└ WKH└ ROG└ V\WWHPV└ WKDW└ WKH\└ WULHG└ WR└ GR└ WKURXJK└ CHJLVODWLRQ◀

7KH└ PHWKDQH└ WDQGDUGV└ RQ└ RLO└ DQG└ JDV└ IDFLOLWLHV└ └ • ┬ ↑ !! └ PLOOLRQ└ D└ \HDU◀ └ 7KH└ QHZ└ R]RQH└ WDQGDUGV└ └ • ¶ ◀ ┤ └ ELOOLRQ◀ └ 7KH└ ┴ !! ¶ ↑ └ FRDO└ DVK└ WDQGDUGV└ └ • ↑ ← → └ PLOOLRQ└ D└ \HDU◀ └ $QG└ WKH└ ┴ !! ¶ ¶ └ VXOIXU└ GLR[LGH└ WDQGDUGV└ └ • ¶ ◀ ↑ └ ELOOLF \HDU◀

1RZ└ ZKHQ└ \RX└ KHDU└ WKLV└ └ DOO└ WKLV└ PRQH\V└ EHLQJ└ VSHQW└ IRU└ FRPSOLDQFH└ FRWW└ E\└ RXU└ MRE└ FUHDWRUV└ └ SHRSCH└ RXW└ WKHUH└ DUH└ ZRUNLQJ└ IRU└ D└ OLYLQJ└ DQG└ ΛKH\UH└ KLULQJ└ SHRSCH◀ └ :KDW└ DUH└ WKRXJKWW└ DQG└ ZKDW└ GR└ \RX└ EHOLHYH└ VKRXOG└ EH└ URCH└ RI└ WKH└ FRWW└ RI└ (3$V└ GHFLVLRQ└ PDNLQJ"

358,77 └
,└ WKLQN└ LWW└ YHU\└ LPSRUWDQW└ LQ└ WKH└ UXCHPDNLQJ└ SURFHVV└ └ 6HCDWRU◀ └ $QG└ WKH└ 6XSUHPH└ &RXUW└ DQG└ FRXUW└ KDYH└ UHFRJQL]HG└ WKDW└ YHU\└ LPSRUWDQW└ IDFWRU◀ └ ,└ PHQWLRQHG└ HDUOLHU└ WKH└ FDVH└ WKDW└ ZH└ ZHUH└ LQYROYHG└ LQ└ 2NOKRPD└ LQYROYLQJ└ ΛKH└ 5HJLRQDO└ +D]H└ 3URJUDP◀

7KDW└ ZDV└ DQ└ H[DPSOH└ ZKHUH└ 2NOKRPD└ DFWXDOO\└ FRPSOLHG└ DQG└ PHW└ DQG└ VDWLVILHG└ WKH└ UHTXLUHPHQW└ XQGHU└ WKH└ ┼ ┼ └ XQGHU└ WKH└ WDWXWH└ DQG└ WKH└ UXCH└ EXW└ ΛKHLU└ WWHSV└ WKDW└ ZHUH└ WDNHQ└ ZHUH└ GLVSODFHG└ E\└ WKH└ (3$└ └ DGGLQJ└ KXQGUHGV└ RI└ PLOOLRQV└ RI└ FRWW└ ┼ ┼ └ GROODUV└ RI└ FRWW└ WR└ FRQVXPHUV└ LQ└ WKH└ JHQHUDWLRQ└ RI└ HOHFWULFLWW◀

$QG└ VR└ └ FRWW└ DUH└ YHU\└ LPSRUWDQW└ DQG└ ZH└ QHHG└ WR└ PDNH└ VXUH└ WKDW└ ┼ ┼ └ WKDW└ ΛKH\UH└ FRQVLGHUHG└ LQ└ FHUWDLQ└ DUHDV└ RI└ WKH└ WDWXWH└ └ DV└ ,└ LQGLFDWHG└ HDUOLHU└ └ ΛKH\└ FDQW└ EH└ XQGHU└ 7LWOH└ ¶ └ WKH└ 1H[W└ SURJUDP◀ └ %XW└ ┼ ┼ └ EXW└ ┼ ┼ └ EXW└ LQ└ WKDW└ FDVH└ └ WKDW└ \RXUH└ UHIHUULQJ└ WR└ LV└ DQ└ REOLJDWLRQ└ RI└ WKH└ (3$└ WR└ DFWXDOO\└ HQJDJH└ LQ└ D└ FRWW└ EHQHILW└ DQDO\VLV└ DQG└ PDNH└ D└ UHFRUG└ EHIRUH└ LW└ PDGH└ LWW└ GHFLVLRQ◀

,1+2)(└
'R└ \RX└ WKLQN└ WKDW└ WKH└ CDZV└ WKDW└ DUH└ RQ└ WKH└ ERRNV└ ULJKW└ QRZ└ DGHTXDWH└ \└

KDQGOH└ WKLV└ VLWXDWLRQ"

358,77 └
,└ GR└ WKLQN└ ┼ ┼ └ ,└ GR└ CDUJHO\☼ └ 6HQDWRU◀ └ ,└ WKLQN└ LW└ FRWWO\└ DQ└ DSSOLFDWLRQ└ LWXH└
ΛKDW└ WKH└ DJHQF\└ DQG└ WKH└ UHJXODWRU└ GRLQJ└ LW└ MRE└ XQGHU└ WKH└ WDWXWH└ DV└
SURYLGHG└ E\└ &RQJUHVV◀

,1+2)(└
0P┼ KPP◀ └ 7KDQN└ \RX└ YHU\└ PXFK◀

?$55$662 └
6HQDWRU└ :KLWHKRXVH◀

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$QG└ SUHVXPDEO\└ 0U◀ └ 3UXLWW☼ └ LW└ JRHV└ ZLWKRXW└ VD\LQJ└ WKDW└ LI└ WKH└ (3$V└ JRLQJ└
ΛR└ FRQVLGHU└ FRWW└ WR└ WKH└ LQGXWU\└ RI└ FRQIRUPLQJ└ WR└ SRODXWLRQ└ JXLGHOLQHV☼ └ LW└
VKRXOG└ DOVR└ FRQVLGHU└ EHQHILW└ WR└ WKH└ SXEOLF└ IURP└ FCHDQHU└ DLU☼ └ FCHDQHU└
ZDWHU└ DQG└ WKH└ UHVXOW└ RI└ WKDW└ FRPSOLDQFH☼ └ ULJKW"

358,77 └
,W└ VKRXOG◀ └ ,W└ VKRXOG☼ └ 6HQDWRU◀

:+,7(+286(└
6R└ ZH└ KDYH└ EHHQ└ WDONLQJ└ DERXW└ IXQG└ UDLVLQJ└ GRQH└ E\└ \RX└ IRU└ WKH└ 5XCH└ RI└
/DZ└ 'HIHQVH└)XQG└ GXULQJ└ WKH└ WLPH└ ZKHQ└ \RX└ ZHUH└ ERWK└ D└ ERDUG└
PHPEHU└ DQG└ IRU└ D└ IXOO└ \HDU☼ └ WKH└ FKDLUPDQ└ RI└ WKH└ UXCH└ RI└ ODZ└ GHIHQVH└ IXQG└
DQG└ WKH└ IDFW└ WKDW└ ZH└ KDYH└ H[DFWO\└]HUR└ LQIRUPDWLRQ└ LQ└ WKLV└ FRPPLWWHH└
DERXW└ WKDW└ IXQG└ UDLVLQJ◀

:H└ DOVR└ KDYH└]HUR└ ┼ ┼ └ DQG└ CHW└ PH└ DVN└ XQDQLPRXV└ FRQVHQW└ IRU└ WKH└ SDJH└
IURP└ ◀ ◀ ◀

?$55$662 └
:LWKRXW└ REMHFWLRQ◀

:+,7(+286(└

◀◀◀└ \RXU└ ILOLQJ└ WKDW└ GLVFORVH└ WKDW└ KH└ ZDV└ LQ└ IDFW└ D└ PHPEHU└ RI└ WKH└ ERDUG└ RI└ GLUHFWRUV└ DQG└ FKDLUPDQ└ RI└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG◀└ :H└ DOVR└ KDYH└ D└ PHHWLQJ└ DJHQGD└ IURP└ WKH└ 5HSXEOLFDQ└ $VVRUGH\└ *HQHUDOV└ $VVRFLDWLRQ└ GXULQJ└ D└ WLPH└ WKDW└ \RX└ ZHUH└ DQ└ H[HFXWLYH└ FRPPLWWHH└ PHPEHU└ RI└ WKH└ $VVRUGH\└ *HQHUDOV└ $VVRFLDWLRQ└ PHHWLQJ└ DW└ WKH└ *UHHQEULHU☼└ ZKLFK└ ,└ ZLOO└ \WLSXODWH└ IRU└ P\└ IULHQG└ IURP└ :HVW└ 9LUJLQLD☼└ LV└ D└ CRYHD\└ SODFH└ WR└ JR◀

$QG└ WKH└ DJHQGD└ ZKLFK└ ,G└ OLNH└ WR└ WDNH└ WKLV└ SDJH└ RI└ DQG└ SXW└ LQWR└ WKH└ UHFRUG☼└ PHQWLRQV└ D└ SULYDWH└ PHHWLQJ└ ZLWK└ 0XUUD\└ (QHUJ\◀└ ,W└ PHQWLRQV└ D└ SULYDWH└ PHHWLQJ└ ZLWK└ 6RXWKHUQ└ &RPSDQ\◀└ ,W└ PHQWLRQV└ D└ SULYDWH└ PHHWLQJ└ ZLWK└ WKH└ $PHULFDQ└)XHO└ 3HWUROHXPLFDO└ 0DQXIDFWXUHUV◀

,I└ \RXOO└ VKRZ└ WKH└ JUDSKLF☼└ WKHVH└ DUH└ DOO└ WKH└ VDPH└ JURXSV└ WKDW└ ,YH└ EHHQ└ DVNLQJ└ DERXW└ LQ└ WHUPV└ RI└ \RXU└ IXQG└ UDLVLQJ└ IRU└ WKH└ 5XCH└ RI└ /DZ└ 'HIHQVH└)XQG☼└ DQG└ \RX└ NQRZ☼└ WKHUHV└ 0XUUD\└ (QHUJ\☼└ DQG└ WKHUHV└ 6RXWKHUQ└ &RPSDQ\☼└ DQG└ ,P└ VXUH└ WKH└ $PHULFDQ└)XHO└ 3HWUROHXPLFDO└ 0DQXIDFWXUHUV└ UHSUHVHQW└ D└ CRW└ RI└ WKH└ RWKHUV◀

$V└ ,└ XQGHUVWDQG└ LW☼└ ZH└ NQRZ└ CRWKLQJ☼└ QR└ PLQXWHV☼└ QR└ WDWHPHQW☼└ QR└ UHSRUW└ DERXW└ ZKDW└ WRRN└ SODFH└ LQ└ WKRVH└ PHHWLQJV└ WKDW└ DUH└ GHVFULEHG└ DV└ SULYDWH└ PHHWLQJV└ RQ└ D└ VKHW└ WKDW└ LV└ WDPSHG☼└ FRQILGHQWLDO◀└ &RUUHFW'└ :H└ NQRZ└ CRWKLQJ└ DERXW└ WKH└ FRQWHQW└ RI└ WKRVH└ PHHWLQJV☼└ VR└ ◀◀◀

358,77└

6HQDWRU☼└ ,└ GLGQW└ JHQHUDWH└ WKH└ GRFXPHQW◀└ ,└ NQRZ└ CRWKLQJ└ DERXW└ WKH└ ┼┼└ KRZ└ WKDW└ GRFXPHQW└ JRW└ JHQHUDWHG└ RU└ ZKDW└ ◀◀◀

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$UH└ \RX└ GHQ\LQJ└ WKDW└ WKRVH└ SULYDWH└ PHHWLQJV└ WRRN└ SODFH"

358,77└

1R☼└ 6HQDWRU◀└ ,└ MXVW└ GLGQW└ JHQHUDWH└ WKH└ GRFXPHQW◀└ $QG└ GRQW└ NQRZ└ DERXW└ /KH└ FRQWHQW└ RI└ WKHP☼└ ZKLFK└ \RXYH└ UHSUHVHQWHG◀

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2.☼└ DQG└ ZH└ GRQW└ NQRZ└ DQG└ EHFDXVH└ \RX└ ZHUH└ RQ└ WKH└ H[HFXWLYH└ FRPPLWWHH└ RI└ 5$*$☼└ WKDW└ LQIRUPDWLRQ└ WKDW└ ZH└ FRXOG└ JHW◀└ 5LJKW'└ ,└ PHDQ☼└ LW└ DYDLODEOH└ LI└ WKHUH└ ZHUH└ PLQXWHV└ RU└ UHSRUW└ RW└ RI└ WKRVH└ PHHWLQJV☼└ QRWHV└ WDNHQ☼└ EXW└ ZH└ GRQW└ KDYH└ WKHP◀└ &RUUHFW'

358,77 └
6HQDWRU└ WKDW└ ZRXOG└ EH└ D└ UHTXHVW└ PDGH└ WR└ WKH└ 5HSXEOLFDQ└ $WWRUQH\└
*HQHUDO└ $VVRFLDWLRQ◀ └ ,└ PLJKW└ DGG└ WKH└ 5HSXEOLFDQ└ $WWRUQH\└ *HQHUDO└
$VVRFLDWLRQ└ WKHUHV└ D└ 'HPRFUDW└ $WWRUQH\└ *HQHUDO└ $VVRFLDWLRQ└ DV└ ZHOO◀

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,P└ ┼ ┼ └ ,P└ QRW└ IDXOWLQJ└ WKDW◀ ◀ ◀

358,77 └
$QG└ WKH\└ KDYH└ WKH└ VDPH└ NLQG└ RI└ WKLQJ└ ◀ ◀ ◀

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,P└ WDONLQJ└ DERXW└ SULYDWH└ PHHWLQJV└ WKDW└ ◀ ◀ ◀

358,77 └
6R└ WKHVH└ PHHWLQJV└ ┼ ┼ └ WKHVH└ PHHWLQJV└ WDNH└ SODFH└ DOO└ RI└ WKH└ WLPH└ ◀ ◀ ◀

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◀ ◀ ◀ └ DW└ D└ WLPH└ WKDW└ \RX└ ZHUH└ RQ└ WKH└ H[HFXWLYH└ FRPPLWWHH└ ZLWK└ VRPH└ RI└ WKH└
UHDOO\└ UHDOO\└ ELJ└ SROOXWHUV└ ZLWK└ ZKRP└ \RXYH└ EHHQ└ YHU\└ FORVHO\└ SROLWLFDOO\└
DVVRFLDWHG◀

358,77 └
7KHUHV└ D└ ┼ ┼ └ WKHUHV└ D└ FRQIHUHQFH└ └ ,└ PD\└ 6HQDWRU└ RI└ :HVWHUQ└ $WWRUQH\└
*HQHUDO└ ◀ ◀ ◀

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,└ NQRZ◀

358,77 └
◀ ◀ ◀ └ WKDW└ JRHV└ E\└ WKH└ 1DWLRQDO└ $VVRFLDWLRQ└ ◀ ◀ ◀

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7KH\└ WDON└ DERXW└ ZDWHU◀ └ 'ULYHV└ WKDW└ ZKDW└ WKH\└ ◀ ◀ ◀

358,77 └

$QG└ WKHUH└ DUH└ PHHWLQJV└ WKDW└ WDNH└ SODFH└ DW└ HDFK└ RI└ WKRVH└ HYHQWW└ └ DV└ ZHOO◀

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7KH└ UHWW└ RI└ WKH└ DWWRUQH\└ JHQHUDOV└ DYRLG└ WKDW└ └ VR└ ZH└ GRQW└ ZDQW└ WR└ WDON└ DERXW└ ZDWHU◀ └ /HW└ WDON└ DERXW└)2,$◀ └ <RXYH└ KDG└ D└ FRQYHUVDWLRQ└ ZLWK└ WKH└ &KDLUPDQ└ DERXW└)2,$◀ └ $V└ ,└ XQGHUWDQG└ LW└ └ WKHUH└ LV└ D└)2,$└ UHTXHWW└ WR└ WKH└ 2NODKRPD└ $WWRUQH\└ *HQHUDOV└ RIILFH└ └ WR└ \RXU└ RIILFH└ IRU└ HPDLOV└ EHWZHHQ└ \RXU└ RIILFH└ DQG└ 'HYDQ└ (QHUJ\└ DQG└ .RFK└ ,QGXVWULHV└ DQG└ $PHULFDQV└ IRU└ 3URVSHULW\└ └ WKH└ .RFK└ IURQW└ JURXS└ DQG└ 0XUUD\└ (QHUJ\└ DQG└ WKH└ $PHULFDQ└ 3HWUROHXP└ ,QVWLWXWH◀

$QG└ WKH└ LQIRUPDWLRQ└ WKDW└ ,└ KDYH└ LV└ └ LV└ WKDW└ └ WKDW└ RSHQHG└ UHFRUGV└ DFW└ UHTXHWW└ ZDV└ ILOHG└ PRUH└ WKDQ└ → ┤ !! └ GD\V└ DJR└ └ PRUH└ WKDQ└ WZR└ \HDUV└ DJR└ └ /KDW└ LQ└ UHVSRQVH└ WR└ LW└ └ \RXU└ RIILFH└ KDV└ FRQFHGHG└ WKDW└ WKHUH└ DUH└ ┬ └ !! !! !! └ UHVSRQVLYH└ GRFXPHQWW└ └ ┬ └ !! !! !! └ HPDLOV└ DQG└ RWKHU└ GRFXPHQWW└ EHWZHHQ└ \RXU└ RIILFH└ DQG└ WKHVH└ FRPSDQLHV◀

$QG└ WKDW└ LQ└ → ┤ !! └ GD\V└ H[DFWO\└]HUR└ RI└ WKRVH└ GRFXPHQWW└ KDYH└ EHHQ└ SURGXFHG◀ └ ,V└ WKDW└ DFFHSWDEOH└ WXUQDURXQG└ RQ└ D└)2,$└ UHTXHWW"└ $QG└ VKRXOG└ ZH└ GRW└ EH└ FRQFHUQHG└ WKDW└ \RXU└ RIILFH└ LV└ GRW└ FRPSO\LQJ└ ZLWK└ WKH└)2,$└ UHTXHWW└ WKDW└ UHDDWHV└ WR└ VSHFLILFDOO\└ WR└ VR└ PDQ\└ RI└ WKHVH└ FRPSDQLHV└ WKDW└ DUH└ JRLQJ└ WR└ EH└ EHIRUH└ \RX└ DV└ (3$└ DGPLQLWWUDWRU└ LI└ \RXUH└ FRQILUPHG"

358,77 └

6HQDWRU└ └ ZH└ DFWXDOO\└ KDYH└ ┼ ┼ └ ,└ DFWXDOO\└ KDYH└ D└ JHQHUDO└ FRXQVHO└ DQG└ DQ└ DGPLQLWWUDWRU└ LQ└ P\└ RIILFH└ WKDW└ DUH└ GHGLFDWHG└ WR└ SHUIRUPLQJ└ RU└ SURYLGLQJ└ UHVSRQVHV└ WR└ RSHQ└ UHFRUGV└ UHTXHWW└ ◀ ◀ ◀

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1RW└ YHU\└ GHGLFDWHG◀ └ ,I└ LW└ WDNHV└ → ┤ !! └ GD\V└ └ DQG└ LWW└ WWLOO└]HUR◀

358,77 └

$QG└ ┼ ┼ └ ,P└ QRW└ ┼ ┼ └ ,P└ QRW└ LQYROYHG└ LQ└ WKDW└ SURFHWV◀ └ 7KDW└ LV└ KDQGOHG└ LQGHSHQGHQWO\└ E\└ WKDW└ DGPLQLWWUDWRU└ DQG└ WKDW└ JHQHUDO└ FRXQVHO└ LQ└ UHVSRQGLQJ◀ └ 6R└ ,└ FDQW└ VSHDN└ WR└ WKH└ WLPHOLQH└ DQG└ ZK\└ LWW└ WDNHQ└ WKDW└ QHQJWK└ RI└ WLPH◀

%XW└ ,└ FDQ└ WHOO└ \RX└ WKDW└ RXU└ RIILFH└ ZRUNV└ ┼ ┼ └ ZH└ DFWXDOO\└ JR└ DFURVV└ WKH└ WDWH└
RI└ 2NODKRPD└ WKURXJK└ ┼ ┼ └ LQ└ WUDLQLQJ└ ZLWK└ RIILFLDOV└ CRFDOO\└ LQ└ FRPSOLDQFH└
ZLWK└)2,$└ DQG└ RSHQ└ UHFRUGV└ CDZ☼ └ VR└ ◀ ◀ ◀

♂ &52667$/.□

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:HOO☼ └ PD\EH└ \RX└ RXJKW└ WR└ VHQG└ \RXU└ SHRSOH└ WR└ \RXU└ RZQ└ WUDLQLQJ└
EHFDXVH└ LW└ GRHVQW└ VHHP└ WR└ EH└ WWLFNLQJ└ YHU\└ ZHOO◀

358,77 └
,P└ QRW└ VXUH└ ZKDW└ WKH└ ┼ ┼ └ WKH└ UHSUHVHQWDWLRQ└ \RX└ PDGH└ DERXW└ WKH└ WLPHOLQH☼ └
,P└ QRW└ ┼ ┼ └ ,└ GRQW└ NQRZ└ DQG└ WKDW└ ◀ ◀ ◀

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*LYHQ└ KRZ└ PDQ\└ RI└ WKHVH└ JURXSV└ KDYH└ LPSRUWDQW└ ILQDQFLDO└ LQWHUHWW└
EHIRUH└ WKH└ (3$☼ └ GR└ \RX└ QRW└ WKLQN└ WKDW└ ┬ ☼ !! !! !! └ HPDLOV└ EDFN└ DQG└ IRUWK└
EHWZHHQ└ \RX└ DQG└ \RXU└ RIILFH└ DQG└ WKHP└ DUH└ UHOHYDQW└ WR└ SRWHQWLDO└ FRQIOLFW└
RI└ LQWHUHWW└ DV└ DQ└ DGPLQLWWUDWRU└ DQG└ VKRXOG└ EH└ EHIRUH└ XV└ DV└ ZH└ FRQVLGHU└
WKLV"

358,7 └
$JDLQ☼ └ ,└ WKLQN└ WKH└ (3$└ RI└ WKLV└ FRXQVHO└ KDV└ CDLG└ D└ YHU\└ FOHDU└ SURFHVV└ ZLWK└
UHVSHFW└ WR└ FRYHUHG└ HQWLWLHV☼ └ DV└ ZH└ GHVFULEHG└ LW└ HDUOLHU└ DQG└ RQ└ SDUWLFXODU└
PDWWHUV└ DQG└ VSHFLILF└ FDVHV☼ └ ,└ ZLOO└ IROORZ└ WKH└ DGYLFH└ RI└ WKDW└ (3$└ FDUHHU└
SHUVRQ└ HWKLFV└ WR└ PDNH└ VXUH└ WKDW└ WKHUH└ DUH◀ ◀ ◀

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<RX└ NHHS└ VD\LQJ└ WKDW└ DQG└ ◀ ◀ ◀

%$55$662 └
7KH└ 6HQDWRUV└ WLPH└ KDV└ H[SLUHG◀

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:DQW└ PH└ WR└ ILQLVK└ P\└ VHQWHQFH"

%$55$662 └
3CHDVH└ GR◀

:+,7(+286(└
7KH└ SUREOHP└ ZLWK└ WKDW└ LV└ WKDW└ LI└ \RX└ KDYHQW└ GLVFRVHG└ DQ\└ RI└ WKLV└
LQIRUPDWLRQ└ WKHQ└ WKH└ (3└ HWKLFV└ FRXQVHO└ ZRXOG└ KDYH└ QR└ LGHD└ WR└ HYHQ└
CRRN◀ └ 7KH\└ ZRXOG└ KDYH└ QR└ LGHD└ ZKDW└ WKH└ ULVNV└ DUH◀ └ <RX└ FDQW└ VD\└ └ QRERG\└
FDQ└ CRRN└ DW└ ZKHWKHU└ ,└ GLG└ WKLV└ └ EXW└ E\└ WKH└ ZD\└ └ WKH\UH└ JRLQJ└ WR└ CRRN└ DW└ LW◀ └
,W└ MXWW└ GRHQW└ DGG└ XS◀ └ 6RUU\└ └ DERXW└ WKH└ + + └ JRLQJ└ RYHU└ P\└ WLPH◀

%$55$662 └
7KDQN└ \RX◀ └ 7KDQN└ \RX└ 6HQDWRU◀ └ ,└ ZRXOG└ OLNH└ WR└ SRLQW└ RXW└ └ ZH└ KDG└ D└ UHSRUW└
FDUG└ WKDW└ ZDV└ MXWW└ EURXJKW└ XS└ DQG└ ,G└ OLNH└ WR└ LQWURGXFH└ IRU└ WKH└ UHFRUG└ D└
CHWWHU└ WR└ + + └ IURP└ HDFK└ RI└ WKH└ ILYH└ PHPEHUV└ RI└ &RQJUHVV└ IURP└ WKH└ WDWH└ RI└
2NODKRPD└ ZLWK└ WKHLU└ WWHDGIDWW└ UHSRUW└ IRU└ 6FRWW└ 3UXLWW└ └ LQ└ VD\LQJ└ └ | :H└ DUH└
SURXG└ RI└ KLV└ VHUYLFH└ WR└ RXU└ WDWH└ DQG└ DUH└ YHU\└ FRQILGHQW└ WKDW└ KH└ ZLOO└ GR└ D└
VXSHUE└ MRE└ VHUYLQJ└ RXU└ QDWLRQ└ DQG└ RXU└ FLWL]HQV└ LQ└ WKLV└ CHZ└ URCH◀ |

$OVR└ DV└ IROORZ└ XS└ IRU└ WKH└ ILUW└ URXQG└ RI└ TXHWWLRQV└ └ WKHUH└ ZDV└ VRPH└
GLVSXWH└ DERXW└ D└ CDZVXLW└ DJDLQW└ 0DKDUG└ (JJ└)DUP└ DQG└ ZKR└ LW└ ZDV└ ILCHG└
E\◀ └ ,└ KDYH└ KHUH└ WKH└ FRPSODLQW└ LQ└ WKH└ FDVH└ DQG└ LW└ ZDV└ ILCHG└ 0D\└ ¶ ← └ ⊥ !! ¶ ¶ ◀
&DQ└ \RX└ UHDG└ LW"

,W└ VD\V└ | $QG└ WKH└ WWDWH└ RI└ 2NODKRPD└ E\└ DQG└ WKURXJK└ $WWRUCH\└ *HCHUDO└
6FRWW└ 3UXLWW◀ | └ 6R└ \RX└ DUH└ WKH└ RCH└ WKDW└ ILCHG└ WKH└ VXLW└ DCRQJ└ ZLWK└ WKH└
DWWRUCH\└ JHCHUDO└ RI└ 7H[DV└ DJDLQW└ 0DKDUG└ (JJ└)DUP└ DQG└ WKLV└ ZLOO└ EH└
VXEPLWWHG└ IRU└ WKH└ UHFRUG└ DV└ ZHOO◀ └ 6HQDWRU└ &DSLWR"

&$3,72 └
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ 6LQFH└ WKH└ 5DQNLQJ└ 0HPEHU└ PHQWLRQHG└ WKDW└
0U◀ └ -RH└ *RIIPDQ└ KDG└ YLVLWHG└ └ ,└ FDOOHG└ WR└ WKH└ DWWHQWLRQ└ LQ└ EHMHHFKLQJ└ \RX└
WKDW└ ZKHQ└ \RXUH└ VXFFHWVIXOO\└ WKH└ DGPLQLWWUDWRU└ DW└ WKH└ (3$└ WKDW└ \RX└ ZLOO└
OLWWHQ└ WR└ HYHU\ERG\└ DQG└ FRPH└ WR└ WWDWHV└ WKDW└ DUH└ PRWW└ GLUHFWO\└ DIIHFWHG◀

+H└ PHQWLRQHG└ WKDW└ WKH└ DWWRFLDWHG└ DWWLWWDQW└ DGPLQLWWUDWRU└ KDG└ PDGH└ WKH└
CRQJ└ OLWW└ WKDW└ KH└ KDG└ VDLG◀ └ %XW└ ,└ ZRXOG└ OLNH└ WR└ SRLQW└ RXW└ FDUULILFDWLRQ◀ └ 7KH└
(3$└ DQQRXQFHG└ RQ└ 6HSWHPEHU└ + !! └ D└ GD\└ ,OO└ UHPHPEHU└ EHFDXVH└ WKDWW└
WKH└ ELUWKGD\└ RI└ P\└ \RXQJHWW└ FKLOG└ DQG└ WKH\└ DQQRXQFHG└ ZKHUH└ WKH\└ ZHUH└
JRLQJ└ IRU└ WKHLU└ OLWWHQLQJ└ VHWWLRQV◀

7KH└ ZHQW└ WR└ %RXWRQ◀ └ 7KH└ ZHQW└ WR└ 1HZ└ <RUN└ &LWW◀ └ 7KH└ ZHQW└ WR└
3KLODGHOSKLD◀ └ 7KH└ ZHQW└ WR└ $WODQWD◀ └ 7KH└ ZHQW└ WR└ 'HQYHU◀ └ 7KH└ ZHQW└ WR└
/HQH[D☼ └ .DQVDV☼ └ DQG└ , └ ZLVK└ RXU└ .DQVDV└ 6HQDWRU└ ZDV└ KHUH☼ └ ZKLFK└ ,YH└
ORRNHG└ XS└ DV└ D└ SDUW└ RI└ WKH└ .DQVDV└ &LWW└ PHWURSROLWDQ└ DUHD◀ └ 7KH└ ZHQW└ WR└
6DQ└)UDQFLVFR◀ └ 7KH└ ZHQW└ WR└ :DVKLQJWRQ└ '◀ &◀ └ 7KH└ ZHQW└ WR└ 'DOODV└ DQG└
/NH└ ZHQW└ WR└ 6HDWWOH☼ └ WKH└ ZHQW└ WR└ &KLFDJR◀

:K└ WWDWHV└ LQ└ WKH└ CDWW└ ILYH└ \HDUV└ KDV└ CRWW└ ¶ !! ☼ !! !! !! └ MREV☼ └ CRW└ ZKRO└
EHFDXVH└ RI└ WKLV└ EXW└ VRPH└ RI└ WKLV└ KDV└ + + └ SCD\V└ D└ CDUJH└ SDUW◀ └ $QG└ VR└ ,OO└ JR└
EDFN└ WR└ P└ RULJLQDO└ UHTXHWW└ WKDW└ WKH└ SHRSCH└ WKDW└ DUH└ DI IHFWHG└ E└ WKLV└
HQYLURQPHQWDOO└ DQG└ KHDOWK└ ZLVH└ DUH└ MXWW└ DV└ + + └ DUH└ MXWW└ DV└ LPSRUWDQW└ DV└
/NH└ SHRSCH└ ZKR└ WWDQG└ WR└ CRVH└ WKHLU└ MREV└ RYHU└ WKLV◀

:KR└ WKHQ└ DUH└ SOXQJHG└ LQWR└ SRYHUW◀ └ :KR└ WKHQ└ KDYH└ D└ KRSHCHWCHW└
DURXQG└ DQG└ LQ└ WKHLU└ FRPPXQLWLHV◀ └ :KR└ WKHQ└ EHFRPH└ DGGLFWHG└ WR└ GUXJV└
DQG└ RWKHU└ RSLRLGV"└ , └ PHDQ☼ └ LW└ MXWW└ D└ FDVFDGLQJ└ LWXHW◀ └ 7KHLU└ OLYHV└ DUH└
VXWW└ DV└ LPSRUWDQW◀ └ 6R└ WKDW└ P└ + + └ WKDW└ P└ SCHD└ RQ└ WKDW◀

1RZ☼ └ CDWW└ TXHWWLRQ└ IURP└ PH◀

&$53(5 └
0U◀ └ &KDLUPDQ☼ └ FRXOG└ , └ DVN└ XQDQLPRXV└ FRQVHQW└ UHTXHWW◀ └ ,I└ , + + └ VRUU└ IRU└
LQWHUUXSWLQJ◀ └ %XW└ WKH└ GRFNHW└ ZLWK└ UHVSHFW└ WR└ WKH└ RXWUHDFK└ WKDW└ WKH└ (3$└
GLG└ LQ└ FRQMXQFWLRQ└ ZLWK└ WKH└ &CHDQ└ 3RZHU└ 3CDQ☼ └ VKRZV└ IURP└ 2FWREHU└ + + └ ,└
/NLQN└ 2FWREHU└ ¶ ├ ☼ └ ┴ !! ¶ ┤ ☼ └ VRPHWKLQJ└ OLNH└ WKLV└ ◀ ◀ ◀

&$3,72 └
, └ ZDV└ WKHUH└ WKURXJK└ WKH└ OLWWHQLQJ└ VHWWLRQV◀

&$53(5 └
7KH└ GRFNHW└ UHTXLUHV└ CHDUD└ ¶ ☼ !! !! !! └ PHHWLQJV☼ └ FDCDV☼ └ SUHVHQWDWLRQV☼ └
FRQIHUHQFHV☼ └ FRQVXOWDWLRQV☼ └ ¶ ☼ !! !! !! └ LQ└ RWKHU└ RXWUHDFK└ ZLWK└ WWDNHKROGHUV◀ └
7KH└ GRFNHW└ VKRZV└ WKLV└ SRXW┼ SURSRVDO└ LQWHUDFWLRQV└ FRQFXGHG└ PRUH└ WKDQ└
┬ !! !! └ PHHWLQJV└ ZLWK└ WWDWH└ DQG└ CRFDO└ WWDNHKROGHUV└ ZKR└ KDG└ ┬ !! └ GLVFXWLRQV└
ZLWK└ SURGXFWW◀

)RXU└ KXQGUHG└ DQG└ ILIWW└ PHHWLQJV└ ZLWK└ LQGXWWU└ WWDNHKROGHUV☼ └ ¶ ↑ !! └
GLVFXWLRQV└ ZLWK└ HQYLURQPHQWDO└ + + └ HQYLURQPHQWDO└ MXWWLFH└ DQG└ VFLHQWLILF└
WWDNHKROGHUV☼ └ GR]HQV└ RI└ PRUH└ GLVFXWLRQV└ ZLWK└ FRQYHQHUV└ DQG└ WKLV└ JRHV└
RQ└ DQG└ RQ└ DQG└ RQ◀

7KH└ ┼ ┼ └ LQ└ WRWDO└ WKH└ DJHQF\└ UHFHLYHG└ DOPRXW└ ┤ ◀ ┬ └ PLOOLRQ└ FRPPHQW└ DERXW└ DOO└ DVSHFW└ RI└ WKH└ SURSRVH└ UXCH☼ └ PRUH└ WKDQ└ DQ\└ UXCH└ LQ└ (3$└ KLWRU\☼ └ DQG└ ΛKRXVDQGV└ RI└ SHRSCH└ SDUWLFLSDWHG└ LQ└ WKH└ DJHQF\V└ SXEOLF└ KHDULQJV☼ └ :HLGDUV☼ └ OLWWHQLQJ└ VHVVLRQV└ DQG└ VR└ IRUWK☼ └ DOO└ DFURVV└ WKH└ FRXQWU\◀ └ 7KH└ DJHQF\└ PDGH└ PDQ\└ UHYLVLRQV└ LQ└ WKH└ ILQDO└ UXCH└ DQG└ LQ└ UHVSRQVH└ WR└ WKRVH└ FRPPHQW◀ └ 7KDQN└ \RX◀

?$55$662 └
6HQDWRU☼ └ WKHQ└ ,G└ DVN└ WKDW└ WKH└ ┼ ┼ └ RQFH└ D└ TXHVWLRQHU└ WDUWW☼ └ WKH\└ EH└ DOORZHG└ WR└ FRQWLQXH└ EHFDXVH└ ZH└ FRXOG└ JHW└ LQWR└ D└ CHQJWK\└ GLVFXVVLRQ◀ └ 7KH└ (3$└ ZDV└ IRXQG└ JXLOW└ RI└ FRYHUW└ SURSDJDQGD└ IRU└ VROLFLWLQJ└ LQIRUPDWLRQ└ ΛKURXJK└ D└ QXPEHU└ RI└ HQYLURQPHQWDO└ JURXSV◀

,W└ ZDV└ D└ ┼ ┼ └ FRQWLQXHV└ WR└ EH└ D└ EOW└ RQ└ WKH└ UHFRUG└ RI└ WKH└ (3$└ DQG└ D└ TXHVWLRQ└ RI└ WKLV└ ┼ ┼ └ WKH└ HQWLUH└ $GPLQLWWUDWLRQ└ DQG└ WKHLU└ DSSURDFK└ WRZDUG└ DELOLWLHV└ RI└ WKH└ ┼ ┼ └ IRU└ WKH└ UXCH└ RI└ CDZ└ YHUVXV└ DQG└ (3$└ RXW└ RI└ FRQWUROO◀ └ 6R☼ └ ZHUH└ JRLQJ└ WR└ DOORZ└ WKH└ TXHVWLRQHU└ WR└ FRQWLQXH◀ └ $QG└ ,└ UHYHUW└ EDFN└ WR└ \RX☼ └ 6HQDWRU└ &DSLWR◀

&$3,72 └
7KDQN└ \RX☼ └ QRW└ WR└ EHDW└ D└ GHDG└ KRUVH☼ └ EXW└ WR└ WU\☼ └ ,QO└ VD\└ WKDW└ WKH└ $VVLWDQW└ $GPLQLWWUDWRU└ 0F.D\☼ └ ZKHQ└ VKH└ ZDV└ WHOOLQJ└ PH└ WKDW└ WKH└ RQO\└ RQH└ WR└ JR└ ZKHUH└ SCDFHV└ ZHUH└ FRPIRUWDEOH☼ └ VKH└ ORRNHG└ DW└ PH└ DQG└ VDLG☼ └ | 6HQDWRU☼ └ ZHUH└ JRLQJ└ LQWR└ 3LWWVEXUJK◀ |

*HH☼ └ WKDQNV└ D└ OW◀ └ ,Q└ DQ\└ HYHQW☼ └ ZKLFK└ LV└ QW└ LQ└ :HXW└ 9LUJLQLD☼ └ ,QO└ PDNH└ ΛKDW└ SRLQW☼ └ P\└ TXHVWLRQ└ LV☼ └ \RXYH└ VDLG└ D└ QW└ DERXW└ WWDWHV☼ └ DQG└ ,└ DJUHH◀ └ 7KH└ WWDWHV└ VKRXOG└ KDYH└ WKH└ SULPDF\☼ └ LVW└ LQ└ WKH└ CDZ☼ └ DQG└ WKDW└ VRPHWKLQJ└ ΛKDW└ SDUW└ RI└ ZK\└ \RX└ EURXJKW└ VXLW☼ └ DQG└ SDUW└ RI└ WKH└ UHDVRQ└ \RXYH└ EHHQ└ VXFFHVVIXO└ ZLWK└ RWKHU└ $WWRUQH\V└ *HQHUDO◀

/HW└ PH└ DVN└ \RX└ D└ TXHVWLRQ☼ └ CHW└ VD\└ \RX└ KDYH└ D└ WWDWH└ ZKHUH└ \RXUH└ WKH└ DGPLQLWWUDWRU└ RI└ WKH└ (3$☼ └ DQG└ \RX└ GHHP└ WKDW└ WKDW└ WWDWHV└ 2II ILFH└ RI└ (QYLURQPHQWDO└ 4XDOLW\└ RU└ '(3☼ └ ZKLFK└ LV└ ZKDW└ LW└ LV└ LQ└ :HXW└ 9LUJLQLD☼ └ MXW└ GRHVQW└ PHDVXUH└ XS◀ └ 7KH\UH└ QW└ SUWHFWLQJ└ WKHLU└ SHRSCHV└ KHDOWK◀ └ 7KH\UH└ QW└ HQIRUFLQJ└ WKH└ CDZ◀

7KH└ DUH└ LQ└ \RXU└ MXGJPHQW└ DQG└ IRONV└ WKDW└ \RXUH└ ZRUNLQJ└ ZLWK└ DUH└ QRW└ XS└ WR└ WKH└ WDVN└ DQG└ DUH└ CHWWLQJ└ WKHLU└ SHRSCH└ GRZQ◀ └ :KDW└ DYHQXHV└ RI└ FRUUHFWLRQ└ ZRXOG└ \RX└ KDYH└ DW└ WKH└ (3$└ GR└ \RX└ KDYH└ DQG└ ZKDW└ ZRXOG└ \RX└ H[HUFLVH└ LQ└ WKDW└ NLQG└ RI└ FDWHJRU\"└ $QG└ ZKDW└ NLQG└ RI└ MXGJPHQW└ ZRXOG└ KDYH└ WR└ EH└ PDGH└ IRU└ WKRVH└ WKLQJV└ WR└ RFFXU"

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6HQDWRU└ , └ UHDOO└ DSSUHFLDWH└ WKH└ TXHVWLRQ◀ └ %HFDXVH└ , └ WKLQN└ WKHUH└ DUH└ /LPHV└ ZKHUH└ WDWWHV└ DUH└ ♂ LQDXGLECH□◀ └ <RX└ NQRZ└ WKDW└ WKH└ GRQW└ SHUIRUP└ /KH└ REOLJDWLRQV└ WKDW└ WKH└ KDYH└ CHW└ VD└ XQGHU└ WKH└ &CHDQ└ $LU└ $FW└ LQ└ DGRSWLQJ└ WDWH└ LPSCHPHQWDWLRQ└ SODQ◀ └ 2U└ DV└ WKH└ DGRSW└ WKH└ WDWH└ LPSCHPHQWDWLRQ└ SODQ└ WKH└ GRQW└ WDNH└ LQWR└ FRQVLGHUDWLRQ└ DOO└ WKH└ IDFWRUV└ /KDW└ &RQJUHW└ KDYH└ SXW└ LQ└ WKH└ WDWXWH└ DQG└ WKH└ (3$└ UHTXLUHV◀

,Q└ WKRVH└ LQWDQFHV└ LVW└ YHU└ DSSURSULDWH└ IRU└ WKH└ (3$└ WR└ XVH└ LVW└ DXWKRULW└ D└ IHGHUDO└ LPSCHPHQWDWLRQ└ SODQ└ WR└ WDNH└ RYHU└ WKDW└ MXULVGLFWLRQ└ DQG└ WR└ LQVXUH└ WKDW└ WKH└ VDIHW└ DQG└ KHDOWK└ RI└ RXU└ FLW]HQV└ LV└ SURWHFWHG└ DQG└ DLU└ TXDOLW└ LV└ PDLQWDLQHG└ DQG└ ZDWHU└ TXDOLW└ LV└ PDLQWDLQHG◀ └ 6R└ WKHUH└ LV└ D└ WLPH└ DQG└ SODFH└ IRU└ WKDW◀

,└ WKLQN└ LQ└ PDQ└ LQWDQFH└ KRZHYHU└ WKH└ CDW└ VHYHUDO└ \HDU└ LVW└ EHHQ└ WKH└ ILUW└ UHVSRQVH└ DV└ RSSRVHG└ WR└ \RX└ NQRZ└ FRRSHUDWLRQ└ DQG└ D└ IHGHUDO└ LPSCHPHQWDWLRQ└ SODQ└ LV└ DEVROXWHO└ LQ└ RUGHU└ DW└ WLPHV◀ └ %$55$662 └ 6HQDWRU└ 0HUNCH└ 0(5./(< └ 0U◀ └ &KDLUPDQ└ EHIRUH└ \RX└ WDUW└ P└ FORFN└ ,G└ OLNH└ WR└ IROORZ┼ └ XS└ RQ└ 6HQDWRU└ ,QKRIHV└ WWUDWHJ└ KHUH└ RI└ VXEPLWWLQJ└ FHUWDLQ└ IDFW└ EDFN└ IRU└ WKH└ UHFRUG◀ └ $QG└ ,G└ DVN└ XQDQLPRXV└ FRQVHQW└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ DQ└ DUWLFCH└ IURP└ WKH└ 8QLRQ└ RI└ &RCFHUCHG└ 6FLHQWLWW└ UHCDWHG└ WR└ WKH└ VR┼ FDOCHG└ &OLPDWH└ *DWH◀ └ 7KDW└ WKH└ 6HQDWRU└ UHIHUUHG└ WR└ HDUOHU◀

$QG└ WKDW└ QRWHV└ WKDW└ WKH└ PDQXIDFWXUHG└ FRQWUYHUV└ RYHU└ HPDLOV└ WWRCHQ└ IURP└ WKH└ 8QLYHUVLW└ KDV└ JHCHUDWHG└ D└ CRW└ RI└ KHDW└ EW└ QRW└ OLJKW◀ └ (PDLO└ FRQWHQW└ EHLQJ└ TXRWHG└ GRHV└ QRW└ LQGLFDWH└ FOLPDWH└ GDWD└ UHVHDUFK└ KDV└ EHHQ└ FRPSURPLVHG◀

0RWW└ LPSRUWDQWO└ QRWKLQJ└ LQ└ WKH└ FRQWHQW└ RI└ WKHVH└ WWRCHQ└ HPDLOV└ KDV└ DQ└ LPSDFW└ RQ└ RXU└ RYHUDOO└ XQGHUWDQGLQJ└ RI└ KXPDQ└ DFWLYLWLHV└ GULYLQJ└ GDQJHUXV└ CHYHDV└ RI└ JCREDO└ ZDUPLQJ◀ └ 0HGLD└ UHSRUW└ DQG└ FRQWUDU└ FODLPV└ /KDW└ WKH└ GR└ DUH└ LQDFFXUDWH◀ └ 6R└ , └ VXEPLW└ WKDW└ ┼ ┼

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:LWKRXW└ REMHFWLRQ◀

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┼ ┼ └ IRU└ WKH└ UHFRUG◀ └ 7KDQN└ \RX◀ └ ,G└ DOVR└ OLNH└ ┼ ┼

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7KLV└ &KDLUPDQ└ VLQFH└ P\└ QDPH└ LV└ LQYROYHG└ CHW└ PH└ UHVSRQG◀ └ :HUH└ \RX└
OLWWHQLQJ└ ZKHQ└ ,└ WDONHG└ DERXW└ WKH└ YDULRXV└ SXEOLFDWLRQV└ WKDW└ KDYH└ FRPH└
RXW└ DQG└ WDONHG└ DERXW└ KRZ└ IUDXGXOHQW└ LW└ ZDV└ WKHVH└ DUH└ SXEOLFDWLRQV└
VFLHQFH└ SXEOLFDWLRQV└ KDYH└ JRQH└ LQ└ PDQH└ WKHLU└ RZQ└ HYDOXDWLRQV└ DQG└ IRU└
WKH└ 8◀ .◀ └ 7HCHJUDSK└ WR└ VD\└ LW└ WKH└ ZRUW└ VFLHQWLILF└ VFDQGDO└ IRU└ RXU└
JHQHUDWLRQ└ WKHQ└ WKDW└ SUHWW\└ H[WUHPH"

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0\└ FROOHDJXH└ ZH└ FRXOG└ KDYH└ DQ└ HQWLUH└ GD\└ GHGLFDWHG└ WR└ WKH└ UHYLHZ└ RI└
WKH└ VFLHQWLILF└ OLWHUDWXUH└ RQ└ WKLV└ DQG└ ,└ ┼ ┼ └ LW└ ZRXOG└ ZHLJK└ YHU\└ KHDYLO\└ RQ└ WKH
VFDOHV└ LQ└ WKH└ GLUHFWLRQ└ ,YH└ LQGLFDWHG└ LQ└ VXSSRUW└ RI└ WKH└ LQIRUPDWLRQ└
SUHVHQWHG└ E\└ WKH└ 8QLRQ└ RI└ &RQFHUQHG└ 6FLHQWLWWW◀ └ :H└ PD\└ MXWW└ KDYH└ WR└
DJUHH└ WR└ GLVDJUHH◀ └ 7KDW└ ZK\└ ,└ VXEPLWWHG└ LW└ IRU└ WKH└ UHFRUG◀ └ :HOO└ CHW└ WKH└
SXEOLF└ GHFLGH◀

♂ 81.12:1□ └
7KDW└ ZK\└ WKH└ WWDWHPHQW└ LV└ UHSHDWHG└ RYHU└ DQG└ RYHU└ DJDLQ└ DERXW└ WKH└
VFLHQFH└ LV└ VHWWOHG└ LV└ QRW└ DQ└ DFFXUDWH└ WWDWHPHQW◀

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,G└ LQYLWH└ WKH└ 6HQDWRU└ WR└ TXHVWLRQ└ WKH└ ZLWQHVV◀

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7KH└ EHDXW\└ RI└ WKH└ 6HQDWH└ LV└ ZH└ JHW└ WR└ KDYH└ RXU└ RZQ└ RSLQLRQV◀ └
0HDQZKLOH└ ,G└ DOVR└ OLNH└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ LQ└ UHVSRQVH└ WR└ ZKHQ└ ,└
ZDV└ VSHDNLQJ└ DERXW└ DWWKPD└ 0U◀ └ &KDLUPDQ└ \RX└ QRWHG└ D└ WWXG\└ IURP└ WKH└
1DWLRQDO└ %DDFN└ &KDPEHU└ RI└ &RPPHUFH◀

$QG└ LW└ LPSRUWDQW└ WR└ QRWH└ WKDW└ WKDW└ RUJDQL]DWLRQ└ KDV└ EHHQ└ IXQGHG└ E\└ WKH└
$PHULFDQ└ 3HWUROHXP└ ,QVWLWXWH└ E\└ D└ .RFK└ %URWKHUV└ IURQW└ JURXS└ └ DQG└ E\└
([[RQ◀ └ $QG└ WKDW└ WKHUH└ LV└ D└ VHULHV└ RI└ UHVSRQVHV└ WKDW└ LQYRNH└ WKH└ RSSRVLWH└
VLGH└ RI└ WKDW└ DQG└ WKH└ 1$&3└ └ ZKLFK└ FHUWDLQ└ VSHDNV└ IRU└ D└ EURDG└ VZDWKH└
RI└ $IULFDQ└ $PHULFDQV└ └ WDNHV└ D└ YHU└ └ YHU└ GLIIHUHQW└ WDQFH└ └ DQG└ LW└ KDV└
HQGRUVHG└ WKH└ &HDQ└ ┼ ┼

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:LWKRXW└ REMHFWLRQ◀

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7KDQN└ \RX◀ └ ,G└ DVR└ OLNH└ WR└ VXEPLW└ IRU└ WKH└ UHFRUG└ └ WZR└ DUWLFOHV└ ┼ ┼ └ RU└ WZR└
WXDWHPHQW└ IURP└ WKH└ 1DWLRQDO└ &RQJUHVV└ RI└ $PHULFDQ└ ,QGLDQV└ └ DQG└ IURP└
/DWLQR└ RUJDQL]DWLRQV└ ┼ ┼ └ D└ ZKRH└ JURXS└ RI└ /DWLQR└ 2UJDQL]DWLRQV└ └ WKDW└ DUH└
YHU\└ FRQFHUQHG└ DERXW└ WKLV└ QRPLQDWLRQ◀

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:LWKRXW└ REMHFWLRQ◀

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7KDQN└ \RX└ YHU\└ PXFK└ └ 0U◀ └ &KDLUPDQ◀ └ $QG└ WKHQ└ ,G└ OLNH└ WR└ WXUQ└ WR└ D└
TXHVWLRQ└ WKDW└ KDV└ SX]]HG└ PH└ RYHU└ WLPH└ └ DQG└ LW└ LQ└ WKH└ FRQWH[W└ RI└ KRZ└
RQH└ HYDOXDWHV└ KRZ└ RQH└ YLHZV└ WKH└ ZRUOG◀

$QG└ ,└ KHDUG└ RQH└ RI└ P\└ FROOHDJXHV└ RQFH└ SUHVHQW└ LW└ WKLV└ ZD\└ └ LI└ \RX└ JR└ WR└ D└
GRFWRU└ DQG└ WKH\└ VD\└ \RX└ KDYH└ FDQFHU└ └ \RX└ GHFLGHG└ \RX└ EHWWHU└ JHW└ D└
VHFRQG└ RSLQLRQ└ └ DQG└ WKHQ└ \RX└ JR└ WR└ ¶ !! !! └ GRFWRUV└ DQG└ → └ RI└ WKHP└ VD\└ \RX└
KDYH└ FDQFHU└ DQG└ \RX└ EHWWHU└ DFW└ └ FRW└ SHRSOH└ IHHO└ OLNH└ KPPP└ └ → └
GRFWRUV└ WROG└ PH└ ,└ VKRXOG└ DFW◀

7KHH└ WROG└ PH└ ,└ VKRXOG└ JR└ WDNH└ VRPH└ KHDOWKFDUH└ VXSSOHPHQW◀ └ 0D\EH└ ,└
EHWWHU└ KDYH└ WKH└ RSHUDWLRQ◀ └ $QG└ WKDW└ UHDOO\└ WKH└ SDFH└ ZKHUH└ ZH└ DUH└ LQ└
FOLPDWH└ VFLHQFH└ GRZ└ └ ZKHUH└ WKH└ RYHUZKHOPLQJ└ ZHLJKW└ RI└ WKH└ VFLHQWLILF└
FRPPXQLW\└ ZHLJKV└ LQ└ DQG└ VD\V└ └ | <HV└ └ LW└ YHU\└ CRJLFDO◀ | └ <RX└ FDQ└ GR└ LW└ LQ└ D└
CDERUDWRU\└ └ DV└ 6HQDWRU└ :KLWHKRXVH└ GRWHG└ └ WKDW└ FDUERQ└ GLR[LGH└ WUDSV└
KHDW◀

<RX└ FDQ└ GR└ LW└ LQ└ D└ CDERUDWRU└└ WKDW└ PHWKDQH└ WUDSV└ KHDW◀ └ <RX└ FDQ└ WUDFN└ WKH└ FKDQJH└ LQ└ WKH└ HQYLURQPHQW└ RI└ WKH└ FRQFHQWUDWLRQ└ RI└ WKRVH└ JDVHV◀ └ <RX└ FDQ└ VHH└ WKH└ LPSDFW└ RQ└ WKH└ JURXQG└ QRZ◀ └ 0└ KRPH└ WDWH└ \RX└ KDYH└ DQ└ LPSDFW└ RQ└ WKH└ R└WHUV└ EHFDXVH└ WKH└ 3DFLILF└ 2FHDQ└ LV└ ┬ !! └ SHUFHQW└ PRUH└ DFLGLF└ WKDQ└ LW└ ZDV└ EHIRUH└ ZH└ WDUWHG└ EXUQLQJ└ FRDO◀

7KDW└ LV└ D└ VFDU└└ WKLQJ└ ZKHQ└ VKHDOILVK└ KDYH└ WUXXECH└ IRUPLQJ└ VKHDOV◀ └ ,W└ KDV└ DQ└ HFFRQPLF└ LPSDFW◀ └ 2XU└ SLQH└ EHHWCHV└ DUH└ WKULYLQJ└ EHFDXVH└ WKH└ ZLQWHUV└ QRW└ FROG└ HQRXJK└ WR└ NLOO└ WKHP☼ └ DQG└ VR└ LWW└ KDYLQJ└ D└ KXJH└ LPSDFW└ RQ└ RXU└ IRUHWW◀ └ 7KDW└ DQ└ HFFRQPLF└ LPSDFW└ RQ└ UXUDO└ $PHULFD◀ └ 7KH└ VRWWKHUQ└ SDUW└ RI└ P└ WDWH└ KDV└ KDG└ WKUHH└ ZRUWW└ HYHU└ GURXJKWW└ LQ└ WKH└ CDWW└ ¶ ↑ └ \HDUV◀

,W└ LV└ D└ KXJH└ LPSDFW└ RQ└ DJULFXOWXUH└ FRPPXQLWW◀ └ 7KH└ WWUHDPV└ LQ└ 2UHJRQ└ FRPLQJ└ IURP└ WKH└ VQRZ└ SDFNW☼ └ KDYH└ EHHQ└ GHFOLQLQJ└ LQ└ VL]H└ DQG└ UDLVLQJ└ LQ└ WHPSHUDWXUH└ ┼ ┼ └ YHU└ EDG└ IRU└ WURXW☼ └ YHU└ EDG└ IRU└ VDOPRQ└ ┼ ┼ └ WKDW└ DQ└ LPSDFW└ RQ└ RXU└ ILVKLQJ└ FRPPXQLWW◀

6R└ WKH└ JOREDO└ ZDUPLQJ└ WKDW└ LV└ WDNLQJ└ SODFH└ DQG└ EHLQJ└ GULYHQ└ E└ WKH└ EXUQLQJ└ RI└ IRWLO└ IXHDV└ LV└ KDYLQJ└ D└ KXJH└ HFFRQPLF└ LPSDFW└ RQ└ WKH└ FLWL]HQV└ RI└ P└ WDWH◀ └ 0└ UXUDO└ FLWL]HQV◀ └ 0└ FLWL]HQV└ ZKR└ GHSHQG└ RQ└ WLPEHU☼ └ ZKR└ GHSHQG└ RQ└ ILVKLQJ☼ └ ZKR└ GHSHQG└ RQ└ IDUPLQJ◀ └ 6KRXOG└ WKH└ FLWL]HQV└ VHHN└ WR└ DGGUHW└ WKLV└ SURECHP"└ %HFDXVH└ ZHUH└ MXWW└ RQ└ WKH└ IURQW└ HQG└ RI└ WKLV└ KDSSHQLQJ◀

7HQ└ \HDUV└ DJR└ ZH└ ZHUH└ WDONLQJ└ DERXW└ PRGHDV└ WKDW└ CHG└ WR└ WKH└ FRQYHUWDWRU└ 6HQDWRU└ ,QKRIH└ KDG└ DERXW└ &OLPDWH└ *DWH☼ └ DERXW└ SUHWWLQJ└ ZLWK└ DWXPSWLRQV└ DQG└ PRGHDV☼ └ ZH└ GRQW└ CHHG└ PRGHDV└ QRZ◀ └ :H└ KDYH└ IDFW└ RQ└ WKH└ JURXQG◀ └ 7KH└ PRRVH└ DUH└ G\LQJ└ EHFDXVH└ WKH└ WLFNV└ DUHQW└ EHLQJ└ NLOCHG└ E└ WKH└ ZLQWHU└ EHLQJ└ FROG└ HQRXJK◀

7KH└ ILVK└ DUH└ PLJUDWLQJ└ RQ└ WKH└ $WODQWLF└ FRDWW└ DQG└ 0DLQHW└ QRWLQJ└ LWW└ CREWWHUV└ WR└ &DQDGD◀ └ 7KHVH└ IDFW└ RQ└ WKH└ JURXQG└ DUH└ H[WUDRUGLQDULO└ UHDO☼ └ WKH└ KDYH└ D└ KXJH└ HFFRQPLF└ LPSDFW◀ └ $QG└ VKRXOGQW└ ZH└ WDNH└ D└ YHU└ VHULRXV└ DSSURDFK└ WR└ WKH└ XUJHQF└ RI└ WKLV└ SURECHP└ DV└ ZH└ VHH└ LW└ GHVFHQGLQJ└ XSRQ└ XV"

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6HQDWRU☼ └ ,└ WKLQN└ WKH└ (3$☼ └ DQG└ LI└ FRQILUPHG└ DV└ WKH└ $GPLQLWWUDWRU☼ └ WKHUHV└ FXUUHQWO└ DQG└ REOLJDWLRQ└ WR└ GHDO└ ZLWK└ WKH└ LWXH◀ └ 7KH└ 0DWDFKXWHWW└ 9(3$└ FDVH└ VD└└ WKDW└ &2└ └ LV└ D└ SRODXWDQW└ XQGHU└ WKH└ &HDQ└ $LU└ $FW☼ └ DQG└ DV└ VXFK☼ └ WKDW└ ZKDW└ JHCHUDWHG└ WKH└ ┴ !! !! └ (QGDQJHUHPHQW└)LQGLQJ◀

6R└ , └ WKLQN└ WKHUH└ LV└ D└ CHJDO└ REOLJDWLRQ└ SUHVHQWO\└ IRU└ WKH└ (3$└ $GPLQLWWUDWRU└ /R└ UHVSRQG└ WR└ WKH└ &2└ └ LVVXH└ WKURXJK└ SURSHU└ UHJXODWLRQV◀

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, └ EHOLHYH└ \RXUH└ DFNQRZOHGJLQJ└ WKDW└ ZKLFK└ ,P└ JODG└ WR└ KHDU└ WKDW└ LW└ LV└ D└ VHULRXV└ SURECHP└ DQG└ WKDW└ WKH└ (3$└ WKDW└ FDUERQ└ GLR[LGH└ LV└ D└ SRONXWDQW└ DQG└ ZH└ KDYH└ D└ CHJDO└ REOLJDWLRQ└ WR└ WDNH└ LW└ RQ◀

358,77 └
, └ WKLQN└ 0DVVDFKXVHWW└ 9(3$└ VD\└ WKDW└ FRXQWHU┼ EDDDQFHG└ E\└ WKH└ 85└ GHFLVLRQ└ WKDW└ FDPH└ RXW└ D└ IHZ└ \HDUV└ DDWHU└ WKDW└ \RX└ FDQW└ WUDQVIRUP└ D└ WWDWXWH└ DV└ WKH└ (3$└ VRXJKW└ WR└ GR└ ZLWK└ WKH└ 36'└ SURJUDP◀ └ 6R└ , └ WKLQN└ WKH└ FRXUW└ KDV└ VSRNHQ└ HPSKDWLFDOO\└ DERXW└ WKLV└ LVVXH└ DQG└ WKH└ (3$└ KDV└ D└ CHJDO└ REOLJDWLRQ└ WR└ UHVSRQG◀

0(5./(< └
$QG└ DV└ \RX└ NLQG└ RI└ UDQN└ WKH└ XUJHQF\└ ZLWK└ ZKLFK└ \RX└ EULQJ└ WR└ WKLV└ GR└ \RX└ VHH└ LW└ DV└ VRPHWKLQJ└ \RX└ ZDNH└ XS└ HYHU\└ GD\└ ┼ ┼ └ WKH└ GH[W└ JHQHUDWLRQ└ ZLOO└ ZHLJK└ ZKHWKHU└ RU└ QRW└ ZH└ DFWHG└ SURPSWO\└ RU└ LV└ LW└ PRUH└ , └ KDYH└ D└ CHJDO└ REOLJDWLRQ└ EHFDXVH└ RI└ WKLV└ FRXUW└ GHFLVLRQ└ VR└ ,OO└ KDYH└ WR└ KDYH└ VRPH└ IRONV└ SD\└ VRPH└ DWWHQWLRQ└ WR└ LW'

358,77 └
, └ WKLQN└ WKH└ LPSRUWDQFH└ 6HQDWRU└ LVW└ YHU\└ GLIILFXOW└ WR└ SULRULWL]H└ \RX└ NQRZ└ 6HQDWRU└ -LOO└ /H%U\DQV└ ♂ SK□ └ QRW└ KHUH└ EXW└ ZKHQ└ VKH└ WDONHG└ WR└ PH└ DERXW└ ♂ LQDXGLECH□ └ DQG└ WKH└ WKUHDW└ WKDW└ VKHV└ IDFLQJ└ LQ└ 1HZ└ <RUN└ LV└ WKDW└ DQ└ CHVV└ LPSRUWDQW└ WKDQ└ WKH└ &2└ └ LVVXH"

,W└ QRW◀ └ $QG└ VR└ WKH└ (3$└ GHDOV└ ZLWK└ YHU\└ ZHLJKW└ LVVXHV└ DV└ \RX└ NQRZ└ DWHU└ DQG└ DLU└ TXDOLW└ LW└ D└ PDWWHU└ RI└ SULRULWL]LQJ└ WKH└ UHVRXUFHV└ WR└ DFKLHYH└ EHWWHU└ RXWFRPHV└ LQ└ HDFK└ DQG└ , └ WKLQN└ LVW└ YHU\└ LPSRUWDQW└ WR└ GR└ VR└ DV└ DQ└ $GPLQLWWUDWRU◀

0(5./(< └

,└ GR└ IHHO└ OLNH└ SHUKDSV└ \RX└ GRQW└ XQGHUVWDQG└ WKH└ JUDYLW\└ RI└ WKH└ VLWXDWLRQ└
IURP└ \RXU└ UHVSRQVH◀ └ %HFDXVH└ WKHUH└ DUH└ IHHGEDFN└ PHFKDQLVPV└ WKDW└ DUH└
WDUWLQJ└ WR└ RFFXU└ ZLWK└ WKH└ RSHQ└ EOXH└ ZDWHU└ └ DQG└ WKH└ $UFWLF└ IHHGEDFN└ IURP└
PHWKDQH└ EXEEOLQJ└ XS└ IURP└ WKH└ SHUPDIURVW└ EXEEOLQJ└ XS└ IURP└ WKH└ SHDW└
ERJV◀

%XEEOLQJ└ XS└ IURP└ ZKDW└ ZDV└ SUHYLRXVO\└ IUR]HQ└ PHWKDQH└ RQ└ WKH└ ERWWRP└ RI└
WKH└ RFHDQ└ WKDW└ KDV└ LQFUHGLEO\└ DFFHOHUDWLQJ└ LPSDFW└ RQ└ JORREDO└ ZDUPLQJ◀ └
2XU└ UDWH└ RI└ FDUERQ└ GLR[LGH└ SRODXWLRQ└ LV└ GRW└ GHFUHDVLQJ└ JORREDOO\└ LW└ KDV└
GRXEOHG└ LQ└ UDWH└ IURP└ RQH└ SDUW└ SHU└ PLOOLRQ└ SHU└ \HDU└ └ WR└ WZR└ SDUWV└ SHU└
PLOOLRQ└ SHU└ \HDU◀

6R└ └ ZH└ DUH└ RQ└ DQ└ DFFHOHUDWLQJ└ FXUYH└ DV└ D└ KXPDQ└ FLYLOL]DWLRQ◀ └ ,I└ KXPDQ└
FLYLOL]DWLRQ└ GRHVQW└ JHW└ LW└ WRJHWKHU└ YHU\└ TXLFNO\└ └ ZH└ DUH└ LQ└ YHU\└ GHHS└
/URXEOH└ └ DQG└ ,└ ZRXOG└ KRSH└ WKDW└ DW└ VRPH└ SRLQW└ └ SHUKDSV└ WKH└ XUJHQF\└ RI└ WKH└
VLWXDWLRQ└ ZRXOG└ EH└ VRPHWKLQJ└ \RXOO└ JUDE└ D└ KROG└ RI◀ └ 7KDQN└ \RX◀

%$55$662 └
6HQDWRU└ 5RXQGV"

5281'6 └
7KDQN└ \RX└ └ 0U◀ └ &KDLUPDQ◀ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ └ CDW└ \HDU└ DW└ DQ└
RYHUVLJKW└ KHDULQJ└ └ ZH└ KHDUG└ UHSRUW└ RI└ WKH└ (3$└ UHJLRQDO└ RIILFHV└ ZKR└
ZHUH└ VHQGLQJ└ FRPSDQLHV└ LQIRUPDWLRQ└ FROOHFWLRQ└ UHTXHWW└ └ RU└ ,&5V◀ └
3XUVXDQW└ WR└ 6HFWLRQ└ ¶ ¶ ┤ └ RI└ WKH└ &HDQ└ $LU└ $FW└ └ UHJDUGLQJ└ WKHLU└ RSHUDWLRQV└
ZLWK└ QR└ H[SODQDWLRQ└ DV└ WR└ WKH└ UHDVRQV└ IRU└ WKH└ ,&5V◀

7KHVH└ ,&5V└ └ ZKLFK└ FRPSDQLHV└ DUH└ CHJDOO\└ REOLJDWHG└ WR└ UHVSRQG└ WR└ FDQ└
FRXW└ WKH└ FRPSDQLHV└ PLOOLRQV└ RI└ GROODUV└ WR└ FROOHFW└ WKH└ LQIRUPDWLRQ└ WR└
UHVSRQG└ WR└ WKH└ UHTXHWW◀ └ 7KH\└ RIWHQ└ KHDU└ QR└ IROORZ┤ XS└ IURP└ WKH└ (3$└
UHJDUGLQJ└ ZKHWKHU└ WKHLU└ UHVSRQVH└ ZDV└ DGHTXDWH└ └ RU└ ZKDW└ WKH└ LQIRUPDWLRQ└
ZRXOG└ EH└ XVHG└ IRU◀

/DWW└ \HDU└ ,└ UHTXHWWHG└ IURP└ WKH└ (3$└ └ D└ UHFRUG└ RI└ WKH└ ,&5V└ WKDW└ KDG└ EHHQ└
VHQW└ WR└ 8◀ 6◀ └ FRPSDQLHV└ WKURXJKRXW└ WKH└ YDULRXV└ UHJLRQV◀ └ ,└ ZDV└ WROG└ E\└ WKH└
(3$└ WDII└ └ WKDW└ WKHUH└ ZDV└ QR└ ZD\└ WR└ JHW└ WKLV└ LQIRUPDWLRQ└ EHFDXVH└ WKH\└
GLGQW└ KDYH└ LW◀

6HFRQG└ └ LQ└ ┴ !! ¶ ↑ └ ,└ ZURWH└ D└ CHWWHU└ WR└ WKH└ (3$└ $GPLQLWWUDWRU└ *LQD└
0F&DUWK\└ └ UHTXHWWLQJ└ WKH└ HFRQRPLF└ LQIRUPDWLRQ└ WKDW└ IRUPV└ WKH└ EDVLV└ RI└
/KH└ &HDQ└ 3RZHU└ 3DQ└ DQG└ WKH└ 2]RQH└ 1R[└ 6WDQGDUGV◀

7KHVH└ DUH└ WKH└ PDMRU└ UHJXODWLRQV└ WKDW└ ZHUH└ EHLQJ└ TXLFNO\└ LPSRVHG└ RQ└
$PHULFDQ└ WD[SD\HUV◀ └ 7KH└ UHVSRQVH└ ZKLFK└ ,└ UHFHLYHG└ WRRN└ WZR┼ DQG┼ D┼ └
KDOI└ PRQWKV└ WR└ JHW└ WKH└ UHVSRQVH☼ └ EXW└ ,P└ ┼ ┼ └ XQGHUWDQG└ WKDW└ ,P└ RQH└ RI└
WKH└ IHZ└ UHFLSLHQWV└ ZLWK└ DQ└ DFWXDOO\└ CHWWHJ└ EDFN└ IURP└ WKH└ (3$◀

$QG└ ,└ ZRXOG└ DVN└ WKDW└ LW└ EH└ LQFOXGHG└ DV└ SDUW└ RI└ WKH└ UHFRUG└ RI└ WKH└ PHWLQJ└
WRGD\☼ └ 0U◀ └ &KDLUPDQ☼ └ DQG└ WKH└ CHWWHJ└ ZDV└ EDVLFDOO\└ QRWKLQJ└ ┼ ┼ └ QRWKLQJ└
WKRUW└ RI└ UHIHUULQJ└ PH└ WR└ DQ└ ,QWHUQHW└ OLQN└ WKDW└ GLUHFWHG└ PH└ WR└ :HEDJH☼ └
WKH└ VDPH└ :HEDJH└ ZKLFK└ JHQHUDWHG└ WKH└ TXHVWLRQV└ LQ└ WKH└ ILUWW└ SDDFH◀

(VVHQWLDOO\☼ └ WKH└ MXUW└ VLPSO└ VXJJHVWHG└ WKDW└ ,└ *RRJOH└ LW◀ └ 1RW└ KDUGO└ D└
UHVSRQVH└ WKDW└ \RX└ ZRXOG└ H[SHFW└ EDFN└ IURP└ DQ└ IHGHUDO└ DJHQF\☼ └ DW└ CHDWW└
RQH└ WKDW└ ZDV└ WU\LQJ└ WR└ EH└ UHVSRQVLYH└ ZLWK└ UHJDUG└ WR└ PDMRU└ SURSRVHG└
UXOHV◀

:RUNLQJ└ DW└ D└ 8QLWHG└ 6WDWHV└ VHQDWRU☼ └ ,YH└ IRXQG└ LW└ CHDUO└ LPSRVVLEOH└ WR└
HDVLO└ DFFHVV└ WKH└ LQIRUPDWLRQ└ WKDW└ ,P└ CRRNLQJ└ IRU◀ └ ,└ FDQW└ LPDJLQH└ WKH└
GLIILFXOW└ RI└ D└ VPDOO└ EXVLQHVV☼ └ D└ IDUPHU└ RU└ D└ UDQFKHU└ ZKHQ└ WKH└ DUH└
VHHNLQJ└ WR└ JHW└ LQIRUPDWLRQ└ IURP└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ $JHQF\◀

$V└ WKH└ (3$└ DGPLQLWUDWRU☼ └ WKH└ URCH└ ZKLFK└ \RX└ DUH└ VHHNLQJ☼ └ GR└ \RX└
EHOLHYH└ WKDW└ WKLV└ LV└ DQ└ DGHTXDWH└ ZD\└ WR└ FRPPXQLFDWH└ ZLWK└ WKH└ SXEOLF└ DQG└
HCHFWHG└ RIILFLDOV☼ └ DQG└ ZKDW└ DUH└ \RX└ YLHZV└ RQ└ PDNLQJ└ DJHQF\└
FRPPXQLFDWLRQ└ DQG└ UHFRUGNHHSLQJ└ PRUH└ WUDQVSDUHQW└ DQG└ DFFHVVLECH"

358,77 └
6HQDWRU☼ └ WKLV└ LV└ DFWXDOO\└ D└ FRPPRQ└ WKHPH☼ └ DV└ ,└ PHW└ ZLWK└ PDQ\└ RI└ \RX└ RQ└
WKLV└ FRPPLWWHH☼ └ ERWK└ 'HPRFUDWV└ DQG└ 5HSXEOLFDQV☼ └ LW└ ZDV└ H[SUHVVHG└ WR└
PH└ WKDW└ D└ FRQFHUQ└ DERXW└ WKH└ CDFN└ RI└ UHVSRQVH└ E\└ WKH└ (3$└ DW└ DOO└ LQ└
UHVSRQVH└ WR└ LQTXLULHV☼ └ CHW└ DCRCH└ WKH└ WLPH└ UHVSRQVH◀

$QG└ VR└ ,└ EHOLHYH└ LWW└ YHU\└ LPSRUWDQW☼ └ DV└ ,└ LQGLFDWHG└ LQ└ P\└ RSHQLQJ└
WDWHPHQW└ WR└ OLWWHQ☼ └ QRW└ RQO\└ WKH└ YRLFH└ RI└ WKH└ $PHULFDQ└ SHRSCH☼ └ EXW└ OLWWHQ└
WR└ PHPEHUV└ RI└ &RQJUHVV☼ └ OLWWHQ└ WR└ PHPEHUV└ RI└ WKLV└ ERG\└ ZLWK└ UHVSHFW└ WR└
WKH└ LWXHV└ WKDW└ DUH└ FRQFHUQ└ WR└ WKHP└ LQ└ WKHLU└ UHVSHFWLYH└ WDWHV◀

$QG└ WKDW└ VRPHWKLQJ└ ,└ WDNH└ YHU\└ VHULRXVO\└ DQG└ ZRXOG└ VHHN└ WR└ UHVSRQG└
H[SHGLWLRXVO\└ WR└ \RX└ DQG└ WR└ RWKHUV└ RI└ WKLV└ ERG\└ ZLWK└ UHVSRQVHV◀

5281'6 └

7KH└ 5DQNLQJ└ 0HPEHU└ KDG└ DVNHG└ DQG└ ZDV└ IRORZLQJ└ XS└ ZLWK└ WKH└ TXHVWLRQV└ LQ└ WHUPV└ RI└ \RXU└ UROH└ DV└ WKH└ DWWRUQH\└ JHQHUDO└ ZLWK└ UHJDUG└ WR└ IUDFNLQJ└ LWXHV└ LQ└ WKH└ 2NODKRPD└ EXW└ DOVR└ ZLWK└ UHJDUG└ WR└ FHQDQ└ DLU└ DWWDLQPHQW└ CHYHDV└ DQG└ VR└ IRUWK◀

$QG└ LW└ VHHPHG└ WR└ PH└ WKDW└ ZKDW└ \RX└ ZHUH└ WU\LQJ└ WR└ SRUWUD\└ DW└ WKH└ WLPH└ DQG└ ,G└ OLNH└ \RX└ WR└ H[SDQG└ RQ└ WKLV└ EHFDXVH└ ,└ WKLQN└ WKLV└ LV└ LPSRUWDQW└ LV└ LW└ + + \RX└ KDYH└ D└ GLIIHUHQW└ UROH└ DV└ DQ└ DWWRUQH\└ JHQHUDO└ WKDQ└ \RX└ ZRXOG└ EH└ LI└ \RX└ ZHUH└ UHVSRQVLEOH└ DV└ WKH└ DJHQF\└ ZLWKLQ└ WKH└ WDWH└ ZKR└ KDG└ WKH└ GLUHFW└ DQG└ WDWXWRU\└ DXWKRULW\└ WR└ UHVSRQG└ WR└ WKRVH└ LWXHV◀

,W└ VHHPV└ WR└ PH└ WKDW└ WKDW└ RQH└ RI└ WKH└ URHV└ WKH└ (3$└ DGPLQLWUDWRU└ KDV└ ZKLFK└ ZRXOG└ EH└ GLIIHUHQW└ WKDQ└ WKDW└ RI└ DQ└ DWWRUQH\└ JHQHUDO└ ZKLFK└ LV└ WKH└ H[HFXWLRQ└ RI└ WKH└ ODZV└ WKDW└ ZHYH└ SDVVHG◀ └ &RXOG└ \RX└ H[SDQG└ D└ OLWWOH└ ELW└ ¾HFDXVH└ ,└ WKLQN└ WKLV└ LV└ UHDOO\└ LPSRUWDQW└ LQ└ WHUPV└ RI└ \RXU└ + + └ WKH└ ZD\└ \RX└ SHUFHLYH└ \RXU└ GXWLHV└ ZLWK└ UHJDUG└ WR└ H[HFXWLQJ└ WKH└ ODZV└ WKDW└ WKLV└ &RQJUHVV└ KDV└ SDVVHG◀

358,77 └
<HV└ 6HQDWRU└ DQG└ ,└ DSSUHFLDWH└ WKH└ TXHVWLRQ◀ └ 7KH└ UROH└ RI└ DQ└ DGPLQLWUDWRU└ LV└ WR└ SHUIRUP└ DQ└ H[HFXWLYH└ URO└ DQ└ H[HFXWLYH└ SROLF\└ PDNLQJ└ URO└ DQG└ LQ└ FDUU\LQJ└ RXW└ WKH└ IXQFWLRQV└ DQG└ WKH└ WDWXWHV└ WKDW└ &RQJUHVV└ KDV└ SDVVHG◀ └ 7KDW└ PXFK└ GLIIHUHQW└ WKDQ└ P\└ FXUUHQW└ URO└ DV└ DWWRUQH\└ JHQHUDO◀

$QG└ DV└ ,└ WUHG└ WR└ LQGLFDWH└ WR└ 6HQDWRU└ &DUSHU└ WKDW└ LQ└ UHVSHFW└ WR└ HQIRUFHPHQW└ DFWLRQV└ LQ└ WKH└ WDWH└ RI└ 2NODKRPD└ WKDW└ YHXWHG└ VSHFLIILFDOO\└ LQ└ WKH└ 'HSDUWPHQW└ RI└ (QYLURQPHQWDO└ 4XDOLW\◀ └ 7KH\UH└ WKH└ RQHV└ WKDW└ EULQJ└ HQIRUFHPHQW└ DFWLRQV└ DJDLQW└ FRPSDQLHV└ ZKR└ GR└ QRW└ FRPSO\└ ZLWK└ DLU└ SHUPLW└ HW└ FHWHUD◀

:H└ SURYLGH└ JHQHUDO└ FRXQVHO└ WR└ WKHP└ LQ└ WKDW└ SURFHVV└ EXW└ LW└ LV└ QRW└ RXU└ UHVSRQVLELOLW└ EXW└ PRUH└ LW└ QRW└ RXU└ MXULVGLFWLRQ◀ └ $QG└ WKDW└ LPSRUWDQW└ WR└ PH└ EHFDXVH└ LW└ JRHV└ EDFN└ WR└ UXOH└ RI└ ODZ└ LW└ JRHV└ EDFN└ WR└ SURFHVV◀

,└ WKLQN└ RIWHQ└ WLPHV└ ZKDW└ ZH└ VHH└ LQ└ WKLV└ FRXQWU\└ LV└ WKDW└ WKRVH└ NLQG└ RI└ GLVUHJDUG└ WKH└ DXWKRULW└ RU└ MXULVGLFWLRQ└ WKDW└ EHQ└ JLYHQ└ WR└ WKHP└ E\└ WKH└ WDWXWH└ RI└ WKH└ FRQWWLWXWLRQ└ DQG└ WKH└ DFW└ DQ\ZD\◀ └ 7KDW└ ZKDW└ FUHDWHV└ ,└ /NLQN└ D└ ODFN└ + + └ D└ ODFN└ RI└ FRQILGHQFH└ LQ└ WKH└ $PHULFDQ└ SHRSOH◀ └ $QG└ VR└ ,YH└ /NULHG└ WR└ UHVSHFW└ WKRVH└ ERXQGDULHV◀

,YH└ WULHG└ WR└ UHVSHFW└ P\└ URCH└ DV└ DWWRUCH\└ JHQHUDO└ DV└ DWWRUCH\└ JHQHUDO☼ └
WWD\└ LQ└ P\└ CDCH☼ └ LI└ \RX└ ZLOO└ DQG└ SURYLGH└ WKH└ FRXQVHO└ DQG└ SHUIRUP└ WKH└ MRE└
ΛKDW└ ZHUH└ VXSSRVHG└ WR└ SHUIRUP└ WR└ WKDW└ DJHQF\☼ └ EXW└ WKHQ└ DOORZ└ WKDW└
DJHQF\└ WR└ HQIRUFH☼ └ DV└ UHTXLUHG└ E\└ CDZ◀

5281'6 └
$QG└ WKHQ└ YHU\└ TXLFNO\☼ └ WKDW└ DOVR└ PHDQV└ WKDW└ ZLWK└ UHJDUG└ WR└ GHWHUPLQLQJ└
ΛKH└ VFLHQFH└ EHKLQG└ WKH└ CDZV└ WKDW└ ZH└ FUHDWH☼ └ DV└ WKH└ DGPLQLWWUDWRU☼ └ \RXUH└
QRW└ JRLQJ└ WR└ PDNH└ WKH└ GHWHUPLQDWLRQ└ \RXUVHOI◀ └ <RX└ H[SHFW└ WKDW└ VRXQG└
VFLHQFH└ DQG└ WKDW└ VFLHQWLWW└ ZLWK└ WKDW└ EDFNJURXQG└ ZRXOG└ EH└ PDNLQJ└ WKH└
UHFRPPHQGDWLRQV└ WKDW└ \RX└ ZRXOG└ WKHQ└ EDVH└ D└ GHFLVLRQ└ RQ"

358,77 └
<HV☼ └ DQG└ ZHUH└ REMHFWLYH└ DQG└ WUDQVSDUHQW└ LQ└ WKDW└ SURFHVV◀

5281'6 └
7KDQN└ \RX◀ └ 7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

%$55$662 └
7KDQN└ \RX└ 6HQDWRU└ 5RXQGV◀ └ 6HQDWRU└ %RRNHU"

%22.(5 └
0U◀ └ &KDLUPDQ☼ └ LI└ \RX└ ZRXOG└ JUDFHIXOO\└ KROG└ WKH└ FORFN└ IRU└ D└ VHFRQG☼ └
EHFDXVH└ ,└ ZDQW└ WR└ UHVSRQG└ YHU\└ VXFFLQFWO\└ WR└ VRPHWKLQJ└ WKDW└ 0U◀ └ + + └
6HQDWRU└ %RR]PDQ└ DQG└ \RX└ VDLG◀ └)LUWW└ RI└ DOO└ WR└ \RX☼ └ VLU☼ └ ,└ MXWW└ ZDQW└ WR└ VD\☼ └
LWW└ P\└ ILUWW└ WLPH└ JRLQJ└ WKURXJK└ QRPLQDWLRQ└ KHDULQJV◀ └ <RX└ KDYH└ EHHQ└ YHU\└
JHQHURXV└ ZLWK└ WKH└ ZD\└ \RXYH└ EHHQ└ FRQGXFWLQJ└ WKHVH└ KHDULQJV◀

,└ WKLQN└ LWW└ LPSRUWDQW└ WKDW└ ZH└ NQRZ└ WKDW☼ └ DQG└ ,└ DSSUHFLDWH└ WKH└ QXPEHU└ RI└
URXQGV└ WKDW└ \RX└ DUH└ GRLQJ◀ └ $QG└ WKHQ└ WR└ 6HQDWRU└ %RR]PDQ☼ └ ,└ UHDOO\└ GR└
DSSUHFLDWH└ KLP└ DGGLQJ└ WR└ WKH└ OLGH└ RI└ LQTXLU\└ RQ└ KDYLQJ└ \RX└ WR└ PH└ DV└ D└
IULHQG☼ └ ZKLFK└ PHDQV└ D└ CRW└ WR└ PH◀

3HRSCH└ DURXQG└ KHUH☼ └ \RXU└ FRCCHDJXHV└ NQRZ└ WKDW└ \RX└ KDYH└ D└ GHHS└
UHVSHFW└ IRU└ WKH└ NLQG└ RI└ NLQGGHVV└ DQG└ + + └ DQG└ MXWW└ GHFHQF\└ WKDW└ \RX└
UHSUHVHQW└ WR└ D└ CHYHO└ WR└ ZKLFK└ ,└ DVSLUH└ WR└ EXW└ KDYH└ CRW└ DWWDLCHG◀ └ 6R└ ,└ WKDQN└
\RX└ IRU└ WKDW◀ └ 7KDQN└ \RX└ IRU└ LQGXOJLQJ└ PH◀

%$55$662 └
7KDQN└ \RX◀

%22.(5 └
$QG└ DJDLQ└ └ ZLWK└ ┼ ┼ └ ZLWK└ UHVSHFW└ WR└ P\└ FROOHDJXH└ ZKR└ LV└ D└ UHDOO\└ JRRG└
PDQ└ └ LI└ WKLV└ ZDV└ EHWZHHQ└ 'HDZDUH└ DQG└ 1HZ└ -HUVH\└ └ ,P└ WKH└ XS└ WDWH└ └ ,└
ZRXOG└ EH└ YHU\└ KDSS\└ ZLWK└ WKH└ DJUHHPHQW└ WKDW└ LW└ VHHPV└ WKDW└ \RX└ ┼ ┼ └ WKDW└
\RX└ GLG◀

%XW└ \RX└ ZHUH└ WKH└ GRZQ└ WDWH└ └ DQG└ ┼ ┼ └ DQG└ VR└ WKDW└ ZKDW└ ,└ GRQW└
XQGHUWDQG◀ └ 1RZ└ └ \RX└ VDLG└ HDUOLHU└ LQ└ \RXU└ WHWWLPRQ\└ LQ└ UHJDUG└ WR└ WKLV└
PDWWHU└ WKDW└ \RX└ KDYH└ D└ FRS\└ RI└ WKH└ ┴ !! !! ┬ └ DJUHHPHQW◀ └ 'R└ \RX└ KDYH└ WKDW'

358,77 └
,└ KDYH└ WKH└ VHFRQG└ DJUHHPHQW└ 6HDWRU└ └ WKH└ RQH└ ◀ ◀ ◀

%22.(5 └
2.└ └ ZHOO└ └ CHW└ MXWW└ ORRN└ DW└ D└ ┴ !! !! !! └ DJUHHPHQW└ DQG└ ,└ NQRZ└ \RX└ FOLPHG└ LQ└
\RXU└ WHWWLPRQ\└ HDUOLHU└ WKDW└ WKH└ ┴ !! !! ┬ └ DJUHHPHQW└ KDG└ DQ└ H[SLUDWLRQ└ RQ└ LW◀

358,77 └
,W└ ZDV└ D└ WHQ└ \HDU└ SHULRG└ WKDW└ └ WKDW└ QHHGHG└ WR└ EH└ UHHYDOXDWHG◀ └ 7KLV└ LV└ WKH└
VHFRQG└ WDWHPHQW└ ,└ KDYH└ KHUH└ └ 6HDWRU◀ └ ,└ GRQW└ KDYH└ ◀ ◀ ◀

%22.(5 └
<HV└ └ VLU◀ └ ,└ MXWW└ ZDQW└ WR└ FDUL I\└ WKDW└ LW└ VHHPV└ WKDW└ LW└ D└ FRQWUDGLFWLRQ◀ └
7KHUHV└ QR└ H[SLUDWLRQ└ RQ└ WKH└ ┴ !! !! ┬ └ DJUHHPHQW◀ └ ,W└ KDG└ D└ UHHYDOXDWLRQ└ └ D└
SHULRG└ LQ└ ZKLFK└ LW└ ZRXOG└ EH└ UHHYDOXDWHG└ DQG└ LW└ ZDV└ UHHYDOXDWHG└ E\└ \RXU└
WDWH└ ZLWK└ LQYROYHPHQW└ RI└ WKH└ (3$└ DQG└ WKH└ LQYROYHPHQW└ RI└ $UNDQVDV└ DQG└
/KH\└ FDPH└ XS└ ZLWK└ WKH└ VDPH└ ◀ !! ┬ → └ WDQGDUG◀

$QG└ LI└ \RX└ ORRN└ DW└ WKH└ SURYLVLRQV└ RI└ ZKDW└ \RX└ GR└ KDYH└ LQ└ IURQW└ RI└ \RX└ └ WKH└
┴ !! ¶ ┬ └ DJUHHPHQW└ └ DQG└ ,└ KDYH└ D└ EORZ└ XS└ RI└ 3DJH└ ┤ └ RI└ WKDW└ DJUHHPHQW└ └ LW└
WDWHV└ WKDW└ └ WDUWLQJ└ KHUH└ └ LW└ WDWHV└ WKDW└ └ | 2NODKRPD└ └ WKURXJK└ WKH└ :DWHU└
5HVRXUFHV└ %RDUG└ ZLOO└ SURSRVH└ D└ UXOH└ DPHQGPHQW└ WKDW└ UHPRYHV└ WKH└ GDWH└

/R└ DFKLHYH└ IXOO└ FRPSOLDQFH└ ZLWK└ WKH└ QXPHULF└ SKRVSKRUXV└ FULWHULRQ└ VHW└
IRUWK└ LQ└ 2NODKRPD└ DGPLQLWUDWLYH└ FRGH◀ | └ $QG└ WKHQ└ LW└ OLWW└ WKHWH└ WZR└
FRGHV◀

$QG└ LI└ \RX└ CRRN└ DW└ WKRVH└ WZR└ FRGHV└ └ ZKDW└ WKRVH└ WZR└ FRGHV└ GR└ ┼ ┼ └ \RX└
NQRZ└ ZKDW└ WKH└ DUH◀ └ 7KH└ └ VHW└ WKH└ VHFWLRQV└ RI└ SKRVSKRUXV└
FRQFHQWUDWLRQV└ VKDOO└ QRW└ H[FHHG└ ◀ !! ┬ → └ E└ -XQH└ ┬ !! ◀ └ ,W└ UHPRYLQJ└ WKH└ -XQH└
┬ !! └ GHDGOLQH└ LQ└ WKHWH└ WZR└ WDWXWHV◀

$QG└ VR└ WKDW└ ┼ ┼ └ WKDW└ ZKDW└ LV└ IUXWUDWLQJ└ WR└ PH└ LV└ WKDW└ WKLV└ LV└ ZKDW└ \RXUH└
KHUDOGLQJ└ DV└ DJUHHPHQW└ └ EXW└ \RX└ DUHDG└ KDG└ LQ└ \RXU└ ┴ !! ¶ ┬ └ DJUHHPHQW└ └
LW└ FCHDU└ WKDW└ \RXUH└ GRLQJ└ WR└ PH└ └ DQG└ , └ GRQW└ NQRZ└ RI└ DQRWKHU└ ZD└
UHDGLQJ└ LQ└ WKH└ IDFW└ └ LV└ \RX└ WDNH└ D└ ELGGLQJ└ UXCH└ RI└ CDZ└ DQG└ \RX└ VXVSHQG└ LW└
IRU└ DQRWKHU└ WKUHH└ \HDUV└ DOORZLQJ└ WKH└ FRUH└ SRODXWLRQ└ WR└ WDNH└ SODFH◀

358,77 └
6HQDWRU└ └ WKDW└ ┼ ┼ └ WKDW└ LV└ QRW└ ┼ ┼ └ WKH└ LWXXH└ KHUH└ ZDV└ QRW└ ZKHWKHU└ 2NODKRPD└
FRXOG└ HQIRUFH└ LW└ ◀ !! ┬ → └ WDQGDUG└ └ LW└ ZDV└ ZKHWKHU└ $UNDQVDV└ ZDV└ JRLQJ└ WR└
DGRSW└ WKDW└ WDQGDUG└ RQ└ WKDW└ VLGH└ RI└ WKH└ ERUGHU◀ └ 7KDW└ KDG└ QHYHU└ WDNH└
SODFH└ LQ└ KLWRU\◀ └ 7KDW└ ZDV└ WKH└ FRQFHUQ└ RI└ 2NODKRPDQV◀ └ 7KDW└ ZDV└ WKH└
FRQFHUQ└ RI└ 0U◀ └)LWH└ DW└ WKH└ VFHQLF└ ,OOLQRLV└ 5LYHU◀

%22.(5 └
$QG└ VR└ , └ UHVSHFW└ WKDW◀ └ ,P└ JRLQJ└ WR└ WXLSXODWH└ WR└ ZKDW└ \RX└ VDLG◀ └ ,I└ \RX└ ┼ ┼ └ ,P
UXQQLQJ└ RXW└ RI└ WLPH└ └ VLU└ ┼ ┼ └ EHFDXVH└ , └ DJUHH└ ZLWK└ \RX└ └ ZKHWKHU└ $UNDQVDV└
ZDV└ JRLQJ└ WR└ EH└ DECH└ WR└ OLYH└ XS└ WR└ WKDW└ WDQGDUG└ └ EXW└ \RXUH└ WKH└
2NODKRPD└ DWWRUCH\└ JHCHUDO└ └ DQG└ WKLV└ LV└ ZKDW└ , └ ZDQW└ WR└ VD\◀

$V└ VRRQ└ DV└ \RX└ GLG└ WKLV└ VR└ FDOCHG└ └ KLWRULF└ DJUHHPHQW└ WKDW└ VHW└ LW└ EDFN└ └
\RX└ EDVLFDOO\└ WXUCHG└ WR└ WKH└ (3$└ ZLWK└ WKH└ UXCH└ ┼ ┼ └ ZLWK└ WKH└ SRZHU└ RI└ WKH└ CDZ└
RI└ WKH└ 6XSUHPH└ &RXUW└ DQG└ VD\└ 2.└ └ EDFN└ RII└ RI└ P\└ FRUSRUDWLRQV◀ └ :K\└ GR└
, └ VD\└ WKDW└ VR└ FRQILGHQWO\"└ %HFDXVH└ , └ SXOO└ D└ CHWWHU└ IURP└ 7\VRQ└)RRGV└ WKDW└
OLWHUDOO\└ VL[└ GD\V└ DWWHU└ \RXU└ VR└ FDOCHG└ └ KLWRULF└ DJUHHPHQW└ RI└ VXVSHQGLQJ└
/KLV└ UXCH└ IRU└ WKUHH└ \HDUV└ └ WKH\UH└ GHDLJKWHG◀

7KH\└ ZULWH└ WR└ WKH└ (3$└ DQG└ VD\└ KH\└ └ \RX└ ┼ ┼ └ WKH\└ KDYH└ QRZ└ DOUHDG\└ KHUG└
RI└ WKH└)HEXCU\└ ┴ !! WK└ DJUHHPHQW└ E\└ $UNDQVDV└ DQG└ 2NODKRPD└ RIILFLDOV└ WR└
VRLQWO\└ FRQGXFW└ DQ└ FRPSUHKHQVLYH└ WWXG\└ RI└ FRQFHQWUDWLRQV└ DQG└ LPSDFW└
LQ└ WKH└ ,OOLQRLV└ 5LYHU└ 6KHG◀ └ 7KH\UH└ H[FLWHG◀

7KH└ OLWHUDOO└ VD└ FRPSOLDQFH└ KRZHYHU└ ZLWK└ WKH└ QRZ└ ◀ ‼ ┬ → └ PLOOLJUDP└ KDV└ EHHQ└ VXVSHQGHG└ VR└ OD└ RII└ XV└ (3$└ XQGHU└ WKLV└ DJUHHPHQW└ XQWLO└ WKH└ WWXG└ SURFHVV└ LV└ FRPSOHWHG◀ └ 7KH└ VD└ | ,Q└ FRQFOXVLRQ└ WKH└ E└ WWDWH└ DJUHHPHQW└ KDV└ VXVSHQGHG└ LPSOHPHQWDWLRQ└ GDWH└ RI└ ◀ ‼ ┬ → └ GXULQJ└ WKH└ WHUP└ RI└ WKH└ DJUHHPHQW◀ |

,QGXWWU└ LV└ UHDOO└ KDSS└ DERXW└ WKLV└ DQG└ EHOLHYHV└ DQG└ RI└ FRXUVH└ WKLV└ CHWWHU└ └ XQGHW└ \RXUH└ VD└LQJ└ 7└VRQV└ ZDV└ ZURQJ└ WKH└ EHOLHYH└ WKDW└ ZKDW└ \RX└ GLG└ LV└ JLYH└ WKHP└ WKH└ (3$└ ZLWK└ WKH└ SRZHU└ RI└ WKH└ 6XSUHPH└ &RXUW└ DQG└ WKH└ ┴ ‼ └ \HDUV└ RI└ ZRUN└ WKDW└ SUHGHFHWRUV└ RI└ \RXU└ KDG└ GRQH└ WKH└ SRZHU└ WR└ ┼ ┼ └ WR└ ┼ ┼ └ /R└ VXVSHQG└ WKDW└ SRZHU└ RI└ WKHP└ WR└ FRPSO└ ZLWK└ WKH└ CDZ◀

$QG└ VR└ WKDW└ UHDOO└ ZKDW└ ,P└ WWUXJJOLQJ└ ZLWK◀ └ 2Q└ RQH└ KDQG└ \RX└ VD└ WKDW└ \RX└ ILCHG└ CDZVXLW└ DJDLQW└ ¶┤ └ SHRSCH└ DJDLQW└ WKH└ (3$◀ └ ,W└ WKLV└ LGHD└ RI└ IHGHUDOLVP◀ └ 2I└ 2NCDKRPD└ VRYHUHLJQW└ └ 2NCDKRPD└ WWDWHV└ ULJKW└ \RXUH└ ILHUFHD└ ILJKWLQJ└ IRU└ 2NCDKRPD└ DQG└ RQ└ WKH└ VLGH└ RI└ WKH└ SRCCXWHUV◀

$QG└ \RX└ VD└ WKH└ (3$└ LV└ DWWHPSWLQJ└ WR└ GR└ WKLQJV└ EXW└ WKHQ└ RQ└ WKH└ RWKHU└ KDQG└ LQ└ WKLV└ FDVH└ WKDW└ \RXUH└ WDONLQJ└ DERXW└ └ \RX└ VZLWFK└ VXGGHQD└ WR└ VD└ | :HOO└ 2NCDKRPDV└ ZDWHU└ TXDOLW└ WWDQGDUG└ IRU└ SKRVSKRUXV└ WKDW└ KDV└ EHHQ└ ZRUNHG└ RQ└ IRU└ ┴ ↑ └ \HDUV└ DUPHG└ ZLWK└ DQ└ (3$└ DSSURYDO└ DUPHG└ ZLWK└ D└ 6XSUHPH└ &RXUW└ GHFLVLRQ└ RQ└ SRLQW└ VD└LQJ└ WKDW└ XS└ ULYHU└ WWDWHV└ DUH└ ERXQG└ LQGXWWULHV└ EHOLHYH└ WKDW└ WKH└UH└ ERXQG└ EXW└ VXGGHQD└ └ \RXUH└ QR└ CRQJHU└ ILJKWLQJ└ IRU└ 2NCDKRPD◀

<RXUH└ ILJKWLQJ└ WR└ SURWHFW└ LQGXWWU└ DQG└ RQ└ WKH└ VLGH└ RI└ LQGXWWU└ DJDLQ◀

358,7 └
,└ FDQ└ DWXUH└ \RX└ 6HQDWRU└ WKDW└ LQGXWWU└ GLGQW└ WKLQN└ WKH└ ZHUH└ ERXQG◀ └
$QG└ ,└ FDQ└ ◀ ◀ ◀

%22.(5 └
7KHQ└ ZK└ GLG└ 7└VRQV└ ZULWH└ WKH└ CHWWHU└ └ VLU"

358,77 └
,└ GRQW└ ┼ ┼ └ ,└ GRQW└ NQRZ◀ └ ,└ GRQW└ NQRZ└ ZK└ WKH└ VDLG└ WKDW└ └ EHFDXVH└ DV└ 6HQDWRU└ %RR]PDQ└ LQGLFDWHG└ HDUOLHU└ WKH└ SKRVSKRUXV└ CHYHO└ DW└ ◀ ‼ ┬ → └ ZDV└ XQHQIRUFHDEOH└ RQ└ WKH└ $UNDQVDV└ VLGH└ RI└ WKH└ ERUGHU└ DQG└ WKDW└ ZKHUH└ WKH└ FRQWULEXWLRQ└ ZDV└ ┼ ┼ └ WKDW└ ZDV└ WKH└ FRQFHUQ◀ └ $QG└ XQWLO└ WKLV└ DJUHHPHQW└ WKDW└ ZH└ KDG└ KHUH└ └ ZDV└ QHJRWLDWHG└ DQG└ VLJQHG└ E└ $UNDQVDV◀

7KDW└ KDG└ QHYHU└ RFFXUUHG└ LQ└ WKH└ KLWRU\└ RI└ 2NODKRPD◀

?22.(5 └

?&W└ VLU☼ └ $UNDQVDV└ ZDV└ SDUW└ WR└ WKH└ ┴ !! ¶ ┴ └ VFLHQWLILF└ LQYHWWLJDWLRQ◀ └ 7KH\UH└ ERXQG└ E\└ D└ 6XSUHPH└ &RXUW└ MXWLFH└ FDVH☼ └ ZKLFK└ ,YH└ SRLQWHG└ RXW└ WR└ \RX└ DOUHDG\└ DQG└ ,└ FRXOG└ UHDG└ \RX└ WKH└ ELQGLQJ└ SDUDJUDSKV☼ └ ERXJKW└ LQ└ E\└ WKH└ (3$└ DQG└ REYLRXVO\└ XQGHUWRRG└ E\└ LQGXWWU\└ WKDW└ WKH\└ ZHUH└ ERXQG└ E\└ WKDW└ WDQGDUG◀

<RXU└ DJUHHPHQW└ GLGQW└ H[WHQG└ ┼ ┼ └ GLGQW└ ┼ ┼ └ GLGQW└ WRS└ LW◀ └ ,W└ H[WHQGHG└ WKH└ ┼ ┼ └ ^KH└ ┼ ┼ └ WKH└ SHULRG└ LQ└ ZKLFK└ SHRSOH└ FRXOG└ SROOXWH◀ └ ,└ GRQW└ XQGHUWDQG└ KRZ└ ^KDW└ FRXOG└ EH└ KLWRULF◀

358,77 └

6HQDWRU☼ └ ,└ MXW└ ┼ ┼ └ ,└ WKLQN└ DV└ \RX└ CRRN└ DW└ ZKDW└ ZDV└ DFKLHYHG└ EHWZHHQ└ $UNDQVDV└ DQG└ 2NODKRPD☼ └ \RX└ KDYH└ WKH└ $UNDQVDV└ DWWRUGH\└ JHQHUDO☼ └ (G└)LWH☼ └ ZKR└ ZDV└ WKH└ ROG└ ┼ ┼ └ ZKR└ KDG└ EHHQ└ LQYROYHG└ LQ└ WKHVH└ LVVXHV☼ └ DV└ LQGLFDWHG└ HDUOLHU└ VLQFH└ ¶ ← ┬ ☼ └ WU\LQJ└ WR└ HQIRUFH└ DQG└ REWDLQ└ ZDWHU└ TXDOLW\└ WR└ ┼ ┼ └ WKDW└ LPSURYHG└ WKH└ ,OOLQRLV└ ┼ ┼ └ WKH└ 6HQLF└ ,OOLQRLV└ 5LYHU☼ └ KH└ FLWHG└ WKH└ KLWRULF└ UHVXOWW└ LQ└ WKLV└ ┼ ┼ └ LQ└ WKLV└ PDWWHU◀

6R└ ,P└ XQDZDUH└ RI└ WKH└ CHWWHU└ WKDW└ \RXUH└ UHIHUUULQJ└ WR☼ └ EXW└ ,└ FDQ└ DWXUH└ \RX└ ^KDW└ LQGXWWU\└ ZDV└ GRW☼ └ GRW└ DW└ DOO└ H[FLWHG└ DERXW└ ◀ !! ┬ → └ EHLQJ└ HQIRUFHG└ RQ└ WKH└ $UNDQVDV└ VLGH└ RI└ WKH└ ERUGHU◀

?22.(5 └

$QG└ ,OO└ FRQFOXGH└ MXW└ E\└ VD\LQJ☼ └ VLU☼ └ LW└ FHDU└ WKDW└ LQGXWWU\└ ZDV└ H[FLWHG└ DERXW└ WKH└ WKUHH┤ \HDU└ GHD\└ WKDW└ \RX└ ERXJKW└ WKHP└ WR└ FRQWLQXH└ WR└ SROOXWH◀ └ ,W└ ZULWWHQ└ WKHUH└ LQ└ D└ CHWWHU◀ └ $QG└ LW└ VHHPV└ WR└ PH└ WKH└ WKHPH└ LQ└ \RXU└ LV└ GRW└ IHGHUDOLVP└ DQG└ WDWHV└ ULJKWW☼ └ EXW└ GHUHJXODWLRQ└ DQG└ VLGLQJ└ ZLWK└ SROOXWHUV└ DJDLQWW└ WKH└ HQYLURQPHQW└ DQG└ WKH└ SXEOLF└ KHDOWK└ WDQGDUGV◀

$QG└ LW└ XQIRUWXQDWH└ WR└ PH└ WKDW☼ └ WKDW└ ┼ ┼ └ WKDW└ ┼ ┼ └ XQGHW└ \RX└ FDQ└ VKRZ└ PH└ \RPHWKLQJ└ GLIIHUHQW└ LQ└ WKH└ ZD\└ WKDW└ WKLV└ DFWXDOO\└ KHOSHG└ WR└ FHDQ└ XS└ WKH└ ULYHU└ TXLFNHU☼ └ EXW└ ,└ MXW└ GRQW└ VHH└ WKDW└ DW└ DOO└ LQ└ WKH└ HYLGHQFH└ DQG└ WKH└ IDFW└ ^KDW└ ,└ KDYH└ EHIRUH└ PH◀

?$55$662 └

7KDQN└ \RX└ YHU\└ PXFK└ 6HQDWRU└ %RRNHU◀ └ 2XU└ CH[W└ TXHVWLRQHU└ LV└ DFWXDOO\└
6HQDWRU└ %RR]PDQ◀ └ 6LQFH└ ZH└ KDYH└ 2NDKRPD└ DQG└ $UNDQVDV└ ERWK└ KHUH└ └ ,└
GRQW└ NQRZ└ LI└ \RX└ KDYH└ D└ TXHVWLRQ└ 6HQDWRU└ %RR]PDQ└ └ RU└ LI└ \RX└ MXVW└ ZDQW└
WR└ PDNH└ D└ FRPPHQW└ DERXW└ WKLV└ DJUHHPHQW└ WKDW└ ┼ ┼ └ VLQFH└ ERWK└ RI└ WKH└ WDWHV└
DUH└ KHUH└ └ ,└ WKLQN└ \RX└ GLG└ UHSUHVHQW└ WKH└ FRQJUHVVLRQDO└ GLVWULFW└ GLUHFWO\└
DGMDFHQW◀

%22=0$1 └
1R└ └ ,└ ZDQW└ WR└ PDNH└ D└ TXLFN└ FRPPHQW└ DQG└ WKHQ└ DVWHU└ WKDW└ ,└ WKLQN└ DOO└ RI└ P\└
TXHVWLRQV└ KDYH└ EHHQ└ DQVZHUHG└ DQG└ \LHOG└ EDFN└ LI└ └ \RX└ NQRZ└ └ LI└ ZH└ FDQ└
KDYH└ DJUHHPHQW◀ └ %XW└ └ ,└ WKLQN└ WKH└ WKLQJ└ └ 6HQDWRU└ %RRNHU└ └ WR└ XQGHUVWDQG└
LV└ └ LV└ WKDW└ ILUVW└ RI└ DOO└ WKH└ ZDWHU└ ZDV└ GRW└ EHLQJ└ SRONXWHG└ DW└ WKDW└ SRLQW◀

$UNDQVDV└ KDG└ PDGH└ WUHPHQGRXV└ LPSURYHPHQW└ RYHU└ WKH└ \HDUV└ DQG└ KDG└
VXXW└ ┼ ┼ └ WKH└ GLVFKDUJH└ LQ└ 6SULQJGDOH└ └)D\HWWHYLOOH└ └ 5RJHUV└ └ %HQWRQYLOOH└ └ WKH└
PDMRU└ FRPPXQLWLHV└ WKHUH└ └ WKDW└ KDYH└ JURZQ└ WUHPHQGRXVO\└ GXULQJ└ WKDW└
WLPH└ IUDPH└ └ WKHLU└ GLVFKDUJHV└ ZHUH└ GRZQ└ WR└ └ \RX└ NQRZ└ └ YHU\└ DGPLUDEOH└
CHYHDV◀ └ 6R└ DOO└ RI└ WKDW└ ZDV└ EHLQJ└ GRQH◀ └ 7KH└ TXHVWLRQ└ ZDV└ └ ZDV└ ◀ !! ┬ → └ IDLU└
YHUVXV└ ◀ !! ┤ └ RU└ ◀ !! ↑ "

$V└ ,└ PHQWLRQHG└ HDUOLHU└ └ RXU└ PRWW└ SULWWLGH└ ULYHU└ LQ└ $UNDQVDV└ ZDV└ GRW└
DW└ ◀ !! ┬ → ◀ └ 6R└ ZH└ GLGQW└ IHHO└ OLNH└ ZH└ FRXOG└ ┼ ┼ └ ZH└ FRXOG└ GR└ WKDW◀ └ 6R└ $UNDQVDV└
┼ ┼ └ 2NDKRPD└ ZDV└ KDSS\└ ZLWK└ DOO└ WKLV└ WWXII◀ └ $UNDQVDV└ ZDV└ GRW◀ └ $QG└
EHFDXVH└ RI└ WKDW└ LQ└ ┴ !! ¶ ┬ ☼ └ DV└ WKH└ DJUHHPHQW└ UDQ└ RXW└ └ WKH└ ZHUH└ SUHSDUHG└
WR└ VXH└ ┼ ┼ └ RU└ WR└ JR└ EDFN└ WR└ FRXUW└ DJDLQ◀

7KLV└ WKLQJ└ KDG└ EHHQ└ OLWLJDWHG└ VLQFH└ WKH└ 6XSUHPH└ &RXUW└ ILQDOLQJ└ EDFN└ LQ└
WKH└ !! V└ DOO└ DCRQJ└ WKH└ OLGH◀ └ %XW└ WKDWW└ ┼ ┼ └ DQG└ WR└ EH└ KRQHVW└ └ ,P└ GRW└ KDSS\└
ZLWK└ WKH└ ◀ !! ┬ → ◀ └ ,└ WKLQN└ LVW└ WRR└ WWULQJHQW◀ └ ,└ ZRXOG└ FKDOOHQJH└ └ \RX└ NQRZ└ └ WR└
ILQG└ D└ ULYHU└ LQ└ 1HZ└ -HUVH\└ WKDW└ PHHWW└ WKDW└ WWDQGDUG└ └ DQG└ \RX└ FDQW└ GR└ LW◀ └
,W└ D└ YHU\└ └ YHU\└ WWULQJHQW└ WWDQGDUG◀

6R└ LW└ ZDV└ ┼ ┼ └ LW└ ZDVQW└ FRQWLQXLQJ└ WR└ SROOXWH└ DQG└ WKLQJV└ OLNH└ WKDW◀ └
7UHPHQGRXV└ SURJUHVV└ PDGH└ RQ└ WKH└ $UNDQVDV└ VLGH◀ └ (YHU\RQH└ DJUHHV└
ZLWK└ WKDW◀ └ ,W└ ZDV└ ZKHUH└ GR└ \RX└ GUDZ└ WKH└ OLPLW◀ └ $QG└ VR└ RMWHQ└ ZLWK└ WKH└ (3$☼ └
WKLV└ LV└ VR└ LPSRUWDQW◀ └ :HYH└ KDG└ RQ└ WKH└ FRPPLWWHH☼ └ ZHYH└ KDG└ WKH└
JHQWOHPDQ└ WKDW└ UHSUHVHQW└ WKH└ ZDWHU└ GLVWULFW☼ └ \RX└ NQRZ☼ └ IRU└ WKLV└ ┼ ┼ └ WKLV└
KXJH└ DUHD◀

7KH└ VSHQW└ • ¶ └ ELOOLRQ└ └ \RX└ NQRZ└ └ GRLQJ└ D└ JUHDW└ MRE└ RI└ FKDOOLQJ└ WKLQJV└ XS└ └
UDLVLQJ└ HYHU\ERG\V└ UDWHV◀ └ (3$└ KDV└ FRPH└ EDFN└ DQG└ ZDQW└ WKHP└ WR└
VSHQG└ DQRWKHU└ • ¶ └ ELOOLRQ└ IRU└ ┼ ┼ └ IRU└ D└ WLQ└ IUDFWLRQ└ WKDW└ HYHU\ERG└ DJUHHV└
ZRXOG└ QRW└ KDYH└ DQ└ LPSDFW└ RQ└ WKH└ ZDWHU└ TXDOLW└ LQ└ WKH└ ULYHU◀ └ 7KRVH└ DUH└
WKH└ NLQG└ RI└ WKLQJV└ WKDW└ \RX└ JHW└ LQWR◀

6R└ └ DJDLQ└ └ ,P└ QRW└ ┼ ┼ └ ,P└ UHDOO└ QRW└ KDSS└ DW└ DOO└ DERXW└ WKH└ ◀ !! ┬ → ◀ └ ,└ WKLQN└
7\VRQV└ DQG└ WKH└ LQGXVWU└ ZHUH└ KDSS└ LQ└ WKH└ VHQVH└ WKDW└ \RX└ ZRXOG└ KDYH└ D└
VLWXDWLRQ└ ZKHUH└ \RX└ ZRXOG└ KDYH└ VRPH└ ILQDOLW└ └ \RX└ ZRXOG└ KDYH└ VRPH└
UHVRXWLRQ└ VR└ WKDW└ HYHU\ERG└ FRXOG└ JR└ IRUZDUG◀

%$55$662 └
6HQDWRU└ (UQW└ DQ└ ILQDO└ FRPPHQW└ RU└ WKRXJKW└ RU└ TXHWLRQ"

(5167 └
,└ ┼ ┼ └ WKDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ ,└ GRQW└ KDYH└ DQ└ IXUWKHU└ TXHWLRQV◀ └
:KDWHYHU└ DGGLWLRQDO└ TXHWLRQV└ ,└ KDYH└ └ ,└ ZLOO└ VXEPLW└ IRU└ WKH└ UHFRUG◀ └ %XW└ ,└
GR└ KDYH└ VRPH└ FRVLQJ└ FRPPHQW◀ └ ,└ GR└ ZDQW└ WR└ SXVK└ EDFN└ D└ OLWWOH└ ELW└ RQ└
WKH└ ┼ ┼ └ RQ└ WKH└ UDQNLQJ└ PHPEHUV└ FRPPHQW└ HDUOLHU◀

,└ KDG└ JRQH└ WKURXJK└ D└ VHULHV└ RI└ H[DPSOHV└ RI└ RYHUUHDFK└ E\└ WKH└
JRYHUQPHQW└ ZLWK└ WKH└ H[SDQGHG└ GHILQLWLRQ└ RI└ ZDWHUV└ RI└ WKH└ 8◀ 6◀ └ DQG└ WKH└
UDQNLQJ└ PHPEHU└ KDG└ WDWHG└ WKDW└ KH└ KDG└ D└ CHWWHU└ WKDW└ KHG└ UHFHLYHG└ IURP└
WKH└ $GPLQLWWUDWRU└ *LQD└ 0F&DUWK\◀

$QG└ ,└ KDYH└ QR└ GRXEW└ WKDW└ VKH└ ZDV└ DQZHULQJ└ WKRVH└ TXHWLRQV└ KRQHWWO\└ └
EHFDXVH└ VKH└ ZDVQW└ WKH└ RQH└ PDNLQJ└ WKH└ WDWHPHQW◀ └ 7KH└ WDWHPHQW└
WKDW└ ,└ SUHVHQWHG└ FDPH└ IURP└ WKH└ &RUSV└ RI└ (QJLQHHUV└ DQG└ WKH└ 'HSDUWPHQW└
RI└ -XWLFH◀ └ 1RZ└ ,└ NQRZ└ WKLV└ WR└ EH└ WUXH◀ └ 7KHVH└ DUH└ QRW└ DV└ LPSOLHG└ IURP└
VRPH└ REVFXUH└ :HEVLWH└ RII└ WKH└ ,QWHUQHW└ GRQH└ E\└ VRPH└ EORJJHU└ LQ└ D└
EDVHPHQW└ VRPHZKHUH◀

7KH└ FRPPHQW└ DFWXDOO\└ FDPH└ IURP└ WKLV└ FRPPLWWHH└ └ FDVH└ WXKGLHV└ IURP└
WKLV└ FRPPLWWHH└ 6HSWHPEHU└ ┴ !! ¶ ├ ◀ └ 7KHVH└ DUH└ H[DPSOHV└ RI└ FDVH└ WXKGLHV└
IURP└ DOO└ DFURVV└ WKH└ 8QLWHG└ 6WDWHV└ └ DQG└ ,└ ZLOO└ FLWH└ MXW└ RQH└ WKDW└ ,└ ┼ ┼ └ ,└
RSHQHG└ XS└ WR◀

| $└ CDQG└ RZQHU└ LQ└ &DOLIRUQLD└ UHFHLYHG└ DQ└ LQYHVWLJDWLRQ└ CHWWHU└ IURP└ WKH└
&RUSV└ LQIRUPLQJ└ KLP└ WKDW└ GLVNLQJ└ SHUIRUPHG└ E\└ D└ WHQDQW└ IDUPHU└ RQ└ KLV└
CDQG└ PD\└ KDYH└ UHVXOWHG└ LQ└ DQ└ XQDXWKRUL]HG└ GLVFKDUJH└ LQWR└ :2786◀ | └
$QG└ WKDW└ UHJXODWRUV└ KDG└ RSHQHG└ D└ FDVH└ DJDLQWW└ WKH└ CDQG└ RZQHU◀ └ 7KH\└
DUH└ EHLQJ└ LPSOHPHQWHG└ FDVH└ E\└ FDVH◀

7KLV└ CHWWHU└ FDPH└ DV└ D└ VXUSULVH└ WR└ WKH└ CDQG└ RZQHU└ ZKR└ KDG└ EHHQ└ GLVNLQJ└
ΛKLV└ SDUWLFXDU└ VLWH└ SHUIRGLFDOO\└ RYHU└ WKH└ SDWW└ ¶ ↑ └ \HDUV└ WR└ VXWDLQ└ JUD]LQJ└
FRQGLWLRQV└ IRU└ KLV└ FDWWOH└ └ D└ SUDFWLFH└ KH└ EHOLHYHG└ ZDV└ QRUPDO└ XQWLO└ KH└
UHFHLYHG└ WKLV└ QRWLFH◀

7KH└ &RUSV└ WROG└ WKH└ CDQG└ RZQHUV└ FRQVXQWDQW└ WKDW└ DOO└ GLVNLQJ└ IRU└ DQ\└
SXUSRVH└ DQG└ DW└ DQ\└ GHSWK└ ZLWK└ DQ\└ SRWHQWLDO└ :2786└ LV└ D└ GLVFKDUJH└ LQWR└
:2786└ DQG└ LQ└ WKH└ DEVHQFH└ RI└ D└ SHUPLW└ UHSUHVHQW└ DQ└ XQDXWKRUL]HG└
GLVFKDUJH└ LQ└ YLRODWLRQ└ RI└ WKH└ &HDQ└ :DWHU└ $FW◀ └ 7KLV└ LV└ DQ└ DFWXDO└ CHWWHU└
IURP└ WKH└ &RUSV└ WKDW└ ZDV└ VXEPLWWHG└ WR└ WKLV└ FRPPLWWHH└ └ WKH└ (3:└
FRPPLWWHH└ CDXW└ \HDU◀

6R└ WKLV└ LV└ QRW└ PDGH└ XS◀ └ 7KLV└ LV└ D└ YHU\└ UHDO└ LPSDFW└ WR└ DOO└ $PHULFDQV◀ └ $QG└
\R└ ,└ DSSUHFLDWH└ \RXU└ WDQFH└ └ $WWRUQH\└ *HQHUDO└ 3UXLWW└ WKDW└ LI└ \RX└ DUH└
FRQILUPHG└ └ \RX└ ZLOO└ ZRUN└ ZLWK└ WKRVH└ WKDW└ ZLWK└ WR└ FRQWLQXH└ IDUPLQJ└ QRUPDO└
SUDFWLFHV◀ └ %XW└ WKLV└ LV└ QRW└ PDGH└ XS└ IRONV◀ └ $QG└ ZH└ MXWW└ QHHG└ HYHU\RQH└ WR└
XQGHUWDQG└ WKDW└ WKH└ &RUSV└ └ WKH└ '2-└ DQG└ WKH└ (3$└ KDYH└ JRQH└ EH\RQG└
ZKDW└ ZH└ FRQVLGHU└ WR└ EH└ UHDVRQDEOH└ DSSOLFDWLRQ└ RI└ WKH└ CDZ◀ └ 7KDQN└ \RX└
YHU\└ PXFK◀

♂ 81.12:1□ └
0U◀ └ &KDLUPDQ└ └ LI└ ,└ FRXOG└ MXWW└ UHVSRQG└ YHU\└ EULHIO\◀ └ 7KH└ CHWWHU└ WKDW└ ,└ VHQW└
RQ└ -DQXDU\└ ¶ ¶ └ ZDV└ QRW└ MXWW└ WR└ WKH└ (3$◀ └ ,W└ ZDV└ WKH└ KHDG└ RI└ WKH└ (3$└ DQG└
DOVR└ └ WKDW└ RI└ WKH└ DWWLWXDQW└ VHFUHWDU\└ RI└ WKH└ $UP\└ └ WKH└ 'HSDUWPHQW└ RI└ WKH└
$UP\└ └ ZKRV└ LQ└ FKDUJH└ RI└ WKH└ $UP\└ &RUSV└ RI└ (QJLQHHUV◀ └ 6R└ LW└ ZDV└ UHDOO\└
ΛR└ ERΛK└ └ ERΛK└ (3$└ DQG└ WKH└ $UP\└ &RUSV└ RI└ (QJLQHHUV◀

,└ JDYH└ WKHP└ D└ ¶ ↕ ┴ └ GR]HQ└ RU└ PRUH└ TXHVWLRQV└ └ DQG└ VDLG└ └ WKLV└ LV└ ┼ ┼ └ WKHVH└ DUH└
ΛKH└ DVVHUWLRQV└ WKDW└ ZHUH└ KHDULQJ◀ └ :KDW└ LV└ WKH└ WUXWK"└ $QG└ WKH\└
UHVSRQGHG└ MRLQWO\◀ └ 6R└ └ ,└ ZRXOG└ MXWW└ CHDYH└ LW◀

(5167 └

$QG└ LI└ ┼ ┼ └ LI└ ,└ FDQ└ UHVSRQG└ WR└ WKDW◀ └ ,└ ┼ ┼ └ ,└ DSRORJL]H└ EHFDXVH└ ,└ ZDV└ JRLQJ└ V
XVH└ 6HQDWRU└ 5RXQGV└ CHWWHU└ DV└ D└ SUPS◀ └ ,└ KDG└ QRW└ VHHQ└ D└ CHWWHU└ IURP└ WKH└
(3$◀ └ ,└ KDG└ ZULWWHQ└ $GPLQLWWUDWRU└ *LQD└ 0F&DUWK\└ QHDUO\└ WZR└ \HDUV└ DJR└
RQ└ VRPH└ LVXHV└ WKDW└ ,└ ZDV└ ZDQWLQJ└ DGGUHVVHG└ IRU└ ,RZD◀

$QG└ ,└ LQYLWHG└ KHU└ WR└ FRPH└ WR└ ,RZD└ DQG└ YLVLW◀ └ 6KH└ QHYHU└ HYHU└ UHVSRQGHG└ WR└
PH└ RU└ P\└ WWDII◀ └ 6R└ WKDQN└ \RX└ 0U◀ └ &KDLU◀

?$55$662 └
6HQDWRU└ 0DUNH\"

0$5.(< └
7KDQN└ \RX└ 0U◀ └ &KDLUPDQ◀ └ 0U◀ └ 3UXLWW└ \RX└ KDYH└ FULWLFL]HG└ WKH└ 2EDPD└
$GPLQLWWUDWLRQ└ RQ└ D└ QXPEHU└ RI└ RFFDVLRQV└ IRU└ DOOHJHGO\└ TXRWH└ | FRORXGLQJ└
ZLWK└ HQYLURQPHQWDO└ JURXSV└ WR└ HQJDJH└ LQ└ VXH└ DQG└ VHWWOH└ WDPWLFV◀ | └ <RX└ MXWW└
UHLWHUDWHG└ \RXU└ FRQFHUQ└ WR└ 6HQDWRU└ ,QKRIH◀

?&XW└ LQ└ 'HPHPEHU└ PDQ\└ RI└ \RXU└ FR╢ SDUWLQLII└ DWWRUQH\V└ JHQHUDO└ ZKR└ DUH└
VXLQJ└ WKH└ (3$└ RYHU└ WKH└ &HDQ└ 3RZHU└ 3DQ└ VHQW└ D└ CHWWHU└ WR└ 3UHVLGHQW└
HQHFW└ 7UXPS└ XUJLQJ└ KLP└ WR└ VHWWOH└ WKHLU└ CDZXLW└ UHDWHG└ WR└ WKH└ &HDQ└
3RZHU└ 3DQ◀ └ 7KDW└ VXUH└ VRXQGV└ OLNH└ DQ└ LQYLWDWLRQ└ WR└ HQJDJH└ LQ└ VXH└ DQG└
VHWWOH└ WR└ PH◀

7R└ DYRLG└ WKH└ DSSHDUDQFH└ RI└ HQWHULQJ└ LQWR└ VZHHWKHDUW└ VHWWOHPHQW└ RQ└ WKH└
&HDQ└ 3RZHU└ 3DQ└ LQ└ FDVHV└ ZLOO└ \RX└ FRPPLW└ WR└ UHFXVLQJ└ \RXUVHOI└ IURP└ DOO└
RQJRLQJ└ OLWLJDWLRQ└ WKDW└ \RX└ DUH└ LQYROYHG└ LQ"

358,77 └
6HQDWRU└ ,└ ZRXOG└ VD\└ WR└ \RX└ WKDW└ WKH└ VXH└ DQG└ VHWWOH└ SUDFWLFH└ ZKHWKHU└ E\└
ΛKLV└ DGPLQLWWUDWLRQ└ RU└ IXWXUH└ DGPLQLWWUDWLRQV└ LV└ D└ SUDFWLFH└ WKDW└ VKRXOG└ QRW└
EH└ IROORZHG◀ └ ,└ EHOLHYH└ WKDW└ UHJXODWLRQV└ WKURXJK└ OLWLJDWLRQ└ LV└ ZURQJ◀

,└ EHOLHYH└ WKDW└ WKH└ UXOH└ PDNLQJ└ SURFHVV└ WKDW└ &RQJUHVV└ KDV└ HVWDEOLVKHG└
VKRXOG└ EH└ UHVSHFWHG└ E\└ DJHQFLHV└ QRW└ RQ└ WKH└ (3$└ EXW└ DFURVV└ WKH└
ERDUG◀ └ ,└ ZRXOG└ PHQWLRQHG└ RQH└ FDVH└ WR└ \RX◀ └ 7KDW└ FDVH└ LV└ ◀ ◀ ◀

0$5.(< └

%XW└ WKLV└ LV└ ZKDW└ WKH└ ┼ ┼ └ LW└ CRRNV└ OLNH└ WKDW└ ZKDW└ WKH└ DWWRUQH\V└ JHQHUDO└ DUH└ GRLQJ└ ZKR└ DUH└ VXLQJ└ DQG└ \RXUH└ D└ FR┼ SODLQWLII└ LQ└ WKLV└ FDVH└ RQ└ WKH└ &HDQ└ 3RZHU└ 3DDQ◀ └ :LOO└ \RX└ UHFXVH└ \RXU└ ┼ ┼ └ ZLOO└ \RX└ UHFXVH└ \RXUVHOI└ IURP└ DQ\└ URH└ LQ└ WKH└ VHWWOLQJ└ RI└ WKHVH└ FDVHV☼ └ LQ└ WKH└ GHJRWLDWLRQ└ RQ└ WKH└ VHWWOLQJ└ RI└ /KHVH└ FDVHV"

358,77 └
7KH└ VXH└ DQG└ VHWWOH└ SUDFWLFH└ VKRXOG└ QRW└ EH└ XVHG└ E\└ DQ\└ DGPLQLWWUDWLRQ└ WR└ UHJXODWH◀ └ :HYH└ H[SHULHQFHG└ LQ└ 2NODKRPD└ D└ FDVH└ LQYROYLQJ└ WKH└)LVK└ DQG└ :LOGOLIH└ DQG└ (QGDQJHUHG└ 6SHFLHV└ $FW└ DQG└ WKH└ UHOLWWLQJ└ RI└ CHWVHU└ SUDLULH└ FKLFNHQ└ WKDW└ LPSDFWHG└ RXU└ WWDWH◀ └ 6R└ VXH└ DQG└ VHWWOH└ LV└ ZURQJ◀

0$5.(< └
6R└ WKDW└ LV└ DJDLQ└ ◀ ◀ ◀

358,77 └
7KDW└ VXH└ DQG└ VHWWOH└ LV└ ZURQJ◀

0$5.(< └
$UH└ \RX└ JLYLQJ└ PH└ D└ \HV☼ └ WKDW└ \RX└ ZLOO└ QRW└ VHWWOH└ ZLWK└ WKHVH└ DWWRUQH\V└ JHQHUDO"

358,77 └
,└ ZLOO└ QRW└ HQJDJH└ LQ└ D└ VXH└ DQG└ VHWWOH└ SUDFWLFH└ LI└ FRQILUPHG└ DV└ WKH└ (3$└ $GPLQLWWUDWRU◀

0$5.(< └
2.☼ └ EXW└ ◀ ◀ ◀

358,77 └
$Q\└ WLPH◀

0$5.(< └
6R☼ └ ZLOO└ \RX└ QHJRWLDWH└ ZLWK└ WKHP└ WR└ ┼ ┼ └ WR└ UHDFK└ D└ VHWWOHPHQW☼ └ VXFK└ DV└ WKDW└ KDV└ EHHQ└ UHFRPPHQGHG└ E\└ WKH└ ┼ ┼ └ E\└ WKH└ DWWRUQH\V└ JHQHUDO└ ZKR└ DUH└ WKH└ SODLQWLIV└ LQ└ WKLV└ FDVH└ DJDLQWW└ WKH└ &HDQ└ 3RZHU└ 3DDQ"

358,77 └
6HQDWRU└ LW└ LV└ D└ EHOLHI└ RI└ PLQH└ WKDW└ WKH└ XVH└ RI└ VXH└ DQG└ VHWWOH└ LV└ D└ SUDFWLFH└
/KDW└ ◀◀◀

0$5.(< └
5LJKW◀

358,77 └
◀◀◀└ VKRXOG└ QRW└ EH└ GRQH└ E\└ ◀◀◀

0$5.(< └
,└ KHDU└ \RX◀

358,77 └
◀◀◀└ DQ\└ DJHQF\└ RI└ WKH└ 8◀ 6◀└ JRYHUQPHQW◀

0$5.(< └
6R└ \RXOO└ ┼┼└ ZLOO└ \RX└ UHFXVH└ \RXUVHOI└ IURP└ DQ\└ LQYROYHPHQW└ LQ└ WKLV└ OLWLJDWLRQ└
DV└ LW└ LV└ EHLQJ└ GHFLGHG"

358,77 └
$V└ ,YH└ LQGLFDWHG└ WR└ \RX└ 6HQDWRU└ WKH└ (3$└ DW└ WKLV└ FRXQVHO└ FDUHHU└ WDII└ DW└
/KH└ (3$└ KDV└ VDLG└ WKDW└ D└ SDUWLFXODU└ PDWWHU└ LQ└ VSHFLILF└ FDVH└ WKDW└ WKRVH└ ┼┼└
/KRVH└ ZLOO└ EH└ HYDOXDWHG└ DW└ WKH└ WLPH◀└ ,OO└ VHHN└ WKHLU└ FRXQVHO└ DQG└ FRPSO\└
ZLWK└ WKHLU└ FRXQVHO◀

0$5.(< └
+RQHVWO\└ 0U◀└ 3UXLWW└ WKHUH└ LV└ QR└ ELJJHU└ FDVH└ WKDQ└ WKH└ &HDQ└ 3RZHU└ 3DDQ◀└
,W└ JRHV└ WR└ WKH└ SURPLVH└ WKDW└ WKH└ 8QLWHG└ 6WDWHV└ LV└ PDNLQJ└ WR└ WKH└ ZRUOG└ WKDW└
ZH└ DUH└ JRLQJ└ WR└ UHGXFH└ VLJQLILFDQWO\└ RXU└ JUHHQKRXVH└ JDVHV◀└ 6R└ WKLV└ MXXW└
JRHV└ WR└ \RX└ DV└ DQ└ LQGLYLGXDO└ VD\LQJ└ WKDW└ VLQFH└ \RX└ EURXJKW└ WKH└ FDVH└
ZLWK└ WKHVH└ RWKHU└ DWWRUHH\V└ JHQHUDO└ WKDW└ \RX└ ZLOO└ QRZ└ UHFXVH└ \RXUVHOI◀

358,77 └
,└ ZRXOG└ WKDW└ ◀◀◀

0$5.(< └
6LQFH└ \RX└ DUH└ LQ└ IDFW└ WKH└ SODLQWLII└ DQG└ GHIHQGDQW└ LQ└ WKLV└ FDVH└ └ LI└ \RX└ DUH└
FRQIIUPHG└ DV└ WKH└ (3$└ DGPLQLWUDWRU◀

358,77 └
6HQDWRU└ └ DV└ ,└ LQGLFDWHG└ WR└ \RX└ HDUOLHU└ └ DQG└ ,P└ VRUU\└ WR└ LQWHUUXSW└ \RX└ └ EXW└
DV└ ,└ LQGLFDWHG└ WR└ \RX└ HDUOLHU└ └ ,└ ZLOO└ UHFXVH└ LI└ GLUHFWHG└ E\└ WKH└ (3$└ DW└ WKLV└
FRXQVHO└ └ WKH└ FDUHHU└ WDII└ DW└ (3$└ HWKLFV◀ └ <RX└ NQRZ└ WKHVH└ LQGLYLGXDOV◀ └
7KH\└ DUH└ ┼ ┼ └ WKH\└ DUH└ ┼ ┼ └ WKH\YH└ EHHQ└ WKHUH└ DQG└ WKH\└ ┼ ┼ └ ,└ ZLOO└ IRORZ└ WKHLU└
FRXQVHO└ DQG└ JXLGDQFH◀

0$5.(< └
:HOO└ DOO└ ULJKW◀ └ ,└ NQRZ└ ,P└ QRW└ JRLQJ└ WR└ JHW└ \RX└ WR└ UHFXVH└ \RXUVHOI└ IURP└ DQ\└
RI└ WKHVH└ FDVHV└ EXW└ ,P└ MXVW└ WHOOLQJ└ \RX└ └ LVW└ JRLQJ└ WR└ ZLQG└ XS└ EHLQJ└ D└ KXJH└
FRQIOLFW└ RI└ LQWHUHVW└ LI└ WKHVHV└ DWWRUQH\V└ JHQHUDO└ JHW└ WR└ VHWWOH└ RQ└ WKHLU└ WHUPV└
ZLWK└ WKH└ 7UXPS└ DGPLQLWUDWLRQ└ └ DQG└ \RXUH└ VLWWLQJ└ WKHUH└ LQ└ WKH└ PLGGOH└ RI└
WKH└ URRP└ DV└ WKDW└ RFFXUV◀

1RZ└ OHW└ PH└ ┼ ┼ └ OHW└ PH└ JR└ WR└ DQRWKHU└ VXEMHFW└ DQG└ WKDW└ LV└ WKLV└ EHWWOH└ RI└
7UXPS└ ZDWHU◀ └ 7UXPS└ ZDWHU└ └ QDWXUDO└ VSULQJ└ ZDWHU└ └ RQ└ WKH└ QDEHO└ LW└ VD\V└ └
TXRWH└ | 3XUH└ └ IUHVK└ DQG└ IUHH└ IURP└ FRQWDPLQDQWV◀ └ 7KLV└ LV└ ZDWHU└ WKH└ ZD\└ LW└
ZDV└ PHDQW└ WR└ EH◀ | └ 7UXPS└ KRWHO└ JXHWW└ KDYH└ WKH└ OX[XU\└ RI└ GULQNLQJ└ WKLV└
ZDWHU└ └ LI└ WKH\└ GRQW└ WUXXW└ ZKDW└ FRPHV└ RXW└ RI└ WKH└ WDS◀

/RZ└ LQFRPH└ FRPPXQLWLHV└ DFURW└ RXU└ FRXQWU\└ GR└ QRW└ KDYH└ WKH└ VDPH└
OX[XU\◀ └ 'R└ \RX└ DJUHH└ WKDW└ WKH└ (3$└ SOD\V└ D└ FULWLFDO└ URCH└ LQ└ HQVXULQJ└ WKDW└
DOO└ $PHULFDQV└ UHJDUGCHW└ RI└ UDFLDO└ HWKQLF└ RU└ HFRQRPLF└ EDFNJURXQGV└
KDYH└ D└ ULJKW└ WR└ FCHDQ└ ZDWHU└ └ IUHH└ IURP└ FRQWDPLQDQWV"

358,77 └
$EVROXWHD\└ LQ└ IDFW└ └ 6HQDWRU└ %RRNHU└ DQG└ ,└ DOUHDG\└ WDONHG└ DERXW└
HQYLURQPHQWDO└ MXVWLFH└ LQ└ RXU└ PHHWLQJ◀

0$5.(< └

$QG└ WKDW└ LV└ JUHDW◀ └ $V└ WKH└ ZLGH└ VSUHDG└ CHDG└ FRQWDPLQDWLRQ└ LQ└)OLQW└ └
0LFKLJDQ└ ZDWHU└ VXSSO\└ WUDJLFDOO\└ UHPLQGV└ XV└ └ CRZ└ LQFRPH└ DQG└ PLQRULW\└
FRPPXQLWLHV└ RIWHQ└ EHDU└ IDU└ JUHDWHU└ HQYLURQPHQWDO└ EXUGHQV◀ └ <HW└ \RX└ WRQG└
6HQDWRU└ &DUGLQ└ HDUOLHU└ WRGD\└ WKDW└ \RX└ GLGQW└ NQRZ└ LI└ WKHUH└ LV└ DQ\└ VDIH└
CHYHO└ RI└ CHDG◀

?&XW└ VFLHQWLILF└ H[SHUWW└ └ LQFOXGLQJ└ WKH└ &'&└ DQG└ :RUOG└ +HDOWK└ 2UJDQL]DWLRQ└
KDYH└ FRQFOXGHG└ WKDW└ WKHUH└ LV└ QR└ VDIH└ CHYHO└ RI└ CHDG└ H[SRVXUH◀ └ :LOO└ \RX└
FRPPLW└ WR└ PDNLQJ└ HQYLURQPHQWDO└ MXWWLFH└ IRU└ SRRU└ DQG└ PLQRULW\└
FRPPXQLWLHV└ DQ└ LPPHGLDWH└ SULRULW\└ RI└ WKH└ (3$└ └ LI└ \RX└ DUH└ FRQILUPHG└ DV└
DGPLQLWUDWRU"

358,77 └
,└ EHOLHYH└ LW└ D└ YHU\└ LPSRUWDQW└ URCH└ RI└ WKH└ (3$└ DGPLQLWUDWRU◀

0$5.(< └
:HOO└ └ PLQRULW\└ FRPPXQLWLHV└ RIWHQ└ GRQW└ KDYH└ WKH└ FRQLHV└ ◀ ◀ ◀

?&55$662 └
7KH└ 6HQDWRUV└ WLPH└ KDV└ H[SLUHG└ LQ└ WKH└ WKLUG└ URXQG◀

0$5.(< └
2.└ └ WKDQN└ \RX└ 0U◀ └ &KDLUPDQ◀

?&55$662 └
7KDQN└ \RX◀ └ 7KH└ ┼ ┼ └ DQG└ QRZ└ 6HQDWRU└ 6XOOLYDQ◀

68//,9$1 └
6HQDWRU└ ♂ VLF□ └ 3UXLWW└ └ ,└ MXWW└ KDG└ RQH└ ILQDO└ TXHWWLRQ◀ └ :H└ WDONHG└ DERXW└ VRPH└
RI└ WKH└ FKDOOHQJHV└ WKDW└ ZH└ KDYH◀ └ <RX└ NQRZ└ └ WKLV└ FRPPLWWHHV└ EHHQ└
ZRUNLQJ└ RQ└ WKH└ LQIUDWUXFWXUH└ LWXHV◀ └ 7KHUH└ D└ CRW└ RI└ GLVFXWLRQV└ RYHU└
CDWW└ \HDU└ DERXW└)OLQW└ └ 0LFKLJDQ└ DQG└ DJLQJ└ LQIUDWUXFWXUH└ └ ZKLFK└ ,└ WKLQN└ LV└ D└
FRQFHUQ└ DW└ WKH└ WWDWH└ DQG└ CRFDO└ DQG└ IHGHUDO└ CHYHOV◀

7KHUHV└ DOVR└ D└ FKDOOHQJH└ LQ└ FHUWDLQ└ SDUWV└ RI└ WKH└ FRXQWU\└ RQ└ QR└
LQIUDVWUXFWXUH└ QRGH└ RQ└ FHDQ└ ZDWHU└ DQG└ VHZHU◀ └ $QG└ P\└ WDWH└ KDV└ RYHU└
┼ !! └ FRPPXQLWLHV└ WKDW└ GRQW└ KDYH└ DQ\└ FHDQ└ ZDWHU└ DQG└ VHZHU└ LQ└ WHUPV└ RI└
WKH└ GLVHDVHV└ DQG└ WKH└ OLYLQJ└ FRQGLWLRQV└ LQ└ FRPPXQLWLHV└ OLNH└ WKDW└ DV└ \RX└
FDQ└ LPDJLQH└ LW└ FDQ└ EH└ YHU\└ GLIILFXOW◀

6R└ LQ└ D└ ELSDUWLVDQ└ ZD\└ WKLV└ FRPPLWWHH└ DFWHG└ CDWW└ \HDU└ HWDEOLVKHG└ D└ QHZ└
SURJUDP└ IRU└ GLVDGYDQWDJHG└ FRPPXQLWLHV└ VPDOO└ FRPPXQLWLHV└ WR└ ZRUN└ RQ└
WKRVH└ NLQG└ RI└ LWXHV└ IRU└ GLIIHUHQW└ FRPPXQLWLHV└ ZKHWKHU└ LQ└ $CDMND└ RU└
RWKHU└ SDUW└ RI└ WKH└ FRXQWU\└ WKDW└ OLWHUDOO\└ OLYH└ LQ└ WKLUG┼ ZRUOG└ FRQGLWLRQV└ LQ└
\RPH└ FRPPXQLWLHV◀

6R└ WKDW└ ZRXOG└ EH└ DGPLQLWWHUHG└ E\└ WKH└ (3$└ WKLV└ QHZ└ SURJUDP◀ └ $QG└ ,└ MXWW└
ZDQW└ WR└ JHW└ \RXU└ FRPPLWPHQW└ WR└ ZRUN└ ZLWK└ XV└ WR└ IXOO\└ IXQG└ WKDW└ QHZ└
SURJUDP└ WR└ ZRUN└ RQ└ WKRVH└ NLQG└ RI└ LWXHV◀

358,77 └
$V└ ZH└ WDONHG└ DERXW└ LQ└ RXU└ PHWLQJ└ 6HQDWRU└ ,└ EHOLHYH└ VRPHWLPHV└ ZKHQ└
LQIUDVWUXFWXUH└ LV└ UHIHUHQFHG└ ZH└ WKLQN└ URDGV└ DQG└ EULGJHV└ DQG└ ZH└ GRQW└
WKLQN└ ZDWHU└ LQIUDVWUXFWXUH◀

68//,9$1 └
<HDK◀

358,77 └
$QG└ ,└ WKLQN└ DOO└ WKRVH└ DUH└ LPSRUWDQW◀ └ $QG└ ,└ ZRXOG└ PDNH└ WKDW└ D└ SULRULWW└
LQWHUIDFLQJ└ ZLWK└ &RQJUHVV└ LI└ FRQILUPHG└ DV└ (3$└ DGPLQLWWUDWRU◀

68//,9$1 └
*UHDW└ WKDQN└ \RX◀ └ 7KDQNV◀

%$55$662 └
7KDQN└ \RX└ 6HQDWRU└ 6XOOLYDQ◀ └ ,└ ZDQW└ WR└ WKDQN└ DOO└ WKH└ PHPEHUV└ IRU└ WKH└
UHVSHFWIXO└ ZD\└ LQ└ ZKLFK└ WKH└ EXVLQHVV└ ZDV└ FRQGXFWHG└ WRGD\◀ └ 0HPEHUV└
PD\└ DOVR└ VXEPLW└ IRORZ└ XS└ ZULWWHQ└ TXHVWLRQV└ EXW└ LW└ VHHPV└ WKDW└ HYHU\RQH└
KDG└ SCHQW└ RI└ RSSRUWXQLW└ WR└ DVN└ RUDO└ TXHVWLRQV◀ └ 6FKHGXOHG└ IRU└ WKH└ FORVH└
┼ ┼ └ WKH└ UHFRUGLQJ└ IRU└ WKH└ FORVH└ RI└ EXVLQHVV└ 7KXUVGD\└ -DQXDU└ ¶ ◀ └
6HQDWRU└ &DUSHU"

&$53(5 └
,└ WKRXJKW└ ZH└ ZHUH└ JRLQJ└ WR└ GR└ RQH└ PRUH└ URXQG◀

%$55$662 └
,└ WKRXJKW└ WKUHH└ URXQGV└ ZDV└ WKH└ CRQJHWW└ LQ└ WKH└ KLWWRU\└ RI└ WKLV◀ └ 7KH└ CDWW└ ┼ ┼ └
WKH└ RQD\└ RWKHU└ WLPH└ WKHUH└ ZHUH└ WKUHH└ URXQGV└ ZDV└ &KULWW\└ 7RGG└ :KLWPDQ└
LQ└ ┴ ‼ ‼ ¶ ◀ └ $QG└ WKRVH└ ZHUH└ WKUHH└ URXQGV└ RI└ ILYH└ PLQXWHV└ HDFK└ DQG└ WKH└
UHDVRQ└ WKDW└ VKH└ DV└ D└ 5HSXEOLFDQ└ CRPLCHH└ ZDV└ JLYHQ└ WKUHH└ URXQGV└ LV└
WKDW└ WKH└ FKDLUPDQ└ RI└ WKH└ FRPPLWWHH└ ZDV└ +DUU\└ 5HLG◀

6R└ WKH└ WKUHH└ URXQGV◀ └ 7KH└ ZLWCHW└ KDV└ EHHQ└ KHUH└ VLCFH└ ¶ ‼ ‼ ‼ ◀ └ ,W└ LV└ CRZ└
┤ ┬ ‼ ☼ └ VR└ KHV└ EHHQ└ VL[┼ DQG┼ D┼ KDOI└ KRXUV☼ └ DQG└ ,└ WKLQN└ WKUHH└ URXQGV└ E\└ DQ\└
FULWHULD└ WKDW└ RQH└ ZRXOG└ XVH└ HDFK└ RI└ ILYH└ PLQXWHV☼ └ ZKHQ└ ┼ ┼ └ ZKHQ└ *LCD└
0F&DUWK\└ ZDV└ CRPLCDWHG└ DQG└ ,└ KDG└ VLJCLILFDQW└ CXPEHUV└ RI└ TXHWWLRQV☼ └
%&UEDUD└ %R[HU└ OLPLWHG└ PH└ WR└ ILYH└ PLQXWH└ URXQG☼ └ RQH└ ILYH└ PLQXWH└ URXQG└
DQG└ RQH└ WZR└ PLQXWH└ URXQG◀

:H└ KDYH└ PRUH└ WKDQ└ GRXECHG└ WRGD\└ WKDW└ DPRXQW└ RI└ WLPH└ IRU└ TXHWWLRQLQJ◀

&$53(5 └
0U◀ └ &KDLUPDQ"

%$55$662 └
6HQDWRU"

&$53(5 └
,P└ FHUWDLQ└ CRW└ VD\LQJ└ WKDW└ \RXYH└ EHHQ└ XQIDLU└ ZLWK└ XV☼ └ EXW└ XQWLO└ WKLV└ YHU\└
PLQXWH☼ └ ,└ CRQW└ WKLQN└ LW└ KDV└ EHHQ└ FCHDU└ WR└ DQ\RQH└ WKDW└ WKHUH└ ZDV└ D└ WKUHH└
URXQG└ OLPLW☼ └ DQG└ ,└ EHOLHYH└ \RX└ RSHQHG└ WKH└ KHDULQJ└ E\└ VD\LQJ└ WKDW└ ZHG└ JR└
RQ└ XQWLO└ SHRSCHV└ TXHWWLRQV└ ZHUH└ DQZHUHG◀

6R└ WKLV└ LV└ D└ ELW└ RI└ D└ CRYHDW☼ └ EXW└ DJDLQ└ SCHDVH└ CRQW└ WDNH└ LW└ DV└ D└ FULWLFLVP└
RI└ \RXU└ IDLUCHWW◀ └ ,└ WKLQN└ WKDW└ \RX└ KDYH└ EHHQ└ IDLU◀ └ 7KLV└ LV└ MXWW└ QHZV└ DQG└ ,└
CR└ KDYH└ D└ EXCFK└ RI└ TXHWWLRQV└ ULJKW└ KHUH└ WKDW└ ,G└ KRSHG└ WR└ DVN└ DV└ ┼ ┼ └ DV└
ZKDW└ ,└ H[SHFW└ WR└ EH└ D└ ILCDO└ IRXUWK└ URXQG◀

%$55$662 └
:HOO☼ └ WKHQ└ ,└ ZRXOG└ DOUHDG\└ LQYLWH└ \RX└ WR└ SCHDVH└ VXEPLW└ WKRVH└ IRCORZ└ XS└

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +H[3DJH└└ !! └|RI└└

ZULWWHQ└ TXHVWLRQV└ E\└ WRPRUURZ└ DW└ FORVH└ RI└ EXVLQHVV◀

&$53(5 └
0U◀ └ &KDLUPDQ◀ └ 0U◀ └ &KDLUPDQ└ FRXOG└ ,└ EH└ UHFRJQL]HG"└ ◁HDK└ └ ,└ ◀ ◀ ◀

?$55$662 └
6HQDWRU└ &DUSHU└ DQG└ WKHQ└ 6HQDWRU└ %RRNHU◀

&$53(5 └
,└ DSSUHFLDWH└ WKH└ ZD\└ \RXYH└ FRQGXFWHG└ WKLV└ ┼ ┼ └ WKLV└ KHDULQJ└ WRGD\◀ └
$SSUHFLDWH└ DOO└ WKH└ PHPEHUV└ FRPLQJ└ DJDLQ└ ┼ ┼ └ FRPLQJ└ EDFN└ DJDLQ└ DQG└
DJDLQ◀ └ :KHQ└ ┼ ┼ └ ZKHQ└ ZH└ ZHUH└ WDONLQJ└ D└ ZHHN└ RU└ WZR└ DJR└ DERXW└ ZKHUH└ WR└
KDVH└ WKH└ KHDULQJ└ └ ZKHWKHU└ WR└ KDVH└ RQH└ GD\└ RI└ KHDULQJV└ RU└ WZR└ GD\V└ RI└
KHDULQJV└ └ ZH└ ZHUH└ LQWHUHVWHG└ ┼ ┼ └ RXU└ VLGH└ ZDV└ LQWHUHVWHG└ LQ└ KDYLQJ└ WZR└
GD\V└ RI└ KHDULQJV◀

:H└ ZHUH└ LQWHUHVWHG└ LQ└ KDYLQJ└ DQ└ RXWLGH└ SDQHO└ DQG└ LW└ ZDV└ H[SODLQHG└ WR└
XV└ WKDW└ WKH└ ┼ ┼ └ WKDWW└ QRW└ UHDOO└ WKH└ WUDGLWLRQ└ RI└ WKH└ FRPPLWWHH└ WR└ KDVH└ DQ└
RXWLGH└ SDQHO◀ └ %XW└ ┼ ┼ └ DQG└ \RX└ VDLG└ └ ,G└ SUHIHU└ WR└ GR└ LW└ LQ└ RQH└ GD\└ DQG└ ZHOO└
WWD\└ DV└ CRQJ└ DV└ SHRSOH└ KDVH└ TXHVWLRQV◀ └ ,└ WKLQN└ WKDW└ ZDV└ DOPRWW└ H[DFWO\└
\RXU└ ZRUGV◀ └ $QG└ WKDWW└ KDUG└ WR└ DUJXH└ ZLWK◀

:H└ FDQ└ WWD\└ DV└ CRQJ└ DV└ SHRSOH└ KDVH└ TXHVWLRQV◀ └ 6RPH└ RI└ WKH└ IRONV└ KDVH└
VRPH└ PRUH└ TXHVWLRQV◀ └ ,└ NQRZ└ ,└ GR◀ └ $QG└ ZHUH└ GRW└ UXQQLQJ└ RXW└ WKH└ FORFN◀ └
7KH\UH└ KRQHVW└ TXHVWLRQV◀ └ $QG└ ,└ ZRXOG└ MXVW└ DVN└ WKDW└ \RX└ WKLQN└ EDFN└ RQ└
RXU└ HDUOLHU└ FRQYHUVDWLRQ└ DQG└ \RX└ VHH└ \RXU└ ZD\└ FCHDU└ WR└ KDVH└ RQH└ PRUH└
URXQG└ DQG└ ZHOO└ FDOO└ LW└ D└ GD\◀

?$55$662 └
◁HDK└ └ ZHOO└ └ ,└ ZRXOG└ VD\└ D└ FRXSCH└ RI└ WKLQJV◀ └ 2QH└ └ LV└ ,└ RI IHUHG└ WR└ WWDUW└ WKH└
FRPPLWWHH└ PHWLQJ└ HDUOLHU└ WRGD\└ EHFDXVH└ WKHUH└ DUH└ PDQ\└ RI└ XV└ ZKR└
KDVH└ FRPPLWPHQW└ LQWR└ WKH└ HYHQLQJ◀ └ 3HRSOH└ IURP└ RXU└ KRPH└ WWDWHV└ ZKR└
DUH└ KHUH└ IRU└ WKH└ LGDXJXUDWLRQ└ DFWLYLWLHV◀ └ :H└ KDVH└ FRPPLWPHQW└ IRU└ RXU└
KRPH└ WWDWHV◀ └ $QG└ WKH└ LGHD└ RI└ WWDUWLQJ└ DW└ !! !! └ ZDV└ UHVHFWHG◀

7KH└ ┼ ┼ └ ZDQWHG└ WR└ JR└ DORQJ└ └ ,└ WKLQN└ ULJKW└ EHIRUH└ WKH└ WKLUG└ URXQG└ └ ,└ VDLG└ └
QRZ└ └ LI└ WKHUHV└ JRLQJ└ WR└ EH└ DQ└ RQJRLQJ└ └ PD\EH└ ZH└ VKRXOG└ WDNH└ D└ EUHDN└ └
JLYH└ WKH└ ZLWGHW└ DQ└ RSSRUWXQLW\└ WR└ WDNH└ D└ EUHDN◀ └ ◁RX└ VDLG└ └ QR└ └ CHW└ SCRZ└
RQ◀ └ 7KH└ ZLWGHW└ KDV└ EHHQ└ VLWWLQJ└ WKHUH└ QRZ└ IRU└ MXW└ DERXW└ WKUHH└ KRXUV◀

KWWS ↕ ↕ ZZZ◀ FT◀ FRP↕ GRF↕ FRQJUHVVLR╢DOWHDQVFUL╢SWV "¶ ┴ SULQWVWXH ¶ ┼┴ ↕!!

$QG└ GHSHQGLQJ└ RQ└ WKH└ ZLVKHV└ RI└ WKH└ FRPPLWWHH☼└ P\└ SUHIHUHQFH└ LV└ WR└ VD\└
ZH└ KDYH└ GRQH└ PRUH└ WKDQ└ HYHU└ GRQH└ LQ└ WKH└ QDWW└ ¶ ├└ \HDUV└ RU└ ¶ →└ \HDUV└ IRU└
QRPLQHHV◀└ ,└ PHDQ└ LI└ SHRSOH└ KDYH└ RQH└ RU└ WZR└ TXHVWLRQV☼└ ,└ ZRXOG└ ZDQW└ WR└
JLYH└ WKH└ ZLWQHVV└ DQ└ RSSRUWXQLW\└ WR└ WWLHWFK└ KLV└ CHJV◀└ ,QO└ EH└ KDSS\└ WR└ WWD\└
DQG└ ZH└ FDQ└ FRPH└ EDFN└ ZLWK└ D└ WKUHH└ PLQXWH└ URXQG◀

?&XW└ ,└ MXWW└ GRQW└ ┼┼└ ,└ WKLQN└ WKHUH└ ┼┼└ SHRSOH└ KDYH└ REOLJDWLRQV└ DQG└
FRPPLWPHQWV└ DQG└ ZH└ WKRXJKW└ ZH└ ZRXOG└ EH└ FRPSOHWHG└ E\└ QRZ☼└ DQG└ LW└
GRHV└ VHHP└ WKDW└ PDQ\└ RI└ WKH└ HQG☼└ \RX└ NQRZ☼└ QRW└ DV└ ┼┼└ DQG└ IRU└ SHRSOH└ WKDW└
DUH└ KHUH└ QRZ☼└ WKH\└ FRXOG└ JR└ D└ ┼┼└ \RX└ NQRZ◀

6R└ ZH└ KDYH└ WZR└ PHPEHUV☼└ WKUHH└ PHPEHUV☼└ LI└ \RX└ ZDQW└ WR└ JR└ WZR└ WR└
WKUHH└ PLQXWHV☼└ RU└ RQH└ RU└ WZR└ TXHVWLRQV☼└ ,└ WKLQN└ ZH└ ZRXOG└ EH└ DECH└ WR└
DFFRPPRGDWH└ EXW└ WR└ EULQJ└ EDFN└ WKH└ HQWLUH└ FRPPLWWHH└ DQG└ JR└ LQWR└ WKH└
QLJKW└ ┼┼

&$53(5└
1R☼└ ,P└ QRW└ ┼┼└ ,P└ QRW└ VXJJHVWLQJ└ ZH└ EULQJ└ EDFN└ WKH└ HQWLUH└ ┼┼└ ,P└ JRLQJ└ WR└
VXWW└ VXJJHVW└ WKDW☼└ LI└ ZH└ FDQ☼└ PD\EH└ ZH└ FDQ└ DJUHH└ KHUH◀└ 7KRVH└ WKDW└ DUH└
KHUH└ WRGD\☼└ ULJKW└ WKLV└ PRPHQW☼└ LI└ WKH\└ KDYH└ TXHVWLRQ☼└ JLYH└ WKHP└ ILYH└
PLQXWHV◀└ $QG└ WKHQ└ ZKHQ└ WKH\UH└ GRQH☼└ WKHQ└ ZHUH└ GRQH☼└ ZHUH└ GRQH◀└
<HDK◀

?&55$662└
$Q\└ REMHFWLRQ└ IURP└ RXU└ VLGH"└ $Q\└ ZLWK└ WKHVH└ RWKHU└ ◀◀◀

&$53(5└
<RX└ KDYH└ WR└ JR└ ZLWK└ ◀◀◀

?&55$662└
6HQDWRU└ ,QRIH"

,1+2)(└
$QWKRXJK└ ZH└ ZRXOG└ EH└ DECH└ WR└ \LHOG└ EDFN└ DQ\└ WLPH└ WKDW└ ◀◀◀

?&55$662└
6XUH◀

,1+2)(└
◀◀◀└ ZH└ KDYH└ LI└ ZH└ GLGQW└ ZDQW└ WR└ XVH└ LW◀

&$53(5 └
2U└ \RX└ FRXOG└ \LHOG└ WR└ XV◀

,1+2)(└
2.☼ └ ,└ FDQ└ RQO\└ VD\└ WKDW└ ◀◀◀

♂ /DXJKWHU□

,1+2)(└
,└ FDQ└ RQO\└ VD\└ WKDW└ ,YH└ FKDLUHG└ WKLV└ FRPPLWWHH└ IRU└ TXLWH└ D└ QXPEHU└ RI└
\HDUV◀ └ ,YH└ EHHQ└ WKURXJK└ WKLV└ RFFH└ EHIRUH└ DQG└ WKHUH└ LV└ DOZD\V└ DQ└ HI IRUW└
E\└ WKRVH└ ZKR└ DUH└ SHUKDSV└ GRW└ UHDOO\└ VDWLVILHG└ DV└ VRPH└ RI└ WKH└ RWKHUV└
PLJKW└ EH└ WR└ WU\└ WR└ PDNH└ LW└ FRQWLQXH└ RQ└ DQG└ RQ└ DQG└ RQ◀ └ ,└ ZRXOG└ SUHIHU└ WR└
JR└ ┼ ┼ └ JR└ DKHDG◀

,└ WKLQN└ ZHYH└ DOO└ KDG└ DGHTXDWH└ WLPH└ DQG└ ┼ ┼ └ DQG└ EH└ SUHSDUHG└ WR└ YRWH◀

%&$55$662 └
:HOO☼ └ ZH└ GRQW└ KDYH└ D└ YRWH└ VFKHGXOHG└ IRU└ WRGD\└ RQ└ WKLV◀ └ :H└ GRQW└ KDYH└
DQ└ DJUHHPHQW└ RQ└ WKDW◀ └ 6R└ WKHUH└ ZRXOGQW└ EH└ ┼ ┼ └ ZRXOGQW└ EH└ D└ YRWH◀ └ ,└
ZRXOG└ ┼ ┼ └ ,└ ZRXOG└ VD\└ LI└ ┼ ┼ └ LI└ WKH└ ┼ ┼ └ LI└ WKH└ ◀◀◀

,1+2)(└
:HOO☼ └ LI└ WKDW└ WKH└ FDVH└ WKHQ└ ZH└ FDQ└ FRQILGH└ LW└ WR☼ └ IRU└ WKH└ UHFRUG◀

♂ 81.12:1□ └
♂ ,QDXGLEOH□◀

%&$55$662 └
$Q\└ RWKHU└ VXJJHVWLRQV└ IURP└ WKH└ ◀◀◀

68//,9$1 └

0U◀ └ &KDLUPDQ└ └ , └ WKLQN└ \RXYH└ EHHQ└ H[HHGLQJO\└ IDLU└ └ SDUWLFXODUO\└ UHDDLYH└
/R└ WKH└ FRQILUPDWLRQ└ RI └ *LQD└ 0F&DUWK\└ DQG└ , └ WKLQN└ LW└ SXUHO\└ ZLWKLQ└ \RXU└
FDOO└ WR└ KDYH└ WKH└ DGGLWLRQDO└ TXHVWLRQV└ EH└ VXEPLWWHG└ IRU└ WKH└ UHFRUG◀ └ 6LOOO└ WKH└
RSSRUWXQLW└ IRU└ WKH└ ZLWQHW└ WR└ DQZHU└ WKH└ TXHVWLRQV◀

+HOO└ WLOOO└ KDYH└ WR└ GR└ LW└ EHIRUH└ KLV└ FRQILUPDWLRQ└ └ EXW└ UHDDLYH└ WR└ DQ└ R\KHU└
(3$└ DGPLQLWUDWRU└ KHDULQJ└ └ \RXYH└ EHHQ└ YHU└ JHQHURXV└ └ YHU└ IDLU└ DQG└ , └
/KLQN└ WKDW└ IURP└ WKDW└ SHUVSHFWLYH└ ◀ ◀ ◀

&$53(5 └
&RXOG└ , └ ┼ ┼ └ FRXOG└ , └ MXVW└ ◀ ◀ ◀

68//,9$1 └
◀ ◀ ◀ └ , └ WKLQN└ WKDW└ └ WKDW└ D└ YHU└ IDLU└ RXWFRPH└ └ WR└ WLOOO└ DVN└ WKH└ TXHVWLRQV◀ └ -X\
VXEPLW└ WKH└ TXHVWLRQV└ IRU└ WKH└ UHFRUG◀

&$53(5 └
<HDK└ └ FRXOG└ , └ UHVSRQG└ WR└ RXU└ FRQHDJXH└ IURP└ $QDVND" └ , └ GRQW└ NQRZ└ LI └ \RX└
UHPHPEHU└ └ D└ \HDU└ RU└ WZR└ DJR└ └ WKHUH└ ZDV└ D└ MRLQW└ VHVVLRQ└ RI └ WKH└ +RXVH└
DQG└ 6HQDWH└ FRPPLWWHHV└ DQG└ R\KHU└ ♂ VLF□ └ FRPPLWWHHV└ └ DQG└ WKH└ ZLWQHW└
ZDV└ *LQD└ 0F&DUWK\└ DQG└ , └ DUULYHG└ IRXU└ KRXUV└ LQWR└ WKH└ KHDULQJ└ DQG└ DIWHU└ D└
ZKLCH└ , └ ZDV└ UHFRJQL]HG└ WR└ ┼ ┼ └ WR└ DVN└ D└ TXHVWLRQ◀

$QG└ P\└ TXHVWLRQ└ RI └ *LQD└ 0F&DUWK\└ ZDV└ └ | <RXYH└ EHHQ└ KHUH└ IRU└ IRXU└
KRXUV└ └ KDYHQW└ \RX"| └ 6KH└ VDLG└ └ | <HV◀ | └ $QG└ , └ VDLG└ └ | ,V└ WKHUH└ TXHVWLRQ└ \RX└
KDYHQW└ EHHQ└ DVNHG└ WKDW└ \RX└ ZLVK└ \RX└ KDG└ EHHQ└ DVNHG"| └ $QG└ VKH└ VDLG└ └
| <HV◀ | └ , └ VDLG└ └ | :KDW└ LV└ LW"| └ 6KH└ VDLG└ └ | , └ ZLVK└ ,G└ EHHQ└ DVNHG└ LI └ , └ QHHGHG
EDWKURRP└ EUHDN◀ |

, └ GRQW└ ┼ ┼ └ , └ GRQW└ NQRZ└ LI └ WKH└ ZLWQHW└ QHHGV└ D└ EDWKURRP└ EUHDN└ └ EXW└ LI └ \RX└
QHHG└ RQH└ IRU└ D└ FRXSOH└ PLQXWHV└ └ ZH└ FDQ└ DUUDQJH└ WKDW◀ └ $QG└ , └ FDQ└ VD\└ └
KHUHV└ ZKDW└ ZHUH└ DVNLQJ└ IRU◀ └)LYH└ PLQXWHV└ └ &RU\└ %RRNHU└ └ 6KHDGRQ└
:KLWHKRXVH└ └ 7RP└ &DUSHU◀ └ :H└ DVN└ KLP└ D└ TXHVWLRQ└ DQG└ ZHUH└ GRQH◀ └
7KDW└ LW◀ └ &DQ└ \RX└ KDQGOH└ WKDW"

%&$55$662 └
, └ DVNHG└ EHIRUH└ ◀ ◀ ◀

&4◀ FRP┼6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQGV└ +HI 3DJH└ ¶└!!RI└

&$53(5 └
:K\└ GRQW└ \RX└ VD\☼ └ \HV"└ :HUH└ ZDWWLQJ└ D└ CRW└ RI└ WLPH└ KHUH☼ └ RWKHUZLVH└
ZHOO└ MXWW└ ◀ ◀ ◀

%$55$662 └
+RZ└ DERXW└ WKH└ ◀ ◀ ◀

&$53(5 └
◀ ◀ ◀ └ NHHS└ WDONLQJ└ DURXQG└ LW◀

%$55$662 └
$V└ \RX└ VDLG☼ └ \RX└ KDYH└ D└ FRXSOH└ RI└ TXHWWLRQV☼ └ \RX└ KDYH└ D└ FRXSOH└ ┼ ┼ └ CHWW└
JR└ WKUHH└ PLQXWHV└ HDFK└ DQG└ WKHQ└ ZHOO└ FDOO└ LW└ JRRG◀

&$53(5 └
$OO└ ULJKW◀

%$55$662 └
<RXUH└ ┼ ┼ └ \RXUH└ XS◀

%22.(5 └
0U◀ └ &KDLUPDQ"

%$55$662 └
6HQDWRU└ %RRNHU"

%22.(5 └
,G└ DVNHG└ WR└ EH└ UHFRJQL]HG└ HDUOLHU◀ └ ,└ GR└ ZDQW└ WR└ ◀ ◀ ◀

%$55$662 └
<HV☼ └ RK☼ └ ,P└ ┼ ┼ └ ,└ DSRORJL]H◀ └ <HV☼ └ VLU"

%22.(5 └

KWWS ↕ ↕ ZZZ◀ FT◀ FRP↕ GRF↕ FRQJUHVVLR┼DQWDQVFULSWW "¶ ┴ SULQWWUXH ¶↕ ┼┴ ↕!!

1R└ ,└ MXVW└ ZDQW└ WR└ UHSHDW└ ,└ GR└ WKLQN└ ZKDW└ 6HQDWRU└ 6XOOLYDQ└ VDLG└ \RX└ KDYH└ EHHQ└ YHU\└ YHU\└ JHQHURXV◀ ,W└ WXUHG└ ,└ DSSUHFLDWH└ ZKDW└ VHHPV└ OLNH└ DQ└ DFFRUG└ ULJKW└ QRZ└ RI└ D└ IHZ└ PLQXWHV└ HDFK└ ,G└ DSSUHFLDWH└ WKDW◀

2QH└ WKLQJ└ \RX└ GLGQW└ PDUN└ ZKLFK└ ,└ WKLQN└ VKRXOG└ EH└ UHDOO\└ LPSRUWDQW└ LV└ ,└ KDYH└ QR└ V\PSDWK\└ IRU└ WKH└ QRPLQHH└ DQG└ KLV└ HQGXUDQFH◀ ,└ GR└ KDYH└ IRU└ KLV└ IDPLO\└ EHKLQG└ KLP└ ZKR└ KDV└ VDW└ WKURXJK└ DOO└ WKLV└ DQG└ ,└ MXVW└ ZDQW└ WR└ PDUN└ IRU└ WKH└ UHFRUG└ WKDW└ WKH\└ DUH└ WUXH└ FKDPSV└ DQG└ ,└ WKLQN└ WKDW└ LPSRUWDQW└ WR└ NQRZ◀ $QG└ ,└ WKDQN└ WKHP└ IRU└ WKHLU└ LQGXOJHQFH└ QRW└ WKH└ QRPLQHH└ EXW└ ◀◀◀

%$55$662 └
:HOO└ ,└ ZRXOG└ MXVW└ VD\└ ◀◀◀

%22.(5 └
◀◀◀ ,└ WKLQN└ WKDW└ PRUH└ HYLGHQFH└ WKDW└ KH└ FDUHV└ IRU└ WKH└ FKLOGUHQ└ RI└ 2NODKRPD◀

♂ /DXJKWHU□

%$55$662 └
,└ ZRXOG└ MXVW└ VD\└ PDQ\└ SHRSOH└ + + └ PRUH└ SHRSOH└ YRWH└ IRU└ PH└ EHFDXVH└ RI└ P\└ ZLIH└ WKDQ└ YRWH└ IRU└ PH└ DQG└ ,└ ZRXOG└ VXJJHVW└ IRU└ \RX└ DV└ ZHOO└ LQ└ WKH└ FDVH└ RI└ /KLV└ QRPLQHH◀ 6R└ ◀◀◀

%22.(5 └
/HW└ PH└ \LHOG└ WR└ 6HQDWRU└ :KLWHKRXVH◀

%$55$662 └
2.◀

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,└ MXVW└ ZDQWHG└ WR└ WRXFK└ RQ└ WZR└ WKLQJV└ DQG└ WKHQ└ ZHOO└ ZUDS└ XS◀ 7KH└ ILUVW└ LV└ /KDW└ RQ└ \RXU└ TXHVWLRQDLUH└ \RX└ OLVWHG└ DQ└ HPDLO└ DGGUHVV└ ZLWK└ D└ PH◀ FRP└ GRPDLQ└ DV└ \RXU└ EXVLQHVV└ HPDLO◀

&4◀ FRP╢6HQDWH└ (QYLURQPHQW└ DQG└ 3XEOLF└ :RUNV└ &RPPLWWHH└ +RQG└ +NI 3DJH╙ ¶└╙RI╙

<RX└ DOVR└ KDYH└ DQ└ RDJ◀ RN◀ JRY└ DGGUHVV◀ └ $UH└ WKHUH└ RWKHU└ HPDLO└ DGGUHVV└
WKDW└ \RX└ KDYH└ DQG└ DUH└ WKHUH└ RWKHU└ HPDLO└ DGGUHVVHV└ WKDW└ \RX└ XVH└ IRU└
EXVLQHVV└ RWKHU└ WKDQ└ \RXU└ PH◀ FRP└ DQG└ \RXU└ RDJ◀ RN◀ JRY└ HPDLO└
DGGUHVVHV"

358,77 └
7KH└ + + └ ,P└ VRUU└ └ 6HQDWRU◀ └ 7KH└ + + └ WKH└ PH└ DGGUHVV└ LV└ QRW└ D└ EXVLQHVV└ HPDLO└
DGGUHVV◀ └ ,W└ D└ + + └ LW└ D└ + + └ DQG└ ,P└ QRW└ VXUH└ ZK└ LW└ ZDV└ GHVLJQDWHG└ DV└ VXFK◀ |
,P└ RQ└ P└ ILUWW└ YLVLW└ ◀ ◀ ◀

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2└ PD└EH└ ZH└ FDQ└ SUHVFULEH└ WKH└ ILOLQJ└ RQ└ WKDW◀ ◀ ◀

358,77 └
<HDK└ EXW└ WKHUH└ DUH└ QR└ ◀ ◀ ◀

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◀ ◀ ◀ └ VR└ WKHUH└ QR└ RWKHU└ ◀ ◀ ◀

358,77 └
◀ ◀ ◀ └ WKHUH└ DUH└ QR└ RWKHU└ HPDLO└ DGGUHVVHV└ LI└ WKDW└ \RXU└ TXHVWLRQ└ 6HQDWRU◀

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:H└ KDYH└ JRQH└ WKURXJK└ WKH└ FDVHV└ WKDW└ \RX└ OLW└ DV└ \RXU└ HQYLURQPHQWDO└
FDVHV└ DQG└ ZKHQ└ ZH└ WDNH└ RXW└ WKH└ FDVHV└ WKDW└ ZHUH└ WDUWHG└ E└ \RXU└
SUHGHFHVVRU└ 'UHZ└ (GPRQGVRQ└ DQG└ ZKHQ└ \RX└ WDNH└ RXW└ WKH└ FDVHV└ WKDW└
DUH└ ILVK└ NLOO└ FDVHV└ ZKLFK└ DV└ ,└ XQGHUVWDQG└ LV└ D└ IRUP└ \RX└ CDNH└ PDWWHU└ ♂ SK□ └
WKDW└ LV└ UHVROYHG└ E└ CHWWHU└ DW└ WKH└ WDII└ CHYHD└ \RX└ FRXQW└ WKH└ ILVK└ \RX└ SD└ WKH
IHH◀

$QG└ ZKHQ└ \RX└ WDNH└ RXW└ WKH└ TXL└ WDP└ FDVHV└ ZKLFK└ DUH└ D└ IRU└ WKRVH└ ZKR└
DUHQW└ CDZ└HUV└ D└ SULYDWH└ LQGLYLGXDO└ ZKR└ EULQJV└ DQ└ DFWLRQ└ DQG└ WKHQ└
DWWRUCH└ JHQHUDO└ FDQ└ WWHS└ LQ└ DQG└ WDNH└ WKH└ DFWLRQ└ RYHU└ LI└ WKH└ ZDQW└ EXW└
LW└ EURXJKW└ LQ└ WKH└ ILUWW└ LQWDQFH└ E└ D└ SULYDWH└ LQGLYLGXDO◀ └ $QG└ WKHQ└ LI└ \RX└
WDNH└ RXW└ WKH└ FDVHV└ LQ└ ZKLFK└ \RX└ VXHG└ (3$└ └ WKHUH└ LV└ YLUWXDOO└ QRWKLQJ└ CHIW◀

$QG└ LQ└ DGGLWLRQ└ WR└ WKDW└ └ ZH└ KDYH└ WKDW└ \RX└ FRVHG└ WKH└ (QYLURQPHQWDO└ 3URWHFWLRQ└ 8QLW└ LQ└ 2NODKRPD└ DV└ D└ IUHH└ WDQGLQJ└ XQLW◀ └ <RX└ WROG└ PH└ ZKHQ└ ZH└ PHW└ WKDW└ \RX└ KDG└ URODHG└ LW└ LQWR└ \RXU└)HGHUDOLVP└ XQLW└ EXW└ ,└ ZDV└ MXWW└ RQ└ /KH└)HGHUDOLVPV└ XQLW└ :HEVLWH└ DQG└ WKH└ ZRUG└ | HQYLURQPHQWDO| └ GRHVQW└ HYHQ└ DSSHDU└ RQ└ WKDW◀

$QG└ LW└ DSSHDUV└ WR└ EH└ UXQ└ E\└ WKH└ VROLFLWRU└ JHQHUDO└ DQG└ LW└ VD\V└ RYHU└ DQG└ RYHU└ DJDLQ└ WKDW└ LW└ LQYROYHG└ LQ└ DSSHDDWH└ OLWLJDWLRQ◀ └ $QG└ RI└ FRXUVH└ └ LI└ \RXUH└ EULQJLQJ└ DQ└ DFWLRQ└ └ \RXUH└ GRW└ WDUWLQJ└ DW└ WKH└ DSSHDDWH└ CHYHO◀ └)LQDOO\└ └ WKH└ ┼ ┼

358,77 └
6HQDWRU└ └ LI└ ,└ PD\└ ┼ ┼ └ WKH└ 'HSXW\└ 6ROLFLWRU└ *HQHUDO└ &DD\WRQ└ %DQN└ ZDV└ DFWXDOO\└ HPSOR\HG└ E\└ WKH└ SUHYLRXV└ DWWRUQH\└ JHQHUDO◀ └ +H└ KDV└ EHHQ└ GHVLJQDWHG└ D└ GHSXW\└ VROLFLWRU└ JHQHUDO└ DQG└ LV└ UHVSRQVLEOH└ IRU└ HQYLURQPHQWDO└ UHDWHG└ DGYLVH└ DQG└ FRQVHQW└ WR└ ◀ ◀ ◀

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<HS◀

358,77 └
◀ ◀ ◀ └ WKRVH└ DJHQFLHV◀

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<HDK└ └ WKDW└ D└ GLIIHUHQW└ IXQFWLRQ└ └ WKRXJK◀ └ 7KDW└ D└ GLIIHUHQW└ IXQFWLRQ└ WKDQ└ /R└ EULQJ└ DQ└ DFWLRQ◀ └ ,YH└ EHHQ└ DQ└ DWWRUQH\└ JHQHUDO└ └ WRR◀ └ ,└ NQRZ└ WKH└ GLIIHUHQFH◀ └ 7KH└ DWWRUQH\└ JHQHUDO└ KDV└ DQ└ REOLJDWLRQ└ WR└ SURYLGH└ CDZ\HUV└ WR└ JLYH└ DGYLFH└ WR└ DJHQFLHV└ └ EXW└ \RX└ DOVR└ KDYH└ WKH└ DXWKRULWW└ WR└ EULQJ└ FULPLQDO└ DFWLRQV└ └ LI└ \RX└ ZLVK└ └ DQG└ \RX└ KDYH└ WKH└ DXWKRULWW└ WR└ EULQJ└ FLYLO└ DFWLRQV└ └ LI└ \RX└ ZLVK◀

$QG└ LW└ WKRVH└ DXWKRULWLHV└ WKDW└ ,└ EHOLHYH└ KDYH└ GRW└ JRWWHQ└ PXFK└ DWWHQWLRQ◀ └ $QG└ WKH└ CDWW└ SLHFH└ RI└ WKDW└ └ EHFDXVH└ \RX└ ZLOO└ KDYH└ D└ FKDQFH└ WR└ UHVSRQG└ └ EXW└ ,P└ RQ└ D└ VKRUW└ FORFN└ └ WKDQNV└ └ LV└ WKDW└ WKHUH└ ZDV└ DQ└ 2NODKRPD└ (QYLURQPHQWDO└ &ULPHV└ 7DVNIRUFH└ WKDW└ \RXU└ SUHGHFHVVRU└ CHG└ DQG└ LW└ GHVFULEHV◀

$QG└ ,G└ DVN└ WR└ KDYH└ WKHMH└ GRFXPHQW└ SXW└ LQWR└ WKH└ ┼ ┼ └ WKH└ UHFRUG└ └ IURP└
¶ → └ WR└ ┴ ‼ ¶ ‼ └ WKH└ 2(&76└ └ WKH└ (QYLURQPHQWDO└ &ULPHV└ 7DVNIRUFH└ RI └ WKH└
(QYLURQPHQWDO└ 3URWHFWLRQ└ 8QLW└ LQ└ FRQGXFWLRQ└ ZLWK└ WKH└ (3$└ DQG└ RWKHU└
HQWLWLHV└ FRQGXFWHG└ ¶ ┤ ┴ └ FULPLQDO└ LQYHWWLJDWLRQV└ UHVXOWLQJ└ LQ└ ↑ ├ └
SURVHFXWLRQV◀

&ULPLQDO└ FDVHV└ UHVXOWHG└ LQGLYLGXDO└ FRQYLFWLRQV└ RQ└ ¶ ¶ ‼ └ IHORQ\└ DQG└ ┴ ¶ └
PLVGHPHDQRU└ FRXQWW└ └ • ← └ PLOOLRQ└ LQ└ ILQHV└ └ ┴ ← └ \HDUV└ RI └ MDLO└ WLPH◀ └ :H└ FDQ└
SXW└ LW└ LQ└ WKH└ UHFRUG◀ └ ,V└ WKHUH└ HYHQ└ ┼ ┼ └ GR└ \RX└ HYHQ└ SDUWLFLSDWH└ LQ└ WKH└
2NODKRPD└ (QYLURQPHQWDO└ &ULPHV└ 7DVNIRUFH└ WWLOO"

?$55$662 └
:LWKRXW└ REMHFWLRQ◀

358,77 └
6HQDWRU└ DV└ ,YH└ LQGLFDWHG└ ZH└ HDFK└ GD\└ ZLWK└ RXU└ 'HSDUWPHQW└ RI └
(QYLURQPHQWDO└ 4XDOLW\└ RQ└ HQIRUFHPHQW└ DORQJ└ ZLWK└ RWKHU└ DJHQFLHV◀ └ ,└
JXHVV└ LW└ D└ PDWWHU└ RI └ TXRWH↕ XQTXRWH└ | ZKR└ WDNHV└ WKH└ FUHGLW└ IRU└ WKDW└ W\SH└
RI └ HQIRUFHPHQW◀ | └ %XW└ WKRVH└ LQGLYLGXDO└ KDYH└ RI IHUHG└ WDWHPHQW└ WR└ WKLV└
ERG\◀ └ 7KH\└ DUH└ D└ PDWWHU└ RI └ WKH└ UHFRUG◀

<RXYH└ KHDUG└ WDWHPHQW└ WKDW└ WKH└ &KLUPDQ└ KDV└ UHIHUUHG└ WR└ WKDW└ ┼ ┼ └ WKDW└
ZH└ KDYH└ ZRUNHG└ GLOLJHQWO\└ ZLWK└ WKRVH└ DJHQFLHV└ WR└ HQIRUFH└ DSSURSULDWHO\└ └
DQG└ ,└ ZRXOG└ UHIHU└ WR└ WKHLU└ WDWHPHQW└ LQ└ UHVSRQVH◀

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7KDQN└ \RX└ ┼ ┼ └ 6HQDWRU└ %RRNHU◀

?22.(5 └
7KDQN└ \RX└ YHU\└ PXFK◀ └ 6R└ ILUWW└ RI └ DOO└ └ ,└ DSSUHFLDWH└ \RX└ WDONLQJ└ DERXW└
HQYLURQPHQWDO└ MXVWLFH└ DQG└ PHQWLRQHG└ WKDW└ ZH└ GLG└ WDON└ DERXW└ WKDW└ DQG└ ,└
IHOW└ JRRG└ DERXW└ \RXU└ SHUVRQDO└ FRPPLWPHQW└ WR└ DW└ CHDWW└ PH└ WKDW└ \RX└ ZHUH└
SXUVXH└ WKDW◀ └ ,└ MXWW└ ZDQW└ WR└ MXWW└ JR└ WKURXJK└ WKLV└ CDWW└ SRLQW◀ └ ,└ ZDQW└ WR└ SXW└
/RJHWKHU└ D└ IDFW└ SDWWHUQ└ KHUH└ └ WKHQ└ CHW└ \RX└ KDYH└ WKDW└ DQG└ GLVSXWH└ LW◀

,└ NQRZ└ WKHUHV└ DW└ CHDWW└ RQH└ SRLQW└ LQ└ KHUH└ \RX└ GLVSXWH└ └ EXW└ ,└ UHDOO\└ ZDQW└ WR└
JHW└ WR└ WKH└ ┼ ┼ └ ZKDW└ ,└ GUDZ└ IURP└ WKH└ IDFWW└ └ DQG└ \RX└ FDQ└ DJDLQ└ └ KDYH└ WKH└ CDWW└
ZRUG◀ └ 6R└ └ ZKDW└ ,P└ VHHLQJ└ └ ZKHQ└ ,└ SXW└ WRJHWKHU└ DOO└ WKH└ IDFWW└ └ DQG└ MXWW└ D└
SDWWHUQ◀

<RX└ NQRZ☼ └WKHUH└ ZDV└ D└ OLWLJDWLRQ└ IURP└ \RXU└ SUHGHFHVVRU└WKDW└ \RX└ GHFOLGHG└WR└ FRQFOXGH└ ZKHQ└ \RX└ JRW└ LQ└ DJDLQW└ D└ SRODWLQJ└ SRXQWU\└ SURGXFHUV└ ZKR└ ZHUH└ GXPSLQJ└ KXQGUHGV└ RI└WKRXVDQGV└ RI└WRQV└ RI└ FKLFNHQ└ ZDWHU└ LQWR└WKH└ ,OOLQRLV└ 5LYHU└ VKHG◀ └ <RX└ VKXW└ GRZQ└WKH└ (QYLURQPHQWDO└ (QIRUFHPHQW└ 8QLW└ LQ└ \RXU└ RIILFH◀

7KLV└ LV└WKH└ RQH└ ,└ NQRZ└ \RX└ + + └ \RX└ GR└ QRW└ DJUHH└ ZLWK└ PH└ RQ☼ └ EXW└ ,└ VHH└ LW└ D\ /KDW└ \RX└ DOVR└ DWWHPSWHG└WR└ VXVSHQG└ 2NOOKRPDV└ :DWHU└ 4XDOLW\└ 6\VWHPDUG└ IRU└WKUHH└ \HDUV◀ └%XW└WKH└ ODWW└ IDFW☼ └ DQG└ DJDLQ☼ └ \RX└ KDYH└WKH└ ODWW└ ZRUG└ KHUH☼ └ VLU☼ └ LV└WKDW└ \RX└ DOVR└ VXSSRUWHG└ D└ FRQWWLWXWLRQDO└ DPHQGPHQW└ 6\VWH└ 4XHWWLRQ└ → → → ☼ └WKH└ VR└ FDOOHG☼ └ 5LJKW└WR└)DUP└ DPHQGPHQW└WKDW└ ZRXOG└ KDYH└ PDGH└ LW└ PRUH└ GLIILFXOW└ IRU└WKH└ 2NOOKRPD└ 6\VWH└ /HJLVODWXUH◀

$JDLQ☼ └ \RX└WDON└ DERXW└ IHGHUDOLVP☼ └ QRZ└ \RXUH└WU\LQJ└WR└WDNH└WKH└WHHWK└ RXW└ RI└WKH└ 2NOOKRPD└ 6\VWH└ /HJLVODWXUH└ DQG└ CRFDO└ JRYHUQPHQW└WR└ HQDFW└WKHLU└ RZQ└ HQYLURQPHQWDO└ ODZV└ LQ└WKH└ IXWXUH◀ └ $QG└ + + └ DQG└WKLV└ NLQG└ RI└ VXSSRUW☼ └ DQG└ ,└ QRRNHG└ DOO└WKURXJKRXW└ PDJD]LQHV☼ └ \RXUH└ JRLQJ└ LQ└ VXSSRUW└ RI└WKLV└ LV└ FCHDU◀ └ +HUH└ \RX└ DUH└ LQ└WKH└ 3UR└ DQG└ &RQ└ DERXW└ VXSSRUWLQJ└ → → → ◀

+HUH└ LV☼ └ PRWWO\└ LV└ ZRUOG└ ERDUGV└ ZKR└ DUH└ DJDLQW└ \RX└ RQ└WKLV└ LQ└ \RXU└ WWDWH◀ └ +HUHV└ RQH└ IURP└ 7XOVD└ :RUOG└ (QGRUVHPHQW☼ └WKDW└ VDLG☼ └ | 7KH└ PHDVXUH└ ZRXOG└ SUHYHQW└ IXWXUH└ WWDWH└ DQG└ CRFDO└ UHJXODWLRQ└ RQ└ IDUPLQJ└ DQG└ OLYHWWRFN└ DFWLYLWLHV☼ └ XQCHW└WKH└ WWDWH└ KDV└ D└ FRPSHOOLQJ└ WWDWH└ LQWHUHWW◀ | └ $└ YHU\└ KLJK└ CHJDO└ WWDQGDUGV☼ └ DV└ ,└ NQRZ☼ └ QRW└WKH└ CDZ\HU└WKDW└ \RX└ DUH☼ └ VLU☼ └ EXW└ ,└ NQRZ└WKDW☼ └WKDW└ LV└ D└ YHU\└ KDUG└ RQH☼ └ WWDQGDUG└WR└ PHHW◀

$QG└ VR└WKLV└ LV└WKH└ FKDOOHQJH└ LV└WKDW☼ └WKLV└ LGHD└WKDW└ \RXUH└ VXSSRUWLQJ└ IHGHUDOLVP└ YHUVXV☼ └ LW└ VHHPV└WR└ PH└ D└ SDWWHUQ└ RI└ \RX└ EHLQJ└ RQ└WKH└ VLGH└ RI└ WKH└ SROOXWHUV☼ └ DQG└ HYHQ└WU\LQJ└WR└WDNH└WKH└WHHWK└ RXW└ RI└WKH└ WWDWH└ CHJLVODWXUHV└ DELOLW\└WR└ UHJXODWH└WKHVH└ KDUPIXO└ HQYLURQPHQWDO└WR[LQV◀ └ ,P└ KDSS\└WKDW└WKLV└ + + └WKLV└ EDOORW└ LQLWLDWLYH└ ZDV└ RYHUZKHOPLQJ└ GHIHDWHG└ E\└ 2NOOKRPD└ YRWHUV◀

%XW└ DV└ ,└ VHH└ \RX└ DVFHQGLQJ└ SRWHQWLDOO\└WR└WKLV└ YHU\└ LPSRUWDQW└ SRVLWLRQ☼ └ VLU☼ └ ,└ MXWW└ ZRUU\└ DERXW└ ZKRVH└ VLGH└ \RXUH└ JRLQJ└WR└ EH└ RQ☼ └ JLYHQ└WKH└ IDFW└ SDWWHUQ└WKDW└ ,└ KDYH└ DERXW└ ELJ└ LQGXWU\☼ └ DERXW└ ELJ└ SROOXWLRQ☼ └ HVSHFLDOO\└ DV└ ,└ NQRZ└WKH└ ELOOLRQV└ RI└ DQLPDOV└WKDW└ ZH└ KDYH└ LQ└ .+ IRHV└ ♂ "□ └WKDW└ DUH└ SRLVRQLQJ└ ULYHUV└ DOO└ RYHU└WKLV└ FRXQWU\◀

,└ UHDOO└ MXVW└ ZDQW└ \RX└ WR└ UHVSRQG└ WKDW└ └ VLU◀ └ $QG└ ,QO└ VD└ └ EHFDXVH└ WKLV└ ZLOO└ EH└ P└ CDWW└ ZRUG└ └ \RX└ ZLOO└ KDYH└ LW└ └ ,└ ZDQW└ WR└ WKDQN└ \RX└ IRU└ \RXU└ LQGXOJHQFH◀ └ ,└ NQRZ└ WKLV└ KDV└ EHHQ└ D└ CRQJ└ GD└ DQG└ ,└ ZDQW└ WR└ WKDQN└ \RXU└ IDPLO└ DV└ ZHOO◀

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7KDQN└ \RX└ └ 6HQDWRU◀ └ $QG└ CHW└ PH└ ┼ ┼ └ CHW└ PH└ UHVSRQG◀ └ 7KHUHV└ EHHQ└ VRPH└ FRQIXVLRQ└ DERXW└ WKH└ OLWLJDWLRQ◀ └ <RX└ PDGH└ UHIHUHQFHV└ WR└ VHYHUDO└ WKLQJV└ /KHUH└ DQG└ LI└ ,└ PD└ UHVSRQG└ WR└ D└ FRXSOH◀ └ 7KH└ OLWLJDWLRQ└ WR└ ZKLFK└ \RX└ UHIHU└ └ 6HQDWRU└ %RR]PDQ└ DFWXDOO└ UHIHU└ WR└ LW└ DV└ ZHOO◀

0└ SUHGHFHVVRU└ GLG└ EULQJ└ DQ└ DFWLRQ└ DSSUR[LPDWHO└ ┴ !! !! → └ WLPH└ IUDPH└ DJDLQWW└ WKH└ SRXQWU└ LQGXWU└ DQG└ PDQ└ RWKHU└ GHIHQGDQWW└ LQ└ WKH└ QRUWKHUQ└ GLWWULFW└ RI└ 2NODKRPD◀ └ 7KDW└ FDVH└ KDG└ EHHQ└ IXOO└ OLWLJDWHG└ └ VXEPLWWHG└ WR└ WKH└ FRXUW└ IRU└ GHFLVLRQ└ EHIRUH└ ,└ HYHU└ FDPH└ LQWR└ RIILFH◀

,W└ ZDV└ DQ└ H[DPSOH└ RI└ SRWHQWLDOO└ UHJXODWLRQ└ WKURXJK└ OLWLJDWLRQ└ └ DQG└ ,YH└ /DONHG└ DERXW└ WKDW└ HDUOLHU└ LQ└ UHVSRQVH└ WR└ TXHWWLRQV◀ └ ,└ KDG└ HYHU└ DXWKRULWW└ DW└ /R└ GLVPLW└ WKDW└ FDVH└ ZKHQ└ ,└ FDPH└ LQWR└ RIILFH◀ └ ,└ GLG└ CRW◀ └ 7KDW└ FDVH└ LV└ WWLOO└ SHQGLQJ└ WRGD└ └ DZDLWLQJ└ D└ IHGHUDO└ MXGJHV└ GHFLVLRQ◀ └ ,YH└ WDNHQ└ CR└ DFWLRQ└ /R└ XQGHUPLQH└ WKDW└ FDVH◀

,YH└ GRQH└ CRWKLQJ└ EXW└ ILCH└ EULHIV└ LQ└ VXSSRUW└ RI└ WKH└ FRXUW└ PDNLQJ└ D└ GHFLVLRQ◀ └ 6R└ ,└ ┼ ┼ └ WKDW└ D└ SRLQW└ RI└ FDUUW└ RQ└ WKH└ OLWLJDWLRQ◀ └ :LWK└ UHVSHFW└ WR RXU└ ┼ ┼ └ RXU└ RIILFH└ └ ,└ VXEPLWWHG└ WKLV└ LQ└ UHVSRQVH└ WR└ 6HQDWRU└ :KLWHKRXVH└ UHTXHWW◀ └ :H└ PHW└ HDUOLHU└ └ RU└ H[FXVH└ PH└ └ CDW└ ZHN└ DQG└ KH└ DVNHG└ DERXW└)7(V└ DQG└ EXGJHW◀ └ ,YH└ VXEPLWWHG└ UHVSRQVH└ WR└ KLP◀

:H└ KDYH└ DOPRWW└ D└ • → !! !! └ !! !! !! └ EXGJHW└ WKDW└ WKH└ DGPLQLWWUDWRU└ RI└ RXU└ RIILFH└ KDV└ DWWULEXWHG└ WR└ HQYLURQPHQWDO└ UHDWHG└ DFWLYLWLHV└ DQG└ VHYHQ└)7(V└ WKDW└ DUH└ DWWRFLDWHG└ ZLWK└ WKDW└ DV└ ZHOO◀ └ 6R└ ,└ ZDQW└ WR└ PDNH└ VXUH└ WKDW└ WKRVH└ WZR└ ┼ ┼ └ WKRVH└ WZR└ LWHPV└ ZHUH└ VKDUHG└ ZLWK└ \RX└ LQ└ UHVSRQVH└ WR└ \RXU└ ┼ ┼ └ \RXU└ FRPPHQWW◀

%22.(5 └
<RX└ KDYH└ CRWKLQJ└ WR└ UHVSRQG└ WR└ RQ└ ┼ ┼ └ RQ└ WKH└ 6WDWH└ 4XHWWLRQ└ → → → "

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7KH└ 6WDWH└ 4XHVWLRQ└ → → → ☼ └ ZHUH└ DFWXDOO\└ LQYROYHG└ LQ└ D└ EDOORW└ GLDWLQJ└ RI└
WKRVH└ WKLQJV└ DQG└ VR☼ └ WKRXJK└ ┼ ┼ └ WKRXJK└ \RX└ UHSUHVHQWHG└ WKDW└ ,└ ZDV└
DFWLYHO\└ LQYROYHG└ LQ└ HQGRUVHPHQW└ RU└ LQYROYHG└ LQ└ WKH└ ┼ ┼ └ ,└ ┼ ┼ └ ,└ UHDOO\└ ZDV└ QRW└
DV└ IDU└ DV└ WKH└ DFWXDO└ YRWH└ DQG└ ┼ ┼ └ QRZ☼ └ WKHUH└ ZDV└ VRPH└ RS╢ HG└ DQG└ VRPH└
GHFLVLRQV☼ └ EXW└ ,YH└ WULHG└ WR└ ┼ ┼ └ WR└ PDNH└ VXUH└ WKDW└ ,└ GLGQW└ JHW└ LQYROYHG└ LQ└
WKDW└ EHFDXVH└ RI└ RXU└ RWKHU└ REOLJDWLRQV└ LQ└ WKH└ RIILFH◀

%$55$662 └
6HQDWRU└ &DUSHU"

%22.(5 └
$QG└ ,└ FDQ└ VXEPLW└ WKLV└ IRU└ WKH└ UHFRUG☼ └ VLU☼ └ WKH└ ┼ ┼ └ WKH└ ◀ ◀ ◀

%$55$662 └
<HV☼ └ ZLWKRXW└ REMHFWLRQ◀

%22.(5 └
7KDQN└ \RX☼ └ VLU◀

&$53(5 └
0U◀ └ 3UXLWW☼ └ HDUOLHU└ WRGD\└ ,└ PHQWLRQHG└ WKDW└ ,G└ VXEPLWWHG└ D└ OLWW└ RI└ DERXW└ ↑ !! └
TXHVWLRQV└ WR└ \RX└ VKRUWO\└ DIWHU└ &KULWWPDV◀ └ ,└ DVNHG└ IRU└ D└ UHVSRQVH└ E\└
-DQXDU\└ ☼ └ DQG└ JRW└ QRQH☼ └ DQG└ ,└ DVNHG└ P\└ WDII└ HDUOLHU└ WKLV└ PRUQLQJ└ LI└
ZHG└ JRWWHQ└ WKH└ ZULWWHQ└ UHVSRQVHV└ RQ└ WKRVH└ TXHVWLRQV└ DV└ RI└ WRGD\☼ └ DQG└ ,└
XQGHUVWDQG└ WKDW└ ZH└ KDYH└ QRW◀

<RXUH└ JRLQJ└ WR└ UHFHLYH└ D└ QXPEHU└ RI└ TXHVWLRQ└ IRU└ WKH└ UHFRUG└ IURP└ XV☼ └
'HPRFUDW└ DQG└ 5HSXEOLFDQ☼ └ DQG└ ,P└ DQ[LRXV└ ZKDW└ \RXU└ UHVSRQVH└ DUH└ WR└
WKRVH└ ┼ ┼ └ WKRVH└ TXHVWLRQV◀ └ %XW└ ZH└ QHHG└ \RXU└ DQVZHUV◀ └ $QG└ ZH└ QHHG└ JRRG└
DQVZHUV◀ └ $QG└ WKH└ LGHD└ RI└ ZDLWLQJ└ WZR└ RU└ WKUHH└ ZHHNV└ DQG└ QRW└ SURYLGLQJ└
DQWKLQJ└ LV└ MXVW└ XQDFFHSWDEOH◀ └ 6R└ MXVW└ ┼ ┼ └ MXVW└ WR└ SXW└ RQ└ ┼ ┼ └ SXW└ WKDW└ RXW└
WKHUH◀

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:HOO☼ └ LI└ ,└ FRXOG☼ └ 6HQDWRU└ ◀ ◀ ◀

&$53(5 └

6HFRQGO\☼ └ ,└ ZRXOG└ OLNH└ WR└ DVN└ \RX└ D└ TXHVWLRQ☼ └ LI└ ,└ PD\◀

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◀◀◀ └ LI└ ┼ ┼ └ LI└ ,└ PD\└ RI IHU└ WKLV◀ └ ,└ WULHG└ WR☼ └ DQG└ ,└ WDONHG└ WR└ WKH└ &KDLUPDQ└ /KLV☼ └ ZLWK└ UHVSHFW└ WR└ \RXU└ ┼ ┼ └ \RXU└ TXHVWLRQV└ \RX└ VXEPLWWHG☼ └ ,└ ZDV└ UHVSHFWLQJ└ WKH└ SURWRFRO└ RI└ WKH└ &KDLU└ LQ└ UHVSRQGLQJ└ WR└ WKRVH└ TXHVWLRQV└ DQG└ FRPPLWWHG└ WKDW└ WKRVH└ TXHVWLRQV└ ZRXOG└ EH└ DQVZHUHG└ IRU└ WKH└ UHFRUG└ SRWW└ WKH└ KHDULQJ☼ └ DQG└ WKDW└ ZKDW└ ,└ ZDV└ GLUHFWHG└ WR└ GR└ E\└ WKH└ &KDLUPDQ◀

&$53(5 └

$OO└ ULJKW◀ └ 6HFRQG☼ └ EDVHG└ RQ└ \RXU└ HDUOLHU└ WDWWHPHQW☼ └ ,└ MXW└ ZDQW└ WR└ FODULI\└ \RPHWKLQJ◀ └ ,I└ FRQILUPHG☼ └ FDQ└ ZH└ KDYH└ \RXU└ DVXUDQFHV└ WKDW└ WKH└ (3$└ ZLOO└ FRQWLQXH└ WR└ UHJXODWH└ PHUFXU\└ HPLWWLRQV└ IURP└ SRZHU└ SODQW└ XQGHU└ 6HFWLRQ└ ¶ ¶ ┴ └ RI└ WKH└ &HDQ└ $LU└ $FW☼ └ DQG└ \RX└ ZLOO└ GRW└ GHIHU└ WR└ WKH└ WDWHV"

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0HUFXU\☼ └ XQGHU└ WKH└ 6HFWLRQ└ ¶ ¶ ┴ └ LV└ ┼ ┼ └ LV└ VRPHWKLQJ└ WKDW└ WKH└ (3$└ VKRXOG└ GHDO└ ZLWK└ DQG└ UHJXODWH◀

&$53(5 └

7KDQN└ \RX◀ └ ,└ ┼ ┼ └ ,└ FDPH└ DFURVV└ D└ TXRWH└ IURP└ \RX└ WKDW└ VDLG└ ┼ ┼ └ ,└ WKLQN└ \RX└ WDWHG└ WKH└ IROORZLQJ└ DERXW└ DQ└ (3$└ UXOH└ LQYROYLQJ└ FURVV┼ WDWH└ VPRJ└ SRODXWLRQ└ DQG└ WKH└ (3$└ UXOH◀ └ ,└ WKLQN└ \RX└ ZHUH└ TXRWHG└ DV└ VD\LQJ☼ └ | 7KUHDWHQHG└ WKH└ FRPSHWLWLYH└ HGJH└ 2NODKRPD└ KDV└ HQMR\HG└ IRU└ \HDUV└ ZLWK└ ORZ└ FRXW└ DQG└ UHOLDEOH└ HOHFWULF└ JHQHUDWLRQ◀

7KLV└ ORZ└ FRXW└ HQHUJ\└ GRW└ RQD\└ EHQHILWW└ 2NODKRPD└ PDQXIDFWXUHUV☼ └ EXW└ JLYHV└ RXU└ WDWH└ D└ FRQVLGHUDEOH└ HGJH└ LQ└ UHFUXLWLQJ└ QHZ└ MREV◀ | └ $QG└ WKH└ TXHVWLRQ└ ,└ ZRXOG└ DVN☼ └ DV└ DW└ WKH└ SHULO└ RI└ WKRVH└ RI└ XV└ ZKR└ OLYH└ LQ└ WDWHV└ DUH└ GRZQZLQG└ IURP└ ZKHUH└ 2NODKRPD└ PLJKW└ EH☼ └ DV└ \RX└ ORZHU└ \RXU└ HQHUJ\└ FRXW└ WR└ EHQHILW└ 2NODKRPDQV☼ └ ,└ MXW└ ZDQW└ WR└ DVN└ \RX☼ └ LQ└ WKH└ VSLULW└ RI└ /KH└ *RQHQ└ 5XOH☼ └ NHHS└ LQ└ PLQG└ ZKDW└ WKDW└ PHDQV└ IRU└ XV◀

.HHS└ LQ└ PLQG└ ZKDW└ WKDW└ PHDQV└ IRU└ ┼ ┼ └ IRU└ XV☼ └ EHFDXVH└ LQ└ P\└ WDWH☼ └ DV└ ,└ VDLG└ HDUOLHU└ RQ☼ └ ,└ FDQ└ VKXW└ GRZQ└ P\└ WDWHV└ HFRQRP\└ DQG└ ZH└ WLOO└ ZRXOG└ KDYH└ EHHQ└ RXW└ RI└ FRPSOLDQFH└ IURP└ DQ\└ QXPEHU└ RI└ FHDQ└ DLU└ UHTXLUHPHQWW☼ └ DQG└ WKDW└ ZDV└ GRW└ EHFDXVH└ RI└ DQ\WKLQJ└ ZH└ SXW└ XS└ LQ└ WKH└ DLU◀

,W└ EHFDXVH└ RI└ ZKDW└ IRONV└ RXW└ WR└ WKH└ ZHXW└ SXW└ XS└ LQ└ WKH└ DLU└ DQG└ LW└ HYHQWXDOO\└ FDPH└ GRZQ└ WR└ HQG└ RI└ $PHULFDV└ WDLO└ SLSH◀└ ,└ ZRXOG└ MXXW└ DVN└ WKDW└ \RX└ GR└ WKDW◀└ 7KH└ CDXW└ ZH└ KDYH└ D└ FKDUW└ WKLV└ TXLFND\└ FKDUW└ PD\└ ZH└ VHH└ WKLV└ FKDUW└ 7KLV└ LV└ DQ└ LQWHUHWWLQJ└ FKDUW◀└ 7KLV└ LV└ ZKDW└ ZH└ FDOO└ D└ EXV\└ FKDUW◀└ ,W└ D└ EXV\└ FKDUW◀

$QG└ LW└ CRRNV└ DW└ WKH└ LWXH└ RI└ FURW└ ERUGHU└ DLU└ SROOXWLRQ◀└ $V└ \RX└ FDQ└ VHH└ ZLWK└ WKLV└ FKDUW└ VPRJ└ SROOXWLRQ└ LQ└ RXU└ FRXQWU\└ FRYHV└ DOO└ RYHU└ WKH└ SCDFH└ ,└ PHDQ└ DOO└ RYHU└ WKH└ SCDFH◀└ $V└ ,└ PHQWLRQHG└ DV└ 'HDZDUHV└ JRYHUQRU└ WKH\└ VKXW└ GRZQ└ P\└ WDWH└ LQ└ RUGHU└ WR└ FRPH└ LQWR└ FRPSOLDQFH└ ZLWK└ WKH└ FCHDQ└ DLU└ FKDOOHQJHV◀

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Senate Environment and Public Works Committee
Hearing entitled, "Nomination of Attorney General Scott Pruitt to be Administrator of the U.S. Environmental Protection Agency"
January 18, 2017
Questions for the Record for the Honorable E. Scott Pruitt

Senator Booker:

1.For many years I have worked with the EPA on the Passaic River superfund clean-up project in my home city of Newark. In 2016, the EPA announced an historic plan to remediate the Passaic River from toxic chemicals, PCBs, and other contaminants that resulted from the production of Agent Orange. The project will remove 3.5 million cubic yards of toxic sediment from the lower eight miles of the Passaic River in New Jersey—the largest environmental dredging project in the history of the federal Superfund program.
a.If confirmed do you commit to make implementation of the Passaic River cleanup project a priority?
b.If confirmed do you commit to carrying out the EPA Region II March 3, 2016 "Record of Decision" for the Lower 8.3 miles of the Lower Passaic River in a timely and efficient manner?

I am not familiar with the details of the remedy that has been selected for the Passaic River Superfund site, but if confirmed, I expect to make clean up of contaminated sites one of my priorities and will seek input from Congress and relevant stakeholders before taking action in this matter.

2.As the former Mayor of Newark, I have seen how low-income and minority communities living in close proximity to the port of Newark are exposed to high levels of air pollution resulting in serious health problems. Across the nation 13 million people—3.5 million of whom are children—live near major marine ports or rail yards. What is your plan to address the pressing environmental justice concerns regarding poor air quality near major seaports and other congested nodes in our nation's freight network? I have been a champion of the bipartisan Diesel Emissions Reduction Act (DERA) Program that helps replace diesel engines and helps make major sea ports and inland transportation hubs cleaner and more efficient. If confirmed can you commit to supporting the DERA program?

As I committed to you during the meeting in your office, I understand there are wide ranging variety of environmental justice issues affecting urban and rural America. In fact, as you will recall, I've committed to work with your office and visit impacted areas with you. I am also aware that the Diesel Emissions Reduction Act Program has received bipartisan support from

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members of the Environment and Public Works Committee. If confirmed, I would like to work with members of Congress to best direct resources to bipartisan initiatives.

3.Climate change is one of the most pressing issues currently facing the planet. Rising sea levels and extreme weather are currently threatening the safety and security of my constituents in New Jersey. Lower income and vulnerable communities are disproportionately impacted by the extreme heat and flooding events that are becoming more common and more severe. Given the immediate and increasing threat to my constituents and to people everywhere, what is your plan to address climate change?

If confirmed, I will work to achieve the objectives of EPA-administered laws consistent with the process and framework established by Congress. I will work closely with the states in establishing and implementing regulatory standards to ensure a meaningful and effective advancement of these objectives.

4. In 2016, troubling reports of lead contamination in school drinking water in New Jersey and other areas of the country made clear the urgent need to test school drinking water and remediate school drinking water infrastructure that is contaminating the water our children drink.
a. What is your plan to prioritize and expedite the EPA's efforts to eliminate lead contamination in school drinking water?

If confirmed, I will fully carry out EPA's authorities, including its authorities under the Safe Drinking Water Act. I note that in the WIIN Act, Congress amended the Safe Drinking Water Act to authorize funding for voluntary school lead testing. If confirmed and if funding is provided, I will carry out that program.

5.If you are confirmed, how would EPA respond when a state permits pollution to be discharged into a smaller waterway that leads to contamination of drinking water supplies in a downstream state?

If confirmed, I would follow the processes set forth in the Clean Water Act and its implementing regulations.

6. How do you define "environmental justice"? Do you think it's a serious issue?

I am familiar with the concept of environmental justice. As I testified, the Administrator plays an important role regarding environmental justice. I agree that it is important that all Americans be treated equally under the law, including the environmental laws.

7. Decades of peer-reviewed academic and government research demonstrate that low-income communities and communities of color disproportionately experience environmental burdens compared to other populations in the United States. Do you agree with this conclusion? If not, why?

As I testified at the hearing, I am familiar with the concept of environmental justice and believe the Administrator plays an important role in this regard. I agree that it is important that all Americans be treated equally under the law, including the environmental laws.

8. What do you believe are the legal obligations of EPA to ensure that recipients of EPA funds comply with Title VI of the Civil Rights Act of 1964?

The obligations of recipients of federal funds are defined by the statutes and regulations to which you refer. Those statutes and regulations speak for themselves.

9. There are currently hundreds of unresolved Title VI civil rights complaints before EPA. Recent reports from EPA's OIG and independent organizations have documented EPA's long-standing failure to enforce Title VI. If confirmed, what will you do as EPA Administrator to address this?

If confirmed, I would expect to be briefed by staff and review any recommendations by the Office of Inspector General before taking action on this issue.

10. Indigenous communities are consistently targeted for energy extraction, nuclear waste, uranium mining and/or oil and natural gas pipelines. How will you address this moving forward?

If confirmed, I will faithfully execute all laws enacted by Congress relating to protection of indigenous communities.

11. Children living in communities of color and low-income communities have the highest blood lead levels of all children in the United States, and even some developing countries. As Administrator, what steps would you take to address this?

I am concerned about high-blood levels in children and children's health generally. As I testified, the Administrator has a significant role regarding environmental issues. If confirmed, I would expect to be briefed to learn about EPA's legal authorities and ongoing programs and outstanding recommendations from the Inspector General, if any, concerning this issue before taking action.

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12. As Administrator will you continue to convene and implement the advice and recommendations of the National Environmental Justice Advisory Council, a federal advisory committee to EPA since 1993?

As I testified, the Administrator plays an important role regarding environmental justice. I am not personally familiar with the legal authorities or activities concerning this advisory committee but I would expect, if confirmed, to be briefed by staff about ongoing programs and activities before taking any action. If confirmed, I would work to faithfully execute the laws EPA is responsible for administering, in order to protect human health and the environment for all Americans. If confirmed, I would expect EPA to operate in an open and transparent manner, consider the views of stakeholders as appropriate, act based on sound science, and follow the laws as established by Congress.

13. As Administrator, will you work to have of EPA's EJ 2020 Plan fully implemented?

As I testified, the Administrator plays an important role regarding environmental justice. I am personally unfamiliar with the details of current initiatives regarding environmental justice referenced in the question, but I would expect, if confirmed, to be briefed by staff about ongoing programs and activities before taking any action.

14. Do you intend to meet minority community members and leaders who have concerns about an environmental or health issue within your EPA jurisdiction?

Yes, if confirmed.

15. Public participation is the cornerstone of a healthy democracy and a basic component of good US policy development and enforcement. What are your plans to maximize inclusion and participation in decision-making processes by historically marginalized communities of color?

As I testified, the Administrator plays an important role regarding environmental justice. If confirmed, I would expect EPA to operate in an open and transparent manner, consider the views of stakeholders as appropriate, act based on sound science, and follow the laws as established by Congress, including the Civil Rights Act. If confirmed, I would work to faithfully execute the laws EPA is responsible for administering, in order to protect human health and the environment for all Americans.

16.Illegal solid waste dumping sites where hundreds of thousands of pounds of trash and waste tires harbor disease-carrying vectors and pests such as mosquitoes, which transmit life threatening diseases like dengue, west Nile and zika viruses can be found all over the United States. These dumping sites

disproportionally affect low income and minority communities. What will you do to address this health threat to these communities?

I understand the Resource Conservation and Recovery Act prohibits open dumping, and under this law states have primary responsibility to regulate solid waste disposal. If confirmed, I would expect to be briefed by staff and to hear the views of states and other stakeholders before taking any action consistent with EPA's legal authorities.

17.Monitoring of our coastal waters is critical to ensure the health and safety of its swimmers and bathers. Many coastal communities, especially low-income and minority communities have limited free recreational opportunities other than spending the day at the beach. As EPA administrator will you commit to continuing EPA's BEACHES program, which provides funding for state water quality monitoring programs that ensure healthy and safe recreation?

I am not personally familiar with the BEACHES program, but I would expect, if confirmed, to be briefed by staff about the program. If confirmed, I would work to faithfully execute the laws EPA is responsible for administering, including those authorizing the BEACHES program, in order to protect human health and the environment for all Americans. If confirmed, I would expect EPA to operate in an open and transparent manner, consider the views of stakeholders as appropriate, act based on sound science, and follow the laws as established by Congress.

18.A 2014 study by scientists at Lawrence National Laboratory at Berkeley reported that an estimated 10 % of chemicals used in fracking fluid are known to be toxic to humans and aquatic life. Fracking practices commonly are conducted in fringe low-income and working class communities. Since these toxics are known to leach into waterways how will you ensure this is prevented?

As was affirmed by Congress in drafting the Lautenberg Act, hazard is only one characteristic of risk and simply stating a chemical substance has toxicity does not mean there is exposure. EPA is tasked with carrying out laws as directed by Congress and if I am confirmed, I will use the authorities vested in me to protect drinking water under the Safe Drinking Water Act.

19. Nationally, 13 percent of the population lives within three miles of a Superfund site while in New Jersey, 50 percent of the population lives within three miles—the highest percentage in any state. New Jersey has 113 Superfund sites on the National Priority List—more than any other state. These sites are the most heavily contaminated properties in the country, and are the areas that pose the greatest potential risk to public health and the environment. What is your plan to strengthen the EPA's superfund program?

If confirmed, I would expect to prioritize the cleanup of contaminated land. I would also expect to be briefed by staff and to receive the views of relevant stakeholders on ways to improve the operation of the Superfund program, if confirmed. I also understand the Government Accountability Office and the EPA Inspector General regularly review the operation and activities of the Superfund program and, if confirmed, I would expect to look to their recommendations for additional areas for improvement, if confirmed.

20. If confirmed do you commit to working to include substantial funding for Superfund cleanups in the new administration's request for a large national infrastructure package?

If confirmed, I expect to make cleanup of contaminated sites one of my priorities.

21. In 2003, Arkansas and Oklahoma signed an agreement, the Statement on Joint Principles to take several measures to reduce phosphorus pollution in the Illinois River Watershed. One requirement was for Oklahoma to revise its 0.037 mg/L phosphorus criterion by 2012, which it did. Why, instead of supporting the conclusion of your own state Water Resources Board, did you delay implementation an additional three years by negotiating another agreement to conduct yet another study?

The "Statement of Joint Principles and Actions" did not require Oklahoma to "revise" its criterion, but rather stated that "Oklahoma will reevaluate Oklahoma's .037 mg/l criterion for total phosphorus in Oklahoma's Scenic Rivers by 2012, based on the best scientific information available at that time, and with the full, timely inclusion of officials from the State of Arkansas representing both point and non point source dischargers." As of 2012, which was the final date for the reevaluation to occur, Arkansas maintained its objection that Oklahoma's .037 mg/l criterion was inappropriate, and not based on the best scientific information available at that time. Rather than protract a now decades long dispute that appeared to again be headed towards litigation once again, I instead negotiated an agreement whereby Arkansas agreed to be finally bound to the results of a new study that would use the best scientific information available at the time to determine the appropriate criterion. This agreement avoided the prospect of more litigation, and ultimately resolved the dispute (with Oklahoma getting the stringent standard that it wanted).

22. In your testimony before the Senate Environment and Public Works Committee, you said that the 2003 agreement expired during your term? Where exactly in the agreement do you see any expiration to the agreement?

The "Statement of Joint Principles and Actions" stated that "Oklahoma will reevaluate Oklahoma's .037 mg/l criterion for total phosphorus in Oklahoma's Scenic Rivers by 2012, based on the best scientific information available at that time, and with the full, timely inclusion of officials from the State of Arkansas representing both point and non point source dischargers." As of 2012, which was the final date for the reevaluation to occur, Arkansas maintained its objection that the .037 mg/l criterion was inappropriate, and not based on the best scientific information available at that time. Therefore, the 2013 Agreement was reached with Arkansas whereby it agreed to be bound by the results of a new study that would use the best scientific information available at the time to determine the appropriate criterion.

23.The 2003 agreement says that, "The state of AR and OK, acting through their environmental agencies, will reissue the above-specified cities' NPDES permits on a normal five (5) year resistance cycle, with the understanding that NPDES permits for these point source dischargers to the shared Oklahoma Scenic Rivers Watershed issued in the year 2012 or beyond must include phosphorus limits stringent enough to meet applicable water quality standards."
a.Do you agree that the 2003 agreement places obligations on NPDES permitted facilities in Arkansas beyond 2012?
b.Because Oklahoma reevaluated its criterion in 2012, does this section require that NPDES permits issued in Arkansas have to be stringent enough to meet Oklahoma's .037 mg/L phosphorus water quality standard by 2012 and then beyond 2012?
c.In your testimony before the Environment and Public Works committee, you testified that the agreement was "historic" and OK's phosphorus limit would be implemented for the first time in history on both sides of the river. Do you agree that the .037 mg/L phosphorus criterion was enforceable on both sides of the border under the terms of the 2003 agreement?

Yes. No. No.

24.In the 2013 agreement between Arkansas and Oklahoma, you agreed "not to institute or maintain administrative enforcement actions, judicial proceedings or take regulatory actions contrary to this second statement."
a. Why did you agree to suspend your enforcement authority?
b. How many enforcement actions did you suspend?
c. Do you interpret "judicial proceedings" to include any judgment in the pending case your predecessor brought against 14 poultry polluters? Was this agreement intended to suspend enforcement of any judicial resolution of that case?

I did not agree to suspend enforcement authority. The Agreement simply acknowledged that neither state would take actions that would violate the terms of the agreement. I do not know if any enforcement proceedings were suspended, as my office is not the entity that would be involved in such

actions. I do not interpret "judicial proceedings" in that manner, and the agreement was not so intended.

25. In 2013, you negotiated an agreement with Arkansas that allowed those municipal dischargers to continue discharging at 1 mg/l phosphorus, agreed to remove the 2012 deadline for complying with Oklahoma's phosphorus standard, and agreed to reopen Oklahoma's phosphorus water quality standard. Since Arkansas had already agreed, in 2003, to ensure that its large municipal dischargers would fully comply with Oklahoma's phosphorus standard starting in 2012, why did you let them out of that agreement in 2013? Please identify any provision of your 2013 agreement that requires these dischargers to meet Oklahoma's phosphorus standards after February 20, 2016.
a. Since the U.S. EPA approved Oklahoma's Phosphorus Standard in 2003, what legal basis do you think Arkansas had to file a lawsuit challenging since the time for filing a legal challenge had expired? If you do not believe the time for filing a legal challenge had expired, please explain the basis for your belief.
b. Do you agree that Arkansas is required to ensure that its point source discharge permits comply with all Oklahoma water quality standards that have been approved by the U.S. EPA under the case of Arkansas v. Oklahoma, including the phosphorus standard approved in 2003? Please state the basis for your belief.
c. The Joint Study Committee authorized by your 2013 agreement recommended a standard different from Oklahoma's existing phosphorus water quality standard. Please explain whether this recommended standard will supplant Oklahoma's current water quality standard, and why you have state that the study confirmed Oklahoma's existing 30-day geometric mean 0.037 mg/l phosphorus standard. What is your understanding of the impact of excluding samples taken during conditions where surface runoff is the dominant influence of total flow and stream ecosystem processes?

The 2013 Agreement did not "let anyone out" of the 2003 Agreement. Arkansas believed that it had legal recourse to resist a criterion to which it objected. Without that additional context as to the claims to which you refer, I am unable to answer your question relating to time bar of Arkansas' hypothetical claims. With regard to Arkansas's obligations, pursuant to the 2013 Agreement, Arkansas is now obligated to adopt and implement a stringent phosphorus standard. The study "used a weight of evidence approach to recommend a six-month average total phosphorus level of not to exceed 0.035 milligrams per liter based on water samples collected during critical conditions was necessary[.]" As I've stated, this confirmed that Oklahoma's 0.037mg/l standard was--despite Arkansas's arguments that it was unnecessarily stringent--necessary to protect the watershed. I am not familiar with the "the impact of excluding samples taken during conditions where surface runoff is the dominant influence of total flow and stream ecosystem processes," to which you refer, and thus cannot offer an opinion on that statement.

26. You stated in your EPW Questionnaire that you negotiated an agreement with Arkansas to reduce phosphorus pollution in the Illinois River watershed that was occurring as a result of poultry growers. Please explain how the agreement reduces pollution from poultry growers.

Runoff from poultry farms contribute to increased phosphorous levels in the Illinois River. The agreement imposed on Arkansas the requirement that it adopt a stringent phosphorous standard, which will necessarily require Arkansas to stringently regulate sources of phosphorous, such as poultry farms, in order to meet that standard.

27. You stated that Oklahoma's phosphorus standard was not being enforced on the Arkansas side of the border prior to your 2013 Agreement. Are you aware that, in April of 2009, the EPA required the Arkansas Department of Environmental Quality to ensure that the discharge permit for the Northwest Arkansas Conservation Authority include an enforceable final effluent limitation for phosphorus stringent enough to meet Oklahoma's phosphorus water standard by June 30, 2012, and that the final NPDES permit for Northwest Arkansas Conservation Authority issued by Arkansas included that requirement? Given the fact that Oklahoma's phosphorus standard was being enforced in Arkansas prior to your 2013 agreement, please explain the benefit to Oklahoma from entering into the agreement.

However, upon reviewing it, I note that Arkansas reserved the right to revise the 0.1 mg/l phosphorus permit limit ("The Department reserves the right to revise the permit limit of 0.1 mg/l for Total Phosphorus upon submission of data which indicates that a Total Phosphorus limit other than 0.1 mg/l is appropriate"). Further, I am aware that Arkansas continued to dispute the validity of Oklahoma's t0.037 mg/ limit, a dispute that is now resolved with Arkansas agreeing that 0.037 mg/l phosphorus standard is appropriate. That agreement greatly benefits Oklahoma.

28. It appears that the last call or meeting that EPA has on the long delayed TMDL for the Illinois River and Lake Tenkiller watersheds occurred on November 14, 2013. Please explain how your 2013 Agreement is related to the TMDL or cleanup of Lake Tenkiller. What steps have you taken with the U.S. EPA to encourage completion of the Illinois River and Lake Tenkiller TMDLs and oppose further delay?

I would certainly encourage the EPA to fulfill any obligations it might have to complete those TMDLs, but I have not taken any legal actions to force the EPA to do so.

29. What steps have you taken to implement and enforce the 0.037 mg/L criterion for phosphorus pollution just approved by the Scenic Rivers Joint Commission in Oklahoma? What measures has Arkansas agreed to in light of the study results?

I have not personally taken any steps to implement or enforce that water quality standard, because the authority to do so is vested in Oklahoma's environmental regulators, such as the Oklahoma Department of Environmental Quality, and Oklahoma Water Resources Board.

30. In 1992 the US Supreme Court in Arkansas v Oklahoma, 503 U.S. 91 (1992), resolved a lawsuit between Oklahoma and Arkansas related to water pollution in the Illinois River and held that upriver states must comply with water quality standards that are adopted by downriver states and approved by EPA. After that Supreme Court decision, effective July 1, 2002, Oklahoma adopted a nutrient criterion for total phosphorous of .037 mg/l for all Oklahoma water bodies designated as Scenic Rivers, codified at Oklahoma Administrative Code 785:45-5-19(c)(2). This new water quality standard had a ten year phase in period before full compliance was required on June 30, 2012. EPA approved Oklahoma's .037 mg/l phosphorous standard, as codified at Oklahoma Administrative Code 785:45-5-19(c)(2), on December 29, 2003.
a. Given this history, do you agree that as of July 1, 2012 Oklahoma's .037 mg/l phosphorous standard was in effect and was binding on upriver states such as Arkansas?
b. More specifically, do you agree that as of July 1, 2012 compliance with Oklahoma's .037 mg/l phosphorous standard was required for the portion of the Illinois River in Arkansas?
c. If you do not agree that as of July 1, 2012 compliance with Oklahoma's .037 mg/l phosphorous standard was required for the portion of the Illinois River in Arkansas, please explain the legal basis for your disagreement.

Oklahoma water quality standards do not automatically apply to upstream dischargers in other states. In 1992, in Arkansas v. Oklahoma, a case that pre-dated Arkansas' authorization to carry out its own Clean Water Act permitting program, the Supreme Court held that it was in EPA's discretion to issue a permit for a publicly owned treatment plant in Fayetteville, Arkansas that required compliance with downstream (Oklahoma) water quality standards. The Court took no position regarding when the Clean Water Act compelled such compliance, only that it was reasonable for EPA to assume that a section 401 water quality certification applied to federally issued NPDES permits. Please note that section 401 applies only to federal permits and as such would not apply to an Arkansas permit now that Arkansas is an authorized state. Under 40 CFR 131.10 state water quality standards are supposed to ensure "attainment and maintenance" of standards applicable to downstream states, but EPA is the arbiter of that when it approves state standards. Under section 402(b) of the Clean Water Act a state that is downstream of an authorized state gets notice of permits

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and the opportunity to file recommendations, but has no veto authority. Under section 402(d) of the CWA, EPA has the authority to review state issued permits and impose additional conditions. Interpreting this section, in International Paper Co. v. Ouellette, 479 U.S. 481, 493, 490-91 (1987) , the Supreme Court found that the only law applicable to a point source in an authorized state is the law of the source state. A downstream state is subordinate to a source state and its only recourse it to ask EPA to veto or condition a permit.

31. Please identify any investigations and/or lawsuits the Office of Attorney General initiated after January 17, 2011 to address groundwater contamination associated with swine animal feeding operations and any publicly available data in your possession regarding levels of groundwater contamination at any swine animal feeding operations, as well as any communications that the Office of Attorney General has had with the owners or operators of swine animal feeding operations after January 17, 2011.

The Oklahoma Department of Agriculture regulates Concentrated Animal Feeding Operations (CAFOs) and swine operations generally under the Oklahoma Agriculture and Environmental codes. The Oklahoma Department of Agriculture and the Oklahoma Office of the Attorney General already had several large swine feeding operations under Consent Decree or Settlement Agreement by the time I took office in 2011. (Hanor Roberts & Seaboard Foods, for example) The terms of those Consent Decrees and Settlement Agreements required the swine operations to make regular reports to the Department of Agriculture and the Office of the Attorney General. These reports included monitoring well data, lagoon data and other terms to be carried out by the operators pursuant to the agreements. My office has continued to monitor these operations to confirm compliance with the Consent Decree and Settlement Agreements.

Senator Cardin:

1. Please provide your definition of EPA's "activist agenda" as stated on your professional biography on the State of Oklahoma's official website. Please provide a list of all environmental laws and regulations that you consider to comprise the federal agency's "activist agenda" and how each environmental law or regulation listed in response to this question meets this definition.

I firmly believe that the EPA has a vital role, but it must do so within the bounds of its legal authority. The actions undertaken by the Office of Attorney General have been out of concern that EPA had exceeded its legal authority in those specific actions, not out of animosity toward the mission of the Agency or any specific regulation or statute. Regulations that are not on solid legal foundation and that cannot survive judicial review will not result in environmental protections.

2. For what purpose other than to handle the State of Oklahoma's legal challenges against the EPA did you create the Federalism Unit and defund the Environmental Protection Unit?

The Federalism Unit within the Attorney General's Office serves to protect the State of Oklahoma's sovereign interests in our republican form of government, with a particular focus on issues related to the vertical and horizontal separation of powers demanded by our Constitution. It is headed by the Solicitor General. With regard to the environmental protection unit, it is misleading to say that it was "defunded." Consistent with the practice of every Attorney General save one, I determined that a standalone unit was operationally inefficient. I opted to combine the Environmental Protection Unit and the Consumer Protection Unit into a single unit called the "Public Protection Unit." The Public Protection Unit continued the work of the Environmental Protection Unit, and that work continues to this day, headed by the very same attorney who worked in the Environmental Protection Unit under the prior Attorney General.

3.Do you intend to create a Federalism Unit within the EPA similar to Oklahoma's? Explain why or why not.

My understanding is that the Department of Justice, working in coordination with the EPA Office of General Counsel, represents EPA in litigation, and would thus serve to protect such federalism related interests.

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4.Would you support budget cuts to the EPA in similar scope (10% or higher) to those made to Oklahoma Department of Environmental Quality appropriations since FY2009[1]?

I am not familiar with Oklahoma Department of Environmental Quality's budget. I have no first-hand knowledge of EPA's development of its FY 2018 budget request. If confirmed, I look forward to working with EPA's budget staff and program offices and officials with the Office of Management and Budget on EPA's request. I will work to ensure that the limited resources appropriated to EPA by Congress are managed wisely in pursuit of that important mission and in accordance with all applicable legal authorities.

5.Of the lawsuits filed against the EPA in which you participated personally and substantially as Attorney General for Oklahoma, do you intend to recuse yourself from decision making regarding litigation in which you represented the State of Oklahoma as an adversarial party? Do you intend to recuse yourself for the entirety of each case?

As a lawyer, I am bound by the rules of professional conduct not to "switch sides" in any litigation in which I represented the State of Oklahoma, unless my former client gives its informed consent.

6.Do you believe the State of Oklahoma and the EPA should be regarded as the same or different "clients" for conflicts of interest purposes? Explain why or why not.

The State of Oklahoma and the federal government are separate sovereign authorities; representing one does not entail representing the other. In addition, while the State of Oklahoma has been my client as a lawyer during my service as Attorney General, if confirmed as EPA Administrator I will not be acting as a lawyer with clients.

7.The American Bar Association (ABA) Model Rules of Professional Conduct, Rule 1.1, Special Conflicts Of Interest for Former and Current Government Officers and Employees, Comment 5 discusses the balancing of interests. On the one hand, where the successive clients are a government agency and another client, public or private, the risk exists that power or discretion vested in that agency might be used for the special benefit of the other client. A lawyer should not be in a position where benefit to the other client might affect performance of the lawyer's professional functions on behalf of the government. Also, unfair advantage could accrue to the other client by reason of access to confidential government information about the client's adversary obtainable only through the lawyer's government service. In the spirit of Rule 1.11, what previous lawsuits

[1] http://okpolicy.org/wp-content/uploads/2016_Budget_Highlights.pdf?997616#page=7&x42044

might affect your performance of the Administrator's professional functions on behalf of the EPA?

Because I will follow the guidance of ethics officials and my own professional responsibilities in determining whether and how to participate in a particular matter, I do not expect any previous lawsuits to adversely affect my performance as EPA Administrator if confirmed.

8.On the other hand, the rules governing lawyers presently or formerly employed by a government agency should not be so restrictive as to inhibit transfer of employment to and from the government. The government has a legitimate need to attract qualified lawyers as well as to maintain high ethical standards. Thus a former government lawyer is disqualified only from particular matters in which the lawyer participated personally and substantially. The provisions for screening and waiver in paragraph (b) are necessary to prevent the disqualification rule from imposing too severe a deterrent against entering public service. The limitation of disqualification in paragraphs (a)(2) and (d)(2) to matters involving a specific party or parties, rather than extending disqualification to all substantive issues on which the lawyer worked, serves a similar function. Please provide a list of federal lawsuits filed against the EPA in which you participated personally and substantially as Attorney General for Oklahoma.

As Attorney General of Oklahoma, I have participated personally and substantially in the following suits against the EPA:

- **EME Homer City Generation v. EPA, No. 12-1182 (U.S.S.C.)**
- **Michigan v. EPA, No. 14-46 (U.S.S.C.)**
- **Murray Energy Corp. v. EPA, Nos. 14-1112, 14-1151 (D.C. Cir.)**
- **Murray Energy Corp. v. EPA, Nos. 15-1385, 15-1392, 15-1490, 15-1491 & 15-1494 (D.C. Cir.)**
- **Oklahoma v. EPA, Nos.12–9526, 12–9527 (10th Cir.)**
- **Oklahoma ex rel. Pruitt v. EPA, No. 16-5038 (10th Cir.).**
- **Oklahoma ex rel. Pruitt v. McCarthy, No. 15-cv-369 (N.D. Okla.).**
- **Oklahoma v EPA, No, 13-cv-00726 (W.D. Okla.)**
- **West Virginia v. EPA, No. 14-1146 (D.C. Cir.)**
- **West Virginia v. EPA, No. 16-1264 (D.C. Cir.)**

9.Do you accept a screen is appropriate for EPA strategic decisions specific to those lawsuits in which you represented an adversarial party? Explain why or why not.

I will consult with relevant ethics officials and review relevant rules of professional conduct to determine whether a screen is appropriate in a particular matter.

10.Comment 5 discusses a lawyer who moves between different government entities. When a lawyer has been employed by one government agency and then

moves to a second government agency, it may be appropriate to treat that second agency as another client for purposes of this Rule, as when a lawyer is employed by a city and subsequently is employed by a federal agency. However, because the conflict of interest is governed by paragraph (d), the latter agency is not required to screen the lawyer as paragraph (b) requires a law firm to do. The question of whether two government agencies should be regarded as the same or different clients for conflict of interest purposes is beyond the scope of these Rules. Do you believe two government agencies—the State of Oklahoma and the EPA—should be regarded as the same or different "clients" for conflicts of interest purposes? Explain why or why not.

As explained above, the State of Oklahoma and the federal government are separate sovereign authorities. While the State of Oklahoma was my client as a lawyer, if confirmed as EPA Administrator I will not be acting as a lawyer with clients.

11.How might the spirit of Rule 1.11's conflicts of interest provisions apply if those government entities were adversarial parties to a lawsuit?

If two government entities are adversarial parties to a lawsuit, then under ABA Model Rule 1.11 a lawyer's previous representation of one entity in the litigation will preclude his later representation of the other entity in the same litigation, unless the former client gives its informed consent. As explained above, if confirmed as EPA Administrator I will not be acting as a lawyer with clients.

12.ABA Rule 1.7 Conflict Of Interest: Current Clients provides that a "lawyer shall not represent a client if the representation involves a concurrent conflict of interest. A concurrent conflict of interest exists if the representation of one client will be directly adverse to another client; or there is a significant risk that the representation of one or more clients will be materially limited by the lawyer's responsibilities to another client, a former client or a third person or by a personal interest of the lawyer." In the spirit of Rule 1.7, do you reasonably believe that you will be able to provide competent and diligent leadership to the EPA, an agency you "don't like" and have sued several times? Explain why or why not.

I will provide diligent and competent leadership to the EPA if confirmed as Administrator. As I explained in my testimony to the Committee, I am a firm believer in the EPA's mission to protect the environment and look forward to the opportunity to lead the agency to help provide our future generations with a better and healthier environment.

13.Please explain how your litigation position in each case is or is not at odds with the mission of the EPA, to protect human health protect human health and the environment—air, water, and land.

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The EPA's mission is defined by the laws passed by Congress granting it the authority to act. Any action by the EPA that exceeds the authority granted to it by Congress, by definition, cannot be consistent with the Agency's mission. In each case filed against the EPA, in the view of the State of Oklahoma, the EPA had acted in excess of the authority granted to it by Congress.

14.Do you accept that EPA, state, local and tribal agencies work together to ensure compliance with environmental laws passed by Congress, state legislatures and tribal governments?

I agree it is essential for the federal government, state governments, and tribal governments to work together to provide the environmental protection that our laws demand and that the American people deserve. As I explained in my testimony to the Committee, I strongly support cooperative federalism. If confirmed, I will make every effort to partner with the EPA's counterparts in state, local, and tribal governments to further these goals.

15.In 2005, former Attorney General Drew Edmondson filed a federal lawsuit in 2005 seeking to prohibit the spreading of chicken waste over land in the Illinois River Basin in northeastern Oklahoma. Companies named in *State of Oklahoma v. Tyson Foods Inc.* (No. 4:05-cv-00329) include Tyson Foods Inc., Tyson Poultry Inc., Tyson Chicken Inc., Cobb-Vantress Inc., Cal-Maine Foods Inc., Cargill Inc., Cargill Turkey Production L.L.C., George's Inc., George's Farms Inc., Peterson Farms Inc., Simmons Foods Inc., Cal-Maine Farms Inc. and Willow Brook Foods Inc. On December 9, 2015, the State of Oklahoma filed brief amici curiae along with 21 other states in support of the petitioners in *American Farm Bureau Federation v. EPA* (No. 15-599). The *Tyson Foods* defendants did not participate in the Bay TMDL lawsuit, and the American Farm Bureau was not a party to the Oklahoma suit. However, Tyson Foods Inc., headquartered in Springdale, Arkansas—the largest poultry producing company in the world—is a member of the Arkansas Farm Bureau. Do you accept that the American Farm Bureau, a national organization, represents the interests of the Arkansas Farm Bureau and its members, including Tyson Foods? Explain why or why not.

It is my understanding that the American Farm Bureau Federation is a distinct corporate entity from the Arkansas Farm Bureau, which is a distinct corporate entity from Tyson Foods. Accordingly, I do not believe one can ignore corporate form and conflate the American Farm Bureau Federation with either the Arkansas Farm Bureau or Tyson Foods. I observe that the Pennsylvania Farm Bureau filed suit against EPA in the challenge to the Chesapeake Bay TMDL on its own behalf, notwithstanding the fact that American Farm Bureau Federation also was a plaintiff.

16.In 2013, despite the lack of a verdict in the *Tyson Foods* case, you added the State of Oklahoma to the American Farm Bureau/poultry industry backed lawsuit

against the EPA's efforts to enforce a TMDL to restore water quality in the Chesapeake Bay. You sided with the American Farm Bureau, the Fertilizer Institute, the National Chicken Council, the National Pork Producers Council and other farming interests. The lawsuit claimed EPA was exceeding its authority in enforcing "total maximum daily load," or TMDL, standards in Chesapeake Bay, limitations on nitrogen, phosphorus and sediments. In what ways did you balance the interests of your client, the State of Oklahoma, as Counsel for Amicus Curiae in *American Farm Bureau* while *Tyson Foods*, in which you represented the State of Oklahoma as Plaintiff, was ongoing?

These are two different lawsuits regarding different parties and different matters. There also is no issue conflict because the issues raised in the two lawsuits also are distinct.

17.In 2016, more than six years after arguments concluded in *Tyson Foods*, there has been no final ruling from U.S. District Court Judge Gregory K. Frizzell. Do you find the six-year delay in *Tyson Foods* to be acceptable or reasonable, and if so, why?

It would not be appropriate for me as an attorney to comment on the acceptableness or reasonableness of the actions of a judge before whom the Office of the Attorney General has a pending case.

18.Please provide a list of all confidential government documents related to the Chesapeake Bay TMDL to which you would not have access but for your status as counsel to the State of Oklahoma as amicus curiae in *American Farm Bureau*.

I am not aware of any such documents. A request for such documents can be made to the Office of the Attorney General pursuant to the Oklahoma Open Records Act.

19.If the Supreme Court were to grant certiorari in *American Farm Bureau*, or a case like it challenging the Chesapeake Bay TMDL, how would you direct the EPA as Administrator to rigorously defend its own rule?

Any TMDL should be a cooperative effort. If confirmed as EPA Administrator and if the litigation challenging the Chesapeake Bay TMDL reached the Supreme Court during my time in office, I would expect to consult with the States and other interested stakeholders about the issues raised in such litigation.

20.In what ways did you balance the interests of your client, the State of Oklahoma, as Amicus Curiae in *American Farm Bureau* and as Plaintiff in *Tyson Foods*?

These are two different lawsuits regarding different parties and different matters. As Attorney General of Oklahoma, I represent the interests of the State of Oklahoma when I seek to ensure that federal law is followed such that Oklahoma retains its sovereign authority to regulate where federal law allows such state regulation..

21.Do you accept that the Chesapeake Bay TMDL could still fail to significantly reduce pollution flowing to the Chesapeake Bay if the EPA steps back from its role in holding states accountable for their cleanup commitments? Explain why or why not.

It is my understanding that recent quality data shows that the water quality of the Chesapeake Bay is improving. Further, it is my understanding that the United States Geological Survey and other researchers have found that the time lag between measures taken on the ground and water quality response can be years, decades or even longer. Accordingly, today's improvements in water quality are likely the result of measures taken before the effective date of the Bay TMDL. These measures, as well as state plans to require treatment plants upgrades that also pre-date the effective date of the Bay TMDL, will continue to improve water quality. That said, the Bay TMDL represents a cooperative effort of all states in the watershed and EPA has a role in overseeing its implementation.

22.The TMDL approach hinges on numeric water quality standards that set a qualitative number for pollution limits, rather than a qualitative description of how healthy waters should be. As Administrator, how would you promote effective numeric standards?

I agree with the Mach 2011 nutrient framework issued by the Assistant Administrator for the Office of Water entitled "Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions," which prioritizes state action to encourage on the ground activities over establishment of numeric nutrient limits. According to the State of Florida, based on their experience with the imposition of federal numeric nutrient limits, controversy over the validity of a number can actually delay pollutant reduction activities, delaying water quality improvements.

23.In the Mississippi River watershed, the Obama Administration defended a lawsuit against the EPA from environmentalists seeking numeric nutrient criteria. The United States District Court for the Eastern District of Louisiana ruled in favor of the EPA, finding “Presumably, there is a point in time at which the agency will have abused its great discretion by refusing to concede that the current approach [...] is simply not going to work.” But for now, “EPA is entitled to judgment as a

matter of law in its favor." As Administrator, would you continue to waste resources on a qualitative, voluntary approach?

I was not involved in the litigation your reference, and am not familiar with the details of the case.

24.As Administrator, do you intend to make enforcement of the Chesapeake Bay cleanup plan a priority? How? Do you acknowledge that it will be even more difficult to make progress without EPA?

The Chesapeake Bay TMDL has been upheld by the Third Circuit Court of Appeals. If confirmed, I will continue to enforce the law and will continue EPA's leadership role as a member of the Chesapeake Bay Executive Council. I agree that progress would be difficult without a collaborative process.

25.Would you deny the political will in the states of the Chesapeake Bay watershed to protect the Bay?

I would listen to the views of all interested stakeholders including the States.

26.In a 2013 speech, you said "There are issues with respect to clean water and air that cross state lines. There is a role, and I think it's important for conservatives, for us to recognize, that though I don't like the EPA [...] I think it's not good for us to say that the EPA doesn't have any role." How would you characterize the EPA's role in mediating cross-state air and water pollution disputes?

I certainly agree that EPA plays a leadership role in mediating cross-state air and water pollution disputes.

27.In 1992, the Supreme Court held in *Arkansas v. Oklahoma* (No. 90-1262), a case challenging the EPA's issuance of a National Pollution Discharge Elimination System (NPDES) permit to a publicly owned treatment plant in Fayetteville, Arkansas for a discharge into a river flowing into Oklahoma, that the Clean Water Act authorizes the EPA to require that point sources in upstream states not violate water quality standards in downstream states.[2] Is the EPA interpreting this Supreme Court precedent correctly? If not, how would you change its interpretation through NPDES?

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[2] https://www.epa.gov/sites/production/files/2015-01/documents/waterpollution-ludwiszewski-memo.pdf

Arkansas v. Oklahoma involved an EPA-issued permit because at the time of the litigation the Fayetteville wastewater treatment plant began operation Arkansas did not have an approved state permitting program. Oklahoma is authorized to implement its own NPDES permitting program, in lieu of the federal program. As such, I am not familiar with how EPA is applying Arkansas v. Oklahoma when it issues permits in the handful of states without such approved permitting programs.

28.After the *Arkansas* decision, you agreed to a three-year delay in 2012 to allow for an independent study of the science behind the standard. What specific factors motivated your decision to delay enforcement of Oklahoma's standard?

The "Second Statement of Joint Principles and Actions" that Oklahoma entered into with Arkansas in 2012 actually required that "[t]he States, through the appropriate Parties, will continue to require existing point source dischargers to the Illinois River Watershed with a design capacity of greater than 1 MGD to operate under existing National Pollutant Discharge Elimination System ("NPDES") permits reflecting an effluent limit for total phosphorus of not more than I mg/L based upon a 30 day average, assuming the U.S. Environmental Protection Agency does not object" and likewise required that "Parties for both States will continue cooperative efforts to improve and protect water quality in the Scenic Rivers."

29.Please provide all communications you had had with representatives of agricultural and other companies regarding water quality litigation between Arkansas and Oklahoma.

Such communications can be requested from the Oklahoma Office of the Attorney General through a request made to that office pursuant to the Oklahoma Open Records Act.

30.Do you commit to fully apply and enforce the Good Neighbor provision if confirmed as EPA Administrator?

Yes. If I am confirmed as Administrator, I will exercise my authority in this area consistent with Congress's intent in enacting the Act. Specifically with respect to Section 110(a)(2)(D) and the "good neighbor" obligations of Section 110, I intend to engage in a transparent process that will allow states to have a meaningful opportunity to understand their obligations with regard to reducing emissions that cause or contribute to nonattainment or interference with maintenance in other states through the SIP process and to act consistent with my authority under Section 110(c) if states fail to do so.

31.What is your understanding of the role of climate change in algal blooms?

EPA identifies the following as causes of harmful algal blooms: sunlight, slow-moving water, and excess nutrients. For climate change to have a role, it would first have to have an impact on one of these three causes.

32.Please provide a list of water treatment plants under consent order from the Oklahoma Department of Environmental Quality during your tenure as Attorney General. Please identity funding sources other than federal funding that are available to bring these treatment plants into compliance with the Clean Water Act.

This question should be directed to the Oklahoma Department of Environmental Quality, as I have no personal knowledge of such matters.

33.Of the 1,677 public water supplies under the purview of the Oklahoma Department of Environmental Quality, 19 had recent elevated detections of lead in March, 2016. Please describe any action you took to address lead contamination as Attorney General.

As the question indicates, the Oklahoma Department of Environmental Quality as opposed to the Office of Attorney General has primary responsibility for implementing and enforcing environmental laws in Oklahoma.

34.When more than 10 percent of tap water samples in a local system contain lead levels of at least 15 parts per billion, the state steps in to review the water system's treatment for corrosive properties and update the sampling schedule as necessary. How have budget cuts to the Oklahoma Department of Environmental Quality impacted sampling?

I have no personal knowledge of the Oklahoma Department of Environmental Quality's budget, or how any budget cuts may have impacted that office.

35.EPA and the Centers for Disease Control and Prevention (CDC) agree that there is no known safe level of lead in a child's blood. Lead is harmful to health, especially for children. Do you accept that there is no safe level of lead in a child's blood?

I am concerned about the health of children. I have not myself reviewed the scientific studies correlating blood lead levels to impacts in children. However, it is my understanding that neither EPA nor CDC have identified a "safe" level of exposure, but instead have adopted levels appropriate for action under their specific statutory authorities.

36.Please provide any information relating to enforcement actions for Lead and Copper Rule violations undertaken during your tenure as Attorney General for Oklahoma.

Such enforcement actions would have been undertaken by Oklahoma's environmental and water regulators, at agencies like the Oklahoma Department of Environmental Quality or the Oklahoma Water Resources Board. This question should be directed to those agencies so that can describe to you the relevant actions taken by the State of Oklahoma.

37.The Safe Drinking Water Act (SDWA) requires EPA to establish and enforce standards that public drinking water systems must follow. EPA delegates primary enforcement responsibility (also called primacy) for public water systems to states and tribes if they meet certain requirements. In a letter to Oklahoma Secretary of the Environment Gary Sherrer, EPA Regional Administer Ron Curry said the State had until June 1, 2013 to fully implement the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules. Please provide all information related to Oklahoma's primacy under the Public Water System Supervision Program during your tenure as Attorney General.

As your question indicates, such matters would be within the purview of Oklahoma's environmental regulators, not the Office of Attorney of General.

38.Do you concur that persistent drinking water safety problems indicate the need to strengthen, not weaken, the federal law designed to ensure the safety of Americans' drinking water? Explain why or why not.

I believe that persistent drinking water problems largely stem from a failure to comply with current laws and regulations. If confirmed, I will work to increase compliance with the law, which will require effective enforcement and oversight, technical assistance, and infrastructure improvements. It also may require changes to existing regulations to improve oversight tools and eliminate ambiguities that lead to compliance issues.

39.At the same time, deteriorated lead paint and elevated levels of lead-contaminated house dust are present in an estimated 24 million U.S. houses, according the Centers for Disease Control and Prevention. The long-term effects that lead poisoning can cause include learning disabilities, hyperactivity, impaired hearing and brain damage. Infants and young children are most susceptible to lead poisoning. EPA's Lead Renovation, Repair and Painting Rule (RRP Rule) requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by EPA (or an EPA authorized State), use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices. Do you believe the RRP Rule should be a voluntary standard? Explain why or why not.

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No. Oklahoma is an authorized state. The Oklahoma Lead-Based Paint Management Act designates the Department of Environmental Quality as the official agency for implementing the Lead-Based Paint Management Program.

40.EPA is addressing lead contamination and resulting hazards under these laws in many ways, including by issuing and enforcing regulations. Do you find this regulatory authority appropriate for EPA, and not the States? Why or why not.

It is appropriate for EPA to faithfully enforce federal law. With respect to the RRP rule, it is my understanding that there have been issues with EPA implementation of the RRP rule in states that are not authorized due to a delays in certifying firms.

41.Title IV of the Toxic Substances Control Act (TSCA), as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992, directs EPA to regulate lead-based paint hazards. As Administrator, how would you implement Title IV of TSCA?

Congress enacted both TSCA Title IV to create a national program to achieve the national goal of eliminating lead-based paint hazards from housing as expeditiously as possible and TSCA Title V to authorize the establishment of a state grant program to provide technical assistance on EPA environmental programs for schools and to implement school environmental health programs. If confirmed, I will faithfully discharge my responsibility to protect human health and the environment for all Americans with the highest possible dedication and commitment in accordance with the legal authorities established by Congress.

42.The CWA prohibits anyone from discharging pollutants, including lead, through a point source into a water of the United States unless they have a National Pollutant Discharge Elimination System (NPDES) permit. As part of their water quality standards regulations, states and authorized tribes adopt ambient water quality criteria with sufficient coverage of parameters, such as lead, and of adequate stringency to protect the designated uses of their surface waters. What changes, if any, would you make to the NPDES permit?

I have not contemplated any changes to the NPDES permit program, if confirmed.

43.Please provide all confidential government information regarding the 2010 consent order with the Making Money Having Fun (MMHF, LLC), a coal combustion waste mine fill operator in Bokoshe, Oklahoma, that you obtained as Attorney General.

I did not become Attorney General until January 2011. The Oklahoma Department of Environmental Quality has responsibility for administering and enforcing environmental laws in Oklahoma, along with other agencies like the Water Resources Board and the Corporation Commission. Those agencies may be able to provide you information about the 2010 consent order your reference.

44.The EPA finalized the first federal coal ash disposal rules in 2015, but the rules did not include any direct mechanism to implement or enforce the rules. Now, Congress has provided the mechanism in S. 612-114th, the WINN Act, which was passed with bipartisan support. Senate Majority Leader Mitch McConnell also issued a press release stating his approval of several of the bill's provisions, including the coal ash language. As you may know, if states create a coal ash permitting program, or amend their current programs to incorporate federal standards and get EPA approval, they will be able to implement the rules themselves. If they do not, the EPA is directed either put into place a federal permitting system, or have the authority to directly enforce the requirement. Do you intend to enforce the coal ash language in S. 612-114th, the WINN Act, that received bipartisan report?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress, including the WIIN Act provisions regarding coal ash.

45.Please provide an explanation of any modification you would make to the coal ash provision in S. 612-114th, the WINN Act.

I have not had occasion to review in depth this new statutory. Congress, not the Administrator of EPA, has authority to modify statutory language such as the coal ash provision in the WIIN Act. I do not at this time have any opinion whether Congress should modify the statute in question.

46.Kentucky is already in the process of working on regulations governing coal ash disposal. The state's proposal would modify the concept of "permit-by-rule," and allow utilities to build their own coal ash landfills or ponds without prior permitting or review by regulators. The utilities could be fined by regulators or sued by individuals for violations. Energy and Environment Cabinet spokesman John Mura has said the Cabinet believes this would qualify as a "permitting program" as required by the WINN Act. As Administrator, would you allow the Kentucky Energy and Environment Cabinet's "permit by rule" program to qualify as a permitting program under the bipartisan WIIN Act? Why or why not?

I am not familiar with how Kentucky regulates coal ash disposal. It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is fully and fairly considered with input from staff and in accordance with applicable legal requirements.

47.What is the goal of your lawsuit asking to strike down EPA's "Waters of the United States" rule under the CWA? What will the states be empowered to do that they can't do with the rule in place? (be specific)

The goal of the lawsuit I brought to advance the State of Oklahoma's interest in protecting its regulatory authority is to have the courts vacate the WOTUS rule. If the WOTUS rule is vacated, we will return the status quo, and the State of Oklahoma's sovereign authority to regulate waters within its border will not be diminished.

48.The brief filed on behalf of states argues that states need to "protect" waters. Are you aware of the legal concept under the Clean Water Act that provides for states to be more protective than the Clean Water Act, not less—that the Act sets a minimum standard of protection and cleanliness?

The state brief filed in the WOTUS case argues that the WOTUS rule fails to recognize the limits on federal authority that Congress adopted when it enacted the CWA over forty years ago. Under the Act, Congress "chose to 'recognize, preserve, and protect the primary responsibilities and rights of States . . . to plan the development and use . . . of land and water resources.'" Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 174 (2001) ("SWANCC") (quoting 33 U.S.C. § 1251(b)). As noted in the state brief: "The Rule likewise reaches and even exceeds the outer bounds of Congress's constitutional authority. The Rule's expansion of federal authority over intrastate waters will "impinge[] o[n] the States' traditional and primary power over land and water use," and "readjust the federal-state balance." SWANCC, 531 U.S. at 174.The Rule's coverage of intermittent waters, ephemeral waters, and isolated sometimes-wet lands "presses the envelope of constitutional validity," Rapanos, 547 U.S. at 738 (Scalia, J., plurality) (citation omitted), far more than the challenged agency actions in Rapanos and SWANCC. That is, states have exclusive, not additional, authority over all land and non-navigable, wholly intrastate waters.

49.Do you believe that states should be free to allow more pollution or fewer waters to be protected from pollution and development than described in the Waters of the United States Rule?

The litigation brought by the states was premised on a concern that EPA had exceeded its statutory authority as established by Congress. Additionally, the WOTUS rule is a jurisdictional rule, not a substantive rule as your question suggests.

50.Are there waters that you believe should not be protected under the Clean Water Act? What specifically are they? Why do you think that the rule covers those waters now? Why do you think they should not be protected?

As I stated in my testimony before the Committee, I believe that the Clean Water Act regulates more than navigable waters. But, it does not regulate all waters. How much more would best be answered by Congress. Absent Congressional action, it is the role of EPA to seek to provide clarity on the scope of federal jurisdiction. What that is has to be determined and assessed through notice and comment rulemaking. The WOTUS rule exceeded the authority granted by Congress by allowing federal regulation of land if rainwater collects on the surface and seeps into the ground or if rainwater runs over the land as ephemeral flows. It also exceeded CWA authority by regulating isolated ponds and wetlands. Such non-navigable, wholly intrastate water should be protected, as appropriate, under state, not federal, law. For example, isolated bodies of water have not been subject to federal regulation since the 2001 Supreme Court decision in SWANCC struck down earlier agency attempts to expand federal jurisdiction beyond the limits of the Act. The WOTUS rule would reverse that decision and regulate the same waters that the Supreme Court has already said are subject to exclusive state regulation.

51.In your lawsuit against the Clean Water Rule you argue against what you perceive as an undue federal intrusion on local control of decisions about water quality. You have also argued that cities in towns in Oklahoma should not be able to control their water quality by issuing local regulations for the activities of oil and gas companies. How is your stance in favor of local control under the Clean Water Act consistent with your position against local control when it comes to the water polluting activities of oil and gas companies? What legal underpinning is there for that difference?

State concerns regarding the WOTUS rule are based on the limitations on federal authority under the Clean Water Act. Oklahoma concerns over the regulation of commercial activities including oil and gas company operations by local governments are based on the limitations of local authority under state law and federal law. Respect for the rule of law underpins both concerns, and both seek to ensure that laws enacted by the relevant legislatures—Congress on one hand, the Oklahoma Legislature on the other—are followed.

52.Wetland ecosystems provide significant environmental and economic benefits to American citizens including water purification, flood and erosion control, and

habitat for wildlife and commercial fish species. In fact, over fifty percent of commercial fish and shellfish stocks in the Southeastern United States rely on coastal wetlands. Section 404 of the Clean Water Act protects wetland ecosystems by regulating the discharge of dredging and fill material. If confirmed, what is your plan to improve the biological condition of wetlands?

If confirmed, I will take care to faithfully execute all environmental laws enacted by Congress, including Section 404 of the Clean Water Act.

53.As of 2014 Oklahoma had nearly 14,000 miles of rivers and nearly 1,000 square miles of lakes that are so polluted they don't meet the state's water quality standards. That's approximately 42% of all the delineated stream miles in Oklahoma, and almost 1,600 of those were added during your time as Attorney General. Only 107 miles of rivers in Oklahoma – about a third of one percent – were classified as meeting Oklahoma's water quality standards. The other 58% are classified as having insufficient data to enable the state to say they're meeting state standards. As Oklahoma's Attorney General, what did your office do to ensure that the companies were complying with the state's clean water laws?

The Oklahoma Department of Environmental Quality and the Oklahoma Water Resources Board have primary responsibility for implementing and enforcing environmental laws in Oklahoma. Such questions should be directed to those environmental regulators.

54.How many water pollution enforcement actions did your office file, and how many of those resulted in orders to halt or reduce pollution discharges? Please provide a comprehensive list.

The Oklahoma Department of Environmental Quality and the Oklahoma Water Resources Board have primary responsibility for implementing and enforcing environmental laws in Oklahoma. Those agencies are thus best situated to provide a comprehensive list of enforcement actions take by the State of Oklahoma. The Office of Attorney General has on occasion assisted those environmental regulators by providing legal representation in cases under the CWA for pollution to groundwater, streams and other waterways. Other cases included pollution that caused fish kills and CERCLA Superfund sites that damaged Oklahoma groundwater and or streams. Those cases are EPA, States of Oklahoma & Texas v Mahard Egg Farm; EPA, State of Oklahoma v. Doe Run Mining et al.; ODWC v. Kent Feeds; ODWC v. Southern Towing; State Of Oklahoma, ODWC v Kelco Manufacturing; and State of Oklahoma & Cherokee Nation v. Sequoyah Fuels Corp.

55.President Reagan's EPA adopted the "Stream Buffer Zone" rule to protect streams, and the Obama administration has replaced that rule with the "Stream Protection Rule." Do you think Reagan's rule was a more straightforward way to

protect streams? Why or why not? What specifically about it was more "straightforward?"

The stream buffer zone rule and stream protection rule are not EPA rules. They were issued by the Office of Surface Mining Reclamation and Enforcement of the Department of the Interior.

56.The American Society of Civil Engineers states that decrepit, decades-old municipal wastewater systems are at fault for the discharge of 900 billion gallons of untreated sewage and wastewater into U.S. waterways each year, enough to cover New York City under a layer 127 feet deep. According to a New York Times report, municipal sewer systems are the nation's biggest violators of the U.S. Clean Water Act, and more than one-third of them have violated pollution laws at least once since 2006. This worn-out, faulty infrastructure requires new investments in order to protect public health and the environment. As the leader of the Agency in charge of protecting human health and US waterways, how will you help states and municipalities modernize their wastewater infrastructure?

If confirmed, I will continue support for the Clean Water State Revolving Loan Funds and the new Water Infrastructure Financing Innovation Act loan program. In addition, I would continue to implement EPA's Integrated Planning Framework to provide municipalities with flexibility to prioritize actions they take to come into compliance.

57.The American Society of Civil Engineers states that decrepit, decades-old municipal wastewater systems are at fault for the discharge of 900 billion gallons of untreated sewage and wastewater into U.S. waterways each year, enough to cover New York City under a layer 127 feet deep. According to a New York Times report, municipal sewer systems are the nation's biggest violators of the U.S. Clean Water Act, and more than one-third of them have violated pollution laws at least once since 2006. This worn-out, faulty infrastructure requires new investments in order to protect public health and the environment. As the leader of the Agency in charge of protecting human health and US waterways, how will you help states and municipalities modernize their wastewater infrastructure?

If confirmed, I will continue support for the Clean Water State Revolving Loan Funds and the new Water Infrastructure Financing Innovation Act loan program. In addition, I would continue to implement EPA's Integrated Planning Framework to provide municipalities with flexibility to prioritize actions they take to come into compliance.

58.Given the President-elect's concerns about EPA's slow and inadequate response to lead in drinking water problems and the lack of adequate testing, what specifically would you do to prevent a Flint-like disaster from happening elsewhere?

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If confirmed, I will focus EPA's resources and attention on its core missions, including ensuring safe drinking water.

59.Would you commit to undertaking stronger EPA oversight and enforcement of drinking water rules, such as stronger enforcement of the lead and copper rule that wasn't enforced in Flint, MI?

Yes.

60.What specific lessons did you draw from the Flint, MI tragedy, regarding EPA's proper role in overseeing the States' administration of delegated federal programs?

I believe that EPA staff should be encouraged to notify their managers when they identify issues and managers must take those issues seriously when brought to their attention. I agree with the assessments of others that the Flint tragedy was a failure at every level of government, but I am particularly disturbed that EPA did not take action until long after they became aware of the elevated lead levels in Flint drinking water.

61.What are your views on when EPA should step in to take enforcement or emergency action where a state is authorized to administer a program under one of the federal environmental laws but is failing its duty to protect the public?

If confirmed, I will follow the process outlined in section 1414 of the Safe Drinking Water Act, as recently amended in section 2106 of the WIIN Act, to notify persons of elevated lead levels in their drinking water and will carry out the recommendations of the EPA Inspector General in his October 2016 Management Alert to update the guidance on Safe Drinking Water Act emergency authority and require training on the use of that authority.

62.Did EPA do an adequate job in the instance of the lead crisis in Flint, MI? If not, what specifically would you do differently?

No. If confirmed and faced with a similar situation, I would inform the state that EPA will take action if they fail to do so, and use EPA's emergency authority if the state fails to act.

63.How specifically would you strengthen EPA's lead and copper rule for drinking water to ensure, as Mr. Trump suggested, that water is adequately tested and treated before children are exposed to lead?

It would be inappropriate for me to prejudge the outcome of a matter that may come before me if confirmed as Administrator. If confirmed I would request a full briefing by EPA staff on potential revisions consistent with EPA legal authorities.

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64.House Republican leadership said in 2016 that EPA should get new lead-in-water rules proposed as soon as possible, and criticized the agency for being too slow when it promised to get them out by 2017. By what date would you commit to get a new rule issued? How would you ensure that final improvements to this rule are issued and implemented quickly?

If confirmed, I will make issuing revisions to the Safe Drinking Water Act Lead and Copper Rule a priority. As I am not at the Agency, I do not know what is the soonest feasible date.

65.An independent advisory group of experts including state regulators and water industry representatives recommended to EPA that all old lead service lines that pump water into homes from water mains should be replaced. The water utility trade associations support this. Do you support that recommendation? In your view, what would be the best way to pay for these replacements—Congressional Appropriations, issuance of debt by cities and states, a combination, or other? Please explain.

It is my understanding that, if properly implemented, corrosion control treatment of water protects public health from exposure to lead from lead service lines. EPA's highest priority should be to ensure that this treatment is being properly employed. Replacement of lead service lines is a long term goal that municipalities should incorporate into their capital improvement plans, which are generally implemented through state and local funds. Federal assistance through the Drinking Water State Revolving Funds and the new WIFIA program can provide additional assistance.

66.Do you agree that removing lead from gasoline was an important and successful EPA rulemaking? Why or why not?

I have not evaluated this issue.

67.Lead has no safe level of human exposure, particularly for children. What actions will you take to require lead to be removed from children's environment to reduce their exposure to lead in air, water, soil, and paint?

If confirmed, I will faithfully carry out the authorities granted to EPA by Congress to reduce exposure to lead.

68.In March 2016 it was reported that 19 drinking water systems in Oklahoma had elevated lead levels. Of the 100 water systems with the highest self-reported lead levels between 2013 and 2015, seven are located in Oklahoma. One exceeded the federal action level by 1,175 parts per billion - many times greater than the amount of lead needed to cause the death of a fetus or spontaneous abortion, or

permanent severe developmental problems. As Oklahoma A.G., what specific actions did your office take to protect children against lead poisoning?

The Oklahoma Department of Environmental Quality and the Oklahoma Water Resources Board have primary responsibility for implementing and enforcing environmental laws in Oklahoma. Questions relating to actions taken by the State of Oklahoma with regard to lead in water systems should thus be directed to those environmental regulators.

69.How will you ensure that required evaluation of state drinking water primacy programs is conducted and how will you use EPA authority and resources to help states carry out their Safe Drinking Water Act primacy responsibilities?

If confirmed, I will focus on EPA's core missions, including oversight of state implementation of the Safe Drinking Water Act.

70.Will you direct EPA to continue and follow up on findings from 2016 increased oversight of state implementation of the Safe Drinking Water Act Lead and Copper Rule?

Yes.

71.What are your expectations for the 2017 Proposed Revisions to the Safe Drinking Water Act Lead and Copper Rule?

It is my understanding that EPA expects to issue that proposed rule in 2017.

72.In our conversation in my office, I asked for your thoughts on the Paris Agreement and the US commitment to the Paris Agreement. You pointed out that the Paris Agreement commitments are non-binding and when I asked you whether you thought the US should stay in the Paris Agreement you did not want to comment because you felt that the Paris Agreement is a matter handled in full by the State Department. Is that a fair characterization of your comments to me?

I believe I stated that a decision as to whether the U.S. stayed in the Paris Agreement would be a decision for the State Department.

73.Does that mean that you would advise the EPA to refrain from engaging with the State Department on US engagements with the UNFCCC and the execution process around the Paris Agreement?

Interagency cooperation is very important. Should the Administration decide to continue to participate in the Paris Agreement, and if I am confirmed as Administrator, I will collaborate with all involved agencies to ensure that commitments made on behalf of the United States are

achievable and consistent with requisite legal authorities delegated by Congress.

74.How does your position that EPA should ostensibly recuse itself from State Department responsibilities and engagements on the Paris Agreement comport with any plans that you, as the next EPA administrator, may execute to rescind or alter domestic policies that affect the US National Determined Contribution (NDC) to the Paris Agreement?

As I stated in a previous answer, should the State Department decide to continue to participate in the Paris Agreement and if I am confirmed as Administrator, I will work with all involved agencies to ensure that commitments made on behalf of the United States are achievable and consistent with requisite legal authorities delegated by Congress.

75.Recently at the World Economic Forum in Davos, Switzerland, Chinese President Xi Jinping expressed China's great interest in being the world's leader on a number of issues including action to address climate change. Do you believe it is the U.S.'s national interest to cede leadership to the Chinese on global action to address climate change?

It is the mission of the State Department to advance our national interests within the realm of foreign policy. If confirmed, I will work to advance the mission of the EPA, which is to protect human health and the environment, consistent with the State Department's strategy for international engagement on climate change.

76.Do you believe climate change is a real and serious threat to the planet?

The climate is changing and human activity impacts our changing climate in some manner. The ability to measure with precision the degree and extent of that impact, and what to do about it, are subject to continuing debate and dialogue.

77.Do you accept the scientific consensus that should average global temperatures reach or exceed +2 degrees Celsius that many regions of the world will very likely experience catastrophic changes in the environment that may very likely impact the safety and prosperity of many people?

• Do you believe that uncertainty in climate science warrants greater study before the U.S. takes significant action to reduce greenhouse gas pollution?
• If so, are you aware that the portion of the scientific community that claims there is uncertainty in the science is limited to limited to about 5% of climate science communities?
• If you believe that the very small portion of the world's climate science community who hold outlier opinions on the severity of climate change justifies inaction, why wouldn't you give similar credence to other outlying opinions in the

climate science community that hold that global average temperatures may exceed 10 degrees Celsius and that catastrophic events may occur as soon as five or ten years?

The climate is changing and human activity impacts our changing climate in some manner. The ability to measure with precision the degree and extent of that impact, and what to do about it, are subject to continuing debate and dialogue. If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data.

78.Our ability to predict the weather has improved dramatically over the last 20 years with the advent of supercomputers, new satellite monitoring options, and vastly superior atmospheric models. But still floods, droughts, hurricanes and similar phenomena occur and cause damage with sometimes only limited warning. What precision of prediction do you require before you are willing to accept the scientific community's overwhelming consensus that unchecked increases in greenhouse gas emissions will very likely have catastrophic effects, many of which the National Climate Assessment has described in detail every 4 years since 1990?

The ability to measure with precision the degree and extent of human activity on our changing climate, and what to do about it, are subject to continuing debate and dialogue. If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data.

79.Do you believe that science should guide our nation's environmental policy?

Congress has made it very clear in the Clean Air Act, the Clean Water Act and other major environmental laws that the regulatory actions of the EPA should be based on the most up to date and objective scientific data. If confirmed, I will follow the directives of Congress to set science-based standards to protect the environment and human health.

80.What would have to change about our ability to predict the effect of increasing greenhouse gas emissions in Earth's atmosphere for you to consider it adequate?

If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving understanding of the impact increasing greenhouse gases have on our changing climate.

81.Would you support making those changes in sufficient time to ward off any negative effects of increasing those emissions?

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The ability to measure with precision the degree and extent of human activity on our changing climate, and what to do about it, are subject to continuing debate and dialogue. If confirmed, I will make sure the agency's regulatory actions are based on the most up to date and objective scientific data.

82.What is your scientific background and what expertise do you have in environmental science?

My degrees are in communications, political science, and law. As with prior EPA Administrators who held bachelor of arts degrees, I completed science courses as a prerequisite to requiring my degree. Also, I understand that six of the 12 people who have been confirmed as EPA Administrator (including the first four individuals) had law degrees.

83.How do you square your opinion that air regulation is a matter for the states and that EPA has limited authority to mandate regulation of air pollution, with the court's overwhelming opinions that EPA has exclusive authority to regulate air pollution including greenhouse gases?

The concept of cooperative federalism is a bedrock principle of the Clean Air Act, the Clean Water Act and other EPA-administered laws. Whether working to improve air quality, water quality or other important environmental objectives, Congress made achieving these a shared responsibility between the EPA and the states. If confirmed, I will respect the intention of Congress and relative statutory framework.

84.Given that you are one of the lead attorneys challenging the clean power plan, a regulation promulgated by EPA in part due to the court's decision in landmark cases that determining EPA authority and responsibility to regulate greenhouse gases for domestic sources, in you rescind the Clean Power Plan:

It is unclear what question is being asked.

85.What policies would you promulgate to replace the Clean Power Plan, which you would have to do to ensure the EPA is in compliance with the court orders to regulate greenhouse gases?

It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is fully and fairly considered with input from staff, as part of a transparent process that seeks input from stakeholders, and that is consistent with EPA's statutory authorities.

86.What assurances will you give the public that your proposed replacement rules will withstand the tests established in the case law determining EPA's endangerment finding is adequate and legal and sufficiently regulates carbon pollution to protect public health and safety?

It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is fully and fairly considered with input from staff, as part of a transparent process that seeks input from stakeholders, and that is consistent with EPA's statutory authorities.

87.Do you trust the analysis, concerns and recommendations of security experts at the State Department, Department of Defense, Central Intelligence Agency, The Navy War College, UN Security Council, and the World Bank, who have expressed growing concerns over the threat climate change poses to national and global security?

I have no reason to disagree with the statements from the listed security experts, although I have not made any attempt to independently verify their accuracy.

88.U.S, national security experts that are working to incorporate climate modeling and climate change assessments into our national security planning apparatus rely on sound scientific analysis, modeling data, and technical assistance from the EPA in interpreting the data. Will commit to continuing EPA's engagements with the agencies and departments responsible protecting our national security and advancing our understanding and preparedness for the security risks climate change poses to the United States?

Interagency cooperation is very important. If I am confirmed as Administrator, I will collaborate with any agency or department that may require the EPA's technical expertise to strengthen their own administrative actions.

89.What assurances can you provide the public, particularly vulnerable communities at greatest risk from pollution, that you will represent their interests fairly as administrator when your personal political campaigns, as well as organizations that you have held leadership positions within - like the Republican Attorneys General Association, has received hundreds of thousands of dollars in contributions from the fossil fuel industry because of your working championing their interests by challenging laws regulating these industries?

As I explained in my testimony to the Committee, I am a firm believer in the EPA's mission to protect the environment and look forward to the opportunity lead the agency to help provide our future generations with a better and healthier environment for all Americans.

90.You have lost many of the lawsuits challenging EPA's authorities, including the Chesapeake Bay TMDL and the lawsuit challenging the endangerment finding on greenhouse gases. Given the difficulty you've had winning cases, what

assurances can you provide the committee of your sound judgment when it comes to understanding our nation's environmental statutes?

As Attorney General of Oklahoma, my focus has been on examining federal environmental statutes and relevant case law to evaluate the legality of the EPA's actions and the impact of those actions on Oklahoma. Oklahoma filed a friend of the court brief with the U.S. Court of Appeals for the Third Circuit in part to inform the court how EPA's interpretation of TMDL and other matters involved in the challenge would impact other states, including Oklahoma. If I am confirmed, I will apply those lessons which I have developed in the performance of my duties as Attorney General and would continue to do so if confirmed as Administrator.

91.Will you work with all stakeholders and the State Department on execution of the Kigali Amendment to the Montreal Protocol to phasedown hydrofluorocarbons (HFCs) and will you commit to ensuring that any actions EPA may take to modify or rescind the Safe New Alternatives Program (SNAP) rules on HFCs coincide with the U.S.'s acceptance or ratification of the Kigali Amendment?

Should the State Department decide to advance the Kigali Amendment to the Montreal Protocol and if I am confirmed as Administrator, I will work with all involved agencies and impacted stakeholders to ensure that EPA's actions related to hydrofluorocarbons (HFCs) are coordinated accordingly.

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Ranking Member Carper:

1.Please list all public speeches or presentations you have made that included references to any issue related to energy or the environment since 1998, and please provide copies (written, audio, or video) of any such speeches or presentations. Please also indicate whether you received compensation for any such speech or presentation (whether stipend, travel, lodging expenses, or other form of remuneration) along with the name of the entity that provided such compensation and the amount thereof.

Please see attached list of speeches and enclosed copies of speeches in response to this request.

2. Please provide a list of the skills and experiences you bring to the EPA Administrator position and why you believe that you would be a good fit for the position.

I am a licensed attorney with significant experience in constitutional law, the Administrative Procedure Act, and Environmental Protection Agency administered statutes. This body has recognized my expertise in EPA related matters on several occasions, inviting me to testify before this and other committees on matters relating to the EPA. My legal education and profession has trained me to ask probing questions and think critically regardless of the subject.

3. Please define the Environmental Protection Agency (EPA)'s mission and the role you believe that sound science plays in fulfilling that mission.

The mission of EPA is to protect human health and the environment. Where Congress directs the EPA to act based upon scientific findings, the EPA should rely on well-reasoned, and sound, scientific findings.

4. In a 2006 article in The Oklahoman, you were described as someone that "believes in negotiating, but not compromising." Do you feel this continues to be an accurate description of you? If so, why? Do you agree with President Nixon's articulation of the principal roles and functions of the EPA? If you do not agree, please explain the aspects with which you disagree and why.

Based on the limited information provided in the question, I am uncertain about the article to which the question refers. The content and context of

the article and quote are not readily apparent. However, if confirmed as Administrator, I will take my responsibility to protect human health and the environment for all Americans with the highest possible dedication and commitment in accordance with the legal authorities established by Congress. I have a record of working on a bipartisan basis.

5. Do you think it is constitutional for Congress to direct EPA to set national standards that protect public health? Is it constitutional for Congress to do that even if the pollution only harms citizens of a single state?

The constitutionality of laws enacted by Congress depends on the particulars of the particular law, and will typically be decided by a court. Courts have generally recognized that Congress has the authority to create the EPA and vest certain powers in it.

6. Mr. Pruitt, your official biography on the website of the Oklahoma Attorney General's office says that you are "...a leading advocate against the EPA's activist agenda." The EPA, the agency you have been nominated to lead, has the critical mission "to protect human health and the environment" for all Americans. When you sued the EPA over the Good Neighbor Rule (Cross-state Rule), how did that protect human health and the environment for downwind states?

I firmly believe that the EPA plays an important role in addressing interstate water and air quality issues, but it must do so within the bounds of its legal authority. The actions undertaken by the Office of Attorney General challenging the Cross State Air Pollution Rule related to whether EPA had properly accounted for and allocated pollution from upwind states, as mandated by Congress. Regulations that are not on solid legal foundation and that cannot survive judicial review will not result in environmental protections.

7. You've been part of numerous lawsuits against the EPA – against clean air, clean water and climate regulations. However, you also have stated you are for clean air and clean water. Can you name one Clean Air Act regulation – not a voluntary or grant program – that is on the books today that you do support?

I firmly believe that the EPA plays an important role, especially as it relates to cross-state air and water pollution, but EPA must do so within the bounds of its legal authority as provided by Congress. Regulations that are not on solid legal foundation and that cannot survive judicial review will not result in environmental protections.

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8. Are there any other EPA regulations that are on the books today that you do support?

I have not conducted a comprehensive review of existing EPA regulations. As Attorney General, I have brought legal challenges involving EPA regulations out of concern that EPA has exceeded its statutory authority based on the record and law in that matter.

9. President-elect Donald Trump has said repeatedly—at least half a dozen times—on the campaign trail that he would starve the EPA of funding or completely eliminate the agency. In March last year, the President-elect stated in reference to the EPA:

"We are going to get rid of it in almost every form. We're going to have little tidbits left but we're going to take a tremendous amount out,"

After the election, the President-elect didn't seem to change his tune. President-elect Trump stated two days after the election again in reference to the EPA:

"Environmental protection, what they do is a disgrace; every week they come out with new regulations,"

You also have a history attacking the agency. Please tell us why we should disregard the President-elect's statement on the EPA, disregard your actions and only believe your words that you will support clean air and clean water laws?

As I testified, I support the EPA's mission to protect human health and the environment. If confirmed, I will faithfully execute the environmental laws enacted by Congress.

10. As Administrator, will you take into account the true costs of air pollution including the adverse health and environmental impacts on states that are adversely affected by upwind pollution sources?

As I stated at the hearing, costs are important in the rulemaking process and the Courts have recognized that important factor. The Clean Air Act prescribes when costs should be considered and to what extent in a

rulemaking. If confirmed, I commit to faithfully executing the law as enacted by Congress.

11. As Administrator, will you take into account the full economic and job benefits that result from clean air protections such as the economic benefits to communities from clean air and American leading businesses that manufacture advanced technologies?

As I stated at the hearing, the EPA should consider the benefits of cleaner air for the public. The Clean Air Act prescribes certain instances where the EPA is obligated to conduct a cost-benefit analysis as part of the rulemaking process. If confirmed, I commit to faithfully execute the law as enacted by Congress.

12. If it is technologically and economically feasible to eliminate the release of a particular pollutant, do you agree that we should do so?

Environmental statutes prescribe certain instances where technological or economic feasibility is a relevant factor to consider in a rulemaking. If confirmed, I commit to faithfully execute the law as enacted by Congress.

13. I have often found that environmental regulations can and often drive innovation. We have seen that with the Acid Rain Program, CAFÉ, Clean Diesel standards, RFS and most recently with the mercury standards. Do you agree environmental regulations often drive innovation? If so, why? If not, why not?

The factors that lead to technological innovation can be complex and varied, and legal requirements may be one such factor.

14. Who serves or has served as your scientific advisor for climate change related issues during your time as attorney general? Please provide their names, their titles, and when they served as your science advisors.

The Office of Attorney General does not have a science advisor to advise on climate change related issues.

15. Mr. Pruitt, my State of Delaware is already seeing the adverse effects of climate change with sea level rise, ocean acidification, and stronger storms. While all states will be harmed by climate change, the adverse effects will vary by

state and region. Can you comment on why it is imperative that we have national standards for the reduction in carbon pollution?

If confirmed, I will fulfill the duties of the Administrator consistent with Massachusetts v. EPA and the agency's Endangerment Finding on Greenhouse Gases respective of the relative statutory framework established by Congress.

16. Pruitt, will you agree that there will be no retaliation against EPA employees who work on climate change issues?

If confirmed, yes.

17. Clean car standards save consumers money at the pump and help reduce oil imports. Automakers are complying with vehicle standards ahead of schedule. As Administrator, will you commit to support, defend and enforce EPA's current programs to address emissions from vehicles?

Congress has enacted numerous statutes directly or indirectly affecting transportation fuels, transportation fuel infrastructure, and the vehicles that consume those fuels. Congress committed many of those statutes to the EPA Administrator's responsibility. If confirmed as Administrator, I would administer each of those statutes in accordance with Congress's statutory objectives, and in light of the administrative record in each given proceeding. And I would work with Congress to ensure that its statutes continue to provide the best possible legal framework for governing American fuels, fuel infrastructure, and vehicles, and for promoting American energy independence, energy security, and environmental protection.

18. What is your definition of sound science?

Sound science is that which complies with applicable laws and federal guidance regarding scientific integrity, peer review, information quality, and transparency.

19. Prior to your nomination, how have you acquired scientific information relevant to the missions of the EPA? And since your nomination?

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As Attorney General of Oklahoma, my focus has been on examining federal environmental statutes and relevant case law to evaluate the legality of the EPA's actions. Legal education is rooted in the Socratic method, which trains law students through probing questions and critical thinking and I apply those lessons and skills in the performance of my duties as Attorney General and would continue to do so if confirmed as Administrator.

20. Please list all undergraduate and postgraduate science courses that you have taken. Please describe any other science education that you have completed over the years beyond high school.

My degrees are in communications, political science, and law. As with prior EPA Administrators who held bachelor of arts degrees, I completed science courses as a prerequisite to requiring my degree.

21. President Nixon articulated that an important role for EPA is "The conduct of research on the adverse effects of pollution . . . the gathering of information on pollution, and the use of this information in strengthening environmental protection programs and recommending policy changes." Do you agree with President Nixon that EPA has an important role to play in researching any emerging risks from pollution as well as strengthening protections and recommending policy changes based on the science?

Yes.

22. Do you think the U.S. National Academy of Sciences is a reliable authority on scientific matters?

I have no reason to think otherwise, but I have not had occasion as Attorney General to consider this issue.

23. What degree of scientific certainty should the EPA have about a potential health or environmental threat before acting to protect people from that threat?

EPA actions are governed by statutes such as the Clean Air Act and other legal authorities and relevant case law, which establish applicable legal and scientific standards for the Administrator to act. If confirmed, I will adhere to these authorities to fulfill EPA's mission to protect human health and the environment for all Americans.

24. Do you support legislative efforts to change the independent nature of the EPA' s Science Advisory Board? If so, please explain why.

I am unfamiliar with the legislative efforts being referred to in this question. If confirmed, I expect to be briefed by EPA staff before taking any position on such matters.

25. If confirmed, do you plan to propose or advocate for budget cuts to the EPA's FY 2018 budget? If so, for which programs would you reduce funding? Would you target the EPA's research programs? Are there areas of agency action where you believe additional financial resources are needed?

I have no first-hand knowledge of EPA's development of its FY 2018 budget request. If confirmed, I look forward to working with EPA's budget staff and program offices to develop a budget and will work to ensure that the resources appropriated to EPA by Congress are managed wisely in pursuit of the Agency's important mission and in accordance with all applicable legal authorities.

26. For the most part, patients and their families only participate in scientific trials and studies once they know their privacy - and any resulting health-related information - will remain confidential and secure. If confirmed, do you commit to respecting confidentiality agreements that exist between researchers and their subjects? Will you protect the health information of the thousands of people that have participated in health studies in the past?

If confirmed, it will be my privilege to work with EPA scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to improving public health and our environment. I have no first-hand knowledge of EPA's policies or practice concerning the confidentiality of health information. If confirmed, I would expect to learn more about the existing practice and I commit to follow applicable legal authorities regarding the confidentiality of health information.

27. If confirmed, how will you ensure that EPA maintains independent science, transparent decision-making, and scientific free speech?

If confirmed, it will be my privilege to work with EPA scientists and the thousands of other dedicated public servants at EPA who have chosen to

devote their careers to improving public health and our environment. I also commit, if confirmed, to follow applicable laws and federal guidance on scientific integrity, information quality, and transparency.

28. Mr. Pruitt, when Congress passed our bedrock environmental laws, we directed EPA to periodically review and update the federal minimum health protection standards based on the best available scientific evidence. Do you agree that these federal minimum standards must be based on the best available science?

I agree that EPA regulatory actions must be based on the best available science in accordance with the law. If confirmed, I commit to faithfully execute the law as enacted by Congress.

29. Mr. Pruitt, conflicts of interest threaten the integrity of science and public trust in the agency's scientific determinations. Scientists are not immune from having their work and conclusions influenced by their financial interests. Allowing scientists with conflicts of interest to serve as peer reviewers is contrary to widely accepted scientific integrity practices, including those of the National Academies of Sciences, the National Institutes of Health, and other scientific bodies. Industry funded scientists who may have unique expertise can be invited to present information to peer reviewers or an advisory committee, but should not actually serve as a reviewer or member of the committee. Can you explain what steps you would take as Administrator to ensure that scientists with financial conflicts of interest do not threaten the independent peer review process at EPA?

Independent peer review is critical to ensuring the scientific integrity of EPA actions. If confirmed, it will be my privilege to work with EPA's scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to making a healthier and cleaner environment. I commit, if confirmed, to follow applicable legal authorities regarding conflicts of interests in the scientific peer review process.

30. Mr. Pruitt, do you agree that for scientific research to be credible, it must be subject to objective, independent peer review before it is published and remain subject to scrutiny after it is published?

Independent peer review is critical to ensuring the integrity of scientific research. If confirmed, it will be my privilege to work with EPA's scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to making a healthier and cleaner

environment. I commit, if confirmed, to follow applicable legal authorities regarding the peer review process for scientific research.

31. Mr. Pruitt, do you agree that for scientific research to be credible, scientists must disclose all sources of funding for their research?

Credible scientific research is critical to the EPA's mission and, if confirmed, I commit to follow applicable legal authorities regarding scientific research.

32. In the 1970 and 1990 Clean Air Act Amendments, Congress delayed older coal power plants air control requirements because Congress thought that most of the old plants would be shuttered in the decade after the legislation passed. Congress thought there was no need to invest in new technologies at these old, dying plants. Did many of these coal plants actually retire? Do you know the average age of our coal fleet?

I understand that the U.S. Energy Information Administration's Electric Power Annual 2015 report released in November 2016 indicated that between 2005 and 2015 more than one-third of U.S. coal-fired power plants retired and the remaining fleet has an average age of 38 years.

33. Do you know what the role the price of natural gas plays in industry decisions to retire coal plants and fuel switch to natural gas?

I am aware that market conditions, such as the reduced price of natural gas, and costly environmental regulations have been causing coal-fired power plants to prematurely shut-down or convert to natural gas.

34. In your cases against the EPA's Mercury and Air Toxics Rule, who served as your scientific advisor for the case?

Oklahoma's petition to review the Mercury and Air Toxics Rule was a legal challenge brought on the administrative record and argued that EPA acted contrary to law and arbitrarily and capriciously by not considering the costs of regulation in determining whether it was necessary and appropriate to regulate mercury from fossil fuel power plants within the meaning of Section 112(n). The Supreme Court ultimately agreed with Oklahoma's argument that EPA failed to act in accordance with the rule of law when it ignored costs in its determination and remanded the matter to the D.C. Circuit.

35. Mr. Pruitt, ten percent of American women have dangerous levels of mercury in their bodies. But recent data shows that since the United States started cleaning up emissions from coal power plants, not only has mercury pollution in the North Atlantic fallen dramatically, so has the concentration of mercury in Atlantic fisheries. Mercury in Atlantic bluefin tuna is down 19% in only eight years. Given this resounding confirmation that regulation works, how firmly can you assure us that if you are confirmed, EPA's recent successful crackdown on all sources of mercury emissions, including coal power plants will accelerate, rather than pulling back?

As I stated in my testimony, mercury is listed as a hazardous air pollutant under section 112 of the Clean Air Act and is subject to regulation from listed source categories of hazardous air pollutants. If I am confirmed as Administrator, I will regulate under Section 112 in a manner that is consistent with Congress's intent in enacting that provision. I will also faithfully administer other federal statutes that regulate mercury to the extent that they are under my jurisdiction, including the Mercury Export Ban Act of 2008, the Mercury-Containing and Rechargeable Battery Management Act of 1996, the Clean Water Act, the Emergency Planning and Community Right-to-Know Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act.

36. As you may remember, we had three exchanges over the issue of whether EPA should regulate toxic air emissions, including mercury, from power plants, specifically through the provisions authorized under Section 112 of the Clean Act. We also discussed your lawsuits, one pending, against the recent EPA rule that again addresses regulation of power plant mercury and other toxic air emissions under Section 112. Below is a direct quote from our second exchange, when I asked you directly about regulating power plant toxic air emissions:

"Senator, I actually have not stated that I believe the EPA should not move forward on regulating mercury or adopting rulemaking in that regard. Our challenge was with regard to the process that was used in that case and how it was not complicit with statutes as defined by congress. So there is not a statement or belief that I have that mercury is something that shouldn't be regulated under section 112 as a hazardous air pollution. A HAP."

These statements conflict directly with the language in the brief that you filed on June 2012 in White Stallion Energy, et al. V EPA: which says: "Finally, the record does not support EPA's findings that mercury, non-mercury HAP metals, and acid gas haps pose public health hazards."

These statements also conflict directly with language in the brief in the pending case that you filed April 25, 2016 with Murray Energy Corporation, et al v EPA: "EPA cannot properly conclude that it is "appropriate and necessary to regulate HAPs under Section 112."

These written statements quite clearly directly contradict your statements before our committee. Which statement is false, the verbal before our committee or the legal documents you filed pending in court? If confirmed, will you recuse yourself from any involvement in questions or cases related to regulating air toxic emission from power plants under Section 112(d) of the Clean Air Act?

As I stated in my testimony, mercury is listed as a hazardous air pollutant under Section 112 of the Clean Air Act and is subject to regulation from listed source categories of hazardous air pollutants. Electric utility steam generating units are subject to regulation under Section 112 only upon a lawful showing that their regulation is appropriate and necessary. In Michigan v. EPA, the Supreme Court agreed with Oklahoma's legal position when it concluded that EPA interpreted Section 112(n) unreasonably by failing to consider costs in its appropriate and necessary determination. That challenge was made by Oklahoma on the specific administrative record before the court in that matter and all statements regarding the sufficiency of regulation in that case relate only to the material in the record before the Agency. If I am confirmed as Administrator, I will apply the Clean Air Act faithfully in all matters before me and will follow the advice of the EPA Ethics Counsel in determining any recusals.

37. As you may remember, we had three exchanges over the issue of whether EPA should regulate mercury (and other air toxic) emissions from power plants, specifically through the provisions authorized under Section 112 of the Clean Act. We also discussed your lawsuits, one pending, against the recent EPA rule that implement regulations to regulate power plant mercury emissions under Section 112. As you may remember, I specifically asked you at the end of the hearing:

"Based on your earlier statements, that if confirmed we can have your assurances that the EPA will continue to regulate mercury emissions from power plants under Section 112 of the Clean Air Act and you will not defer to the states."

You answered:

"Mercury under Section 112 is something that EPA should deal with and regulate."

You stated this many times. I was very clear in my questioning that I was asking about mercury emissions and of course, the many other air toxic emissions, which the courts have said must be regulated under Section 112(d) from power plants. However, in this answer, you only mentioned mercury and not power plant mercury emissions, and you completely disregarded the other air toxics that are emitted by power plants, which include acid gases and carcinogenic metals like arsenic, nickel and cadmium. So please clarify, if confirmed, can we have your assurance that the EPA will continue to regulate power plants using the technology based standards required by Section 112(d) of the Clean Air Act and you will not defer to the states. Please answer in regards to all power plant air toxic emissions, not just on the question of mercury itself, and not just with respect to whether mercury should be regulated, but as to whether power plant mercury and other air toxics must be regulated.

As I stated in my testimony, mercury is listed as a hazardous air pollutant under Section 112 of the Clean Air Act and is subject to regulation from listed source categories of hazardous air pollutants. Electric utility steam generating units are subject to regulation under Section 112 only upon a lawful showing that their regulation is appropriate and necessary. In Michigan v. EPA, the Supreme Court agreed with Oklahoma's legal position when it concluded that EPA interpreted Section 112(n) unreasonably by failing to consider costs in its appropriate and necessary determination. The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. As Administrator, I will enforce the Mercury Air Toxics Rule so long as that Rule remains in force.

38. As you may remember, we had three exchanges over the issue of whether EPA should regulate mercury (and other air toxic) emissions from power plants, specifically through the provisions authorized under Section 112 of the Clean Act. We also discussed your lawsuits, one pending, against the recent EPA rule that implement regulations to regulate power plant mercury emissions under Section 112. After our first exchange, you stated:

"There was no argument that we made from a state perspective that mercury is not a hazardous air pollutant under Section 112. Our argument focused upon the cost-benefit analysis that the EPA failed to do and the Michigan v EPA case the Supreme Court actually agreed. It was more about the process again that the EPA was supposed to go through in regulating mercury to provide certainty to

those in the workplace, not a statement in respect whether mercury should be regulated or not under section 112."

Mr. Pruitt, in this exchange, did you mean to avoid the question whether power plant mercury and other HAPs must be regulated under the technology based requirements of maximum achievable control, under Section 112(d)? Or do you agree the Supreme Court, which expressly declined to consider this question, leaving the MATs Rules Section 112(d) regulations in place? Please fully explain your previous statements.

Neither statement is false. As I stated in my testimony, mercury is listed as a hazardous air pollutant under Section 112 of the Clean Air Act and is subject to regulation from listed source categories of hazardous air pollutants, and Oklahoma was not challenging mercury's status as a HAP in the case you reference. Electric utility steam generating units are subject to regulation under Section 112 only upon a lawful showing that their regulation is appropriate and necessary. In Michigan v. EPA, the Supreme Court agreed with Oklahoma's legal position when it concluded that EPA interpreted Section 112(n) unreasonably by failing to consider costs in its appropriate and necessary determination. The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. As Administrator, I will enforce the Mercury Air Toxics Rule so long as that Rule remains in force.

39. As you may remember, we had three exchanges over the issue of whether EPA should regulate mercury (and other air toxic) emissions from power plants, specifically through the provisions authorized under Section 112 of the Clean Act. We also discussed your lawsuits, one pending, against the recent EPA rule that implement regulations to regulate power plant mercury emissions under Section 112. As you may remember, I specifically asked you at the end of the hearing:

"Based on your earlier statements, that if confirmed we can have your assurances that the EPA will continue to regulate mercury emissions from power plants under Section 112 of the Clean Air Act and you will not defer to the states."

You answered:

"Mercury under Section 112 is something that EPA should deal with and regulate."

You stated this many times during our exchanges. I was very clear in my questioning that I was asking about mercury emissions from power plants. And of course as well the many other air toxics emitted by this industry and listed by congress for regulation. However, in this answer, you only mentioned mercury and not power plant mercury emissions, or other air toxics at all. So please clarify,

- Do you agree that the EPA's recent consideration of the costs of the Mercury and Air Toxics Rule that shows that the agency has met the "necessary and appropriate" criteria Congress provided under 112(n) to direct the EPA to regulate power plant mercury (and other air toxic) emissions under Section 112, and more specifically under Section 112(d)? If not, why not?
- If you do not agree that EPA has met the "necessary and appropriate" criteria found in Section 112(n), what is your understanding of what that would mean for the Mercury and Air Toxics Rule?
- If the pending case you brought before the DC Circuit challenging EPA's cost analysis (Murray Energy Corporation, et al v EPA), is successful what is your view of what EPA would have to do to regulate mercury and other hazardous air pollutant power plant emissions under Section 112?

As I stated in my testimony, mercury is listed as a hazardous air pollutant under Section 112 of the Clean Air Act and is subject to regulation from listed source categories of hazardous air pollutants. Electric utility steam generating units are subject to regulation under Section 112 only upon a lawful showing that their regulation is appropriate and necessary. In Michigan v. EPA, the Supreme Court agreed with Oklahoma's legal position when it concluded that EPA interpreted Section 112(n) unreasonably by failing to consider costs in its appropriate and necessary determination. In my capacity as Attorney General of the State of Oklahoma, on remand the petitioner group has argued that EPA's supplemental finding regarding costs is contrary to law and arbitrary and capricious for the reasons stated in that brief. If the D.C. Circuit finds against EPA, I am confirmed as Administrator and the matter comes before me at that time, I will seek and follow the advice of EPA Ethics Counsel in determining whether I may participate in that matter. If I do participate in that matter, I will apply the Clean Air Act faithfully and use my best efforts to take appropriate action in light of the administrative record before the Agency at that time.

40. In the pending case you brought before the DC Circuit challenging EPA's cost analysis (Murray Energy Corporation, et al v EPA), the following statement is included in your brief:

"EPA also claims that, even though it was able to quantify highly uncertain IAQ benefits purportedly resulting from mercury emissions, other health and

environmental benefits of reducing EGU mercury, acid gas, and non-mercury metals emissions simply could not be quantified. But these purported benefits are to speculative to support "appropriate and necessary" finding for the same reasons the Agency cannot quantify them: they are not supported by the scientific literature."

As you probably know, the health benefits of cleaning up hazardous air pollutants are many, although many are difficult to quantify and certainly difficult or impossible to monetize. There are, however, several studies on how to quantify loss of IQ from mercury exposure and some early studies on how to quantify long-term effects of exposure. If confirmed, how do you recommend the EPA calculate the health risks to the unborn that may be exposed to mercury-laden fish because of power plant mercury emissions? How would you quantify the health risks of the Oklahomans living near the forty lakes that have mercury fish consumption advisories? There are also emerging studies quantifying the health impacts of the toxic metals and acid gases emitted by power plants, although monetizing the precise health costs of each pollutant are not possible as they are emitted in the toxic soup. How would you justify not protecting people living near these emissions if it were not possible to precisely quantify the health risks of exposure to power plant emissions of hydrochloric acid, hydrofluoric acid, nickel, arsenic, chromium and other heavy metals?

If I am confirmed as Administrator, I look forward to working with EPA staff to arrive at a transparent and scientifically sound process for determining the health risks associated with any activity that is properly before me at the Agency, including those related to mercury exposure, and regulating those activities as appropriate consistent with Congress's intent in enacting the Clean Air Act.

41. What industry is the largest emitter of mercury air emissions in this country? The second? The third? Please provide peer-reviewed data and sources for this answer.

EPA's technical support document (v2) for the 2011 National Emissions Inventory indicates that the industries that are the three largest point source emitters of mercury in the U.S. are (1) utility coal boilers, (2) electric arc furnaces, and (3) industrial, commercial institutional boilers and process heaters.

42. What impacts do mercury power plant air emissions have on unborn children? Can you explain how power plant mercury emissions settle in water bodies and eventually can impact the unborn?

Some portion of mercury emitted into the air by power plants is deposited directly or indirectly into a watershed. Once present in the watershed, it can be naturally converted into methylmercury, which can then can be absorbed by aquatic organisms, such as fish, and consumed by humans. The unborn children of pregnant women can be exposed to methylmercury if their mothers consume those fish.

43. How much of our nation's mercury air emissions come from the natural environment, vs manmade emissions? Please provide peer-reviewed data and sources for this answer.

J.M.Pacynaetal.:Current and future levels of mercury atmospheric pollution on a global scale, Atmos. Chem. Phys., 16, 12495–12511, 2016, indicates that approximately 30% of worldwide mercury emissions are manmade and 70% come from primary natural mercury emissions and re-emissions.

44. Mr. Pruitt, do you understand that EPA's data show that power plants emit not only 50 percent of all US emissions of mercury, but that they also emit 82% of hydrochloric acid gas, 62% of hydrofluoric acid gas as well as many listed heavy metals, which are emitted as particulate matter, including Selenium (83% of domestic emissions), Nickel (28% of domestic emissions), Arsenic (62% of domestic emissions), Chromium (22% of domestic emissions), and others? The cite for those statistics is found in EPA's record at 76 Fed. Reg. Page 25006 Table 5. Given that Section 112(d) as interpreted by the US Courts for many years requires the regulation of all listed hazardous air pollutants from listed industries, would you not agree that power plant hazardous air pollutants must all be regulated under the technology based requirements of section 112(d)?

The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. If confirmed, I will enforce the Mercury Air Toxics Rule so long as that Rule remains in force.

45. Given that the statute requires a showing that not one power plant emits hazardous air pollutants in amounts greater than required to cause a lifetime risk of cancer greater than one in a million to the most exposed persons, and for non-carcinogenic air toxics, to exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effects, and given that EPA's long standing record shows that the coal- and oil-fired power industry cannot make either of those showings what other regulatory mechanism do you believe is available "under section 112"?

The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. If confirmed, I will enforce Mercury Air Toxics Rule so long as that Rule remains in force. If I am confirmed as Administrator and am presented with information showing that EPA has discretion to regulate power plants in a manner that is consistent with the Clean Air Act but that differs from the Mercury and Air Toxics Standard, or that power plants meet the standard for de-listing under Section 1129c)(9), I would consider that matter in due course as I would consider any other matter under my jurisdiction in due course.

46. The joint brief filed by your state and the regulated industry in the most recent round of appeals of EPA's decision making on power plant air toxics suggests that you are not aware of recent court precedent upholding EPA's evaluation of all the benefits, including so-called 'co-benefits' of EPA's rulemaking on particulate matter reductions that would be the direct result of the rule. What is your position on the importance of judicial precedent in governing the Agency's actions under the same statutes as have been previously interpreted by the courts?

If confirmed, I would faithfully comply the Clean Air Act in accordance with congressional intent. Judicial precedent is undoubtedly an important guide to congressional intent but Congress has also delegated interpretive authority to the Administrator of the Clean Air Act, consistent with judicial review. If I am confirmed as Administrator and form the judgment that a judicial decision is incorrect, I would consider seeking an appeal or petition for certiorari to the Supreme Court seeking reversal of that decision. Likewise, EPA recently promulgated regional consistency regulations that address the implication of adverse federal court decisions that result from challenges to locally or regionally applicable actions and I would exercise my discretion under those regional consistency regulations unless and until they are changed.

47. As I am sure you are aware, the US Supreme Court has expressly declined to consider whether EPA should have chosen some other mechanism "under section 112" in regulating power plant mercury and all the other HAPs emitted by the industry. What is your position on that precedent?

In the White Stallion decision, the D.C. Circuit held that EPA's interpretation of Section 112(n) that Sections 112(c) and -(d) provided the appropriate mechanism for regulating power plants under Section 112 after the appropriate and necessary determination was made was entitled to deference. As your question indicates, the Supreme Court did not grant

discretionary review of that question. So long as the White Stallion decision is not reversed by the D.C. Circuit and the underlying agency action is not vacated, it remains a valid judicial precedent on this point.

48. Given that you have been actively suing the EPA over the Mercury and Air Toxics Rule and have one pending lawsuit, will you recuse yourself from participating in any decision making that may reopen the EPA's decision regarding the fact that it is "necessary and appropriate" to regulate power plants under Section 112 of the Clean Air Act?

As I stated in my testimony to the Committee, I will follow the advice of EPA Ethics Counsel in all recusal matters.

49. If confirmed, will you continue with EPA's assertion that it is "necessary and appropriate" to regulate mercury and other hazardous air pollutants from power plants under Section 112 – specifically under the technology based maximum achievable control requirements of Section 112(d)?

The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. As Administrator, I will enforce all aspects of the Mercury Air Toxics Rule so long as that Rule remains in force.

50. Do you agree with the Whitman v. American Trucking Associations, Inc., 531 U.S. 457 (2001) decision written by Justice Antonin Scalia that states that the EPA cannot consider implementation costs when setting primary and secondary National Ambient Air Quality Standards? If you do not agree, please explain.

As I stated in my testimony to Congress, there are instances where consideration of costs is not a factor. Setting the NAAQS for criteria pollutants is one such instance.

51. In 2015, you stated that in implementing the tighter ozone NAAQS, the EPA "failed to achieve the goals to protect air quality; the agency did not "articulate how the rule would further protect public health"; and was another "attempt by the administration to use executive agencies like the EPA to bypass Congress." Can you please explain what you meant by these statements?

Based on the limited information in the question, the source or context of the quote to which the questions refers is not readily apparent. Oklahoma

joined four other states in a petition for review of EPA's 2015 decision to lower the National Ambient Air Quality Standard for ozone from 75 ppb to 70 ppb. The legal question raised by the state petitioners in the case is whether EPA set the standard at a level than can be achieved by states given the background concentrations and uncontrollable sources of ozone in many parts of the country. The briefs filed by the many State petitioners to that rule fully explain the States' position and speak for themselves. The case remains pending before the U.S. Court of Appeals for the District of Columbia Circuit.

52. As many of my colleagues know, I am an avid runner. I especially love to run with my 22-year son, who is a triathlete. In Delaware during the summer, we often have code orange days warning about the high levels of ozone for that day. Can you take a minute or two to describe how high levels of ozone could damage my lungs if I were to take a long run during a code orange day? Does ozone pollution cross state boundaries? If confirmed, how would you direct states to work together to reduce ozone pollution?

As I indicated at my nomination hearing, the Cross-State Air Pollution Rule is important, as pollution does cross state boundaries. An upwind state that contributes to a downwind state's inability to meet air quality standards should take responsibility.

53. In 2013, you argued that the EPA's decision to impose a Federal Implementation Plan on Oklahoma to address Regional Haze would cost more than $1 billion over five years. It is three years later. Do you still agree with this cost assessment? If not, why not?

The cost estimates referenced in this question were developed in connection with the Oklahoma State Implementation Plan that EPA rejected and EPA's subsequent decision to implement a Federal Implementation Plan. Oklahoma and a state utility filed legal challenges against the Federal Implementation Plan decision. The 10th Circuit initially stayed the rule pending judicial review. A split panel of the 10th Circuit upheld the Federal Implementation Plan in 2013. As Attorney General, I have not had reason to revisit the specific cost estimate at issue in this case.

If I am confirmed as Administrator, I will use my best efforts to hold to the five-year NAAQS review period prescribed by the Clean Air Act.

54.If confirmed, will you continue to hold to the five-year National Ambient Air Quality Standards review time period that the Clean Air Act requires of the EPA?

If I am confirmed as Administrator, I will use my best efforts to hold to the five-year NAAQS review period prescribed by the Clean Air Act.

55. In previous hearings in this committee, we have had a few economists testify questioning EPA's science linking small particle pollution to negative health impacts. Can you just take a moment and talk about what you know about small particles and how they impact our lungs? Is the science robust in this area?

The science linking adverse health impacts and fine particulate matter pollution is well established. Accordingly, EPA has promulgated a National Ambient Air Quality Standard for particulate matter pollution that limits the concentration of small particulates, including those smaller than 2.5 microns, in the ambient air that at the level that the agency has determined is requisite to protect public health and welfare from adverse effects, while allowing an adequate margin of safety.

56. Mr. Pruitt, Section 109 of the Clean Air Act is very clear. It requires EPA to review the NAAQS for six common air pollutants including ground-level ozone, particulate matter, sulfur dioxide, nitrogen dioxide every 5 years. The Clean Air Act requires EPA to set these standards that "are requisite to protect the public health," with "an adequate margin of safety," and secondary standard necessary to protect public welfare. The science was clear that the 2008 ozone standard was not protecting public health, so EPA was required to Act. Is that not your understanding of the Clean Air Act?

Section 109 of the Clean Air Act requires EPA to set NAAQS at the level that is requisite to protect against adverse health and welfare effects, while allowing an adequate margin of safety. The Act includes a regular review cycle for criteria pollutants.

57. The EPA updated the Cross-State Air Pollution Rule in September 2016, which is within the time period for the rule to be subject to the Congressional Review Act (CRA). As Administrator, would you support the President signing a CRA resolution of disapproval that would reject these new standards?

Although I am familiar with the update to the Cross-State Air Pollution Rule and generally familiar with the Congressional Review Act, I have not

reviewed any potential legislation which may reject these new standards. If I am confirmed, I will thoroughly review any resolution of disapproval which may be filed pursuant to the Congressional Review Act on this issue.

58. Mr. Pruitt, the Clean Air Act recognizes that air pollution does not respect state boundaries and directs EPA to set minimum national standards to protect the health of the nation, including protecting downwind states.

•Do you agree that EPA should set minimum national standards?

•Do you agree that EPA must protect downwind states?

As I indicated during my nomination hearing, I believe the Cross State Air Pollution Rule is important and should be enforced by the EPA. An upwind state that contributes to a downwind state's nonattainment should take responsibility for that contribution.

59. Mr. Pruitt, my State of Delaware is a downwind state, and most of the air pollution in my state is coming from upwind states.

•Do you agree that it is EPA's role to ensure equity between where air pollution is produced and where it is received?

•Do you agree that to remedy this unfairness, the upwind states must do more to control their emissions to avoid exporting the pollution (and the costs to the health and welfare) to the downwind states?

As I indicated during my nomination hearing, I believe the Cross State Air Pollution Rule is important and should be enforced by the EPA. An upwind state that contributes to a downwind state's nonattainment should take responsibility for that contribution.

60. As you are well aware, on April 2, 2007, in Massachusetts v. EPA, 549 U.S. 497 (2007), the Supreme Court determined that sufficient information existed then for EPA to make an endangerment finding with respect to the combined emissions of six greenhouse gases from new motor vehicles and new motor vehicle engines under CAA section 202(a). On December 7, 2009, the Administrator determined that those gases/sources contribute to greenhouse gas pollution that endangers public health and welfare. How do you plan to execute your legal authority to protect the public health and welfare from greenhouse gas pollution?

The Supreme Court held that GHGs are an air pollutant under the Clean Air Act. It did not address the question of whether regulation of GHGs under the Clean Air Act is warranted. In the subsequent UARG decision, the

Supreme Court cautioned EPA that there are significant limits on EPA's authority to regulate GHGs under the Clean Air Act. The unprecedented Supreme Court stay of EPA's so-called "Clean Power Plan" was predicated upon a finding that the plaintiffs in the case were likely to prevail on the merits. In light of these holdings, I will hew closely to the text and intent of the Clean Air Act when considering further regulation of GHGs under that law if confirmed as Administrator.

61. Building off Congress's work on CAFE, the Obama Administration has updated emission standards for light and heavy-duty vehicles. These rules have had very little effect on the purchase price of new vehicles, but have saved consumers millions of dollars in fuel costs, vastly improved our energy security by slowing petroleum use and reduced a lot of pollution. If confirmed, do you support further strengthening vehicle emission standards? And with your federalism view, how do states address carbon pollution from vehicles themselves?

In making each of its decisions regarding light- and heavy-duty vehicle emission standards, the EPA has made decisions based on the administrative record at hand and Congress's statutory objectives. If confirmed, I would take care to make such decisions regarding vehicle emissions standards in furtherance of Congress's statutory objectives, based on the evidence in the administrative record. With respect to federalism, the Supreme Court stressed in Massachusetts v. EPA that States play a crucially important role in promulgating vehicle emission standards under the Clean Air Act: each "State has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain." To that end, "Congress has ordered EPA to protect [the States and their people] by prescribing standards applicable to the 'emission of any air pollutant from any class or classes of new motor vehicle engines, which in [the Administrator's] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'" Furthermore, the Clean Air Act and other federal administrative laws give each affected State "a concomitant procedural right to challenge the rejection of its rulemaking petition as arbitrary and capricious," and the Supreme Court affords States "special solicitude" to challenge the resulting standards in court. If confirmed, I would take care to ensure that States continue to play a central role in the administrative process giving rise to the EPA's vehicle emissions standards.

62. The EPA promulgated phase two of the heavy-duty vehicles greenhouse gas emissions standards in August 2016, which is within the time period for the rule to be subject to the Congressional Review Act (CRA). As Administrator, would you support the President signing into law a CRA resolution of disapproval that would

reject these new standards? What is your view of whether the EPA would be able to re-issue any heavy-duty vehicle greenhouse gas emission standards given the CRA's language that would prohibit the agency from issuing regulations that are "substantially similar?"

Although I am familiar with the regulations on heavy vehicle greenhouse gas emissions standards which were published in August 2016, I have not reviewed any potential legislation which may reject these standards. If I am confirmed, I will thoroughly review any resolution of disapproval which may be filed pursuant to the Congressional Review Act on this issue. In terms of re-issuing other heavyduty vehicle greenhouse gas emission standards, I would have to be briefed in detail on the regulations which have been published, and the provisions of the Congressional Review Act which prohibit the Agency from issuing any regulations which are substantially similar to the initial rules in order to determine what options the Agency may have in terms of proposing and finalizing additional regulations in this space.

63. As you know, the Renewable Fuels Standard, as amended by Congress in 2007, requires the blending of 36 billion gallons of renewable fuel into conventional gasoline and diesel by 2022. In order to add that many renewable fuel gallons to our fuel supply, do you agree that EPA must approve the sale of fuels blended with greater than 10-percent renewable content?

While Congress included "applicable volume" levels in the RFS statute, Congress also took care to expressly authorize the EPA Administrator to reduce volumetric requirements below the statute's default levels in light of real-world conditions from year to year. Specifically, the Administrator may waive the statute's volume requirements if he determines "that implementation of the requirement would severely harm the economy or environment of a State, a region, or the United States, or "that there is an inadequate domestic supply." The EPA already has granted such waivers based on real-world conditions in recent years and, if confirmed, I would take care to administer the statute in accordance with the statutory objectives. While no statute mandates the sale of fuels blended with greater than 10 percent renewable content, statutes do vest the Administrator with discretion to authorize a variety of fuel blends.

64. In October 2010, EPA approved the use of a 15-percent renewable fuel blend for cars built in 2007 or later. In the following January, EPA extended the use of that blend to model years 2001 to 2006. Do you support the decision by the EPA to allow 15-percent renewable fuel blends? If confirmed, would you commit to

using the discretion give to you by the Clean Air Act to evaluate even higher blends?

The EPA's 2010 and 2011 decisions to grant "partial waivers" for the use of E15 fuel for some vehicles were premised upon the EPA's conclusions (based on the administrative record) regarding E15's potential impacts on exhaust emissions (both immediate and long-term), evaporative emissions, "materials compatibility," and "drivability and operability." If confirmed, I would take care to administer the law in accordance with Congress's statutory objectives and the administrative record.

65. The Renewable Fuels Standard was designed to reduce dependence on foreign oil at a time that the U.S. was importing well more than half of its demand and concerns about energy and national security were paramount. It also was designed to reduce greenhouse gas emissions from the transportation sector.

Now that the United States supplies 76 percent of its oil domestically, do you believe the program continues to have an important role in enhancing the energy and environmental security of our country?

As Congress indicated in the Energy Independence and Security Act of 2007, domestic production of renewable fuel contributes to our nation's "greater energy independence and security."

67. As you heard in my opening statement, the EPA's record demonstrates that strong environmental policies create economic opportunities. An undeniable example of this is the impact of the Renewable Fuels Standard in rural America. According to the Renewable Fuels Association, in 2015, 14.8 billion gallons of ethanol was produced, supporting 85,967 direct jobs, while net petroleum import dependence fell to just 24 percent, and would have been 32 percent without the addition of domestically produced ethanol. In addition, the Association says the use of ethanol in gasoline in 2015 reduced greenhouse gas emissions from transportation by 41.2 million metric tons — equivalent to removing 8.7 million cars from the road for an entire year. Do you agree that the Renewable Fuels Standard has supported rural economies in America while allowing for the production of cleaner transportation fuels?

I agree that the RFS's promotion of renewable fuels contributes to economic growth in agricultural communities, and promotes the production and consumption of transportation fuels providing many environmental benefits.

68. Some of my colleagues believe removing the corn ethanol mandate, but keeping the advanced biofuel mandate in the RFS is the best way forward. Do you have concerns with this approach?

The RFS statute neither expressly mandates the blending of corn ethanol nor prohibits its blending. In enacting the RFS statute, Congress took care to expressly authorize the EPA Administrator to reduce the volumetric requirements below the statute's default levels, in light of real-world conditions. Specifically, Congress authorized the Administrator to waive the volume requirements if he or she determines "that implementation of the requirement would severely harm the economy or environment of a State, a region, or the United States, or "that there is an inadequate domestic supply." The EPA already has granted such waivers based on real-world conditions in recent years and, if I am confirmed, I would take care to administer the statute in accordance with the statutory objectives.

69. As you may know, in recent years we have seen significant swings in Renewable Identification Number (RINs) prices. RINs are used by the EPA to track and ensure refineries are in compliance with the Renewable Fuel Standard. Many small and mid-range refineries are having difficulties with the price spikes of the RIN prices because many are buying some, if not all, their RINs off the market. As a result, high and volatile RIN prices have had a financial impact on these refineries. As the RFS continues to be implemented, what do you believe the agency should do – if anything - to assist with RIN prices?

As I indicated in my testimony, the EPA's RIN framework is currently the subject of a pending comment period. If confirmed as Administrator, I would take care to administer the RFS program, including the RIN framework, in accordance with Congress's statutory objectives, and based on the evidence in the EPA's administrative record, as well as the expertise of EPA staff and the expertise of other federal agencies relevant to the RIN framework and affected markets. The EPA already has entered into a "memorandum of understanding" with the CFTC, "on the sharing of information available to EPA related to the functioning of renewable fuel and related markets."

70. Mr. Pruitt, do you agree that the burden should be on a chemical facility operator to show that the design and operation of the facility is as safe as possible to protect workers and the public from explosions, fires, and other releases of toxic chemicals?

I believe that every American should be provided safe home and work environments and people who live or work in and around chemical facilities are no exception to that.

71. Mr. Pruitt, when there are feasible measures that chemical companies can take to prevent explosions and fires that release toxic chemicals into surrounding communities that can kill people, do you agree that the companies should take such measures?

I believe that chemical companies should take actions to prevent explosions and fires as well as other safety incidents.

72. Do you support the "not net loss of wetlands" policy? George H.W. Bush initiated this critical policy in 1988 to protect our remaining wetlands habitat and all of the critical ecological and economic functions it supports. It has been U.S. Government policy ever since.

Yes.

73. A GAO report published on December 5, 2013 found that "more than 40 years after Congress passed the Clean Water Act [...] EPA reported that many of the nation's waters are still impaired, and the goals of the act are not being met. Without changes to the act's approach to nonpoint source pollution, the act's goals are likely to remain unfulfilled." If confirmed, how will you work to address surface water quality impairments, including from non-point source pollutants?

Congress did not grant EPA authority to regulate non-point sources because regulation of non-point sources is the regulation of land, a traditional state authority. Instead, Congress created a planning process under section 208 of the Clean Water Act and authorized funding for state non-point source management plans under section 319. If confirmed, I will implement the authorities granted to EPA by Congress.

74. You have attacked the Obama Administration's "Waters of the United States" regulation, objecting to "the significant negative impact such a rule would inflict on states and the landowners within their borders." Oklahoma's major streams and rivers lie within two river basins, the Red and the Arkansas, both of which flow into other states. And Oklahoma receives most of its waters from upstream neighbors, particularly Texas. Without national regulation, how would you suggest that that Oklahoma's downstream neighbors - Arkansas and Louisiana -

guarantee the quality of the water that flows across their boundaries? And how would you suggest that Oklahoma protects the quality of the water that it receives from upstream neighbors like Texas? You appear to believe that the only parties with an interest in water are those within a state, not downstream neighbors. Why?

Federal jurisdiction exists over navigable water, interstate water, and tributaries that can transport pollutants to navigable waters, and jurisdiction over the interstate rivers that are the subject of your question is not in dispute.

75. Communities across the country are facing the economic and health consequences of contaminated ground water, which impacts water systems and private well owners. How will you work to ensure communities are protected from drinking contaminated ground water? How will you address and strengthen the EPA's response to groundwater contamination and ensure homeowners and water systems are taking the steps to diagnose, treat, and remediate their groundwater resources?

For drinking water wells that are public water systems, the requirements of the Safe Drinking Water Act apply and EPA has authorities to provide small systems with technical assistance through circuit rider programs. For private well owners, the WIIN Act provided authority for EPA to support a drinking water technology clearinghouse for well owners. If confirmed, I will use the authorities and resources granted by Congress to help both public water systems and well owners.

76. This question is of interest to Senator Manchin and me: We must do everything we can to ensure that every American has access to safe and clean water. West Virginia has had issues with chemicals like PFOA in our drinking water as recently as last year. In fact, the State had to ship in alternative water supplies to the city of Vienna. Martinsburg and Parkersburg also had serious challenges. And, in 2014, the Elk River Chemical Spill left 300,000 West Virginians without access to potable water, so I know Senator Manchin looks forward to working with you to promote federal clean water initiatives. He also appreciates your commitment in your meeting together to working to address these challenges. Please outline how you intend to expand efforts to promote safe drinking water and support the modernization of our nation's water infrastructure.

If confirmed, I will focus on EPA's core missions, including, as appropriate, use of EPA's emergency order authority under the Safe Drinking Water Act.

I also will implement the newly revised TSCA statute to address chemicals and will continue implementation of monitoring, review, and regulation of contaminants under the SDWA if confirmed.

77. One of the tools within the Clean Water Act that communities can use to restore the quality of polluted waters is through the development and implementation of a Total Maximum Daily Load (TMDL) plan. The GAO also found that funding for TMDLs has been insufficient in meeting national needs, with more than 50% of the nation's waters being identified as impaired. Will you advocate for funding to match the needs for the TMDL program? How do you plan to support and strengthen the Total Maximum Daily Load (TMDL) regulatory framework?

If confirmed, I will support continued funding of State programs authorized under section 106 of the Clean Water Act, which states use in part for TMDL development. I also will support flexibility for state use of 106 funds to allow states to focus on priorities such as impaired waters requiring TMDLs. If confirmed, I also will support the continued development of tools to help states develop TMDLs. Finally, I would note that neither GAO nor EPA has said that 50% of the nation's waters are identified as impaired. For example, states have assessed about 32% of rivers and streams. Of those assessed waters, states have identified about 54% as impaired. That means states have data showing that 17% of rivers and streams are impaired. You cannot extrapolate the data from assessed waters to all waters because most states target their monitoring to focus on waters they have reason to believe are impaired, so they can target their resources where they are needed the most.

78. You expressed great pride in your role in resolving the Mahard Egg Farm enforcement, indicating that it demonstrates your commitment to enforce environmental law. When was the complaint in the litigation filed, and how did that date correspond to the date of the proposed consent decree? Based on your responses to these questions, how well investigated and developed was this case when you took office? Can you explain your personal involvement in either the complaint or the consent decree?

The complaint was filed on May 23, 2011. The consent decree was entered into on August 10, 2011. There was no filed case when I took office, but the matter had been investigated by the Office of Attorney General, the Oklahoma Department of Agriculture, the EPA, and the State of Texas. I authorized the filing of the case once in office. The complaint and consent decree were handled by the attorneys in the Office of Attorney General responsible for environmental matters.

79. Mr. Pruitt, the Clean Water Act requires EPA to review and revise its national water quality standards for pollutants based on the best available science. EPA has proposed or finalized more stringent standards for ammonia, nutrients, selenium, and dental offices. Do you agree that these standards must be based on the best available science?

Under section 303(c)(1) of the Clean Water Act, states are required to, every three years "hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards." Proposed changes to state water quality standards are submitted to EPA. Under 303(c)(3), EPA is to approve the state standards if they meet the requirements of the Clean Water Act. Under section 304, EPA establishes water quality criteria that provide guidance for state water quality standards. The Clean Water Act directs EPA to review these criteria documents "from time to time" except for criteria to protect public health from pathogens in recreational coastal waters, which must be reviewed every 5 years. Unlike the Safe Drinking Water Act, the Clean Water Act does not require the use of best available science. That said, I believe it is always important to use best available science, particularly for science documents like water quality criteria documents.

80. Last Congress, our committee worked together to pass the Frank R. Lautenberg Chemical Safety for the 21st Century Act, a bill overhauling the toothless Toxic Substances Control Act, that was signed into law earlier this year. EPA is now responsible for implementing the law, which will require a significant amount of resources. If confirmed, do you commit to ensuring EPA will prioritize implementation and has sufficient resources to comply with the requirements and timelines established by Congress?

As you are likely aware, I wrote this body a letter urging passage of the Lautenberg Chemical Safety Act. If confirmed as EPA Administrator, I will take care that the Act is faithfully executed. A copy of that letter is attached.

81. Last year, the Toxic Substances Control Act was signed into law. There was little doubt that this bipartisan legislation was overdue and very necessary to protect our constituents. EPA has already announced they are fast-tracking five chemicals under the authority of the new TSCA regime. You mentioned during our meeting earlier this month that you were concerned with some of the more aggressive timelines included in this legislation. Please elaborate. Please also outline how you intend to support the Agency in ensuring they have the resources to comprehensively implement this landmark legislation.

The Lautenberg Act has a number of statutory deadlines that must be met by the Agency when carrying out the law. If confirmed I fully intend to pick up the process where the previous administration left off with completing the required rulemakings and initial chemical reviews as well as subsequent prioritizations. The updated law also allowed for updating the industry user fees used to fund the program, a process started by the previous administration, and one which I intend to quickly evaluate.

82. You have publicly supported the recent updates to the TSCA law. Since this legislation pre-empts state actions, how does that align with your views on states rights and federalism? Do you agree that federal environmental laws – such as the Mercury and Air Toxics Rule, TSCA and Clean Power Plan – also provide certainty to businesses that have to do business across the country?

Article 1, Section 8, Clause 3 of the U.S. Constitution, which gives Congress the power "to regulate commerce with foreign nations, and among the several states, and with the Indian tribes." Unlike the Clean Water and Clean Air Acts which regulate pollutants TSCA regulates chemical substances manufactured for commerce in not only all 50 states but often globally. Federal preemption of states is appropriate when dealing with interstate commerce issues and the Lautenberg Act's preemption provisions comport to my views on states' rights and federalism for those reasons.

83. Do you think that companies that work in the U.S. and around the world should be able to hide chemical information here that they have given to governmental regulators elsewhere?

The Lautenberg Act amended Section 14 of TSCA to delineate a process by which to protect, review, and possibly make public chemical information. If confirmed I intend to implement the law as passed by Congress.

84. In a 2005 U.S. Senate Committee on Homeland Security and Governmental Affairs hearing, President-elect Trump publicly praised asbestos, calling it "the greatest fireproofing material ever made." Every major independent scientific organization, including the World Health Organization, the International Agency on Research for Cancer (IARC), and others, acknowledges asbestos as a known human carcinogen with no safe level of exposure. The US EPA spent years studying the dangers of asbestos, and ultimately attempted to ban most uses. Just last month, the EPA redoubled its stance on the dangerous nature of asbestos by designating it as a top-ten high-risk chemical for priority TSCA action. If confirmed, will you heed the decades of conclusive science about asbestos or

will you allow the President-elect's personal opinion skew the EPA's actions on asbestos?

The Lautenberg Act has extensive requirements for risk evaluations and the use of sound science in decisions throughout the chemical review and potential regulatory process. If confirmed I will implement the law following those statutory requirements.

85. You may be aware that asbestos use has drastically declined among industries that once used it heavily, including the construction and automotive sectors, as those industries began switching to safer substitutes. As a result, one industry now accounts for 90% of all asbestos consumed in the U.S. — the chlor-alkali industry, which uses asbestos diaphragms in its chlorine manufacturing process. The chlor-alkali industry has been the only point of public pushback against an asbestos ban under TSCA, and they have asked the EPA to exempt the chlor-alkali industry's use from any regulation on asbestos. Exempting the primary user from a restriction or ban, of course, would result in negligible impact. Will you commit to ensuring that any regulation or restriction on asbestos does not allow for any exemptions for the chlor-alkali industry or any other industry?

Asbestos has been identified by the EPA as a high-priority chemical that requires a risk evaluation following the process established by the Lautenberg Act to determine whether conditions of use of the chemical substance pose an unreasonable risk. Prejudging the outcome of that risk evaluation process would not be appropriate.

86. The EPA promulgated a ban on asbestos in 1989, after a decade of research, risk evaluation, and rulemaking. In 1991, the asbestos ban was overturned by the 5th Circuit Court of Appeals on the grounds that the ban fell short of EPA's requirement to impose regulations that are "least burdensome" to industry. Under the Lautenberg Act reforms to TSCA, the EPA is now empowered to ban and regulate chemicals that are "toxic, persistent, and bioaccumulative," like asbestos, without concern for industry cost or any other non-risk factor. Will you commit to ensuring that industry concerns are not considered during the risk evaluation and rule making processes regarding asbestos?

The Lautenberg Act requires notice and comment be provided at multiple stages of the chemical review process including prior to publishing a final risk evaluation and through any potential subsequent regulatory rulemaking. This notice and comment is designed to get the input of a wide range of stakeholders to ensure sound and inclusive rulemakings and not to produce or dismiss comments from one particular entity or interest.

87. On April 9, 2015, you wrote a letter in support of the Lautenberg Act reforms to TSCA. In this letter, you expressed your support for the EPA: "I believe the agency, within the boundaries of its authorities as provided by Congress, serves a valuable mission to protect human health and preserve the environment." During the writing, negotiations, and passage of the Lautenberg Act, Congress — and the sitting President — made explicitly clear their intentions that the newly empowered EPA should swiftly ban asbestos and other deadly toxins. How will you ensure the EPA is able to meet statutory TSCA deadlines set forth by Congress?

I am committed to implementing the Lautenberg Act as required by law including meeting the statutory deadlines enumerated in the law including the required rulemakings, risk evaluations, and future chemical prioritizations.

88. In your April 9, 2015 letter in support of the Lautenberg Act reforms, you specifically praised the bill's explicit protection of vulnerable populations, including workers. Asbestos is one of the leading workplace carcinogens, responsible for approximately half of all occupational cancer deaths, according to the World Health Organization (WHO). During 1999 - 2014, the CDC NIOSH National Occupational Respiratory Mortality System (NORMS) database, there were 62,956 Americans who died from mesothelioma and asbestosis. These are just two of many deadly asbestos-related diseases. Given this data and your self-expressed concern for protecting workers, will you commit now to ensuring the EPA bans the import and use of asbestos under TSCA should you be confirmed?

Asbestos has been identified by the EPA as a high-priority chemical that requires a risk evaluation following the process established by the Lautenberg Act to determine whether conditions of use of the chemical substance pose an unreasonable risk. Prejudging the outcome of that risk evaluation process would not be appropriate.

89. Your home state of Oklahoma leads the nation in pesticide-related illnesses and deaths. At a time when pesticide/herbicide usage is on the rise across the country, how would you protect American workers, consumers, and landscapes from the toxic effects of agricultural chemicals?

If confirmed as Administrator, I would faithfully execute the laws administered by EPA. I would expect to be briefed by staff before taking any action on this issue.

90. What will you do to ensure EPA is conducting a transparent process regarding pesticide regulation? Please specify how you will approach notifying the public regarding pesticides in terms of notice of actions, publication of information (including studies and data) in the dockets, or timely responses to requests under the Freedom of Information Act. If you do not believe in a transparent process, why not?

If confirmed, transparency and openness will be priorities, and I will work to ensure that the pesticide registration process complies with all public notice and transparency requirements under the law.

91. In June 2016 the White House Pollinator Health Task Force, which was co-chaired by the EPA, released the Pollinator Partnership Action Plan. Do you support this plan and EPA's role in it? If not, why not? Mr. Pruitt, do you agree that vulnerable populations, like pregnant women, infants, and children, must be specifically considered in the study of the impacts of toxic chemicals on human health? Why is this important?

I am not personally familiar with the report referenced in this question. In considering the health effects of chemicals, if confirmed as Administrator, I would expect to be briefed by EPA staff before taking action and would work to ensure EPA followed all applicable legal requirements and made its decisions based on sound science. If confirmed, I would also follow legal requirements regarding the use of science and consideration of health impacts on specific subpopulations.

92. For nearly a decade, a state-permitted coal ash disposal pit in Bokoshe, OK, operated by a company named "Making Money Having Fun," has caused severe air pollution through releases of fugitive dust, which have harmed residents of the town of Bokoshe. Encompassing 458 acres, the Making Money Having Fun pit covers 259 acres of a former coal mine with enough coal ash to fill the 70-foot-deep pit and create a miniature mountain stacked 50 feet high. The site is permitted to rise another 550 feet over the next 20 years. By 2036, the coal ash pit could hold 9.2 million tons of toxic waste. Since 1998, residents have complained about the toxic dust to state regulators. Residents of Bokoshe, particularly children, have experienced extremely high rates of asthma that are linked to high levels of fugitive dust. In addition, residents experience elevated cancer rates that may be linked to the dump site. In 2011, the CBS Nightly News covered the exposure of the community to toxic dust. See http://abcnews.go.com/US/oklahoma-town-fears-cancer-asthma-linked-dump-site/story?id=13303440. In 2014, the U.S. Environmental Protection Agency acknowledged that there was a problem with fugitive dust at the site. Ash samples

collected in Bokoshe contained elevated levels of the carcinogens hexavalent chromium and arsenic, among other toxic metals. The Making Money Having Fun pit is not the only unlined coal ash dump in a former mine in Oklahoma. Seven miles west of Bokoshe, in McCurtain, OK, coal ash protrudes like an iceberg from a water-soaked pit. McCurtain residents have complained about dust clouds, spurring two state notices alleging violations — one in 2011 and another in 2015. State records show seven similar coal ash dump sites permitted in the county where Bokoshe is located.

•Did the Oklahoma AG Office ever investigate the Making Money Having Fun pit for environmental violations?

•Did your office take any actions to require Making Money Having Fun to control fugitive emissions at the site?

•As Oklahoma AG, what did your office do to investigate coal ash dumps in Oklahoma for violation of environmental or health standards?

The matter you reference was handled by Oklahoma's environmental regulators at the Department of Environmental Quality.

93. Mr. Pruitt, do you believe that all citizens in the U.S. should be equally protected from the threats posed by the dumping of coal ash? Currently, communities near municipal solid waste landfills and abandoned mines where millions of tons of toxic coal ash are disposed are not protected by the new federal coal ash rule. Do you think these communities deserve equal protection from pollution of their air, water and communities from coal ash?

I do not question the importance of clean air, land, and water, and I believe all Americans should be treated equally under the law.

94. Mr. Pruitt, do you think it is important for communities to know what hazardous substances are stored and disposed in their neighborhoods? Do you think it is important for citizens to know what hazardous substances are in their drinking water? If so, as head of EPA, will you guarantee that all coal ash permit programs approved by EPA will be as protective as the federal coal ash rule, including requiring communities be kept informed regarding the condition of toxic dumpsites near their homes and the safety of their drinking water?

As discussed in my testimony, public participation and transparency will be among my priorities if confirmed as Administrator. I do not question the importance of clean drinking water. It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is

fully and fairly considered with input from staff, as part of a transparent process that seeks input from stakeholders, and that is consistent with EPA's statutory authorities, including the coal ash provision in the WIIN Act.

95. Mr. Pruitt, environmental justice organizations have noted that 70 percent of coal ash dumps are located in low-income, disadvantaged communities. Do you agree that these communities deserve to know if coal ash ponds are leaking toxic substances into their drinking water supplies? Do you agree that these citizens have a right to expect that their drinking water be free of pollution from coal ash impoundments?

I am not familiar with the reports referenced in the question. As my testimony indicates, if confirmed as Administrator, I will prioritize public participation and transparency. I believe all Americans should be treated equally under the law.

96. In recent years, spills, leaks and collapses of coal ash impoundments have become a greater and greater hazard to clean water. In fact, more than half of the total toxic water pollution found in America's rivers, lakes and streams comes from such impoundments. Do you believe that coal ash from power plants and other coal-burning facilities should be regulated as a hazardous pollutant, given that its chemical composition includes lead, mercury, cadmium and arsenic? What would you do as Administrator to ensure that the kinds of ash spills recently devastating Kingston, Tennessee and Dan River, North Carolina, never again occur, anywhere?

I am generally aware that EPA has recently determined that coal ash from power plants should be regulated as a non-hazardous waste under Subtitle D of the Resource Conservation and Recovery Act and supports that decision. I understand provisions of the WIIN Act recently passed by Congress and signed into law provides EPA and states additional authority concerning the regulation of coal ash through permit programs. If confirmed, I will work to ensure this new authority is implemented.

97. Mr. Pruitt, a growing body of scientific evidence has shown that people living near mountaintop removal coal mines face a number of increased health risks, including greater risk of cancer, birth defects, and premature death. If you are confirmed as EPA Administrator, how would your agency consider these health concerns?

If confirmed, I would consider human health in accordance with EPA's legal authorities.

98. Mr. Pruitt, do you believe that the people who live downstream from surface coal mining operations deserve to have their sources of drinking protected from contamination from toxic chemicals such as arsenic, selenium and lead?

I strongly believe in the importance of safe drinking water, and if confirmed as Administrator, will work to implement EPA's statutory authorities in this regard.

99. Mr. Pruitt, the Manhattan Project and the Cold War triggered a boom in uranium mining in the United States. Uranium mining was carried out under the 1872 Mining Law, which did not require mining companies to clean up the mines. Abandoned uranium and other hardrock mines litter the West. These abandoned mines leach toxic chemicals, including uranium, radium, radon, and arsenic into surface and ground waters that are sources of drinking water.

•Do you agree that there is insufficient funding to address the huge problem of abandoned uranium and other hardrock mines?

•Do you agree that the 1872 Mining Law must be reformed to provide funding for the cleanup of abandoned mines?

I have not studied the issue of whether the 1872 Mining Law should be reformed or whether there is sufficient funding to address the cleanup of abandoned mines. I am generally aware of questions about whether current environmental laws inhibit the cleanup of abandoned mines by Good Samaritans, but I would expect to be briefed by staff before considering any actions on this topic.

100. The EPA is responsible for overseeing the cleanup of some of our nation's most contaminated lands. One such site is the West Lake Landfill, a Superfund site located in Bridgeton, Missouri. This site has been contaminated since 1973 when soils were mixed with residues from the Manhattan Project and used as daily cover in the landfilling operation. Local residents are rightfully concerned and frustrated by delays at the EPA in determining a proper course of action for handling this radioactive waste. In the 114th Congress the Senate unanimously passed legislation that would transfer the remediation authority for West Lake to the Army Corps of Engineers' Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP is already successfully overseeing the cleanup of nuclear contamination at other sites in the St. Louis area. However, as of this moment, the authority over the West Lake site remains with the EPA. Please explain your

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views on the EPA's authority and responsibility with regard to the cleanup of Superfund sites.

•If you are confirmed as the next EPA Administrator, would you support transferring the cleanup of sites like the West Lake Landfill to FUSRAP? Why or why not?

•If you support cleanup authority remaining with the EPA, what concrete steps would you pursue as Administrator to ensure that the agency is progressing toward a real solution at the site that protects both the environment and the health of area residents?

I am not familiar with this particular issue or the legislation that is referenced in the question, but I appreciate the interests that residents have in the efficient operation of the Superfund program and the clean up of contaminated sites in their community. It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is fully and fairly considered, as part of a transparent process that seeks input from all stakeholders.

101. Do you believe that if safer technologies or chemicals are available for a facility to use, that could prevent a serious chemical disaster, that the facility should be required to implement them to save lives, prevent injuries of workers, first-responders, and community members, and prevent serious economic damages from a disaster?

I believe workplace safety is very important and any potential regulatory decisions should be carefully examined through a open and transparent process to ensure facilities are not shifting to new chemicals or technologies that improve safety in one area but shift risks to create new and potentially more serious concerns.

102. Do you believe that federal agencies like the EPA have an obligation to consult Native American tribes when actions by the agencies could impact tribal sovereignty or the tribal trust relationship?

Yes, I believe that consultation is a sound practice that should occur whenever possible.

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103. Indigenous communities are consistently targeted for energy extraction, nuclear waste, uranium mining and/or oil and natural gas pipelines. How will you address this moving forward?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress imposing obligations on me in this regard. Whenever possible, I will consult with Indian Tribes prior to taking actions that may affect their sovereign interests.

104. As Administrator, what steps will you take to ensure that EPA and other federal agencies are complying with Executive Order 12989 on Environmental Justice?

I am not familiar with what steps EPA has or has not taken undertaken to implement this Executive Order. If confirmed, I will work to ensure that EPA complies with all applicable Executive Orders.

105. In January 2015, EPA issued its final rule under the Resource Conservation and Recovery Act defining what is a solid waste for purposes of ensuring that the recycling of hazardous materials does not increase the risk of harm to people or the environment, known as the "Definition of Solid Waste" or "DSW" rule. As an integral part of the rulemaking on the DSW rule, EPA conducted an environmental justice analysis of the rule's protectiveness for minority and low-income populations. EPA published its detailed environmental justice analysis report on the DSW Rule with the final rule. Will you ensure that EPA conduct detailed environmental justice analysis on all significant rules that may have adverse impacts on minority and low-income populations and publish such reports along with the final rules?

I am not familiar with the environmental justice analysis referenced in this question. If confirmed, I will work to ensure EPA conducts the required analysis to support its regulatory actions in accordance with applicable statutory requirements and Executive Orders.

106. There are currently some forty pending civil enforcement actions in which EPA is discussing possible settlement terms or pursuit of litigation. In the past during a transition in power such pending actions have proceeded unimpeded. Will you follow this precedent and let them progress at their own pace or will you intervene? And, if you do opt to intervene on a case-by-case basis, what criteria will you use to determine which enforcement cases go forward and which do not?

I am unfamiliar with the specific details of the actions referenced in the question. I would expect to be briefed by staff, in consultation with the Department of Justice as appropriate, before taking any action.

107. Please provide a list of all financial contributors to your attorney general and state senate campaigns, including their total donations and affiliations.

A full list of contributors to my campaigns for the state senate and attorney general may be found at the Oklahoma Ethics Commission's websites. For state campaign committees from 2002-2014, please use this site: https://www.ok.gov/ethics/public/candidate.php. For 2015 to the present, the Commission uses this site: http://guardian.ok.gov/PublicSite/SearchPages/Search.aspx?SearchTypeCodeHook=1F26BA5E-71EA-48E4-8D50-C1013E9FE0A7. Attached is a letter from the Oklahoma Ethics Commission regarding materials prior to 2002.

108. Why did you initially refuse a formal, independent audit of your office's finances from the Oklahoma State Auditor and Inspector as mandated by Oklahoma law? Please provide a copy of the findings of the 2016 audit.

I did not refuse an audit. I requested that an independent auditor conduct the audit, rather than the State Auditor. The State Auditor ultimately agreed to not participate in the audit, and the audit was completed. The results are publicly available.

109. Do you know Mr. Fount Holland of A.H. Strategies? If so, what is your relationship?

I am familiar with Mr. Holland. I have no relationship with him.

110. Do you know Continental Resources CEO Harold Hamm and if so, what is your relationship with him?

Yes. Harold Hamm is a friend.

111. You were a board member of the Rule of Law Defense Fund from November 2015 to November 2016. As a nonprofit, that organization doesn't have to disclose its donors. But the tax filings of the Koch brothers' Freedom Partners Foundation show that it contributed $175,000 of the group's $885,000 in 2014, nearly 20

percentage the total. Was the Koch brothers' Freedom Partner's Foundation the largest contributor to the Rule of Law Defense Fund? Did that Foundation have any say with respect to the Fund's activities?

I have no knowledge of whether the Freedom Partners' donation was the largest contributor to Rule of Law Defense Fund. I have resigned as Chairman and as a board member, and those records are kept by the staff of Rule of Law Defense Fund. RLDF's policies at the time I was a board member were that donors did not have any say with respect to the fund's activities.

112. The Rule of Law Defense Fund is an affiliate of the Republican Attorneys General Association, which has received more than $2.25 million in funding from fossil fuel interests since 2015—money that goes primarily to help elect GOP attorneys general, according to an analysis of its activities by the Center for Media and Democracy. What are the fossil fuel-related activities of the Fund? Has the Fund supported or undertaken any public interest or environmental protection activities?

To my knowledge, RLDF has facilitated policy discussion on a wide range of issues, including many public interest and environmental protection issues, some of which may have some nexus to matters involving fossil fuels.

113. The Huffington Post reported this week that two election fundraising groups, Oklahoma Strong and Liberty 2.0, both linked to you spent at least $637,034 since the start of 2015, even though you couldn't run for re-election as Oklahoma attorney general. These groups disbursed an average of roughly $26,543 per month, both of which announced plans last week to shut down. Would you describe for the Committee where these funds went? Is the Huffington Post's characterization that these funds money went to consultants and travel correct? And what were the specific activities conducted with these funds?

I do not have any knowledge of where remaining funds from Oklahoma Strong PAC or Liberty 2.0 went after the entities closed. Both entities are managed by a staff and decisions are made independently of me.

114. Has Oklahoma Strong or Liberty 2.0 taken money from the fossil fuel industry?

This question would have to be directed to those that operate those entities.

115. Has any of the special interest money gone to other Attorneys General that may or may not sue the EPA if you are confirmed?

Without additional context to help me understand your question, I cannot answer it.

116. Has any of this special interest money gone to any member of the EPW Committee that will vote on your confirmation and serve as your oversight committee in the Senate if you are confirmed?

Without additional context to help me understand your question, I cannot answer it. In any event, I have no knowledge of the fundraising activities of the members of this committee.

117. Before being confirmed, will you disclose who has contributed to the Oklahoma Strong PAC and Liberty 2.0 Super PAC?

I do not personally have records of who has contributed to Oklahoma Strong PAC or Liberty 2.0 Super PAC. That information is publicly available on campaign finance reports, and in the possession of the staff of those entities.

118. Please provide the dates and the name of every event you attended as attorney general that was hosted by energy companies, energy representatives, energy lobbyists, or political action committees (PACs) that have energy donors.

Please see attached list.

119. For each listed matter in which the State of Oklahoma has been a litigant or petitioner against the EPA, please provide any and all documents (including any and all written or electronic correspondence, audiotapes, electronic records, videotapes, photographs, telephone messages, voice mail messages, e-mails, facsimiles, daily agendas and calendars, information about meetings and/or discussions, whether in-person or over the telephone, agendas, minutes and a list of participants for those meetings and/or discussions, and transcripts and notes of any such meetings and/or discussions) from the date on which your office first began to prepare the litigation at hand, to the date of this letter, between you (or other employees of your office) and each representative of each non-

governmental entity with whom you (or your office) communicated about the litigation.

In order for you to receive a comprehensive response to a voluminous request of that nature, I would direct you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act.

120. Of the total outlays from the Attorney General's office during your tenure, what percentage of your office's expenditures in Oklahoma went toward suing the federal government or challenging federal regulations?

My understanding is that less than one percent of the Office of the Attorney General's budget has been for litigation involving legal challenges to federal actions.

121. How many legal cases did your predecessor bring against industry in Oklahoma or other states for violating federal or state environmental protections? How many similar cases have you brought during your tenure? Please identify each such case brought under your tenure, the nature of the violation alleged, and the result achieved, including any penalties assessed and collected.

I do not know how many cases were brought by my predecessor. The Department of Environmental Quality is primarily responsible for implementing and enforcing environmental laws in Oklahoma. The Office of Attorney General has historically had a limited role, compared to the Department of Environmental Quality, in litigating environmental enforcement cases. Information about environmental cases attorneys in my office have litigated during my tenure is included in this response.

122. Do the Oklahoma Strong PAC and Liberty 2.0 Super PAC continue to operate from your state campaign headquarters in Tulsa? What is your connection to either of these political action committees? Do any of your former campaign employees work for either of these political action committees, if so, who and for what period of time?

It is my understanding that both entities have been wound down. I previously served as Honorary Chairman of Oklahoma Strong PAC, I have not served in any similar role with Liberty 2.0. My understanding is that there have been common vendors between Oklahoma Strong PAC and my previous campaigns, but I am not personally aware of any contracts those

vendors might have with the PACs, so your question regarding the details of any such relationships would need to be directed to the PACs or the vendors.

123. How much money have fossil fuel interests given to the Republican Attorneys Generals Association during the duration of your service in the leadership of that organization?

Other issues

Records of fundraising for that organization are kept with the staff of the Republican Attorneys General Association, and are also disclosed on campaign finance reports filed by that entity. I am not aware how much money has been donated to RAGA or from whom.

124. At a time of state budget cuts in Oklahoma, why did the attorney general's office expenditures increase from $28 million to $37.5 million under your leadership?

The budget cuts you refer to relate to reductions in the appropriations that each agency receives from the Legislature. I believe the Office of Attorney General has seen its appropriation from the Legislature cut every year since 2014, culminating in an appropriation of $0 this last fiscal year. What can lead to confusion is the fact that the appropriation from the Legislature makes up only a portion of the Office of Attorney General's budget, and the Office's budget and expenditures can fluctuate greatly year over year depending on the timing of case settlements and related distributions. For example in fiscal year 2014, the Attorney General's Office distributed higher than normal case settlement funds that inflated the budget over typical levels. Conversely, that total came down in fiscal years 2015 and 2016. Thus, fluctuations such as the one assumed by your question do not accurately reflect the size of the Office's budget. In my tenure as Attorney General, the Oklahoma Office of the Attorney General streamlined legal services for dozens of agencies, returned $29 million to the General Revenue Fund, distributed mortgage settlement restitution funds to impacted citizens, strengthened tobacco enforcement, and led the Office in such a fiscally responsible manner that the Office was able to forego all $6.4 million in state-appropriated operating funds for fiscal year 2017--that in addition to the Office having its annual appropriation cut in every prior year. The Office of Attorney General was the only state agency to voluntarily do this. During my tenure, the Office assumed the statutory duties of the Human Rights Commission through our Office of Civil Rights Enforcement, strengthened tobacco settlement enforcement efforts, and launched the Solicitor General's Unit. The Office also increased by one third the number

of agencies, commissions, or boards which it represents. This has led to a precipitous decline in state agency usage of costly private counsel. It is these and other efforts that have permitted the Office to contribute approximately $29 million to the General Revenue Fund over the last six years.

125. Do you think the upwind or upstream states of Oklahoma would be willing to impose more stringent environmental protections because of the adverse impacts certain activities in their state might have on Oklahomans? Have they ever done so on their own?

The Department of Environmental Quality has primary responsibility for implementing and enforcing environmental laws in Oklahoma. As Attorney General, I do not have responsibility or authority for setting environmental policy for the State and do not have the specific information at issue in this question.

126. Do your views on federalism expand beyond the EPA? For example, were you against the recently passed legislation that pre-empted states from labeling GMO foods? If not, why not?

I did not have an opinion on the GMO labeling legislation, however, I view that it is a similar matter to the Lautenberg Act reforms to TSCA which we supported despite its pre-empting state regulation, because it provides certainty nation-wide to regulations and often a consensus federal standard.

127. You campaigned in 2010 against a "one-size-fits-all strategy" towards environmental protection. That phrase is sometimes used to imply that whether American children should be adequately - or inadequately - protected against poisonous air, water and food should be based on the political jurisdiction in which they happen to live. Is that what you meant - that air and water health standards should vary from state to state? Do children's hearts or senior's lungs vary in their vulnerability to pollution between Oklahomans and Californians? Do you accept the premise at the heart of the Clean Air and Clean Water Acts that every American, wherever they live, should have a science based, legally guaranteed right to clean air, pure water and healthy food? Or do you think these decisions should be made by local politicians based on interest group lobbying?

I strongly believe in the importance of clean air, water, and land. Many of the environmental laws passed by Congress, including the Clean Air Act, are based on a framework of cooperative federalism by which states

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administer programs authorized or delegated by EPA in order to implement these authorities. If confirmed, I will support open and transparent regulatory processes and base decisions on sound science in accordance with EPA's legal authorities.

128. How do you plan to consider costs in reviewing national ambient air quality standards? Do you agree with Justice Scalia's opinion in Whitman v. American Trucking Associations that it is "fairly clear that [the Clean Air Act] does not permit the EPA to consider costs in setting the standards."

I agree that the Supreme Court's decision in Whitman v. American Trucking Associations confirms that the Clean Air Act does not allow the Administrator to consider costs in setting the NAAQS.

129. Do you believe that economic or cost-benefit analysis should ever be used to decide how much toxic pollution children should breathe or drink; many lives EPA should save; how many children should get cancer or asthma just because they live near a polluting factory?

As I stated in my testimony, I fundamentally believe in EPA's core mission of protecting the American people. Environmental statutes, such as the Clean Air Act and the Clean Water Act, prescribe certain instances where a cost-benefit analysis may be considered in a rulemaking. If confirmed, I commit to fully carry out EPA's core mission and follow the law as provided by Congress.

130. Every year during your tenure as Oklahoma Attorney General, the American Lung Association gave Oklahoma counties a failing grade for not meeting ozone air pollution health standards. In fact, your home town of Tulsa is ranked 18th out of 228 metropolitan areas for high alert ozone days. Are you concerned about the impacts of soot and smog pollution on Oklahoma citizens? What efforts have you undertaken as Oklahoma Attorney General to protect Oklahomans from soot and smog pollution?

While I am concerned about children's health, matters of the sort you reference would be handled by Oklahoma's environmental regulators at the Department of Environmental Quality and the Oklahoma Water Resources Board.

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131. If confirmed, do you commit to protecting scientific research conducted and funded by the EPA? Will you continue EPA's long-standing practice of protecting the confidentiality of health records of individual patients that participate in scientific studies?

If confirmed, it will look forward to working with EPA's scientists and the thousands of other public servants at EPA. If confirmed, I would expect to learn more about the existing practice and relevant legal authorities concerning the confidentiality of scientific data before taking action.

132. Do you agree with this statement from NASA: "97 percent or more of actively publishing climate scientists agree: Climate-warming trends over the past century are extremely likely due to human activities." If not, please explain why you do not agree.

I have no reason to disagree with NASA's statement, although I have not made any attempt to independently verify its accuracy.

133. Please provide a list of all the cases, briefs and other legal actions that your office has filed while you have served as attorney general.

Please see attached list.

134. How many legal cases have you filed, or joined others in filing, against the EPA? Please provide a full list with the outcome of each case, including those cases in which the court disagreed with your argument, agreed with your argument, and those in which the court refused to hear the matter.

Enclosed is a list of the relevant cases. The relevant court opinions, judgments, or orders are the best source of information about how these cases were disposed.

135. It is my understanding that you currently have nine cases pending against the EPA on behalf of the State of Oklahoma. Is this correct? Will you recuse yourself from participation in these cases if you are confirmed? If not, why not? Will you recuse yourself from settlement discussions? If not, why not? Will you recuse yourself from decision making on altering or revising the regulations that are impacted by these pending cases? If not, why not? What are the recusal requirements of the Oklahoma Bar Association governing similar situations?

Please see attached list of cases. Immediately upon my nomination, I was walled off from all involvement in any litigation or other matters the State of Oklahoma is pursuing involving the EPA. I have disclosed relevant matters to the Office of Government Ethics and EPA ethics officials. As EPA Administrator I will recuse from participation in litigation in matters in which I represented the State of Oklahoma, unless I receive informed consent from the State of Oklahoma and the permission of relevant federal ethics officials. It is my understanding that recusal obligations do not extend to regulatory rulemaking of general applicability, which does not create a conflict under applicable rules.

136. If confirmed, do you plan on proposing or advocating for budget cuts to the EPA's FY 2018 budget? If so, in which programs would you reduce funding? Would you target the EPA's research programs? Are there areas of agency action where you believe additional financial resources are needed?

I have no first-hand knowledge of EPA's development of its FY 2018 budget request. If confirmed, I will work to ensure that the limited resources appropriated to EPA by Congress are managed wisely in pursuit of that important mission and in accordance with all applicable legal authorities.

137. It is my understanding that prior to you taking office, there was an Environmental Protection Unit within the Oklahoma Attorney General's office. Is that correct?

The Oklahoma Department of Environmental Quality is the State agency responsible for implementing and enforcing environmental laws in Oklahoma.

138. It is my understanding that after you took office, the Environmental Protection Unit within the Oklahoma Attorney General's office was eliminated. Is that correct? Can you explain why the work of this unit was discontinued? Did the work continue in another section of your office? If so, who continued to do that work and for what period of time?

My office continues to employ attorneys vested with responsibilities related to environmental protection, including the attorney who served as the lead attorney on the previous attorney general's "environmental protection unit." That attorney's responsibilities remain unchanged (he has been promoted, in fact), and he pursues exactly the kind of cases that he pursued under the previous attorney general. The only thing that changed was the internal

organization of the attorneys vested with those responsibilities, because I concluded (consistent with the practices of every attorney general in the State's history but for my immediate predecessor) that it was not operationally efficient to have a separate unit for such work. Thus, I chose to house that work in the Office's Public Protection Unit and then later in the Solicitor General's Unit. As I explained in my testimony to the committee, my office continues to pursue environmental cases. I do not possess lists of cases pursued my predecessor so I cannot provide the comparative that you request. I am aware that many environmental cases take many, many years to litigate to completion, so some of the actions that my Office continues to pursue were initiated prior to my taking office. Please see attached list of cases.

139. In your cases against the EPA's Mercury and Air Toxics Rule, who served as your scientific advisor for the case?

The Office of Attorney General does not have a science advisor.

140. Please provide your definition of cooperative federalism.

Cooperative federalism occurs when the federal government works cooperatively with state and local governments to address issues of national concern. Federalism is not cooperative when the federal government mandates or coerces state and local governments into effectuating federal policies.

141. Provide examples of times the EPA has intervened and required a state to do more than the state intended and you supported the EPA's actions.

The water quality crisis in Flint is one where EPA should have acted faster in accordance with its legal authorities in consultation with the State.

142. You are quoted in an interview this past November saying "we hope there is going to be regulatory rollback...Well when you look at the EPA, and the role it's played over the last several years, there's going to be substantial change in that agency." Which EPA regulations do you believe should be rolled back? What changes do you believe should occur in the EPA? Which EPA regulations should be maintained?

Based on the limited information provided in the question, I am uncertain what interview it is referring to. However, if confirmed as Administrator, I

will take my responsibility to protect human health and the environment for all Americans with the highest possible dedication and commitment. The actions undertaken by the Office of Attorney General challenging certain EPA regulations have been because EPA exceeded it legal authorities as established by Congress and interpreted by the courts. Regulations that are not on solid legal foundation and that cannot survive judicial review will not result in environmental protections.

143. In your testimony before the Senate Environment and Public Works Committee in May 2015, you stated that the EPA "has played an important role in addressing water and air quality issues that transverse state lines." Since you became attorney general, hasn't your state sued against EPA regulations that address cross-state air and water pollution? What are the most significant sources of interstate pollution and what are the most important actions the EPA can take to address them?

As my testimony indicates, I firmly believe that the EPA plays an important role in addressing interstate water and air quality issues, but it must do so within the bounds of its legal authority. The actions undertaken by the Office of Attorney General challenging certain EPA regulations have been because EPA exceeded it legal authorities as established by Congress and interpreted by the courts.

144. Do you believe the EPA has, in your words "exceeded the constraints placed upon the agency by Congress" by issuing the Mercury and Air Toxics Rule? If so, please explain.

Based on the limited information in the question, the source or context of the quote to which the question refers is not readily apparent. Twenty one states filed a petition with the Supreme Court to review EPA's Mercury Air Toxics Standards. The Supreme Court held that the EPA was required to consider costs as part of its decision whether to regulate power plants under section 112. I agree with the Supreme Court's conclusion.

145. Do you support states taking further public health protective actions beyond those required by EPA regulations?

Yes—if authorized under the law and not preempted or displaced by federal law.

146. Do you agree with the EPA's legal interpretation of the Clean Water Act and share the view the agency has federal jurisdiction over wetlands and streams that impact the health of downstream navigable waters? If you do not agree, please explain.

The EPA takes a broader view of its jurisdiction under the Clean Water Act than the question suggests. A federal court appeals has held that the EPA's interpretation of its jurisdiction under the Clean Water Act is likely unlawful. I agree with that court's conclusion.

147. Would you explain the basis for your recent challenges to EPA's finding that it is appropriate and necessary to regulate the emissions of carbon dioxide and hazardous air pollutants from power plants?

The particular matters being asked about are unclear from the limited information in the question. As discussed in response to Questions 27 and 35, the state of Oklahoma, along with many other states, filed petitions for review challenging EPA regulations in matters where EPA has exceeded its statutory authority as established by Congress and interpreted by the courts. The standard for regulating under section 111 of the Clean Air Act is whether in the Administrator's judgment a category of sources "causes, or contributes significantly, to air pollution which may reasonably be anticipated to endanger public health or welfare." The standard for regulating under section 112(n) of the Clean Air Act is if "the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph." The briefs filed by the state petitioners are the best statements of the legal arguments being made and speak for themselves.

148. As attorney general, what types of environmental justice cases have you pursued? Please provide a list of cases and outcomes. What is your view of EPA's mission in regard to environmental justice?

As discussed elsewhere in these responses, the Oklahoma Department of Environmental Quality is the state agency with primary responsibility for implementing and enforcing environmental laws in Oklahoma. As I testified, I believe the Administrator plays an important role regarding environmental justice. Attached is a list of environmental cases brought under my tenure.

149. In a 2013 press statement, you stated "the evidence is clear that the current ethanol fuel mandate is unworkable." Would you explain what you meant at this time?

Based on the limited information in the question, the context of the quote referenced in the question is not readily apparent. If confirmed, my duty as EPA Administrator would be to enforce the laws passed by this body.

150. In your joint brief against the Mercury and Air Toxics Standards, it stated "human exposure to methylmercury resulting from coal fired EGUs (Electric Generating Units) is exceedingly small." What is the scientific basis for this statement? Do you continue to agree with this assessment?

Based on the limited information in the question, the source or context of the quote to which the question refers is not readily apparent. Twenty one states filed a petition with the Supreme Court to review EPA's Mercury Air Toxics Standards. The legal question in that case was a narrow one focused on whether EPA was required to consider costs before it imposed regulations on power plants under section 112 of the Clean Air Act.

151. The EPA is responsible for administering two of the nation's most important infrastructure investment programs- the Clean Water and Safe Drinking Water State Revolving Loan Funds (SRFs). Unfortunately, water and sewer infrastructure in this country continues to deteriorate and investment is sorely needed. The American Society of Civil Engineers rates our wastewater and drinking water infrastructure a "D." If confirmed, what will you do to ensure that the federal government is adequately investing in our nation's wastewater and drinking water infrastructure?

If confirmed, I will continue support for the Clean Water State Revolving Loan Funds and the new Water Infrastructure Financing Innovation Act loan program. In addition, I would continue to implement EPA's Integrated Planning Framework to provide municipalities with flexibility to prioritize actions they take to come into compliance.

Senator Duckworth:

1. During your confirmation hearing, we discussed the ongoing petitions requesting EPA initiate a rulemaking to reconsider or change the regulations identifying refiners and importers of gasolines and diesel fuel as the entities responsible for complying with the annual percentage standards adopted under the Renewable Fuel Standard (RFS) program. I am specifically concerned with harmful proposals to move the point of obligation from refiners and importers to entities that blend renewable fuel into transportation fuel. Moving the point of obligation from refiners to blenders would disrupt a component of the RFS program that has worked well for the past 10 years. This harmful proposal is opposed by a broad range of stakeholders, including organizations that represent blenders, and it would undermine Congress' goal in creating the RFS program by likely decreasing the production, distribution and use of renewable fuels in the United States.

• If confirmed as EPA Administrator, will you commit to denying any petition requesting EPA change the RFS point of obligation, including requests to move the point of obligation from refiners to blenders?
• Please provide all statements you have made, whether in writing or verbally, expressing your view on the RFS point of obligation.

As I indicated in my testimony, the EPA's RIN framework is currently the subject of a pending notice-and-comment rulemaking. If confirmed as Administrator, I would take care to administer the RFS program, including the RIN framework, in accordance with Congress's statutory objectives, and based on the evidence in the EPA's administrative record, as well as the expertise of EPA staff and the expertise of other federal agencies relevant to the RIN framework and affected markets. The EPA already has entered into a "memorandum of understanding" with the CFTC, "on the sharing of information available to EPA related to the functioning of renewable fuel and related markets."

Senator Gillibrand:

1.Assuming that costs should be considered in rulemakings, do you believe that externality costs – for example costs to society from impacts of a pollutant -- should be considered in addition to the financial costs of compliance?

As I stated at the hearing, costs are important in the rulemaking process and the Courts have recognized that important factor. Environmental statutes, such as the Clean Air Act, prescribe when costs should be considered in a rulemaking. If confirmed, I commit to fully follow the law as provided by Congress.

2.New York has the toughest acid rain regulations for power plants in the nation, but the acid rain that has affected the Adirondacks is predominately caused by emissions from Midwestern coal-fired power plants. The scientific data collected as part of a long-term and robust acid rain monitoring program of Adirondack lakes and streams provides the evidence that the sulfur dioxide trading program under the Clean Air Act has been a cost effective method to reduce sulfur dioxide from the atmosphere. This regulatory strategy was implemented without a detrimental economic effect. Is the regulatory strategy outlined above: strong federal standards coupled with even stronger state standards an example of the "meaningful role" you envision for EPA and the "useful role of the states?"

As I stated at the hearing, costs are very important in the rulemaking process and the Courts have recognized that important factor. Environmental statutes, such as the Clean Air Act, prescribe when costs should be considered in a rulemaking. If confirmed, I commit to fully follow the law as provided by Congress.

3.EPA promulgated the Cross State Air Pollution Rule (CSAPR) in 2011 and an update to the rule in September 2016. How will you implement CSAPR and the update rules?

The Cross-State Air Pollution Rule is a regulation that is currently in effect and, as such, constitutes a binding regulation. So long as that rule remains in force, I will faithfully execute the law and enforce obligations under it.

4.What strategy will you pursue to ensure upwind emissions do not affect the ability of downwind states to meet air quality standards, per Section 110(a)(2)(D) of the Clean Air Act?

As I stated in my testimony before the Committee, I agree that the Clean Air Act gives EPA an important role in addressing interstate pollution issues, among many other things. If I am confirmed as Administrator, I will exercise my authority in this area consistent with Congress's intent in enacting the Act. Specifically with respect to Section 110(a)(2)(D) and the "good neighbor" obligations of Section 110, I intend to engage in a transparent process that will allow states to have a meaningful opportunity to understand their obligations with regard to reducing emissions that cause or contribute to nonattainment or interference with maintenance in other states through the SIP process and to act consistent with my authority under Section 110(c) if states fail to do so.

5.What is EPA's role in resolving disputes regarding the transport of pollutants between states?

As I stated in my testimony before the Committee, I agree that the Clean Air Act gives EPA an important role in addressing interstate pollution issues, among many other things. I strongly believe in states working collaboratively to address crossborder environmental challenges and did so when I was the Attorney General of Oklahoma, including negotiating a historic agreement with my Democratic counterpart in the State of Arkansas to reduce pollutants into the scenic Illinois River. As Administrator, I intend to provide assistance to states as they work collaboratively in these issues. Where the Act contemplates a more direct role for EPA, such as with respect to Section 110(a)(2)(D) and the "good neighbor" obligations of Section 110, I intend to engage in a transparent process that will allow states to have a meaningful opportunity to understand their obligations with regard to reducing emissions that cause or contribute to nonattainment or interference with maintenance in other states through the SIP process

6.What specific actions have you taken as Oklahoma Attorney General to protect Oklahoma's children from exposure to air pollution?

While I am also concerned about children's health, environmental regulation in Oklahoma is the responsibility of Oklahoma's environmental regulators at agencies like the Oklahoma Department of Environmental Quality. That agency would likely be better situated to answer your question by actions taken by the State with regard to air pollution.

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7.Does state sovereignty includes a state's authority to combat impacts to air and water from pollution generated in other states?

Yes.

8.The EPA Clean Air Science Advisory Committee currently fills a role that The Clean Air Act requires; this role is that of an independent scientific committee to advise the Administrator regarding any possible revisions to the national standards (NAAQS). That advisory committee has stated on record that the ozone NAAQS should be more protective than the current standards. Will you follow the advice of the advisory committee as Administrator?

I agree that the Clean Air Act assigns the advisory committee a role in advising the Administrator regarding the promulgation and revision of NAAQS. If confirmed as Administrator, I will follow a transparent process that is legally and scientifically sound in all NAAQS decisions, including consideration of the views of the advisory committee.

9.What role will the opinions of that advisory committee play in any decision-making you might have to do regarding review of and revisions to the NAAQS?

I agree that the Clean Air Act assigns the advisory committee a role in advising the Administrator regarding the promulgation and revision of NAAQS. If confirmed as Administrator, I will follow a transparent process that is legally and scientifically sound in all NAAQS decisions, including consideration of the views of the advisory committee.

10.In the April 22, 2016 State Petitioners' Opening Brief that you signed seeking to vacate EPA's primary NAAQS of 70 ppm, you wrote that "that EPA must consider the burden of a NAAQS." What did you mean by the burden of a NAAQS?

The Clean Air Act requires the Administrator to establish NAAQS that protect public health and welfare from adverse effects, allowing an adequate margin of safety, and to revise those standards as appropriate. This includes establishing NAAQS at a level that is "requisite," which the Supreme Court has interpreted as being neither more nor less stringent than necessary to protect public health. The State Petitioners' Opening Brief, particularly in Section II of the Argument portion, the part of the brief to which the quotation in your question is relevant, argues that the ozone NAAQS is arbitrary and capricious because it fails to interpret the Act in a manner that ensures the standard is "requisite." As I have explained elsewhere in my testimony to the Committee and in response to the Committee's written questions, all legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in an advocacy

capacity. If confirmed as Administrator, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

11.What is the burden on individuals who are exposed to, and suffer health effects from, air pollution if NAAQS are not strong enough to protect public health?

The Clean Air Act requires the Administrator to establish NAAQS that protect public health and welfare from adverse effects, allowing an adequate margin of safety, and to revise those standards as appropriate. Individuals exposed to pollutant concentrations that are above the NAAQS may suffer adverse health effects, the specifics of which vary depending on the pollutant at issue.

12.How will you take into consideration the cost of pollution on human health when taking regulatory action?

As I stated in my testimony, if confirmed, my primary goal would be to protect the American people through lawful regulations. I also indicated at the hearing that costs are very important in the rulemaking process and the Courts have recognized that important factor. I understand environmental statutes, such as the Clean Air Act and Clean Water Act, prescribe when costs should be considered in the rulemaking process. If confirmed, I commit to fully follow the law as provided by Congress.

13.New York is very concerned with the interstate transport of ozone and particulate matter, which cause death and illness in our state and damages our natural resources, but also interferes with New York's ability to meet its legal obligation to attain the national standards set by EPA. Can ground-level ozone or its precursor, nitrogen oxides, can be generated in one state and reduce air quality in another state?

Yes.

14.Can fine particulate matter or its precursors, nitrogen oxides and sulfur dioxide, be generated in one state and reduce air quality in another state?

Yes.

15.EPA's regulatory impact analysis enumerated numerous important categories of mercury benefits that the agency found couldn't be monetized, such as the impacts of mercury on non-IQ neurological impacts (including developmental

delays, effects on attention/behavior, effects on motor skills, effects on memory); cardiovascular impacts; genotoxic, immunologic, and other toxic effects.

•Do you agree that mercury has these impacts?

•Do you agree that the benefits of reducing these impacts are valuable?

•Do you think that avoided harms, like reducing childhood development delays, need to be monetized to count as part of a cost-benefit analysis?

•Do you agree that consideration of a monetized cost-benefit analysis that does not include these benefits because they cannot be monetized is an incomplete picture of the costs and benefits of reducing mercury emissions?

I agree that as Administrator, it is appropriate to consider both the monetized benefits of regulation and benefits that cannot be monetized. Likewise, where appropriate in light of Congress's intent in enacting each Clean Air Act provision, I agree that it is appropriate to consider both the monetized costs of regulation and any other negative impacts, regardless of whether those can be monetized. If I am confirmed as Administrator, I will exercise my authority consistent with Congress's intent in enacting the Act.

16.In your comments at the EPW nomination hearing, you claimed that your challenges to the mercury standards were entirely procedural in nature.

•In your brief challenging the original mercury standard, you asserted that "the record does not support EPA's findings that mercury, non-mercury HAP metals, and acid gas HAPs pose public health hazards." Explain how this is a procedural claim.

•In your brief challenging the original mercury standard, you asserted that "EPA's EGU MACT standards are unlawful under §112(n)(1)(A)." Explain how this is a procedural claim.

•In signing the original petitioners' brief, were you just advocating for a client? Or do you continue to believe all the positions argued in the original petitioners' brief are correct?

•In your brief challenging EPA's supplemental finding, you asserted that "EPA must consider costs in relation to benefits to justify its 'appropriate and necessary' determination." Explain how this is a procedural claim.

•In your brief challenging EPA's supplemental finding, you asserted that EPA's "'alternative' benefit-cost approach is also invalid because it is based on the 'Co-Benefits' of reducing pollutants other than HAPs." Explain how this is a procedural claim.

•In your brief challenging EPA's supplemental finding, you asserted that "EPA's refusal to consider alternative control strategies and all relevant costs, is contrary

to the statute and the Supreme Court's direction." Explain how this is a procedural claim.

In my testimony, when I stated that Oklahoma's challenges were procedural in nature, I was referring to whether EPA acted consistent with law and the record in following the procedure set forth for regulating electric utility steam generating units under Section 112(n) of the Act. That procedure required EPA, taking into account certain information, to determine whether regulating the sources under Section 112 is appropriate and necessary.

17.When filing briefs for Oklahoma in the Mercury and Air Toxics Standard litigation, Clean Power Plan litigation, and other litigation against EPA that you joined as Attorney General, were you just advocating for a client? Or do you continue to believe all the positions argued in your briefs are correct?

As I stated in my testimony to the committee, all legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in an advocacy capacity. If confirmed as Administrator, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

18.The Great Lakes Restoration Initiative (GLRI) was launched in 2010 to accelerate efforts to protect and restore the largest system of fresh surface water in the world — the Great Lakes. EPA is a critical member and lead of the GLRI Task Force and Regional Working Group. This coordination in partnership with the states has produced unprecedented results, with GRLI resources funding over 2,000 projects to improve water quality, protecting and restoring native habitat and species, preventing and controlling invasive species, and addressing other Great Lakes environmental problems. Under your leadership, will the GLRI continue to be a top priority?

If confirmed, I will continue EPA's support for the Great Lakes Restoration Initiative, which was formally authorized by Congress in December 2016.

19.Will you support an annual appropriation of at least $300 million for the Great Lakes Restoration Initiative?

I note that $300 million has been the annual appropriation for the Great Lakes Restoration Initiative for the past several years, even though the prior Administration proposed to cut that funding to $250 million. Three hundred

million also is the Congressional authorized level of funding. If confirmed, I will take into account that funding history and Congressional authorization when making recommendations to the Office of Management and Budget regarding EPA's appropriations.

20.New York is suffering from infestations of invasive species such as the emerald ash borer and zebra mussel, which have large impacts in the state. EPA has been an important ally in our efforts, and has a number of programs that fight invasive species. What is your view on EPA's role in fighting invasive species, and do you believe EPA should commit more resources, fewer resources, or about the same amount of resources to this issue?

I am not aware of the state of invasive species in New York. If confirmed, I would expect to be briefed by staff on this issue before taking any action consistent with EPA's legal authorities.

21. Does climate change have an impact on the spread of invasive species, such as the emerald ash borer, in New York State?

I am not familiar with the state of invasive species in New York.

22.Should states continue to have the sovereign authority to set their own ballast water discharge standards to protect the environment from the spread of invasive species?

The issue of federal preemption of state ballast water discharge regulations is a question for Congress, not the Administrator of the EPA. If confirmed, I will carry out the authorities granted to EPA by Congress.

23.Approximately 200 miles of the Hudson River are classified by the EPA as one of the largest Superfund sites in the country when 1.3 million pounds of PCBs were discharged by two General Electric plants into the Hudson River over a 30-year period. The EPA has required targeted dredging between 2009 and 2015. Last year, the Commissioner of the New York State Department of Environmental Conservation repeatedly advised the EPA of the State's concerns that EPA's remedy for the Hudson River left in place substantial levels of PCB contamination. The EPA is slated to release its five-year review of the project this spring. Independent and objective quantitative analyses are essential in order to determine whether the remedy is protective of human health and the environment. Will you agree to work with New York State to evaluate the sufficiency of the remedy selected in the EPA's Record of Decision?

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I appreciated hearing about this Superfund site in our meeting and your staff followed up with us concerning the consent decree in this situation. If confirmed, I intend for EPA to work collaboratively with New York State to assess the sufficiency of the remedy. I understand that EPA intends to provide data and analysis related to a review of the remedy to the site related to all stakeholders, including New York, federal partners, and the environmental community. I also understand the State and other stakeholders will have the opportunity to present information to EPA through that process. I confirmed, I would work to ensure that EPA's decision will be informed by such information provided through such process.

24.With regard to the Hudson River, will you thoroughly quantify the trends based on all available fish, water, and sediment data and make reasonable and conservative assumptions regarding future trends?

I believe EPA actions should be based on sound science and taken in accordance with applicable statutory requirements, including consideration such as those you identify.

25.As of 2014, New York had the third largest number of Superfund sites among all states, with 87 sites. One in four Americans lives within three miles of a contaminated disposal site that poses serious risks to human health and the environment. In recent years, EPA has allocated approximately $250 million per year for Superfund cleanup. The agency estimates that much greater amounts – from $355 million to over $600 million per year – will be needed in the future. What changes should be made to the Superfund statute to help facilitate these important clean-up projects?

If confirmed, I would expect to prioritize the cleanup of contaminated land. Prior to suggesting any legislative proposals, I would expect to be briefed by staff and to receive the views of relevant stakeholders on ways to improve the operation of the Superfund program, including any changes to its statutory authority, if confirmed.

26.Do you support restoring the tax on petroleum products that funded the Superfund trust fund, but was discontinued in 1995?

This is a matter for Congress to decide.

27.What would you do, if confirmed, to facilitate and improve Superfund clean-ups in the absence of new legislation?

If confirmed, I would expect to prioritize the cleanup of contaminated land. I would also expect to be briefed by staff and to receive the views of relevant

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stakeholders on ways to improve the operation of the Superfund program, absent new statutory authority, if confirmed. I also understand the Government Accountability Office and the EPA Inspector General also regularly review the operation and activities of the Superfund program, and I would expect to look to their recommendations for additional areas for improvement, if confirmed.

28.The EPA's Brownfields Program provides grants and technical assistance to assess, clean up, and reuse contaminated properties. Cleaning up and reinvesting in brownfields protects human health and the environment, reduces blight, and takes development pressures off agricultural and other working lands. Through fiscal year 2013, on average, $17.79 was leveraged for each EPA Brownfields dollar and 7.3 jobs leveraged per $100,000 of EPA brownfields funds expended on assessment, cleanup, and revolving loan fund cooperative agreements. Unfortunately, only about 1/3 of all applicants to the program are successful. Do you support expanding the resources for the Brownfields Program to adequately support these communities in need?

I am aware EPA's Brownfields program has enjoyed bipartisan support in Congress. If confirmed as Administrator, I expect cleanup of contaminated land to be among my priorities and to be briefed by staff about the Brownfields programs activities and resources before taking any action.

29.In 2005, New York State, Connecticut, and the EPA and Army Corps reached an agreement to eliminate or reduce the amount of dredged sediment dumped in the open waters of Long Island Sound. The New York State Department of Environmental Conservation and Department of State have repeatedly urged the EPA and Army Corps not to move forward with the permanent designation of an open water dumping site in Eastern Long Island Sound, raising concerns that the sediment has not been properly tested and could negatively impact the economic and environmental state of Long Island Sound, which was designated in 1987 by Congress as an Estuary Of National Significance. Will you work to enforce NYS's right to protect Long Island Sound from additional open water dumping of dredged material?

The designation by EPA of an area as a site for dredged material disposal must follow the rigorous process set forth in the Marine Protection, Research, and Sanctuaries Act to ensure protection of the environment. As I stated in my testimony before the Committee, I support following the administrative processes set forth in law, including the National Environmental Policy Act, to ensure that EPA's statutory responsibilities are fully carried out.

30.Will you commit to assisting the states with determining upland alternatives to the open water disposal of dredged material?

Disposal of dredged material is not an EPA mission or responsibility. That lies with the Corps of Engineers.

31.Will you continue the Long Island Sound Study office and ensure it receives the necessary resources from EPA?

As I noted in my testimony before the Committee, I support collaborative efforts to achieve environmental protection. The Long Island Sound Study is a collaborative effort among EPA, New York, and Connecticut.
EPA's Long Island Sound Study office was authorized by Congress in 1990 under section 119 of the Clean Water Act. If confirmed, I will carry out all responsibilities given to EPA by Congress.

32.Will you support annual appropriations of at least $10 million for the EPA's Long Island Sound geographic program?

If confirmed, I will seek budgetary resources to carry out all responsibilities given to EPA by Congress. I note that the most recent appropriation for the Long Island Sound program was about $3.9 million and the most recent budget request was about $2.9 million.

33.How do you intend to handle existing EPA enforcement actions initiated prior to January 20, 2017?

I am unfamiliar with the specific details of the actions referenced in the question. I would expect to be briefed by staff, in consultation with the Department of Justice as appropriate, before taking any action.

34.Municipal landfills that are non-compliant with the Resource Conservation and Recovery Act (RCRA) have created public health and environmental problems on the island of Puerto Rico, contributing to water, ground and air contamination. How will you address non-compliant landfills in Puerto Rico?

I am not familiar with the details of this specific issues but, if confirmed as Administrator, I would expect to be briefed by staff about EPA's ongoing involvement and role at these sites. If confirmed, I expect to make cleanup of contaminated land one of my priorities. I also believe in the importance of hearing the views of all stakeholders and would welcome the opportunity to discuss this further.

35.I have been working with EPA Region 2 to address the significant environment and public health crisis in the Caño Martin Peña in San Juan, Puerto Rico. As we discussed during our meeting in my office, EPA must take aggressive action to work with the Army Corps of Engineers to clean up hazardous waste, which is threatening the lives of children and families, who do not have full representation in the Congress. Will you continue EPA's aggressive push to clean up the Caño?

As discussed, I am not familiar with the details of this specific matter but, if confirmed as Administrator, I would expect to be briefed by staff about EPA's ongoing involvement and role at this site. If confirmed, I expect to make cleanup of contaminated land one of my priorities.

36.If confirmed, will you visit San Juan and tour Caño Martin Peña during your first year as Administrator?

As we discussed in your office, I would be pleased to accompany you on this trip at a mutually convenient time if I am confirmed as Administrator.

37.What is the scientific basis for sea level rise, which we have experienced along the coast of New York State?

If confirmed as Administrator, I will work to ensure EPA regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving understanding of the changes in our climate and sea level rise.

38.Do you agree with the National Climate Assessment that human-induced climate change has already increased the number and strength of extreme weather events?

I am aware of the broad range of views within the scientific community regarding the relationship between human activity on changes in the climate and any resulting impact on extreme weather events. If confirmed as Administrator, I will work to ensure EPA regulatory actions are based on the most up to date and objective scientific data.

39.Why did you eliminate the environmental protection unit of the Oklahoma Attorney General's office?

My office continues to employ attorneys vested with responsibilities related to environmental protection, including the attorney who served as the lead attorney on the previous attorney general's "environmental protection unit." That attorney's responsibilities remain unchanged (he has been promoted, in fact), and he pursues exactly the kind of cases that he pursued under the

previous attorney general. The only thing that changed was the internal organization of those vested with those responsibilities, because I concluded (consistent with the practices of every attorney general in the State's history but for my immediate predecessor) that it was not operationally efficient to have a separate unit for such work. Thus, I chose to house that work in the Office's Public Protection Unit and then later in the Solicitor General's Unit.

40.How may staff does the Oklahoma Attorney General's office have dedicated, full time, to enforcing federal environmental laws in Oklahoma? Do not include in that number staff working on lawsuits against the EPA.

The Office of the Attorney General's employs seven attorneys who responsibilities include environmental-related matters, with a primary focus on enforcing Oklahoma law, rather than the federal law that your question presumes. These duties substantially include representing the environmental agencies of the State of Oklahoma or providing counsel to those environmental agencies in actions they determine to pursue.

41.Perfluorooctanoic acid (PFOA) is listed as an unregulated contaminant under the Safe Drinking Water Act. PFOA was discovered in the municipal water supply and private wells in the Village of Hoosick Falls and Towns of Hoosick and Petersburgh, NY and in North Bennington, Pownal, Vermont. Perfluorooctane sulfonate (PFOS) was found in Newburgh New York.

In 2014, PFOA and PFOS were found in public drinking water wells in Horsham, Warminster, and Warrington, Pennsylvania. They were found by the federal Environmental Protection Agency, as part of the Unregulated Contaminant Monitoring Rule. The amounts of PFOA and PFOS found in the public wells in the area were among the 10 highest samples anywhere in the country based on the provisional health advisory level set by EPA in 2009.

In 2009, EPA set a provisional health advisory level of .4 parts per billion. In May, 2016, EPA set a Lifetime Health Advisory level for PFOA at 70 parts per trillion. How will you work to ensure that drinking water sources are monitored for PFOA and PFOS, particularly in small communities under 10,000 people?

If confirmed, I will carry out the authorities and responsibilities given to EPA by Congress. Congress did not make monitoring eligible for Safe Drinking Water Act State Revolving Loan Fund assistance because it is considered operation and maintenance that is local responsibility. However, Congress recently authorized a grant program to assist small and disadvantaged communities provide safe drinking water. Testing of unregulated

contaminants is eligible for assistance under this authority. If funding is provided by Congress, I will carry out that program.

42.How will EPA continue to evaluate the health effects of PFOA on all communities that were exposed, in particular vulnerable populations including infants and fetuses during pregnancy?

As I stated at my confirmation hearing, PFOA is a chemical substance that the Agency should address quickly and I will look to continue evaluating the health effects of PFOA through TSCA and the Safe Drinking Water Act.

43.Will you work collaboratively with other agencies, including the Centers for Disease Control and Prevention, the National Institutes of Health, and the Department of Defense, to ensure that the public is informed about the health effects of contamination?

As I stated at my confirmation hearing I believe collaboration between federal agencies to protect and better inform the public.

44.Will you work collaboratively with states and local governments to ensure that information on PFOA and PFOS are communicated in a transparent and timely manner to the public?

Cooperative federalism and collaboration between EPA and officials at the state and local level is something I feel very strongly about and if I am confirmed I will work collaboratively with state and local governments.

45.In the absence of federal drinking water standards, what role should EPA play in assisting communities whose drinking water supplies have become contaminated by PFCs or other emerging contaminants?

Congress recently authorized a grant program to assist small and disadvantaged communities provide safe drinking water. Testing of unregulated contaminants is eligible for assistance under this authority. If confirmed and if funding is provided by Congress, I will carry out that program.

46.The latest EPA survey of capital improvement needs indicates that public water systems need to invest $384.2 billion on infrastructure improvements over 20 years to ensure the provision of safe tap water. The needs estimate generally excludes costs associated with addressing unregulated contaminants or the costs of replacing lead service lines. What funding level do you view as effective for the

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EPA Drinking Water State Revolving Fund (DWSRF) capitalization grant program?

The federal government offers some financial assistance but the vast majority of the Investments in public water systems will be made by the public and private entities that own and operate those systems. The Safe Drinking Water Act State Revolving Loan Funds leverage federal investment at about 1.76 to 1. That is, a federal dollar leverages about 1.76 dollars in loan assistance. The new WIFIA program can leverage federal investment at a level of up to 60 to 1. I fully support the Drinking Water SRF and would not support any cuts to that program. However, if Congress provides additional funds I am excited by the opportunities the new WIFIA program presents.

47. How would you use the "precautionary principle" to bring to bear cutting edge science on emerging contaminants to ensure decisions are technically valid, while also not delaying regulatory decisions to wait for every potential detail to be addressed when health impacts may be occurring during the delay?

If confirmed agency decisions will be based on sound science and I will work to protect health and the environment as expeditiously as possible.

48.What is your view on EPA's role in overseeing response actions undertaken by DOD at U.S. military facilities, including where PFOA, PFOS, or other PFCs may have been released?

EPA's role is governed by the statutory and regulatory authorities, including section 120 of the Comprehensive Environmental Response, Compensation and Liability Act and the National Contingency Plan.

49. As you know, Congress passed a provision in law that exempts hydraulic fracturing from the Safe Drinking Water Act. Do you think that hydraulic fracturing chemicals should be exempt or do you believe that this law has merit?

Article 1 Section 8 of the Constitution vests in Congress the authority to make our nation's laws and, if confirmed, as a member of the Executive Branch I will faithfully execute my duty to implement and enforce the laws written by Congress.

50.How will you address the disproportionate effect of environmental contamination on low-income communities of color?

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If confirmed, I will expect to be briefed by staff about EPA's programs and statutory authorities in this area.

Senator Markey:

1. There is tremendous diversity across states in this country, and occasionally states have differences of opinion on how to approach a problem. One of the roles of the federal government is to be an arbiter among states.
• What is your philosophy on how interstate pollution conflicts should be handled?
• Should a state be able to pollute a river for which another state relies on for drinking water?
• What is the EPA's role in resolving interstate pollution conflicts?
• How would you determine when EPA should be involved in interstate pollution disputes?

As I testified in the hearing, I have pursued opportunities to address interstate environmental quality matters. One of the examples I have highlighted is the work that Arkansas Attorney General Dustin McDaniel and I took to address an enforceable water quality standard between Arkansas and Oklahoma. I have also discussed how Texas should be responsible when air quality issues affect Oklahoma and my experience with that. When negotiations among and between states breakdown EPA has a role to set environmental standards. However, that is should be a last course of action instead of the first. I believe environmental statutes are designed with states as a primary implementer. Environmental statutes envision that states have the delegated enforcement and primacy to implement and enforce environmental statutes. Only when that is not happening or when negotiations between and among states breakdown should EPA determine a dispute and only after attempting to assist states negotiate a local solution. I am fond of saying that we need national standards and neighborhood solutions. I think that should shape the work of the EPA.

2. During the hearing, you repeatedly underscored the need to make regulation "regular" for regulated entities.
• How do you reconcile that goal with the mission of EPA, which is "to protect human health and the environment"?
• If confirmed as EPA Administrator will your highest priorities be to protect human health and the environment?

As I testified, I believe in the rule of law and that process matters. I do not view these as being contrary to EPA's mission to protect human health and the environment.

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3. Please list any deductible or nondeductible charitable donations you made in the last three years, including, for each contribution, the name of the recipient and the amount.

I have complied with the reporting obligations from the Office of Government Ethics and the EPW Committee.

4. As attorney general, you made Freedom of Information Act (FOIA) requests, and expected a fast response. Do you commit to respond to FOIAs as quickly as possible, if you are confirmed?

If confirmed, I will commit to tasking my staff with responding to FOIA requests in a timely manner.

5. During Mr. Trump's campaign, there were reports that even volunteers were required to sign non-disclosure agreements. After his election, President-elect Trump's team demanded lists of career officials who worked on climate science issues at the Energy Department and women's and gender issues at the State Department. It is against the law to retaliate against career officials for following lawful policy directives. It is also against the law to interfere with career employees communicating with Congress. I have included a summary of these laws below.

Any suggestion that the incoming administration is targeting career officials for retaliation simply because they worked on policies that the new President disagrees with threatens to create a chilling effect on employees who are simply trying to do their jobs.

5 U.S.C. § 7211, provides that: The right of employees, individually or collectively, to petition Congress or a Member of Congress. or to furnish information to either House of Congress, or to a committee or Member thereof, may not be interfered with or denied. Pursuant to 5 U.S.C. § 2302(b)(8), it is a violation of federal law to retaliate against whistleblowers. That law states: Any employee who has authority to take, direct others to take, recommend, or approve any personnel action, shall not, with respect to such authority ... take or fail to take, or threaten to take or fail to take, a personnel action with respect to any employee or applicant for employment because of. ... (A) any disclosure of information by an employee or applicant which the employee or applicant reasonably believes evidences- (i) a violation of any law, rule, or regulation, or (ii) gross mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, any disclosure to the Special Counsel, or to the Inspector General of an agency or another employee designated by the head of the agency to receive such disclosures, of information which the employee or applicant reasonably believes evidences a violation of any law, rule, or regulation... " In addition, pursuant to 18 U.S.C. § 1505, it is against federal law to interfere with a

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Congressional inquiry: Whoever corruptly, or by threats or force, or by any threatening letter or communication influences, obstructs, or impedes or endeavors to influence, obstruct, or impede the due and proper administration of the law under which any pending proceeding is being had before any department or agency of the United States, or the due and proper exercise of the power of inquiry under which any inquiry or investigation is being had by either House, or any committee of either House or any joint committee of the Congress.
• If you are confirmed, will you commit to protect the rights of all career employees of the EPA, including their right to speak with Congress?
• Will you commit to communicate employees' whistleblower rights via email to all EPA employees within a week of being sworn in?

If confirmed, I commit to protecting the rights of all EPA employees and will follow the law.

6. The President-elect appears to be planning to ignore the advice he was given by bipartisan ethics experts to divest himself from his business interests. In the United States, he has hundreds of business interests, which include everything from vineyards, golf courses, hotels and casinos. Some of these interests could be impacted by EPA regulations or enforcement actions – for example, Donald Trump's New Jersey casino flunked air pollution tests, his hotel in Chicago has had a Clean Water Act violation and his New Jersey Golf Club violated the Safe Drinking Water Act.
• Do you commit to ensure that no employee of the EPA is pressured to take - or not take - any regulatory or enforcement action or decision because that action or decision would adversely affect business interests associated with the president-elect or his family?
• Considering that the president-elect has stated he will not release his tax returns anytime soon, how will you know exactly what all of the Trump family interests are without his tax returns?

If confirmed as Administrator, I will take care that all environmental laws enacted by Congress are faithfully executed without regard to identity of the owners of any regulated business that might be affected by such execution of the laws.

7. The following series of questions relate to Title 74 Section 20i of the Oklahoma Statutes. As Attorney General of Oklahoma, you were responsible for complying with this law. For your ease of reference, Section 20i is provided below:

74 Okl. St. § 20i (2016)
§ 20i. Legal Representation of Agency or Official of Executive Branch--Contracts

A. An agency or official of the executive branch may obtain legal representation by one or more attorneys by means of one of the following:

1. Employing an attorney as such if otherwise authorized by law;

2. Contracting with the Office of the Attorney General; or

3. If the Attorney General is unable to represent the agency, or official due to a conflict of interest, or the Office of the Attorney General is unable or lacks the personnel or expertise to provide the specific representation required by such agency or official, contracting with a private attorney or attorneys pursuant to this section.

B. When entering into a contract for legal representation by one or more private attorneys, an agency or official of the executive branch shall select an attorney or attorneys from a list of attorneys maintained by the Attorney General. An agency may contract for legal representation with one or more attorneys who are not on the list only when there is no attorney on the list capable of providing the specific representation and only with the approval of the Attorney General. The list shall include any attorney who desires to furnish services to an agency or official of the executive branch and who has filed a schedule of fees for services with and on a form approved by the Attorney General. An agency or official may agree to deviate from the schedule of fees only with the approval of the Attorney General.

C. Before entering into a contract for legal representation by one or more private attorneys, an agency or official of the executive branch shall furnish a copy of the proposed contract to the Attorney General and, if not fully described in the contract, notify the Attorney General of the following:

1. The nature and scope of the representation including, but not limited to, a description of any pending or anticipated litigation or of the transaction requiring representation;

2. The reason or reasons for not obtaining the representation from an attorney employed by the agency or official, if an attorney is employed by the agency or official;

3. The reason or reasons for not obtaining the representation from the Attorney General by contract;

4. The anticipated cost of the representation including the following:

a. the basis for or method of calculation of the fee including, when applicable, the hourly rate for each attorney, paralegal, legal assistant, or other person who will perform services under the contract, and

b. the basis for and method of calculation of any expenses which will be reimbursed by the agency or official under the contract; and

5. An estimate of the anticipated duration of the contract.

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D. Before entering into a contract for legal representation by one or more private attorneys where the agency has reason to believe that the case, transaction or matter will equal or exceed Twenty Thousand Dollars ($ 20,000.00) or after employment when it becomes apparent that the case, transaction or matter will equal or exceeds Twenty Thousand Dollars ($ 20,000.00), an agency or official of the executive branch shall obtain the approval of the Attorney General when the total cost, including fees and expenses, of all contracts relating to the same case, transaction, or matter will equal or exceed Twenty Thousand Dollars ($ 20,000.00). Any amendment, modification, or extension of a contract which, had it been a part of the original contract would have required approval by the Attorney General, shall also require approval by the Attorney General.

E. When an agency or official of the executive branch enters into a contract for professional legal services pursuant to this section, the agency shall also comply with the applicable provisions of *Section 85.41 of Title 74 of the Oklahoma Statutes.*

F. The provisions of this section shall not apply to the Oklahoma Indigent Defense System created pursuant to *Section 1355 et seq. of Title 22 of the Oklahoma Statutes.*

G. The Attorney General shall, on or before February 1 of each year, make a written report on legal representation obtained pursuant to paragraphs 2 and 3 of subsection A of this section. The report shall include a brief description of each contract, the circumstances necessitating each contract, and the amount paid or to be paid under each contract. The report shall be filed with the Governor, the President Pro Tempore of the Senate, the Speaker of the House of Representatives, the Chair of the Appropriations and Budget Committee of the House of Representatives, and the Chair of the Appropriations Committee of the Senate.

•The Oklahoma Governor considers the Office of Attorney General a state agency, and includes the Attorney General on a comprehensive list of Oklahoma state agencies available at https://www.ok.gov/portal/agency.php. Do you agree that the Office of Attorney General is an agency under Oklahoma state law? If not, please explain.

Generally speaking, the Office of Attorney General is a state agency. Whether it is an "agency" for purposes of any particular statute requires an analysis of that statute.

•Subsection G of Title 74 Section 20i of the Oklahoma Statutes requires the Attorney General to report annually on any contracts for legal representation that state agencies have entered into with private attorneys over the course of the prior year. For the avoidance of doubt, no exception is provided under Section 20i for contracts for legal representation entered into by the Attorney General with private attorneys. Do you agree that Subsection G of Title 74 Section 20i required

you, as Attorney General, to report contracts for legal representation that you entered into with private attorneys over the course of the prior year? If not, please explain.

No. The purpose of Section 20i, as demonstrated by its text, is to place the Office of Attorney General in the role of approving contracts for outside counsel that other agencies wish to enter into rather than utilizing the services of the Office of Attorney General. Subsection G requires a report be made of contracts entered into "pursuant to this section," as Subsection A(3) makes clear. Because the Office of Attorney General is not required to seek permission from itself "pursuant to" that section of law, it has no applicable contracts to report pursuant to Subsection G. The Office of Attorney General has, however, routinely disclosed contracts it has entered into with outside counsel, when requests for such contracts are made.

•The last fiscal year in which payments from the Office of Attorney General to private attorneys were recorded in the report submitted pursuant to Subsection G of Title 74 Section 20i of the Oklahoma Statutes was FY 2011. No payments from the Office of Attorney General to private attorneys were recorded in the reports you filed for FY 2012, FY 2013, FY 2014, or FY 2015. As Oklahoma Attorney General, did you enter into any verbal or written contracts with private attorneys for legal representation (whether or not such contracts provided compensation to private attorneys) other than those listed in the reports you submitted for fiscal years 2011 through 2015? Please provide a brief description of each such contract you entered into, the date you entered into the contract, the circumstances necessitating the contract, and the amount—if any—paid under the contract (including details of any non-monetary benefits that you may have obtained, offered, been offered, or delivered in connection with the contract).

Yes. Such information can be requested from the Office of Attorney General through a request made pursuant to Oklahoma's Open Records Act.

•Subsection B of Title 74 Section 20i of the Oklahoma Statutes requires that—when entering into a contract for legal representation by one or more private attorneys—an agency or official of the executive branch must select an attorney or attorneys from a list maintained by the Attorney General. If there are no listed attorneys capable of providing the specific representation, then the agency must obtain the approval of the Attorney General in order to enter into the contract.

○Please describe your process, as Attorney General, for evaluating a request submitted by a state agency to enter into a contract for legal representation by a private attorney not on the approved list. Please provide any documents detailing this process (which you or your staff relied on in making such evaluations) or indicate if this process was undocumented.

o Please provide any documents submitted to you by state agencies requesting approval to enter into a contract for legal representation by a private attorney not on the approved list, as well as your written responses to such requests.

o Please provide any papers documenting decisions made by you or the Office of Attorney General to enter into contracts for legal representation by private attorneys that did not originate with requests submitted to you by state agencies.

o Do you agree that Subsection B of Title 74 Section 20i required you, as Attorney General, to enter into contracts for legal representation only with private attorneys included on the list referred to in that subsection unless there were no listed attorneys capable of providing the specific representation? If not, please explain.

Such information can be requested from the Office of Attorney General through a request made pursuant to Oklahoma's Open Records Act. With regard to your question, because the Office of Attorney General maintains the referenced list, and is authorized to allow representation from attorneys not on the list, the Office of Attorney General plainly has the discretion to allow representation from attorneys not on the list.

Did you—at any time during your term as Attorney General—enter into a written or verbal contract for legal representation (whether compensated or pro bono) by one or more private attorneys not included on the list referenced in Subsection B of Title 74 Section 20i of the Oklahoma Statutes? If so, for each such contract:

o Please provide a brief description of the contract, the circumstances necessitating the contract, and the amount—if any—paid under the contract (including details on any non-monetary benefits that you may have obtained, offered, been offered, or delivered in connection with the contract).

o Please indicate if you entered into the contract with a private attorney not on the approved list because there were no attorneys on the approved list capable of providing the specific representation or for another reason. Please describe the process you followed in reaching a decision to enter into a contract with a private attorney not on the approved list. Please list the attorneys on the approved list that you considered hiring (and deemed incapable of providing the specific representation) before deciding to enter into a contract with a private attorney not on the approved list. For each attorney on the approved list that you considered and rejected, please describe the deficiencies in their capabilities that led you to reject them in favor of a private attorney not on the approved list.

Such information can be requested from the Office of Attorney General through a request made pursuant to Oklahoma's Open Records Act.

•As of January 18, 2017, neither David Rivkin, Jr. (nor any other attorney employed by Baker Hostetler) appeared on the "Approved Attorney List | 20i" accessible on your website at https://www.oag.ok.gov/litigation/1917atty.nsf/wfindatty.html?OpenView.

oDid David Rivkin Jr. represent the State of Oklahoma in its Clean Power Plan case against EPA?

oTo the best of your knowledge, did David Rivkin Jr. or Baker Hostetler receive any compensation or funds from any third party in conjunction with this or any other litigation in which it represented the State of Oklahoma on your behalf? If so, please provide the names of any such third parties.

oDid you enter into a written or verbal contract for legal representation (whether compensated or pro bono) with David Rivkin, Jr. of the Washington, D.C.-based law firm Baker Hostetler? If so, please provide:
a brief description of the contract;
the date you entered into the contract;
the circumstances necessitating the contract;
the deficiencies in the capabilities of attorneys on your approved list that led you to reject them in favor of David Rivkin Jr.—an attorney not on your approved list; and
the amount—if any—paid under the contract (including details on any non-monetary benefits that you may have obtained, offered, been offered, or delivered in connection with the contract).
oPlease list any contributions made by David Rivkin Jr. or any employee of Baker Hostetler to you, your campaign, or any organizations or entities for which you engaged in fundraising, along with the dates of such contributions.

Yes. No. Yes. Information relating to the contract can be requested from the Office of Attorney General through a request made pursuant to Oklahoma's Open Records Act. A full list of contributors to my campaigns for the state senate and attorney general may be found at the Oklahoma Ethics Commission's websites. For state campaign committees from 2002-2014, please use this site: https://www.ok.gov/ethics/public/candidate.php. For 2015 to the present, the Commission uses this site: http://guardian.ok.gov/PublicSite/SearchPages/Search.aspx?SearchTypeCodeHook=1F26BA5E-71EA-48E4-8D50-C1013E9FE0A7. Attached is a letter from the Oklahoma Ethics Commission regarding materials prior to 2002.

•During your term as Attorney General, did you ever enter into an arrangement whereby a private attorney or attorneys represented the State of Oklahoma on your behalf on a pro bono basis while being compensated by a third party? If so, please list the legal matters in which you entered into such arrangements, and, for each matter, the third party or parties that compensated the private attorneys, the amounts paid, and any monetary or non-monetary benefits that you may have

obtained in connection with the arrangement. During your term as Attorney General, did you have a process in place for ensuring that any private attorneys that represented the State of Oklahoma on a pro bono basis did not receive compensation from a third party for the legal services they provided to the state? If so, please describe this process.

No. Our Office would not enter into any such agreement for representation if it believed that the attorney was not truly working pro bono, and the Office would seek assurances from the attorney that they were.

8.The Online Lenders Alliance is "a trade group for online payday and short-term lenders and the companies that steer customers to them," according to a recent Los Angeles Times article describing actions by the Consumer Financial Protection Bureau to protect consumers from misleading advertising claims made by certain members of the payday lending industry.
•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from the Online Lenders Alliance or any other trade, industry, advocacy, or other group representing companies making payday, title, installment, or short-term loans to consumers? If so, please list the amounts and dates of such donations or solicitations.

I am not aware of any such solicitations or donations.

•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from any company making payday, title, installment, or short-term loans to consumers? If so, please list the amounts and dates of such donations or solicitations.

I am not aware of any such solicitations or donations.

•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from any principal, senior executive, officer, or director of a company making payday, title, installment, or short-term loans? If so, please list the amounts and dates of such donations or solicitations.

I am not aware of any such solicitations or donations.

•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from any member of the Board of Directors of the Online Lenders Alliance? For your convenience, the members

of the Board of Directors of the Online Lenders Alliance, along with their business affiliations, are listed below. For each of these individuals, please provide the amounts and dates of their donations, or, if you unsuccessfully solicited donations from them, the dates of such solicitations.

- Kim Anderson, Strategic Link Consulting
- Samantha Bentson, Cashland Online
- Kirk Chartier, Enova Financial
- Doug Clark, Axcess Financial
- Mark Curry, MacFarlane Group
- John Dalton, LeadFlash
- Steve Hotz, The Lead Group
- Clive Kinross, MoneyKey
- Glenn McKay, Selling Source, LLC.
- Bart Miller, Centrinex
- Greg Rable, FactorTrust, INC.
- Ken Rees, Elevate
- Walt Wojciechowski, MicroBilt

I am not aware of any such solicitations or donations.

•On June 16, 2015, you, as Attorney General, sent a letter to Richard Cordray, Director of the Consumer Financial Protection Bureau (hereinafter, "CFPB"), expressing concerns about certain rules the CFPB proposed to regulate payday, vehicle title, and installment lending.

- Was the text of this letter partially or substantially drafted by the Online Lenders Alliance or any other trade, industry, advocacy, or other group representing companies making payday, title, installment, or short-term loans to consumers?
- Did the Online Lenders Alliance or any other trade, industry, advocacy, or other group representing companies making payday, title, installment, or short-term loans to consumers participate in the drafting of this letter in any other way? If so, please explain.
- Did you ask the Online Lenders Alliance or any other trade, industry, advocacy, or other group representing companies making payday, title, installment, or short-term loans to consumers review or provide comments on a draft of this letter before it was sent? If so, please provide any records related to your outreach.
- Did the Online Lenders Alliance or any other trade, industry, advocacy, or other group representing companies making payday, title, installment, or short-term

loans to consumers review or provide comments on a draft of this letter before it was sent? If so, please provide any communications between you or your office and any such group regarding this letter.

As far as I am aware, no as to all.

9.The Consumer Federation of America is an association of non-profit consumer organizations devoted to advancing the consumer interest through research, advocacy, and education.
•Did you ask the Consumer Federation of America or any other interest or advocacy group representing Oklahoma's consumers review or provide comments on a draft of this letter before it was sent? If so, please provide any records related to your outreach.

•Did the Consumer Federation of America or any other interest or advocacy group representing Oklahoma's consumers review or provide comments on a draft of this letter before it was sent? If so, please provide any communications between you or your office and any such group regarding this letter.

As far as I am aware, no as to all.

10.As you may know, Oklahoma has one of the highest usage rates for payday loans in the country and allows payday lenders to charge consumers interest rates of up to 390 percent on annual basis for a 14-day term loan. In November 2016, the CFPB reported that consumers in Oklahoma submitted debt collection complaints at a rate of 36 percent (higher than the 27 percent national average). In addition, the CFPB found that average monthly complaints from Oklahomans increased 17 percent from August through October 2015 (higher than the national rate of 13 percent).

•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from the Consumer Federation of America or any other interest or advocacy group representing Oklahoma's consumers? If so, please list the amounts and dates of such donations or solicitations.

•Have you, your campaign, or any organizations or entities for which you engaged in fundraising ever received or solicited donations from any member of the Board of Directors of the Consumer Federation of America? If so, please provide the amounts and dates of their donations, or, if you unsuccessfully solicited donations from them, the dates of such solicitations.

I am not aware of any such solicitations or donations.

11. You have pursued at least twenty legal actions against the EPA on clean water, clean air and climate change related regulations, including multiple lawsuits that are ongoing. You have additionally criticized the EPA and its scientists on a range of scientific facts and regulations that aim to protect public health.
• Please identify EPA regulations or standards that you do support in their current form.
• In many of your legal actions and activities as Oklahoma AG, you have endorsed positions or signed letters that were drafted by oil and gas industry paid lobbyists. Please identify areas in which your views differ significantly from those of the oil and gas industry?

When negotiations among and between states breakdown EPA has a role to set environmental standards. However, that should be a last course of action instead of the first. I believe environmental statutes are designed with states as a primary implementer. Environmental statutes envision that states have the delegated enforcement and primacy to implement and enforce environmental statutes. Only when that is not happening or when negotiations between and among states breakdown should EPA determine a dispute and only after attempting to assist states negotiate a local solution. I am fond of saying that we need national standards and neighborhood solutions. I think that should shape the work of the EPA. As I also testified at the hearing, when it was appropriate to pursue legal actions or settlement negotiations specifically with the oil and natural gas industry I have done so. When considering new regulations on oil and natural gas production and practices, I have joined other co-regulators in Oklahoma advocating those changes.

12.Your Ethics Agreement states that for a one-year period, you "***will*** seek authorization to participate personally and substantially in particular matters involving specific parties in which I know the State of Oklahoma is a party or represents a party."

•Why does this language assume that you "will" seek authorizations for all such instances?

•Why is your recusal limited to a one-year period, when in some cases the "particular matters" will not be resolved within that timeframe?

•Will you commit to recusing yourself from participating in all such particular matters, without requesting or receiving a waiver, until the matter is fully resolved? If not, why not?

•These 'particular matters' are all litigation in which your Ethics Agreement contemplates you switching from plaintiff in your capacity as Attorney General of Oklahoma (in which you were a principal decision-maker on the part of those litigating against EPA), to defendant as EPA Administrator (in which you would be the principal decision-maker on the response to the lawsuit you filed). Why do

you not believe this creates an unresolvable conflict of interests that makes it impossible for you to properly, lawfully and ethically represent the interests of the EPA, while simultaneously upholding your professional duty to your former client, the State of Oklahoma?

My Ethics Agreement was drafted in close consultation with ethics experts at the Office of Government Ethics and EPA ethics officials, and reflects a diligent effort to ensure that I seek authorization before participating in any matter involving specific parties in which I know the State of Oklahoma is a party or represents a party for one year after my resignation as Oklahoma Attorney General. I believe you may be misreading the language in my Ethics Agreement regarding prior authorization. If, during the relevant time period, I would like to consider participating in a particular matter involving specific parties in which I know the State of Oklahoma is a party or represents a party, I will seek advance authorization to do so. With respect to my professional obligations as a member of the bar, I am not permitted to "switch sides" as counsel in any matter in which I participated as a lawyer. The standards that would apply to me as EPA Administrator are different, however, as I will not be representing the EPA as a lawyer if I am confirmed.

13. During the hearing, you refused to unequivocally recuse yourself from litigation that you brought against the EPA, repeatedly stating that you would follow the direction of agency ethics officials' guidance in this area on a case-by-case basis. Isn't it true that if you are confirmed, the agency ethics officials that you are referring to will report to you, and this reporting relationship could be perceived to have the potential to influence the guidance they provide you with? In light of this, will you commit to the modification of your Ethics Agreement, using your own discretion and authority to do so and prior to any vote on your confirmation, in order to provide more clarity about your intentions for recusal related to each matter involving specific parties in which the State of Oklahoma is a party? If not, why not?

My Ethics Agreement was drafted in close consultation with ethics experts at the Office of Government Ethics and EPA ethics officials, and reflects a diligent effort to ensure I comply with all applicable federal ethics rules. I will abide by the commitment I made in that letter. I am confident in the former staff of the EPA and have no reason to believe they will give me anything other than their best advice on ethics matters. Moreover, not all officials who may consider a request for authorization to participate in a matter will necessarily report to me. Before participating in matters involving specific parties in which I am concerned where there may be a question regarding my impartiality, I would expect, where they deem it appropriate, that EPA ethics officials may consult with ethics experts at OGE before making a recommendation.

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14.I am attaching a January 17, 2017 letter from Citizens for Responsibility and Ethics in Washington (CREW) and a January 18, 2017 letter from The Campaign Legal Center (CLC), both sent to the EPA Designated Agency Ethics Official, for the record and for your review. The CREW letter references several factors related to your refusal to unequivocally recuse yourself from participating in any of these matters as EPA Administrator that would cause a reasonable person with knowledge of the relevant facts "to question his [your] impartiality in these matters" and "to question the integrity of the agency's programs and operations." The CLC letter states that "the plan described in his [your] ethics agreement is insufficient to avoid actual or apparent conflicts of interest, and would cause members of the public to question his impartiality in the conduct of his [your] duties, contrary to his [your] obligation to "ensure that every citizen can have complete confidence in the integrity of the Federal Government.""

•The CREW letter states that ethics regulations demand your recusal from participating personally and substantially as Administrator in particular matters involving specific parties in which the State of Oklahoma is a party, even if the State of Oklahoma withdraws from the matter. Do you agree to make such a recusal for each such matter, even if the State of Oklahoma withdraws from the matter? If not, why not?

•The CREW letter states that "there would be serious and apparent conflicts leading to reasonable doubts about Mr. Pruitt's impartiality if he were to participate in these lawsuits as EPA Administrator *at any point* in their lifetime. It is therefore essential that Mr. Pruitt's recusals last through the full course of each matter." Do you agree to recuse yourself for the full course of each matter involving specific parties in which the State of Oklahoma is a party? If not, why not?

•The CREW letter states that any waiver request you might make from recusal from any of these matters "should be denied based on consideration of the relevant factors listed under" 5 C.F.R. 2635.502(d). Do you agree not to request a waiver from recusal from any such matter? If not, why don't you agree with the analysis of the factors listed in the regulations as they apply to your past litigation history against the Agency that CREW described in the letter should result in a denial of the waiver request?

As discussed above, my Ethics Agreement was drafted in close consultation with ethics experts at the Office of Government Ethics and EPA ethics officials, and reflects a diligent effort to ensure I comply with all applicable federal ethics rules. If confirmed, I will ask relevant federal ethics officials to fully review the issues raised in the CREW letter and, if appropriate, take them into account in determining the proper legal course of action in particular instances.

15.Some of the legal cases that you brought against the agency remain open, and there may be legal decisions that require EPA regulatory action as they are resolved; for example, a court could uphold the EPA regulation and require it to be enforced, or a court could direct such a regulation's revision. Since such regulatory actions would be a direct consequence of the litigation, any conflict of interests associated with your participating in the legal matter should extend to any EPA regulatory or enforcement action taken as a result of court action on the litigation. Do you agree to recuse yourself without waiver and for the entirety of your tenure at the EPA from all such regulatory or enforcement actions that are taken as a result of court action on a specific legal matter from which you were recused? If not, why not?

As EPA Administrator I will recuse from participation in litigation in matters in which I represented the State of Oklahoma, unless I receive informed consent from the State of Oklahoma and the permission of relevant federal ethics officials. It is my understanding that recusal obligations do not extend to regulatory rulemaking of general applicability, which does not create a conflict under applicable rules.

16.If you are confirmed, you will also have the ability to accomplish through *regulation* as EPA Administrator what you have been seeking to accomplish through *litigation* as Attorney General. For example, instead of waiting for a court to decide whether to grant your lawsuit's request to overturn EPA's smog standard, you could start to write a regulation to do just that on your very first day on the job. Will you commit to recuse yourself from working on the revision or elimination of any *regulation* regarding issues on which you have sued the EPA? If not, why not?

It is my understanding under federal ethics rules that regulatory rulemaking of general applicability does not create a conflict.

17. I am also attaching, for the record and for your review, the Ethics Agreement signed by Carol Browner, former EPA Administrator during the Clinton Administration. In her Ethics Agreement, she agreed to recuse herself from participating "personally and substantially in any EPA matter which involves the State of Florida as a specific party and in which I was personally and substantially involved as Secretary, Department of Environmental Regulations, State of Florida". I note that this agreement was not limited to one year in duration and not subject to waivers. I am also attaching, for the record and for your review, the Obama Administration Ethics Pledge that each nominee agreed to uphold, which states, in part, "I will not for a period of 2 years from the date of my appointment participate in any particular matter involving specific parties that is directly and substantially related to my former employer or former clients, including regulations and contracts." If the response to any part of questions 2, 3 or 4 is no, please

also explain why in light of the stronger Ethics Agreements and pledges made by past EPA Administrators?

I am not familiar with the facts and circumstances surrounding Ms. Browner's Ethics Agreement. In my Ethics Agreement, which was drafted in close consultation with ethics experts at the Office of Government Ethics and EPA ethics officials, I agreed to abide by federal regulations that require my recusal from particular matters involving specific parties in which the State of Oklahoma is a party for a period of one year after my resignation as Attorney General, unless I receive a waiver. I will abide by the commitment in that letter, in addition to any other obligations imposed by the Trump Administration as well as my obligations as a member of the bar.

18. In addition to your participation in specific litigation and regulatory matters that raise conflicts of interests, there may be pending enforcement matters at EPA in which donors to you or your political action committees are the subjects. For example, records indicate that Tyson Foods has been the subject of an EPA Clean Air Act enforcement action[3] and reportedly "faces an ongoing criminal investigation by the EPA for its release of toxic pollutants into waterways".[4] Do you commit to recusing yourself from participation in any enforcement matter in which the subject is an entity that has previously made a donation to you or any of your political action committees? If not, why not?

I will consult with relevant federal ethics officials to determine whether to participate in a particular matter.

19. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138 (D.C. Cir. 2015) stated that "Decisionmakers violate the Due Process Clause and must be disqualified . . . when they act with an 'unalterably closed mind.'" One of your filings stated that the agency's record "does not support EPA's findings that mercury, non-mercury HAP metals, and acid gas HAPs pose public health hazards." Do you have an "unalterably closed mind" on the question of whether mercury and acid gas HAPs pose public health hazards? If not, please explain your current view on this question.

As I stated in my testimony to the committee, all legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in my capacity as an advocate. If confirmed as Administrator, I will consider all

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[3] https://www.epa.gov/enforcement/tyson-foods-inc

[4] http://www.meatpoultry.com/articles/news_home/Business/2016/08/Tyson_investors_call_for_envir.aspx?ID=%7B4E28BCD7-045D-489C-8A41-48A6DDDBE99F%7D&cck=1

matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

20. Section 301(a) of the Clean Air Act prohibits the Administrator from delegating authority over many regulatory proceedings. To the extent that you are recused from participating in such decisions, who could lawfully make them?

If I am recused from participating in a matter, the Federal Vacancies Reform Act and other federal law provide a mechanism for another EPA official to perform such functions in an acting capacity. Under current policy, the EPA Deputy Administrator would typically serve this function.

21.Each case in which you litigated on behalf of your former client requested that the court compel EPA to take a specific action; for example, one pending suit asks a court to compel EPA to maintain the ozone standard at 75 ppb instead of lowering it to 70 ppb. A court may direct EPA to take specific actions as these cases are resolved, which will require changes to EPA regulations. Moreover, as EPA Administrator, you could simply direct the Agency to amend its regulations to do the very thing your lawsuit asked a court to do in the first place. This also creates an unresolvable conflict of interests.

• Will you recuse yourself, without waiver and for the entirety of your tenure as EPA Administrator, from any agency proceedings that a) directly result from the resolution of or b) are related to the "particular matters" that your Ethics Agreement agrees you should be recused from? If not, why not, and why do you not believe that such agency proceedings would be covered by your recusal under the applicable Standards of Ethical Conduct for Employees of the Executive Branch?

As EPA Administrator I will recuse from participation in litigation in matters in which I represented the State of Oklahoma, unless I receive informed consent from the State of Oklahoma and the permission of relevant federal ethics officials. I understand that this does not extend to regulatory rulemaking of general applicability, which would not create a conflict under applicable rules.

22. Our oceans are essential for life, and much of what happens on land ultimately ends up in our oceans. There are many ways in which our actions on land can both positively and negatively affect marine life and the marine environment. Under the Marine Protection, Research and Sanctuaries Act (MPRSA), the EPA ensures that harmful substances are not dumped into the

marine environment. Additionally, reducing ocean pollution is a global goal in which the U.S. is an active participant.
• In your opinion, what role does the EPA have in protecting our oceans and the marine life within?
• How specifically will the EPA, under your administration, ensure that harmful manmade substances do not end up in our oceans?
• How will the EPA continue to ensure the U.S. is a leader in reducing ocean pollution, and assisting other countries in reducing pollution that makes it into our oceans?

If confirmed, I will carry out the authorities and responsibilities given to EPA by Congress. These include responsibilities under the Marine Protection, Research and Sanctuaries Act.

23.The greenhouse gas effect traps outgoing longwave radiation causing a radiative imbalance of Earth, ultimately leading to the warming of the globe. The fundamental physics of climate change are well settled.
•Are you aware of the theory of radiative balance of the Earth? Can you briefly describe it?
•Do you understand Planck's law and the difference between shortwave vs. longwave radiation, and how that relates to Earth's energy balance?
•Do you agree that disturbances to this equilibrium can warm or cool the Earth?
•Are you aware of the atmospheric circulation and oceanic currents that transport heat from the Equator to the poles?
•Due to the complexity of the climate system, there are lag times between changes in certain conditions, such as the amount of carbon dioxide in the atmosphere, and other observable changes, such as the temperature of the deep ocean. If an action by the United States or world today, could positively or negative benefit the future, say 50 to 100 years down the road, is that an important consideration?
•Are you aware that there is less ice on land in such places as Antarctica and Greenland than in previous years since the Industrial Revolution? What do you believe is causing this decrease in mass of ice on land?
•To where do you believe the water from ice melt on land goes, and do you believe that could cause global sea levels to rise?
•Do you disagree that additional greenhouse gases in Earth's atmosphere, such as carbon dioxide, will cause a smaller magnitude outgoing longwave radiation to escape to space? Please explain.
•Do you disagree that the burning of fossil fuels, such as oil or natural gas, cause carbon dioxide to be released into the atmosphere? Please explain.
•Do you disagree that if fossil fuels were not extracted and burned, less carbon dioxide would be released into the atmosphere? Please explain.
•Therefore, is it possible, if not probable, that humans releasing greenhouse gases into the atmosphere could cause more heat to be trapped by the atmosphere? Please explain.

•Do you understand that the concept address is the previous question is the basis of human-caused climate change? Please explain.
•If not human burning of fossil fuels, how do you explain the observed increase in carbon dioxide in atmosphere?
•What is a safe level of carbon dioxide in the atmosphere? Please provide this number in parts per million. Please explain.
•If states want to individually take measures to curb greenhouse gas emissions will you allow them to do so? If yes, how will you support them? If not, why does the EPA have the authority to stop a state from implementing measures to curb greenhouse gases?

If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving understanding of the impact increasing greenhouse gases have on our changing climate. I will also adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment consistent with the process and rule of law established by congress. I also believe the Administrator has an important role when it comes to the regulation of carbon dioxide, which I will fulfill consistent with *Massachusetts v. EPA* and the agency's Endangerment Finding on Greenhouse Gases respective of the applicable statutory framework established by Congress. I believe the most effective path towards achieving these objectives is through close partnership with the states granting them regulatory leeway as ascribed by the rule of law.

24. If states want to individually take measures to curb greenhouse gas emissions will you allow them to do so? If yes, how will you support them? If not, why does the EPA have the authority to stop a state from implementing measures to curb greenhouse gases?

Yes, states are free to pursue regulatory measures to address greenhouse gas emissions under state legal authority.

25.A recently released report by *Solar Power Rocks* gave Oklahoma a grade of "F" and found that the "solar industry has been stymied at every turn."
•The length of return for a 5-kilowatt solar array installation is 16 years in Oklahoma, compared to the just 4 years in Massachusetts. Why do you believe that is the case?
•In 2014, the Oklahoma legislature passed legislation putting a surcharge on rooftop solar. Do you support this? Why or why not?

I am not familiar with "lengths of return" or the potential differences in such lengths of return between states, and thus have no opinion as to the cause

of any such differences. I am not familiar with the legislation you reference, and have formulated no opinion with regard to the wisdom of it as a matter of Oklahoma policy.

26. Last week, in his nomination hearing, Rex Tillerson dismissed the importance of America being energy independent. If you are confirmed as EPA Administrator, you will oversee tailpipe standards for cars and SUVs and the renewable fuel standard, two important polices that support energy independence by reducing oil consumption in America. In your view, should achieving energy independence be a priority for America?

As Congress indicated in the Energy Independence and Security Act of 2007, domestic production of renewable fuel contributes to our nation's "greater energy independence and security." Our energy independence will best be achieved by an "all-of-the-above" strategy without the government picking winners and losers. Setting motor vehicle emissions standards is a complex task that requires careful balancing of several competing factors. Setting such standards also requires coordination with NHTSA, which continues to administer the CAFE program. I will consider the relevant factors carefully and will coordinate closely with NHTSA on any motor vehicle emissions standards that will be addressed during my tenure if I am confirmed as Administrator.

27.A cornerstone of science is impartiality and following the facts. This is what has allowed the United States to be a world leader in science.

•Do you commit to allowing EPA scientists to do their jobs and not interfere with their science?
•How will you ensure that scientists, such as those employed by EPA, are allowed to continue their work unimpeded by potential challenges due to their topic of research?
•Do you agree that only scientists and technical experts, not impeded by political influence, should edit scientific work? If not, why?
•In your opinion, what is the role that a public affairs office has in editing any potential publically available statement or information?
•Do you pledge that your all of your work as EPA Administrator will be guided by the best available science?
•Do you commit to maintaining EPA's Scientific Integrity Policy regardless of research area?

If confirmed, it will be a privilege to work with EPA scientists and the thousands of other public servants at EPA. I have no first-hand knowledge of the role of the public affairs office as referenced in the question and, if confirmed, I expect to learn more about the office. Indeed, I fully believe, as former EPA administrators have stated, that sound, objective science must

serve as "the backbone" of EPA actions. I have no first-hand knowledge of the specific scientific integrity policy referenced in the question and, if confirmed, I commit to thoroughly reviewing the policy and to follow applicable laws and federal guidance regarding scientific integrity, information quality, and transparency.

28.It has been reported by *Wired* that President-elect Trump plans to undo President Obama's June 2013 Climate Action Plan, and remove materials from EPA websites. While we understand revising policies from administration to administration, the reports of removing environmental data from EPA websites is troubling. Will you commit to keeping environmental records, data, and records provided as part of previous rulemakings publically available on the EPA's website?
•Will you commit to ensuring that any current publically available dataset remains available and easy to access? If not, please explain.
•Will you ensure that all data interpretation tools available on the EPA website remain publically available and easy to access? If not, please explain.

I have not been briefed on any changes to the EPA website following the transfer of power from the Obama Administration to the Trump Administration. That being said, I commit to reviewing the materials that are included on the EPA site if I am confirmed.

*29.*I have heard that EPA's Fiscal Year 2018 budget request may include a 17% budget cut. . I am troubled by this reported planned cut to EPA budget and urge you to reconsider this drastic move. Will you maintain robust funding for scientific research at EPA, and to ensure that environmental data continues to be collected?

I have no first-hand knowledge of EPA's development of its FY 2018 budget request. If confirmed, I will work to ensure that the limited resources appropriated to EPA by Congress are managed wisely in pursuit of that important mission and in accordance with all applicable legal authorities.

30.Hydraulic fracturing (fracking) now provides more than half of the United States oil output. In 2000, fracking provided less than 2% of America oil. This has dramatically changed the energy landscape of the United States.
•Do you believe that hydraulic fracturing (or fracking) is the cause of the increased frequency and strength of earthquakes in Oklahoma? Please explain.
•As Attorney General have you taken any actions related to earthquakes caused by fracking?
•In May 2016, you testified that the decline in the coal industry was due to the price drop of natural gas and not EPA regulation. Do you stand by this statement? If not, why have your views changed?

•Do you believe that fracking can contaminate drinking water supplies? Please explain.

Scientists from the state level up to the National Research Council have found that the act of hydraulic fracturing itself poses very little risk of creating seismic events. Seismicity concerns related to the oil and natural gas industries are more commonly tied to the underground injection of wastewater which is regulated by the Safe Drinking Water Act. As I stated in my testimony, in Oklahoma the Corporation Commission has jurisdiction over this matter and I have been in contact with that agency that has taken very meaningful steps to address seismic concerns. I believe that there is not one single factor that has precipitated the decline in the coal industry alone. Finally, I agree with EPA's Dr. Thomas Burke who, following the release of EPA's final hydraulic fracturing water study, reiterated that the Agency only found a small number of confirmed cases of contamination. With well over one million wells that have been hydraulically fractured in the United States the evidence found by EPA suggests a very low likelihood of drinking water contamination from hydraulic fracturing or its associated activates.

31.This past December, the EPA released a report entitled, "Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States." The EPA found scientific evidence that fracking activities can affect drinking water supplies.
•Have you read this report?
•What steps will you take as Administrator to reduce the possibility of drinking water contamination due to hydraulic fracturing activities?
•Of those chemicals used in hydraulic fracturing activities, the EPA found that nearly 200 might pose a public health risk. Will you commit to continuing to study these identified chemicals and the potential health risks, as well as identify other potential harmful chemicals used in hydraulic fracturing activities?

I am familiar with the report and if confirmed as EPA Administrator I will faithfully execute my legal duties to administer laws as authorized by Congress including the Safe Drinking Water Act. Understanding and studying risks to local communities is something central to the role as Administrator and I will continue to study potential risk using the Agencies many tools.

32.Do you agree the Clean Air Act health benefits significantly outweigh costs? For example, a peer-reviewed study found that in 2010 alone the Clean Air Act Amendments of 1990, which reduced fine particulate pollution and ozone, avoided more than 160,000 premature deaths, 130,000 heart attacks, prevented 13 million missed workdays, and avoided 3.2 million missed school days by children.

Based on the limited information provided, it is unclear as to the specific study referenced. However, as I indicated in my testimony, I am incredibly proud of the progress the U.S. has made to provide public health protections and improve our environmental stewardship while also growing our economy. If confirmed, I commit to continue this progress and protect the American people through commonsense and lawful regulations.

33.According to the Consumer Reports National Research Center survey completed in June 2016, 84 percent of Americans feel that automakers should continue to improve fuel economy for all vehicle types. About three-quarters of survey respondents specifically indicated that the U.S. government should require vehicle manufacturers to improve the fuel economy of their vehicles over time. As you may know, when the government stopped increasing fuel economy standards for two decades in the mid-1980s, vehicle fuel economy stopped improving. Now that we are once again making progress, what will you do to make sure that vehicle fuel economy continues to improve as Americans expect?

While the EPA regulates emissions under the Clean Air Act, it is true that Congress vested authority to regulate fuel economy through the Corporate Average Fuel Economy (CAFE) standards" framework set forth originally in the Energy Policy and Conservation Act. Congress vested responsibility for the CAFE program in the Department of Transportation, not the EPA; accordingly, I take no position on Congress's policy decision on this subject, or on the Department of Transportation's administration of the CAFE program. If confirmed as EPA Administration, I would administer the Clean Air Act in accordance with the terms of the Act, including Congress's statutory policy objectives, and would do so on the basis of the factual record in any given proceeding.

34.After conducting its Midterm Evaluation of fuel economy standards for model years 2022 through 2025, the EPA determined that automakers were well-positioned to meet the standards at lower costs than previously estimated. In fact, the EPA chose to retain the current standards to provide regulatory certainty for the auto industry despite a technical record suggesting that standards could be made more stringent.

Among the technologies that the EPA considered in reaching its determination that fuel economy standards could be readily achieved were so-called “off-cycle technologies.” Off-cycle technologies are innovations such as more efficient air conditioning through enhanced window glass that reduces solar load, stop-start systems, solar panels, active aerodynamics, and adaptive cruise control. By reducing the energy demands placed on the engine, these technologies serve to improve fuel economy and reduce tailpipe emissions of carbon pollution. Vehicle manufacturers may claim “off-cycle credits” for these carbon pollution-reducing technologies which may have benefits not adequately captured as part the

standard fuel economy testing procedures.

Americans in Massachusetts, Ohio, Tennessee, North Carolina, Michigan, Indiana and across the country have good-paying jobs that depend on vehicle manufacturers continuing to demand these innovative technologies.

In your hearing, you explained how important it is for the EPA to consider jobs and economic impacts as part of its analysis and decision-making. If confirmed, would you support the “off-cycle credit” mechanism included that the EPA included in its fuel economy standards—a mechanism that drives American innovation and job growth? If not, please explain your position.

If confirmed, my job as Administrator would be to administer the statutes that Congress has enacted, including the statutory objectives that Congress incorporates into those statutes. If Congress chooses to enact legislation to promote certain technologies, such as "off-cycle" vehicle technologies, then those statutory priorities would fall within the EPA Administrator's responsibility. If confirmed, I would look forward to working with Congress on any such statutory proposals that it legislates.

35.Is the carbon dioxide that comes out of car tailpipes physically or chemically different from the carbon dioxide that comes out of power plant smokestacks? If so, how?

As a matter of law, Congress elected to enact different statutory frameworks for regulating emissions from stationary sources and mobile sources: Title I of the Clean Air Act for the former, Title II for the latter. As the Supreme Court recognized in Utility Air Regulatory Group v. EPA (2013), these two frameworks have significant differences.

36.Would the impact on the climate system of carbon dioxide from power plants be any different from that of carbon dioxide from tailpipe emissions? If so, in what way?

As noted above, Congress elected to enact different statutory frameworks for regulating emissions from stationary sources and mobile sources: Title I of the Clean Air Act for the former, Title II for the latter. As the Supreme Court recognized in Utility Air Regulatory Group v. EPA (2013), these two frameworks have significant differences.

37.Do you agree that the power sector and the transportation sectors each contribute at least a quarter of U.S. carbon dioxide emissions?

According to the EPA (https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions), in 2014 electricity generation accounted for 30% of total greenhouse gas emissions (quantified in terms of metric tons of CO2 equivalent), and transportation accounted for 26%.

38.Congress established protections for the air in national parks and wilderness areas in the Clean Air Act amendments of 1977. The quality of the air in New England parks like Cape Cod national seashore and Acadia national park suffers from pollution blown in from elsewhere. Last summer you joined other Attorneys General in comments objecting to the EPA's amendments to the Regional Haze Rule. Given your previous objection, if confirmed as EPA administrator, what will you do to fulfill the 40-year directive from Congress to protect and restore the air quality of national parks like Cape Cod and Acadia even if it requires states from outside the region to reduce their air pollution?

As I stated in my testimony before the Committee, I agree that the Clean Air Act gives EPA an important role in addressing interstate pollution issues, among many other things. All legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in my capacity as an advocate. If confirmed, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

39.The 1977 Clean Air Act amendments also provide a role for federal land managers in protecting the air quality of national parks and wilderness areas. If confirmed as EPA Administrator, how will you make sure that EPA honors the obligations federal land managers have under the Clean Air Act and that their expertise is incorporated into the policies necessary to achieve the goal of natural air quality?

I am confirmed, I will exercise my authority consistent with Congress's intent in enacting the Act. This includes acting transparently in a manner that takes into account the views of the federal land managers where the Act calls for their views, such as in assessing visibility impacts from new major sources in the preconstruction permitting process.

40.When Congress passed the original Renewable Fuels Standard (RFS) in 2005, "inadequate domestic supply" and "severe harm" to the economy were the only conditions under which the general waiver authority allowing the EPA to waive the RFS could be invoked. Despite this clear direction from Congress, in its 2014-2015-2016 final Renewable Volume Obligation (RVO), EPA used "available refueling infrastructure" as a condition to waive the standard even though Congress expressly rejected it. Do you believe that EPA's use of this reason for

granting a waiver in the 2014-2015-2016 RVO is consistent with Congressional intent and the law?

As I stated at my hearing, I believe the EPA Administrator should use its waiver authority judiciously and not to undermine or question the commitments made by Congress when enacting the RFS.

41.The Renewable Fuels Standard (RFS) is one of our country's most important tools to reduce carbon pollution from the transportation sector. The 2007 amendments to the RFS included increasing volumes of cellulosic and advanced biofuels. If confirmed, will you increase the blending targets for cellulosic and advanced biofuels, including biodiesel, given Congressional intent? What role can EPA play to facilitate the expansion of cellulosic and advanced biofuels, including biodiesel?

Section 211(0) of the Clean Air Act contains enumerated tables of applicable target volumes of renewable fuel, specifically cellulosic and advanced, for calendar years 2006 through 2022. As I indicated in my nomination hearing, it is not the job of the Administrator of the EPA to do anything other than administer the program according to the intent of Congress. If confirmed, I will work to administer this program in accordance with statute and Congressional intent.

42.In response to an Inspector General report, the EPA announced in August that it would update the estimates of carbon pollution reduction from renewable fuels. If confirmed as Administrator, will you commit to completing this update and using the best available commercial and scientific information, including a recent USDA report on the emissions profile of renewable fuels?

I have not had an opportunity to review the referenced report, but, if confirmed, I will review it.

43.In a response to a Renewable Fuels Standard question, you stated during the hearing that "we have less consumption today." Please provide the annual U.S. consumption of gasoline since 2005 as well as forecasts for 2017 and 2018. Is U.S. consumption of gasoline declining or increasing?

In the course of my nomination hearing, I referenced market conditions that have changed since 2005, when the initial RFS program was enacted. When the program was updated in 2007, Congress could not predict how the

market conditions would further change, from decreased consumption to more fuel-efficient vehicles, and therefore provided the Administrator with the ability to waive certain provisions contained in the Act. As I stated at my hearing, I do not believe the EPA Administrator should use this waiver authority to undermine the commitments made by Congress when enacting the RFS.

44.EPA set out to reduce mercury, arsenic, and other toxic chemicals from coal and oil-fired power plans through a rule that you sued to block. Power plants account for half of the mercury emissions in the United States and EPA's Mercury and Air Toxins Standards rule could save up to 11,000 lives and save $90 billion on health costs each and every year across the United States.

•The World Health Organization states that mercury has a toxic effect on humans, and in particular poses a significant threat to child development. Do you agree that mercury is a toxic substance and exposure to it should be limited? Please explain.

•Most people are exposed to mercury from eating fish and shellfish. Do you agree that we should take appropriate steps that reduce the amount of mercury in fish and shellfish? Please explain.

As I stated in my testimony before the Committee, mercury is appropriately regulated as a hazardous air pollutant under Section 112 of the Clean Air Act. If I am confirmed as Administrator, I will regulate under Section 112 in a manner that is consistent with Congress's intent in enacting that provision. I will also faithfully administer other federal statutes that regulate mercury to the extent that they are under my jurisdiction, including the Mercury Export Ban Act of 2008, the Mercury-Containing and Rechargeable Battery Management Act of 1996, the Clean Water Act, the Emergency Planning and Community Right-to-Know Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act.

45.Donald Trump recently bemoaned "you're not allowed to use hair spray anymore because it affects the ozone." Hairspray is still available for sale, just without the chemical responsible for the ozone hole.

The ozone hole was first discovered in the mid-1980s. The world quickly came together to address the ozone hole through the Montreal Protocol. Actions were taken prior to confirmation of the hypothesis that chlorofluorocarbons (CFCs) due to human emissions, that chemical Donald Trump alluded to in his statement, to address the ozone hole. The treaties to address the ozone hole were the first universally ratified treaties in the history of the United Nations.
•Do you agree with the overwhelming scientific evidence that CFCs are the cause of the historic depletion of the ozone layer? If not, why not?

•Do you consider the "Montreal Protocol on Substances that Deplete the Ozone Layer" to be a success? If not, why not?
•Considering the success of the world coming together to solve an environmental problem in that instance, do you believe that such a framework could be used as an example to solve other global environmental problems? If not, why not?

I consider the Montreal Protocol to be a successful example of the world coming together to solve an important environmental problem and that the Montreal Protocol could serve as an example to the President as he exercises his foreign affairs powers and to the Senate as it considers ratification of any treaty that may come before it.

46.Mr. Pruitt, you have repeatedly sued EPA to overturn regulations that seek to protect Americans from the effects of soot, ozone, greenhouse gases, mercury, arsenic and other air pollutants. These toxic air pollutants are often blown east from large industrial and energy sources in the Midwest, particularly impacting air quality and public health from Maine and Massachusetts to the Smoky Mountains.

•EPA's Clean Air Scientific Advisory Committee, which provides independent scientific advice to EPA on its air pollution standards, said that ozone causes a "decrease in lung function, increase in respiratory symptoms, and increase in airway inflammation." Do you agree with this scientific conclusion? Please explain.

•EPA projected that its final Cross State Air Pollution Rule would avoid up to 34,000 premature deaths, 15,000 non-fatal heart attacks and 400,000 asthma attacks – every year. Do you agree with this conclusion? Please explain.

•The EPA concluded that the health effects associated with fine soot particles include premature death, more ER visits and increased frequency of chronic respiratory disease. Do you agree with this conclusion? Please explain.

As I stated in my testimony to the committee, all legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in my capacity as an advocate. If confirmed as Administrator, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

47.Lead is not just a problem in Flint, Michigan, but all over the United States including Oklahoma. In your capacity as Attorney General of Oklahoma, what did you and your office do to prevent childhood lead exposure?

While I am concerned about children's health, matters of the sort you reference would be handled by Oklahoma's environmental regulators at the

Department of Environmental Quality and the Oklahoma Water Resources Board.

48.During your confirmation hearing before the Environment and Public Works Committee, in response to a question, you indicated that you did not know if there is a safe level of lead. Scientific experts at the Centers for Disease Control and Prevention (CDC) and the World Health Organization, among other leading scientific bodies have repeatedly warned of the dangers of lead, specifically to children, concluding that there is no level of lead exposure that is safe.

•Do you agree that exposure to lead is dangerous and that no level of exposure should be considered safe?

•If confirmed, will you commit to making reducing childhood lead exposure a priority?
•What specific strategies will you implement to reduce lead exposure?
•Will you advocate for more funding for the programs that reduce lead exposure risk, especially in children?

I have not myself reviewed the scientific studies correlating blood lead levels to impacts in children. However, it is my understanding that neither EPA nor CDC have identified a "safe" level of exposure, but instead have adopted levels appropriate for action under their specific statutory authorities. If confirmed I will carry out EPA's authorities to reduce exposure to lead, including exposures by children.

49.The EPA is tasked with implemented the Safe Drinking Water Act (SDWA), and ensuring that the drinking water supply for many Americans is safe. Given the Flint, Michigan drinking water crisis, many Americans that took clean water for granted are now being faced with questions about a basic necessity.
•The Water Infrastructure Improvement for the Nation (WIIN) Act of 2016, or WIIN Act, passed Congress was signed by the President, and became public law on December 12, 2016. Will you commit to, as expedient as practicable, implementing the changes to the Safe Drinking Water Act?
•The human-caused drinking water crisis in Flint, Michigan has highlighted the widespread concern of lead in drinking water pipes across the nation. Additionally, nearly 4 million Americans may be unknowingly drinking unsafe water. Are you aware of how many public water systems in the United States have issues with lead in drinking water above safe levels?
•If a public official knowingly exposes their community to dangerous levels of contaminants, such as lead, should that official be held accountable for such actions? What do you think are acceptable punishments for such an action?
•If confirmed as EPA Administrator, what will you do to ensure that communicates across America have safe drinking water that is not contaminated with lead?

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If confirmed I will fully implement the changes to the Safe Drinking Water regulatory requirements made by the WIIN Act, including the changes to the notification requirements relating to lead levels in drinking water. If funding is provided, I will also implement the assistance programs authorized in that Act. I also will fully implement the existing authorities under the SDWA, including, as appropriate, EPA's authority to take emergency action. If confirmed I will seek a briefing from EPA staff on the number of public water systems that are not in compliance with the SDWA Lead and Copper Rule. I am unaware of EPA authorities to punish individuals other than to seek the resignation of responsible EPA officials, such as the resignation of the former Regional Administrator of EPA Region 5 who resigned after her failure to act upon information regarding the lead levels in the Flint water system became public.

50.The updated Toxic Substances Control Act (TSCA) requires that EPA evaluate the risks to "potentially exposed or susceptible subpopulations" and take action to protect these subpopulations from all identified risks. Do you commit to follow this statutory requirement?

Yes.

51.As Oklahoma Attorney General, you have consistently advocated for the rights of states in the area of environmental protections. Will you apply the preemption provisions in TSCA in a manner that is consistent with the statute and your pre-stated philosophy when it comes to state leadership on environmental protection matters?

As I stated in my letter to Senators Inhofe and Boxer from April 9, 2016, I believe the Lautenberg Act ensures states have an important voice at the table and I will apply the law as enacted by Congress.

52.The new law greatly increases transparency and provides EPA with an obligation to protect against unjustified claims of confidentiality by industry. Do you commit to uphold the bill's statutory requirements in this area?

As I stated in my letter to Senators Inhofe and Boxer from April 9, 2016, I believe public dissemination of information about chemicals is critical to ensure public health and safety is upheld. In my view the Lautenberg Act struck a common sense balance between protecting confidential business information and informing the public and I intend to apply the law as enacted by Congress.

53.Do you agree that transparency is important to meaningful public participation in EPA's work on chemicals under TSCA? Do you commit to increasing transparency by fully implementing the provisions in the new law to prevent unjustified claims of confidentiality by industry?

As I have previously stated I believe the Lautenberg Act struck an appropriate balance between protecting confidential business information and informing the public and I intend to apply the law as enacted by Congress.

54.One of the reasons Congress was able to agree on a major re-write of TSCA was because of the fundamental agreement we made to clarify the law to ensure that costs could not be considered when EPA decided whether a chemical was safe or what level of a chemical was safe. Costs could only be a factor when deciding what type of regulation to require to meet that safe standard. Do you continue to support this approach? Would you oppose any effort to change this reformed approach to regulation?

If confirmed I intend to faithfully execute all provisions of the Lautenberg Act as enacted by Congress.

55.Nearly three decades ago, President George H. W. Bush attempted unsuccessfully to ban asbestos. Asbestos is banned in 55 countries across the globe and the World Health Organization says, quote, "all forms of asbestos are carcinogenic to humans". More than 30 Americans die each day from diseases like asbestosis and cancer caused by asbestos. Yet, in his 1997 book, *The Art of the Comeback*, President-elect Trump stated, that asbestos is, quote, "100 percent safe, once applied" and that he, quote, "believe[s] that the movement against asbestos was led by the mob." Do you agree with Mr. Trump that asbestos is 100 percent safe once applied or that the movement against asbestos was led by the mob?

Asbestos has been identified by the EPA as a high-priority chemical that requires a risk evaluation following the process established by the Lautenberg Act to determine whether conditions of use of the chemical substance pose an unreasonable risk. Prejudging the outcome of that risk evaluation process would not be appropriate.

56.In 2015, I released a reported entitled, "Failing the Grade: Asbestos in America's Schools."[5] Asbestos is still found in schools across America, and the true scope of the problem is still hard to ascertain. More than 53 million American children and six million American adults spend large portions of their days in school buildings that may contain dangerous environmental hazards. My report laid out recommendations on how to address the findings of the report.

•Millions of students attend schools that may have asbestos and this is clearly a widespread problem. How would the EPA under your direction, if confirmed, begin to assess the true scope of the problem?

•Will you commit to raising awareness among students, parents, teachers, and other employees about persistent asbestos hazards in school buildings? If not, why not?

•Do you support periodic reporting requirements for schools to report their progress related to the management and abatement of asbestos? If not, why not?

•Do you support additional funding for enforcement actions for schools that do not follow the law and may be exposing children to asbestos? If not, why not?

•Do you support public access to information about where asbestos can be found in products, school buildings, and elsewhere to empower the public to avoid preventable asbestos exposures? If not, why not?

•Do you support providing consumers with access to current information about asbestos-containing products? If not, why not?

•Do you support schools that are known to have asbestos updating their reports of where asbestos is located within a school? If not, why not?

•Do you support states communicating information to the EPA on their progress with implementation of asbestos response plans? If not, why not?

•Do you support continued research and outreach to improve public awareness of the danger of asbestos exposure? If not, why not?

If confirmed I will take the responsibility of protecting human health and the environment very seriously and in accordance with the legal authorities established by Congress. EPA has identified asbestos as a high-priority chemical and is now required to set the scope of review as well as conduct a risk evaluation of the conditions of use of the substance. Without prejudging that review process any conditions of use of asbestos or any other chemical substance that pose an unreasonable risk are required to be addressed under the law and appropriate communication of chemical reviews as well as transparency in the process is an important aspect of the law as passed by Congress. In addition to the Lautenberg Act, in 1986, Congress enacted the Asbestos Hazard Emergency Response Act (AHERA) and then later amended the act in 1990 to modify EPA's school asbestos remediation program. While I have not assessed the appropriateness of periodic reporting requirements, if confirmed I intend to use the authorities granted to the Agency by Congress under TSCA and other statutes to

[5] http://www.markey.senate.gov/imo/media/doc/2015-12-Markey-Asbestos-Report-Final.pdf

assess potential dangers as well as inform and protect the public as appropriate.

57.Last year entitled, "The ABCs of PCBs: A Toxic Threat to America's Schools."[6] Although Congress and the EPA banned the production and most uses of PCBs in 1979, the toxic chemical is still found in many schools across this country. In addition, my report laid out six recommendations.

•Since up 30% of students may be exposed to PCBs, this is a widespread problem. How would the EPA under your direction, if confirmed, begin to assess the true scope of the problem?

•PCBs are found within caulk and fluorescent light ballast in American schools. How would you encourage the removal of PCB-containing materials? Since these ballast are nearing the end of their useful life, EPA has said that it "recommends all PCB-containing FLBs be removed from lighting fixtures". Would you support the promulgation of a regulation under section 6(e) of TSCA that updates EPA's current regulations for PCBs and includes a requirement that all PCB-containing ballast be removed from schools and daycare facilities? If not, why not?

•There are multiple local education agencies and schools that have been seeking the advice and assistance of the EPA in dealing with PCB issues. Will you commit to assisting these agencies and schools and ensuring that the guidance EPA provides across all Regions of EPA is consistently and proactively provided? If not, why not?

•Do you support a requirement that each each school that was built or retrofitted between 1950 and 1979 (and therefor may contain PCBs) undergo a survey (to be administered by the local educational agency) in order to determine whether and where PCBs may be located within a school? If not, why not?

•Do you support a requirement for recordkeeping by state and local educational agencies of testing for, response to, and remediation of PCB hazards in schools? If not, why not?

•Do you support the EPA updating its testing guidance to encourage inspections of all schools built or retrofitted between 1950 and 1979, and improve its efforts to proactively and consistently communicate testing guidance to states, local education agencies, and schools with potential PCB hazards? If not, why not?

•Do you support the EPA developing guidance regarding the means by which parents, teachers, and employees should be notified of potential PCB hazards by schools and daycare facilities, including the manner in which such hazards should be described? If not, why not?

•Do you support the development and provision of updated guidance on the proper remediation of PCBs by EPA for schools, daycare facilities and other entities to use? If not, why not?

•Do you support the EPA proactively and regularly sharing best practices and other information outreach to states and school districts, and enforcement

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[6] https://www.markey.senate.gov/imo/media/doc/2016-10-05-Markey-PCB-Report-ABCsofPCBs.pdf

activities, related to PCB hazards in schools and daycare facilities across all EPA regions? If not, why not?
•Do you support EPA regional offices increasing their outreach to states and local education agencies to make them aware of available EPA's PCB regulations, guidance and resources? If not, why not?
•Do you support the EPA updating its current guidance on PCB hazards in schools to incorporate lessons learned from previous remediation projects and best available science? If not, why not?
•Do you support schools having detailed plans on how a school specifically plans to ensure the proper removal of PCBs before starting a PCB remediation project? Please explain.
•Do you support the authorization and appropriations of money for the testing for, response to, and remediation of PCB hazards and other environment hazards in schools? Please explain.

Addressing the issues of possible harmful exposures to chemicals in schools is an issue I would take very seriously if confirmed as EPA Administrator. While protecting children from exposure to chemical substances of concern it is important to have all the facts and ensure that an action does not create unintended consequences or put children at potentially greater peril via risk shifting or the possibility of remedial actions resulting in greater exposure to a substance. While I would not prejudge a regulatory outcome under the TSCA or any other law, I will work collaboratively with state and local governments and citizens to address issues and ensuring EPA regions are consistent and performing their legally required duties will be a priority if confirmed.

58.The Environmental Working Group reported that Oklahoma led the nation in pesticide-related illness and deaths between 2000 and 2010 based on data from the Center for Disease Control and Prevention.[7]
•Are you aware that your state, Oklahoma, leads the United States in pesticide-related illness and deaths? Why do you think this is the case?
•Recent reports have suggested that the increased use of pesticides is linked to the rapid decline in the bee population. What is your understanding of the science explaining the cause of the decline in bees in the United States?

I am not personally familiar with the report referenced in this question or generally the rate of pesticide usage in Oklahoma. I am generally aware of the important role bees play as pollinators, but it is unclear from the information provided in the question what specific reports are being discussed. If confirmed as Administrator, I would expect to be briefed by EPA staff before taking action on this issue and would work to ensure EPA

[7] http://www.ewg.org/agmag/2016/12/pruitt-s-home-state-leads-nation-pesticide-illnesses-and-deaths

followed all applicable legal requirements and made its decisions based on sound science.

59.Racial minorities and low-income communities are disproportionately affected by environmental pollution, siting of waste disposal facilities, and other industrial pollution causing activities. In many instances, the combination of poverty and race as well as lax enforcement and oversight of industrial activities results in worsened health outcomes by these communities.
•How will you address environmental justice and equity for minority and poor communities through EPA programs?
•What will you do to improve health equity as administrator of the EPA?
•What are your plans on reducing toxic pollution and disproportional burden of pollutants in communities of color?
•What will you do to increase enforcement and oversight in communities that are bearing the burden of environmental hazards?

•In your confirmation hearing, you committed to making environmental justice a top priority. If confirmed, will you commit to dedicating funding to assist minority and poor communities with resources and technical assistance to better engage with the EPA and industry about pollution activities and concerns occurring in their communities?

•What will you do to improve the EPA's office of Civil Rights to ensure that the EPA is in compliance with the Civil Rights Act of 1964?
•Will you uphold and make a top priority throughout the agency's work, Executive order 12898, which requires federal agencies to make "achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."
•Do you vow to ensure that environmental justice activities throughout the agency remains focused on poor and minority communities?
•EPA recently developed the agency's EJ2020 action Agenda to better deliver on its historical promises of reducing disparities in environmental protection. Will you utilize and uphold this guidance and procedures outlined in this document throughout the work of the agency? Please explain.

As I testified, the Administrator plays an important role regarding environmental justice. If confirmed, I would work to faithfully execute the laws EPA is responsible for administering, in order to protect human health and the environment for all Americans. If confirmed, I would expect EPA to operate in an open and transparent manner, consider the views of stakeholders as appropriate, act based on sound science, and follow the laws as established by Congress, including the Civil Rights Act. I am personally unfamiliar with the operations of EPA's Office of Civil Rights and details of current indicatives regarding environmental justice referenced in the question, but I would expect, if confirmed, I would be briefed by staff about ongoing programs and activities before taking any action.

60.If you are confirmed, do you commit not to direct the cessation of or otherwise impede the investigations or actions of the EPA Office of Enforcement and Compliance Assurance? If not, why not?

I am unfamiliar with the specific details of the actions referenced in the question. I would expect to be briefed by staff, in consultation with the Department of Justice as appropriate, before taking any action.

61.For each year since 1995, please provide information regarding the State of Oklahoma's environmental enforcement efforts. Specifically, for each year, please provide a list that includes:

•A brief description of each environmental enforcement action (including investigations and enforcement proceedings) initiated by the AG's office, including the date the action was initiated, the name of the subject of the action, and the nature of the action and environmental violation that led thereto.

•The annual budget of the Office of Environmental Enforcement, both in dollar terms and as a percentage of the AG's annual budget.

•The number of employees in the Office of Environmental Enforcement and in the AG's office writ large.

•A description of each environment enforcement action (including investigations and enforcement proceedings) that was closed, including a description of the resolution of the matter, whether a fine or penalty was levied (and if so the amount of such fine or penalty), whether non-monetary remedies were required (and if so, what), and whether a criminal prosecution was initiated in the matter (and if so what the resolution of the prosecution was).

In order for you to receive a comprehensive response to a voluminous request of that nature, I would direct you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act.

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Senator Merkley:

1. In an interview with The Oklahoman in 2015, you were talking about Oklahoma's environmental lawsuit against poultry producers who were polluting the Illinois River basin, and you said that in your view, regulation through litigation is the wrong approach. However, you have been highly active in bringing lawsuits against the EPA, whose regulations typically incorporate information gathered as a result of the kind of extensive stakeholder outreach that you seem to value. What have your experiences in suing the EPA taught you about how to lead the agency?

My experiences suing the EPA have taught me the value of ensuring that the EPA acts lawfully so that the regulations it promulgates are actually put to work protecting the environment, rather than being invalidated by courts.

2. The legal actions that you have brought against the EPA suggest that you feel the agency does not have the expertise or skill to make adequate assessments about how to maintain environmental standards. How do you propose to improve the EPA's capabilities so that the agency can achieve its goals in the proper manner?

The legal challenges I have brought have been to protect the interests of Oklahoma. If confirmed, I expect to learn more about EPA's workforce needs and ensure that the Agency is working towards achieving its goals in a proper manner.

3. You have said that the "American people are tired of seeing billions of dollars drained from our economy due to unnecessary EPA regulations". In a poll taken in December 2016 of 2,000 supporters of President-elect Trump, 64% of Trump voters support maintaining or increasing the federal budget for environmental protection and conservation. 78% of the Trump voters said they supported air pollution regulations generally, and 61% said companies should be required to reduce their carbon emissions. These are the people who supported Donald Trump, the man who nominated you for this position. Do you share the view of the majority of Trump voters and support maintaining or increasing the federal budget for environmental protection and conservation? Do you share the view of the majority of the President-elect's supporters that companies should be required to reduce their carbon emissions?

If confirmed as Administrator, I look forward to working with President Trump to achieve his environmental priorities using the tools authorized by Congress and respectful of the rule of law.

4. Several states, including Oregon, Washington, and California, have taken steps to regulate and reduce greenhouse gas emissions. Would you, as the leader of the EPA, attempt to undermine state-led attempts to combat climate change?

I respect and believe the states have a very important role in setting and implementing environmental standards that reflect the needs, challenges and expectations of their local communities. Congress established a clear process by which states may set more stringent standards subject to the approval of the Administrator and based on the specific request made and the corresponding record submitted. If confirmed and if I receive any such requests, I will consider them consistent with applicable statutory framework established by Congress.

5. The EPA produces a wide range of scientific documents. Are you committed to allowing EPA scientists the right of last review of all reports, executive summaries, press releases and websites related to purely science-based documents?

If confirmed, it will be my privilege to work with EPA scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to improving public health and our environment. Scientific documents are critical to EPA's decision-making and I commit, if confirmed, to ensure EPA scientific documents follow applicable laws and federal guidance on scientific integrity, information quality, and transparency.

6. Are you committed to transparency at EPA? If so, will you commit to making sure that EPA data is proactive made available to the public, consistent with privacy and confidential business information laws? Will you ensure that all data and data interpretation tools that are currently on EPA websites continue to be publicly available, and, if they become out of date, are archived in an accessible manner?

Yes, I am committed to transparency at EPA. I commit to making sure that EPA data is made available to the public consistent with privacy and confidentiality laws, and I will ensure that all EPA tools currently available to the public will remain accessible to the public and will be archived appropriately.

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7. How would you incorporate independent science in your decision making?

If confirmed, it will be my privilege to work with EPA scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to improving public health and our environment. I believe EPA decision-making should be based on sound, independent science, and if confirmed, my decision-making will follow applicable laws and federal guidance on scientific integrity, information quality, and transparency.

8. Are you familiar with the scientific integrity policies of the EPA? Can you commit to adhering to EPA's scientific integrity policies?

If confirmed, I expect to learn more about EPA's scientific integrity policies and I commit to follow applicable laws regarding scientific integrity.

9. How will you work with the White House Office of Science and Technology Policy to ensure that the work of scientists at the EPA, and scientists that provide input to the EPA, is free from political and financial influence?

If confirmed, it will be my privilege to work with EPA scientists and the thousands of other dedicated public servants at EPA who have chosen to devote their careers to improving public health and our environment. I have no first-hand knowledge of the EPA's consultation with the White House Office of Science and Technology Policy and, if confirmed, I would expect to learn more about EPA's work with the office. Indeed, EPA actions must be based on sound, objective science. I commit, if confirmed, to follow applicable laws and federal guidance on scientific integrity, information quality, and transparency.

10. Pacific coast shellfish aquaculture is estimated to be a $278 million industry, but over the last decade, oyster growers have struggled to maintain yields because the water in the hatcheries is becoming too acidic for oysters to survive. The oceans are becoming more acidic because they are absorbing more and more CO2 from the atmosphere. The impact of this acidification on oyster farming has been documented in the scientific literature. On numerous occasions, you've expressed skepticism about climate change, but there is no doubt in the minds of these shellfish growers about the reality that increased CO2 levels are threatening their livelihoods. As EPA Administrator, how would you address this issue?

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If confirmed, I will implement the laws that EPA is charged to administer. Under section 304 of the CWA EPA establishes water quality criteria to protect aquatic life, including shellfish. Certain EPA programs also include authorities that can support projects that may benefit the shellfish industry, including the National Estuary Program under section 320 of the CWA, the Long Island Sound programs under section 119 of the CWA, and the Chesapeake Bay program under section 117 of the CWA. Finally, section 319 of the CWA can support programs and projects to reduce runoff that may impact oyster beds..

11. There are many groups within the Christian community -- and groups from other faiths -- in the United States who agree with the overwhelming scientific consensus that climate change is a danger to our country, and who strongly support taking action to mitigate the causes and impacts of climate change. For example, the Southern Baptist Convention made a statement in 2007 saying that Christians are responsible for caring for creation, and emphasized the importance of acting to prevent climate change. The President of the Southern Baptist Theological Seminary, has also issued a statement echoing these views. As EPA Administrator, would you share the view that, in the interest of caring for creation, that action should be taken to prevent climate change?

I believe we can grow our economy, harvest the resources God has blessed us with, while also being good stewards of the air, land, and water by which we have been favored. If confirmed, I will work to advance the mission of EPA to protect human health and the environment within the framework established by Congress.

12. The EPA is required to follow the best available science in its rule-making process. Given that every major scientific institution in the United States agrees with the position that the warming trend over the past century is due to human activity, do you have any reason to disagree with the position of every major scientific institution in the United States? Please explain.

I agree EPA's rulemaking process must be based on the best available science. However, I have no first-hand knowledge of the specific institutions or findings referenced in the question. If confirmed, I commit EPA's rulemaking process will be based on the best available science and will follow applicable laws and federal guidance on scientific integrity, information, and transparency.

13. 97% of publishing climate scientists support the idea the climate change is real and man-made. You are an attorney, but have questioned the reality of climate change. Do you currently agree that climate change is real and man-made? If not do you believe the 97% of climate scientists that do hold that view are wrong, or lying?

The ability to measure with precision the degree and extent of human activity on our changing climate, and what to do about it, are subject to continuing debate and dialogue. If confirmed, I will make sure the agency's regulatory actions are based on the most up to date and objective scientific data.

14. What scientific organizations do you personally trust when it comes to the science of climate change? Please explain why you trust any organization(s) you list.

If confirmed as EPA Administrator, I will adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment and will base my decisions on sound science, including advice provided by agency experts and advisory personnel.

15. Below is a list of statements from the Intergovernmental Panel on Climate Change's Fifth Assessment Report. For each statement, please indicate your agreement or disagreement and explain your reasoning: • "Warming of the climate system is unequivocal."
• "The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased."
• "The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years."
• "Carbon dioxide concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions."
• "The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification."
• "The largest contribution to total radiative forcing is caused by the increase in the atmospheric concentration of CO2 since 1750."
• "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century."
• "Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system."
• "It is very likely that the Arctic sea ice cover will continue to shrink and thin and that Northern Hemisphere spring snow cover will decrease during the 21st century

as global mean surface temperature rises. Global glacier volume will further decrease."
• "Global mean sea level will continue to rise during the 21st century.... [T]he rate of sea level rise will very likely exceed that observed during 1971 to 2010 due to increased ocean warming and increased loss of mass from glaciers and ice sheets."
• "Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions."

There is a diverse range of views regarding the key drivers of our changing climate among scientists. I believe that these differences should be the subject of robust and open debate free from intimidation. If confirmed, I will continue to encourage an honest debate on our changing climate, the role of human activity, our ability to measure the degree and extent of human activity, and what to do about it. If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data. I will also adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment consistent with the process and rule of law established by congress.

16. Are you aware that each of the past three decades has been warmer than the one before, and warmer than all the previous decades since record keeping began in the 1880s? This trend is based on actual temperature measurements. Do you believe that there is uncertainty in this warming trend that has been directly measured? If so, please explain.

I am aware of a diverse range of conclusions regarding global temperatures, including that over the past two decades satellite data indicates there has been a leveling off of warming, which some scientists refer to as the "hiatus." I am also aware that the discrepancy between land-based temperature stations and satellite temperature stations can be attributed to expansive urbanization within in our country where artificial substances such as asphalt can interfere with the accuracy of land-based temperature stations and that the agencies charged with keeping the data do not accurately account for this type of interference. I am also aware that 'warmest year ever' claims from NASA and NOAA are based on minimal temperature differences that fall within the margin of error. Finally, I am aware that temperatures have been changing for millions of years that predate the relatively short modern record keeping efforts that began in 1880.

17. Is there a scientific basis, based on the best available science and the weight of scientific evidence, for revoking or revising the finding that greenhouse gases endanger public health and welfare?

To my knowledge, there is nothing currently pending before the EPA that would require I take any additional actions on the Endangerment Finding on Greenhouse Gases and if there were, it would not be wise to prejudge the outcome.

18. Last year, Oklahoma's Department of Environmental Quality added eight lakes to what is now a list of 40 lakes where people should limit their fish consumption due to the dangerous levels of mercury. Do you believe that coal fired power plants contributed to the mercury contamination in those 8 lakes? Do you believe coal fired power plants contribute to mercury contamination in the environment?

I agree with the Oklahoma Department of Environmental Quality's determinations regarding fish advisories. As discussed elsewhere in my written responses to the Committee, coal fired power plants are the largest point source emitters of mercury into the air in the United States. I do not have direct knowledge of whether these fish advisories were caused by coal fired power plants or other sources, and if so whether those sources are located in the United States or elsewhere.

19. Do you agree that fish consumption is a leading source of mercury exposure and that the source of mercury in fish comes largely from the burning of fossil fuels? If you disagree, please explain why, including citations of the authoritative bodies that support your position.

I agree that fish consumption is a leading source of mercury exposure, particularly in certain subpopulations, such as unborn children.

20. Do you agree with the American Academy of Pediatrics' finding on the importance of minimizing mercury exposures for child health? If you disagree, please explain why, including citations of the authoritative bodies that support your position.

I agree with the American Academy of Pediatrics' finding. As I stated in my testimony before the Committee, mercury is appropriately regulated as a hazardous air pollutant under Section 112 of the Clean Air Act. If I am

confirmed as Administrator, I will regulate under Section 112 in a manner that is consistent with Congress's intent in enacting that provision. I will also faithfully administer other federal statutes that regulate mercury to the extent that they are under my jurisdiction, including the Mercury Export Ban Act of 2008, the Mercury-Containing and Rechargeable Battery Management Act of 1996, the Clean Water Act, the Emergency Planning and Community Right-to-Know Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act

21. You are currently representing Oklahoma in challenging the EPA's supplemental finding that it is necessary and appropriate to regulate emissions of mercury and other hazardous air pollutants from power plants. Do you agree that nearly all covered facilities are already in compliance with EPA's Mercury and Air Toxics Standard? If not, explain why not.

The Mercury and Air Toxics Standard has not been vacated by the Supreme Court or the D.C. Circuit and currently regulates both mercury and other air toxics. I do not have personal knowledge of whether any facilities are out of compliance with the Mercury and Air Toxics Standard. If I am confirmed as Administrator, I will exercise my authorities as Administrator to enforce all laws administered and regulations promulgated by the Administrator, including the Mercury and Air Toxics Standard, against sources that are out of compliance.

22. Do you agree that ground-level ozone is a dangerous pollutant that causes respiratory and cardiovascular harm? If no, on what basis do you disagree? If you disagree, please explain why, including citations of the authoritative bodies that support your position.

I agree that ground-level ozone is a dangerous pollutant that can cause respiratory and cardiovascular harm,

23. You are currently pursuing a lawsuit against the EPA over the agency's new ozone limits, which the EPA is required to review at least every five years. The new limit is 70 parts per billion; the previous limit, set in 2008, was 75 parts per billion. Prior to the announcement of the new limit, officials at the Oklahoma Department of Environmental Quality said that the state would be able to meet the 70 ppb level, however you have taken the position that EPA's standard is unachievable, and you have criticized the agency's data collection and its scientific processes. Could you please describe why you feel the EPA is unqualified to assess the safety and necessity of the new ozone levels? Could

you please also describe why your state's Department of Environmental Quality was wrong to say that they could meet the new ozone safety levels?

Oklahoma joined four other states in a petition for review of EPA's 2015 decision to lower the National Ambient Air Quality Standard for ozone from 75 ppb to 70 ppb. The legal question raised by the state petitioners in the case is whether EPA set the standard at a level than can be achieved by states given the background concentrations and uncontrollable sources of ozone in many parts of the country. The briefs filed by the many State petitioners to that rule fully explain the States' position and speak for themselves. The case remains pending before the U.S. Court of Appeals for the District of Columbia Circuit.

24. In a 2013 interview, you said: "The evidence is clear that the current ethanol fuel mandate is unworkable. The decision by the EPA to lower that standard is good news for Oklahoma consumers. It's good the Administration finally recognized the concerns of consumers and a variety of industries and took steps to correct this flawed program." Please explain what you meant by "unworkable" and "flawed program". Do you still hold this view? If not, what caused you to change your view?

As I indicated during my nomination hearing, the Administrator and the EPA routinely missed the statutory targets in publishing the Renewable Volume Obligations each year, creating great uncertainty in the marketplace. In fact, in some years they missed the timeline, as far as submitting those targets, by over a year; in some cases over two years. The EPA failed to adhere to statutory requirements, resulting in a flawed and unworkable program.

25. In December 2015, the President-elect said of Senator Ted Cruz' opposition to the RFS, "…oil pays him a lot of money, he's got to be for oil, right? The oil companies give him a lot of money. So, but I'm with you. I'm with everybody. I'm with everybody. Look, I'm self-funding. I have no oil company. I have no special interest." In contrast, you have received over $300,000 from the fossil fuel industry, and have sent at least one letter to EPA on your own letter head that was drafted by the oil industry. If you are confirmed as EPA Administrator, will you commit to ensuring that your previous donors will not exert undue influence over the regulatory process and your decision-making at EPA with regard to the Renewable Fuels Standard?

If confirmed, I will work to administer the RFS in accordance with statute and Congressional intent.

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26. If the Sixth Circuit and the Supreme Court approve EPA's "Waters of the United States" rule defining the jurisdictional extent of the Clean Water Act, would you direct the EPA to amend that rule? If so, how? If the courts invalidate EPA's "Waters of the United States" rule, how would you direct the EPA to define which waterways and wetlands are protected by the Clean Water Act?

If I am confirmed, I will seek to make changes to the WOTUS rule following all appropriate administrative procedures, including the requirements of notice and comment under the Administrative Procedure Act.

27. In your opinion, under what circumstances should the Clean Water Act apply to pollution being discharged into groundwater? If the Ninth Circuit's forthcoming decision in Hawai'i Wildlife Fund v. County of Maui conflicts with your view, would you direct the EPA to write a new regulation overruling the 9th Circuit?

I believe that the Clean Water Act applies only to discharges to surface water, not groundwater. In contrast, the Safe Drinking Water Act requires permits for underground injection into certain aquifers. I cannot speculate on a judicial decision that has not been issued.

28. You've taken money from Monsanto, one the world's largest sellers of pesticides, in your previous electoral campaigns. How will you ensure that the safety of pesticides is vetted and regulated by the EPA according to the best science on risk and potential harm, rather than the profit-making interests of your campaign financiers? In your role as EPA administrator, how will ensure the agency is not unduly influenced by the political power of these large corporations?

If confirmed as Administrator, I would expect EPA's regulatory process relating to pesticides to be open and transparent and based on sound science in accordance with EPA's legal authorities.

29. What will you do to ensure EPA is conducting a transparent process regarding pesticide regulation? Please specify how you will approach notifying the public regarding pesticides in terms of notice of actions, publication of information (including studies and data) in the dockets, or timely responses to requests under the Freedom of Information Act. If you do not believe in a transparent process, why not?

I am committed to transparency at EPA. I commit to making sure that EPA data is made available to the public consistent with applicable privacy and

confidentiality laws, and I will work to ensure that EPA uses a variety of tools and methods to keep the public informed about EPA activities as they relate to pesticide regulation if I am confirmed.

30. What will you do to work with pesticide manufacturers, distributors, conservation organizations, farmers, and beekeepers to ensure pesticide labels are clear and enforceable? Will you commit to enforcing these labels? If you will not work on this issue, why not?

If confirmed as Administrator, I would expect EPA's regulatory process relating to pesticides to be open and transparent and based on sound science in accordance with EPA's legal authorities.

31. EPA defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Would you as EPA administrator advance the goal of environmental justice and if so, how?

If confirmed, I would work to faithfully execute the laws EPA is responsible for administering in order to protect human health and the environment for all Americans. As I testified, the Administrator plays an important role in regarding environmental justice.

32. Exposure to air toxicity, water pollution, lead, and hazardous waste sites results in disproportionate levels of disease, disability, and mortality amongst communities of color. As Administrator, what will you do to protect America's most vulnerable and underrepresented communities from environmental hazards and reduce the burden of toxicity shouldered by these communities?

As I testified, the Administrator plays an important role in regarding environmental justice. If confirmed, I would work to faithfully execute the laws EPA is responsible for administering in order to protect human health and the environment for all Americans. If confirmed, I would expect EPA to operate in an open and transparent manner, consider the views of stakeholders as appropriate, act based on sound science, and follow the laws as established by Congress

33. President-Elect Trump has stated that the drinking water crisis in Flint, Michigan, would never have happened if he was president. If appointed, what

measures do you plan to take to protect drinking water across the country and particularly for the most vulnerable populations?

If confirmed, I will return EPA's focus to carrying out its core missions, including, as appropriate, use of EPA's emergency order authority under the Safe Drinking Water Act.

34. Oklahoma has seen a massive increase in earthquakes recently (907 (>magnitude 3.0) in 2016 and 585 in 2015 - which is more than the previous 35 years combined). The Oklahoma Geological Survey released a report in 2015 linking the disposal of fracking wastewater with earthquakes in Oklahoma. As recently as November 2016, a 5.0 magnitude earthquake struck Cushing, Oklahoma. Forty to fifty buildings were reported to have been damaged; Governor Mary Fallin felt the damage was substantial enough to declare a state of emergency for Payne County, where Cushing is located (a first step towards being granted federal aid). • What was the incidence of earthquakes in Oklahoma prior to widespread use of hydraulic fracturing in the past decade?
• What has been the incidence of earthquakes in Oklahoma in the past 10 years, since widespread use of hydraulic fracturing?
• What have been the economic and health impacts of earthquakes in Oklahoma in the past 10 years?
• What was your rationale for not using the office of the Attorney General to change the disposal practices of wastewater from hydraulic fracturing to protect the citizens of Oklahoma?

As I discussed at my confirmation hearing, the State of Oklahoma has taken seismicity issues very seriously and has taken proactive and aggressive actions. Oklahoma, as have other states, been successfully regulating hydraulic fracturing since the 40's and 50's. State and federal geologists have largely confirmed that the while the act of hydraulic fracturing itself poses little seismicity risk, the underground injection of wastewater at certain pressures and volumes can result in some seismic activity. While earthquakes have increased in frequency in recent years, the State has taken aggressive actions and reports have indicated the rate of seismic events has recently declined. Seismic activity can of course have significant impacts on communities and the activities linked to seismicity concerns in Oklahoma are regulated under state law by other agencies that my office works with as appropriate under Oklahoma law.

35. The EPA is the front line agency serving or assisting Indian Country with environmental protection and recognition of treaty rights. As EPA Administrator, would the you commit to the protection of tribal treaty rights in agency decision making processes in situations where rights may be affected by EPA actions

including federal approval of: • state water quality standards (CWA)
• state 401 water quality certifications
• state distribution and use of pesticides (FIFRA)
• oil spill program countermeasures (SPCC)?

If confirmed, I will commit to ensuring that the United States meets all treaty obligations that it has pursuant to treaties with Indian Tribes.

36. Will you support current efforts to establish federal baseline water quality standards for Indian Reservations that do not currently have Clean Water Act standards in place? Please explain why or why not. An advanced notice of proposed rulemaking on this initiative was published in the Federal Register on September 29, 2016.

Because an advance notice of proposed rulemaking has been published, this matter will come before me for decision if I am confirmed as Administrator. Thus, I will not prejudge the outcome, but rather will commit to fairly evaluating the matter and reaching a sound decision.

37. The 2016 Frank R. Lautenberg Chemical Safety for the 21st Century Act (TSCA) requires the EPA Administrator to identify "potentially exposed or susceptible subpopulations" in chemical assessments to ensure their protection. Tribal and local populations in the Pacific Northwest consume high quantities of fish that can result in greater exposure to chemical contaminants. How will the new Administration implement TSCA reform to ensure that tribes and vulnerable populations unique to individual states are protected by federal rules on toxic substances?

The Lautenberg Act defined the term "potentially exposed or susceptible subpopulations" as "a group of individuals within the general population identified by the Administrator who, due to either greater susceptibility or greater exposure, may be at greater risk than the general population of adverse health effects from exposure to a chemical substance or mixture, such as infants, children, pregnant women, workers, or the elderly." Protecting citizens that are either more susceptible or who have greater exposure to a substance is an important aspect of the law and I will take great care to ensure the Act is faithfully executed if I am confirmed.

38. Will you commit to continue EPA's Treaty Rights Guidance and that initiative's implementation? Will you commit to continue EPA's Policy on Consultation and Coordination with Tribes?

If confirmed as Administrator, I will evaluate all guidance documents and policies to ensure that they represent faithful execution of the duties imposed on me, and powers granted to me, by Congress. If the guidance and policy you referenced, I will keep them in place.

39. The 2014 U.S. National Climate Assessment concludes that climate change will impact every community in the United States, and that low-income communities and communities of color will be the hardest hit. These vulnerable communities will feel the impacts of climate change more severely due to lower quality housing, which is often less equipped to safely weather severe storms, severe heat, and freezing temperatures. How will you work to reduce climate change risks in low-income communities and communities of color?

I believe environmental justice for low-income and minority communities is an important role of the EPA Administrator. If confirmed, I will adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment for all of our nation's citizens.

40. I understand that there are two political action committees affiliated with you. A spokesperson has made the statement that both PACs will be closed by the end of the month. Can you confirm that that both PACs will be closed by then?

I do not control either of the political action committees to which you refer, and thus cannot confirm their intentions. As you have heard, however, I have also heard that both entities have announced that they will wind down their activities.

41. It has also been reported that a 501(c)(4) organization called Protecting America Now has been created to raise funds to support your confirmation. If you are confirmed, will you make sure that Protecting American Now is disbanded? Please provide a list of Protecting America Now's donors.

I am not affiliated in any way with "Protecting America Now," and thus have no ability to disband the organization. For the same reason, I have no knowledge of the group's donors.

42. When is it appropriate for the Federal government to regulate pollution rather than states?

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Many federal environmental statutes were designed with the idea that the states would be the principal implementer. I believe it is essential to begin with that model. There are instances where the federal government approves or disapproves state programs or issues implementation plans in lieu of the state involved. However, this should be the vast exception to the rule. Some environmental statutes like CERCLA place the principal responsibility with the federal government for the important remediation activities under that statute. However, even with statutes like CERCLA, EPA still have an obligation with work with states and localities in designating sites which need remediation and most importantly in developing remediation plans.

43. Do you personally disagree with any existing Federal environmental law, or any provisions of any existing Federal environmental laws? If so, please explain which and why.

If confirmed, I will faithfully execute the laws as enacted by Congress.

44. Which EPA regulations do you believe should instead be left to states to implement, and why?

I believe federal environmental statutes are designed with states as a primary implementer. Environmental statutes envision that states have the delegated enforcement and primacy to implement and enforce environmental statutes. Only when that is not happening or when negotiations between and among states breakdown should EPA determine a dispute and only after attempting to assist states negotiate a local solution. I am fond of saying that we need national standards and neighborhood solutions. I think that should shape the work of the EPA.

45. When states or local governments regulate pollution with different sets of standards, various industry groups have raised the concern that it creates a patchwork of regulatory policies that make compliance difficult. Do you share this concern, and why?

As I testified in the hearing, I have pursued opportunities to address interstate environmental quality matters. One of the examples I have highlighted is the work that Arkansas Attorney General Dustin McDaniel and I took to address an enforceable water quality standard between Arkansas and Oklahoma. I have also discussed how Texas should be responsible when air quality issues affect Oklahoma and my experience with that. When

negotiations among and between states breakdown EPA has a role to set environmental standards. However, that is should be a last course of action instead of the first. I believe environmental statutes are designed with states as a primary implementer. Environmental statutes envision that states have the delegated enforcement and primacy to implement and enforce environmental statutes. Only when that is not happening or when negotiations between and among states breakdown should EPA determine a dispute and only after attempting to assist states negotiate a local solution. I am fond of saying that we need national standards and neighborhood solutions. I think that should shape the work of the EPA.

46. Do you believe that the Renewable Fuel Standard is an appropriate regulatory role for the EPA versus states?

Section 211(o) of the Clean Air Act provides the Administrator of the EPA with the authority and responsibility to administer the RFS program. If confirmed, I will work to administer the RFS in accordance with statute and Congressional intent.

47. Do you agree that there should be national fuel economy standards to reduce tailpipe pollution from cars and make vehicles more fuel efficient? Please explain.

While the EPA regulates emissions under the Clean Air Act, it is true that Congress vested authority to regulate fuel economy through the Corporate Average Fuel Economy (CAFE) standards" framework set forth originally in the Energy Policy and Conservation Act. Congress vested responsibility for the CAFE program in the Department of Transportation, not the EPA; accordingly, I take no position on Congress's policy decision on this subject.

48. Do you support California's authority under the Clean Air Act to receive a waiver from the EPA to set emissions standards for vehicles that are stronger than EPA standards?

In the Clean Air Act, Congress provided that the EPA Administrator may waive the Clean Air Act's preemptive effect over some of California's state air quality standards for mobile sources, when certain specific statutory criteria are met. If confirmed as EPA Administrator, I will administer this program in accordance with Congress's objectives, on a case-by-case basis in accordance with the law and with the administrative record in any given case, upon proper petition by California.

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49. You are currently representing Oklahoma as one of 13 petitioners challenging EPA's standards limiting conventional, toxic, and greenhouse gas pollutants from new oil and gas facilities. Please describe how Oklahoma would prefer to handle these pollutants in the absence of EPA regulation. If your proposed pollution standards are more lax than the EPA's standards, please provide information supporting the why your standards are preferable from a public health standpoint.

As Attorney General, I sought to ensure that the Oklahoma Legislature retained its power to make policy for Oklahoma. Policymaking is the province of the legislature. Thus, I have no opinion with regard to what environmental policy might be appropriate.

50. Please also describe, and provide the same information, for what Oklahoma's policies would be should Oklahoma and its fellow petitioners be successful in challenging the EPA's implementation of the Cross-State Air Pollution Rule.

As my testimony indicates, I firmly believe that the EPA plays an important role in addressing interstate air quality issues, but it must do so within the bounds of its legal authority and justified by a record of support. The actions undertaken by the Office of Attorney General challenging certain EPA regulations have been because EPA exceeded it legal authorities as established by Congress and interpreted by the courts. The Department of Environmental Quality is responsible for implementing and enforcing environmental laws in Oklahoma.

51. You also represent Oklahoma as a petitioner in ongoing litigation against the EPA's 111(b) standards for CO2 emissions for new, modified, and reconstructed power plants. Should you win your suit, will Oklahoma take any steps to regulate power plant CO2 emissions, or does the state plan to continue not regulating CO2 emissions?

I will not prejudge the outcome of any rule that is the subject of ongoing litigation if I am confirmed.

52. As Attorney General, your role was also to prosecute environmental cases within Oklahoma. Please list all environmental cases you have originated as Oklahoma's Attorney General, and provide all documents related to those cases and a summary of the outcomes of those cases.

Please see the list of cases attached to this response.

53. The Environmental Protection Unit was eliminated as a group within the Attorney General's office once you became Attorney General. This appears to indicate a decrease in support, or at least priority, for pursuing environmental cases within your office compared to your predecessor. To clarify if you have continued to pursue environmental cases as Oklahoma Attorney General, please provide description and documentation of all the environmental cases that were handled by your office versus the AG's office during Drew Edmondson's tenure. Please also describe the work your office did on any environmental cases that were begun during your predecessor's tenure but were continued or completed by your office.

My office continues to employ attorneys vested with responsibilities related to environmental protection, including the attorney who served as the lead attorney on the previous attorney general's "environmental protection unit." That attorney's responsibilities remain unchanged (he has been promoted, in fact), and he pursues exactly the kind of cases that he pursued under the previous attorney general. The only thing that changed was the internal organization of the attorneys vested with those responsibilities, because I concluded (consistent with the practices of every attorney general in the State's history but for my immediate predecessor) that it was not operationally efficient to have a separate unit for such work. Thus, I chose to house that work in the Office's Public Protection Unit and then later in the Solicitor General's Unit. As I explained in my testimony to the committee, my office continues to pursue environmental cases. I do not possess lists of cases pursued my predecessor so I cannot provide the comparative that you request. I am aware that many environmental cases take many, many years to litigate to completion, so some of the actions that my Office continues to pursue were initiated prior to my taking office. Please see attached list of cases.

54. As part of the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016, Congress passed the Columbia River Restoration Act, a program which gives the EPA authority to create a competitive grant program to address environmental cleanup and restoration in the Columbia River Basin. This program empowers states and local communities to better coordinate and implement local cleanup and restoration efforts. Will you, as EPA administrator, work to advance and implement this bipartisan effort to empower local entities and states?

While I am not familiar with the Columbia River Basin restoration program, I support collaborative efforts and neighborhood solutions. I also respect

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Congressional authorizations. If confirmed, I will ask the EPA staff to brief me on this program and the new authority granted by Congress.

55. In January, 2017, the EPA announced $17 million in credit assistance for the Water Infrastructure Finance and Innovation Act (WIFIA). This program, initially passed into law as part of the 2014 WRDA bill, now has the funding needed to allow EPA to make approximately $1 billion in loans and leverage a total $2 billion in total water-infrastructure investment. As you mentioned in your hearing, water infrastructure is critically needed, but often overlooked. Will you, as EPA administrator, work to ensure adequate resources to implement the WIFIA loan program, and seek further funding and assistance for other water infrastructure programs and initiatives, such as the Drinking Water State Revolving Fund?

Yes, if confirmed.

56. The Federal Government has a long history of activities within Portland Harbor, which in 2000 was designated a Superfund site and is now one of the largest and most complex Superfund sites in the country. The history of Federal activities within the Superfund site includes ship building, repairing, and dismantling, as well as a variety other activities that likely led to some amount of contamination of the river. Today, the Willamette river sediment within the Portland Harbor Superfund site is contaminated with compounds associated with the activities carried out by the Federal government over the course of many decades. Now that the Environmental Protection Agency has issued its final Record of Decision for this Superfund site, there will be a process to divide up cleanup responsibilities among parties responsible for the contamination. Can you commit to work with the appropriate Federal agencies, such as the Department of Defense and Department of Justice, to ensure that the Federal government engages proactively with relevant stakeholders during the allocation process, takes ownership for its share of the contamination, and pays its fair share of the cleanup?

I am not familiar with the details of the remedy that has been selected for the Portland Harbor Superfund site. If confirmed, I expect to make clean up of contaminated sites one of my priorities and would be interested in hearing the views of the Congressional Delegation and other stakeholders on the issues raised by this cleanup plan.

<u>Senator Sanders:</u>

The Environmental Protection Agency (EPA) has approximately 15,000 employees. The following questions ask how you, as Administrator, would treat civil servants and make human resource decisions.

1.Do you support--and promise to uphold--the merit system principles set forth in Chapter 23 Title 5 U.S. Code, which prohibit factors other than merit from consideration in civil service employment decisions?

If confirmed, I commit to implementing the law as enacted by Congress.

2.As Administrator, do you support use of the Holman Rule, which allows any member of Congress to propose amending an appropriations bill to single out a government employee or cut a specific program? Will you support Congress in passing an amendment under the Holman Rule?

If confirmed as Administrator, I would implement the law and work with the Agency in accordance with the laws passed by Congress.

3.Is retention and recruitment of a high quality scientific workforce at EPA a priority for you?

Yes.

4.As Administrator, do you believe that you will be better able to recruit and retain top talent at the EPA under conditions where Congress is able to individually target employees based on political considerations?

If confirmed as Administrator, I would implement the law and work with the Agency in accordance with the laws passed by Congress.

5.As Administrator, do you support Congress targeting and altering the salaries of individuals within the EPA?

If confirmed as Administrator, I would implement the law and work with the Agency in accordance with the laws passed by Congress.

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6.As Administrator, how will you generally view the division of responsibility and authority between Congress and your Department on personnel issues?

In my view, Congress passes the laws governing executive branch personnel.

On June 14 2016, EPA Administrator Gina McCarthy signed an order on "Transgender and Gender Non-Conforming Employees" (http://src.bna.com/f0T) and said at the time that it "reinforces that discrimination of any kind in the EPA workplace is unacceptable, including discrimination on the basis of gender identity, expression or perceived non-conformity." Among other things, the order states that an "employee should be permitted to use the [sanitary and related] facilities that correspond with their gender identity." This is in stark contrast to the suit you filed with 10 other attorneys general challenging the guidance issued under President Obama on accommodating transgender students in public schools.

7. Will you as EPA Administrator ensure that Administrator McCarthy's order is vigorously implemented, and continue to ensure that transgender and gender non-conforming employees are not discriminated against on the basis of their gender-identities?

If confirmed, I commit to protecting the rights of all EPA employees and will follow the law.

As Attorney General, you disbanded your office's Environmental Protection Unit and reduced your office's funding for environmental law to zero.

8. In your personal opinion, what are the most pressing air and water quality challenges that deserve the attention of the EPA? What would you do at the EPA to better address these challenges, if anything?

As discussed, the Oklahoma Department of Environmental Quality -- not the Office of Attorney General -- has primary responsibility for implementing and enforcing environmental laws in Oklahoma. Consistent with the practice of every Attorney General save one, I determined that a standalone unit was operationally inefficient. I opted to combine the Environmental Protection Unit and the Consumer Protection Unit into a single unit called the "Public Protection Unit." The Public Protection Unit continued the work of the Environmental Protection Unit, and that work continues to this day, headed by the very same attorney who worked in the Environmental Protection Unit under the prior Attorney General. As discussed, I believe EPA plays an

important role in addressing cross-state pollution, and if confirmed, I would expect to work cooperatively with states to address the problems of environmental pollution.

The Keystone Sanitary Landfill (KSL) is an existing 714-acre landfill located in the boroughs of Dunmore and Throop, Pennsylvania. KSL has submitted an application to the Pennsylvania Department of Environmental Protection (DEP) for a permit modification to expand the facility's disposal capacity by approximately 145 million cubic yards. The permitting and approval of this process is strictly under the jurisdiction of the Pennsylvania DEP.

Under Subtitle D of the Resource Conservation and Recovery Act of 1976, states play a lead role in ensuring the federal criteria for operating municipal solid waste and industrial waste landfills regulations are met, and they may set more stringent requirements. Under the Hazardous and Solid Waste Amendments of 1984, EPA was authorized to determine the adequacy of the state permit programs. In the absence of an approved state program, the federal requirements must be met by waste facilities.

9.Are you committed to maintaining the process to determine the adequacy of a state's municipal solid waste management plan as required under the Hazardous and Solid Waste Amendments of 1984?

If confirmed, I commit to faithfully executing the laws I would be responsible for administering as EPA Administrator.

10.Further, if a state does not have an approved state program, are you committed to inspecting and enforcing federal requirements including the prohibition on open dumping?

If confirmed, I commit to faithfully executing the laws I would be responsible for administering as EPA Administrator.

11.Constituents have expressed concerns regarding the potential impact on the environment, quality of life, health and traffic congestion as a result of the Keystone Sanitary Landfill. How do you intend to work collaboratively with states in the event that a state violates the federal Clean Water Act or the Safe Drinking Water Act or a state requests assistance from EPA?

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I believe states play an important role in administering environmental laws such as the Clean Water Act, and if confirmed, I would expect to work cooperatively with states toward our shared goal of protecting human health and the environment consistent with EPA's legal authorities.

During your hearing, you stated that climate change was not a hoax, but you also were reluctant to discuss your views on the causes of climate change. You stated that your personal views were not relevant. However, as Attorney General, you challenged EPA's 2009 finding that greenhouse gases, including those from fossil fuels, endanger public health and welfare, due to anthropogenic climate change. The EPA went through an exhaustive scientific review and public comment process prior to issuing the Endangerment Finding, but in the lawsuit you labeled it "arbitrary and capricious." The Endangerment Finding references more than 100 published scientific studies and reports by the U.S. Climate Change Science Program/U.S. Global Change Research Program, the Intergovernmental Panel on Climate Change (IPCC), and the National Research Council of the U.S. National Academy of Sciences.

12.As Administrator, will you recognize the findings of the U.S. Climate Change Science Program/U.S. Global Change Research Program and the National Research Council of the U.S. National Academy of Sciences on the science of climate change, including its anthropogenic causes?

If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving understanding of the impact increasing greenhouse gases have on our changing climate.

In 2014, the Gund Institute for Ecological Economics and the University of Vermont released the Vermont Climate Assessment report. The report found that many of our state's communities have already been highly impacted by climatic changes and are engaged in processes to respond to these transitions. Some populations and regions of the state are particularly vulnerable, including rural areas and those increasingly exposed to extreme weather events. Flooding, such as experienced under Tropical Storm Irene, has been devastating to some of our state's communities. EPA partnered with Vermont in incorporating smart growth policies to increase flood resilience after the tropical storm. Under direction from Executive Order 13653, Preparing the United States for the Impacts of Climate Change, EPA and New England's EPA Region 1 both have developed climate adaptation plans that assist our region in preparing for these changes.

13.Will you support EPA's continued climate adaptation planning and implementation in accordance with Executive Order 13653?

If confirmed, I will work to ensure the agency complies with and operates according to all applicable Executive Orders.

14.Do you support the Paris Climate Agreement?

The role of the United States in the Paris Agreement is a State Department matter. If confirmed, I will work to advance the mission of the EPA, which is to protect human health and the environment, consistent with the State Department's strategy for international engagement on climate change.

15.What are your plans for implementing the Paris Climate Agreement?

Should the government decide to continue to participate in the Paris Agreement and if I am confirmed as Administrator, I will collaborate with all involved agencies to ensure that commitments made on behalf of the United States are achievable and consistent with requisite legal authorities delegated by Congress.

You have written that the climate change "... debate is far from settled. Scientists continue to disagree about the degree and extent of global warming and its connection to the actions of mankind."

16.What would it take for you to admit that all three of these allegations are incorrect?

If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving understanding of the impact increasing greenhouse gases have on our changing climate.

17.Which scientists, saying what, would change your mind?

If confirmed, I will work to ensure that any regulatory actions are based on the most up to date and objective scientific data, including the ever-evolving

understanding of the impact increasing greenhouse gases have on our changing climate.

18.If Harold Hamm told you he was no longer a climate change denier, would you believe him?

I do not believe he is a climate change "denier."

19.President Elect Trump's Secretary of State nominee, Rex Tillerson, is no longer a climate change denier. Why do you disagree with Tillerson?

There is a diverse range of views regarding the key drivers of our changing climate among scientists, policy-makers and President Trump's nominees. I believe that these differences should be the subject of robust and open debate free from intimidation. If confirmed, I will continue to encourage an honest debate on our changing climate, the role of human activity, our ability to measure the degree and extent of human activity, and what to do about it.

The Clean Air Act, and its amendments, sets limits on harmful pollutants like mercury and sulfur dioxide. As Oklahoma's Attorney General, you have repeatedly brought lawsuits against the EPA for their enforcement of the Clean Air Act, stating that the federal government has overstepped its authority to regulate and that these decisions are best left to the states. Pollution, like mercury and sulfur dioxide, from Midwest coal-fired power plants is blown right into New England. Mercury is a potent neurotoxin that bio-accumulates in the fish in our streams and lakes, and places our pregnant women and young children at particular health risk. Sulfur dioxide contributes to acid rain that that harms the forests and waters of New England.

20.If you do not believe that the EPA should have the regulatory authority that would protect states such as Vermont from interstate pollution, that leaves these science and public health decisions to the courts. Can you explain why federal courts should be in the position of determining safe levels of pollution to protect the health and welfare of Vermonters, as opposed to the federal agency who mission it is to protect human health and the environment -- air, water, and land?

As I stated in my testimony before the Committee, I agree that the Clean Air Act gives EPA an important role in addressing interstate pollution issues, among many other things. If I am confirmed as Administrator, I will exercise

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my authority in this area consistent with Congress's intent in enacting the Act.

Data shows that mercury pollution in the North Atlantic and mercury concentrations in our fisheries have fallen dramatically since the United States started requiring stronger emission controls from coal power plants.

21.Given this scientific confirmation of these regulations working how can you assure us that if you are confirmed to lead the EPA you will continue to accelerate the clean-up of all sources of mercury emissions, including coal power plants?

I agree that there has been a consistent downward trend in mercury concentrations, but note that this trend began well before EPA promulgated the Mercury and Air Toxics Standards. As I stated in my testimony before the Committee, mercury is appropriately regulated as a hazardous air pollutant under Section 112 of the Clean Air Act. If I am confirmed as Administrator, I will regulate under Section 112 in a manner that is consistent with Congress's intent in enacting that provision. I will also faithfully administer other federal statutes that regulate mercury to the extent that they are under my jurisdiction, including the Mercury Export Ban Act of 2008, the Mercury-Containing and Rechargeable Battery Management Act of 1996, the Clean Water Act, the Emergency Planning and Community Right-to-Know Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act.

It is widely reported that EPA's Clean Power Plan (CPP) will be one of the first policies to be dropped under the new administration.

22.Do you envision that you will seek to replace the CPP with some other program that also would promote the reduction of greenhouse gas emissions nationally?

While I will not prejudge the outcome of any Rule that is the subject of ongoing litigation, if confirmed, I will work to achieve the objectives of EPA-administered laws consistent with the process and rule of law set out by Congress.

23.According to the EPA, "The Clean Power Plan will lead to climate and health benefits worth an estimated $55 billion to $93 billion in 2030, including avoiding 2,700 to 6,600 premature deaths and 140,000 to 150,000 asthma attacks in

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children." What do you say to parents who have children with asthma who are worried that the dismantling of the CPP?

If confirmed, I will administer environmental laws that protect human health and the environment within the framework established by Congress. I will follow explicit cost-benefit obligations to ensure the benefits are associated with the pollutant being regulated and the costs are reflective of market realities.

President-elect Trump has stated that the water poisoning that happened in Flint Michigan "would never have happened if I were president." More than 1,000 communities have lead poisoning levels higher than those found in Flint Michigan.

24.If you were head of EPA what actions would you take to ensure that every community has clean water to drink?

If confirmed, I will focus on EPA's core missions, including, as appropriate, use of EPA's emergency order authority under the Safe Drinking Water Act. I also will implement the newly revised TSCA statute to address chemicals and will continue implementation of monitoring, review, and regulation of contaminants under the SDWA.

25. What federal financial commitments would you need and what changes in environmental laws, policies and regulations would you need to ensure that a Flint-like situation never happens again?

It is my understanding that some requirements in the Safe Drinking Water Act Lead and Copper Rule relating to monitoring and when corrosion control treatment is mandated are ambiguous and need to be clarified to make both compliance and enforcement easier and prevent a Flint-like situation from happening again. If confirmed, I will ensure that the revisions to that rule proceed expeditiously. As to resources, I will return EPA's focus, including resources, to carrying out its core missions. In addition, I believe that the new WIFIA program offers significant opportunities to leverage additional infrastructure investments.

Lake Champlain is one of Vermont's most treasured environmental features. Tourism and property values are tied to the health of the lake—keeping its waters swimmable, fishable and drinkable. Run-off—including from lawns, paved roads and parking lots, and farmlands—contributes to high levels of phosphorus that spur algae growth. The algae turns the lake green and can be toxic. In 2016, EPA released new phosphorus limits for the lake by establishing a TMDL (Total

Maximum Daily Load). We are concerned that you, as Attorney General, have opposed other clean-ups similar to that of Lake Champlain. You signed an amicus brief opposing EPA's clean-up of the Chesapeake Bay under the Clean Water Act.

26.As Administrator, will you continue the agency's support for the clean-up of Lake Champlain through these new TMDLs?

A TMDL under section 303(d) of the Clean Water Act does not establish a water quality standard. It is a tool for achieving a water quality standard by determining how much of a particular pollutant, like phosphorus, that a body of water can assimilate and achieve the water quality standard. EPA recently issued new phosphorus TMDLs for Lake Champlain to implement Vermont's water quality standards. These replace a prior TMDL that EPA had approved in 2002 and then disapproved 9 years later after being sued by the Conservation Law Foundation. I am not familiar with the details of either the original Vermont TMDL that EPA approved or the new TMDLs that EPA developed after being sued. I believe TMDLs can only be successful if developed in a collaborative fashion. It is my hope that the new Lake Champlain TMDLs were developed in such a fashion and in accordance with the law. If so, I am not aware of any reason that I would not support their implementation, if confirmed as EPA's administrator.

27.Specifically, should Vermont fail to make satisfactory progress toward meeting the TMDL, would you support EPA's prior pledge to ramp up federal oversight of Vermont programs and crack down on pollution from wastewater treatment facilities? If not, how will you ensure Clean Water Act obligations are satisfied?

Under Clean Water Act regulations (40 CFR 122.44), limits in a NPDES permit for a point source must be consistent with any waste load allocation for the discharge set forth in a TMDL and once these limits are part of a permit, they are federally enforceable. Vermont is authorized to carry out its own permitting program in lieu of the federal permitting program. If confirmed, I will work with the State of Vermont to see that the requirements of the Clean Water Act are met.

The EPA works with other state and federal agencies in developing contingency plans in the event of an oil spill. These plans identify and coordinate the activities of the different government agencies and private organizations involved in the response. Vermonters are concerned about the potential for oil spills, particularly from rail accidents, that might adversely affect the state's waters. We view the EPA as a critical partner in developing plans for, and responding to, the case of an oil spill with potential impacts to a water body or other area subject to the

jurisdiction of the Environmental Protection Agency under the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.).

28.Do you as Administrator commit to the EPA's partnership with the states in developing plans for, and responding to, the case of an oil spill that affects waters under its jurisdiction, such as Lake Champlain?

EPA, in partnership with other federal agencies on the National Response Team, has a significant role in carrying out the National Oil and Hazardous Substances Pollution Contingency Plan. EPA is the lead agency for responses under the Oil Pollution Act to spills into inland waters (other than the Great Lakes) and the Coast Guard is the lead agency for coastal waters and the Great Lakes). If confirmed, I will support EPA's continued implementation of the oil spill response authorities given to it by Congress.

At EPA, science provides the foundation for Agency policies, actions, and decisions made on behalf of the American people.

29.What should be the role of science in the development of EPA policies, rules, and regulations?

I fully believe, as former EPA administrators have stated, that science must serve as "the backbone" of EPA actions.

U.S. Secretary of the Interior Sally Jewell has observed that "consumer spending for outdoor recreation is greater than household utilities and pharmaceuticals combined — and yet the federal government has never fully recognized or quantified these benefits." Outdoor recreation is not just an issue of concern to the Department of the Interior, it depends on clean air and water, which are under the purview of the EPA. The health and welfare of Americans is dependent on their ability to be actively engaged outdoors, breathing clean air and drinking clean water.

30.If under your watch, the EPA seeks to reduce regulations, will you take into account the economic losses from recreation to places like Vermont before doing so?

As I indicated in my testimony, if confirmed, my primary goal would be to protect the American people through lawful regulations. I understand environmental statutes, such as the Clean Air Act and the Clean Water Act,

prescribe in certain instances that the EPA consider economic impacts in the rulemaking process. If confirmed, I commit to fully follow the law as provided by Congress.

Much of the nation's and the world's attention has been focused in recent months on the Dakota Access Pipeline, the construction of which crosses multiple states. Many pipelines on Indian lands are located entirely within a single state, however. Here EPA is not always the primary regulator, and state laws do not always apply. The health and environmental consequences of pipeline failures, however, can be enormous.

31.Will you commit to work with this Committee and other agencies to address the environmental and public health and safety issues associated with the operation of pipelines on Indian lands, including purely intrastate pipeline facilities?

If confirmed, I will faithfully execute all applicable laws as Administrator. As was discussed at my confirmation hearing I have worked successfully with Oklahoma Tribes and I would use my role to address environmental and public health and safety issues on state, federal, and tribal lands.

Yesterday, the Obama Administration took the final step in laying out a process for the next administration to provide a full environmental review for the Dakota Access pipeline.

32.Will you commit to fully supporting the Army Corps of Engineers as it conducts reviews of alternative routes and to meaningful consultation with Native American tribes when a project could affect their tribal treaty rights?

I cannot speak to the actions of the Army Corps of Engineers but if confirmed I will carry out any legal duties required by the Administrator of the EPA.

Oil and natural gas extraction by way of hydraulic fracturing, or "fracking," has expanded rapidly in the United States, including in your state of Oklahoma. As you know, there are increasing concerns about water and air contamination, including the seismic activity associated with wastewater disposal. EPA conducted a study of hydraulic fracturing's drinking water impacts and released a final report in December 2016. The agency found "hydraulic fracturing activities can impact drinking water resources under some circumstances." The report identifies certain conditions under which impacts from hydraulic fracturing activities can be more frequent or severe. Both Vermont and New York have

banned hydraulic fracturing out of concerns for its public health and environmental effects.

33.Do you concur with the conclusions of the EPA's final report on hydraulic fracturing and drinking water?

As I discussed at my confirmation hearing, states like my home state of Oklahoma have been successfully regulating hydraulic fracturing for decades. As EPA officials have indicated the number of identified cases of drinking water contamination related to hydraulic fracturing activities is small particularly compared to the large number of hydraulically fractured wells and I agree with that assessment.

34.Are there gaps in available data that make it difficult for the EPA to fully assess hydraulic fracturing effects on drinking water as well as air quality?

Hydraulic fracturing has been extensively studied by state, federal, and non-governmental bodies.

35.What further studies—if any—do you believe would be appropriate for EPA to conduct on the effects of hydraulic fracturing on air and water quality?

I am not aware of any urgent need for new studies of hydraulic fracturing but if confirmed I commit to review any new information on the subject.

36.Do you agree, as EPA scientists found, that of the 1,606 chemicals injected for hydraulic fracturing, 173 chemicals are a proven risk to public health?

Risk encompasses both hazard as well as a likelihood of exposure. EPA found that 173 of the chemicals listed can be hazardous but did not speak to their risk likely because of their very low probability of exposure.

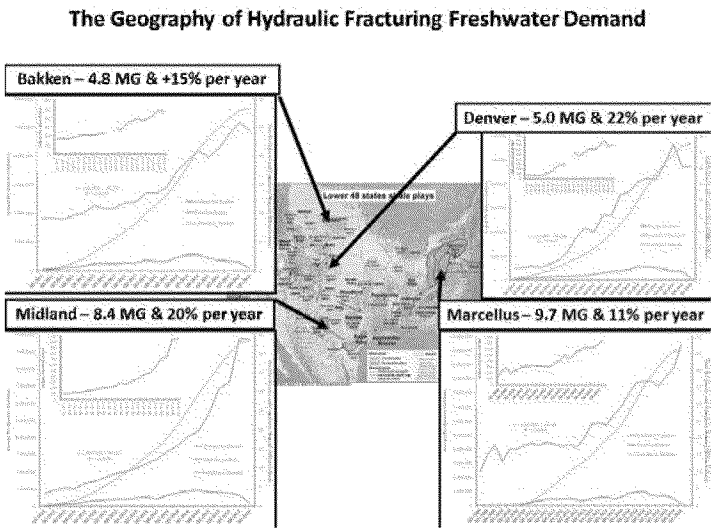
To date communities have been absorbing the costs of damage from oil and gas operations, whether that is in terms of health impacts, contaminated soils and water, which depress property values and destroy businesses, residential neighborhoods turned into industrial zones, earthquakes caused by injection wells (which are increasingly being excluded from homeowner insurance policies) and more.

37.What would be your approach as Attorney General to ensuring that communities do not to absorb these costs, and operators become responsible for the full costs of their operations, including damages?

As discussed at my confirmation hearing as Attorney General I have taken on oil and natural gas companies who violated Oklahoma laws and regulations. If confirmed, I will uphold and execute the laws as established by Congress.

38.Given that High Volume Hydraulic Fracturing (HVHF), or fracking gas wells, currently require an average of 4.8-9.7 million gallons of fresh water to fracture a single well (Note: This demand is growing by 11-20% per year), and only 4.5-7.5% of this water is being recycled, would you consider modern-day oil and gas drilling to be a long-term, sustainable solution to our country's energy needs?"

EPA's final report on hydraulic fracturing and drinking water found that in most cases hydraulic fracturing constituted "generally less than 1% of total water use" in counties and stated that their findings suggested "that hydraulic fracturing operations represented a relatively small user of water in most counties." I agree with these specific EPA conclusions.



39.When did you first find out that fracking could cause earthquakes in Oklahoma under certain geological conditions? Did you publicly call on industry to alter their practices?

As I stated at my confirmation hearing the Oklahoma Corporation Commission is vested with the jurisdiction of regulating oil and gas activities, they have acted to address seismicity concerns in the state and I have worked with and supported the Commission and other state agencies as required by state law.

40.What percentage of injection wells in Oklahoma is monitored for pollution (in groundwater, deep and shallow)? In those that were monitored, what was the concentration of pollutants?

Wastewater disposal through underground injection is regulated by the State of Oklahoma through delegated powers from the EPA pursuant to the Safe Drinking Water Act and to the best of my knowledge the State appropriately follows all requirements under the law.

The "Hockey Stick Moment" is when a variable of interest hits an exponential point in its growth with respect to time. The most notable "Hockey Stick Moment" is the rising levels of atmospheric CO2, N2O, and CH4 resulting from anthropogenic forces. However, a moment closer to Oklahoma is the exponential increase in earthquake activity even the USGS has shown is a function of the disposal of nearly 20% of US fracking waste into Oklahoma and Kansas' Class II Injection wells.

41.Do you agree that this growth in quake activity is a function of excessive and irresponsible oil and gas waste generation and disposal and is worthy of more research and monitoring by the EPA?

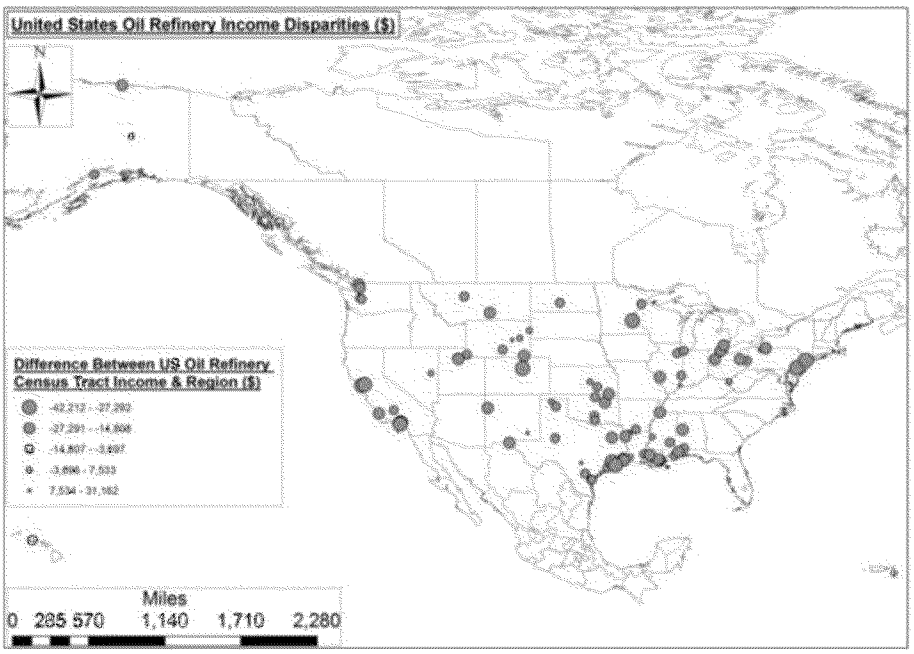
As previously mentioned, wastewater disposal through underground injection is regulated by the State of Oklahoma under delegated powers from EPA pursuant to the Safe Drinking Water Act. Underground injection is not unique to the oil and natural gas industries as EPA has regulations on six different classes of underground injections. Underground injection of wastewater from oil and natural gas activities has been conducted safely in a number of states for decades, and, in a previous EPW hearing, Senator Cardin complimented "the actions taken" in Oklahoma with regard to oil and gas wastewater disposal. He went so far as to say the State "provided a good model that should be used in other States," lauding Oklahoma's actions as an example of "the Federal Government working with the State to develop the right framework for dealing with natural gas extraction." The State of Oklahoma has acted on local seismicity concerns and, to the best of my knowledge, follows all applicable SDWA requirements in regulating class 2 injection wells within the state.

42.You at first belittled the idea that oil and gas operations could cause human induced seismicity in Oklahoma, so did Harold Hamm. Do you now believe that you were both wrong?

As new information becomes available on a number of issues it should always be evaluated and taken into consideration. The State of Oklahoma has taken actions to address seismicity concerns related to the oil and natural gas industry and I support the state taking action.

43. How would a Trump/Pruitt EPA address growing environmental and economic justice issues associated with existing oil refineries and associated unconventional oil and gas infrastructure proposals?

As I stated at my confirmation hearing I believe addressing environmental justice in poor and minority communities is an important role of the EPA Administrator. If confirmed I intend to enforce laws under EPA jurisdiction with uniformity regardless of which industry a potential violation of law comes from.



44.Would you support implementing a requirement to provide full, well specific, public disclosure of all information related to oil and gas development involving

hydraulic fracturing that informs understanding groundwater, surface water, public health and safety, and habitat potential impacts?

If confirmed I would review both EPA's legal authorities as well as the potential need for new requirements and regulations.

With regards to decommissioning a former nuclear power plant, a fair amount of confusion appears to exist in regulating non-radiological hazardous materials during active plant demolition. Most agencies, including the EPA, will defer to the Nuclear Regulatory Commission (NRC) for anything at a nuclear power plant site. However, the NRC does not regulate the non-radiological aspects of nuclear power plant operation--e.g., the NRC does not regulate chemical or oil spills that occur at a nuclear power plant site.

45.How active of a role should the EPA play during the hazardous material survey and active demolition phases of power plant decommissioning to assure that public health and the environment are not impacted by a site's prior use as a nuclear power plant?

In 2002, the EPA and the NRC signed a Memorandum of Understanding entitled "Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites." The EPA's responsibilities with regard to the regulation of non-radiological hazardous materials are address in sections V.C.3, V.D.4, and VI. If confirmed, I will carry out EPA's responsibilities under the law.

The National Environmental Policy Act (NEPA) requires all federal agencies to consider the potential environmental impact of any industrial project while the agencies assess their regulatory authority specific projects. While the Nuclear Regulatory Commission (NRC) does conduct Environmental Assessments for nuclear power plant construction, operations, modifications and decommissioning activities, these assessments are frequently conducted after all other technical assessments for a nuclear power plant project have been evaluated; meaning that they are not an integral part of the NRC's regulatory decision-making process.

46.As Administrator, how will you encourage or require the NRC to more rigorously include NEPA requirements in its "technical" regulatory evaluations?

I am not familiar with how the Nuclear Regulatory Commission conducts its analyses under the National Environmental Policy Act. Under section 309 of

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the Clean Air Act, EPA reviews and comments on the NEPA analyses of other agencies. If confirmed, I will ensure that EPA continues to carry out this statutory responsibility.

Changes in weather patterns, such as heavier precipitation events that increase run-off and flooding, are affecting lakes, rivers, and reservoirs nationwide. Water quality, quantity, and the integrity of our water infrastructure are at risk. Recent studies in the Northeast have found that degraded water quality on lakes can cost lakeside communities millions of dollars in losses from both tourism and taxable income due to reduced property values.

47.How will the EPA support water resource management programs to address these issues?

If confirmed, I will continue to implement the water quality protection authorities granted to EPA by Congress. These include regulatory and financial and technical assistance programs. The Clean Water Act expressly leaves the allocation of water quantity to states. I further note that Congress has not given EPA water resources management authorities. Instead, such programs are carried out by the Corps of Engineers and, in the 17 Western states, the Bureau of Reclamation.

48.How would you address EPA's permitting backlog, e.g. the National Pollutant Discharge Elimination System (point source water dischargers) program?

Making sure permits are current is one of core functions under the statutory responsibilities given to EPA and in turn carried out by authorized states. However, in recent years states have been asked to shift their focus and resources to other activities. If confirmed, I would focus on ensuring EPA is able to carry out its core functions under our environmental.

Federal regulations such as the Clean Water Act and the Clean Air Act set national standards to protect our natural resources and safeguard public health. In 2010 you campaigned against a "one-size-fits-all strategy" towards environmental protection.

49.What did you mean by that and how would you, as EPA Administrator, ensure that all Americans are adequately protected against poisonous water and air regardless of where they happen to live?

As I said in my testimony before the committee, I support national standards and neighborhood solutions. That means there may be one standard that applies nationally, but not only one way to achieve that standard. If confirmed, I will bring this philosophy to my role as EPA Administrator.

50.Do you support and stand behind the premise of the Clean Water and Clean Air Acts that every American has the right to clean water and air?

I fully support the Clean Water Act and the Clean Air Act.

In a court filing opposing the Waters of the United States you wrote "This regulation usurps the state's authority over its land and water use, and triggers numerous and costly obligations under the [Clean Water] Act for the state and its citizens."

51.Without national regulations how would you guarantee the quality of water that flows across state boundaries?

Regulation of rivers and streams that form the boundaries of states or flows from one state to another is not an issue raised by states in the WOTUS litigation.

52.Do you believe that the only people with an interest in water are those within a state and not downstream neighbors?

No.

53.Every national science organization, not to mention the Pentagon, lists climate change as a critical threat to our planet, our economy, and our national health. The Pentagon considers Climate Change a "Threat Multiplier" and a "Growing Security Threat." Do you agree with the Pentagon and our National Security advisors regarding the severity of this crisis?

I have no reason to disagree with the statements from the listed security experts, although I have not made any attempt to independently verify their accuracy.

54.Please describe your plan, process, or other information that the EPA may be able to provide to the Pentagon to mitigate or mollify the threats our military describes.

Interagency cooperation is very important. I believe the development of military readiness and response plans are best left to our military and national security experts. If confirmed, I will provide technical expertise to other agencies as appropriate.

55.Will you be promoting greater use of carbon-based fossil fuels?

I do not believe it is the mission of the EPA to promote one type of energy source over another. If confirmed as Administrator, I will fairly and equitably enforce the laws within the framework established by Congress and not pick winners and losers.

56.Do you think the EPA has any role in helping our nation decrease or end the consumption of carbon fuels?

The mission of EPA is to set standards that protect the environment and the health and welfare of our citizens. While setting national energy policies are not within the statutorily ascribed purview of the agency, EPA regulatory actions often impact the ability of those charged with generating our nation's energy to do their job. If confirmed, I will listen to all impacted stakeholders when developing EPA actions. I will also coordinate with impacted agencies, such as the Federal Energy Regulatory Commission, to ensure EPA's actions do not undermine their equally important missions and statutory objectives.

57.Do you see any reason for reducing carbon emissions that come from using fossil fuels like oil, coal, and natural gas?

I believe the Administrator has an important role when it comes to the regulation of carbon dioxide. If confirmed, I will fulfill the duties of the Administrator consistent with Massachusetts v. EPA and the agency's Endangerment Finding on Greenhouse Gases respective of the relative statutory framework established by Congress.

58.What do you think are the most reliable sources for scientific news and information?

If confirmed as EPA Administrator, I will adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment and will base my decisions on sound science, including advice provided by agency experts and advisory personnel.

59.Do you plan to request regular briefings from government science and/or intelligence sources? If so, how often? If not, why?

If confirmed, I will make decisions based on sound science reflective of diverse, objective and unbiased views conducted in a transparent manner reliant on public engagement and consistent with the framework established by Congress.

60.Do you intend to have meetings with or receive regular briefings from private industrial sources? If so, how often? If not, why?

If confirmed, I intend to operate the agency consistent with the statutory framework established by Congress and follow associated processes, which require extensive outreach with the public and regulated community.

The President-Elect has positioned himself as a champion of coal miners. You may be aware of the crisis facing the nation's largest multi-employer health and pension plans serving coal miner retirees, administered by the UMWA. The pension plan is facing insolvency within 10 years and, more immediately, over 20,000 retired coal miners and their dependents are facing an imminent loss of health care coverage. Senator Manchin e developed a bi-partisan legislative response to this crisis called the Miners Protection Act that I co-sponsored. It was marked up and passed by the Senate Finance Committee last September on an 18-8 vote. We were expecting the Senate and House Republican leadership to work with us to include the MPA in the Continuing Resolution package that we deliberated on during the lame duck session. We also asked the President-Elect to express his support for this legislation given his abundant pro-coal miner rhetoric during the Presidential campaign. Senate Democrats sent him a letter imploring him to publicly express his support. We got no response. The outcome was a Continuing Resolution that included nothing more than a 4 month extension of health benefits for the retirees who now face a termination of benefits in April instead of this month.

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61.How will you work with the President-elect and the rest of his cabinet to work with Congress to pass the MPA and fulfill the nation's commitment to the coal miners whose work powered this country for generations?

I am not familiar with the proposed legislation referenced in the question or EPA's authorities and responsibilities for pension and health care plans for miners.

As you may know, each federal agency, including EPA, has an important role in enforcing Title VI of the Civil Rights Act of 1964, which prohibits discrimination on the basis of race, color and national origin by recipients of federal funds. This is an accountability law — before the law was passed, federal funds were subsidizing agencies and organizations, from schools to hospitals to other agencies of government that discriminated. The case that led to the passage of Title VI was *Simkins v. Moses Cone Memorial Hospital,* a 1963 case in which a circuit court finally, 9 years after *Brown v. Board,* struck down a provision of federal law that allowed federally subsidized hospitals to have separate wings for "whites" and "colored" people under a "separate but equal" provision of a federal law called the Hill Burton Act.

62.Are you familiar with Title VI?

Yes.

63.Are you familiar with the Moses Cone Memorial Hospital case?

Yes.

64. If confirmed, wiill you commit to enforcing Title VI and the regulations promulgated by EPA to enforce Title VI?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress that impose duties or grant authority to me as Administrator, including the Civil Rights Act.

Title VI (at 42 USC 2000d-1) specifically empowers "each federal department and agency" that distributes federal funds to effectuate Title VI and then authorizes each agency to issue rules, regulations and orders to implement the law. Thus, the authority and responsibility to enforce Title VI and to ensure that recipients of

federal funds are not discriminating rests with each federal agency, including EPA. As you may know, federal enforcement is all the more important because affected communities can't go to court to enforce claims unless they can prove intentional discrimination under a case that arose out of Alabama — *Alexander v. Sandoval*, 532 U.S. 275 (2001).

65.Are you familiar with the text of Title VI, 42 USC 2000d, which prohibits discrimination on the basis of race, color or national origin?

Yes.

66.What is your vision for Title VI enforcement at EPA? What reforms need to be made? What concrete steps do you envision to strengthen civil rights enforcement at EPA?

If confirmed as Administrator, I will faithfully execute Title VI. I will expect my staff to evaluate any areas that might need reform, and I will take appropriate actions based on the recommendations made to me.

67.Are you familiar with the Supreme Court decision in *Alexander v. Sandoval* (2001)?

Yes.

68.To your knowledge, does the text of the law define or limit the meaning of "discrimination"?

I cannot answer this question without additional context as to what text of what law you refer to.

69.Are you familiar with regulations promulgated by EPA to implement this language, found at 40 CFR Part 7?

I cannot answer this question without additional context as to what you are referring to when you say "this language."

70.In your opinion, does this language further define what is meant by "discrimination"?

I cannot answer this question without additional context as to what you are referring to when you say "this language."

71.In fact, the regulations prohibit actions with an unjustified disparate impact. Do you agree?

The regulations speak for themselves.

72.Are you aware of criticism that EPA has historically done a “poor” job of enforcing Title VI and its regulations?

I am not.

73.If so, do you agree or disagree with criticisms that EPA has historically done a “poor” job of enforcing Title VI and its regulations?

Because I have not heard those criticisms, I cannot say whether I disagree or not.

74.Are you familiar with the Deloitte Report (2011), see https://assets.documentcloud.org/documents/723416/epa-ocr-audit.pdf, which documented problems with EPA’s enforcement of Title VI? If so, what is your past experience with the Deloitte Report?

I am not familiar with the report you reference.

75.Were you aware that the Deloitte Report made the following findings:

•The Office has not adequately adjudicated Title VI complaints – those addressing allegations of discrimination against communities of citizens affected to environmental rules promulgated by the EPA.

•OCR has not completed compliance checks of EPA grantees, in a timely or effective manner, to ensure that grantees are not engaging in discrimination in their work.

I am not familiar with the report you reference.

76.If so, what is your past experience with the findings?

I am not familiar with the findings.

77.In your opinion, what has the EPA already done to address these issues?

I do not know what EPA has or has not done to address any such issues.

78.Do you know whether these steps have been effective?

Because I am not aware of the steps taken--if any--I cannot judge their effectiveness.

79.In your opinion, what more could the EPA do to address these issues?

It would be inappropriate for me to prejudge an issue that may come before me for decision if I am confirmed as Administrator. If the issue comes before me, I will ensure that the issue is fully and fairly considered, as part of a transparent process that seeks input from all stakeholders.

80.If confirmed, will you commit to taking action to address these issues?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress and imposing upon EPA duties or powers.

81.Do you believe that recipients of federal funds — across this whole country — are making any decisions that are discriminatory?

I do not doubt that some recipients of federal funding engage in behaviors that violate federal anti-discrimination laws.

82.Under Title VI and its regulations, should recipients of federal funds review whether a decision has a disproportionate adverse impact to ensure that it is in compliance with civil rights law?

Recipients of federal funds should take all actions required by law to ensure that they are in compliance with federal civil rights laws.

83.Do you have plans for pre-award compliance reviews? When would any such plans go into effect? And post-award compliance reviews? What would such reviews involve?

If confirmed as Administrator, I will ensure that federal funds are awarded in compliance with federal law.

84. What is your understanding of the obligations of recipients under Title VI and EPA implementing regulations? Do you think those obligations are sufficient?

The obligations of recipients of federal funds are defined by the statutes and regulations to which you refer. Those statutes and regulations speak for themselves.

Energy burdens above six percent of a household's income are typically considered unaffordable, but low income households spend an average of 15 to 20 percent of their income on energy bills. Low income families are also more likely to live in older, inefficient housing. The Clean Power Plan provides incentives to states to invest in energy efficiency improvements in low income communities.

85.Are you concerned about the lack of access to energy efficient, affordable housing for low income families?

I am unfamiliar with EPA's role and statutory authorities as they relate to affordable housing. I am concerned about the impact regulations can have on the cost of energy for consumers.

86.As EPA Administrator, how would you help low income working families reduce their energy burdens and access energy-efficient affordable housing?

I am unfamiliar with EPA's role and statutory authorities as they relate to affordable housing.

Low-income rural and urban communities and people of color are disproportionately live near, are exposed to, and die from environmental risks/hazards. As of February 27, 2014, there were 1322 Superfund sites on the National Priorities List in the United States. Fifty-three additional sites have been proposed for entry on the list. Communities of color breathe in nearly 40 percent more polluted air than whites. Sixty-eight percent of African-Americans live within thirty miles of a coal-fired power plant, the zone of maximum exposure to pollutants that cause an array of ailments, from heart disease to birth defects. Half of all U.S. Latinos live in the country's most polluted cities. Hispanic children are twice as likely as non-Hispanic white children to die from asthma while, from 2012-2014, African American children had a death rate ten times that of non-Hispanic white children. African-American children are three times as likely to suffer an asthma attack.

87.As EPA Administrator, how would you ensure that vulnerable low-income communities and communities of color are not overburdened by the harmful impacts of pollution?

If confirmed, I expect to make the cleanup of contaminated land one of my priorities. I believe the nation's environmental laws apply to all Americans.

88.Would you say there is anything you will do, if confirmed, to help these Americans? Will you push to reduce smog and particulate matter that causes more asthma attacks and other lung problems? Or is that a matter for the states and not the EPA?

If confirmed, I will work to ensure human health is protected by implementing Clean Air Act provisions, such as the National Ambient Air Quality Standards for criteria pollutants, including for ground-level ozone and particulate matter, which prioritize protection of human health and welfare. I will also work to ensure all Americans are treated equally under the law in furtherance of EPA's mission to protect human health and the environment.

EPA has adopted many cost-effective safeguards in the past eight years that would significantly reduce the pollution that contributes to asthma attacks in children -- many of which you challenged as Attorney General of Oklahoma.

89.Can you explain how you will protect the interests of these and other children that suffer from asthma?

As I stated in my testimony to the committee, all legal positions that I took in my capacity as Attorney General for the State of Oklahoma were in an the capacity of an advocate. If confirmed as Administrator, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act.

90.Will you commit to working to further reduce pollution, including pollution that disproportionately burdens Hispanic and Environmental Justice communities?

If confirmed, I will work to ensure all Americans are treated equally under the law in furtherance of EPA's mission to protect human health and the environment.

91.Do you think the EPA has done enough to ensure that low-income communities near brownfields receive the same amount of attention as high-

income communities? Will you give priority to the safety and health of our children and future generations over short-term current economic gains of few?

I do not know what EPA has or has not done on this issue. If confirmed as Administrator, I will work to ensure the brownfields program is operated in accordance with applicable legal requirements.

92.Municipal electric utilities depend on the municipal bond tax-exempt status. For Vermont Municipal electric utilities, this is particularly true with regard to utility investments. Do you support tax-exempt bonding as one important tools to improve utility infrastructure (electric, water, wastewater, etc)?

As Attorney General for Oklahoma, I have not studied the issues related to tax-exempt bonds for utility infrastructure. I am not familiar with EPA's role and legal authorities as they relate to municipal tax-exempt bonds.

Your state of Texas is part of a market (ERCOT) that is not Federal Energy Regulatory Commission jurisdictional. This means that Texas does not comply with the same requirements as electric utilities in Vermont and other ISO regions face. ERCOT seems to have embraced wind and other renewable sources.

93.What are the strengths of the ERCOT approach?

I am Attorney General for Oklahoma, not Texas, and do not have an opinion on the Texas electric grid.

94.How would you contrast those with the strengths and weaknesses of the New England ISO?

I am not familiar with the electric grid in New England.

"Green infrastructure" (forests, wetlands, natural floodplains, etc.) can play a critical role in reducing impacts of flooding from extreme weather events like Tropical Storm Irene, and in helping to meet essential water quality requirements/improvements such as the EPA-approved Lake Champlain Total Maximum Daily Load (TMDL) plan. Also, green infrastructure is often much more cost effective than updating or investing in new traditional "gray infrastructure." EPA has played an important role in providing training, technical and financial assistance related to capitalizing green infrastructure.

95.What do you see as EPA's role going forward related to green infrastructure?

Green infrastructure is a good example of a neighborhood solution that can achieve compliance with national standards. I believe EPA should be supportive of such efforts. If confirmed, I will work to break down barriers within EPA to the use of green infrastructure.

In your own state of Oklahoma, wastewater disposal from fracking and drilling has induced thousands of earthquakes, threatening lives and destroying property. Joe and Mary Reneau suffered through a 5.7 magnitude quake (Nov. 6, 2011) near Prague, Oklahoma – their chimney fell into the living room, right on top of a favorite spot of Mary's to sit. Luckily for them, Mary wasn't sitting there at the time, they had earthquake insurance, and they had $200,000 of repairs done on their house. Joe jokes that he won the earthquake lottery. Jerry and John Loveland weren't so lucky, they had $50,000 worth of damage done on their house, no insurance, and no way to pay for the damage. Oklahoma is an oil and gas state. Joe Reneau said he wouldn't bring any claims against the oil company, because if he did, he would be "run out of town." Oklahoma regulators have done next to nothing to help those harmed by oil industry induced quakes or prevent more destruction.

96.As EPA administrator, what will you do to help the Amos family, John and Catherine Fenton, or all those in Oklahoma threatened by oil industry induced earthquakes?

As I have previously stated, underground injection is regulated by the State of Oklahoma under delegated authority from EPA under the Safe Drinking Water Act. The State has taken action to address seismicity concerns and, if I am confirmed, I will continue working with States and within EPA's legal authorities to address public health and environmental concerns.

In September 2016, the EPA recommended a moratorium on the underground injection of fracking wastewater in certain earthquake-prone parts of Oklahoma because regulations had not successfully addressed the problem.

97.Will you uphold the EPA's recommendation—yes or no?

The State of Oklahoma has worked collaboratively with the EPA to address seismicity concerns and state regulators have shut down dozens of

underground injection wells and, if confirmed, I will continue this cooperative approach to addressing such future issues as they might arise.

98. Specifically, EPA's recommendation arose out of the agency learning that the Oklahoma Corporation Commission, the body overseeing the underground injection control program in a primacy agreement with the EPA, has illegally permitted restricted wells to return to normal operations. While EPA cannot order Oklahoma to impose a moratorium, it can revoke the state's authority and take over regulation of the wells itself. As EPA Administrator, will you regulate these wells in compliance with the Safe Drinking Water Act and in addressing the seismic catastrophe occurring in your state—yes or no?

If confirmed as EPA Administrator I will review relevant information, including EPA's legal authorities, to ensure drinking water protections in Oklahoma and across the nation.

99.Do you think local communities have the right to protect themselves from pollution and other threats to public health?

Yes, if authorized under the law and not preempted or displaced by state or federal law.

100.Will you, as EPA Administrator, support these state and local regulations by not intervening or challenging them—yes or no?

I believe in cooperative federalism and I will work with States and local communities to protect citizens consistent with our nations laws.

101. How do you reconcile challenging these rules with your view of respecting and giving deference to state and local environmental regulation?

It is not clear to me what rules are being referred to in this question, however, I believe that environmental and public health protections are the strongest when there is collaboration across all levels of government consistent with applicable laws.

The FracTracker Alliance has shown that 11% of organic farms are within 1/2 mile of oil and gas development, and 100% of farms within the San Joaquin Valley and Southern California are within 8 miles of oil and gas operations (59,840 wells),

and that produced water is being used to irrigate crops (and also organic crops). California feeds 50% of the country.

102. What is your response to the US maintaining food independence and food safety when the majority of its food sheds are threatened by oil and gas contamination?

I have seen no evidence or information that proximity to oil and natural gas development has contaminated or threatened to contaminate our nation's food safety. The State of California would be better able to address their laws and regulations with regards to the location of oil and gas development in their State as well as their irrigation policies.

103. Why is energy independence more important than food independence?

I have not made any statements ranking the importance of these two issues critical to our nation's health and welfare.

104. We have the opportunity to be both energy independent and food independent without poisoning people and the planet. Why should the US be dependent on other countries to supply its food, but not be dependent on other countries to supply its energy?

I support both the goals of domestic energy independence as well as protecting our domestic food supply and working collaboratively with our nation's farmers and ranchers.

105. From your Great Plains perspective how do you feel the advent of High Volume Hydraulic Fracturing (HVHF) will affect the growing concerns about food security/safety relative to energy infrastructure?

Oklahoma, as a rural state, has long successfully balanced safe energy production as well as farming and ranching.

106. How can the public trust the oil and gas industry when it is exempt from so many environmental regulations?

Any statutory exemptions come from Congress and if confirmed I will uphold the laws as directed by the Constitution.

107. How can rural communities trust oil and gas operators when rural gas gathering lines are exempt from federal pipeline safety regulations (because of the exemption, states also cannot regulate rural gas gathering lines, and therefore because they are not regulated the operators do not have an obligation to report on incremental failures along the pipelines, they are only required to report if there is a need for an evacuation).

The State of Oklahoma has worked well with both rural communities and the domestic energy industry (including alternative energy producers as well as conventional) and, if confirmed, I will continue working to foster safe domestic energy development and maintain trust with our nation's communities both rural and urban.

The conventional food supply is sufficiently burdened by a toxic load from pesticides, herbicides, fertilizers, and genetic modification. It doesn't need yet another toxic burden.

108. How can consumers trust the food in restaurants and grocery stores when it may be grown near oil and gas operations?

If confirmed, I would expect to be briefed by staff to before taking action and would work to ensure EPA followed all applicable legal requirements and made decisions based on sound science.

109. How can parents trust the food that is being served to their kids in school cafeterias?

If confirmed, I would expect to be briefed by staff to assess what role, if any, EPA plays concerning the safety of food served in school cafeterias.

Many of our environmental laws were designed to permit regulation and enforcement by the states so long as state programs meet minimum federal standards established by EPA. Since state laws, however, do not always have general effect or application on Indian lands, Congress has amended several of our environmental statutes to permit tribes themselves to assume primacy of enforcement.

110. Do you intend to encourage tribes to develop their own enforcement regimes under approved programs, much as the states do? Or do you expect EPA itself to

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provide direct regulation and enforcement of federal environmental laws on Indian lands throughout the country?

If confirmed as Administrator, I would ensure that Indian lands were subject to adequate environmental regulation, whether that be through tribes utilizing regulatory powers as contemplated by Congress, or through direct regulation by the EPA.

Much of the nation's and the world's attention has been focused in recent months on the Dakota Access Pipeline, the construction of which crosses multiple states. Many pipelines on Indian lands are located entirely within a single state, however. Here EPA is not always the primary regulator, and state laws do not always apply. The health and environmental consequences of pipeline failures, however, can be enormous.

111. Will you commit to work with this Committee and other agencies to address the environmental and public health and safety issues associated with the operation of pipelines on Indian lands, including purely intrastate pipeline facilities?

If confirmed as Administrator, I would faithfully execute any obligations imposed on EPA by Congress to ensure the environmental soundness of pipelines on Indian lands.

Many of the nation's Superfund sites are on Indian lands. We are still dealing with clean-up issues from our uranium industry's legacy from the 1940s and 1950s. The nation's largest open pit uranium mine--Jackpile Mine on Laguna--was only recently added to the Superfund list. The largest Superfund site in the country in your own state is largely on Indian lands: Tar Creek on Quapaw. We have not fully addressed abandoned uranium mill tailings piles and the failure of the Church Rock Dam that dumped irradiated mill tailings into Navajo lands and waters. More recently the failure of the dam below the Gold King Mine in Colorado turned the San Juan River on the Navajo Reservation red all the way to Utah. Today, and nearly every day, fugitive coal dust emissions from trains silt over spawning grounds of treaty-protected fisheries. Oceangoing dumping threatens subsistence lifeways throughout Alaska and the Pacific Northwest. Newer and more virulent strains of black lung disease are overwhelming public health facilities in mining communities. These are just a few examples of major environmental issues that impact disproportionately the poor and the underrepresented elements of our society, including Indian communities and tribal lands.

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112. Can you assure us that under your leadership the EPA will address issues of environmental justice in Native American communities and offer a voice to those most affected by the environmental consequences of industrialization?

If confirmed as Administrator, I will faithfully execute all environmental laws enacted by Congress, and will do so in all communities, including Native American communities.

These questions extend to resources protected by treaties such as water rights and compacts, forestry, hunting and trapping, fishing, etc. Some treaties have language that doesn't apply any longer and needs to be updated. Other language needs updating to reflect cultural realities. For example, “hunting” rights do not include “trapping rights” in the letter of the treaty unless trapping is explicitly mentioned, even though the tribes did not differentiate between both.

113. Please describe the relationship between the federal government and American Indian Tribes as it relates to sovereignty the trust responsibility.

Pursuant to federal law, the federal government has a trust responsibility to American Indian Tribes.

114. What obligations do federal agencies have to formally consult with American Indian tribes? What about independent federal agencies?

The obligations of federal agencies--independent or otherwise--to formally consult with American Indian tribes are defined by federal law. If confirmed as Administrator, I will faithfully execute all laws enacted by Congress requiring or authorizing formal consultation with American Indian tribes.

115. What procedures should the EPA follow regarding permitting of infrastructure projects that could potentially impact American Indian tribes and their citizens?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress requiring that procedures be followed with regard to infrastructure projects that could potentially impact American Indian tribes and their citizens

116. How do you interpret the United Nations Declaration on the Rights of Indigenous Peoples, especially as it relates to obligations of the federal government?

The federal government's obligations with respect to Indian tribes is defined by federal law.

117. Do you believe federal funding should be block granted to states to then disburse to tribes? Alternatively, should tribes receive their full and fair allocation of federal funding without being beholden to cumbersome state bureaucracy?

Federal funding should be disbursed to States and tribes in the manner directed by Congress.

118. What is the federal government's role in permitting extraction of mineral resources on federal Indian lands?

As trustee of federal Indian lands, the federal government's role is to act in the best interest of the tribes with regard to permitting extracting of mineral resources on those lands.

119. How will you promote economic development within Indian country?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress directing or authorizing me to promote economic development within Indian country.

120. How will you ensure the Bureau of Indian Education provides quality education to American Indian students?

The Bureau of Indian Education is overseen by the Department of the Interior, not EPA.

121. What is the role of the federal government to promote renewable energy development on American Indian lands?

The federal government's role in promoting renewable energy development on American Indian lands is determined by Congress. If confirmed as Administrator, I will faithfully execute all laws enacted by Congress imposing upon EPA duties relating to promoting renewable energy development on American Indian lands.

122. What is the role of inter-agency cooperation to work across agencies on American Indian issues?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress imposing upon EPA duties relating to American Indian issues, and if faithful execution of those laws requires cooperation with other federal agencies, I will ensure that such cooperation occurs.

123. Will you work with the White House Inter-Agency Working Group on American Indian issues?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress requiring or authorizing me to work with the White House Inter-Agency Working Group on American Indian issues.

Federal Indian law has long recognized that tribes maintain authority over Indian country to the exclusion of states. Oklahoma has 38 federally recognized Indian tribes and those tribes exert jurisdiction over their lands throughout the state. But as Oklahoma Attorney General, your office has never filed a brief in support of tribal jurisdiction. Instead, your office filed briefs in ODEQ v. EPA, the Dollar General case, and several other cases OPPOSING tribal jurisdiction.

124. How can you hope to serve as a protector of tribal lands when you have, over and over again, advocated to deny tribal governments the right to regulate and protect their OWN resources?

As Oklahoma Attorney General, my duty was to ensure that the State of Oklahoma's jurisdiction was fully realized, and sometimes took legal actions in pursuit of that duty. If confirmed as Administrator, I will faithfully execute all laws enacted by Congress directing or authorizing me serve as a protector of tribal lands.

Indian lands outside reservation boundaries. The EPA has, since at least 1984, recognized the federal government's trust responsibility, which is built upon the longstanding historical and legal relationship between the federal government and Indian tribes. The EPA has also acknowledged that treaties, as part of the supreme law of the land, have the same legal force as federal statutes and must be considered when making agency decisions.

125. How will you work to protect tribal treaty lands and resources that lie outside of reservation boundaries, and how will you help expand tribal authority over those lands and resources?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress directing or authorizing me to regulate tribal treaty lands and resources and directing or authorizing me to seek to expand tribal authority over those lands and resources.

Tribal communities, especially those in Alaska, have borne the brunt of the impacts of climate change. Several Native Alaskan villages have seen their entire way of life vanish as their homes have begun to erode away beneath their feet due to rising sea levels. Others have seen vital food supplies contaminated and sacred species of fish devastated by climate change.

126. How do you plan to protect native peoples from the effects of climate change?

If confirmed as EPA Administrator, I will adhere to the applicable statutory authorities to fulfill EPA's mission to protect human health and the environment for all of our nation's citizens.

127.There are established consultation processes set up for Indian Nations. Will you have "meaningful" talks with them? Will your Agency be transparent in all dealings with Tribal Nations? Will you be honest and fair?

If confirmed as Administrator, I will faithfully execute all laws enacted by Congress requiring consultation processes for Indian tribes. I will engage all who have business before the EPA--including Indian tribes--in meaningful, transparent, honest, and fair processes.

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Senator Sullivan:

1. Alaska's seafood industry is the nation's largest and is one of major employer's in the Alaska economy. In fact, over 60 percent of the nation's commercially harvested fishery resources are caught and processed in Alaska. Alaska's waters remain some of the cleanest and most pristine in the nation. Most of the seafood processors who process these great resources are located in remote areas of Alaska. Each of those processors hold Clean Water Act discharge permits for the small amounts of seafood waste produced during procession operations.

EPA has delegated the management of those discharge permits to the State of Alaska Department of Environmental Conservation as directed by the CWA. In spite of that delegation, EPA remains actively involved in deciding issues that impact the ability of the state agency to accomplish its mission. For example, the EPA is currently considering a rule change that would dramatically impact the operation of seafood processing plants in those remote areas. That change could result in some of those operations having to cease processing because they cannot comply with this rule change. The current rule has been in place for almost 35 years and there is no water quality problem in the locations to justify such a rule change.

Will you commit to reviewing this proposal and confer with the Alaska Congressional Delegation prior to making any change to the current status?

If confirmed, I will review this proposal and confer with the Alaska Congressional Delegation prior to changing the Clean Water Act regulations currently applicable to seafood processors.

The Alaska Department of Environmental Conservation has recently issued a draft Clean Water Act APDES permit to allow seafood processors to continue discharging small amounts of waste pursuant to the Clean Water Act. Unfortunately, EPA is objecting to some of the permit conditions. Again, they are doing so with no known water quality issues or public concern about those conditions. Rather, it appears as though the EPA does not approve of the manner in which our state agency is pursuing its obligations. As a former State of Alaska Department of Natural Resources Commissioner, I have great faith in the ability of state employees to make solid permitting decisions that will protect the state's environment while allowing operations and employment to continue that are compliant with the Clean Water Act.

2. Will you commit to reviewing these EPA actions and allow the state to issue its permit?

Yes, if confirmed, I will review EPA's actions as they relate to Alaska seafood processing permits. As I stated in my testimony, I support national standards and neighborhood solutions.

3. CERCLA Financial Assurance Requirements under Section 108(b):

On December 1, 2016 the Environmental Protection Agency issued a proposed rule under Section 108(b) of the Comprehensive Environmental Response, Compensation and Liability Act that would require hard rock mines to obtain additional and duplicate financial assurance requirements for copper, gold, iron, zinc and other hard rock mines. If this proposed rule is finalized, the financial assurance requirements would likely result in significant redundant costs for mining corporations. EPA has indicated that these regulations will expand to the oil and gas sector next. If confirmed would you work to ensure that any new rules or regulations are not duplicative of rules imposed by other federal agencies or states?

I am not familiar with the details of this rulemaking action and would not want to prejudge the issue prior to being confirmed as Administrator. However, if confirmed I will work to ensure EPA complies with all applicable legal requirements, including those related to analyzing impacts on small businesses, as part of this or any other rulemaking.

4. Section 404(c) of the Clean Water Act:

Do you believe that EPA's use of a preemptive veto of a project under section 404(c) of the Clean Water Act may create the opportunity for overreach by the agency and could undermine administrative process and the rule of law?

As I stated in my testimony, I believe that it is very important that federal agencies follow the appropriate legal process when taking any actions. Any preemptive action before the completion of a statutorily mandated process could undermine both the administrative process and the rule of law.

Senator Whitehouse:

1.Estuaries are important coastal habitats the sustain unique wildlife and plant species, serve as a nurseries for commercially important fish, buffer coastal communities from coastal storms, and filter water as it flows into the ocean. The EPA manages a network of 28 estuaries of national significance around the country. Last Congress, the National Estuary Program (NEP) was reauthorized through 2021 (Public Law No.114-162) in a bipartisan effort and charged with providing grants to support projects that address a number of problems facing estuarine and coastal environments, including seagrass habitat loss, harmful algal blooms, invasive species, and sea level rise. Coming from a non-coastal state, please describe in detail how you will acquaint yourself with 1) the NEP, and 2) coastal issues the NEP helps address.

If confirmed, I would expect to be briefed by EPA staff on the relevant statutory authority and any EPA programs established pursuant to this authority.

2. Each NEP must institute a Comprehensive Conservation and Management Plan (CCMP) to guide management and conservation decisions at the NEP. The effects of climate change on estuaries (i.e., saltwater inundation, increased rainfall-driven runoff, warming waters) are included in these CCMPs. Would you direct the NEPs to disregard the consequences of climate change in the CCMPs and other decision-making reports and tools?

If confirmed, I would expect to be briefed by EPA staff on the relevant statutory authority and any EPA programs established pursuant to this authority. If confirmed, I will follow all as enacted by Congress.

3. The Climate Ready Estuaries program coordinates with the NEP to educate managers on how to assess the effects of climate change on U.S. estuaries. It also provides recommendations and toolkits to help design climate change adaptation and risk identification capabilities. Will you direct the Climate Ready Estuaries program to remove any materials, cancel any webinars or presentations, or stop its coordinated work on climate change with the NEPs?

I am not familiar with the details of the specific program referenced in your question. If confirmed, I would expect to be briefed by EPA staff on the relevant statutory authority and any EPA programs established pursuant to this authority.

4.Marine debris is a growing problem around the world, with plastic debris being the most troublesome component due to its pervasiveness and persistence in the marine environment. The EPA is currently a co-chair of the federal Interagency Marine Debris Coordinating Committee. Under your direction, will the EPA to maintain a leadership role on the committee? How will you continue EPA's

coordinated work with NOAA and other agencies to prevent marine debris, conduct education outreach, and support research efforts?

I am not familiar with the details of the specific program referenced in your question. If confirmed, I would expect to be briefed by EPA staff on the relevant statutory authority to better understand EPA's role compared to those of other federal agencies on this issue.

5.EPA completed a State of the Science White Paper in December entitled "A Summary of Literature on the Chemical Toxicity of Plastics Pollution to Aquatic Life and Aquatic-Dependent Wildlife." The white paper identified four key areas where additional research is needed: 1) "the fate of chemicals both sorbed to and in plastics under differing environment conditions and within an organism after ingestion;" 2) "the relative role plastics play in chemical contaminant transfer to the tissues of organisms compared to other exposure pathways (aqueous dermal exposure and ingestion from natural prey);" 3) "the relative impacts of physical and chemical effects of ingested plastic particles on a wide range of organisms;" and 4) "whether the relatively high surface area of nanoplastics compared to microplastics and their potential to permeate membranes with increased retention time may increase their toxicological risk to organisms." What is EPA's role and responsibility in finding answers to these research questions?

I am not familiar with the report referenced in this question. If confirmed as Administrator, I would expect to be brief by staff to learn more about EPA's authorities and responsibilities before taking any actions referenced in the question.

6.Do you accept the science of ocean acidification that has directly connected the increase in human-caused carbon dioxide emissions with decreases in ocean pH?

First, I would note that the oceans are alkaline and are projected to remain so. Second, it is my understanding that the degree of alkalinity in the ocean is highly variable and therefore it is difficult to attribute that variability to any single cause.

7.Do you accept that the oceans are currently acidifying at a rate unprecedented in tens of millions of years?

First, I would note that the oceans are alkaline and are projected to remain so. Second, it is my understanding that the degree of alkalinity in the ocean is highly variable and therefore it is difficult to attribute that variability to any single cause. I am unaware of tens of millions of years of data on the pH of oceans.

8.Do you accept ocean acidification's predicted toll on coral reefs worldwide, important habitats for recreation, tourism, and commercial fishing?

I am aware that there is a relationship between the alkalinity of water and the calcification process that grows shells and reefs and that a decrease in alkalinity can impair that process.

9.What is the EPA's role in helping states and coastal communities mitigate or adapt to the challenges projected for the shellfish industries or the thousands of individuals that make their living off of this billion-dollar resource?

If confirmed, I will implement the laws that EPA is charged to administer. Under section 304 of the CWA EPA establishes water quality criteria to protect aquatic life, including shellfish. Certain EPA programs also include authorities that can support projects that may benefit the shellfish industry, including the National Estuary Program under section 320 of the CWA, the Long Island Sound programs under section 119 of the CWA, and the Chesapeake Bay program under section 117 of the CWA. Finally, section 319 of the CWA can support programs and projects to reduce runoff that may impact oyster beds.

10.What do you understand to be the consequences of sea level rise, increased storm surge, and warming ocean waters on coastal communities and estuaries?

If confirmed, I would expect to be briefed by staff on the impact sea level rise, storm surge, and warming ocean waters on consequences on coastal communities and estuaries.

11.Both states and some Members of Congress have for years criticized EPA for "one-size-fits-all approaches" and failing to give adequate flexibility to states. Yet in challenging EPA's Clean Power Plan, you attacked EPA for just that – giving states and regions too much latitude in administering the Clean Air Act. Wouldn't that take the Agency in the wrong direction?

I, along with the Supreme Court, which issued a stay against the Clean Power Plan in February 2016, believe the EPA exceeded the bounds of authority established by Congress in the Clean Air Act. In particular, the Rule attempted to supplant decisions traditionally preserved for the states, including the establishment of intrastate energy policies, for agency mandated alternatives that would have increased the price of electricity for local citizens and reduced reliability. The notion of flexibility in the Clean Power Plan was conceptual at best. If confirmed, I will work to achieve the objectives of EPA-administered laws consistent with the process and framework established by Congress abiding by the bedrock principle of cooperative federalism, which relies on meaningful collaboration between the EPA and the states to achieve important environmental objectives.

12.According to the EPA, it has been estimated that the Clean Air Act has a history of reducing air pollution, while creating jobs. Since 1970 aggregate emissions of common air pollutants dropped 72 percent, while the U.S. gross domestic product grew 219 percent. Total private sector jobs increased by 101 percent over the same period. In 2020, EPA estimates that the standards will create the equivalent of over 104,000 new jobs including 17,000 new jobs building renewable energy facilities and over 78,000 jobs in improving demand-side energy efficiency. Do you agree that regulations under the Clean Air Act since 1970 have grown the economy? If not, can you provide your analysis, materials used, and people you solicited to come to this conclusion?

The success of the Clean Air Act is a direct result of the important partnership between the EPA and the states in developing and implementing its key programs. State regulators best understand the needs and uniqueness of local environmental challenges while the EPA is well positioned to set and adjust environmental safeguards that continue to improve the nation's air, land and water and protect public welfare. If confirmed as Administrator, I will adhere to the clear directives and process set out by Congress so that the agency can once again focus on fulfilling its core mission.

13.In 2014, four Republican former EPA Administrators – Bill Reilly, Bill Ruckelshaus, Lee Thomas, Governor Christine Todd Whitman – testified before EPW that climate change is real, EPA regulations do not end up costing as much as industry initially estimates, and EPA has clear authority under the Clean Air Act to curb carbon pollution. In a 2015 interview with Climate Progress, Governor Whitman said: "The idea the EPA is a job killer is false" and with regard to the Clean Power Plan "what EPA did was to allow as much flexibility as frankly I've ever seen them be able to create in a regulation."
Do you think that the former Administrators are correct in their assessment that regulations do not cost as much as industry initially estimates? If not, can you explain why not?

I am not sure what specific regulations the former EPA Administrators were referring to and accordingly lack sufficient information to answer the specific question. Generally speaking, if confirmed, I will work to ensure that EPA regulatory actions accurately account for the costs and benefits across all impacted stakeholders.

14.Carbon Capture Utilization and Storage is a bipartisan policy area that I am working on with my Republican colleagues. Senator Graham and I visited the world's first Carbon Capture project in Canada that has been operational since 2014. In 2016, SaskPower successfully captured and injected 800,000 metric tons of carbon dioxide and the facility has operated nearly 85 percent of the time. Recently, Petra Nova in Texas became the first United States first post-

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combustion carbon capture project to begin operation. SaskPower and Petra Nova are listed in the Clean Power Plan as viable options for helping states reach their Clean Power Plan targets. Do you believe that CCUS is a viable technology for reducing emissions from power plants?

I believe CCUS technology can play an important role in the development of our future coal fleet, however it is not yet a viable option. Both the SaskPower and Petra Nova plants referenced in your question relied on significant support from their respective governments to become operational. Forcing private businesses to use unproven, expensive technology would be unfair, which is why Congress provided for protections against the EPA embracing such a practice in the Energy Policy Act of 2005.

15.In Rhode Island we have BioProcess H2O in Portsmouth and Agcore Technologies, LLC in Cranston that do carbon utilization—the conversion of carbon dioxide into useable products and fuels. These technologies not only capture carbon pollution, but can ease the demand of over-fishing by offering an alternative source of oils and protein. The carbon pollution from the algae production is creating and delivering algae-derived fish and animal feed. These utilization technologies are available now and are reducing carbon emissions. We also have retrofitted coal facilities using CCUS (SaskPower and Petra Nova). Do you believe that CCUS should be pursued as an emission reduction technology for the power sector and industrial sector?

Congress established clear directives the Administrator must consider when setting new source performance standards under the Clean Air Act. These directives are not technology specific, but instead require the Administrator set standards based on the best system of emission reduction that is technically feasible, achievable, adequately demonstrated and considerate of costs. If confirmed, I will follow the Clean Air Act process respective of the framework set by Congress.

16.According to the U.S. Energy Information Administration, in 2014, Oklahoma ranked fourth in the nation in net electricity generation from wind, which provided nearly 17% of the state's net generation. The American Wind Energy Association also estimates that wind power saved electricity customers in Oklahoma more than $1.2 billion in 2013 and a study from the Oklahoma State University found that wind companies have paid close to $134 million in property taxes to the state since 2004, producing revenues for the state. Do you agree that wind energy has saved Oklahomans money and brought revenues to the state? Do you agree that wind energy is an important part of our future clean energy economy?

As I discussed at my nomination hearing, 17 percent of Oklahoma's electricity is generated from wind, and as a state, we have a heavy emphasis

on renewables in addition to oil and gas. Wind energy can be part of successful, diverse, energy portfolio.

17.AWEA also found that the wind farms provided an additional $2.8 billion in societal benefits each year to Southwest Power and that the wind power helped save 3 billion in gallons of water in Oklahoma in 2013. The Windfall Coalition, a group created by Continental Resources Inc. founder and CEO Harold Hamm is trying to get rid of the Oklahoma's incentives for wind energy, as they believe it is a mature technology and doesn't need incentives. Do you support the Coalition's efforts?

The decision on how to address state tax incentives for Oklahoma lies with the State Legislature and, ultimately, the Governor.

18.According to the Wind Energy Association and Solar Energy Industries Association, in 2016 the United States had 400,000 wind and solar jobs–310,000 solar, 88,000 wind. In contrast, according to 2016 DOE Energy Employment Report, employment in oil and gas extraction was 388,000 and 53,000 in coal mining. The Energy Information Administration (EIA) just found that coal production continued to decline in 2016 down nearly 17% from 2015 production. Its Annual Energy Outlook in 2017 reports that declining cost of natural gas is still encouraging utilities to shift away from coal over the long-term. The change is expected under our existing policies regardless of the Clean Power Plan. Do you believe that dismantling the Clean Power Plan and cutting back on environmental regulations will bring back the coal industry? Specifically, will it bring back coal jobs and make coal the dominate source of electricity in the U.S. again?

I am unable to say whether United States utilities and electric cooperatives would or would not return to coal as a predominant portion of their fuel mix if the Clean Power Plan were revoked or other regulations were cut back. The federal Energy Information Administration projects that coal will be an important part of the American fuel mix for the foreseeable future.

19.The Clean Air Act requires the EPA to consult with an independent scientific body, the Clean Air Scientific Advisory Committee, on air quality standards. Congress has also directed EPA to establish and seek advice from an independent Science Advisory Board. Do you intend to deviate from the current appointment process for this advisory committee? Will you disclose professional and political affiliations and political contributions of members that you appoint to the committee? Do agree to maintain the existing structure of this committee and current rules that are in place for the decision making of this committee?

I understand and appreciate the important role of EPA's independent scientific bodies. I have no first-hand knowledge of the existing processes or rules of the advisory committees referenced in the question and, if

confirmed, I expect to learn more about these committees and commit to follow applicable legal authorities.

20.Improved environmental quality and economic growth aren't mutually exclusive. Since 2009, the states participating in the Regional Greenhouse Gas Initiative (RGGI) have seen carbon pollution fall by 18% while their economies grew by 9.2%. Emissions in the other 41 states fell by 4% while their economies grew by 8.8%. Do you agree that RGGI has developed a successful model for growing our states' economies and cutting carbon pollution at the same time? Will you commit to maintaining funding levels for EPA grant programs that fund state level initiatives to reduce their emissions?

While the agreement between the states participating in RGGI appears to be successful, what works for the Northeast may not achieve the same success in, for example, the Southwest. If confirmed, I look forward to working with EPA's budget staff and program offices to develop a budget focused on protecting human health and the environment for all populations. I will work to ensure that the limited resources appropriated to EPA by Congress are managed wisely in pursuit of that important mission and in accordance with all applicable legal authorities.

21.EPA operates multiple networks to monitor compliance with the Clean Air Act's National Ambient Air Quality Standards and to track hazardous air pollutants regulated under the act. These networks include, among others, the State and Local Air Quality Monitoring Network, the National Air Monitoring Network (which targets areas of high population density with a variety of air pollution sources), Special Purpose Monitoring Stations (used for short-term studies and other purposes), Photochemical Assessment Monitoring Stations (used to measure pollutants that contribute to ground-level ozone, a harmful air pollutant), and the National Air Toxics Trends Stations. During our meeting you mentioned a desire to increase resources for the Office of Research and Development, specifically mentioning monitoring equipment in non-attainment areas. What is your vision for monitoring? Do you plan to increase funding at EPA for these important monitoring networks?

I agree that monitoring compliance with the National Ambient Air Quality Standards is important to EPA's mission because it provides EPA with concrete and policy relevant data concerning the attainment status of communities throughout the country. If I am confirmed as Administrator, I expect to assess the Agency's resource usage and regulatory priorities and increased funding for air monitoring will be an area where I will consider deploying additional resources.

22.Section 105 grants provide significant funding to states for implementing the Clean Air Act requirements. Beginning in FY 2017, EPA is proposing a new formula for how the 105 grants are distributed to each of the regional offices (and subsequently to the states). Region 1, where Rhode Island receives its funding from, will receive a smaller percentage of the total 105 funds under this revised

formula. EPA is proposing an implementation approach that would limit regional losses to no more than 2.5% from each region's prior year amount. Region 1 will lose 2.5% for, at least, each of the next five fiscal years and possibly ten years, under this proposed approach. Will you commit to not implementing the new formula until and unless there is sufficient overall funding such that no Region will see reduced funding from the prior year's amount?

If I am confirmed as Administrator, I will consider this and other resource allocation issues and will use my best efforts to ensure that regional funds are allocated equitably.

23.The National Environmental Policy Act has been a bedrock of our nation's environmental laws, ensuring that the environmental and community impacts of major federal actions are properly understood, that alternatives are appropriately considered, and that the public has the opportunity to actively participate in the environmental review process. What is your view of NEPA and its associated regulations, and will you commit to ensuring that the law, including the processes it establishes to ensure meaningful public participation and informed decision making, is in no way weakened?

I understand the National Environmental Policy Act established the White House Council on Environmental Quality and generally a process for considering the environmental impacts of federal actions. If confirmed, I will faithfully execute all applicable laws as Administrator.

24. The EPA's Office of Civil Rights has a long history of failing to comply with the Civil Rights Act of 1964. To date, the office has never found a violation of Title VI, which prohibits recipients of federal funding from acting in discriminatory ways. It has also allowed complaints to linger for years without a response. What will you do to ensure compliance by the EPA with the Civil Rights Act and to improve the track record of the Office of Civil Rights?

If confirmed as Administrator, I would expect to be briefed by staff and review any recommendations by the Office of Inspector General before taking action on this issue.

25. EPA and States are co-implementers of many of our federal environmental laws and programs. We believe that the tools used to implement these programs should be updated, particularly at the State level, to ensure effective implementation. Are there approaches, systems, or tools that you have considered to improve these programs and investments you would like to make in improvements that would benefit both federal and state environmental programs?

As I testified in the hearing, I have pursued opportunities to address interstate environmental quality matters. One of the examples I have highlighted is the work that Arkansas Attorney General Dustin McDaniel and

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I took to address an enforceable water quality standard between Arkansas and Oklahoma. I have also discussed how Texas should be responsible when air quality issues affect Oklahoma and my experience with that. When negotiations among and between states breakdown EPA has a role to set environmental standards. However, that is should be a last course of action instead of the first. I believe environmental statutes are designed with states as a primary implementer. Environmental statutes envision that states have the delegated enforcement and primacy to implement and enforce environmental statutes. Only when that is not happening or when negotiations between and among states breakdown should EPA determine a dispute and only after attempting to assist states negotiate a local solution. I am fond of saying that we need national standards and neighborhood solutions. I think that should shape the work of the EPA.

26. Under Section 111(b) of the Clean Air Act ("CAA"), in 2012, EPA issued New Source Performance Standards (NSPS) to limit emissions of VOCs from new, reconstructed, and modified sources in the oil and gas industry and finalized the rule in August of 2015. EPA developed a regulatory impact analysis of the regulation that estimated that the final standards for new and modified methane sources will yield benefits of $690 million in 2025, which will outweigh estimated costs of $530 million in 2025. Do you disagree with EPA's regulatory analysis? If you do, can you specify what information and analytics you use to justify your position?

I am familiar with the rule and understand that regulatory impact analyses play an important role in the EPA's rulemaking process. I also understand certain statutes, executive orders, and federal guidance documents inform the development of regulatory impact analyses. If confirmed, I commit to work with EPA staff to ensure regulatory impact analyses follow the relevant legal authorities.

27.In 2009, as mandated by the Supreme Court and backed by a robust scientific and technical review, the Environmental Protection Agency produced the Endangerment and Cause or Contribute Findings for Greenhouse Gases (GHGs) under Section 202(a) of the Clean Air Act. It found six greenhouse gases - carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride - "taken in combination endanger both the public health and the public welfare of current and future generations." You challenged the endangerment finding in court and lost. Do you agree with the EPA's finding? Do you commit to not take any steps as Administrator to narrow the scope or otherwise weaken this finding?

If confirmed, I will fulfill the duties of the Administrator consistent with Massachusetts v. EPA and the agency's Endangerment Finding on Greenhouse Gases respective of the relative statutory framework established by Congress. To my knowledge, there is nothing currently

pending before the EPA that would require I take any additional actions on the Endangerment Finding and if there were, it would not be wise to prejudge the outcome.

28.There appears to be clear benefit from the regulation of methane emissions from the oil and gas sector. Can you discuss your views on the techniques used in the regulatory impact analysis for the NSPS for new oil and gas wells to quantify the cost and benefits of the regulation? Do you commit to maintaining the same metrics like emissions reductions, monetized climate benefits and health co-benefits, economic effects, employment benefits when designing new rulemakings?

I am familiar with the role and understand that regulatory impact analyses play an important role in the EPA's rulemaking process. I also understand certain statutes, executive orders, and federal guidance documents inform the development of regulatory impact analyses. If confirmed, I commit to work with EPA staff to ensure regulatory impact analyses follow relevant legal authorities.

29.The regulatory impact analysis for the methane emissions estimates that the rule could also reduce 210,000 short tons of ozone-forming VOCs in 2025, along with 3,900 tons of air toxics, such as benzene, toluene, ethylbenzene and xylene. Industry frequently talks about the costs to polluters of meeting public health standards while ignoring the costs to people harmed by the effects of pollution like the formation of ozone. Do you believe EPA should look at only the costs to the polluters when undertaking its regulatory impact analysis? Should the costs to families, such as children sent to emergency rooms due to asthma attacks triggered by smog, be included in the analysis? If so, should those costs be given a different weight than those claimed by industry?

I am familiar with the rule and understand that regulatory impact analyses play an important role in the EPA's rulemaking process. I also understand certain statutes, executive orders, and federal guidance documents inform the development of regulatory impact analyses. If confirmed, I commit to work with EPA staff to ensure regulatory impact analyses follow relevant legal authorities.

30.As you know, methane emissions from industry are as much as 90% higher than EPA had initially estimated, as has been demonstrated by academic peer-reviewed studies. New information is currently being sent to EPA, as part of the Information Collection Request (ICR), on methane emissions from existing sources. How do you plan to use the information collected? How do you plan to lead the agency in addressing this significant spike in known methane emissions?

Section 114 of the CAA provides the Administrator of the EPA to collect emissions data from existing sources. If confirmed, I will review the ICR

currently underway regarding methane emissions and examine the submitted data to determine the appropriate next steps.

31.You have been quoted previously, "my concern is that EPA is employing its flawed methodology in order to rationalize new and unjustified federal regulations to solve a methane-emissions problem that simply does not exist." Science has shown us that methane's effect on climate change is up to 34 times greater than that of CO2 when averaged over a 100-year time period and even greater when considered over the first 20 years after it is emitted. Additionally, a recent Geophysical Research Letter article found that the U.S. could be responsible for the 30% to 60% increase in atmospheric methane emissions since 2002. Can you clarify what you mean that a methane-emissions problem does not exist? Do you refute the argument that human's development of oil and gas has led to more methane emissions? The U.S., Canada, and Mexico have all pledged to work together in reducing methane emissions from the oil and gas sector between 40% to 45% by 2025. If you are confirmed as Administrator, do you intend to work with the State Department to honor our international methane commitments?

It is my understanding that even EPA's revised methane data shows a decrease in methane emissions from oil and natural gas development since 2005, during a time period of a large increase in domestic energy development. EPA's data is based on a number of assumptions that, if confirmed, I will review carefully prior to making any prejudgments of future actions.

32.The State Department and others have assessed life-cycle emissions for various crude oils and found tar sands crude is one of the dirtiest crudes on the planet from a GHG perspective. Do you agree tar sands crude has significantly higher life-cycle emissions than Oklahoma Sweet and most other crude oils?

The lifetime emissions of any energy source should be considered in the context of necessary extraction techniques as well as transportation of the fuel, among other issues. For example, transporting crude via pipeline clearly creates fewer emissions than transporting it via other sources in terms of fossil fuel energy. Without knowing the specifics of all of these factors in a given instance, it is difficult to identify which sources may result in greater emissions.

33.The State Department conducted a comprehensive economic and environmental analysis of the project and determined that under the current market conditions and those projected for the next few years, Keystone XL is key to getting tar sands crude to market. The EPA agreed with this conclusion. Do you agree? If not, why?

I am not familiar with the State Department study but with over 2.4 million miles of pipeline in the United States as well as other transportation methods for moving goods and energy resources it is my understanding that oil sands development has continued despite the lack of approval for the Keystone XL's cross-border permit.

34.Many of Keystone XL's proponents suggested that rejecting the project would simply divert more tar sands to rail to the Gulf Coast. Were you aware that according to the Energy Information Administration, shipments of Canadian crude by rail to the Gulf Coast have declined since Keystone XL was rejected, from 64,000 barrels per day in 2015 to 45,000 barrels per day in 2016?

I am not familiar with that particular EIA data.

35.The State Department found that the emissions associated with the production, refining and combustion of the tar sands in Keystone XL would result in 147 to 168 million metric tons (MMT) CO2e per year (equivalent to the emissions from as many as 35.5 million cars). The State Department also found that by displacing conventional crude with dirtier tar sands, the project would result in 1.3 - 27.4 MMT CO2e of additional emissions (equivalent to the emissions from as many as 5.7 million cars). Do you agree? If you disagree, please identify any research studies or experts you have consulted to form your opinion.

I am familiar with multiple State Department determinations that the Keystone XL pipeline would not significantly impact climate change.

36.In a recent study, the National Academy of Sciences (NAS) concluded that diluted bitumen—the type of crude that would be primarily transported by Keystone XL—has a series of properties that, taken together, make tar sands spills of greater concern for spill responders than spills of other, commonly transported crude oils. Both EPA and the Coast Guard advised the scientists on the NAS committee. Do you agree with their conclusion that tar sands spills pose greater risks and challenges for spill responders than other crude oil spills? If you disagree, please identify any research studies or experts you have consulted to form your opinion.

Diluted bitumen has been transported safely by pipeline in the United States for more than 40 years. It is my understanding that he NAS report did not infer that the Keystone XL pipeline posed significant concerns or that diluted bitumen could not be safely transported via pipelines or other forms of transportation.

37.The NAS committee also found that there are no known, effective strategies for recovering tar sands bitumen than has been spilled in a waterbody and sunk. Do

you agree? If you disagree, please identify any research studies or experts you have consulted to form your opinion.

I have no information in supporting or challenging this assertion.

38. The NAS committee also found that regulations and agency practices do not take the unique properties of diluted bitumen tar sands into account, nor do they encourage effective planning for spills of diluted bitumen. Do you agree? If you disagree, please identify any research studies or experts you have consulted to form your opinion.

EPA is not the primary regulator of pipelines, this question would more appropriately be posed to the Pipeline and Hazardous Materials Safety Administration.

39.The State Department's EIS found that Keystone XL's leak detection system is unlikely to identify leaks smaller than half a million gallons a day. Given the increased risks of tar sands spills and Keystone XL's proposed route through the Ogallala aquifer, should the EPA play an active role in ensuring that the water our nation's ranchers and farmers rely on is protected?

EPA should play an active role in ensuring protection of our domestic water supply.

40.The Environmental Protection Agency (EPA) has raised concerns regarding the effect that Keystone XL and the tar sands it carries will have on the air quality of Gulf Coast refinery communities. Do you believe that the EPA should take a role to ensure that projects like Keystone XL do not put our communities at risk of asthma, cancer and other serious illnesses?

I am aware that EPA has a role in implementing the National Environmental Policy Act, and other statutory responsibilities as it relates to infrastructure projects like pipelines. If confirmed as Administrator, I will work to faithfully execute the laws EPA is responsible for administering in order to protect human health and the environment for all Americans.

41. Do you believe that Native Americans, landowners, farmers, ranchers and communities affected by projects like Keystone XL should have the opportunity to have their concerns considered and address as part of an environmental review process?

Yes.

42.Based on the climate change implications, spill potential, and other factors, the Obama Administration determined Keystone XL isn't in our nation's best interest. Do you agree? If not, why?

While the Obama Administration failed to grant the cross-border permit required to complete the Keystone XL pipeline, much of the pipeline was built in accordance with applicable laws and permits both federal and state. A large portion of the Keystone XL pipeline safely operates through Oklahoma and I believe that safely and efficiently moving natural resources through the country is very important.

43.If confirmed, do you commit to ensuring EPA fully considers and articulates the environmental implications, based on the best-available science and in accordance with EPA's authority under the National Environmental Policy Act, when determining how to proceed on the Keystone XL Pipeline and any other projects?

If confirmed, I will faithfully execute all applicable laws as Administrator.

44.According to EPA 49% of coal units lack the most advanced NOx controls (Selective Catalytic Reduction systems or SCR). Several units that have SCR or other NOx emission control technology installed are not optimizing their use. For example, these six coal units have SCR installed but are not using it to optimize NOx reductions. In 2015, these facilities' NOx emissions were significantly higher than 2009 because they are not using the systems they have in place to reduce NOx. EPA estimates it costs facilities $500/ton NOx pollution to optimize the reduction of NOx from an SCR and $1300/ton to restart a SCR unit. Do you think these facilities should be regulated to keep on their NOx controls on?

If I am confirmed as Administrator, I will consider all matters presented to me with an open mind and will work to reach conclusions that are reflected in the administrative record of each matter and that comport with Congress's intent in enacting the Act. That includes evaluating your concerns regarding the use of post-combustion NOx controls if and when they are presented to me in a matter before the Agency.

45.Industry frequently talks about the costs to polluters of meeting public health standards while ignoring the costs to people harmed by the effects of pollution. In Rhode Island these effects cannot be ignored as we seen them through rising seas and bad air days for Rhode Islanders. Because Rhode Island ozone air quality issues are largely due to transported emissions from upwind states leading to ozone formation that pollutes the air and lungs of people in downwind states like mine. Over the past two years in Rhode Island, the 8-hour standard ozone standard exceeded 0.07 ppm 10 times in 2015 and 6 times in 2016. With respect

to ozone, do you believe EPA should look at only the costs to the polluters when undertaking its regulatory impact analysis? Should the costs to families, such as children sent to emergency rooms due to asthma attacks triggered by smog, be included in the analysis? If so, should those costs be given a different weight than those claimed by industry?

Under the Clean Air Act, while setting NAAQS for criteria pollutants, cost cannot be considered. This is because human health is the primary focus of these standards. EPA's regulatory impact analyses have typically addressed what you describe as "costs to families" in the benefits portion of the analysis (i.e., the value of public health and environmental effects avoided).

46.EPA's independent science advisers, leading medical groups like the American Medical Association, American Academy of Pediatrics, American Thoracic Society, American Lung Association, American Heart Association, and leading public-interest groups such as the NAACP called for a 60 ppb standard instead of the 70 ppb standard EPA finalized last year. What was your scientific basis for concluding that the old standard, 75 ppb, was sufficient to protect public health? Can you explain what sources you consulted? What groups you discussed this with?

Due to a number of factors and steps taken by the previous Administration, implementation of the 2008 ozone NAAQS did not begin until years later. States had only recently begun to implement the 75ppb standard for ground-level ozone when EPA changed it; considering that approximately 40 percent of the country was in nonattainment for the 2008 standard, I believe EPA should focus on helping those areas meet that standard. Oklahoma's challenge to the most recent ozone NAAQS was based, in part, on concerns that EPA has not adequately assessed the available science. It is EPA's obligation to properly justify any change to an existing NAAQS.

47.Rhode Island ozone air quality issues are largely due to transported emissions from upwind states leading to ozone formation that pollutes the air and lungs of people in downwind states like mine. The Rhode Island Department of Environmental Management told me that there remain a number of power plants located in upwind states that have pollution control equipment installed to reduce nitrogen oxides emissions that either do not use that equipment during the ozone season or do not use it in a way that optimizes the reduction of nitrogen oxides emissions. Why would this be the case?

I am unfamiliar with the specifics as to why certain sources upwind of Rhode Island may not be using control devices in particular ways. CSAPR and related rules are designed to address emissions from upwind states

that significantly contribute to nonattainment in downwind states. EPA presumably considered emissions from the upwind power plants referenced in your question in formulating the existing requirements.

48.Each year, RIDEM issues “ozone alerts” to warn vulnerable Rhode Islanders to stay indoors to protect their health on hot days when air quality is poor. This is a problem that cannot be solved in the state because masses of polluted air are coming from upwind. The health of Rhode Island citizens depends on a strong federal EPA program to impose pollution controls on NOx, particulates, and other mobile and stationary sources of pollution. What will you do to support the federal air quality programs? Will you commit to keep existing funding levels for the clean air programs that impose and regulate pollution controls and protect Rhode Islanders?

If confirmed, I will work to administer the statute and applicable federal programs in accordance with Congressional intent. I look forward to working with EPA's budget staff and program offices to develop a budget focused on fulfilling EPA's mission to protect human health and the environment for all populations. I will work to ensure that the resources appropriated to EPA by Congress are managed wisely in pursuit of the Agency's important mission and in accordance with all applicable legal authorities.

49.Ozone levels in RI are strongly affected by the transport of pollutants emitted in upwind states into RI. Although RI is currently designated as an unclassifiable/attainment area for the ozone NAAQS, monitored ozone levels in the State still exceed the standard on a number of days in the summer months. The Ozone Transport Region (OTR) states, including RI, have implemented a number of programs to reduce pollutant emissions from mobile and stationary sources in their states, as required by the Clean Air Act (CAA). RI and other OTR states were required by the CAA to implement emissions control programs not mandated in upwind states, resulting in increased energy costs and an inequitable economic burden to industry in the OTR states. Any additional emissions reduction programs that could be adopted in the OTR to further reduce ozone levels in the region would be less cost-effective than implementing OTR controls in upwind states and would further this inequity. What steps will you take to address the transport of pollutants emitted in upwind states that contribute to exceedances of the ozone standard in RI and other OTR states?

Interstate transport of pollutants is a concern. An upwind state that contributes to a downwind state's inability to meet air quality standards should take responsibility. It is EPA's responsibility to address such issues, and, if confirmed, I look forward to working on this issue.

50.The intent of the establishment of the RFS in the Energy Policy Act was to enhance U.S. energy security by displacing some imported petroleum with domestically produced ethanol. In your estimation, has the RFS reduced imports of foreign oil?

As Congress indicated in the Energy Independence and Security Act of 2007, domestic production of renewable fuel contributes to our nation's "greater energy independence and security."

51.President-elect Trump has said, "The RFS, which is Renewable Fuel Standard, is an important tool in the mission to achieve energy independence for the United States. I will do all that is in my power as president to achieve that goal....Energy independence is a requirement of America's to become great again. My theme is "Make America Great Again"; it's an important part of it." Do you hold the same beliefs as President-elect Trump about the RFS? If not, can you be specific where your views differ on this policy?

As Congress indicated in the Energy Independence and Security Act of 2007, domestic production of renewable fuel contributes to our nation's "greater energy independence and security." To that end, if confirmed, I will work to administer the RFS program in accordance with statute and Congressional intent.

52.Agriculture Secretary Tom Vilsack, who has been supportive of the RFS, made a statement in Bloomberg Markets, "There's going to be a lot of saber-rattling, but it supports too many jobs and too much rural infrastructure is set up for it. The Renewable Fuel Standard is solid." Do you agree that the RFS has supported jobs . and helped develop our rural infrastructure?

Yes.

53.You have been quoted, "It should come as no surprise that I am working diligently with Oklahoma energy companies, the people of Oklahoma and the majority of attorneys general to fight the unlawful overreach of the EPA and other federal agencies." Do you think that the renewable fuel standard is one of those unlawful overreach regulations from the EPA? Can you explain in more detail the type of overreach you are talking about when it comes to the EPA and other federal agencies?

The RFS was first enacted by Congress in 2005 and updated and expanded in 2007 to promote domestic production and achieve energy independence. Therefore, I do not consider it to be "one of those unlawful overreach regulations from the EPA." The EPA needs to better administer this program

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to provide involved entities with the certainty they need, and, if confirmed, i will administer the RFS in accordance with statute and Congressional intent.

54. You have been quoted in the press saying, "The American people are tired of seeing billions of dollars drained from our economy due to unnecessary EPA regulations, and I intend to run this agency in a way that fosters both responsible protection of the environment and freedom for American businesses." Do you see the RFS as one of those unnecessary EPA regulations that is draining money from our economy?

The RFS was first enacted by Congress in 2005 and updated and expanded in 2007 to promote domestic production and achieve energy independence. The EPA needs to better administer this program to provide involved entities with the certainty they need, and, if confirmed, I will administer the RFS in accordance with statute and Congressional intent.

55.The RFS has been a significant factor in growing the volumes of biodiesel and other advanced biofuels. In light of the uncertainty surrounding the Biodiesel Tax Credit and the increased volume of biodiesel imported from Argentina, do you intend to support the RFS and continue to increase the Renewable Volume Obligations (RVOs) that provide the long term market stability to support investment and increase the jobs available in a growing domestic industry? Do you commit to making all economic and pricing models used in developing the annual blending targets under the RFS available to the public? If you come across models that were used in the past that were left out of the public record, will you make those available? Do you intend to use EIA data in conjunction with your administration of the RFS? Are there other data sources that you intend to rely on?

If confirmed, I will administer the RFS in accordance with statute and Congressional intent. There has been significant investment that has gone into the infrastructure following the enactment of the RFS in 2005, and these individuals need certainty that the EPA has failed to provide in the past, from the trading program to monitoring the fraud in the system, to faith that the program will be enforced and administered as Congress intended. The Clean Air Act requires the Administrator of the EIA to submit annual projections of transportation fuel, biomass-based diesel, and cellulosic biofuel to be sold or introduced into commerce into the United States, and I will commit to continue relying on EIA data projections to set annual volume obligations.

56.It has been estimated that the RFS supports roughly 850,000 jobs across the country and many of those jobs rely on certainty from the EPA setting its volume

requirements for the renewable fuels each year. If confirmed to serve as EPA Administrator, will you carry out the Energy Policy Act as passed in 2005 and updated in 2007, particularly adopting the statutory volume requirements for renewable fuels?

Section 211(0) of the Clean Air Act contains enumerated tables of applicable target volumes of renewable fuel for calendar years 2006 through 2022. If confirmed, I will work to administer the RFS program in accordance with statute and Congressional intent.

57.The RFS has driven investment in low carbon biofuels in our country. Are you committed to working to achieve the gains in advanced and cellulosic biofuels promised under the statue?

Section 211(0) of the Clean Air Act contains enumerated tables of applicable target volumes of renewable fuel, specifically cellulosic and advanced, for calendar years 2006 through 2022. If confirmed, I will work to administer this program in accordance with statute and Congressional intent.

58. Following the Sixth Circuit's stay of the Clean Water Rule in 2015 pending further court action, the EPA and Army Corps issued a joint memorandum that states the agencies 1) "look forward to vigorously defending the merits of the Clean Water Rule, which we continue to believe is fully consistent with the law and based on the best available peer-reviewed science," 2) "intend to move forward with measures to improve implementation of the national CWA section 404 program that were announced concurrent with the Rule," 3) will continue their commitment to improve transparency through making section 404 decisions public and making a number of other improvements to the section 404 permit program, 4) strengthen coordination between the agencies, and 5) "work closely with the Department of Justice to ensure [their] actions remain consistent with the stay." If confirmed as EPA Administrator, will you uphold the tenets of this memorandum? If not, what would you change in the EPA's pursuance of clean water and cooperative relationship with the Army Corps of Engineers? Will you commit to working collaboratively with the Army Corps under its corresponding section 404 and other Clean Water Act authorities to ensure clean water for all Americans? If confirmed as EPA Administrator, would you advise DOJ to stop defending the rule and instead ask the court to set aside the rule and send it back to the agencies for reconsideration? Do you disagree with the process the EPA used in developing the Clean Water Rule, which involved incorporating the best available science and feedback received through around 400 public meetings and over 1 million public comments?

If confirmed I will support efforts of the Corp to improve transparency through making section 404 decisions public and to strengthen

coordination between the agencies. However, I do not support the WOTUS rule and do not believe that it is consistent with the Clean Water Act. Accordingly, if confirmed, I will take appropriate steps, in accordance with the Administrative Procedure Act, to withdraw the rule and replace it with a rule that is within the authority granted to EPA and the Corps under the Clean Water Act and is promulgated in compliance with the APA, the Regulatory Flexibility Act, the Small Business Regulatory Enforcement Fairness Act, the Unfunded Mandates Reform Act, Executive Order 13132 on Federalism, and Executive Order 12866 on regulatory planning and review, procedural requirements that I believe were not met in the promulgation of the WOTUS rule. If confirmed, I also would inform the appropriate courts of these actions.

59. In the wake of SWANCC, Rapanos, and other decisions, how would you shape regulations and internal EPA policy to provide more certainty for regulated parties on how the agency will make section 404 permitting decisions?

EPA does not make 404 permitting decisions. Section 404 of the Clean Water Act grants that authority to the Secretary of the Army, who carries it out acting through the Corps of Engineers. Under section 404(c) EPA has the authority to veto a Corps-issued permit if it EPA determines the discharge will have unacceptable adverse effects. If confirmed, I will seek to clarify when it is appropriate for EPA to use its 404 veto authority.

60.If you choose to pursue a renewed rulemaking to clarify "waters of the United States," will you follow the same procedure and commit to at least the same level of outreach the EPA undertook in developing the Clean Water Rule in developing a new rule?

If confirmed, I will ensure that the outreach performed by EPA is not only extensive, but meaningful.

61.Extreme weather events put water and wastewater infrastructure at risk. In Rhode Island, Super Storm Sandy almost caused Narragansett Bay to breach the water supply for the City of Newport. The March 2010, storms flooded the Pawtuxet River, overtopping the Warwick Wastewater Treatment facility and sending untreated wastewater into surrounding neighborhoods, the River and Narragansett Bay. What do you see as EPA's role in helping cities and towns respond to these increasingly frequent extreme weather events and ensure the safety of the nation's critical water and wastewater infrastructure?

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EPA provides water and wastewater infrastructure assistance through the Clean Water Act and Safe Drinking Water Act revolving loan funds and through the new WIFIA loan program.

62.What role can green infrastructure play in helping municipalities manage and prevent sewer overflows and other storm water and wastewater treatment concerns?

Green infrastructure is a neighborhood solution that can help meet national standards.

63.In making recommendations for revisions to state shares of Clean Water State Revolving Fund (CWSRF) money, do you support increasing allocations for states with the oldest infrastructure?

No. I am not aware of any analysis that suggests that age of infrastructure is an appropriate metric that predicts funding needs for wastewater infrastructure. It was not suggested in the May 2016 Report to Congress from EPA on its review of the CWSRF allotment formula, required by section 5005 of the Water Resources Reform and Development Act (WRRDA) of 2014. I also note that the formula is established by law and only Congress can change it.

64.Sea level in Newport, RI has risen over 10 inches since 1930, Rhode Island experiences significantly more rain and more intense storms than in past decades, and Superstorm Sandy and the Flood of 2010 destroyed roads and buildings. The RI Department of Environmental Management is finalizing an assessment of the vulnerability of each wastewater treatment facility in the state from damage due to flooding and storm surge. Will states have the ability to choose to use State Revolving Fund monies to finance resiliency projects under the next Administration? What restrictions, if any, would you foresee putting on the use of these funds for this purpose?

The eligibilities for the use of CWSRF funds are established in the Clean Water Act. If confirmed, I will manage that program as authorized by Congress.

65.States rely on EPA funding, technical assistance, and other resources to help keep the air, water, and soil clean, particularly through the State and Tribal Assistance Grants and Categorical Grants. State agencies like the RIDEM have delegated authority to carry out federal pollution control laws. Based on what you know about the EPA, do you believe states and tribes are getting enough money from the federal government to support clean air and clean water investments and

enforcement? If confirmed, will you commit to ensuring states and tribes continue to receive at least the amounts of funding they do now? Are there programs that support states and tribes that you would consider cutting or increasing financial support for?

I support the federalism structure of our federal environmental laws, which includes state delegation or authorization of most programs, and EPA STAG grants to help states implement those programs. If confirmed, I will seek to reduce the workload on states by refraining from adding more and more requirements for them to implement and to instead allow them to focus on implementing core environmental programs relating to air, water, and waste. I am not familiar with the development of EPA's FY 2018 budget so I cannot comment on that proposal, but please be assured that I support funding for states.

66.A 2016 Associated Press study of EPA data identified Providence, RI as "one of the largest [drinking water systems] in the country to exceed a federal lead standard since 2013." Almost 20 percent of all retail customers' homes were found to be serviced by utility-owned lead lines. EPA's lead limit before corrective action is required is currently 15 parts per billion. The city's water supply was found to be over this limit six times since 2010. Providence's water hit 30 parts per billion in tests in 2009 and 2013. Providence has shown marked improvement since those peaks, but there is still millions of dollars of investment needed in the city's drinking water infrastructure to reduce the risk of lead. What role do you believe EPA should play supporting these investments?

I would urge the City to explore funding opportunities available from the new WIFIA loan program, which is implemented by EPA.

67.What have you done in your career to demonstrate lead contamination of drinking water will be a priority if you are confirmed as EPA Administrator? Please cite specific examples.

I am concerned about children's health, but the Oklahoma Department of Environmental Quality and the Oklahoma Water Resources Board have primary responsibility for implementing and enforcing environmental laws in Oklahoma, so issues relating to lead contamination of drinking water would fall within their responsibilities. If confirmed as Administrator, I will faithfully execute all environmental laws enacted by Congress, including the Safe Drinking Water Act.

68.In an interview with the Providence Journal last April, Rhode Island's chief of the Center for Drinking Water Quality at the RI Department of Health stated that "[i]n the last monitoring period, we had six small water systems exceed the lead action level. Five were school systems." These systems were brought back into

compliance, but the concern remains. How will you prioritize lead abatement in schools and among the most vulnerable populations?

If confirmed, I will fully carry out EPA's authorities, including its authorities under the Safe Drinking Water Act. I note that in the WIIN Act, Congress amended the Safe Drinking Water Act to authorize funding for voluntary school lead testing. If confirmed and if funding is provided, I will carry out that program.

69.EPA's regulations on lead in drinking water, otherwise known as the Lead and Copper Rule, were last revised in 2007. In its October 2016 white paper on revising the rule, the EPA recognized "[t]here is a compelling need to modernize and strengthen implementation of the rule—to strengthen its public health protections and to clarify its implementation requirements to make it more effective and more readily enforceable." Do you agree the Rule is in need of updating to reflect the latest science?

Yes.

70.Do you believe all covered water systems should follow EPA's drinking water analytical methods when testing drinking water for contamination? If so, what efforts will you undertake to ensure all water systems are brought into compliance?

If confirmed, I will fully carry out EPA's authorities, including its authorities under the Safe Drinking Water Act. To achieve this, I will focus on EPA's core missions, such as provision of safe drinking water.

71.In a November 2016 interview with the New York Times, President-elect Trump specifically called out "crystal clear water" as a priority. Do you agree "crystal clear water" should be a priority of the EPA? If so, please list the specific steps you would take as Administrator to make the President-elect's vision a reality.

Yes, I agree that clean water is a priority of the EPA. If confirmed, I will ensure that EPA focuses on the core missions as directed under laws enacted by Congress, including clean water and safe drinking water.

72.Over 40,000 water bodies in the United States are considered "impaired" under Section 303(d) of the Clean Water Act, meaning they do not meet water quality and health standards. Six hundred and thirty-five of these are in Oklahoma. What specifics steps did you take as Attorney General and as a state legislator to improve the water quality in these impaired waters in Oklahoma?

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Regulation of water quality in Oklahoma is the responsibility of Oklahoma's environmental regulators at agencies like the Oklahoma Water Resources Board and Oklahoma Department of Environmental Quality. Those agencies would be best situated to describe the actions taken by Oklahoma to improve water quality in impaired waters.

73.What clean water initiatives undertaken by the EPA in the last five years do you support?

I support the Mach 2011 nutrient framework issued by the Assistant Administrator for the Office of Water entitled "Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions," which prioritizes state action to encourage on the ground activities over establishment of numeric nutrient limits. I support EPA's May 2012 Integrated Municipal Stormwater and Wastewater Planning Framework, which directs EPA enforcement and permitting officials to allow municipalities to integrate multiple CWA responsibilities in a single plan and prioritize the actions with the greatest health and environmental benefits, and to allow extended compliance schedules to carry out that prioritization. I support EPA's efforts to promote green infrastructure to meet Clean Water Act requirements. Green infrastructure can be a neighborhood solution to meet national standards. I support the new Water Infrastructure Finance and Innovation Act loan program authorized by Congress in 2014 that recently received its first appropriations. The WIFIA program creates tremendous opportunities to increase water and wastewater infrastructure investment because every federal dollar appropriated can leverage as much as $60 in infrastructure investments.

74.How will you address EPA's National Pollutant Discharge Elimination System permitting backlog without undermining any environmental protections or subverting the goals of the Clean Water Act?

First, I would note that at the end of FY 2016, 96.9 percent of Oklahoma's permits were current. Making sure permits are current is one of core functions under the statutory responsibilities given to EPA and in turn carried out by authorized states. However, in recent years states have been asked to shift their focus and resources to other activities. If confirmed, I would return EPA's focus to ensuring that core functions under our environmental laws are carried out.

75.Factory farming of animals is known to cause multiple forms of pollution, such as contaminating local groundwater with nitrates, contributing to hypoxia and "dead zones" in rivers and coastal waters, and releasing the potent greenhouse

gas methane. Considering your close ties with the animal agriculture industry in Oklahoma, your previous history of unsuccessfully prosecuting lawsuits against states with animal welfare laws, your opposition of EPA's attempt to conduct a survey of CAFOs, and your pursuit of punitive yet failed investigations of nonprofit advocacy groups working for animal welfare, do you believe you should recuse yourself from any decisions related to enforcing the CWA and CAA to the fullest extent of the law against these facilities? If not, will you commit to disclosing to the EPW Committee any solicitations you have made to interested parties before you make any decisions related to this topic? If not, what assurances can you provide that you will be able to discharge your duties in this area impartially?

If confirmed, I will faithfully execute the Clean Water Act and Clean Air Act as enacted by Congress. My track record with regard to CAFOs, which includes suing a CAFO together with EPA and collecting what EPA at the time said was the largest civil penalty ever assessed against a CAFO for CWA violations, demonstrates that I can, and will, approach such issues with a fair and open mind.

76.Explain your reasons for opposing EPA's 2012 attempt to conduct a survey of CAFOs. Has your thinking changed since then? Please explain why or why not.

For the purpose of this response, I am assuming that you are referring to EPA's 2011 proposed animal feeding operation reporting rule, published at 76 Fed. Reg. 65431 (October 21, 2011), and the January 19, 2012 comments on that proposed rule filed by 12 state attorneys general, including myself. This proposed rule is an example of an attempt to impose new regulatory requirements without complying with either the law or proper administrative process. Under the Clean Water Act, only facilities that discharge pollutants can be regulated. Despite this limitation on EPA's authority, it had twice before attempted to regulate non-discharging facilities. In 2005, the Second Circuit vacated parts of EPA's 2003 CAFO rule that purported to require non-discharging CAFOs to apply for permits. Waterkeeper Alliance, Inc. v. United States Environmental Protection Agency, 399 F. 3d 486. In 2011, the Fifth Circuit vacated the part of EPA's 2008 CAFO rule that would have required all CAFOs "proposing to discharge" to apply for NPDES permits regardless of whether they had actual discharges. National Pork Producers Council v. United States Environmental Protection Agency, 635 F. 3d 738 (5th Cir. 2011). Further, EPA's authority to require reporting (section 308 of the CWA) applies only to point sources that discharge. That was made clear by the 8th Circuit in Service Oil, Inc. v. Environmental Protection Agency, 590 F. 3d 545 (8th Cir. 2009). Despite the clear limitations of the Clean Water Act, in the CAFO reporting rule EPA proposed to require facilities that are not subject to the Clean Water Act to submit reports to EPA. As such, that proposed rule exceeded EPA's authority.

77.According to the CDC, in 2014 Oklahoma reported the second highest rate of exposure to pesticides in the nation. At a time when pesticide/herbicide usage is on the rise across the country, how would you protect American workers, consumers, and landscapes from the toxic effects of agricultural chemicals?

I am not personally familiar with the data referenced in this question or generally the rate of pesticide usage in Oklahoma. If confirmed as Administrator, I would expect to be briefed by EPA staff before taking action on this issue and would work to ensure EPA followed all applicable legal requirements and made its decisions based on sound science in an open and transparent process.

78.Your close ties to the fossil fuel industry have given a strong appearance of pay-to-play politics favorable to that industry. As you well know, the agrichemical and seed biotechnology industry has a similar history of major lobbying, campaign financing, and maintaining close relationships with lawmakers and agency administrators. Monsanto, the Oklahoma Farm Bureau, and other agricultural interests contributed more than $90,000 to your previous campaigns. Do you believe you should recuse yourself from any decisions related to this industry? If not, will you commit to disclosing to the EPW Committee any solicitations you have made to interested parties before you make any decisions related to this topic? If not, what assurances can you provide that you will be able to discharge your duties in this area impartially?

It is my understanding that recusal obligations do not extend to regulatory rulemaking of general applicability, which does not create a conflict under applicable rules. In any matters involving specific parties where I believe that my impartiality may be questioned, I will consult with relevant federal ethics officials to determine whether to participate in a particular matter, provide them with all relevant facts, and follow their guidance. Following these procedures, along with all the other commitments I have made to comply with applicable ethics rules, will ensure that I discharge my duties impartially.

79.How should the EPA consider the synergistic effects of chemicals when considering approval of these chemicals under FIFRA?

If confirmed, I would expect to be briefed by staff about EPA's relevant legal authorities concerning pesticide registration and current practices in this area before taking any action.

80.The Fish and Wildlife Service recently listed the rusty patched bumble bee as endangered, the first wild bee in the lower 48 states to receive this distinction. Pesticides were listed as part of the blame for the bee's current status. Other

bumble bee species are also at risk due to increased pesticide use and other environmental challenges. How can the EPA assist in bettering the understanding of pesticides' role in declining bee and other pollinator species?

I am generally aware of the important role bees play as pollinators, but I am not personally familiar with the details of the Endangered Species Act listing decision referenced in the question. If confirmed as Administrator, I would expect EPA to be briefed on the matter concerning EPA's legal authorities and any ongoing activities in this area before taking action.

81.Under your leadership, what role will EPA play in the management and control of vector borne illnesses like Zika?

If confirmed, I would expect to be briefed by staff about EPA's relevant legal authorities and operations in this area before taking any action.

82.With respect to the Rule of Law Defense Fund, please provide the following: A written explanation of the role you or any person under your supervision has played in the establishment and operation of the Fund; a list of all donors who have contributed to the Fund since its inception, total donated, and their affiliations; a list of all requests you have made for funding and what was given and from whom in response; a list of all expenditures of over $1,000 made by the Fund since its inception; details of any Fund expenditures over $100 that have benefited you or any person under your supervision, including travel; all communications, including e-mails, between you and the Fund and between you and any individuals related to the establishment of the Fund or the conduct of the Fund's activities; a list of all meetings and fundraisers organized by or sponsored in whole or in part by the Fund that you or any person under your supervision attended, including the dates, locations, agendas and attendees; and a list of all federal and state legislation or regulations the Fund has taken a position on, Fund-organized legal briefs and letters to federal lawmakers, and all actions you have taken with respect to those matters.

I did not play a role in founding or forming the Rule of Law Defense Fund, and no one on my staff played such a role. My understanding from the time I was a member of that entity's board is that its staff operates the fund. A list of contributors to the Fund since its inception is in the custody of RLDF and I do not personally have records of or have knowledge of that information. Expenditures by the fund are in the custody of RLDF, and I do not personally have records of or have knowledge of that information. Any records relating to requests for funding to individuals or to corporate entities would be in the possession of RLDF. RLDF has paid for flights and accommodations when I attended RLDF events or panel discussions.

Because those flights or accommodations were booked directly by RLDF staff, I am not in possession of any receipts for such flights or accommodations.

83.Please list all matters you or your office has had with the US EPA since you became Attorney General of Oklahoma. For the purposes of this and the following questions, "matters" refers to lawsuits (including lawsuits in which your office filed a "friend of the court" brief), enforcement actions, investigations, rulemakings, or any other matter which included an adjudication between parties.

In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act.

84.For each matter you identify in the previous question, please list the following: The names of the attorneys in your office who worked on the matter, and the names and affiliations of all attorneys with whom you or the attorneys in your office had communications about the matter. The names and affiliations of any person with whom you had communications about the matter, and the dates of the communications, and a summary of the substance of that communication. For any person listed the previous subpart, or corporation represented by that person, any contribution or payment made to Scott Pruitt for Attorney General, the Republican Attorney General Association, the Republican Attorney Generals Association, the Rule of Law Defense Fund, Liberty 2.0, Oklahoma Strong, or any other political action committee or 501(c)(4) organization with which you are or have been affiliated in any way.

In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct you to make a request of the Oklahoma Attorney General's Office and the Oklahoma Ethics Commission under the Oklahoma Open Records Act and the individual political organizations.

85.Please list all matters you or your office has had with the US Department of Interior since you became Attorney General of Oklahoma. For the purposes of this and the following questions, "matters" refers to lawsuits (including lawsuits in which your office filed a "friend of the court" brief), enforcement actions, investigations, rulemakings, or any other matter which included an adjudication between parties.

In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct

you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act.

86.For each matter you identify in the previous question, please list the following: The names of the attorneys in your office who worked on the matter, and the names and affiliations of all attorneys with whom you or the attorneys in your office had communications about the matter. The names and affiliations of any person with whom you had communications about the matter, and the dates of the communications, and a summary of the substance of that communication. For any person listed the previous subpart, or corporation represented by that person, any contribution or payment made to Scott Pruitt for Attorney General, the Republican Attorney General Association, the Republican Attorney Generals Association, the Rule of Law Defense Fund, Liberty 2.0, Oklahoma Strong, or any other political action committee or 501(c)(4) organization with which you are or have been affiliated in any way.

In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct you to make a request of the Oklahoma Attorney General's Office and the Oklahoma Ethics Commission under the Oklahoma Open Records Act and the individual political organizations.

87.Please list all matters in which your office participated in any way challenging a law, rule, or regulation of a state other than Oklahoma. For each matter listed, please include the following: Your understanding of the effect of that law, rule, or regulation on the people of Oklahoma. The names of the attorneys in your office who worked on the matter, and the names and affiliations of all attorneys with whom you or the attorneys in your office had communications about the matter. The names and affiliations of any person with whom you had communications about the matter, and the dates of the communications, and a summary of the substance of that communication. For any person listed the previous subpart, or corporation represented by that person, any contribution or payment made to Scott Pruitt for Attorney General, the Republican Attorney General Association, the Republican Attorney Generals Association, the Rule of Law Defense Fund, Liberty 2.0, Oklahoma Strong, or any other political action committee or 501(c)(4) organization with which you are or have been affiliated in any way.

In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct you to make a request of the Oklahoma Attorney General's Office and the Oklahoma Ethics Commission under the Oklahoma Open Records Act and the individual political organizations.

88. As Attorney General you have played a major rule challenging EPA's Clean Power Plan and seven other major rules protecting the public from air pollution, water pollution, and toxic threats. Professional ethics rules prohibit attorneys from changing sides, as you would be doing if confirmed. Federal ethical guidelines specifically require that a public official should not act on a matter if a reasonable person who knew the circumstances of the situation could legitimately question his or her fairness. Will you commit to recusing yourself from substantive matters that include EPA's climate rules, its mercury and air toxics rules, its most recent clean water rule, and others related to the eight pending cases you have against EPA as an Attorney General?

It is my understanding that recusal obligations do not extend to regulatory rulemaking of general applicability, which does not create a conflict under applicable rules. With respect to my professional obligations as a member of the bar, I am not permitted to "switch sides" as counsel in any matter in which I participated as a lawyer. The standards that would apply to me as EPA Administrator are different as I would not be representing the EPA as a lawyer. Nonetheless, in any matters involving specific parties where I believe that my impartiality may be questioned, I will consult with relevant federal ethics officials to determine whether to participate in a particular matter and provide them with all relevant facts.

89.You have taken credit for the lawsuit State of Oklahoma et al. v. Mahard Egg Farm. What was the date on which the complaint in that case was filed? What are the dates of the allegations in the case? Had any Oklahoma state agencies taken any steps to investigate that matter before you became Attorney General? If so, please specify the agencies, their roles investigating the case, and the dates on which they were taken. Did the Oklahoma Attorney General's office take any steps to investigate that matter before you became Attorney General? If so, please specify what was done and when. Please indicate the date on which the Attorney General's office first contacted defendant(s) in this matter.

As I have testified, it was a lawsuit that I initiated together with the State of Texas and the EPA. The complaint was filed on May 23, 2011. The consent decree was entered into on August 10, 2011. There was no case when I took office, but the matter had been investigated by the Office of Attorney General, the Oklahoma Department of Agriculture, the EPA, and the State of Texas. I do not know the first date that the Office of Attorney General first contacted the defendants in that matter.

90.Have you ever met or spoken with Richard "Rick" Berman, who has been affiliated with Center for Consumer Freedom? If so, please describe the substance and dates of your communications with him. Did you or the Attorney General's Office during your tenure ever receive communications of any sort from

Mr. Berman or the Center for Consumer Freedom? If so, please specify the date and content of those communications.

I do not recall ever having met Mr. Berman. I am not aware of any communications with Mr. Berman, but a request for such information can be made to the Office of Attorney General pursuant to Oklahoma's Open Records Act.

91.Before March 12, 2014, had your office received any complaints about the Humane Society of the United States [HSUS] from a resident of the State of Oklahoma? If so, please identify the date of the complaint, the allegations in the complaint, and the city or town of residence of the complainant.

I believe that our office had received such a complaint, but I do not know the residency of any such complainant. A request for such information can be made to the Office of Attorney General pursuant to Oklahoma's Open Records Act.

92.In March 2014, your office issued a consumer warning about HSUS. Based on what evidence did you issue this warning? Did you or your office communicate to any person or entity outside the Attorney General's Office about the timing or substance of your consumer warning about HSUS before it was issued? If so, please state the names of those with whom you or your office communicated, the dates, and the substance of those communications.

The consumer warning was based on information suggesting that HSUS's solicitations for contributions might be misleading Oklahoma consumers. A request for communications can be made to the Office of Attorney General pursuant to Oklahoma's Open Records Act.

93.On July 1, 2014, your office issued a Civil Investigative Demand (CID) to HSUS. Based on what evidence did you issue that CID?

The purpose of a CID is to gather such evidence.

94.On or about July 21, 2014, after the New York Attorney General entered into a settlement with the direct mailing firm Quadriga Art, you were quoted as saying "We believe what happened in New York potentially has happened in Oklahoma." Based on what evidence did you make that statement? Did you issue a Civil Investigative Demand or subpoena to any organizations other than HSUS as a result in whole or in part because of the NYAG's Quadriga Act settlement? If so, please specify the names of the organizations, the dates of the CID, and the result of any investigation conducted pursuant thereto. If not, what evidence did you have that distinguished HSUS from any of the other clients of Quadriga Art?

As I recall, the Office believed that Quadriga Art may have been the vendor for direct mailers used by HSUS in Oklahoma. I am not aware of any other CIDs issued as a result of the Quadriga Art settlement. I am not aware of the Office having received any complaints or having any open investigations relating to other Quadriga Art clients.

95.During the 2010 election cycle, did Devon Energy and Koch Industries max out to your campaign? During the 2014 election cycle, when you ran unopposed, did Devon, Koch Industries, and ExxonMobil max out to your campaign? How much total money has "Scott Pruitt for Attorney General" received from fossil fuel and agricultural interests? Please list your fossil fuel and agricultural donors, dates, and amounts.

A full list of contributors to my campaigns for the state senate and attorney general may be found at the Oklahoma Ethics Commission's websites. For state campaign committee from 2002-2014, please use this site: https://www.ok.gov/ethics/public/candidate.php. For 2015 to the present, the Commission uses this site: http://guardian.ok.gov/PublicSite/SearchPages/Search.aspx?SearchTypeCodeHook=1F26BA5E-71EA-48E4-8D50-C1013E9FE0A7. Attached is a letter from the Oklahoma Ethics Commission regarding materials prior to 2002.

96.How much total money did Oklahoma Strong, your leadership PAC, receive from fossil fuel and agricultural interests? Please list your fossil fuel and agricultural donors, dates, and amounts.

I do not manage or control Oklahoma Strong PAC. Questions relating to its donors would need to be directed to those who do.

97.How much total money did Liberty 2.0, the SuperPAC created to help get you elected, receive from fossil fuel and agricultural interests? Please list your fossil fuel and agricultural donors, dates, and amounts.

I do not manage or control Liberty 2.0. Questions relating to its donors would need to be directed to those who do.

98.Did you or anyone working for you or on your behalf ever solicit money for Oklahoma Strong or Liberty 2.0 from fossil fuel and agricultural interests? If so, when, from whom, and what was the result? Please note any solicitations that were made in which you mentioned work done in your official capacity as Attorney General of Oklahoma and what that work was.

I solicited funds for Oklahoma Strong PAC from a broad array of individuals and corporations representing many different industries. While I do not recall specific solicitations, given my state's deep ties to farming and oil and

gas, I do not doubt that I at some point fundraised from individuals with some connection to those industries. Staff members of the Oklahoma Strong PAC may have records of such solicitations, so requests for details would have to be made to that entity. I have on occasion solicited funds for Liberty 2.0, and records of those solicitations may be maintained by the staff of that organization, so requests for details would have to be made to that entity. I do not recall the contents of any specific conversations that I may have had in this context.

99.During the hearing, I asked if you led the Rule of Law Defense Fund. In response, you stated you had "been an officer of the organization [Rule of Law Defense Fund] for 2016." Your EPW questionnaire states you were a board member or chairman at the Rule of Law Defense Fund between November 2013 and December 2016 while your OGE disclosure says you were a member of the board or Chair between April 2014 and December 2016. Please clarify when you were you a board member of the Rule of Law Defense and when were you the Chair.

I served on the Board of Directors of the Rule of Law Defense Fund from April 2014 until November 2016. I served as Chairman of the Board of Directors of the Rule of Law Defense Fund from November 2015 to November 2016.

100.During the hearing, I asked if you've ever solicited funds for RAGA and you stated you "did not serve in an officer capacity at that entity [RAGA]." On your EPW disclosure form you stated you were a member of the executive committee between November 2013 and November 2015. As discussed, OGE doesn't require you to disclose your relationship with RAGA or other 527 political organizations. Your LinkedIn and campaigns pages state you were chair of RAGA for two terms and RAGA's website indicates you were the RAGA chair in 2012 and 2013. Please clarify when you've been chair of RAGA and when you've been on RAGA's executive committee. Did you provide any information about your relationship with RAGA to OGE or EPA when they were reviewing your conflicts of interest?

I served as Chairman of the Republican Attorney Generals Association from November 2011 to November 2013. These dates represent "two terms" of serving as Chairman. Thereafter, I was a member of the Executive Committee from November 2013 to November 2015. I made all required disclosures to OGE and EPA ethics counsel, including disclosures about my relationship to RAGA.

101.RAGA has given other Republican attorneys general call sheets to solicit on its behalf. Have you or any person working on your behalf ever received call sheets from RAGA asking you to solicit money or event sponsorships? If so, when, for what purpose, who was on your list to contact, who if anyone did you or

any member of your staff make contact any of the listed people/entities, and how much money and which sponsorships was given to RAGA as a result?

I did receive call sheets to solicit funds and/or event sponsorships for RAGA and I did make contact with the listed people/entities. The exact dates, the purpose, and who was called are records that are kept by RAGA, and those requests would need to be made to RAGA. Similarly, I do not have records of how much money or sponsorships were raised as a result - those records are kept by the Republican Attorneys General Association.

102.Besides call sheet efforts, did you or any person working on your behalf ever solicit money for RAGA? If so, when, from whom, for what purpose, and what was the result?

No one else working on my behalf has solicited funds for RAGA. In addition to call sheet efforts, I have asked for funds from individuals/entities in person for RAGA. Records of exact dates, names of individuals and entities and how much money was solicited are kept by the staff of RAGA.

103.In 2015, you were on the agenda to speak on a panel entitled, "The Dangerous Consequences of the Clean Power Plan and other EPA Rules" during RAGA's National Summer meeting that included several fundraisers. The agenda for that meeting included private meetings with attorneys general and Murray Energy, Southern Company, and American Fuel Petrochemical Manufacturers. According to RAGA's 2015 and 2016 member benefits descriptions, donors that contribute $50,000 or more have an "annual opportunity to lead private briefings with Republican attorneys general during RAGA events" and attend other private events, including private dinners and retreats, at which Republican attorneys general are present. Did you or any person working on your behalf attend any of the private meetings with Murray Energy, Southern Company, and/or the American Fuel Petrochemical Manufacturers during the 2015 Summer National RAGA meeting? If yes, please provide a list of meeting attendees, any minutes/notes taken, and describe any conversations about EPA matters.

I do not recall which meetings I attended at the event you reference.

104.During your time as a member of RAGA, have you or any person working on your behalf attended any private meetings or functions with co-plaintiffs or amici for any of the 14 cases you brought against EPA? If yes, please provide a description of the meeting, the date, a list of meeting/event attendees, any minutes/notes taken, and describe any conversations about EPA matters.

I do not recall private meetings or functions with a co-plaintiff or amici while at a RAGA event, and do not know of any instance where a person working on my behalf attended such a meeting. In instances where a case is being litigated, counsel for each plaintiff or amici will routinely speak about matters related to the litigation, as court rules and other procedural matters often require such communications.

105.RAGA indicates that it raises and spends considerable amounts of money to support the election campaigns of Republican attorneys general. Please detail all expenditures from RAGA used to support your position in office, including but not limited to election campaign spending, contributions to other groups and PACs, and opposition research. Please detail any actions that you or your staff have taken to support the fundraising of RAGA for its campaign spending.

RAGA's Oklahoma PAC contributed $5,000 to Scott Pruitt for Attorney General in April, 2014. Inquiries about what other groups and third parties RAGA may have contributed to, or research they conducted would have to be directed to RAGA.

106.RAGA has indicated it has chartered flights for Republican attorneys general. Have you ever been a passenger on a RAGA-chartered flight? If so, when and where did you travel to and from? Did RAGA ever cover or reimburse you for transportation and accommodation? If so, please itemize when, for what, and the value.

Yes, I recall I was a passenger on a chartered flight to and from Las Vegas, Nevada in the fall timeframe of 2014. RAGA has covered the cost of flights and accommodations for me when I have attended RAGA meetings. I do not keep itemized records of these expenses, flights and accommodations are booked directly by RAGA staff.

107.While you were on the board of RLDF, did it cover any chartered flights on which you were a passenger or any of your transportation and accommodation costs? Please itemize any chartered or commercial flights, accommodations, and other travel-related expenses that exceed $100, and the value that RLDF covered.

As far as I am aware, RLDF has never covered the cost of chartered flights for me or my staff. RLDF has covered costs of transportation and accommodations when I traveled on behalf of RLDF for meetings, panels, and other policy-related events. The staff of RLDF booked travel and accommodations for me directly, and records of the costs and expenses are kept by Rule of Law Defense Fund staff and are not in my possession.

108.In 2014 and 2015, while you were on the board or Chairman of RLDF, it contributed over half a million dollars to RAGA. Please list each transaction and the purpose of the transaction.

Records of transactions between those entities are held by Republican Attorneys General Association staff and Rule of Law Defense Fund staff and are not in my possession.

109.As Attorney General, you have jointly signed numerous letters with other Republican attorneys general, such as your letter of June 15 2016 outlining your opposition to state investigations of ExxonMobil. What role did the Rule of Law Defense Fund have in preparing and coordinating release of any letters signed by you as Attorney General? What role did the Republican Attorneys General Association have in preparing and coordinating release of any letters signed by you as Attorney General? What role did any corporate funder of Rule of Law Defense Fund or Republican Attorneys General Association have in preparing and coordinating release of any letters signed by you as Attorney General?

I am not aware of what steps may have been taken by the Rule of Law Defense Fund in preparing or coordinating letters. Day to day operations of the Rule of Law Defense Fund are delegated to staff of the organization. I am unaware of any role by RAGA in preparing or coordinating release of letters. My understanding is that such letters are typically released by the office who took the lead on preparing the letter. I am unaware of any corporate funder of either RAGA or RLDF having any role in preparing or coordinating the release of letters signed by my office.

110.During your time on the board or as Chairman of Rule of Law Defense Fund, did corporate donors to that organization participate in any meeting of the executive committee, including board meetings, phone calls or retreats, during which any EPA matters were discussed? If yes, which corporations participated, what was the nature of the event, and how did they participate (e.g., in person, by phone)?

During my time as Chairman of Rule of Law Defense Fund, I cannot ever recall a time when "corporate donors" participated in a meeting of the executive committee, including board meetings, phone calls or retreats during which EPA matters were discussed. However, members and funders of the Rule of Law Defense Fund were invited to attend large group panel discussions hosted by RLDF where several EPA matters were discussed. Any records of attendees at those meetings would be in the possession of the Rule of Law Defense Fund staff.

111.During your time as attorney general, have you received gifts or in-kind donations that exceed $100 from any entities besides RAGA and RLDF? If so, please list when, from whom, and describe if it was related to a specific event or commitment.

I do not recall receiving gifts with a value of more than $100 from RAGA and/or RLDF. I have, as stated before, had travel and accommodations provided for me when I traveled to and from RAGA or RLDF meetings.

112.Will you commit to recusing yourself from matters before EPA involving any party from whom you have solicited funds during your time as Attorney General of Oklahoma?

Before participating in any matters involving specific parties where I believe that my impartiality may be questioned, I will consult with relevant federal ethics officials and provide them with all relevant facts.

113.Under your predecessors, senior EPA managers' schedules have been available to the public. If confirmed, do you agree to make senior managers' schedules available as well?

If confirmed, I will commit to following applicable laws concerning the public availability of schedules for senior managers.

114.How many email addresses have you used since becoming Attorney General of Oklahoma? How many do you still use? Please provide the domains of all email addresses you've used during your time as Attorney General of Oklahoma, along with the dates used, and note whether they were personal, professional, or both.

I have used two e-mail addresses since becoming Attorney General of Oklahoma. I use a personal e-mail address for personal e-mail, and an official e-mail address for official business. The domain of my personal e-mail address is me.com and the domain of my official e-mail address is oag.ok.gov.

115.Have you ever conducted business using your personal email accounts, non-official Oklahoma Attorney General email accounts, text messages, instant messenger, voicemails, or any other medium? If yes, please provide all business-related emails, texts, from those mediums and any others you've used to conduct official business.

I use only my official OAG email address and government issued phone to conduct official business.

116.In a recent Oklahoma Strong fundraising email, you said:"...As Chairman of the Rule of Law Defense Fund, the policy arm for Republican Attorneys General, I asked my fellow AGs to sign onto a letter urging Senate Majority Leader McConnell and Judiciary Chairman Grassley to stand strong and continue to hold fast against this [Merrick Garland] nomination." What email address did you use to get the other attorneys general to sign onto this letter? What if any groups solicited signatures from other attorneys general? Did you ask Democrats to sign the letter or just Republicans?

I do not recall using any email address to solicit signatures. I have no knowledge of what other groups may have solicited signatures from attorneys general. I do not recall asking any Democrats to support the letter.

117.If confirmed, do you commit to notifying the Committee of all of the email addresses you plan to use upon confirmation and within seven days of using a new email address, including any aliases or pseudonyms? Do you commit do conducting all business using official email addresses and other means and to refrain from any mediums that are outside the Freedom of Information Act's reach?

If confirmed, I commit to notifying the Committee of the e-mail address I use for official business. I will use my official e-mail address for official EPA related business.

118.The office of the Oklahoma AG's budget and FTEs have grown significantly while you've been in office and you indicated you have seven FTEs, accounting for $679,000 in salaries, focused on "environmentally-related responsibilities." What is the breakdown of budget and FTEs dedicated to challenging EPA vs. criminal and civil environmental cases?

The Office's budget and expenditures can fluctuate greatly year over year depending on the timing of case settlements and related distributions. For example in fiscal year 2014, the Attorney General's Office distributed higher than normal case settlement funds that inflated the budget over typical levels. Conversely, that total came down in fiscal years 2015 and 2016. Thus, fluctuations such as the one assumed by your question do not accurately reflect the size of the Office's budget. In my tenure as Attorney General, the Oklahoma Office of the Attorney General streamlined legal services for dozens of agencies, returned $29 million to the General Revenue Fund, distributed mortgage settlement restitution funds to impacted citizens, strengthened tobacco enforcement, and led the Office in such a fiscally responsible manner that the Office was able to forego all $6.4

million in state-appropriated operating funds for fiscal year 2017--that in addition to the Office having its annual appropriation cut in every prior year. The Office of Attorney General was the only state agency to voluntarily do this. During my tenure, the Office assumed the statutory duties of the Human Rights Commission through our Office of Civil Rights Enforcement, strengthened tobacco settlement enforcement efforts, and launched the Solicitor General's Unit. The Office also increased by one third the number of agencies, commissions, or boards which it represents. This has led to a precipitous decline in state agency usage of costly private counsel. It is these and other efforts that have permitted the Office to contribute approximately $29 million to the General Revenue Fund over the last six years. With regard to FTEs related "to challenging EPA vs. criminal and civil environmental cases," the Office currently has four FTEs whose responsibilities would include (among many other things) challenges to EPA rulemakings or other actions.

119.As submitted for the record, here are some statistics from Drew Edmonson's Environmental Unit (1997 to 2010): Criminal matters
142 criminal investigations; 56 federal or state prosecutions; 110 felony counts convictions of individuals; 21 misdemeanor count convictions of individuals; 10 felony counts convictions of corporations; 3 misdemeanor count convictions of corporations; 28 years of jail time; $8M in fines. Is it still your position that the Environmental Protection Unit was only handling one case when you took office?

I am not familiar with the cases being handled prior to my taking office. As I have stated, when I took Office, the primary focus of the "environmental protection unit" was a single lawsuit relating to poultry farms.

120.We reviewed the Oklahoma Attorney General's website between when you took office and the present and found no press releases on criminal or civil environmental enforcement matters. For this review, we did not include lawsuits by Oklahoma against EPA. Why were there no environmental enforcement matters listed on your website as of January 17, 2017?

I have not reviewed the website, so I am not familiar with what matters are or are not listed.

121.What specific reductions in air, water, or solid waste pollution have resulted from your environmental enforcement actions as Attorney General?

Environmental regulation in Oklahoma is the responsibility of Oklahoma's environmental regulators at agencies like the Oklahoma Department of Environmental Quality and the Oklahoma Water Resources Board. The

Office of Attorney General sometimes provides legal services to those agencies with regard to environmental issues, and in that capacity the Office has, for example, negotiated a consent decree requiring a large concentrated animal feeding operation to clean up its operations to prevent water pollution, and negotiated an agreement whereby Arkansas agreed to a stringent phosphorous standard in the Illinois River.

122.How many criminal investigations, federal prosecutions, state prosecutions, felony count convictions of individuals, misdemeanor count convictions of individuals, felony count convictions of corporations, misdemeanor count convictions of corporations, years of jail time, and cumulative fines resulted from environmental cases you initiated? Please list and describe any civil suits and actions you initiated.

To list and describe every civil suit and action initiated by the Office of Attorney General would be all but impossible. Each attorney is responsible for maintaining their own case files, and the Office employs many attorneys across many different units who litigate civil matters of all kinds. In order for you to receive a comprehensive response to a voluminous request of that nature requesting information on all matters, I would direct you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act, and to the extent it is even possible to compile such a list, the Office would make efforts to do so.

123.The Center for Media and Democracy ORA request is dated on or about January 5, 2015. During the hearing, you said, "I actually have a general counsel and an administrator in my office that are dedicated to performing or providing responses to open records requests." In response to questions about the January 5, 2015 request, your general counsel apologized for the delayed response and explained she was busy with other duties. What percentage of time do each of the two staff you mentioned dedicate to responding to Open Records Act requests? Have you communicated with your office's general counsel or any other attorney handling ORA requests to discuss the timing of your office's response to any specific request? If so, please identify which requests you discussed, the dates of those discussions, and the substance of your discussions.

The Office of Attorney General employs a paralegal who intakes requests, opens files, and searches for documents responsive to each Open Records Act request. Once the search is complete, the office's general counsel must review each document to ensure it does not contain information required to be kept confidential under state and federal laws. Along with overseeing the Open Records Act process, the office's general counsel is responsible for overseeing many other programs and statutory duties with which the Office is tasked. I am unaware of what percentage of time is spent solely on Open Records Act requests. I do not recall any conversations with individuals in my office regarding the timing of Open Records Act responses.

124. In a letter regarding this request, your general counsel stated your office processes "these requests in the order in which they are received." How long has that been the policy of your office? Have you fulfilled any ORA requests submitted since at least January 5, 2015?

To my knowledge, that is how the office has historically processed such requests. I am not aware of which requests submitted since January 5, 2015 have or have not been responded to.

125.According to a recent E&E article, your office has 52 outstanding open records requests. Please provide a list of all pending FOIA, Open Records Act or other similar information requests under Oklahoma state law, by whom, and when each was a filed.

I am not familiar with the pending requests. Such a requests should be directed to the Office of Attorney General's general counsel, who can provide such a list.

126.The public and this Committee, in fulfilling our constitutional advice and consent duties, have a right to see information pursuant to the Open Records Act. Please produce all of the following material that has been requested under the Open Records Act prior to November 8, 2016: related to RAGA, RLDF, Liberty 2.0, Oklahoma Strong, and any other 527s, 501(c)(3), and 501(c)(4)s, including the State Policy Network and ALEC; correspondence with the fossil fuel and agriculture industries and any other industries regulated by EPA; any other material related to energy, environment, agriculture, and EPA.

If Open Records Act requests for such information have been made, as your question suggests, those requests will be answered in the normal course.

127.Please provide a list of all Open Records Act requests your office has received during your tenure, from whom and when, the number of days it took to produce the requested documents or decline the request, the outcome of those requests including whether any decisions have been or currently are being challenged in court, and share the following material that has been disclosed as a result of those requests with the Committee: related to RAGA, RLDF, Liberty 2.0, Oklahoma Strong, and any other 527s, 501(c)(3), and 501(c)(4)s, including State Policy Network and ALEC; correspondence with the fossil fuel and agriculture industries and any other industries regulated by EPA; any other material related to energy, environment, agriculture, and EPA.

In order for you to receive a comprehensive response to a voluminous request of that nature, I would direct you to make a request of the Oklahoma Attorney General's Office under the Oklahoma Open Records Act.

128.What was the average length of time it took your office to fulfill open record act requests to your office between January 2011 and December 6, 2014? What was the average length of time it took your office to fulfill open record act requests to your office from December 7, 2014 to the present? What, if any, steps has your office taken to improve the timeliness of your open records act responses?

I am not aware of what the average length of time my office took to fulfill open record act requests is. I have directed my staff to respond to all open records act requests in a timely and efficient manner.

129.Under what circumstances would it be appropriate for EPA to fail to respond to a FOIA request for 700 days?

I am not in a position to render an opinion a hypothetical given that different open record requests raise issues specific to the particular requests at issue. However, I appreciate the importance of openness and transparency, and if confirmed I will work to ensure EPA complies with all legal requirements concerning the implementation of the Freedom of Information Act and other statutes EPA is responsible for administering.

130.Why did you fail to disclose records on your office's expenditures on outside attorneys, as is required under Oklahoma state law, until contacted by a reporter? Why did you not hold your own office's spending practices to the same standard expected of other Oklahoma state offices?

The Office of Attorney General complies with its legal obligations relating to outside counsel, and discloses any outside counsel contracts when asked.

131.Is it correct that your office has spent over $1 million in outside lawyer expenses during your tenure? Please explain the unreported increase in expenses.

The bulk of the outside counsel expenses incurred by the Office during my tenure relate to a single dispute over water rights in southeastern Oklahoma. The Legislature specially appropriated funds to my office for the specific purpose of retaining outside counsel with expertise relevant to that tribal water law issue.

132.Oklahoma state law requires that state agencies select attorneys from a pre-approved list. Several of the outside attorneys that your office has hired are not included on the list of approved attorneys. Why didn't you comply with this requirement?

Because the Office of Attorney General maintains the referenced list, and is authorized to allow representation from attorneys not on the list, the Office of Attorney General plainly has the discretion to allow representation from attorneys not on the list.

133.You have not released records on your contracts with outside attorneys, as required under Oklahoma state law. Please provide all contracts, including any related to pro-bono work. Have any private interests been funding outside attorneys representing your office in lawsuits against the federal government? If so, who, why, and in what amounts? For any pro-bono work, is that an in-kind donation that should be recorded and accounted for in your office's accounting? Has your office done so? Please provide a list of these in-kind donations, from whom, when the work was done, and the value.

A requests for such contracts can made to the Office of Attorney General pursuant to Oklahoma's Open Records Act. When my office retains outside counsel to assist on a matter, it either compensates those attorneys itself, or the outside counsel provides the services pro bono. I am not aware of any outside funding of pro bono counsel, and would not retain any pro bono counsel if they were being so funded. I am not aware of any requirement that pro bono legal services be considered an in kind donation to the Office of Attorney General.

134.You received campaign contributions from at least one of the attorneys that provided outside representation for Oklahoma—David Rivkin, of D.C. law firm BakerHostetler. Is there a prohibition on receiving campaign contributions from those in a contractual relationship with your office? Was your contribution from Mr. Rivkin in compliance with such requirements?

I am not aware of any such requirements. In any event, Mr. Rivkin received no compensation from the Office for the legal services he provided.

135.Are you aware of any payments made to Mr. Rivkin from other parties in return for his representation of your state?

I am unaware of any payments made to Mr. Rivkin from any other parties in return for his representation.

136.Did you contact Mr. Rivkin about representing the State of Oklahoma, did he contact you, or did a third-party made the connection? Please explain.

I cannot recall the exact circumstances leading to Mr. Rivkin's representation, or who initiated the contact. Mr. Rivkin has represented over half of our Nation's states on various matters, and is a well-recognized expert on constitutional questions, particularly those relating to States and their federalism interests.

137.According to your questionnaire, you've given dozens of environment-related speeches in Oklahoma and around the country, many to industry groups. Have you ever given one to a public health group, environmental NGO, or scientific society? You've received various awards, several from industry groups. Have you ever received an award from a public health or environmental group for protecting public health? How about environmental quality? Have you ever received an award from a scientific society?

I have given dozens of speeches on a wide variety of topics to many different groups and industries. I do not recall a specific public health group, NGO or scientific society I have spoken to. I do not recall receiving awards from a public health or environmental group or a scientific society.

138.Please provide any correspondence or details about other communication between you or anyone working on your behalf concerning the establishment or activities of America Rising, America Rising Squared, and Protecting America Now, and any other organizations that are funding efforts to get you confirmed as EPA Administrator.

I am not aware of any such correspondence.

139.You wrote an op-ed attacking efforts to investigate whether Exxon deliberately misled investors and the public despite internal research confirming that climate change is real. Please describe any conversations you've had with political donors to you or your affiliated political action committees, RAGA, Rule of Law Defense Fund, or co-plaintiffs or amici in your cases against EPA about ExxonMobil's potential liability under federal or state law regarding climate change (e.g., federal RICO, New York state's Martin Act, etc.), including the date and substance of those conversations.

I do not recall any such conversations.

140.During your time as the Attorney General of Oklahoma, have you or anyone in your immediate family owned any stocks of companies that were co-plaintiffs or amici in any of your 14 cases against the EPA, including ExxonMobil, Devon Energy, Murray Energy, Southern Company, and Continental Resources. If yes, please list the stock, dates held, and amount.

To my knowledge, no, and a list of my investments has been provided as part of my financial disclosures.

141.In implementing the Lautenberg Act, EPA, consistent with congressional intent, issued a notice making it clear that substantiation of all non-exempt confidential business information (CBI) claims is required upfront. Do you commit to ensuring the EPA follows and upholds that requirement?

As I have previously stated I believe the Lautenberg Act struck an appropriate balance between protecting confidential business information and informing the public and I intend to apply the law as drafted by congress.

142.In a speech at Hillsdale College on June 30, 2016, you referred to a three-hour private, basement meeting with Supreme Court Justices Scalia and Thomas, Leonard Leo of the Federalist Society, and other unidentified people. Referring to Justice Scalia, you said: Leonard [Leo] blessed me on a number of occasions to spend some quality time, personal time, with the previous justice. In fact, I remember one year about three years ago, I was here for a Federalist Society event, their annual meeting that occurs in November. Leonard said 'Scott, stay over, I'd like for you to go dinner on Friday night'… we went to a basement in Washington DC, there were about ten of us in attendance. Two of those folks in attendance were Justice Scalia and Justice Thomas. And we spent three hours talking about the constitution and things that were involved in as attorneys general. It was a fabulous time.

What was the date of this basement meeting? Please provide a complete list of the participants. Please list all cases pending before the Supreme Court at the time of this meeting in which the State of Oklahoma was a party and/or on which you or an attorney in your office was counsel of record. During the basement meeting, was there any discussion or mention of EPA, the environment, public health, environmental or public health regulations, environmental laws including but limited to the Clean Air Act, the Clean Water Act, NEPA, mercury, cross-state air pollution, Renewable Fuels Standards, ozone standards, endangerment from GHGs, regional haze, or climate change. If so, please identify the specific topics that were discussed or mentioned. Have you ever had any other private meetings with any other state or federal judges or justices while you had cases pending before their courts? Which cases? Please describe any such meeting, including the dates, locations, attendees, and topics discussed.

I do not recall the date of the dinner to which you refer, but I believe it was in November 2013. It was a private dinner. I am not aware of any matters that my office had pending before the Supreme Court at the time. As far I recall, none of the topics you mentioned was discussed, nor was any specific matter of any sort discussed. I am not aware of any other meetings of the sort to which you refer. In my capacity as attorney general, I am often at events with judges or justices of various sorts, but no discussion of pending matters would ever occur in any social interactions we might have.

143.The lifetime emissions of any energy source should be considered in the context of necessary extraction techniques as well as transportation of the fuel, among other issues. For example, transporting crude via pipeline clearly creates fewer emissions than transporting it via other sources in terms of fossil fuel energy. Without knowing the specifics of all of these factors in a given instance, it is difficult to identify which sources may result in greater emissions.

The role of the United States in the Paris Agreement is a State Department matter. If confirmed, I will work to advance the mission of the EPA, which is to protect human health and the environment, consistent with the State Department's strategy for international engagement on climate change.

144. Do you support the amendment to the Montreal Protocol to phase down HFCs?

Should the State Department decide to advance the Kigali Amendment to the Montreal Protocol and if I am confirmed as Administrator, I will work with all involved agencies and impacted stakeholders to ensure that EPA's actions related to hydrofluorocarbons (HFCs) are coordinated accordingly.

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 4/20/2018 12:38:00 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]
Subject: RE: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 04-19-2018.xlsx

Good morning,

All notifications from yesterday's Congressional Notification Report have been cleared; however, any notification on this list that has been specifically placed on hold still remains on hold and should not move forward. Please let us know if you have any questions.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

From: OGD_Grant_Reports
Sent: Thursday, April 19, 2018 9:36 AM
To: OGD_Grant_Reports <OGD_Grant_Reports@epa.gov>
Cc: Bell, Matthew <Bell.Matthew@epa.gov>; Cooper, Marian <Cooper.Marian@epa.gov>; Durand, Jessica <Durand.Jessica@epa.gov>; Etheredge, William <Etheredge.William@epa.gov>; Flynn, Mike <Flynn.Mike@epa.gov>; Jones, Laurice <Jones.Laurice@epa.gov>; Milazzo, Julie <Milazzo.Julie@epa.gov>; Naples, Eileen <Naples.Eileen@epa.gov>; Neal, Kerry <neal.kerry@epa.gov>; Polk, Denise <Polk.Denise@epa.gov>; Sanders, LaTonya <Sanders.Latonya@epa.gov>; Showman, John <Showman.John@epa.gov>; Sylvester, Kenneth <Sylvester.Kenneth@epa.gov>; Vizian, Donna <Vizian.Donna@epa.gov>; Naples, Eileen <Naples.Eileen@epa.gov>
Subject: Daily Grant Report (Congressional Notification)

EPA Colleagues,

Attached is the report for 4/19/2018.

You are receiving this email because the Chief of Staff has requested that you be included on this daily report. The purpose of the attached report is to show monetary grant awards that were signed by EPA Award Officials the previous business day. When the award is signed, a Congressional Notification is automatically triggered within the Integrated Grants Management System (IGMS) database. The source of the information contained in the CN report is Grants Data Mart, which reflects information input into IGMS by Grants Management staff across the agency.

Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

Congressional Notification Daily Report for Awar
04/18/18

Grant No	Program Code	Awarding Region Code	EPA Amount This Action: This Action	Award Date	Applicant Name
98543215-6	BG	EPA R5	$730,124.00	4/18/2018	Indiana Department of Environmental Management
00901918-0	A	EPA R9	$398,146.00	4/18/2018	Santa Barbara Co APCD
00F95901-6	V	EPA R6	$290,026.00	4/18/2018	OK Dept of Env Quality
96554911-2	BG	EPA R5	$76,500.00	4/18/2018	Red Lake Band of Chippewa
96496315-4	PM	EPA R4	$35,274.00	4/18/2018	Pinellas County dba Board of Co Commissioners

ds Signed

Project Title	Project Description
PERFORMANCE PARTNERSHIP GRANT	Indiana Department of Environmental Management (IDEM) will operate multiple environmental programs under this Performance Partnership Grant (PPG). This PPG includes the following programs: Clean Air Act 105 for air pollution control, Clean Water Act 106 for water pollution control, Safe Drinking Water Act 1443(a) for protection of drinking water, Solid Waste Disposal Act 3011 for land preservation and restoration, and Toxic Substances Control Act 28 to monitor polychlorinated biphenyl (PCB). This cooperative agreement allows IDEM flexibility in directing resources to achieve maximum environmental benefit.
FY-18 Air Pollution Control Program	To provide continuing support for activities which include strategic planning and evaluation, developing state implementation plans, monitoring air and emissions, rule making, operating permits and all other program related activities to reduce risks to human health and the environment. This assistance agreement provides partial federal funding in the amount of $398,146.
Superfund Tar Creek Operable unit (OU-2) Remedial Design (RD)	This project provides funding to ODEQ to conduct site characterization activities at potential or confirmed hazardous waste sites and undertake response planning and implementation actions at this site which is on the National Priorities List (NPL) to clean up the hazardous waste sites that are found to pose hazards to human health and effectively implement the statutory requirements of CERCLA 121(f) which mandates substantial and meaningful State involvement.
PERFORMANCE PARTNERSHIP GRANTS	This Performance Partnership Grant (PPG) between the United States Environmental Protection Agency and Red Lake Band of Chippewa Indians (Red Lake Band) combines funds under the Clean Air Act (CAA) Section 105, Clean Water Act Section (CWA) Section 106, CWA Section 319, Brownfields 128a Program, and the Indian General Assistance Program (GAP). This project will enable the Red Lake Band to plan, develop, and establish the capability for implementing environmental protection programs. The Red Lake Band will also sustain the programmatic activities of the Red Lake Tribal Air Program, assessment and prioritizing Brownfield sites, and continue to implement the water resource and nonpoint source programs.
Particulate Matter (PM 2.5) Ambient Monitoring Network	This project supports Pinellas County's compliance with National Ambient Air Quality Standards by continuing the ongoing collection of data on the ambient air concentrations of fine particulate matter in Pinellas County, Florida.

00E86704-2	TX	EPA R5	$33,000.00	4/18/2018	St. Croix Tribal Council
02E01496-2	BG	EPA R5	$18,355.00	4/18/2018	Pokagon Band of Potawatomi Indians
00E02336-1	DE	EPA R5	$5,420.00	4/18/2018	Southwest Detroit Environmental Vision

St Croix Air Quality Project	The St Croix Chippewa Indian Tribe will continue to build capacity to characterize and address air quality concerns on their reservation. Specific activities include air quality training, commenting on State permitting actions, conducting diesel equipment inventory, updating quality assurance project plan for air quality data collection and performing air quality assessments. Further, the tribe will begin drafting a Treatment as a State application for Clean Air Act authorities.
Pokagon Band Performance Partnership Project	This Grant Agreement to the Pokagon Band of Potawatomi Indians will enable the Band to plan, develop, establish the capability for implementing Environmental Protection programs, and continue to implement Water Resource programs. This Performance Partnership Grant combines funding under the Clean Water Act, Section 106, and the General Assistance Program.
Southwest Detroit Clean Diesel Collaborative	Southwest Detroit Environmental Vision (SWDEV) will replace 50 vehicles including: Class 8 long-haul trucks, short-haul Class 8 trucks, short-haul single unit Class 6/7 diesel trucks, dump trucks and Class 6/7 Dumpers/Tenders. All vehicles impacted will operate locally within the Detroit metropolitan area 80% of the time, a non-attainment area for ozone and sulfur dioxide. Diesel emission reductions from this project will protect Metro Detroit residents from an estimated 59 tons per year of pollutants, including: 42 tons of nitrogen oxides, 2 tons of particulate matter, 2 tons of carbon dioxide, and 13 tons of hydrocarbons.

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 4/19/2018 1:36:19 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]
Subject: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 04-19-2018.xlsx

EPA Colleagues,

Attached is the report for 4/19/2018.

You are receiving this email because the Chief of Staff has requested that you be included on this daily report. The purpose of the attached report is to show monetary grant awards that were signed by EPA Award Officials the previous business day. When the award is signed, a Congressional Notification is automatically triggered within the Integrated Grants Management System (IGMS) database. The source of the information contained in the CN report is Grants Data Mart, which reflects information input into IGMS by Grants Management staff across the agency.

Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 3/2/2018 11:50:04 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Williams, Michael [Williams.Michael@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]
Subject: RE: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 3-2-18.xlsx

Good Evening,

All notifications from today's Congressional Notification Report have been cleared; however, any notification on this list that has been specifically placed on hold still remains on hold and should not move forward. Please let us know if you have any questions.

Thank you,

Jessica Durand
Policy Specialist
US Environmental Protection Agency
202-564-5317
Durand.jessica@epa.gov

From: OGD_Grant_Reports
Sent: Friday, March 02, 2018 8:51 AM
To: OGD_Grant_Reports <OGD_Grant_Reports@epa.gov>
Cc: Bell, Matthew <Bell.Matthew@epa.gov>; Cooper, Marian <Cooper.Marian@epa.gov>; Etheredge, William <Etheredge.William@epa.gov>; Flynn, Mike <Flynn.Mike@epa.gov>; Jones, Laurice <Jones.Laurice@epa.gov>; Milazzo, Julie <Milazzo.Julie@epa.gov>; Naples, Eileen <Naples.Eileen@epa.gov>; Neal, Kerry <neal.kerry@epa.gov>; Polk, Denise <Polk.Denise@epa.gov>; Sanders, LaTonya <Sanders.Latonya@epa.gov>; Showman, John <Showman.John@epa.gov>; Sylvester, Kenneth <Sylvester.Kenneth@epa.gov>; Vizian, Donna <Vizian.Donna@epa.gov>; Durand, Jessica <Durand.Jessica@epa.gov>; Williams, Michael <Williams.Michael@epa.gov>
Subject: Daily Grant Report (Congressional Notification)

EPA Colleagues,

Attached is the report for 3/2/2018.

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Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,
Jessica Durand

Policy Specialist
US Environmental Protection Agency
202-564-5317
Durand.jessica@epa.gov

Congressional Notification Daily Report for Awarc
3/1/18

Grant No	Program Code	Awarding Region Code	EPA Amount This Action This Action	Award Date	Applicant Name
83568401-7	Q	EPA HQ	$500,000.00	3/1/2018	National Older Worker Career Center
83936101-0	Q	EPA HQ	$253,000.00	3/1/2018	Natl Asian Pacific Center on Aging
00351722-1	K1	EPA R3	$80,000.00	3/1/2018	PA Dept of Environmental Protection
00349222-1	K1	EPA R3	$39,718.00	3/1/2018	WV Dept of Health & Human Resources
00404115-9	A	EPA R4	$151,567.00	3/1/2018	Jefferson Co Air Pollution Control Dist

Is Signed

Project Title	Project Description
Senior Environmental Employment Program for the Office of Pesticides	This cooperative agreement will provide support for Senior Environmental Employment (SEE) Program enrollees to work with the Office of Pesticide Programs, Office of Chemical Safety and Pollution Prevention, Washington, DC.
Management of the Senior Environmental Employment program for EPA's Region V.	This cooperative agreement will provide funding to support Senior Environmental Employment (SEE) Program enrollees working at Region V, Chicago, IL.
Statewide radon program for the residents of PA	The goal of this program is to provide radon risk reduction through activities that will result in increased radon testing, mitigation and radon resistant new construction. The recipient will implement a state program of radon related projects, in homes, schools, or other buildings, including 1) Public Information, outreach, education; 2) Programs to control radon in existing and new structures, 3) Demonstration of radon mitigation methods and technologies, and 4) Other technical, information, and administrative activities. Federal funds of $800,000 are contingent upon availability.
To maintain a statewide radon program for the residents of WV	The goal of this program is to provide radon risk reduction through activities that will result in increased radon testing, mitigation and radon resistant new construction. The recipient will implement a state program of radon related projects, in homes, schools, or other buildings, including 1) Public Information, outreach, educations; 2) Programs to control radon in existing and new structures, 3) Demonstration of radon mitigation methods and technologies, and 4) Other technical, information, and administrative activities. Federal funds of $160,000 are contingent upon availability.
Air Pollution Control Program Support	This agreement funds the Louisville/Jefferson County Metro, Kentucky ongoing program to protect air quality so that it achieves established ambient air standards and protects human health. The program includes ambient air monitoring and various other activities to reduce or control air pollutants such as ozone, particulate matter, regional haze, sulfur dioxide, carbon monoxide, and mercury.

00408115-A	A	EPA R4	$52,917.00	3/1/2018	Metropolitan Gov't of Nashville & Davidson County
00406715-9	A	EPA R4	$29,611.00	3/1/2018	Forsyth County Office of Environmental Assistance and Protection.
00D21418-0	BG	EPA R4	$2,422,939.00	3/1/2018	KY Energy and Environment Cabinet
01F23201-2	V	EPA R6	$130,223.00	3/1/2018	OK Dept of Env Quality
00F95901-5	V	EPA R6	$109,974.00	3/1/2018	OK Dept of Env Quality

Air Pollution Control Program Support	This agreement funds the Nashville Tennessee's ongoing program to protect air quality so that it achieves established ambient air standards and protects human health. The program includes ambient air monitoring and various other activities to reduce or control air pollutants such as ozone, particulate matter, regional haze, sulfur dioxide, carbon monoxide, and mercury.
Air Pollution Control Program Support	This agreement funds Forsyth County, NC ongoing program to protect air quality so that it achieves established ambient air standards and protects human health. The program includes ambient air monitoring and various other activities to reduce or control air pollutants such as ozone, particulate matter, regional haze, sulfur dioxide, carbon monoxide, and mercury.
Performance Partnership Grant	This action approves an award in the amount of $2,422,939 to the Commonwealth of Kentucky Energy and Environment Cabinet to improve air, surface, and ground water quality, restore brownfields to productive use, promote conservation of natural resources and sustainability, protect citizens from Polychlorinated Biphenyl (PCB) contamination, promote pollution prevention, reduce non-point source water pollution, and restore and protect wetlands.
Tar Creek Blood Lead Testing	The project provides funding the Oklahoma Department of Environmental Quality (ODEQ) to conduct blood lead testing in children within the Tar Creek Superfund Site area. The objective is to reduce lead exposure and meet the remedial action objectives and effectively implement the statutory requirements of CERCLA 121(f) by remediating contaminated soils that are found to pose hazards to human health and mandates substantial and meaningful State involvement.
Superfund Tar Creek Operable Unit (OU-2) Remedial Design (RD)	This project provides funding to ODEQ to conduct site characterization activities at potential or confirmed hazardous waste sites and undertake response planning and implementation actions at this site which is on the National Priorities List (NPL) to clean up the hazardous waste sites that are found to pose hazards to human health and effectively implement the statutory requiremens of CERCLA 121(f) which mandates substantial and meaningful State involvement.

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 3/2/2018 1:51:05 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]; Williams, Michael [Williams.Michael@epa.gov]
Subject: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 3-2-18.xlsx

EPA Colleagues,

Attached is the report for 3/2/2018.

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Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,
Jessica Durand
Policy Specialist
US Environmental Protection Agency
202-564-5317
Durand.jessica@epa.gov

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 2/27/2018 2:20:27 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]
Subject: RE: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 02-23-2018.xlsx

Good morning,

All notifications from Friday's (02-23-2018) Congressional Notification Report have been cleared; however, any notification on this list that has been specifically placed on hold still remains on hold and should not move forward. Please let us know if you have any questions.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

From: OGD_Grant_Reports
Sent: Monday, February 26, 2018 8:50 AM
To: OGD_Grant_Reports <OGD_Grant_Reports@epa.gov>
Cc: Bell, Matthew <Bell.Matthew@epa.gov>; Cooper, Marian <Cooper.Marian@epa.gov>; Durand, Jessica <Durand.Jessica@epa.gov>; Etheredge, William <Etheredge.William@epa.gov>; Flynn, Mike <Flynn.Mike@epa.gov>; Jones, Laurice <Jones.Laurice@epa.gov>; Milazzo, Julie <Milazzo.Julie@epa.gov>; Naples, Eileen <Naples.Eileen@epa.gov>; Neal, Kerry <neal.kerry@epa.gov>; Polk, Denise <Polk.Denise@epa.gov>; Sanders, LaTonya <Sanders.Latonya@epa.gov>; Showman, John <Showman.John@epa.gov>; Sylvester, Kenneth <Sylvester.Kenneth@epa.gov>; Vizian, Donna <Vizian.Donna@epa.gov>; Naples, Eileen <Naples.Eileen@epa.gov>
Subject: Daily Grant Report (Congressional Notification)

EPA Colleagues,

Attached is the report for Friday, 2/23/2018.

You are receiving this email because the Chief of Staff has requested that you be included on this daily report. The purpose of the attached report is to show monetary grant awards that were signed by EPA Award Officials the previous business day. When the award is signed, a Congressional Notification is automatically triggered within the Integrated Grants Management System (IGMS) database. The source of the information contained in the CN report is Grants Data Mart, which reflects information input into IGMS by Grants Management staff across the agency.

Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

Congressional Notification Daily Report for Awarc
2/22/18

Grant No	Program Code	Awarding Region Code	EPA Amount This Action: This Action	Award Date	Applicant Name
99662717-1	BG	EPA R6	$6,234,994.00	2/22/2018	Texas Commission on Environmental Quality
98665309-1	I	EPA R6	$1,288,346.00	2/22/2018	Texas Commission on Environmental Quality
00E56603-4	GL	EPA R5	$1,030,000.00	2/22/2018	Ohio Environmental Protection Agency
95494318-0	LS	EPA R4	$1,000,000.00	2/22/2018	South Carolina Dept. of Health & Envir. Control

Is Signed

Project Title	Project Description
TCEQ FY18-19 PPG	This agreement provides funding for the operation of the Texas Commission of Environmental Quality's (TCEQ) continuing environmental programs while giving it greater flexibility to address its highest environmental priorities, improve environmental performance, achieve administrative savings and strengthen the partnership between TCEQ and EPA. This agreement funds statewide programs to: 1) Clean Air Act (CAA), Section 105; 2) Clean Water Act (CWA), Section 106 - Surface Water; 3) CWA, Section 106 - Ground Water; 4) CWA, Section 319 - Nonpoint Source; 5) Safe Drinking Water Act - Public Water Supply; 6) Resource Conservation and Recovery Act (RCRA); 7) Safe Drinking Water Act - Underground Injection Control, and 8) Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The work includes outputs and outcomes associated with managing continuing environmental programs which include activities to protect and maintain water quality program, monitor, abate, and control hazardous materials, solid waste, air pollution, and pesticides.
FY18 Section 106 Categorical WPC	This agreement provides funding to the State of Texas to carry out its program to maintain, protect, and improve the water quality of its rivers, lakes, streams, groundwater, and other waterbodies. The environmental benefits of this program include preventing degradation of unimpaired waterbodies and reducing the number of impaired waterbodies in the state.
OEPA - LAMP & AOC Capacity	This capacity grant for the Ohio Environmental Protection Agency (OEPA) will provide Ohio with resources to: 1) actively participate in the Great Lakes Restoration Initiative work to protect and restore the Areas of Concern (AOCs) within Lake Erie; 2) actively participate in the Lake Erie Partnership; and 3) provide resources for communication and outreach activities related to the AOCs and Lakewide Area Management Plans.
Leaking Underground Storage Tank Trust Fund Program	This action approves an award in the amount of $1,000,000 to the South Carolina Department of Health & Environmental Control to assist the State in developing, implementing and maintaining an effective Underground Storage Tank (UST) program for the remediation of leaking UST's containing petroleum.

18E01490-1	I	EPA R5	$850,625.00	2/22/2018	Ohio Environmental Protection Agency
96558801-D	V	EPA R5	$605,400.00	2/22/2018	Illinois Environmental Protection Agency
00529618-1	F	EPA R5	$584,760.00	2/22/2018	Wisconsin Department of Natural Resources
95411918-0	L	EPA R4	$485,000.00	2/22/2018	South Carolina Dept. of Health & Envir. Control
00521215-E	A	EPA R5	$480,861.00	2/22/2018	Wisconsin Department of Natural Resources

Ohio EPA FFY18 106 Grant Application	The Ohio Environmental Protection Agency's (EPA) Federal Fiscal Year 2018 Clean Water Act, Section 106 grant will implement funding to strategize the protection of public health. Outputs involved with this project include activities related to Ohio's Ambient Ground Water Quality Monitoring Network, inspecting hundreds of dischargers, reviewing National Pollutant Discharge Elimination System (NPDES) permits, maintaining various databases within the Division of Drinking and Ground Waters, and developing Geographic Information Systems capabilities.
IEPA - Southeast Rockford Source Area 7 (RA)	The work to be accomplished is associated with Area 7 Remedial Action (RA) that consist of contractor procurement, preconstruction activities, RA implementation, RA completion and the RA completion report. The overall objective of these tasks is to determine and document that the RA is functioning as designed.
FY 2018 Public Water System Supervision (PWSS) Grant	The goal of the workplan by Wisconsin Department of Natural Resources (WDNR) is to assure that people served by public water systems receive drinking water that meets all applicable standards through effective treatment and source water treatment. Continuing program implementation includes adopting rules at least as stringent as federal regulations, providing assistance to public water systems on regulatory requirements, conducting sanitary surveys, ensuring that monitoring and follow-up is conducted, and enforcing regulations.
State Underground Storage Tanks Program	This action approves an award in the amount of $485,000 to the South Carolina Department of Health & Environmental Control to assist the State in developing, implementing and maintaining an effective underground storage tank (UST) program, and leak detection, with prevention and related enforcement for meeting the provisions of the Energy Policy Act of 2005.
WDNR FY 2016-2018 Section 105 Grant	The Wisconsin Department of Natural Resources (WDNR) will implement an air pollution control program in the state of Wisconsin. WDNR will improve air quality by taking measures to reduce stationary, area and mobile sources of air pollution especially in Wisconsin counties that have not met the national air quality standards for ozone, sulfur dioxides, nitrogen oxides, air toxics and fine particles. The air quality improvements will be made by WDNR through regulatory, monitoring, permitting, and enforcement activities.

01E05302-2	GL	EPA R5	$450,000.00	2/22/2018	Minnesota Pollution Control Agency
02E01586-1	F	EPA R5	$445,630.00	2/22/2018	Ohio Environmental Protection Agency
00534118-1	D	EPA R5	$340,389.00	2/22/2018	Wisconsin Department of Natural Resources
01E01468-6	I	EPA R5	$237,870.00	2/22/2018	Ohio River Valley Water Sanitation Commission
83810001-8	Q	EPA HQ	$98,581.00	2/22/2018	National Older Worker Career Center

Lake Superior Lakewide Action Management Plan and St. Louis River AOC Restoration Support	This grant provides resources to the Minnesota Pollution Control Agency (MPCA) to continue its efforts to implement remedial action plans (RAP) to restore the St. Louis River Area of Concern (SLRAOC), and coordinate implementation of the Lake Superior Lakewide Action and Management Plan (LAMP). MPCA's RAP implementation staff, in coordination with Minnesota Department of Natural Resources, will provide direct oversight of activities specific to beneficial use impairments in the SLRAOC, including fish tumor and deformity assessment, remedial assessment, excessive loading of nutrients, fish consumption advisories/beach closings, loss of fish and wildlife habitat, and degraded fish and wildlife populations. This restoration work is integral to the delisting of the SLRAOC.
Public Water System Supervision Grant	The Ohio Environmental Protection Agency (Ohio EPA) will accomplish the following activities in accordance with their Fiscal Year 2018 Public Water System Supervision (PWSS) program grant. These activities include maintaining primacy, aiding public water systems in achieving a high compliance rate with drinking water regulations, and following all rules, regulations, and laws pertaining to the Safe Drinking Water Act Section 1443(a).
Wisconsin's FY18 RCRA Subtitle C Hazardous Waste Management Program	This agreement is for development and implementation of an authorized hazardous waste management program in the State of Wisconsin to control the generation, transportation, treatment, storage, and disposal of hazardous waste; to minimize hazardous waste production; and to protect health and the environment from inactive hazardous waste facilities. Activities include permitting, corrective action, inspections, enforcement, computerized tracking, ensuring data quality, and pollution prevention outreach. This will help to preserve and restore the land by reducing waste generation and by managing hazardous wastes properly.
CLEAN WATER ACT 106 WATER POLLUTION CONTROL PROGRAM	This agreement provides funding to Ohio River Valley Water Sanitation Commission to carry out its program to maintain, protect, and improve the water quality of its rivers, lakes, streams, groundwater, and other waterbodies. The environmental benefits of this program include preventing degradation of unimpaired waterbodies and reducing the number of impaired waterbodies in the region. Activities include water quality monitoring and assessment, biological studies, review and implementation oversight of pollution control standards, assisting Region 5's development of Total Maximum Daily Loads.
Senior Environmental Employment Program for Region VII Operations	This cooperative agreement will provide funding to support Senior Environmental Employment (SEE) Program enrollees working with Region VII Operations, Lenexa, KS.

00F94501-7	V	EPA R6	$69,179.00	2/22/2018	Quapaw Tribe of Oklahoma
00D51517-2	BG	EPA R4	$30,000.00	2/22/2018	Mississippi Band Of Choctaw Indians
96596212-6	BG	EPA R5	$15,465.00	2/22/2018	Lower Sioux Indian Community
83929001-0	SU	EPA HQ	$14,977.00	2/22/2018	Kennesaw State University Research and Service Foundation
83929601-0	SU	EPA HQ	$14,925.00	2/22/2018	Montana State University-Bozeman-Taylor

Quapaw Tribe of Oklahoma Tar Creek Superfund Site	This is an award to the Quapaw Tribe of Oklahoma for Management Assistance activities at the Tar Creek sites. Management Assistance activities are those activities conducted by the recipient to ensure its meaningful and substantial involvement. These activities include oversight, reviewing and commenting on technical reports, attending technical and public meetings, and ensuring that remedial activities are completed in accordance with applicable laws. Management assistance funding will not be used for activities including any environmental data collection, monitoring or sampling.
Performance Partnership Grants	Funding will support the Mississippi Band of Choctaw Indians' effort to ensure a healthy tribal community and protect the environment in Indian country by developing environmental ordinances and related compliance progrograms, building comprehensive air and wate quality and in-house laboratory analytic capacities, building capacity to assist tribal departments on envionmental issues, and reducing nonpoint source pollution in tribal ecosystems.
Performance Partnership Grant for FY2017 and FY2018	This action will award a Performance Partnership Grant to the Lower Sioux Indian Community and consists of funds from the General Assistance Program (GAP), the Clean Water Act (CWA) Section 106 Program, and the Brownfields Section 128a Program. Activities in the workplan include: continuation of the water quality monitoring of surface, wetlands, and springs, administration of the environmental program, and the development of a site response program for brownfields.
Semitransparent Thin Film Solar Cells	This project aims to create a lightweight, flexible, thin film solar panel that has applications beyond just building rooftops. This will increase solar power generation capacity and improve energy efficiency. By creating a more functional solar panel that can be used on multiple surfaces, this technology can increase solar power generation, while reducing emissions from conventional energy sources and will also reduce costs of installing traditional solar panels that are fragile and heavy.
An Evaluation of the Actual Energy and Indoor Environmental	This project develops guidelines for architects and engineers to ensure adequate Indoor Environmental Quality (IEQ) along with providing measures for reducing energy consumption in the operation of Green buildings. The completion of the program will ensure improved indoor air quality in operating green buildings with aligns with the administrator?s goal to improve air quality management in federal building, which will improve work conditions and reduce costs of operations.

97578018-1	G	EPA R5	$10,850.00	2/22/2018	Wisconsin Department of Natural Resources
83780001-1	AE	EPA HQ	$10,000.00	2/22/2018	The Academy of Natural Sciences

FY 2018 Underground Injection Control Grant	Wisconsin Department of Natural Resources (WDNR) is committed to implementing a comprehensive state Underground Injection Control (UIC) program covering all five classes of injection wells. The primary role of this program is to implement and enforce UIC regulations, which includes four main program elements: (1) UIC Identification, Inventory, Assessment, and Regulatory Development; (2) UIC Surveillance, Compliance, and Enforcement; (3) UIC/SWAP Integration; (4) UIC Data Management.
Baseline Hydroacoustic Survey of Submerged Aquatic Vegetation (SAV) in the Delaware Estuary	The primary goal of this project is to determine the presence, extent and species of submerged vegetation in Delaware Estuary given that this area has little to no record of SAV distribution. A secondary goal is to create geospatial data from post-processed acoustic data to that can overlay with past survey sediment and chemistry data. Data products will be a regional contribution while the methods used may have a broader application.

Message

From: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
Sent: 2/26/2018 1:49:49 PM
To: OGD_Grant_Reports [OGD_Grant_Reports@epa.gov]
CC: Bell, Matthew [Bell.Matthew@epa.gov]; Cooper, Marian [Cooper.Marian@epa.gov]; Durand, Jessica [Durand.Jessica@epa.gov]; Etheredge, William [Etheredge.William@epa.gov]; Flynn, Mike [Flynn.Mike@epa.gov]; Jones, Laurice [Jones.Laurice@epa.gov]; Milazzo, Julie [Milazzo.Julie@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]; Neal, Kerry [neal.kerry@epa.gov]; Polk, Denise [Polk.Denise@epa.gov]; Sanders, LaTonya [Sanders.Latonya@epa.gov]; Showman, John [Showman.John@epa.gov]; Sylvester, Kenneth [Sylvester.Kenneth@epa.gov]; Vizian, Donna [Vizian.Donna@epa.gov]; Naples, Eileen [Naples.Eileen@epa.gov]
Subject: Daily Grant Report (Congressional Notification)
Attachments: Congressional Notification Daily Report 02-23-2018.xlsx

EPA Colleagues,

Attached is the report for Friday, 2/23/2018.

You are receiving this email because the Chief of Staff has requested that you be included on this daily report. The purpose of the attached report is to show monetary grant awards that were signed by EPA Award Officials the previous business day. When the award is signed, a Congressional Notification is automatically triggered within the Integrated Grants Management System (IGMS) database. The source of the information contained in the CN report is Grants Data Mart, which reflects information input into IGMS by Grants Management staff across the agency.

Please don't hesitate to reach out to OGD_Grant_Reports@epa.gov with any questions related to this submission.

Thank you,

Michael D. Williams
U.S. Environmental Protection Agency
National Policy, Training, and Compliance Division
1300 Pennsylvania Ave, NW
MC-3903R
Washington, DC 20460
(202) 564-1068
Email: williams.michael@epa.gov

Message

From: Hamilton, Sabrina [Hamilton.Sabrina@epa.gov]
Sent: 11/14/2017 4:28:35 PM
To: Lewis, Josh [Lewis.Josh@epa.gov]; Dominguez, Alexander [dominguez.alexander@epa.gov]
CC: Cyran, Carissa [Cyran.Carissa@epa.gov]
Subject: RE: LA Attorney General Landry
Attachments: AX-17-000-7112.pdf; Response to the Hon. Jeff Landry, AG of LA -- AX-17-000-7112.pdf; WH12655318 Correspondence -- AX-17-001-1197-WH.pdf; Response to AG Jeff Landry of LA -- AX-17-001-1197-WH -- .pdf; AX-17-000-5735.COR.pdf; AX-16-000-7944.pdf

Alex and Josh,

Attached are the incoming and response letters to Jeff Landry. Please note that no responses were sent for the letters referencing AX-17-000-5735 and AX-16-000-7944. Let me know if you need anything else.

Sabrina

Sabrina Hamilton
Air and Radiation Liaison Specialist
and FOIA Coordinator
Office of Air and Radiation - Correspondence Unit
U.S. Environmental Protection Agency (EPA)
1200 Pennsylvania Avenue, N.W. (6101-A)
Washington, D.C. 20460
Tel: (202) 564-1083
Fax: (202) 501-0600

From: Lewis, Josh
Sent: Tuesday, November 14, 2017 10:32 AM
To: Dominguez, Alexander <dominguez.alexander@epa.gov>
Cc: Hamilton, Sabrina <Hamilton.Sabrina@epa.gov>; Cyran, Carissa <Cyran.Carissa@epa.gov>
Subject: RE: LA Attorney General Landry

Sabrina or Carissa can confirm whether the recent Landry letter has been sent and also whether other letters exist (off the top of my head, I don't recall seeing others).

From: Dominguez, Alexander
Sent: Tuesday, November 14, 2017 9:57 AM
To: Lewis, Josh <Lewis.Josh@epa.gov>
Subject: LA Attorney General Landry

Hey Josh,

Could you point me in the right direction for who to get the below information from:

Any letters we have received from Louisiana Attorney General Jeff Landry as well as our responses. I know there was the one on Tier IV NOx emission standards, but was not sure if that has been sent yet. Any others would be great as well. I also reached out to OCIR but was not sure who in OAR handles this.

Appreciate it,

Alex Dominguez
Policy Analyst to the Principal Deputy Assistant Administrator
Office of Air and Radiation
U.S. Environmental Protection Agency

Message

From: ITEP Global News List [ITEPNEWS@LISTS.NAU.EDU]
on behalf of Lydia Scheer [Lydia.Scheer@nau.edu]
Sent: 4/16/2018 7:08:10 PM
To: ITEPNEWS@LISTS.NAU.EDU
Subject: Still time to register for the 2018 National Tribal Forum on Air Quality!
Attachments: NTF Justification Letter 2018_Final.docx; NTFAgenda_Web.pdf

There's still time to register for the 2018 National Tribal Forum on Air Quality, which also offers SIX different pre-conference workshops! This year's Forum will be held May 14-17 in Minnesota and promises to continue many of the well-loved traditions of the NTFAQ, including training sessions, cultural presentations, exhibits and posters, extracurricular fun, and lots of networking opportunities! See below for more information, and **visit www.nau.edu/ntfaq to register today!**

Need help justifying your attendance to the Forum? The planning committee has drafted the attached template letter to help you in clearly articulating the benefits and values of attending and bringing information back to build your program and inform your work.

Several pre-conference workshops are being planned for Monday May 14 on a variety of topics! Sign up is required to reserve a spot; there are half-day and full-day options available on the following topics (more details available at www.nau.edu/ntfaq):

*>Session #1: **VW Settlement** Workshop: Monday, May 14, 8:00 am – 5:00 pm*
*>Session #2: **Radon** Technical Workshop: Monday May 14, 8:00 am – 5:00 pm*
*>Session #3: Introduction to **Treatment as a State** (TAS) for Air Quality, Monday May 14, 8:00 am – 12:00 pm*
*>Session #4: **Air Sensors** Workshop: Monday May 14, 8:00 am – 12:00 pm*
*>Session #5: Air Quality **Grants** Workshop: Monday May 14, 1:00 – 5:00 pm*
*>Session #6: **Communicating Climate**: Monday May 14, 1:00 – 5:00 pm*

Updated Agenda:
The latest version of the **NTFAQ agenda** is available on our website at: www.nau.edu/ntfaq. Highlights include:

>Special selection of **training sessions and workshops** on Monday May 14 (registration required)
>Keynote speaker: **Karen Diver**, a local and global indigenous leader and formerly the special assistant for Native American affairs to President Obama.
>**NTAA Member Tribes Luncheon**, open to all NTAA member tribes, will be held Tuesday May 15
>The NTF **EcoCafe Exhibit session** will be held Wednesday May 16 - there is still room to sign up to exhibit your poster or information! More info HERE
>Virgil Masayesva Tribal Air Programs Excellence **Award Ceremony & Banquet Dinner** will be Wednesday, May 16
>Stick around for the **5K Breath of Fresh Air Fun Run** Thursday May 17 after the Forum adjourns; there will also be options for bird-watching, whitewater rafting, and other group activities available throughout the event - details available soon!

Lodging:
A group block reservation has been made at the **Black Bear Casino Resort,** located at 1785 Highway 210, Carlton, Minnesota. **The group's lodging rate is $68.00/night, and is available until April 29, 2018,** or until group block has filled. Due to limited availability, it is strongly recommended that you make hotel reservations as early as possible. To reserve your room, contact the Hotel Reservation line at 1-888-771-0777 and request booking under the "National Tribal Forum on Air Quality" group block. A credit card will be required at time of booking to secure the room reservation.
There are several other lodging options available in the vicinity; check here to view nearby listings: Cloquet-area Hotels & Lodging or search for hotels on a map of the area.

Airport Shuttles:
The Fond du Lac Band of Lake Superior Chippewa's Transit Division will be providing ***complimentary shuttle service*** between the Black Bear Casino Resort and the Duluth International Airport on according to the daily flight schedules on Sunday, 5/13, Monday 5/14, Thursday 5/17 and Friday 5/18.

The Duluth (DLH) and Minneapolis/St.Paul (MSP) airports offer other other ground transportation options including shuttles, taxi, and car services.

Updates and more information on the NTF can be found on our website at www.nau.edu/ntfaq - we hope to see you there!

Lydia Scheer, Project Director
Institute for Tribal Environmental Professionals
Northern Arizona University
Box 15004
Flagstaff, AZ 86011

Ph: 928.523.6887
Fx: 928.523.1266

www.nau.edu/itep
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www.tribalexchangenetwork.org

********** You are receiving this email because you are subscribed to one or more email listservs through ITEP. To manage your listserv subscriptions, please visit www7.nau.edu/itep/main/listsrv/. Thank you!

2018 NTFAQ WORKING AGENDA

Carlton, Minnesota; May 14-17, 2018

Time	Topic/Session
	Monday, May 14, 2018 (OPTIONAL)
7:30 am-5:30 pm	**Registration & Coffee**
7:30 am-5:30 pm	**Exhibits**
8:00am-12:00 pm	**Optional Session #1: VW Settlement**
8:00am-12:00 pm	**Optional Session #2: Radon**
8:00am-12:00 pm	**Optional Session #3: TAS 101**
8:00am-12:00 pm	**Optional Session #4: Air Sensor Workshop**
12:00-1:00 pm	**LUNCH (on your own)**
1:00-5:00 pm	**Optional Session #1, cont. VW Settlement**
1:00-5:00 pm	**Optional Session #2, cont. Radon**
1:00-5:00 pm	**Optional Session #5: AQ Grants**
1:00-5:00 pm	**Optional Session #6: Communicating Climate**
5:00-8:00 pm	**Optional evening event: Birdwatching Tour**
	Tuesday May 15, 2018 (Day One)
7:30 am-5:30 pm	**Registration**
7:30 am-5:30 pm	**Exhibits**
7:30 am-8:30 am	**Continental Breakfast**
8:30 am-9:00 am	**Opening Ceremony & Welcoming Remarks**
9:00 am-9:45 am	**Keynote Speaker: Karen Diver**
9:45 am-10:00 am	**Youth Presentation TBD**
10:00 am-11:30 am	**Tribal Air Talk Show/Plenary Day 1**
11:30 am-1:00 pm	**LUNCH (on your own)**
	NTAA Member Meeting & Luncheon (optional)
1:00 pm-2:30 pm	**Networking Clubhouse**
2:30 pm-3:00 pm	**Break**
3:00 pm-4:30 pm	**BREAKOUT #1: Air Quality Policy & Regulations**
	EPA Rules & Regulations Updates
	Tribal Perspectives on EPA Regulatory Reform: Clean Power Plan, Tribal New Source Review (NSR)
3:00 pm-4:30 pm	**BREAKOUT #2: Indoor Air Quality**
	Funding & Resources for IAQ Programs & Activities: Case Studies from Tribes, IHS, Other Partners
3:00 pm-4:30 pm	**BREAKOUT #3: Air Quality Technical & Outreach**
45 min	***Quapaw Tribe Case Study: Tar Creek Lead Mining & Air Quality***
45 min	***Air Dispersion Modeling 101***
3:00 pm-4:30 pm	**BREAKOUT #4: Climate Change**
	Collaborating for Dollars: Four Tribes of Kansas' Water Management Plan Addresses Drought
	Tribal Climate Change & Health
5:30 pm-7:30 pm	***Optional Evening Activity-TBD***
	Wednesday, May 16, 2018 (Day Two)
7:30 am-5:30 pm	**Registration**
7:30 am-5:30 pm	**Exhibits**
7:30 am-8:30 am	**Continental Breakfast**
8:30 am-9:30 am	**Plenary Session: Health Impacts**
	Air Pollution and Brain Disease
	Health Impact Assessment (HIA) as a Tool to Influence Policy and Projects and Elevate Air Quality Concerns
9:30 am-10:00 am	**Networking Break**
10:00 am-12:30 pm	**Eco-Café Exhibit Session & Working Lunch (provided)**
	Lunch Presentation TBD
12:30 pm-1:00 pm	**Networking Break**
1:00 pm-2:30 pm	**BREAKOUT #1: Air Quality Policy & Regulations**
	Health Impact Assessments (HIAs) Workshop
1:00 pm-2:30 pm	**BREAKOUT #2: Indoor Air Quality**
	Integrating Indoor Air Quality Improvements into Respiratory Health Treatment
	Tribal Indoor Air Quality Intervention Study
1:00 pm-2:30 pm	**BREAKOUT #3: Air Quality Technical & Outreach**

	2018 NTFAQ WORKING AGENDA
	Carlton, Minnesota; May 14-17, 2018
	How to do X, Y and Z for free: Open-source data analysis tools
1:00 pm-2:30 pm	**BREAKOUT #4: Climate Change**
	Working Together to Address Erosion and Flooding in Bristol Bay, Alaska
2:30 pm-3:00 pm	**Networking Break**
3:00 pm-4:30 pm	**BREAKOUT #1: Air Quality Policy & Regulations**
	Cooperative Federalism & Tribal Programs under the Current EPA Administration
	How States & Tribes Can Work Together
	TAS & Jurisdiction
3:00 pm-4:30 pm	**BREAKOUT #2: Indoor Air Quality**
	Residential Wood Smoke Interventions Improving Health in Native American Populations: A IAQ Study on the Navajo Nation
	Lessons from a Wood and Coal Stove Replacement Program
3:00 pm-4:30 pm	**BREAKOUT #3: Air Quality Technical & Outreach**
	Pala Tribe Case Study: Tribal Air Monitoring
	Sensor Technology
	Piecing it Together: Minnesota's Air Quality Forecast/Alert Collaboration and Outreach
3:00 pm-4:30 pm	**BREAKOUT #4: Climate Change**
	A Practical Guide to Intellectual Property for Peoples & Local Communities
	Climate Change Adaptation Planning to Building Tribal Resilience
6:00-8:30 pm	**Awards Ceremony & Banquet Dinner (provided, attendance optional)**
	Thursday May 17, 2018 (Day Three)
7:30 am-4:00 pm	**Exhibits**
7:30 am-4:00 pm	**Registration**
7:30 am-8:30 am	**Continental Breakfast**
8:30 am-9:30 am	**Plenary Session: Understanding ETEPs and the Power of Planning to Protect the Environment and Public Health in Indian Country**
9:30 am-10:00 am	**Networking Break**
10:00 am-11:30 am	**BREAKOUT #1: Air Quality Policy & Regulations**
	EPA & Clean Air Act Resources
	EJSCREEN: Environmental Justice Screening and Mapping Tool
	Enforcement Credentials (The Why and the How)
	Tribal Case Study using EJSCREEN
10:00 am-11:30 am	**BREAKOUT #2: Indoor Air Quality**
	NTAA IAQ Workgroup Updates
10:00 am-11:30 am	**BREAKOUT #3: Air Quality Technical & Outreach**
90 min	***Tribal-FERST - A Web Based Tool to Assist in Air Quality Decisions***
10:00 am-11:30 am	**BREAKOUT #4: Climate Change**
	Fort Belknap Tribal Case Study
11:30 am-1:00 pm	**LUNCH (on your own)**
1:00 pm-2:00 pm	**Plenary session: Tribal Air Big Ideas**
2:00 pm-3:00 pm	**Closing Session & Final Raffle**
5:00 pm - 7:00 pm	**5K Fun Run/Walk (tentative)**

Message

Sent: 4/16/2018 2:02:47 PM
To: Tena Smith [tsmith@downstreamcasino.com]
Subject: RE: Colville

Tena –

From: Kelly, Albert
Sent: Sunday, April 15, 2018 5:26 PM
To: John Berrey <jberrey@ogahpah.com>
Cc: Tena Smith <tsmith@downstreamcasino.com>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Colville

We can certainly set a time. Need to know who we are seeing and what our mission is. I am also trying to schedule a time for Tar Creek in May

Albert Kelly
Senior Advisor to the Administrator
1200 Pennsylvania Avenue, NW
Washington, DC 20460
202 306 8830

From: John Berrey [mailto:jberrey@ogahpah.com]
Sent: Wednesday, April 11, 2018 7:50 AM
To: Kelly, Albert <kelly.albert@epa.gov>
Cc: Tena Smith <tsmith@downstreamcasino.com>
Subject: Re: Colville

Is your schedule open? Tena can you suggest a few days.

On Tue, Apr 10, 2018 at 10:02 PM Kelly, Albert <kelly.albert@epa.gov> wrote:

> Sure
>
> Sent from my iPhone
>
> > On Apr 10, 2018, at 5:47 PM, John Berrey <jberrey@ogahpah.com> wrote:
> >
> > Kel, any chance we can run to central Washington State in first half of may?
> > --
> > John L Berrey
> > Chairman
> > Quapaw Tribe BC, DDA

--
John L Berrey
Chairman
Quapaw Tribe BC, DDA

Appointment

From: Lowe, Jill [Lowe.Jill@epa.gov]
Sent: 11/9/2017 5:49:10 PM
To: Lowe, Jill [Lowe.Jill@epa.gov]; Ajl, Diane [Ajl.Diane@epa.gov]; Ammon, Doug [Ammon.Doug@epa.gov]; Anderson, RobinM [Anderson.RobinM@epa.gov]; Armstrong, Joan [Armstrong.Joan@epa.gov]; Bailey, Ethel [Bailey.Ethel@epa.gov]; Ballotti, Doug [ballotti.douglas@epa.gov]; Banipal, Ben [banipal.ben@epa.gov]; Barmakian, Nancy [Barmakian.Nancy@epa.gov]; Barr, Pamela [Barr.Pamela@epa.gov]; Benjamin, Kent [Benjamin.Kent@epa.gov]; Bertrand, Charlotte [Bertrand.Charlotte@epa.gov]; Bilbrey, Sheryl [bilbrey.sheryl@epa.gov]; Blankenship, Steven [Blankenship.Steven@epa.gov]; Boushell, Susan [Boushell.Susan@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Briggs-Steuteville, Sheila [Briggs-Steuteville.Sheila@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Browne, Gladys [Browne.Gladys@epa.gov]; Butler, John [Butler.JohnJ@epa.gov]; Caraballo, Mario [Caraballo.Mario@epa.gov]; Carpenter, Angela [Carpenter.Angela@epa.gov]; Chaffins, Randall [Chaffins.Randall@epa.gov]; Cheatham, Reggie [cheatham.reggie@epa.gov]; CHENG, CHRISTINA [Cheng.Christina@epa.gov]; Clark, Becki [Clark.Becki@epa.gov]; Cooke, Maryt [Cooke.Maryt@epa.gov]; Crossland, Ronnie [Crossland.Ronnie@epa.gov]; Dalzell, Sally [Dalzell.Sally@epa.gov]; Davis, Patrick [davis.patrick@epa.gov]; DeHart, Nicole [DeHart.Nicole@epa.gov]; DeLeon, Rafael [Deleon.Rafael@epa.gov]; Dietz, Linda [Dietz.Linda@epa.gov]; Dillard, Jacqueline [dillard.jacqueline@epa.gov]; Driscoll, Stacie [Driscoll.Stacie@epa.gov]; Duteau, Helen [Duteau.Helen@EPA.GOV]; Edlund, Carl [edlund.carl@epa.gov]; Farmer, Alan [Farmer.Alan@epa.gov]; Fine, Ellyn [Fine.Ellyn@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Flaks, Art [Flaks.Art@epa.gov]; Fleming, Sheila [fleming.sheila@epa.gov]; Freeman, Caroline [Freeman.Caroline@epa.gov]; Gardner, Monica [Gardner.Monica@epa.gov]; Gautam, Nawodit [Gautam.Nawodit@epa.gov]; Gervais, Gregory [Gervais.Gregory@epa.gov]; Gross, Bonnie [Gross.bonnie@epa.gov]; Guillard, Jennifer [Guillard.Jennifer@epa.gov]; Halstead, Amanda [halstead.amanda@epa.gov]; Healy, Helena [Healy.Helena@epa.gov]; Hill, Franklin [Hill.Franklin@epa.gov]; Hill, Teresa [Hill.Teresa@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]; Hostage, Barbara [Hostage.Barbara@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Hughes, Valerie [Hughes.Valerie@epa.gov]; Irizarry, Gilberto [Irizarry.Gilberto@epa.gov]; Jackson, Robert W. [Jackson.Robertw@epa.gov]; Jeng, Richard [Jeng.Richard@epa.gov]; Jennings, Robert [Jennings.Robert@epa.gov]; Johnson, Natalie [Johnson.Natalie@epa.gov]; Keefer, David [Keefer.David@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]; Kemp, Mary [Kemp.Mary@epa.gov]; Kenely, Caroline [Kenely.Caroline@epa.gov]; Kim, Lena. [Kim.Lena@epa.gov]; Kremer, Fran [Kremer.Fran@epa.gov]; Kulpan, Bruce [Kulpan.Bruce@epa.gov]; Leff, Karin [Leff.Karin@epa.gov]; Leonard, Paul [leonard.paul@epa.gov]; Lloyd, David [Lloyd.DavidR@epa.gov]; Lowery, Brigid [Lowery.Brigid@epa.gov]; Ludzia, Peter [Ludzia.Peter@epa.gov]; Lynch, Mary-Kay [Lynch.Mary-Kay@epa.gov]; Lyons, John [Lyons.John@epa.gov]; MacDonald, Frances [MacDonald.Frances@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Manges, Ellen [Manges.Ellen@epa.gov]; Manzanilla, Enrique [Manzanilla.Enrique@epa.gov]; Marinelli, Joanne [Marinelli.Joanne@epa.gov]; McDonald, Carolyn [McDonald.Carolyn@epa.gov]; Meer, Daniel [Meer.Daniel@epa.gov]; Melvin, Karen [Melvin.Karen@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Michaud, John [Michaud.John@epa.gov]; Milhouse, Gloria [Milhouse.Gloria@epa.gov]; Milton, Laura [Milton.Laura@epa.gov]; Mojica, Ivette [Mojica.Ivette@epa.gov]; Moon, Wally [Moon.Wally@epa.gov]; Northridge, Michael [Northridge.Michael@epa.gov]; Olson, Bryan [Olson.Bryan@epa.gov]; Overmeyer, Patricia [Overmeyer.Patricia@epa.gov]; Parent, Suzanne [Parent.Suzanne@epa.gov]; Patterson, Kenneth [Patterson.Kenneth@epa.gov]; Petersen, Chris [petersen.chris@epa.gov]; Peterson, Mary [Peterson.Mary@epa.gov]; Peycke, Mark [Peycke.Mark@epa.gov]; Phillips, Pam [phillips.pam@epa.gov]; Previ, Caroline [Previ.Caroline@epa.gov]; Prince, John [Prince.John@epa.gov]; Reed, Kristen [Reed.Kristen@epa.gov]; Rigger, Don [Rigger.Don@epa.gov]; Riveland, Nancy [Riveland.Nancy@epa.gov]; Roache, Brendan [Roache.Brendan@epa.gov]; Rubin, Howard [Rubin.Howard@epa.gov]; Salo, Earl [Salo.Earl@epa.gov]; Sander, Matthew [Sander.Matthew@epa.gov]; Sasseville, Sonya [Sasseville.Sonya@epa.gov]; Scott, Raoul [Scott.Raoul@epa.gov]; Sebring, Meridith [Sebring.Meridith@epa.gov]; Simon, Nigel [Simon.Nigel@epa.gov]; Smidinger, Betsy [Smidinger.Betsy@epa.gov]; Smith, Sharon [smith.sharon@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]; Stavnes, Sandra [Stavnes.Sandra@epa.gov]; Stewart, Tracey [Stewart.Tracey@epa.gov]; Talton, Anthony [Talton.Anthony@epa.gov]; Terada, Calvin [Terada.Calvin@epa.gov]; Vanroden, Victoria [Vanroden.Victoria@epa.gov]; Washington, Barbara [Washington.Barbara@epa.gov]; Wilbur, Jennifer [Wilbur.Jennifer@epa.gov]; Williams, Doris [Williams.Doris@epa.gov]; Wilson, Eric [Wilson.EricJ@epa.gov]; Wilson, Michaelle [Wilson.Michaelle@epa.gov]; Woodyard, Josh [Woodyard.Joshua@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Zaragoza, Larry [Zaragoza.Larry@epa.gov]; Oh, Peter [Oh.Peter@epa.gov]; Clark, Meredith [Clark.Meredith@epa.gov]; Worthman, Gary [Worthman.Gary@epa.gov]; Schutz, Michelle [Schutz.Michelle@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Tanaka, Joan [Tanaka.Joan@epa.gov];

Short, Thomas [short.thomas@epa.gov]; Mishkin, Katherine [Mishkin.Katherine@epa.gov]; Hirsh, Steven [Hirsh.Steven@epa.gov]

CC: Monell, Carol [Monell.Carol@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Sheldrake, Beth [sheldrake.beth@epa.gov]; Indermark, Michele [Indermark.Michele@epa.gov]; Johnson, Emily [Johnson.Emily@epa.gov]; McEnery, Courtney [mcenery.courtney@epa.gov]; Morales, Susan [Morales.Susan@epa.gov]; Grandinetti, Cami [Grandinetti.Cami@epa.gov]; Einan, David [Einan.David@epa.gov]; Philip, Jeffrey [Philip.Jeff@epa.gov]; Flemming, Tongee [flemming.tongee@epa.gov]; Stanich, Ted [Stanich.Ted@epa.gov]; R1 OSRR Managers [R1_OSRR_Managers@epa.gov]; Cassidy, Meghan [Cassidy.Meghan@epa.gov]; Deabay, Elizabeth [Deabay.Beth@epa.gov]; Cianciarulo, Robert [Cianciarulo.Bob@epa.gov]; Shaffer, Caleb [Shaffer.Caleb@epa.gov]; Leshen, Margaret [Leshen.Margaret@epa.gov]; Lovely, William [Lovely.William@epa.gov]; Bazenas, Ted [Bazenas.Ted@epa.gov]; Sutton, Jennifer [sutton.jennifer@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Lammie, Benjamin [Lammie.Benjamin@epa.gov]; Wainberg, Daniel [Wainberg.Daniel@epa.gov]; McDonough, Barbara [McDonough.Barbara@epa.gov]; Mendes, Jeanette [Mendes.Jeanette@epa.gov]; Bohan, Suzanne [bohan.suzanne@epa.gov]; Madigan, Andrea [Madigan.Andrea@epa.gov]; Thompson, Christopher [Thompson.Christopher@epa.gov]; Urdiales, Aaron [Urdiales.Aaron@epa.gov]; Jennings, Lynne [Jennings.Lynne@epa.gov]; Metz, Chloe [Metz.Chloe@epa.gov]

Subject: Superfund DD Monthly call

Attachments: Untitled Attachment; Untitled Attachment; Untitled Attachment; Untitled Attachment; Untitled Attachment; Untitled Attachment

Location: 1 (202) 991-0477 Conference ID: 6043364

Start: 10/24/2017 6:00:00 PM

End: 10/24/2017 7:30:00 PM

Show Time As: Busy

Recurrence: Monthly
the fourth Tuesday of every 1 month(s) from 2:00 PM to 3:30 PM

New call-in number.

Appointment

From: Nishida, Jane [Nishida.Jane@epa.gov]
Sent: 8/7/2017 2:40:28 PM
To: Nishida, Jane [Nishida.Jane@epa.gov]; Greenwalt, Sarah [greenwalt.sarah@epa.gov]; Wright, Felicia [Wright.Felicia@epa.gov]; Coleman, Sam [Coleman.Sam@epa.gov]; Snyder, Jessica [Snyder.Jessica@epa.gov]; Benjamin, Kent [Benjamin.Kent@epa.gov]; Wagner, Kenneth [wagner.kenneth@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Hill, Teresa [Hill.Teresa@epa.gov]; Williams, Odessa [Williams.Odessa@epa.gov]; Davis, Patrick [davis.patrick@epa.gov]; Simon, Nigel [Simon.Nigel@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Chang, Elle [chang.elle@epa.gov]; Gude, Karen [Gude.Karen@epa.gov]

Subject: TLEF Briefing for Sarah
Attachments: EPA AIEO presentation senior leadership (2017-7) Final.pptx; 8817TLEF Background Documents OWOLEMR6 and Hot Sites Final.docx; 8817TLEF Briefing Material - Background on Tar Creek.docx
Location: Executive Conference Room, RRB 3rd Floor #31204

Start: 8/11/2017 5:15:00 PM
End: 8/11/2017 6:00:00 PM
Show Time As: Tentative

Call-In: Ex. 6 - Personal Privacy **Access Code:** Ex. 6 - Personal Privacy

Appointment

From: Woolford, James [Woolford.James@epa.gov]
Sent: 6/27/2018 1:25:19 PM
To: Woolford, James [Woolford.James@epa.gov]; Edlund, Carl [Edlund.Carl@epa.gov]; Crossland, Ronnie [Crossland.Ronnie@epa.gov]; Lowery, Brigid [Lowery.Brigid@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Duteau, Helen [Duteau.Helen@EPA.GOV]; Friedland, Melissa [Friedland.Melissa@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Breen, Barry [Breen.Barry@epa.gov]; Weyer, Erica [weyer.erica@epa.gov]; Peycke, Mark [Peycke.Mark@epa.gov]; Piehl, Jacob [Piehl.Jacob@epa.gov]; Luckett, Casey [Luckett.Casey@epa.gov]; Atkins, Blake [Atkins.Blake@epa.gov]; Coltrain, Katrina [coltrain.katrina@epa.gov]; Casanova, Rafael [Casanova.Rafael@epa.gov]; Boehr, Craig [Boehr.Craig@epa.gov]; Wall, Gregory [Wall.Gregory@epa.gov]; Page, Phil [Page.Phil@epa.gov]; Ronquillo, Manuel [Ronquillo.Manuel@epa.gov]; Healy, Helena [Healy.Helena@epa.gov]

Subject: Tar Creek
Location: 5621 call in: Ex. 6 - Personal Privacy

Start: 6/29/2018 5:00:00 PM
End: 6/29/2018 5:45:00 PM
Show Time As: Busy

Follow-up discussion to Tuesday's call. Please forward invite as appropriate.
POC: Lois Gartner, 703-603-8711

Message

Sent: 6/25/2018 6:49:50 PM
To: Palich, Christian [palich.christian@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]
CC: Frye, Tony (Robert) [frye.robert@epa.gov]
Subject: RE: Most expensive Superfund sites

As a side note, when we sent this back to Sophie, please highlight to her the last line:
These data do not include costs incurred by PRPs as they are not required to provide that information to EPA.

From: Falvo, Nicholas
Sent: Monday, June 25, 2018 2:45 PM
To: Palich, Christian <palich.christian@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>
Cc: Frye, Tony (Robert) <frye.robert@epa.gov>
Subject: RE: Most expensive Superfund sites

The following table lists those sites where EPA has spent the most Superfund resources through the end of FY 2017. With the exception of reimbursable funds from other federal agencies, Homeland Security Supplemental appropriation, and Brownfields expenditures, the data include all EPA expenditures of Superfund appropriated and reimbursable (e.g., funds from settlements with potentially responsible parties (PRPs)) resources for these sites through the end of FY 2017, including intramural (e.g., payroll) and extramural (e.g., contract, grant) expenditures. These data do not include costs incurred by PRPs as they are not required to provide that information to EPA.

Region	State	EPA ID	Site Name	NPL Status	EPA Superfund expenditures through end of FY 2017
10	ID	IDD048340921	BUNKER HILL MINING & METALLURGICAL COMPLEX	Final	$604.2 Million
1	MA	MAD980731335	NEW BEDFORD	Final	$517.8 Million
8	MT	MT0009083840	LIBBY ASBESTOS SITE	Final	$418.0 Million
2	NJ	NJD986620995	WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	Final	$346.6 Million
6	OK	OKD980629844	TAR CREEK (OTTAWA COUNTY)	Final	$271.7 Million

Source: IFMS/Compass data as of EOFY 2017 (in nominal dollars)

From: Palich, Christian
Sent: Wednesday, June 20, 2018 3:48 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>
Cc: Frye, Tony (Robert) <frye.robert@epa.gov>
Subject: FW: Most expensive Superfund sites

Hi Nick & Erin,

Can you help with this? Not sure where we would find this info.

Thanks!

Christian R. Palich

Deputy Associate Administrator
Office of Congressional & Intergovernmental Affairs
U.S Environmental Protection Agency
O: 202.564.4944
C: 202.306.4656
E: Palich.Christian@epa.gov

From: Miller, Sophie (Daines) [mailto:Sophie_Miller@daines.senate.gov]
Sent: Wednesday, June 20, 2018 3:41 PM
To: Palich, Christian <palich.christian@epa.gov>
Subject: Most expensive Superfund sites

Hello Christian,

Would you be able to share which Superfund sites are the most expensive? I understand there may be two categories: EPA-funded and PRP-funded. If that's the case, two separate lists would be fine.

Thank you.

-Sophie

--

Sophie Miller
Legislative Assistant
U.S. Senator Steve Daines (MT)
202.224.2651 (o)
www.daines.senate.gov

Message

Sent: 5/7/2018 12:44:29 PM
To: Chancellor, Erin [chancellor.erin@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]
Subject: RE: Kell's Future Commitments

Region 6: Tar Creek. I've been in communication with Chairman Berrey's office previously to set up a visit.

From: Chancellor, Erin
Sent: Monday, May 7, 2018 8:42 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>
Subject: Kell's Future Commitments

Hi all,

Steven asked for the attached list. I compiled what I have from emails he forwarded and his calendar and what the regions have mentioned (still waiting on 3 & 4 but I'll talk to them this AM). If you have any additions, please add and send back to me ASAP so we can get this to him.

Thanks!

Erin E. Chancellor
Counsel to the Administrator
U.S. Environmental Protection Agency
(202) 566-1757 (office)
(202) 731-2835 (cell)
chancellor.erin@epa.gov

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 5/4/2018 9:34:55 PM
To: Cook, Steven [cook.steven@epa.gov]
CC: Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]
Subject: FW: R6
Attachments: Donna Canal Proposed Plan_FINAL_ENG-SPANISH.pdf

Erin E. Chancellor

From: Edlund, Carl
Sent: Friday, May 4, 2018 5:27 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: RE: R6

All is well here. I didn't have any pending commitments from Kell, but I did promise in our last call to provide you and Silvina a copy of the Donna Canal announcement [attached]. It will be published on May 7 and announce a public comment period from 5/7/18 to 6/5/18 with public meetings to be held on 5/22 in the morning and evening.

From: Chancellor, Erin
Sent: Friday, May 04, 2018 9:48 AM
To: Edlund, Carl <Edlund.Carl@epa.gov>
Subject: R6

Hi Carl,

Hope all's well in Region 6! I wanted to check in and see if there were any commitments Kell had made to come up your way. We had discussed making another trip to Tar Creek, but nothing else was on my radar.

Have a great weekend-

Thanks,

Erin E. Chancellor
Counsel to the Administrator
U.S. Environmental Protection Agency
(202) 566-1757 (office)
(202) 731-2835 (cell)
chancellor.erin@epa.gov

Message

From: Darwin, Veronica [darwin.veronica@epa.gov]
Sent: 5/24/2018 4:17:22 PM
To: Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]
Subject: RE: SF Site Visits and Community Meetings

I visited two sites to announce removal actions: Hudepohl Brewery site in Cincinnati and Tremont Field site in Cleveland. I gave remarks at ribbon-cutting ceremonies at the Mukluk Preserve site in Baltic Connecticut and at the Solvents Recovery and Service site in Southington, CT. Interacted with community members/PRPs/state legislators before and after events. Happy meetings – lucky me.
V.

From: Fonseca, Silvina
Sent: Thursday, May 24, 2018 10:40 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>
Cc: Cook, Steven <cook.steven@epa.gov>
Subject: RE: SF Site Visits and Community Meetings

I also went to Westlake Public meeting and visited East Waterway in Washington. Additionally, we meet on a quarterly basis with Lois Gibbs and other community groups that represent community interests at several Superfund Sites.

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

From: Falvo, Nicholas
Sent: Thursday, May 24, 2018 9:36 AM
To: Darwin, Veronica <darwin.veronica@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Cook, Steven <cook.steven@epa.gov>
Subject: SF Site Visits and Community Meetings

All –
Trying to help OPA with some data on how many sites we've been actively involved in, how many sites we've visited, and how many community groups we've met with. We've been actively involved in 111 sites (i.e. holding stake holder meetings here in DC, at regional offices, community meetings, and site visits). Please add to the list below, as I know I'm missing some.

SITE VISITS:
Kell
East Chicago (5 times, I went once), Westlake (at least 3 times), Gold King Mine/BPMD, San Jacinto, Doe Run/St. Joes Mineral Corp, Bunker Hill/Coeur d'Alene Basin, Eastern Michaud Flats, Anaconda Smelter, Libby Abestos, Silver Bow Creek/Butte, Anaconda Mine, Tar Creek, Eagle Industries, Fox River (WI), Torch Lake/Stamp Sands, Operating Industries Inc (CA).

Veronica:
San Jacinto,

Erin:
Tar Creek, three other sites,

Silvina:
BF Goodrich, Mississippi Phosphates,

Me:
East Chicago, Mississippi Phosphates, Operating Industries Inc, Stamp Sands/Torch Lake, Fox River

Community Meetings:
Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden,

Nicholas Falvo
Special Assistant to the Senior Advisor
Environmental Protection Agency
Office of the Administrator
Falvo.Nicholas@epa.gov
Office: (202) 564-5075
Cell: (202) 760-0581

Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/13/2018 9:06:42 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Cheatham-Strickland, Latonia [Cheatham-Strickland.Latonia@epa.gov]
Subject: RE: Tar creek

Nick,
I can schedule the meeting with Chairman Berrey on the morning of 2/20 right now if you'd like.

The City Manager in Miami, Oklahoma has invited EPA to a light working lunch preceding our scheduled 1:00pm meeting. Would that work for Kell's?

So, is someone in addition to Kell and Erin Chancellor planning to join Region 6 for the Tar Creek meetings on the schedule for the afternoon of 2/20? I hadn't heard that Ken Wagner may join…

Casey

From: Falvo, Nicholas
Sent: Tuesday, February 13, 2018 3:02 PM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Cc: Cheatham-Strickland, Latonia <Cheatham-Strickland.Latonia@epa.gov>
Subject: RE: Tar creek

Following back around on this and including Ken Wagner's SA Latonia…I'm assuming Ken will be part of this?

Kell personally reached out to Rebecca Jim yesterday to arrange a meeting. Unfortunately he didn't share any information with me. He has not touched base with Chairman Berry yet.

From: Luckett, Casey
Sent: Monday, February 12, 2018 4:33 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Tar creek

Please let me know who'll take care of scheduling the meetings with Chairman Berrey and Rebecca Jim on 2/20.
Thanks,
Casey

From: Falvo, Nicholas
Sent: Monday, February 12, 2018 9:26 AM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Tar creek

I think Erin will be coming in earlier, perhaps Monday night. So as of right now, she's covered.

From: Luckett, Casey
Sent: Monday, February 12, 2018 10:12 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Tar creek

Ok, thanks much. If plans change and she needs to travel with us to Tar Creek on Tuesday morning from the Tulsa airport, please let me know. We arrive Tulsa at 9:30am, pick up the rental car and then its approximately a 1.5 hour trip to Miami, OK.
Casey

From: Falvo, Nicholas
Sent: Monday, February 12, 2018 9:07 AM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Tar creek

She's our new Senior Counsel for OLEM.
Previously served at the TCEQ.

I would imagine she will be traveling with Kell.

From: Luckett, Casey
Sent: Monday, February 12, 2018 10:02 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: FW: Tar creek

Quick question – who is Erin Chancellor and are we making the same or alternate arrangements for her travel and participation?

Thanks,
Casey

Casey Luckett Snyder
EPA R6 Project Manager and
Superfund Reuse Coordinator
214.665.7393
luckett.casey@epa.gov

From: Edlund, Carl
Sent: Thursday, February 08, 2018 3:03 PM
To: Atkins, Blake <Atkins.Blake@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Coltrain, Katrina <coltrain.katrina@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>
Cc: Phillips, Pam <phillips.pam@epa.gov>
Subject: Fwd: Tar creek

Sent from my iPad

Begin forwarded message:

From: "Kelly, Albert" <kelly.albert@epa.gov>
Date: February 8, 2018 at 12:46:08 PM CST
To: "Edlund, Carl" <Edlund.Carl@epa.gov>
Subject: Re: Tar creek

Hello Carl. Erin Chancellor is going to join us at Tar Creek. When should we have agenda? I would like to see Mrs. Jim while there. Also, should we visit Chairman Berry?

Sent from my iPad

On Feb 5, 2018, at 10:58 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:

> Great...I'll ask my folks to send you schedules and agendas for the 20th. No inconvenience at all.
>
> Sent from my iPad
>
> On Feb 5, 2018, at 9:30 AM, Kelly, Albert <kelly.albert@epa.gov> wrote:
>
>> Thanks. Would it be acceptable to plan for the 20th? I don't want to inconvenience anyone.
>>
>> Sent from my iPhone
>>
>> On Feb 5, 2018, at 7:20 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>>
>>> Thanks Blake....a good list.
>>>
>>> Kell- interested in any of these events?
>>>
>>> Sent from my iPad
>>>
>>> On Feb 5, 2018, at 8:41 AM, Atkins, Blake <Atkins.Blake@epa.gov> wrote:
>>>
>>>> Carl, here are some upcoming Tar Creek trips that might be of interest. The reuse/redevelopment opportunity in Miami, and discussion regarding institutional controls with BIA may be of particular interest.
>>>>
>>>> 2/20/18: Meeting with the City of Miami and ODEQ to discuss Miami's interest in acquiring a commercial property and inactive rail spur located within the Tar Creek

Superfund site. The acquisition is an economic development project for the City which will provide rail access to several companies located near the rail spur. A local chat processors has expressed interest in using the commercial property to ship chat.

2/20/18: Host a Tar Creek site tour for the BIA Miami Agency. The tour will include visits to restricted properties which need institutional controls (ICs) to protect the cleanup and ensure long term stewardship. EPA is working with BIA to reach an agreement on the ICs issue since the BIA is the federal agency with the regulatory authority to place deed notices on restricted properties.

2/21/18: Monthly Tar Creek meeting. Meeting attendees include representatives from EPA, ODEQ, the Quapaw Tribe and the BIA. All entities are involved with on-going remedial activities at the site.

3/28/18: Region 6 and Region 7 Managers meeting to discuss coordinated efforts for all operable units of the Tar Creek Superfund site.

3/28/18: Tar Creek Stakeholder meeting: EPA Regions 6 and 7 will participate in a meeting with the Tar Creek stakeholders to provide site updates and action status.

Blake Atkins, Chief
LA/NM/OK Remediation Section
EPA Region 6 Superfund Division
1445 Ross Ave (6SF-RL)
Dallas, TX 75202
214-665-2297 w
214-406-5907 c

From: Edlund, Carl
Sent: Sunday, February 04, 2018 7:40 PM
To: Phillips, Pam <phillips.pam@epa.gov>; Sanchez, Carlos <sanchez.carlos@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>; Atkins, Blake <Atkins.Blake@epa.gov>
Subject: Fwd: Tar creek

Any thoughts? Events that he could hook into?

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 4, 2018 at 2:01:17 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Tar creek**
>
> I would like to schedule a visit to Tar Creek. What would you suggest?
>
> Sent from my iPhone

To: Luckett, Casey[Luckett.Casey@epa.gov]; Edlund, Carl[Edlund.Carl@epa.gov]; Chancellor, Erin[chancellor.erin@epa.gov]; Falvo, Nicholas[falvo.nicholas@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Lindley, Emily[lindley.emily@epa.gov]
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From: Gray, David
Sent: Mon 7/9/2018 4:09:41 PM
Subject: RE: Health clinic grand opening? UPDATE!

Thanks Casey – let's coordinate timing with Erin so she or Ken can join Anne.

David

David Gray

Deputy Regional Administrator

USEPA – Dallas

gray.david@epa.gov

Ex. 6 - Personal Privacy direct

Ex. 6 - Personal Privacy cell

(214) 665-2100 general office

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Sent: Monday, July 9, 2018 8:50 AM
To: Edlund, Carl <Edlund.Carl@epa.gov>; Gray, David <gray.david@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Lindley, Emily <lindley.emily@epa.gov>
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Casey Luckett Snyder

EPA R6 Project Manager and

Superfund Reuse Coordinator

Ex. 6 - Personal Privacy

luckett.casey@epa.gov

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Cc: Denice Hicks <Ex. 6 - Personal Privacy>
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Any news? We were asked to send a list of potential events for the Administrator's to review on 6/27 so unfortunately this one wasn't on the list because they had to be "all set". BUT - I can see about adding it if things have changed in the last couple of days.

If not, no worries!!

Casey

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Of course I thought of your project when I heard the request because it's such a great Superfund Reuse success project! I can ask about an August event but I understand that the idea was to celebrate a Superfund success and the Task Force all rolled into one event.

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Would there be a date in August the Administrator would be available?

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East Central Oklahoma Family Health Center, Inc.

Office: Ex. 6 - Personal Privacy

Cell: Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

ECO Mission: To provide affordable, high quality, patient centered health care for East Central Oklahoma.

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Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 4/12/2018 5:33:45 PM
To: Breen, Barry [Breen.Barry@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Olson, Bryan [Olson.Bryan@epa.gov]; Prince, John [Prince.John@epa.gov]; Melvin, Karen [Melvin.Karen@epa.gov]; Hill, Franklin [Hill.Franklin@epa.gov]; Ballotti, Doug [ballotti.douglas@epa.gov]; Peterson, Mary [Peterson.Mary@epa.gov]; Smidinger, Betsy [Smidinger.Betsy@epa.gov]; Edlund, Carl [Edlund.Carl@epa.gov]; Bilbrey, Sheryl [Bilbrey.Sheryl@epa.gov]; Fleming, Sheila [fleming.sheila@epa.gov]; Grandinetti, Cami [Grandinetti.Cami@epa.gov]; Manzanilla, Enrique [Manzanilla.Enrique@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Bodine, Susan [bodine.susan@epa.gov]; Simon, Nigel [Simon.Nigel@epa.gov]
CC: Hilosky, Nick [Hilosky.Nick@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Lowery, Brigid [Lowery.Brigid@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Gartner, Lois [Gartner.Lois@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Worthman, Gary [Worthman.Gary@epa.gov]; Grantham, Nancy [Grantham.Nancy@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]
Subject: Final AEL Updated April 12, 2018
Attachments: AEL Updates 4.12.2018 final 1.06 pm.pdf

Good afternoon,

Attached is the final revised Administrator's Emphasis List dated April 12, 2018. This has been sent to OPA.

Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Working Draft of Potential April 2018 Update to AEL – April 12, 2018 Updates
Strikeout = site to be removed from list; Red text = site to be added to list

Site	Reg	City	State	NPL	Upcoming Milestone
Mohawk Tannery	1	Nashua	New Hampshire	P	Currently working on the Engineering Evaluation and Cost Analysis. Plan to have a proposed remedy out for public comment in early Summer 2018. Finalize Non-Time Critical Removal Action Memo by end of the 2018 fiscal year. Currently negotiating a redevelopment agreement with a Prospective Purchaser.
Centredale Manor Restoration Project	1	North Providence	Rhode Island	F	Working toward an agreement with the potentially responsible party.
American Cyanamid Co.	2	Bound Brook	New Jersey	F	Issue Proposed Plan for public comment by the end of Spring 2018.
Diamond Alkali Co. (aka Upper Lower Passaic)	2	Newark	New Jersey	F	Finalize the Remedial Investigation and consider taking early actions.
Ventron/Velsicol (aka Berry's Creek)	2	Wood Ridge Borough	New Jersey	F	Issue Proposed Plan for public comment by the end Spring 2018.
L. A. Clarke & Son	3	Spotsylvania	Virginia	F	Resolved two of three disputed issues with potentially responsible parties over risk assessment and conceptual site model. PRPs have conducted initial sampling, and discussions continue to resolve remaining issues. Remaining issues related to implementation of Work Plan is subject to a deadline for invoking dispute resolution. EPA is waiting for PRP response that they will conduct work or dispute.
Delaware Sand & Gravel Landfill	3	New Castle	Delaware	F	Obtain input on enforcement strategy for quick implementation of the remedy by potentially responsible parties to address groundwater contamination before water supply wells impacted.
B.F. Goodrich	4	Calvert City	Kentucky	F	Public comment period has closed and Region is currently evaluating alternatives based on comments received. EPA plans to issue a signed Record of Decision by Summer 2018.
Mississippi Phosphates Corporation	4	Pascagoula	Mississippi	P	Engineering Evaluation and Cost Analysis was issued to the public for comment. EPA is currently evaluating comments received. Sign a Non-Time Critical Removal Action Memo selecting a remedy.
U.S. Smelter and Lead Refinery, Inc. (aka USS Lead or East Chicago)	5	East Chicago	Indiana	F	Sign Explanation of Significant Difference for OU 1 (Zone 2 and 3) In Operable Unit 1-Zone 1 land use decision, issue Proposed Plan to public for comment in Summer 2018. Complete all soil remediation in Operable Unit 1 - Zone 2 early 2021 and Zone 3 Fall 2018.

Allied Paper, Inc./Portage Creek/Kalamazoo River	5	Kalamazoo	Michigan	F	Complete Otsego Township Dam time critical removal action (in Area 3 of OU5).
St. Regis Paper Co.	5	Cass Lake	Minnesota	F	Resolve tribal law as a potential standard issue for proposed remedial action; Sign Record of Decision for residential soil cleanup.
Tar Creek (Ottawa County)	6	Ottawa County	Oklahoma	F	Identify and evaluate opportunities to accelerate cleanup. Ensure long term stewardship. Implement institutional controls to protect cleanup.
~~San Jacinto Waste Pits~~	~~6~~	~~Channelview~~	~~Texas~~	~~F~~	~~Initiate and complete Remedial Design/Remedial Action negotiations and sign Consent Decree.~~ The Record of Decision was signed on October 11, 2017 that selected the remedial action for the Site. On April 9, 2018 EPA entered into an Administrative Settlement Agreement and Order on Consent with the potentially responsible parties to conduct the remedial design of the remedy.
Des Moines TCE (aka Dico Company)	7	Des Moines	Iowa	F	Resolve ongoing litigation to promote redevelopment.
West Lake Landfill	7	Bridgeton	Missouri	F	Complete the public comment process and issue a signed Record of Decision Amendment by the end of the fiscal year 2018.

Bonita Peak Mining District	8	San Juan County	Colorado	F	Issue remediation plan with short- and long-term objectives.
Anaconda Co. Smelter	8	Anaconda	Montana	F	Complete negotiations for implementation of early actions to address human health exposure, followed by site-wide work.
Silver Bow Creek/Butte Area	8	Butte	Montana	F	Administrator's site visit pending in 2018. Move from recent Agreement in Principle to Consent Decree.
Orange County North Basin	9	Fullerton	California	P	Basin-wide groundwater cleanup needed quickly to protect drinking water for millions of residents. Complete public comment process and make final NPL listing decision.
~~Anaconda Copper Mine~~	~~9~~	~~Yerington~~	~~Nevada~~	~~P~~	~~State request for deferral of final NPL listing decision. Pursue agreement on deferral decision.~~ On February 5, 2018 EPA Administrator Scott Pruitt and Nevada Governor Brian Sandoval signed a National Priorities List Deferral Agreement to defer the site to Nevada.
Casmalia Resources	9	Casmalia	California	F	Make final cleanup decision and issue Record of Decision.
~~Portland Harbor~~	~~10~~	~~Portland~~	~~Oregon~~	~~F~~	~~Negotiate additional agreements with Potentially Responsible Parties for remedial design and cleanup.~~ The Record of Decision selecting the remedial action for the site was signed on January 3, 2017. On December 2017 EPA signed an agreement with the Pre-RD Group to conduct the pre-design investigation and baseline sampling. Field activities are now underway.
Quendall Terminals	10	Renton	Washington	F	Complete the upland pilot study to inform the evaluation of the preferred alternative and issue the Proposed Plan for public comment by end of fiscal year 2018.

NPL Status codes
P = Proposed to the NPL
F = Final on the NPL
D = Deleted from the Final NPL

Message

From: Cheatham-Strickland, Latonia [Cheatham-Strickland.Latonia@epa.gov]
Sent: 2/13/2018 8:54:08 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Great Lakes Commission

Sure, will let him know. Do you have any information on Tar Creek, OK trip?

Best Regards,

Latonia

Latonia M. Cheatham Strickland
Special Assistant
Office of Congressional and Intergovernmental Affairs
Cheatham-strickland.latonia@epa.gov
Cell: 202-379-8493
Phone? 202-564-7930

From: Falvo, Nicholas
Sent: Tuesday, February 13, 2018 3:52 PM
To: Cheatham-Strickland, Latonia <Cheatham-Strickland.Latonia@epa.gov>
Subject: Great Lakes Commission

Latonia –
When I was up in the northern freezes of Michigan, I was accompanied by folks from Army Corps of Engineers and USGS. They mentioned the upcoming Great Lakes Commission meeting here in DC, and suggested that Kell attend. But looking at it, it might be something more for Ken since it's more regional based. Cathy Stepp will be giving the first keynote…

So as an FYI, something for Ken if he's in town:
https://www.glc.org/event/2018-glc-semiannual-meeting-and-great-lakes-day/

Nicholas Falvo
Special Assistant to the Senior Advisor
Environmental Protection Agency
Office of the Administrator
Falvo.Nicholas@epa.gov
Office: (202) 564-5075
Cell: (202) 760-0581

Message

From: Woolford, James [Woolford.James@epa.gov]
Sent: 6/22/2018 6:13:03 PM
To: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]
Subject: Re: AEL Updates 6.21.2018 .docx

Trying to set up call next week with Carl Edlund in R 6 to discuss.

It would be useful to have a clearer picture of the Administrator's thoughts.

After conversations with ODEQ We overhauled our implementation approach at TC about 3 or 4 years ago - we now use both the state and tribe (Quapaw) to do implementation vs the prior EPA contractor. All parties seem to happier with the work.

Otherwise this is a very expensive site bcz of the extensive contamination with both eco impacts and HH impacts. The tribes have floated different ideas for reuse. They have tribal claims still outstanding. Projected costs to address the risks are in excess of $200 M.

Sent from my iPhone

On Jun 22, 2018, at 1:24 PM, Fonseca, Silvina <Fonseca.Silvina@epa.gov> wrote:

> Yes. I spoke with both Erin and Jim and that us our plan to get something more concrete.
>
> Sent from my iPhone
>
> On Jun 22, 2018, at 12:52 PM, Cook, Steven <cook.steven@epa.gov> wrote:
>
>> No specific edits from me – just one comment, as we all know Tar Creek needs a better defined target.
>>
>> **From:** Fonseca, Silvina
>> **Sent:** Thursday, June 21, 2018 9:49 PM
>> **To:** Chancellor, Erin <chancellor.erin@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Woolford, James <Woolford.James@epa.gov>
>> **Cc:** Falvo, Nicholas <falvo.nicholas@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>
>> **Subject:** AEL Updates 6.21.2018 .docx
>>
>> Good evening,
>>
>> Attached is a draft revised AEL (internal working version) based on the briefing with the Administrator this week and subsequent conversations with the Regions. Please review and provide any changes/revisions. I would like to have a draft ready to send to the Regions for their awareness and input as we start to move forward to revise the AEL for the July Quarterly release. (Please note that not all this information will be on the public AEL that will be released in July).

Please let me know if you have any questions.

Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Edlund, Carl [Edlund.Carl@epa.gov]
Sent: 7/5/2018 8:13:08 PM
To: Gray, David [gray.david@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Lindley, Emily [lindley.emily@epa.gov]
CC: Woolford, James [Woolford.James@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Taheri, Diane [Taheri.Diane@epa.gov]; Bokun, Lisa [Bokun.Lisa@epa.gov]; Luckett, Casey [Luckett.Casey@epa.gov]
Subject: RE: Health clinic grand opening? UPDATE!

Thanks all ..Casey is out this week but it is my understanding that the Clinic was planning on a Fall opening but would make a crash effort at the end of July if the Administrator were to be available. Will provide an update next week on the timing of the event.

From: Gray, David
Sent: Thursday, July 05, 2018 3:06 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>; Edlund, Carl <Edlund.Carl@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Lindley, Emily <lindley.emily@epa.gov>
Cc: Woolford, James <Woolford.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Health clinic grand opening? UPDATE!

Thanks Erin. I think Anne can attend on July 26 since she was going to be in Tulsa area to tour Tar Creek anyway. If you, Ken or Steven – she could join you! Adding Emily to the conversation.
David

From: Chancellor, Erin
Sent: Tuesday, July 3, 2018 5:00 PM
To: Edlund, Carl <Edlund.Carl@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Woolford, James <Woolford.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Gray, David <gray.david@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Health clinic grand opening? UPDATE!

Hi y'all,

Heard back from Hayley and SP will not be able to make this trip work. If Anne can't make it, either me, Ken, or Steven will go. Please keep us updated, and thanks for all the hard work!

Thanks,

Erin E. Chancellor

From: Edlund, Carl
Sent: Friday, June 29, 2018 8:50 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Woolford, James <Woolford.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Gray, David <gray.david@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Luckett, Casey

<Luckett.Casey@epa.gov>
Subject: Fwd: Health clinic grand opening? UPDATE!

Follow up from info that our AX office provided

Sent from my iPad

Begin forwarded message:

> **From:** "Luckett, Casey" <Luckett.Casey@epa.gov>
> **Date:** June 29, 2018 at 5:55:25 PM CDT
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Cc:** "Bokun, Lisa" <Bokun.Lisa@epa.gov>, "Flemming, Tongee" <flemming.tongee@epa.gov>, "Meyer, John" <Meyer.John@epa.gov>
> **Subject: Fwd: Health clinic grand opening? UPDATE!**
>
> Ok, the Eagle Picher health clinic will officially be up and running and they can make either July 26 or 27 work for an event IF Administrator Pruitt would like to participate. This is ahead of their planned August schedule but they REALLY want him to attend since it's in OK and it's a great SF Reuse success story! It's in Henryetta which is about an hour from OKC. Can we add this as a potential event to the list submitted on Wed? And any idea when we will hear something from his office?
>
> Casey
>
> Sent from my iPad
>
> Begin forwarded message:
>
> > **From:** Donna Dyer <DDyer@ecofhc.org>
> > **Date:** June 29, 2018 at 3:12:31 PM CDT
> > **To:** "Luckett, Casey" <Luckett.Casey@epa.gov>
> > **Cc:** Denice Hicks <dhicks@ecofhc.org>
> > **Subject: Re: Health clinic grand opening?**
> >
> > Okay Casey. We can schedule the open house either July 26th or 27th whichever works best for the Administer
> >
> > Please let me know if it is doable.
> >
> > Thanks so much for thinking of us.
> >
> > Donna Dyer
> > CEO
> > East Central Oklahoma Family Health Center
> >
> > > On Jun 29, 2018, at 9:46 AM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
> > >
> > > Hmmm, didn't see a cc on your email. But thanks for the update.
> > >
> > > Casey

-----Original Message-----

From: Donna Dyer [mailto:DDyer@ecofhc.org]

Sent: Friday, June 29, 2018 9:42 AM

To: Luckett, Casey <Luckett.Casey@epa.gov>

Subject: Re: Health clinic grand opening?

They are working to up the bandwidth of the Internet they installed yesterday. Hopefully I will know something today. I am going to cc Denice Hicks, my CFO. She can keep you informed next week. I still hoping we can make it happen.

Donna Dyer

CEO

East Central Oklahoma Family Health Center

> On Jun 29, 2018, at 9:39 AM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>
> Any news? We were asked to send a list of potential events for the Administrator's to review on 6/27 so unfortunately this one wasn't on the list because they had to be "all set". BUT - I can see about adding it if things have changed in the last couple of days.
>
> If not, no worries!!
>
> Casey
>
> -----Original Message-----
>
> From: Donna Dyer [mailto:DDyer@ecofhc.org]
>
> Sent: Wednesday, June 27, 2018 3:04 PM
>
> To: Luckett, Casey <Luckett.Casey@epa.gov>
>
> Subject: Re: Health clinic grand opening?
>
> I will let you know as soon as I know if the alternative Internet works. I think they are checking it today.
>
> Donna Dyer
>
> CEO
>
> East Central Oklahoma Family Health Center
>
>> On Jun 27, 2018, at 2:58 PM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:

Sure! When do u think you'll know about hosting an event that week? They r really planning ahead because of his busy schedule

Sent from my iPad

> On Jun 27, 2018, at 2:41 PM, Donna Dyer <DDyer@ecofhc.org> wrote:
>
> If we can get moved in I think we might be able to make it happen either the 26th or 27th. I just thought it might help to be leverage for ATT to lay the fiber optic line.
>
> Donna Dyer
>
> CEO
>
> East Central Oklahoma Family Health Center
>
>> On Jun 27, 2018, at 2:33 PM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>>
>> I'm sorry for your frustration and delay. If you do send

an email to the Senators office please be clear that I was just checking to see if the grand opening would even be possible the week of July 23. As I mentioned, the EPA Administrator is looking to identify a Superfund project event that week to mark the one year anniversary of his Superfund Task Force. Of course I thought of your project when I

heard the request because it's such a great Superfund Reuse success project! I can ask about an August event but I understand that the idea was to celebrate a Superfund success and the Task Force all rolled into one event.

Hope all is going well with your knee surgery. Please keep me posted if you decide

on a date because I'll be there with bells on!

Casey

Sent from my iPad

On Jun 27, 2018, at 12:28 PM, Donna Dyer <DD

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2-9950 ddyer@ecofhc.org

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Appointment

From: Stewart, Lakita [Stewart.Lakita@epa.gov]
Sent: 8/8/2017 4:36:18 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]

Subject: Tribal Lands & Environment Forum (TLEF) Briefing
Attachments: EPA AIEO presentation senior leadership (2017-7) Final.pptx; 8817TLEF Background Documents OWOLEMR6 and Hot Sites Final.docx; 8817TLEF Briefing Material - Background on Tar Creek.docx
Location: International Conference Room, RRB 3rd Floor, #31203

Start: 8/8/2017 7:00:00 PM
End: 8/8/2017 8:00:00 PM
Show Time As: Tentative

Call-In: Ex. 6 - Personal Privacy **Access Code:** Ex. 6 - Personal Privacy

Agenda

1. Tribal Program Overview
2. Tar Creek Tour
3. Tribal Dinner
4. TLEF Opening Plenary

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 5/24/2018 2:39:57 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]
Subject: RE: SF Site Visits and Community Meetings

I also went to Westlake Public meeting and visited East Waterway in Washington. Additionally, we meet on a quarterly basis with Lois Gibbs and other community groups that represent community interests at several Superfund Sites.

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

From: Falvo, Nicholas
Sent: Thursday, May 24, 2018 9:36 AM
To: Darwin, Veronica <darwin.veronica@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Cook, Steven <cook.steven@epa.gov>
Subject: SF Site Visits and Community Meetings

All –
Trying to help OPA with some data on how many sites we've been actively involved in, how many sites we've visited, and how many community groups we've met with. We've been actively involved in 111 sites (i.e. holding stake holder meetings here in DC, at regional offices, community meetings, and site visits). Please add to the list below, as I know I'm missing some.

SITE VISITS:
Kell
East Chicago (5 times, I went once), Westlake (at least 3 times), Gold King Mine/BPMD, San Jacinto, Doe Run/St. Joes Mineral Corp, Bunker Hill/Coeur d'Alene Basin, Eastern Michaud Flats, Anaconda Smelter, Libby Abestos, Silver Bow Creek/Butte, Anaconda Mine, Tar Creek, Eagle Industries, Fox River (WI), Torch Lake/Stamp Sands, Operating Industries Inc (CA).

Veronica:
San Jacinto,

Erin:
Tar Creek, three other sites,

Silvina:
BF Goodrich, Mississippi Phosphates,

Me:
East Chicago, Mississippi Phosphates, Operating Industries Inc, Stamp Sands/Torch Lake, Fox River

Community Meetings:

Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden,

Nicholas Falvo
Special Assistant to the Senior Advisor
Environmental Protection Agency
Office of the Administrator
Falvo.Nicholas@epa.gov
Office: (202) 564-5075
Cell: (202) 760-0581

Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/12/2018 9:33:23 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Tar creek

Please let me know who'll take care of scheduling the meetings with Chairman Berrey and Rebecca Jim on 2/20.
Thanks,
Casey

From: Falvo, Nicholas
Sent: Monday, February 12, 2018 9:26 AM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Tar creek

I think Erin will be coming in earlier, perhaps Monday night. So as of right now, she's covered.

From: Luckett, Casey
Sent: Monday, February 12, 2018 10:12 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Tar creek

Ok, thanks much. If plans change and she needs to travel with us to Tar Creek on Tuesday morning from the Tulsa airport, please let me know. We arrive Tulsa at 9:30am, pick up the rental car and then its approximately a 1.5 hour trip to Miami, OK.
Casey

From: Falvo, Nicholas
Sent: Monday, February 12, 2018 9:07 AM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Tar creek

She's our new Senior Counsel for OLEM.
Previously served at the TCEQ.

I would imagine she will be traveling with Kell.

From: Luckett, Casey
Sent: Monday, February 12, 2018 10:02 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: FW: Tar creek

Quick question – who is Erin Chancellor and are we making the same or alternate arrangements for her travel and participation?

Thanks,
Casey

Casey Luckett Snyder
EPA R6 Project Manager and
Superfund Reuse Coordinator
214.665.7393
luckett.casey@epa.gov

From: Edlund, Carl
Sent: Thursday, February 08, 2018 3:03 PM
To: Atkins, Blake <Atkins.Blake@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Coltrain, Katrina <coltrain.katrina@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>
Cc: Phillips, Pam <phillips.pam@epa.gov>
Subject: Fwd: Tar creek

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 8, 2018 at 12:46:08 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Re: Tar creek**
>
> Hello Carl. Erin Chancellor is going to join us at Tar Creek. When should we have agenda? I would like to see Mrs. Jim while there. Also, should we visit Chairman Berry?
>
> Sent from my iPad
>
> On Feb 5, 2018, at 10:58 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>
>> Great...I'll ask my folks to send you schedules and agendas for the 20th. No inconvenience at all.
>>
>> Sent from my iPad
>>
>> On Feb 5, 2018, at 9:30 AM, Kelly, Albert <kelly.albert@epa.gov> wrote:
>>
>>> Thanks. Would it be acceptable to plan for the 20th? I don't want to inconvenience anyone.
>>>
>>> Sent from my iPhone
>>>
>>> On Feb 5, 2018, at 7:20 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>>>
>>>> Thanks Blake....a good list.
>>>>
>>>> Kell- interested in any of these events?

Sent from my iPad

On Feb 5, 2018, at 8:41 AM, Atkins, Blake <Atkins.Blake@epa.gov> wrote:

> Carl, here are some upcoming Tar Creek trips that might be of interest. The reuse/redevelopment opportunity in Miami, and discussion regarding institutional controls with BIA may be of particular interest.
>
> 2/20/18: Meeting with the City of Miami and ODEQ to discuss Miami's interest in acquiring a commercial property and inactive rail spur located within the Tar Creek Superfund site. The acquisition is an economic development project for the City which will provide rail access to several companies located near the rail spur. A local chat processors has expressed interest in using the commercial property to ship chat.
>
> 2/20/18: Host a Tar Creek site tour for the BIA Miami Agency. The tour will include visits to restricted properties which need institutional controls (ICs) to protect the cleanup and ensure long term stewardship. EPA is working with BIA to reach an agreement on the ICs issue since the BIA is the federal agency with the regulatory authority to place deed notices on restricted properties.
>
> 2/21/18: Monthly Tar Creek meeting. Meeting attendees include representatives from EPA, ODEQ, the Quapaw Tribe and the BIA. All entities are involved with on-going remedial activities at the site.

3/28/18: Region 6 and Region 7 Managers meeting to discuss coordinated efforts for all operable units of the Tar Creek Superfund site.

3/28/18: Tar Creek Stakeholder meeting: EPA Regions 6 and 7 will participate in a meeting with the Tar Creek stakeholders to provide site updates and action status.

Blake Atkins, Chief
LA/NM/OK Remediation Section
EPA Region 6 Superfund Division
1445 Ross Ave (6SF-RL)
Dallas, TX 75202
214-665-2297 w
214-406-5907 c

From: Edlund, Carl
Sent: Sunday, February 04, 2018 7:40 PM
To: Phillips, Pam <phillips.pam@epa.gov>; Sanchez, Carlos <sanchez.carlos@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>; Atkins, Blake <Atkins.Blake@epa.gov>
Subject: Fwd: Tar creek

Any thoughts? Events that he could hook into?

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 4, 2018 at 2:01:17 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Tar creek**

I would like to
schedule a visit to Tar
Creek. What would
you suggest?

Sent from my iPhone

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 6/22/2018 5:24:46 PM
To: Cook, Steven [cook.steven@epa.gov]
CC: Chancellor, Erin [chancellor.erin@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]
Subject: Re: AEL Updates 6.21.2018 .docx

Yes. I spoke with both Erin and Jim and that us our plan to get something more concrete.

Sent from my iPhone

On Jun 22, 2018, at 12:52 PM, Cook, Steven <cook.steven@epa.gov> wrote:

> No specific edits from me – just one comment, as we all know Tar Creek needs a better defined target.
>
> **From:** Fonseca, Silvina
> **Sent:** Thursday, June 21, 2018 9:49 PM
> **To:** Chancellor, Erin <chancellor.erin@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Woolford, James <Woolford.James@epa.gov>
> **Cc:** Falvo, Nicholas <falvo.nicholas@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>
> **Subject:** AEL Updates 6.21.2018 .docx
>
> Good evening,
>
> Attached is a draft revised AEL (internal working version) based on the briefing with the Administrator this week and subsequent conversations with the Regions. Please review and provide any changes/revisions. I would like to have a draft ready to send to the Regions for their awareness and input as we start to move forward to revise the AEL for the July Quarterly release. (Please note that not all this information will be on the public AEL that will be released in July).
>
> Please let me know if you have any questions.
>
> Thank you!
>
> *Silvina Fonseca*
> *Special Assistant*
> *Office of the Administrator*
> *U.S. Environmental Protection Agency*
> *Desk: 202.564.1955*
> *Cell:* 202.306.6844

Message

From: Gray, David [gray.david@epa.gov]
Sent: 7/5/2018 8:06:21 PM
To: Chancellor, Erin [chancellor.erin@epa.gov]; Edlund, Carl [Edlund.Carl@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Lindley, Emily [lindley.emily@epa.gov]
CC: Woolford, James [Woolford.James@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Taheri, Diane [Taheri.Diane@epa.gov]; Bokun, Lisa [Bokun.Lisa@epa.gov]; Luckett, Casey [Luckett.Casey@epa.gov]
Subject: RE: Health clinic grand opening? UPDATE!

Thanks Erin. I think Anne can attend on July 26 since she was going to be in Tulsa area to tour Tar Creek anyway. If you, Ken or Steven – she could join you! Adding Emily to the conversation.
David

From: Chancellor, Erin
Sent: Tuesday, July 3, 2018 5:00 PM
To: Edlund, Carl <Edlund.Carl@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Woolford, James <Woolford.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Gray, David <gray.david@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Health clinic grand opening? UPDATE!

Hi y'all,

Heard back from Hayley and SP will not be able to make this trip work. If Anne can't make it, either me, Ken, or Steven will go. Please keep us updated, and thanks for all the hard work!

Thanks,

Erin E. Chancellor

From: Edlund, Carl
Sent: Friday, June 29, 2018 8:50 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Woolford, James <Woolford.James@epa.gov>; Meyer, John <Meyer.John@epa.gov>; Gray, David <gray.david@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>
Subject: Fwd: Health clinic grand opening? UPDATE!

Follow up from info that our AX office provided

Sent from my iPad

Begin forwarded message:

> **From:** "Luckett, Casey" <Luckett.Casey@epa.gov>
> **Date:** June 29, 2018 at 5:55:25 PM CDT
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Cc:** "Bokun, Lisa" <Bokun.Lisa@epa.gov>, "Flemming, Tongee" <flemming.tongee@epa.gov>, "Meyer,

John" <Meyer.John@epa.gov>
Subject: Fwd: Health clinic grand opening? UPDATE!

Ok, the Eagle Picher health clinic will officially be up and running and they can make either July 26 or 27 work for an event IF Administrator Pruitt would like to participate. This is ahead of their planned August schedule but they REALLY want him to attend since it's in OK and it's a great SF Reuse success story! It's in Henryetta which is about an hour from OKC. Can we add this as a potential event to the list submitted on Wed? And any idea when we will hear something from his office?

Casey

Sent from my iPad

Begin forwarded message:

> **From:** Donna Dyer <DDyer@ecofhc.org>
> **Date:** June 29, 2018 at 3:12:31 PM CDT
> **To:** "Luckett, Casey" <Luckett.Casey@epa.gov>
> **Cc:** Denice Hicks <dhicks@ecofhc.org>
> **Subject: Re: Health clinic grand opening?**
>
> Okay Casey. We can schedule the open house either July 26th or 27th whichever works best for the Administer
>
> Please let me know if it is doable.
>
> Thanks so much for thinking of us.
>
> Donna Dyer
> CEO
> East Central Oklahoma Family Health Center
>
>> On Jun 29, 2018, at 9:46 AM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>>
>> Hmmm, didn't see a cc on your email. But thanks for the update.
>>
>> Casey
>>
>> -----Original Message-----
>>
>> From: Donna Dyer [mailto:DDyer@ecofhc.org]
>>
>> Sent: Friday, June 29, 2018 9:42 AM
>>
>> To: Luckett, Casey <Luckett.Casey@epa.gov>
>>
>> Subject: Re: Health clinic grand opening?
>>
>> They are working to up the bandwidth of the Internet they installed yesterday. Hopefully I will know something today. I am going to cc Denice Hicks, my CFO. She can keep you informed next week. I still hoping we can make it happen.

Donna Dyer

CEO

East Central Oklahoma Family Health Center

> On Jun 29, 2018, at 9:39 AM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>
> Any news? We were asked to send a list of potential events for the Administrator's to review on 6/27 so unfortunately this one wasn't on the list because they had to be "all set". BUT - I can see about adding it if things have changed in the last couple of days.
>
> If not, no worries!!
>
> Casey
>
> -----Original Message-----
>
> From: Donna Dyer [mailto:DDyer@ecofhc.org]
>
> Sent: Wednesday, June 27, 2018 3:04 PM
>
> To: Luckett, Casey <Luckett.Casey@epa.gov>
>
> Subject: Re: Health clinic grand opening?
>
> I will let you know as soon as I know if the alternative Internet works. I think they are checking it today.
>
> Donna Dyer
>
> CEO
>
> East Central Oklahoma Family Health Center
>
>> On Jun 27, 2018, at 2:58 PM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>>
>> Sure! When do u think you'll know about hosting an event that week? They r really planning ahead because of his busy schedule
>>
>> Sent from my iPad
>>
>>> On Jun 27, 2018, at 2:41 PM, Donna Dyer

<DDyer@ecofhc.org>
wrote:

If we can get moved in I think we might be able to make it happen either the 26th or 27th. I just thought it might help to be leverage for ATT to lay the fiber optic line.

Donna Dyer

CEO

East Central Oklahoma Family Health Center

> On Jun 27, 2018, at 2:33 PM, Luckett, Casey <Luckett.Casey@epa.gov> wrote:
>
> I'm sorry for your frustration and delay. If you do send an email to the Senators office please be clear that I was just checkin

g to see if the grand openin g would even be possibl e the week of July 23. As I mentio ned, the EPA Admini strator is looking to identify a Superfu nd project event that week to mark the one year anniver sary of his Superfu nd Task Force. Of course I thought of your project when I heard the request becaus e it's such a great Superfu nd Reuse success

project! I can ask about an August event but I underst and that the idea was to celebra te a Superfu nd success and the Task Force all rolled into one event.

Hope all is going well with your knee surgery . Please keep me posted if you decide on a date becaus e I'll be there with bells on!

Casey

Sent
from
my iPad

On Jun 27, 2018, at 12:28 PM, Donna Dyer <DDyer@ecofhc.

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@ecofhc.org

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Message

From: Kelly, Albert [kelly.albert@epa.gov]
Sent: 8/8/2017 2:17:24 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: FW: FYI--EPA/HUD collaboration PLUS top 10
Attachments: HUD MOU Slides - final.pdf; ATT00001.htm

Albert Kelly
Senior Advisor to the Administrator
1200 Pennsylvania Avenue, NW
Washington, DC 20460
202 306 8830

From: Deborah Gail Musiker [mailto:Debbie.M.Chizewer@law.northwestern.edu]
Sent: Tuesday, August 8, 2017 10:11 AM
To: Kelly, Albert <kelly.albert@epa.gov>
Cc: Garypie, Catherine <garypie.catherine@epa.gov>
Subject: Fw: FYI--EPA/HUD collaboration PLUS top 10

fyi

Debbie (Musiker) Chizewer
Environmental Advocacy Clinic
Bluhm Legal Clinic
Northwestern University School of Law
375 East Chicago Avenue, Chicago, IL 60611-3069
Debbie.M.Chizewer@law.northwestern.edu

From: Deborah Gail Musiker
Sent: Thursday, August 3, 2017 4:08 PM
To: garypie.catherine@epa.gov
Subject: FYI--EPA/HUD collaboration PLUS top 10

What and where were the 10 prioritized NPL sites near HUD housing?

The 10 sites were:

- Omaha Lead (Omaha, NE)
- Brown's Dump and Jacksonville Ash (Jacksonville, FL)
- Oronogo-Duenweg Mining Belt (Joplin, MO)
- Jacobsville Neighborhood Soil Contamination (Evansville, IN)
- Anniston PCB Site (Anniston, AL)
- Southwest Jefferson County Mining District (Jefferson County, MO)
- Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
- Tar Creek (Ottawa County, OK)
- Raymark Industries (Stratford, CT)
- Colorado Smelter (Pueblo, CO)

The review also identified 3 Superfund removal actions:

- Pilsen Neighborhood Contamination (Chicago, IL)
- American Lead (Indianapolis, IN)
- Former Chattanooga Foundries (Chattanooga, TN)

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 5/24/2018 1:48:02 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]
Subject: RE: SF Site Visits and Community Meetings

Kell also visited US Oil Recovery and Highland Acid Pit (with Ken right after Harvey, I was there too but with TCEQ).

Here's my info:
Site visits w/o Kell (4 total): (1) Tar Creek w/ Ken (+ community meeting with local activists + tribal meeting), (2) Bunker Hill/Coeur d'Alene (+ community meeting with local activists + tribal meeting), (3) Lowry Landfill, (4) Rocky Mountain Arsenal

Upcoming site visits in June: (1) Bonita Peak/Gold King, (2) Coakley Landfill (+ community meeting with local activists), (3) New Bedford (event with press and local stakeholders), (4) Industri-Plex, and one more site in R1 (they aren't sure which yet).

If you need anything else, please let me know.

Erin E. Chancellor

From: Falvo, Nicholas
Sent: Thursday, May 24, 2018 9:36 AM
To: Darwin, Veronica <darwin.veronica@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Cook, Steven <cook.steven@epa.gov>
Subject: SF Site Visits and Community Meetings

All –
Trying to help OPA with some data on how many sites we've been actively involved in, how many sites we've visited, and how many community groups we've met with. We've been actively involved in 111 sites (i.e. holding stake holder meetings here in DC, at regional offices, community meetings, and site visits). Please add to the list below, as I know I'm missing some.

SITE VISITS:
Kell
East Chicago (5 times, I went once), Westlake (at least 3 times), Gold King Mine/BPMD, San Jacinto, Doe Run/St. Joes Mineral Corp, Bunker Hill/Coeur d'Alene Basin, Eastern Michaud Flats, Anaconda Smelter, Libby Abestos, Silver Bow Creek/Butte, Anaconda Mine, Tar Creek, Eagle Industries, Fox River (WI), Torch Lake/Stamp Sands, Operating Industries Inc (CA).

Veronica:
San Jacinto,

Erin:
Tar Creek, three other sites,

Silvina:
BF Goodrich, Mississippi Phosphates,

Me:
East Chicago, Mississippi Phosphates, Operating Industries Inc, Stamp Sands/Torch Lake, Fox River

Community Meetings:
Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden,

Nicholas Falvo
Special Assistant to the Senior Advisor
Environmental Protection Agency
Office of the Administrator
Falvo.Nicholas@epa.gov
Office: (202) 564-5075
Cell: (202) 760-0581

Message

From: Cook, Steven [cook.steven@epa.gov]
Sent: 6/22/2018 4:52:11 PM
To: Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Woolford, James [Woolford.James@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]
Subject: RE: AEL Updates 6.21.2018 .docx

No specific edits from me – just one comment, as we all know Tar Creek needs a better defined target.

From: Fonseca, Silvina
Sent: Thursday, June 21, 2018 9:49 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Woolford, James <Woolford.James@epa.gov>
Cc: Falvo, Nicholas <falvo.nicholas@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>
Subject: AEL Updates 6.21.2018 .docx

Good evening,

Attached is a draft revised AEL (internal working version) based on the briefing with the Administrator this week and subsequent conversations with the Regions. Please review and provide any changes/revisions. I would like to have a draft ready to send to the Regions for their awareness and input as we start to move forward to revise the AEL for the July Quarterly release. (Please note that not all this information will be on the public AEL that will be released in July).

Please let me know if you have any questions.

Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Woolford, James [Woolford.James@epa.gov]
Sent: 3/21/2018 3:37:12 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Leonard, Paul [leonard.paul@epa.gov]; Gervais, Gregory [Gervais.Gregory@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Leff, Karin [Leff.Karin@epa.gov]
CC: Lowery, Brigid [Lowery.Brigid@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Weyer, Erica [weyer.erica@epa.gov]; Colip, Matthew [colip.matthew@epa.gov]; Duteau, Helen [Duteau.Helen@EPA.GOV]; Schutz, Michelle [Schutz.Michelle@epa.gov]; Gartner, Lois [Gartner.Lois@epa.gov]
Subject: FW: [Deliberative] Working draft of April AEL
Attachments: AEL Initial updates for April2018 03.14.18 clean.pdf

Kell, et. al.

Please find attached the initial updated AEL list. Barry, Cyndy and I would be happy to meet and discuss. The changes are relatively minor at this juncture.

One add (Delaware Sand and Gravel), one deletion (Anaconda). The status of Mississippi Phosphates is still unresolved. Franklin was checking with Trey whether he wanted the site removed. We have a plan in place to transition from removal to remedial funding.

Also, Erica Weyer is stepping in on communications as a result of Greg's departure, and she is working on the first iteration of the comms planning tool.

The updates are in red.

Many thanks to Jen Hovis who has been shepherding this effort with the Regions and other offices.

Jim Woolford

Message

From: Peterson, Mary [Peterson.Mary@epa.gov]
Sent: 7/3/2018 5:36:08 PM
To: Chancellor, Erin [chancellor.erin@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]
CC: Woolford, James [Woolford.James@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]
Subject: Newton County Mine Tailings - timing of Proposed Plan release and Tri-State Mining District Map
Attachments: Tri-State Lead Site Map 7.03.2018.pptx

As discussed on our biweekly call today, I am including a map showing the 4 NPL sites that comprise the Tri-State Mining District. This includes the Tar Creek site in Oklahoma.

We also discussed the timing of the release of the Proposed Plan for the Newton County ESD. I recognize you still need to brief Administrator Pruitt to get his buy-in for release of the Proposed Plan. In order to allow for a possible extension of the public comment period and still achieve a signed ESD by September 30, we will need to publish the Proposed Plan by July 16. If we have to publish beyond that date, signature of the ESD may get delayed until early FY19, which isn't the end of the world, but our goal is to complete it this FY. There is no public meeting planned since this is an ESD and not a ROD or ROD Amendment.

Please let me know if you need anything else on this.

Mary P. Peterson, Director

Superfund Division
EPA Region 7 | 11201 Renner Blvd | Lenexa, KS 66219
913-551-7882 (o) | 816-398-3945 (c) | peterson.mary@epa.gov

Cleaning Up & Restoring the Heartland

Under the foundational principles of integrity, sound science, & rule of law, we value: *Accountability* * *Teamwork* * *Service* * *Respect*

Region 7
Superfund Division

Tri-State Mining District —

National Priority List (NPL) Superfund Sites

Missouri:

1.Jasper County/Oronogo-Duenweg Mining Belt NPL Site

2.Newton County/Newton County Mine Tailings NPL Site

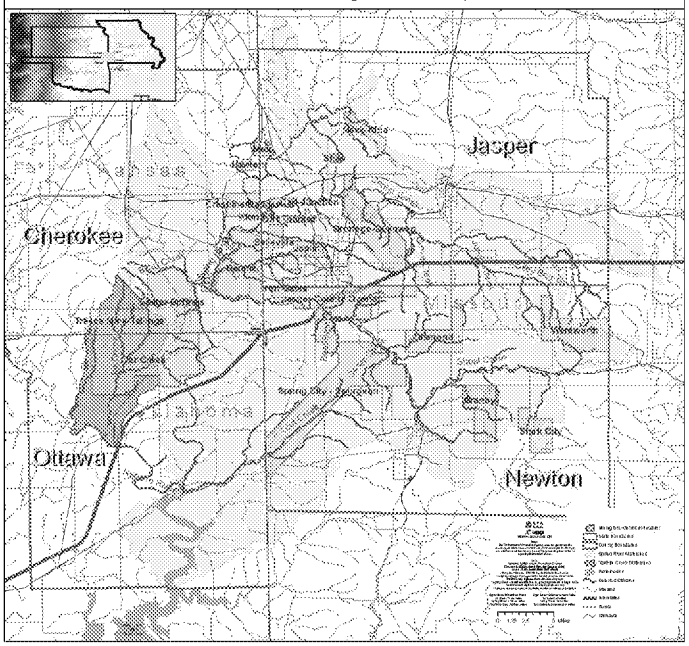
Kansas:

3. Cherokee County NPL Site

Oklahoma:

4.Ottawa County – Tar Creek NPL Site

Tri-State Mining District Map



Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/12/2018 3:11:47 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Tar creek

Ok, thanks much. If plans change and she needs to travel with us to Tar Creek on Tuesday morning from the Tulsa airport, please let me know. We arrive Tulsa at 9:30am, pick up the rental car and then its approximately a 1.5 hour trip to Miami, OK.
Casey

From: Falvo, Nicholas
Sent: Monday, February 12, 2018 9:07 AM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: RE: Tar creek

She's our new Senior Counsel for OLEM.
Previously served at the TCEQ.

I would imagine she will be traveling with Kell.

From: Luckett, Casey
Sent: Monday, February 12, 2018 10:02 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: FW: Tar creek

Quick question – who is Erin Chancellor and are we making the same or alternate arrangements for her travel and participation?

Thanks,
Casey

Casey Luckett Snyder
EPA R6 Project Manager and
Superfund Reuse Coordinator
214.665.7393
luckett.casey@epa.gov

From: Edlund, Carl
Sent: Thursday, February 08, 2018 3:03 PM
To: Atkins, Blake <Atkins.Blake@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Coltrain, Katrina <coltrain.katrina@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>
Cc: Phillips, Pam <phillips.pam@epa.gov>
Subject: Fwd: Tar creek

Sent from my iPad

Begin forwarded message:

From: "Kelly, Albert" <kelly.albert@epa.gov>
Date: February 8, 2018 at 12:46:08 PM CST
To: "Edlund, Carl" <Edlund.Carl@epa.gov>
Subject: Re: Tar creek

Hello Carl. Erin Chancellor is going to join us at Tar Creek. When should we have agenda? I would like to see Mrs. Jim while there. Also, should we visit Chairman Berry?

Sent from my iPad

On Feb 5, 2018, at 10:58 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:

> Great...I'll ask my folks to send you schedules and agendas for the 20th. No inconvenience at all.
>
> Sent from my iPad
>
> On Feb 5, 2018, at 9:30 AM, Kelly, Albert <kelly.albert@epa.gov> wrote:
>
>> Thanks. Would it be acceptable to plan for the 20th? I don't want to inconvenience anyone.
>>
>> Sent from my iPhone
>>
>> On Feb 5, 2018, at 7:20 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>>
>>> Thanks Blake....a good list.
>>>
>>> Kell- interested in any of these events?
>>>
>>> Sent from my iPad
>>>
>>> On Feb 5, 2018, at 8:41 AM, Atkins, Blake <Atkins.Blake@epa.gov> wrote:
>>>
>>>> Carl, here are some upcoming Tar Creek trips that might be of interest. The reuse/redevelopment opportunity in Miami, and discussion regarding institutional controls with BIA may be of particular interest.
>>>>
>>>> 2/20/18: Meeting with the City of Miami and ODEQ to discuss Miami's

interest in acquiring a commercial property and inactive rail spur located within the Tar Creek Superfund site. The acquisition is an economic development project for the City which will provide rail access to several companies located near the rail spur. A local chat processors has expressed interest in using the commercial property to ship chat.

2/20/18: Host a Tar Creek site tour for the BIA Miami Agency. The tour will include visits to restricted properties which need institutional controls (ICs) to protect the cleanup and ensure long term stewardship. EPA is working with BIA to reach an agreement on the ICs issue since the BIA is the federal agency with the regulatory authority to place deed notices on restricted properties.

2/21/18: Monthly Tar Creek meeting. Meeting attendees include representatives from EPA, ODEQ, the Quapaw Tribe and the BIA. All entities are involved with on-going remedial activities at the site.

3/28/18: Region 6 and Region 7 Managers meeting to discuss coordinated efforts for all operable units of the Tar Creek Superfund site.

3/28/18: Tar Creek Stakeholder meeting: EPA Regions 6 and 7 will participate in a meeting with the Tar Creek stakeholders to provide site updates and action status.

Blake Atkins, Chief
LA/NM/OK Remediation Section
EPA Region 6 Superfund Division
1445 Ross Ave (6SF-RL)
Dallas, TX 75202

214-665-2297 w
214-406-5907 c

From: Edlund, Carl
Sent: Sunday, February 04, 2018 7:40 PM
To: Phillips, Pam <phillips.pam@epa.gov>; Sanchez, Carlos <sanchez.carlos@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>; Atkins, Blake <Atkins.Blake@epa.gov>
Subject: Fwd: Tar creek

Any thoughts? Events that he could hook into?

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 4, 2018 at 2:01:17 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Tar creek**
>
> I would like to schedule a visit to Tar Creek. What would you suggest?
>
> Sent from my iPhone

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 6/22/2018 2:51:27 PM
To: Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Woolford, James [Woolford.James@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]
Subject: RE: AEL Updates 6.21.2018 .docx
Attachments: AEL Updates 6.21.2018_EC.DOCX

My edits attached.

Erin E. Chancellor

From: Fonseca, Silvina
Sent: Thursday, June 21, 2018 9:49 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Woolford, James <Woolford.James@epa.gov>
Cc: Falvo, Nicholas <falvo.nicholas@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>
Subject: AEL Updates 6.21.2018 .docx

Good evening,

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Please let me know if you have any questions.

Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 6/22/2018 1:48:52 AM
To: Chancellor, Erin [chancellor.erin@epa.gov]; Cook, Steven [cook.steven@epa.gov]; Woolford, James [Woolford.James@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]
Subject: AEL Updates 6.21.2018 .docx
Attachments: AEL Updates 6.21.2018 .docx

Good evening,

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Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/21/2017 3:12:40 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: Copy of HENC Sites with Descriptions_Final 10 31 17.xlsx
Attachments: Copy of HENC Sites with Descriptions_Final 10 31 17.xlsx

Sites with Human Exposure Not Under Control (HENC) Designations - Brief Descriptions, Pathways, and Main Contaminants Overview

SEMS data as of 10/17/2017, Includes Non-Federal Facility, Final and Deleted NPL Sites, and SAA Sites; Estimated control dates are internal/delibrative

**Indicates site is proposed for the Administrator's Emphasis List, as of 10/30/2017.*

Site Name	Region	State	EPA ID	HE Status	HE Est. Control Date	Why HENC?	Main Exposure Pathways	Main Contaminants of Concern
CENTREDALE MANOR RESTORATION PROJECT	01	RI	RID981203755	HENC	09-29-2020	This site is considered "Current Human Exposure Not Under Control" because nearby residents and recreational users of the Woonasquatucket River are reasonably anticipated to be exposed to unacceptable levels of dioxin and other contaminants if they come into contact with sediment in the river and floodplain or through ingestion of fish from the Woonasquatucket River.	sediment, fish	dioxin
COMMERCE STREET PLUME	01	VT	VTD098352545	HENC	09-28-2018	This site is considered “Current Human Exposure Not Under Control” because groundwater contaminated with volatile organic compounds (VOCs) is creating an unacceptable indoor air risk in one residential home when such groundwater enters the basement during times of flooding.	groundwater, air	VOCs
FLETCHER'S PAINT WORKS & STORAGE	01	NH	NHD001079649	HENC	03-30-2018	This site is considered "Current Human Exposure Not Under Control" because an unacceptable exposure pathway exists in relation to consumption of fish from the Souhegan River. Fish in this area of the river are contaminated with PCBs above acceptable levels.	fish	PCBs
NEW BEDFORD	01	MA	MAD980731335	HENC	09-30-2022	The New Bedford Superfund Site is considered "Current Human Exposure Not Under Control" because unacceptable exposure pathways exist related to consumption of PCB-contaminated fish.	fish	PCBs
RAYMARK INDUSTRIES, INC.	01	CT	CTD001186618	HENC	09-30-2021	This site is considered "Current Human Exposure Not Under Control" because people could come into contact with soil contaminated with lead, asbestos, PCBs, and other contaminants or through inhalation of dust associated with manufacturing waste at residential, recreational, and commercial properties, in addition to numerous floodplain/wetland areas.	soil	lead, asbestos, PCBs
CALDWELL TRUCKING CO.	02	NJ	NJD048798953	HENC	09-30-2018	The Caldwell Trucking Company Superfund Site is considered "Current Human Exposure Not Under Control" because contaminated groundwater continues to seep onto surface soils and discharge into surface water streams and into the Passaic River. Direct contact with the seep contamination is possible due to the location of the seep in a residential area. The contaminants of concern are volatile organic compounds (VOCs), including trichloroethylene and 1,1,1 trichloroethane.	groundwater	VOCs
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879	HENC	09-30-2030	This site is considered “Current Human Exposure Not Under Control” because the Baseline Human Health Risk Assessment for Bound Brook Operable Unit 4 confirms there is a potential for unacceptable cancer risk and non-cancer hazard from exposure to total PCB Aroclors in sediment, floodplain soil, fish, and shellfish that is relatively wide-spread throughout the Study Area. Residents and recreational users of the creek can be exposed through direct contact to arsenic and lead contaminated soils and sediments.	sediment, fish	PCBs

DIAMOND ALKALI CO.	02	NJ	NJD980528996	HENC	09-30-2037	This site is considered Human Exposure Not Under Control because of on-going ingestion of fish and shellfish caught from the lower Passaic River and Newark Bay complex. The Lower Passaic River and Newark Bay are under fish and shellfish consumption advisories, issued by NJDEP based on polychlorinated biphenyl (PCB), dioxin and/or mercury contamination.	fish	PCBs, dioxin, mercury
GOWANUS CANAL	02	NY	NYN000206222	HENC	09-30-2025	The Gowanus Canal Superfund Site is considered Human Exposure Not Under Control because of on-going ingestion of fish caught from the Canal. The Gowanus Canal and Upper New York Bay are under fish and shellfish consumption advisories, issued by NYS DOH based on polychlorinated biphenyl (PCB) and dioxin contamination.	fish	PCBs, dioxin
HUDSON RIVER PCBS	02	NY	NYD980763841	HENC	09-30-2020	This site is considered Human Exposure Not Under Control because of the potential for ingestion of fish caught from the river by those who do not follow the fish consumption advisories and fishing restriction. Though remedial activities completed to date (dredging) have substantially reduced PCB source materials in the Upper Hudson River and the average PCB concentrations in fish in the Upper Hudson are declining, they have not yet reached protective levels.	fish	PCBs
ONONDAGA LAKE	02	NY	NYD986913580	HENC	09-30-2025	This site is considered Human Exposure Not Under Control because of ongoing ingestion of fish caught from the lake and its tributaries. Fish tissue has been found to contain elevated levels of mercury and polychlorinated biphenyls (PCBs) and fish consumption advisories have been issued by New York State.	fish	PCBs
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106	HENC	09-30-2027	This site is considered "Current Human Exposure Not Controlled" because of continued potential for ingestion of fish and crabs from Berry's Creek and Ackerman's Creek. Fish tissue collected from these water bodies has been found to contain elevated levels of mercury and PCBs.	fish	PCBs, mercury
VENTRON/VELSICOL*	02	NJ	NJD980529879	HENC	09-30-2034	This site is considered "Human Exposure Not Under Control" because of continuing exposure to mercury and PCBs in fish tissue.	fish	PCBs, mercury
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664	HENC	06-30-2035	The Vineland Chemical Superfund Site is considered "Human Exposure Not Under Control" because of continuing direct contact exposure to arsenic-contaminated sediments in nearby wetlands and surface water bodies as well as exposure to arsenic in fish.	fish	arsenic
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995	HENC	09-30-2024	This site is considered "Current Human Exposure Not Controlled" because the cleanup of radiologically contaminated soil in residential neighborhoods is ongoing.	soil	radioactive materials
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	03	MD	MDD980918387	HENC	12-31-2017	The 68th Street Dump/Industrial Enterprises Superfund site is considered "Human Exposure Not Under Control" because there is a complete pathway for exposure of surface soil contamination to site workers and trespassers. The major contaminants of concern in the shallow soils are PCBs, PAHs, and lead.	soil	PCBs, PAHs, lead

ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	03	VA	VAD042916361	HENC	06-30-2020	The Human Exposure determination status at the Arrowhead Associates, Inc./Scovill Corp. Superfund site is currently Not Under Control. This site is considered Not Under Control due to finding Vapor Intrusion (VI) in the manufacturing building.	vapor intrusion	TCE, PCE, Acetone, 111-TCA, 1,2-DCE and 1,4-Dioxane
ATLANTIC WOOD INDUSTRIES, INC.*	03	VA	VAD990710410	HENC	10-01-2020	The Atlantic Wood Industries (AWI) Superfund site, located along the Elizabeth River in Portsmouth, Virginia, is a former wood-treating site that has extensive creosote contamination. The site also has heavy metals, PCP, and dioxin contamination. The site is considered Human Exposure Not Under Control because 1) consumers of shellfish are exposed to unacceptably high levels of contaminants, and 2) AWI currently operates a pre-stressed, pre-cast concrete manufacturing business at the site where workers are exposed to surface soils.	soil	creosote, PCBs, dioxin
BOARHEAD FARMS	03	PA	PAD047726161	HENC	09-30-2018	The Human Exposure determination status at the Boarhead Farms Superfund site is currently Human Exposure Not Under Control. At this time, there there is potential for people to be exposured to TCE via vapor intrusion in a residence located on the Boarhead Farms Site.	vapor intrusion	TCE
CULPEPER WOOD PRESERVERS, INC.	03	VA	VAD059165282	HENC	09-30-2023	The Culpeper Wood Preservers, Inc. site is currently Human Exposure Not Under Control. This site is an active wood treating facility and historic use of chromated copper arsenate (CCA) to produce pressure treated lumber has led to surface soil contamination consisting of metals (primarily arsenic and hexavalent chromium) and polynuclear aromatic hydrocarbons (PAHs)that pose a potential exposure pathway to humans. Nearby private wells have also been impacted by arsenic and chromium.	soil	CCA, PAHs
KOPPERS CO., INC. (NEWPORT PLANT)	03	DE	DED980552244	HENC	09-30-2018	The Koppers Co., Inc. (Newport Plant) Superfund site is considered "Current Human Exposure Not Under Control" because trespassers could come into contact with soils and sediments contaminated with creosote.	soil, sediment	creosote
LOWER DARBY CREEK AREA	03	PA	PASFN0305521	HENC	12-28-2018	The Lower Darby Creek Area Superfund sites is considered Human Exposure Not Under Control due to elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) that are present at residential properties in the Eastwick Neighborhood, which is part of OU1 of the Lower Darby Creek Area Site.	soil	PAHs
PRICE BATTERY LEAD SMELTER	03	PA	PAN000305679	HENC	06-30-2019	The Price Battery Lead Smelter Site is currently considered "Human Exposure Not Under Control." Based on data collected and evaluations performed to date, there is a potential risk from recreational use of Kaercher Creek, Mill Creek, and the Schuylkill River from exposure to contaminated sediment and fish ingestion due to site-related metals (i.e., lead) contamination.	sediment, fish	lead

RESIN DISPOSAL	03	PA	PAD063766828	HENC	09-30-2018	The Resin Disposal Superfund site is currently considered "Human Exposure Not Under Control". The Resin Disposal Site is a two-acre landfill that received 85,000 tons of wastes including organic solvents, resin cakes, filter materials and oils from a resin manufacturing process. Several releases of untreated leachate in 2011 from the original leachate treatment system lead to this determination.	soil	organic solvents, resin, leachate
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	03	PA	PAD001933175	HENC	11-01-2019	The Sharon Steel Corp. (Farrell Works Disposal Area) Superfund Site is considered human exposure not under control because of the potential risk from inhalation and/or ingestion of heavy metals (predominantly manganese) from soil and slag at the two business locations that are part of operable unit 2 (OU2).	soil	manganese
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	04	FL	FLD008161994	HENC	09-30-2018	The American Creosote Works, Inc. (Pensacola Plant) Site is designated as "Human Exposure Not Under Control" because 55 residential properties have levels of dioxin above EPA's cleanup level in soil.	soil	dioxin
ANNISTON PCB SITE (MONSANTO CO)	04	AL	ALD000400123	HENC	12-31-2023	The Anniston PCB Superfund site is considered “Current Human Exposure Not Under Control” because there is direct exposure to contaminated soil. Cleanup of soils on residential properties contaminated with Polychlorinated Biphenyls has been completed. However, some properties have not been cleaned-up because access has been denied or where no exposure occurs because the lots are wooded and overgrown. Additionally, PCBs have been identified in floodplain soils and sediment for approximately 37 river miles of Choccolocco Creek. Unacceptable human exposure related to the creek is primarily attributed to consumption of PCB contaminated foods (i.e., contaminated fish or livestock grazing in the floodplains).	soil, fish	PCBs
ARMSTRONG WORLD INDUSTRIES	04	GA	GAN000410033	HENC	12-30-2021	The Armstrong World Industries site is currently considered "Human Exposure Not Under Control" because workers and trespassers could be exposed to contaminated soil and fish/sediment from Rocky Creek. Contaminants of concern are metals, PCB and PAHs in sediment, and PCBs is fish tissue.	sediment, fish	metals, PCB, PAHs, PCBs
BROWN'S DUMP	04	FL	FLD980847016	HENC	12-31-2020	The Brown’s Dump Superfund site is considered “Current Human Exposure Not Under Control” because ash contaminated soil with lead, arsenic, PAHs and dioxin above remedial goals is present at or near the surface at 16 parcels. Four of the 16 parcels of have access for remediation and will be cleanup by 2019. EPA has not been granted access to the remaining twelve parcels that need remediation.	soil	PAHs, dioxin, lead

JACKSONVILLE ASH SITE	04	FL	FLSFN0407002	HENC	12-31-2020	The Jacksonville Ash Superfund site is considered “Current Human Exposure Not Under Control” because ash from the City of Jacksonville’s municipal solid waste incinerators has contaminated soil in residential areas with lead, arsenic, PAHs and dioxin above remedial goals. Contaminants are present at or near the surface at about 221 residential parcels. Approximately 175 parcels have access for remediation and will be cleaned up by 2019. EPA has not been granted access to 46 parcels that need remediation.	soil	lead, arsenic, PAHs, dioxin
LCP CHEMICALS GEORGIA	04	GA	GAD099303182	HENC	12-30-2020	EPA considers the LCP Chemicals Georgia site to be "Human Exposure Not Under Control" because EPA is aware that people are consuming contaminated fish, despite warning signs and fish advisories. The levels of methylmercury and PCBs (primarily Aroclor 1268) detected in fish fillets resulted in a fish consumption advisory for the Turtle River/Brunswick Estuary issued by the Georgia DNR from 1995 to the present.	fish	methylmercury and PCBs
FAIRFAX ST. WOOD TREATERS	04	FL	FLD000623041	HENC	07-31-2018	The current Human Exposure status for the Fairfax St. Wood Treaters site is Not Under Control. EPA has identified a current human exposure pathway from direct contact with contaminated soil on residential properties. The primary off-site contaminant of concern is Arsenic.	soil	arsenic
ALCOA PROPERTIES	05	IL	ILSFN0508010	HENC	12-30-2019	The Alcoa Properties Superfund Alternative site is considered "Current Human Exposure Not Under Control" because the completed operable unit (OU) 1 risk assessment found unacceptable risks for residential and commercial/industrial exposure pathways through ingestion and/or inhalation for exposure to lead and radium compounds in soils.	soil	lead, radium
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER*	05	MI	MID006007306	HENC	09-30-2026	The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site is considered "Current Human Exposure Not Under Control" because the fish in the river are contaminated above health-based levels for human consumption due to PCB contamination. Additionally, in the floodplains along several miles of the river there may be PCB-contaminated sediments above health-based limits for direct contact for recreational users.	fish, soil	PCBs
AMCAST INDUSTRIAL CORPORATION	05	WI	WIN000510210	HENC	12-31-2019	The Amcast Industrial Corporation Superfund site is considered “Current Human Exposure Not Under Control” because people could be exposed via dermal contact to the PCB-contaminated sediments in the ponds and/or by eating the PCB-contaminated fish from the ponds.	fish, sediment	PCBs
ASARCO TAYLOR SPRINGS	05	IL	ILN000508170	HENC	12-30-2020	The ASARCO Taylor Springs Superfund Site is considered “Current Human Exposure Not Under Control” because soil at some residential properties near the site contains concentrations of lead and other metals above health-based levels. Lead is the primary contaminant of concern but other metals are generally co-located with lead. Current known exposure pathways of concern are direct contact with soils in residential, public and industrial areas, and direct contact with soils on the ASARCO property.	soil	lead

BAUTSCH-GRAY MINE	05	IL	ILN000510407	HENC	12-31-2022	The Bautsch-Gray Mine Superfund site is considered “Current Human Exposures Not Under Control” because construction workers, utility workers, trespassers, and recreationalists can be exposed through direct contact with arsenic and lead contaminated soils and mine tailings.	soil, mine waste	arsenic, lead
CEDAR CREEK	05	WI	WID988590261	HENC	06-30-2018	The Cedar Creek site is considered “Current Human Exposure Not Under Control” because humans could be exposed via dermal contact to the PCB-contaminated sediments in the creek and/or by eating the PCB-contaminated fish from the creek.	fish, sediment	PCBs
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	05	IL	ILD062340641	HENC	03-31-2022	The DePue/New Jersey Zinc/Mobil Chemical Corp. Superfund site is considered "Current Human Exposures Not Under Control" because surface and subsurface soil samples at off-site residential properties (operable unit 4) exceed health-based residential screening levels for lead, arsenic, and cadmium.	soil	lead, arsenic, cadmium
EAST TROY CONTAMINATED AQUIFER	05	OH	OHSFN0507962	HENC	12-31-2019	The East Troy Contaminated Aquifer Superfund site is considered “Current Human Exposure Not Under Control” because residents over the ground-water plume may be exposed to PCE in indoor air via the vapor intrusion pathway. Additionally, VOCs have contaminated groundwater below the City of Troy as well as a local drinking water well field.	groundwater, vapor intrusion, indoor air	VOCs, PCE
GENERAL MILLS/HENKEL CORP.	05	MN	MND051441731	HENC	12-31-2017	The General Mills/Henkel Corp. Superfund site is considered “Current Human Exposure Not Under Control” because TCE in groundwater is causing a potential vapor intrusion risk for residences at the Site.	vapor intrusion, indoor air	TCE
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	05	IN	INN000508142	HENC	09-30-2028	The Jacobsville Neighborhood Soil Contamination Superfund site is considered "Current Human Exposures Not Under Control" because residential properties have lead and arsenic levels in surface soils and soils at depth greater than the site specific risk-based cleanup goals of 400 and 30 ppm, respectively. There is a potential risk to human health through direct contact with lead- and arsenic-contaminated soil should soil be excavated.	soil	lead, arsenic
KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	05	IN	INN000510399	HENC	12-31-2018	The Keystone Corridor Ground Water Contamination Superfund Site is considered "Current Human Exposure Not Under Control" because of actual vapor intrusion (VI) issues discovered in spring 2017.	vapor intrusion, indoor air	VOCs
LUSHER STREET GROUND WATER CONTAMINATION	05	IN	IND982073785	HENC	12-31-2018	The Lusher Street Groundwater Contamination Superfund Site is considered “Current Human Exposure Not Under Control” because local residents may be exposed to Site contaminants of concern (COCs) via groundwater (private drinking water wells) and/or the vapor intrusion pathway. The following six VOCs were identified as COCs in groundwater: 1,1,1,-TCA, Chloroform, PCE, TCE, Vinyl chloride and Benzene. Six VOCs were identified as COCs in vapor, based on soil vapor, sub slab, and indoor air screening although only two of these, trichloroethene and tetrachloroethene, were confirmed to have a complete vapor intrusion pathway.	vapor intrusion, groundwater, indoor air	VOCs, PCE, TCE, chloroform, vinyl chloride, benzene

MATTHIESSEN AND HEGELER ZINC COMPANY	05	IL	IL0000064782	HENC	09-30-2027	The Matthiessen and Hegeler Zinc Company (M&H) Site is considered ""Current Human Exposure Not Under Control"" because soil at many properties within the residential portion of the site contains concentrations of lead and other metals above health-based levels.	soil	lead
NORTH SHORE GAS SOUTH PLANT	05	IL	ILD984809228	HENC	12-31-2026	The NSG South Plant is considered “current human exposure not under control” because industrial and commercial workers, per the baseline risk assessment in the approved Remedial Investigation, could potentially be exposed via direct contact to PAHs and other MGP-related contaminants in subsurface soils.	soil	PAHs
OLD AMERICAN ZINC PLANT	05	IL	IL0000034355	HENC	12-31-2020	The Old American Zinc Plant Superfund site is considered “Current Human Exposure Not Under Control” because soil at some residential properties contains concentrations of lead and other metals above health-based levels.	soil	lead
OTTAWA RADIATION AREAS	05	IL	ILD980606750	HENC	09-30-2024	The Ottawa Radiation Superfund site is considered "Current Human Exposures Not Under Control" due to one remaining area (NPL-8) where there is potential for exposure via direct contact, ingestion and/or inhalation to trespassers, construction workers, and/or commercial/industrial workers to radium contaminated soils.	soil	radium
SANDOVAL ZINC COMPANY	05	IL	ILD053980454	HENC	12-31-2025	The Sandoval Zinc Superfund Site is considered "Current Human Exposure Not Under Control" because soil at some residential properties contains concentrations of lead and other metals that exceed health-based levels.	soil	lead
SHEBOYGAN HARBOR & RIVER	05	WI	WID980996367	HENC	09-30-2022	The Sheboygan River and Harbor Superfund site is considered ""Current Human Exposure Not Under Control"" because of human ingestion of contaminated fish. Fish contaminants of concern are PCBs and heavy metals, including arsenic, chromium, copper, lead, and zinc.	fish	PCBs, arsenic, chromium, copper, lead, zinc
ST. LOUIS RIVER SITE	05	MN	MND039045430	HENC	12-30-2030	The St. Louis River Superfund site is considered “Current Human Exposure Not Under Control” because trespassing recreational users of both the St. Louis River/US Steel and St. Louis River/Interlake/Duluth Tar (SLRIDT) portions of the Site can be exposed through direct contact to contaminated soil and sediments (US Steel) and tar seeps (SLRIDT).	soil, sediment	PAHs
TEN-MILE DRAIN	05	MI	MIN000510063	HENC	09-30-2022	The Ten-Mile Drain Superfund Site is considered “Current Human Exposures Not Under Control” because EPA identified several residential properties with elevated concentrations of polychlorinated biphenyls (PCBs) in soils. In addition, fish in the Lange and Revere Street canals are contaminated above Michigan Department of Health and Human Services health-based levels for human consumption due to PCBs.	soil, fish	PCBs
TOWN OF PINES GROUNDWATER PLUME	05	IN	INN000508071	HENC	12-31-2017	The Town of Pines Superfund Alternative site is considered “Current Human Exposure Not Under Control” because a number of properties, including residential yards and a municipal park, were found to have levels of arsenic well above removal action levels. The soils impacted included surficial soils that could be inhaled or ingested through normal use.	soil	arsenic

U.S. SMELTER AND LEAD REFINERY, INC.*	05	IN	IND047030226	HENC	12-31-2019	The U.S. Smelter Lead and Refinery, Inc. Site is considered "Current Human Exposures Not Under Control" due to lead and arsenic contaminated soils in residential areas.	soil	lead, arsenic
VALLEY PIKE VOCS	05	OH	OHN000510489	HENC	01-20-2027	The Valley Pike VOCs Superfund Site is considered “Current Human Exposure Not Under Control” because groundwater, soil and indoor air have been contaminated by volatile organic compounds (VOCs), including tetrachloroethylene (PCE) and trichloroethylene (TCE).	groundwater, soil, indoor air	VOCs, PCE, TCE
VELSICOL CHEMICAL CORP. (MICHIGAN)*	05	MI	MID000722439	HENC	09-30-2026	The Velsicol Chemical Corp. (Michigan) site is considered "human exposure not under control" because dichlorodiphenyltrichloroethane (DDT), polybrominated biphenyls, hexabromobenzene, 1,2-dibromo-3-chloropropane and chlorobenzene, among others, have been released at the Site contaminating soil, sediment, fish, and groundwater.	soil, sediment, groundwater, fish	DDT, polybrominated biphenyls, hexabromobenzene, 1,2-dibromo-3-chloropropane and chlorobenzene
LITTLE SCIOTO RIVER	05	OH	OHN000509950	HENC	06-18-2028	The Little Scioto River site is considered "Current Human Exposure Not Under Control" due to contaminated sediment in the Little Scioto River, operable unit (OU) 1. The risks are driven by potential exposure to carcinogenic polyaromatic hydrocarbons (PAHs) and benzo(a)pyrene equivalents in the sediment. The Baker Wood Creosoting facility, OU 2, has soil and groundwater contamination as well as non-aqueous phase liquids in the soil and groundwater.	sediment, soil, groundwater	PAHs
BANDERA ROAD GROUND WATER PLUME	06	TX	TXN000606565	HENC	09-30-2019	The Bandera Road Ground Water Plume site is currently designated as "Human Exposure Not Under Control" as a result of soil, vapor, indoor air, and groundwater contamination.	soil, vapor, groundwater	tetrachloroethene (PCE)
DONNA RESERVOIR AND CANAL SYSTEM	06	TX	TX0000605363	HENC	09-30-2026	The Donna Reservoir and Canal System site is currently designated as "Human Exposure Not Under Control" as a result of PCB-contaminated sediments and PCBs that are bioaccumulating and biomagnifying in fish tissue at the site.	sediment, fish	PCBs
JONES ROAD GROUND WATER PLUME	06	TX	TXN000605460	HENC	09-28-2018	The Jones Road Ground Water Plume Superfund Site is considered "Human Exposure Not Under Control" because the residents can be exposed to tetrachloroethene and other chlorinated solvent degradation products that have contaminated the ground water.	groundwater	tetrachloroethene
MARION PRESSURE TREATING	06	LA	LAD008473142	HENC	09-21-2018	The Marion Pressure Treating Company Superfund Site is considered "Current Human Exposure Not Under Control" due to creosote contamination in sediment and soil. Creosote has impacted the groundwater beneath the site, however residents are on a public water supply that is not impacted.	sediment, soil, groundwater	creosote
TAR CREEK (OTTAWA COUNTY)*	06	OK	OKD980629844	HENC	02-20-2038	The Tar Creek site is considered Human Exposure Not Under Control because local communities may be exposed to lead in soils, chat piles, chat bases, and mill ponds. Tribal members live throughout the area and eat plants grown on, or animals feeding near, the contaminated areas, and some people continue to trespass and use the contaminated areas for recreational purposes.	soil	lead

WEST COUNTY ROAD 112 GROUND WATER	06	TX	TXN000606992	HENC	09-30-2021	The West County Road 112 Ground Water site is currently designated as "Human Exposure Not Under Control" due to chromium contaminated ground water that has impacted private residential water supply wells used for drinking water.	groundwater	chromium
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	07	MO	MOD981126899	HENC	12-31-2025	The Big River Mine Tailings/St. Joseph Mineral Superfund site is considered Human Exposure Not Under Control because lead-contaminated waste piles and residential yard soils remain unaddressed. Contaminated soil and sediments pose a direct contact and ingestion threat to young children and pregnant women.	soil	lead
CHEROKEE COUNTY	07	KS	KSD980741862	HENC	09-30-2022	The Cherokee County Superfund site is considered Human "Exposure Not Under Control" because children and pregnant women can be exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. Many residential properties are located immediately adjacent to lead contaminated mine waste piles. These piles are used for recreation by nearby residents including young children, and are also a continual source of contamination to nearby soil and surface water through run-off and movement of the mine waste for other purposes.	soil, mine waste	lead
FORMER UNITED ZINC & ASSOCIATED SMELTERS	07	KS	KSN000705026	HENC	09-30-2020	The Former United Zinc and Associated Smelters Superfund site is considered “Current Human Exposure Not Under Control” because lawns of homes are contaminated with lead. Children six years of age and younger living at these homes have direct exposure to lead contaminated soil.	soil	lead
MADISON COUNTY MINES	07	MO	MOD098633415	HENC	09-30-2020	The Madison County site is considered Human Exposure Not Under Control due to ongoing exposures to heavy metals. Surficial mine and mill waste is the source of the heavy metal contamination at the site, which has affected surface soil, sediment, surface water, groundwater, and fish tissue. The heavy metal of most urgent concern with regard to human health at the site is lead.	mine waste, soil, sediment, groundwater, surface water, fish	lead
NEWTON COUNTY MINE TAILINGS	07	MO	MOD981507585	HENC	06-30-2019	The Newton County Mine Tailings Site is considered Human Exposure Not Under Control people can be exposed to lead contamination through direct contact and ingestion of contamination soil and dust. Mine waste piles containing high concentrations of lead and other heavy metals are located on approximately 1,000 acres of land throughout this county wide site. These waste piles cause lead and other heavy metals contamination in surrounding soils, groundwater, and surface water resulting in potential exposure of people living on the site, drinking shallow groundwater, or recreating on the piles.	soil, mine waste, groundwater, surface water	lead
OMAHA LEAD	07	NE	NESFN0703481	HENC	09-30-2022	The Omaha Lead Superfund site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through direct contact and ingestion of contaminated soil and dust.	soil	lead

ORONOGO-DUENWEG MINING BELT	07	MO	MOD980686281	HENC	12-31-2020	The Oronogo-Duenweg Mining Belt Superfund site is considered Human Exposure Not Under Control because children and pregnant women can be exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. Mine waste piles containing high levels of lead and other heavy metals are located on approximately 7,000 acres of land throughout this county wide site. These waste piles cause lead and other heavy metals contamination in surrounding soils, groundwater, and surface water resulting in potential exposure to people living in the site, drinking the shallow groundwater, or recreating on the waste piles. EPA identified unacceptable levels of lead in the yard soil at 2,700 residential properties in the site.	soil, mine waste	lead
PCE FORMER DRY CLEANER	07	IA	IAD039954300	HENC	09-30-2018	The PCE Former Dry Cleaner Superfund site is considered 'Current Human Exposure Not Under Control' because the vapor intrusion pathway requires additional investigation/evaluation. PCE is the main Contaminant of Concern associated with the site.	vapor intrusion	PCE
PLATING, INC.	07	KS	KSD065735912	HENC	09-30-2020	The Plating, Inc. Superfund site is considered "Current Human Exposure Not Under Control" due to high concentrations of hexavalent chromium in groundwater. Human Exposure is not under control because at least two private wells are contaminated with hexavalent chromium.	groundwater	hexavalent chromium
SOUTHWEST JEFFERSON COUNTY MINING	07	MO	MON000705443	HENC	06-23-2022	The Southwest Jefferson County Mining Site is considered "Human Exposure Not Under Control" because lead contamination in soil exceeds health-based criteria in hundreds of residential properties.	soil	lead
WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	07	MO	MON000705842	HENC	09-30-2020	The Washington County Lead District-Furnace Creek site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed.	soil, groundwater	lead
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	07	MO	MON000705027	HENC	03-31-2044	The Washington County Lead District-Old Mines site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed.	soil, groundwater	lead
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	07	MO	MON000705023	HENC	03-31-2044	The Washington County Lead District-Potosi site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria at hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed.	soil, groundwater	lead

WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	07	MO	MON000705032	HENC	09-30-2043	The Washington County Lead District-Richwoods site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria at hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed.	soil, groundwater	lead
ACM SMELTER AND REFINERY	08	MT	MTD093291599	HENC	09-30-2030	The ACM Smelter & Refinery Superfund site is considered "Current Human Exposure Not Under Control" because residents can be exposed, through direct contact, to lead and arsenic in contaminated source materials and residential soils.	soil	lead, arsenic
ANACONDA CO. SMELTER	08	MT	MTD093291656	HENC	12-31-2022	The Anaconda Co. Smelter Superfund site is considered "Current Human Exposure Not Under Control" because residents can be exposed, through direct contact, to lead and arsenic in contaminated residential soils.	soil	lead, arsenic
BARKER HUGHESVILLE MINING DISTRICT	08	MT	MT6122307485	HENC	03-31-2032	The Barker Hughesville Mining District Superfund site is considered "Current Human Exposure Not Under Control" because residents and recreationalists can be exposed, through direct contact, to mine waste containing thallium, manganese, lead and arsenic in contaminated source materials and residential soils.	soil, mine waste	manganese, lead, arsenic
CALIFORNIA GULCH	08	CO	COD980717938	HENC	03-31-2021	The California Gulch site is considered "Current Human Exposure Not Under Control" due to groundwater and soil contamination. Residents and recreationalists could potentially be exposured to lead in contaminated areas.	soil, indoor dust	lead
CARPENTER SNOW CREEK MINING DISTRICT	08	MT	MT0001096353	HENC	12-31-2026	The Carpenter Snow Creek Mining District Superfund site is considered "Current Human Exposure Not Under Control" because permanent and seasonal residents can be exposed, through direct contact, to lead and arsenic in contaminated residential soils.	soil	lead, arsenic
CENTRAL CITY, CLEAR CREEK	08	CO	COD980717557	HENC	09-30-2019	The Central City, Clear Creek Superfund Site is considered "Current Human Exposure Not Under Control" because human health hazards from this site involve potential exposure to heavy metals (primarily lead, arsenic and cadmium), from historic mining activities.	soil	lead, arsenic, cadmium
COLORADO SMELTER	08	CO	CON000802700	HENC	03-31-2027	The Colorado Smelter Superfund Site is considered "Current Human Exposure Not Under Control" because residents are being exposed to lead and arsenic in contaminated residential soils and, in some cases, to contaminated indoor dust from former smelting operations.	soil	lead, arsenic
JACOBS SMELTER	08	UT	UT0002391472	HENC	09-30-2022	The Jacobs Smelter Superfund site is considered "Current Human Exposure Not Under Control" because human exposure to lead and arsenic through inhalation or ingestion of contaminated soil is possible.	soil	lead, arsenic
LIBBY ASBESTOS SITE	08	MT	MT0009083840	HENC	12-31-2022	The Libby Asbestos Superfund Site is considered "Current Human Exposure Not Under Control" due to current and ongoing exposures to soil and building materials contaminated with Libby Amphibole asbestos.	soil, building materials	asbestos

STANDARD MINE	08	CO	CO0002378230	HENC	12-31-2018	The Standard Mine Site is considered “Current Human Exposure Not Under Control” because recreational All-Terrain Vehicle (ATV) users can be exposed to manganese dust while riding ATVs across waste rock piles containing high levels of manganese.	soil, mine waste	manganese
UPPER TENMILE CREEK MINING AREA	08	MT	MTSFN7578012	HENC	09-30-2027	The Upper Tenmile Creek Mining Area Site is considered "Current Human Exposure Not Under Control" due to potential direct contact by the residents of four properties with arsenic and/or lead contamination as well as through recreational exposure to unreclaimed mine wastes and discharging acid mine drainage in the watershed.	soil, mine waste	arsenic, lead
US MAGNESIUM	08	UT	UTN000802704	HENC	09-30-2022	The US Magnesium Superfund Site is "Current Human Exposure Not Under Control" due to potencial exposure to organochlorine chemicals in soils, sediments, solid-wastes, surface- and ground-water and air.	soil, sediment, surface water, groundwater, air	organochlorine chemicals
ADVANCED MICRO DEVICES, INC.	09	CA	CAD048634059	HENC	12-30-2020	The Advanced Micro Devices, Inc. Superfund site is currently Human Exposure Not Under Control due to a vapor intrusion in residential and school buildings.	vapor intrusion	trichloroethylene, cis-1,2-dichloroethylene, and vinyl chloride
ARGONAUT MINE	09	CA	CAD983650011	HENC	07-27-2022	The Argonaut Mine Superfund site is currently Human Exposure Not Under Control. The primary exposure pathways are dermal exposure from direct contact with mine waste piles, sediment, surface water, and inhalation of windblown mine waste dust. The site is in close proximity to a residential neighborhood and two schools.	mine waste, soil, sediment, surface water	mine waste
ASARCO HAYDEN PLANT	09	AZ	AZD008397127	HENC	09-30-2023	The Asarco Hayden Plant is currently designated as Human Exposure Not Under Control. The PRP is currently conducting an RI/FS to characterize air, soil and water contamination. The major COCs at the site are lead, arsenic and copper in the air and soil.	dust from tailings, surface deposition, soil, air, water	arsenic, lead, copper
CARSON RIVER MERCURY SITE	09	NV	NVD980813646	HENC	01-01-2040	The Carson River Mercury Site (CRMS) is considered ''Current Human Exposure Not Under Control'' because people could be exposed to mercury contaminated soils and/or consume fish contaminated with mercury from the site.	fish, soils	mercury
IRON KING MINE - HUMBOLDT SMELTER	09	AZ	AZ0000309013	HENC	01-01-2025	The Iron King Mine Humboldt Smelter is currently designated as "Human Exposure Not Under Control"due to elevated levels of arsenic and lead in mine tailings, drainages, flood plains, behind the dam, and on the former smelter property.	mine waste, soil	arsenic, lead
KLAU/BUENA VISTA MINE	09	CA	CA1141190578	HENC	03-30-2029	The Klau / Buena Vista Mine Superfund site is currently considered Human Exposure Not Under Control. This mercury mine has released large amounts of mercury to on-site soils and surface water bodies. Contaminated sediment downstream indicate elevated levels of mercury in fish tissue.	soils, surface water, fish	mercury
LAVA CAP MINE	09	CA	CAD983618893	HENC	12-31-2017	The Lava Cap Mine Superfund site is considered ''Current Human Exposure Not Under Control'' because recreational users of the area below the mine (the Lost Lake operable unit) can be exposed to mine tailings, leading to incidental ingestion of arsenic in soil and airborne particulates and skin contact with contaminated sediments that are deposited along shoreline and upland areas.	mine waste, soil, air, sediment	arsenic, mine waste

MCCORMICK & BAXTER CREOSOTING CO.	09	CA	CAD009106527	HENC	12-31-2018	The McCormick & Baxter Superfund site is considered ''Current Human Exposure Not Under Control'' because contaminants (including dioxins, polycyclic aromatic hydrocarbons (PAHs), arsenic, chromium & copper) have bioaccumulated in fish.	fish	dioxin, PAHs, arsenic, chromium, copper
MONTROSE CHEMICAL CORP.	09	CA	CAD008242711	HENC	09-30-2035	The Montrose superfund site is considered Human Exposure Not Under Control because the Palos Verdes Operable Unit has ocean sediment contaminated with significant levels of DDT and PCBs which has resulted in contaminated fish.	fish	DDT, PCBs
SULPHUR BANK MERCURY MINE	09	CA	CAD980893275	HENC	09-30-2040	The Sulphur Bank Mercury Mine site is considered Human Exposure Not Under Control because nearby residents and recreational trespassers on the mine property come into contact with mine wastes and soils contaminated with mercury, arsenic and antimony and the consumption of mercury contaminated fish.	fish	mercury, arsenic, antimony
TRW MICROWAVE, INC (BUILDING 825)	09	CA	CAD009159088	HENC	12-30-2020	The TRW Microwave, Inc. site is currently designated Human Exposure Not Under Control due to risk of vapor intrusion in residential and school buildings.	vapor instrusion	trichloroethylene and cis-1,2-dichloroethylene
UNITED HECKATHORN CO.	09	CA	CAD981436363	HENC	12-31-2020	The United Heckathorn Superfund site is considered Current Human Exposure Not Under Control because fishermen and their families may be exposed to dichlorodiphenyltrichloroethane (DDT) and dieldrin when fish or other edible biota (e.g. mussels) from the site are consumed.	fish, biota	DDT, dieldrin
BLACK BUTTE MINE	10	OR	OR0000515759	HENC	04-30-2023	The Black Butte Mine Superfund site is currently considered Human Exposure Not Under Control. The main pathway of concern is surface water, with the potential for people to eat fish which have bioaccumulated mercury or other heavy metals.	fish	mercury
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD048340921	HENC	09-30-2060	The Bunker Hill Superfund site is considered Human Exposure Not Under Control because some people in the area are exposed to hazardous levels of lead and arsenic via residential soils, house dust, and drinking water.	soil, air, groundwater	arsenic, lead

COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD980726368	HENC	03-30-2020	The Commencement Bay, Near Shore/Tide Flats site is considered Human Exposure Not Under Control. Despite considerable remedial action within this site, which covers approximately 12 square miles, isolated areas of contaminated sediment remain within the biologically active zone, areas of contaminated groundwater discharge through bottom sediments into surface water, and fish/shellfish are contaminated.	sediment, groundwater, surface water, fish	Antimony, Arsenic, Cadmium, Copper, Lead, Mercury, Nickel, Silver, Zinc, Napthalene, Acenaphthene, Fluorine, Phenanthrene, Anthracene, 2-Methylnapthalene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzofluoranthenes, Benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h)perylene, Hexachlorobenzene, 1,2 and 1,3 and 1,4 Dichlorobenzene, 1,2,4 Trichlorobenzene, total PCBs, Pthalates, Phenols
HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN1002174	HENC	09-30-2018	The Hamilton/Labree Superfund site is considered “Current Human Exposure Not Under Control” because recreational users can be exposed to PCE contamination by ingestion and inhalation of Berwick Creek sediment and soil. Additionally, construction and utility workers who work in trenches can be exposed to PCE via inhalation of PCE and TCE in groundwater vapors.	sediment, soil, vapor intrusion	PCE, TCE
HARBOR ISLAND (LEAD)	10	WA	WAD980722839	HENC	12-30-2024	The East Waterway (EW) Operable Unit (OU) of the Harbor Island Superfund Site is considered "Current Human Exposure Not Under Control" due to sediments and fish tissue that are contaminated with PCBs, tributyl tin, TCDD, PAHs and metals. The most likely exposure pathway for people is fish and shellfish consumption and dermal exposure.	sediment, fish	PCBs, tributyl tin, TCDD, PAHs, metals
LOCKHEED WEST SEATTLE	10	WA	WAN001002655	HENC	09-30-2018	The Lockheed West Seattle Site is considered Human Exposure Not Under Control because sediment and tissue data samples have shown that eating certain fish and shellfish from the river and Elliott Bay may result in unacceptable exposures to humans. The contaminants on the Site include polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPAH) arsenic, copper, lead, mercury and dioxins/furans.	fish	PCBs, PAHs, arsenic, copper, lead, mercury, dioxin, furans

LOWER DUWAMISH WATERWAY	10	WA	WA0002329803	HENC	09-30-2048	The Lower Duwamish Waterway Superfund site is considered Human Exposure Not Under Control because sediment and tissue data samples have shown that eating certain fish and shellfish from the river may result in unacceptable exposures to humans. The contaminants in the waterway sediments include polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), arsenic, and dioxins/furans.	sediment, fish	PCBs, PAHs, arsenic, dioxin, furans
MIDNITE MINE	10	WA	WAD980978753	HENC	09-30-2025	The Midnite Mine Superfund site is considered "Current Human Exposure Not Under Control" because people visiting areas affected by contaminant migration may be exposed to radionuclides and metals from mine waste, soil, sediments, and surface water. Exposure pathways of concern include ingestion of water, sediments, soil, plants and animals. The levels are higher in the mined areas than other adjacent affected areas. Areas near the mine are used for recreation, hunting and gathering, and traditional tribal activities, and sediment and surface water in these areas are affected by acid mine drainage. Groundwater is affected but not currently used for drinking.	mine waste, soil, sediment, surface water, groundwater	radionuclides, metals
NORTH RIDGE ESTATES	10	OR	ORN001002476	HENC	06-30-2019	The North Ridge Estates site is considered Human Exposure Not Under Control because asbestos contamination in soils poses current human health risk by inhalation of asbestos fibers in air released during soil disturbance activities.	soil, air	asbestos
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA0000026534	HENC	06-30-2021	The Palermo Well Field Ground Water Contamination Superfund site is currently considered Human Exposure Not Under Control because there is a residential portion of the site where groundwater contaminant conditions exist that may pose a threat to human health from TCE vapors.	groundwater, vapor intrusion	TCE
PORTLAND HARBOR*	10	OR	ORSFN1002155	HENC	09-20-2028	Portland Harbor is considered Human Exposure Not Under Control based on data collected as part of the Remedial Investigation. The Portland Harbor Potentially Responsible Parties, under EPA and DEQ oversight, have collected and analyzed sediment, surface water, groundwater, and fish tissue data at the site. Contaminants of concern include heavy metals, pesticides, PCBs, PAHs, and dioxins/furans. The known exposure pathways for people are fish and shellfish consumption, ingestion of surface water, and direct contact with sediments. All of these pathways result in unacceptable exposures to humans.	sediment, surface water, groundwater, fish	metals, pesticides, PCBs, PAHs, dioxin, furans
QUENDALL TERMINAL*	10	WA	WAD980639215	HENC	09-30-2020	The Quendall Terminal Superfund site is considered Human Exposure Not Under Control because surface and subsurface soil, groundwater, and off-shore sediments are contaminated with coal tars, creosote, creosote by-products and arsenic. The risk assessment indicates that use of groundwater for drinking water, dermal contact with surface and subsurface soils, vapor intrusion into occupied buildings, and consumption of even modest quantities of shellfish would all pose unreasonable risks to humans.	soil, groundwater, fish	coal tars, creosote, arsenic

WYCKOFF CO./EAGLE HARBOR	10	WA	WAD009248295	HENC	05-02-2021	The Wyckoff/Eagle Harbor Site is considered Human Exposure Not Under Control. Ongoing creosote seeps on the beaches adjacent to a former wood treating facility provide a complete and direct exposure pathway to recreational and tribal beach users. Dermal contact and incidental ingestion of contaminated beach sediments results in a cancer risk above EPA's risk range. Contaminant levels in shellfish tissue pose an unacceptable risk to both recreational and tribal shellfish harvesters.	sediment, fish	creosote

Sites with Human Exposure Not Under Co

SEMS data as of 10/17/2017, includes Non-Federal Facility, Final and

KEY: Blue text indicates what actions are being taken to address contamination a

Site Name	Region	State	EPA ID	HE Status	HE Est. Control Date
CENTREDALE MANOR RESTORATION PROJECT	01	RI	RID981203755	HENC	09-29-2020
COMMERCE STREET PLUME	01	VT	VTD098352545	HENC	09-28-2018
FLETCHER'S PAINT WORKS & STORAGE	01	NH	NHD001079649	HENC	03-30-2018

ntrol (HENC) Designations - Full Pathway Descriptions

Deleted NPL Sites, and SAA Sites; Estimated control dates are internal/delibrative

at the site. * Indicates site is proposed for the Administrator's Emphasis List, as of 10/30/2017.

Official HE Pathway Description
The Centredale Manor Restoration Project Superfund site is considered "Current Human Exposure Not Under Control" because nearby residents and recreational users of the Woonasquatucket River are reasonably anticipated to be exposed to unacceptable levels of dioxin and other contaminants through contact with sediment in the river and floodplain. Ingestion of fish from the Woonasquatucket River also poses an unacceptable risk. The river and riverbank are active recreational areas. This Human Exposure Control determination is based primarily on risk assessment(s) prepared for the site that took concentration of chemicals present and the frequency/duration of exposure to these chemicals, among other things, into account. EPA has removed contaminated soil located in the backyards of residences immediately adjacent to the river and installed fences restricting access to contaminated sediment in these areas. EPA has also capped three source areas of contamination, reconstructed the Allendale Dam, and excavated source material that was contributing to groundwater contamination in order to prevent further migration of contamination. EPA evaluated numerous remedial alternatives to address river and floodplain sediments containing unacceptable levels of dioxin contamination. EPA released a Proposed Plan outlining the proposed cleanup approach in October 2011, and a Proposed Plan Amendment in July 2012. In conjunction with the release of the Proposed Plans, numerous public informational meetings and public hearings were held. A Record of Decision (ROD) was signed in September 2012. The primary component of the remedy outlined in the ROD calls for excavation of a large volume of contaminated material. A Rhode Island Department of Public Health fishing advisory has been in place since the mid-1990s. EPA continues to work with the Woonasquatucket River Watershed Council to develop annual fact sheets that remind residents about using the river responsibly. EPA also holds periodic dialogue forums with community groups, local citizens, elected officials, and state and federal agencies to discuss the cleanup for the site.
The Commerce Street Plume Superfund site is considered “Current Human Exposure Not Under Control” because groundwater contaminated with volatile organic compounds (VOCs) is creating an unacceptable indoor air risk in one residential home when such groundwater enters the basement during times of flooding. In addition, an area of VOC-contaminated soil in the yard of the same residence is above acceptable levels. The soil contamination is the result of groundwater being removed from the basement via a sump pump to the yard. The 2015 Record of Decision requires actions to excavate the soil and address the sump in the home to mitigate these risks. Plans to complete this work are in development. It is anticipated that the required mitigation activities will be completed by September 2018. EPA and the Vermont Department of Environmental Conservation continue to work directly with the
The Fletcher's Paint Works and Storage Superfund site is considered "Current Human Exposure Not Under Control" because an unacceptable exposure pathway exists in relation to consumption of fish from the Souhegan River. Fish in this area of the river are contaminated with PCBs above acceptable levels. This Human Exposure Control determination is based primarily on risk assessment(s) prepared for the site that took concentration of chemicals present and the frequency/duration of exposure to these chemicals, among other things, into account. The first Five-Year Review for the site is in progress. As part of this Five-Year Review, EPA will verify that the “no fishing” signs are still in place and remain effective. EPA expects to complete the Five-Year Review by March 2018. All other current threats to human exposure have been addressed. EPA addressed immediate threats to human exposure within other known source areas (e.g., through drum removals, building demolition, installation of fences, warning signs and temporary caps). The contaminated soil at the Elm and Mill Street areas of the site, and the contaminated Souhegan River sediments were excavated and transported off-site for proper disposal during the 2016 and 2017 construction seasons. This work was completed pursuant to a 1998 OU1 Record of Decision, as amended in 2009, and a 2016 OU2 Souhegan River Sediments Action Memorandum for a Non-Time Critical Removal Action. EPA has held a number of meetings with citizens, local officials and the PRP to discuss the status of work at the site.

NEW BEDFORD	01	MA	MAD980731335	HENC	09-30-2022
RAYMARK INDUSTRIES, INC.	01	CT	CTD001186618	HENC	09-30-2021

The New Bedford Superfund Site is considered "Current Human Exposure Not Under Control" because unacceptable exposure pathways exist related to consumption of PCB-contaminated seafood. This Human Exposure Control determination is based on site-specific risk assessments that took concentration of chemicals present and the frequency/duration of exposure to these chemicals, among other things, into account.

EPA's full scale dredging program began in 2004 and accelerated in 2014 after a cash-out settlement with the main responsible party.

EPA operates an outreach campaign to dissuade the consumption of local PCB-contaminated seafood. This effort includes the education and medical communities, as well as meetings with stakeholders and local officials. Signs are posted in multiple languages around the harbor shoreline describing the existing fishing ban. Additionally, EPA produced and posted a video on the its New Bedford Harbor project website about the hazards of consuming contaminated fish from various areas of the harbor. Nonetheless, EPA continues to receive reports that consumption of seafood from posted areas is ongoing

The Raymark Industries, Inc. Superfund site is considered "Current Human Exposure Not Under Control" because people could come into contact with soil contaminated with lead, asbestos, PCBs, and other contaminants above acceptable levels at approximately 30 locations throughout the town of Stratford, Connecticut. This Human Exposure Control determination is based primarily on risk assessment(s) prepared for the site. Current land use at these 30 locations varies and includes residential, recreational, and commercial properties, in addition to numerous floodplain/wetland areas. Direct contact with and inhalation of the dust associated with manufacturing waste exceeds acceptable levels.

EPA issued a Record of Decision in July 2011 outlining final source control remedies at four locations and interim actions to reduce or restrict exposures through the use of institutional controls at the other locations. In September 2016, EPA issued another Record of Decision outlining permanent remedies for 22 additional properties as well as Ferry Creek. Waste in soil, wetland soil, and sediment will be excavated and transported to OU4 (a former ballfield at the Raymark facility where some waste has already been placed), where it will be consolidated and capped. Designs of these remedies has begun, and EPA expects to implement them over the next several years. For OU2 (the contaminated groundwater area), the remedy includes installation of vapor ventilation systems at approximately 20 additional properties (mostly residential), work which EPA expects to be completed by September 2018. Investigations are ongoing at four additional OUs, for which EPA expects to issue cleanup proposals in the next two to three years.

EPA has expended approximately $200 million in previous work at the Site, including sampling and investigation of over 200 individual properties throughout the town of Stratford; the removal of Raymark Waste at 47 residential properties; the capping and redevelopment of the former Raymark facility; and the prior installation of approximately 100 indoor air ventilation systems.

There has been significant community engagement at the Site, most recently with the neighborhoods abutting the former Ballfield area prior to the 2016 Record of Decision. EPA is currently working with the Town of Stratford's Health Department, the Connecticut Department of Energy & the Environment, and the Connecticut Department of Public Health on a plan to actively engage each impacted community during design and implementation of the selected remedies. EPA has met with stakeholders regularly (most recently in January 2017 and May 2017). On-going coordination will consist of regular meetings with a newly-formed Community Advisory Group.

CALDWELL TRUCKING CO.	02	NJ	NJD048798953	HENC	09-30-2018
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879	HENC	09-30-2030
DIAMOND ALKALI CO.	02	NJ	NJD980528996	HENC	09-30-2037

The Caldwell Trucking Company Superfund Site is considered "Current Human Exposure Not Under Control" because contaminated groundwater continues to seep onto surface soils and discharge into surface water streams and into the Passaic River. Direct contact with the seep contamination is possible due to the location of the seep in a residential area. The contaminants of concern are volatile organic compounds (VOCs), including trichloroethylene and 1,1,1 trichloroethane. EPA has already initiated clean-up activities at the Site. The soils at the Site have been remediated and the Site is fenced. Some control has been achieved by removing VOCs from groundwater that has seeped to the surface. However, additional contamination in the seep area has been discovered. The PRPs have just recently completed a replacement and upgrade to the seep system air stripper, repairs to the original seep system capture area and repairs and improvements to the seep system French drain system. Analytical results from this recent work are under review to determine the improvements achieved in capturing VOC contamination in the Seep area.

Near the source of the groundwater contamination, VOCs will be contained with a groundwater pump and treatment system. Installation of groundwater recovery wells was completed in 2007. EPA approved the design of a treatment system in April 2008 and the system was constructed and placed into operation in 2009. The system has proved effective for containing contaminated groundwater in the central lagoon area of the Site. In addition, the groundwater in the central lagoon area and north lagoon area receive treatments to enhance biological breakdown of the VOCs.

In addition, there is a newly identified exposure pathway. This pathway involves the inhalation of VOCs that have potentially migrated from groundwater to indoor air. The activities planned to make the Human Exposure determination include additional sampling and investigation necessary to determine the extent of possible human exposure through this pathway. Over 100 residences and commercial properties were evaluated for vapor intrusion and approximately 20 mitigation systems have been installed since the initiation of the vapor intrusion investigation. The PRPs continue to monitor the VI pathway and have submitted a draft operation and maintenance manual which is under EPA review.

The Cornell Dubilier Electronics Inc. site (NJD981557879) was finalized for the NPL on July 28, 1998. This Superfund site is considered "Current Human Exposure Not Under Control" because the Baseline Human Health Risk Assessment for Bound Brook Operable Unit 4 confirms there is a potential for unacceptable cancer risk and non-cancer hazard from exposure to total PCB Aroclors in sediment, floodplain soil, fish, and shellfish that is relatively wide-spread throughout the Study Area. Residents and recreational users of the creek can be exposed through direct contact to arsenic and lead contaminated soils and sediments.

As of April 2016, the planned activities to address this pathway are continuation of ongoing removal of arsenic and lead contaminated sediment and floodplain soils and the implementation of institutional controls. These include fish advisory already established by NJDEP. Also, NJDEP's residential (unrestricted use) standard for PCBs of 0.2 mg/kg is not an ARAR for properties in the floodplains that constitute the majority of the land to be addressed by this remedial action, which are mostly municipal or county land (such as park land or designated open space), and not subject to future residential use; however, land use restrictions, in the form of a deed notice or similar control, may be needed on a few privately owned parcels, to assure remedy protectiveness. The deed notice or other legal instrument would assure that the land use does not become residential/unrestricted in the future.

The remedy requires continued signage to remind anglers and other recreational users of the Bound Brook corridor of the presence of PCBs in sediments and fish, and the need to take preventative measures, such as catch-and-release, when in the area.

EPA is currently designing the cleanup of contaminated sediment and flood plain soils.

The Diamond Alkali Superfund Site is considered Human Exposure Not Under Control because of on-going ingestion of fish and shellfish caught from the lower Passaic River and Newark Bay complex. The Lower Passaic River and Newark Bay are under fish and shellfish consumption advisories, issued by NJDEP based on polychlorinated biphenyl (PCB), dioxin and/or mercury contamination. EPA has already initiated clean-up activities at the site. The planned activities to address this pathway include working with the state to ensure fish consumption advisory signs are posted, the on-going remediation of contaminated material at the former Diamond Alkali facility which will prevent further migration of contamination to the Passaic River and Newark Bay, and the continuation of the Remedial Investigation/ Feasibility Study to identify the nature and extent of contamination at the site. EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. Additionally, an EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise.

GOWANUS CANAL	02	NY	NYN000206222	HENC	09-30-2025
HUDSON RIVER PCBS	02	NY	NYD980763841	HENC	09-30-2020
ONONDAGA LAKE	02	NY	NYD986913580	HENC	09-30-2025

The Gowanus Canal Superfund Site is considered Human Exposure Not Under Control because of on-going ingestion of fish caught from the Canal. The Gowanus Canal and Upper New York Bay are under fish and shellfish consumption advisories, issued by NYS DOH based on polychlorinated biphenyl (PCB) and dioxin contamination. EPA has already initiated clean-up activities at the site. The planned activities to address this pathway include working with the state to ensure fish consumption advisory signs are posted, to clean up some of the former industrial sites along the canal's banks, reduce sewage overflows, and improve water quality. EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. Additionally, an EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise. A Community Advisory Group (CAG) comprised of members representing diverse interests in the community has been established to disseminate site information and solicit public comments on project activities.

The Hudson River PCBs Superfund Site is considered Human Exposure Not Fully Under Control because of the potential for ingestion of fish caught from the river by those who do not follow the fish consumption advisories and fishing restriction. Remedial activities completed to date (dredging) have substantially reduced PCB source materials in the Upper Hudson River. As expected in the Record of Decision, average PCB concentrations in fish in the Upper Hudson are declining but have not yet reached protective levels. Because the remedy includes not only the dredging component but also the subsequent period of monitored natural attenuation, remedy is not complete until the natural attenuation component also has been completed. EPA believes it is likely that improvement will occur gradually over several decades at least. In the interim, the State of New York has in place fishing restrictions and advisories against consumption of fish to control human exposure pathways that could result in unacceptable risks. EPA acknowledges that the consumption advisories are not fully effective in that they rely on voluntary compliance in order to prevent or limit fish consumption. EPA will continue to work with New York State to ensure the ongoing maximum effectiveness of the advisories.

Dredging work was completed in 2015. EPA estimates that the dredging project removed about 72% of the mass of PCBs in the Upper Hudson River. The dredging project resulted in the removal of about 2.75 million cubic yards of PCB-contaminated sediment. Approximately 310,000 pounds of PCBs (twice the mass anticipated) were permanently removed from the river.

EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. Additionally, an EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise. A Community Advisory Group (CAG) comprised of members representing diverse interests along the river has been established to disseminate site information and solicit public

The Onondaga Lake Superfund Site is considered Human Exposure Not Under Control because of ongoing ingestion of fish caught from the lake and its tributaries. Fish tissue has been found to contain elevated levels of mercury and polychlorinated biphenyls (PCBs) and fish consumption advisories have been issued by New York State. The planned activities to address this pathway include working with the State to ensure fish consumption advisory signs are posted and addressing the sources that are resulting in unacceptable fish tissue concentrations. The Lake Bottom dredging and capping has been completed with more than 2 million cubic yards of sediment removed and close to 500 acres of cap placed. Cleanup of several subsites that contributed to contamination in the Lake have been completed or are underway. Additional planned activities to address the exposure pathway include the continuation of several remedial designs and remedial actions and several ongoing Remedial Investigations/Feasibility Studies to identify the nature and extent of contamination at the site. EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. Additionally, an EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise.

UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106	HENC	09-30-2027
VENTRON/VELSICOL*	02	NJ	NJD980529879	HENC	09-30-2034
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664	HENC	06-30-2035

The Universal Oil Products Superfund Site is considered "Current Human Exposure Not Controlled" because of continued potential for ingestion of fish and crabs from Berry's Creek and Ackerman's Creek. Fish tissue collected from these water bodies has been found to contain elevated levels of mercury and PCBs. Remedial actions that address the contaminated soils and a portion of the groundwater have been completed. PCB/PAH contaminated soil has been addressed through a combination of thermal desorption and offsite disposal. A portion of the volatile organic compound contaminated soils has been treated using soil vapor extraction. Lead-contaminated soils have been excavated and placed under the on-site cap. Groundwater was remediated by an on-site treatment system which operated from October 1997 through November 1998. Field studies to evaluate the wetland/creek areas are expected to be completed in 2011. Fish consumption advisory signs are posted in the area.

EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. Additionally, an EPA Community Involvement Coordinator is assigned to the

The Ventron/Velsicol Superfund Site is considered "Human Exposure Not Under Control" because of continuing exposure to mercury and PCBs in fish. Key public areas have been posted with safety/security/public health signage while EPA collects additional data and works with the State on fish consumption advisories.

EPA has already initiated cleanup activities at the site. Currently, a remedy has been implemented for the uplands portion of the site. Mercury-contaminated soils have been excavated from the uplands area and disposed of off-site. Areas with soils containing mercury above residential levels have been capped and prepared for industrial redevelopment, and ICs have been placed on eight properties. Mercury-contaminated soils have also been removed from ditches that lead from the uplands to the wetlands of Berry's Creek. A vertical hydraulic barrier system was installed to capture contaminated groundwater and prevent migration into the Berry's Creek watershed. ICs in the form of a Classification Exception Area and Well Restriction Area are in place to prevent use of contaminated groundwater. The Berry's Creek portion of the Site, OU2, is currently in RI/FS and has identified sediments and marsh soils contaminated with mercury, methylmercury and PCBs. Methylmercury and PCBs have also been identified in fish and crab tissue. A remedy for this OU is expected in FY18.

EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets. An EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise.

The Vineland Chemical Superfund Site is considered "Human Exposure Not Under Control" because of continuing direct contact exposure to arsenic-contaminated sediments in nearby wetlands and surface water bodies as well as exposure to arsenic in fish. Key public areas have been posted with safety/security/public health signage while EPA collects additional data and works with the State on fish consumption advisories.
EPA has already completed a significant portion of cleanup activities at the site. Currently, a groundwater extraction and treatment system is operating to manage the off-site migration of groundwater contaminated with arsenic; institutional controls are also in place to restrict potable use of the contaminated groundwater until the aquifer is restored. In addition, treatment of plant site soils, considered the primary source of the arsenic contamination, is complete. Contaminated sediments from the stream and wetland have been removed and that area has been restored. The present focus of remedial activities is on preventing groundwater seeps from contaminating sediments in a limited section of the stream. EPA continues to perform periodic monitoring of water and sediment, and review this data with property owners and local and State government representatives. Several years of sediment and surface water monitoring data at recreational areas downstream have shown no unacceptable risk.

WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995	HENC	09-30-2024
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	03	MD	MDD980918387	HENC	12-31-2017
ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	03	VA	VAD042916361	HENC	06-30-2020
ATLANTIC WOOD INDUSTRIES, INC.*	03	VA	VAD990710410	HENC	10-01-2020

The Welsbach and General Gas Mantle Superfund Site is considered "Current Human Exposure Not Controlled" because the cleanup of radiologically contaminated soil in residential neighborhoods is ongoing. EPA and the State have reduced the short-term risks at the Site from gamma radiation by installing shielding on some of the site properties, removing surface contamination from three residential properties and a public park, and demolishing the former General Gas Mantle building in Camden.

EPA is continuing the cleanup to address longer-term risks, and has completed the cleanup of the Gloucester City Swim Club and the surrounding residential properties, a recreational complex that includes ball fields, a large open area in Gloucester City that was to be the location of a new middle school, and the former General Gas Mantle facility in Camden. EPA has also completed its cleanup on about 133 residential properties in Camden and Gloucester City by removing the radiological contamination from these properties. What remains to be cleaned up are approximately 20 residential properties and industrial properties that represent over half of the total contamination at the site. EPA ensures community participation throughout the remedial process by meeting with residents and affected stakeholders, issuing public notices and updating fact sheets.

An EPA Community Involvement Coordinator is assigned to the site and can address specific community concerns as they arise. In addition, a field office has been established in the community. It serves as a meeting place and resource center

The 68th Street Dump/Industrial Enterprises Superfund site is considered "Human Exposure Not Under Control" because there is a complete pathway for exposure of surface soil contamination to site workers and trespassers. The major contaminants of concern in the shallow soils are PCBs, PAHs, and lead. EPA recently negotiated a Consent Decree with the responsible parties. Access to the 239 acre site is partially restricted by active rail lines, Interstate I-95, and waterways and fence and signage have been placed throughout the Site to reduce the risk to trespassers. A Health and Safety Plan will be prepared during the initial phase of the Remedial Design which will include recommendations to minimize risks to site workers while the selected remedy requires construction of access barriers and implementation of a Site Security Program. EPA will re-evaluate the protectiveness of the Site in early 2018 following the implementation of the Health and Safety Plan.

The Human Exposure determination status at the Arrowhead Associates, Inc./Scovill Corp. Superfund site is currently Not Under Control. This site is considered Not Under Control due to finding Vapor Intrusion (VI) in the manufacturing building. The manufacturing building is above a contaminated groundwater plume. An indoor vapor mitigation system has been installed in the manufacturing building and the HVAC system has been upgraded to prevent VI. Ongoing monitoring will continue to assure that VI is not occurring. Surface water in the streams will also be sampled. Recent modifications to the operation of the HVAC system used in conjunction with the vapor mitigation system have further reduced contaminant levels. EPA will re-evaluate the space in early FY 2018 using results from recently collected indoor air confirmation samples. The Screening of Potential Alternatives memo to remediate the groundwater beneath the building is scheduled to be submitted for review in late October 2017. EPA is coordinating regularly with the building tenant to discourage use of the

The Atlantic Wood Industries (AWI) Superfund site, located along the Elizabeth River in Portsmouth, Virginia, is a former wood-treating site that has extensive creosote contamination. The site also has heavy metals, PCP, and dioxin contamination. The site is considered Human Exposure Not Under Control because 1) consumers of shellfish are exposed to unacceptably high levels of contaminants, and 2) AWI currently operates a pre-stressed, pre-cast concrete manufacturing business at the site where workers are exposed to surface soils. EPA is undertaking a cleanup to address the unacceptable exposures. The steps include: stabilizing creosote-soaked soils; dredging and consolidating contaminated sediments, and covering contaminated soils.

The AWI site is the former location of a creosote and pentachlorophenol wood treater. The site is located on the Southern Branch of the Elizabeth River and is surrounded by the Norfolk Naval Shipyard (NNSY), also a Superfund site. During WWII, the Navy leased part of the site and filled the area with used blast sand that contained heavy metals. The river contains co-mingled contamination from the AWI site and the NNSY site. Current human exposure is currently considered not under control for several reasons. One, EPA recently completed dredging contaminated sediment from the river. Part of the river cleanup includes monitored natural recovery (MNR), which EPA expects to take slightly less than 10 years to complete. EPA plans to begin oyster sampling next year to determine the initial risk reduction from the dredging. Whether EPA can consider the river (Operable Unit 3) to have human exposure under control next year will depend on the results of that data. Two, the on-site landfill for the dredged sediment is currently under construction and sediment is in stockpiles. Workers, for example, at the pre-cast concrete manufacturing facility at the site have access to the stockpiles. The facility owner, which is also a PRP, has not provided access to all the area required for the landfill construction. EPA is negotiating with the owner and Virginia to obtain access and complete landfill construction and capping. EPA is pushing for resolution of this issue, however, an exact timetable is uncertain. EPA will re-evaluate in 2018

BOARHEAD FARMS	03	PA	PAD047726161	HENC	09-30-2018
CULPEPER WOOD PRESERVERS, INC.	03	VA	VAD059165282	HENC	09-30-2023
KOPPERS CO., INC. (NEWPORT PLANT)	03	DE	DED980552244	HENC	09-30-2018
LOWER DARBY CREEK AREA	03	PA	PASFN0305521	HENC	12-28-2018
PRICE BATTERY LEAD SMELTER	03	PA	PAN000305679	HENC	06-30-2019

The Human Exposure determination status at the Boarhead Farms Superfund site is currently Human Exposure Not Under Control. EPA performed a removal assessment and emergency removal action in 2009 to address vapor intrusion from TCE in a residence located on the Boarhead Farms Site, consisting primarily of installing portable air filtration units. The potentially responsible party (PRP) performed additional response actions to address vapor intrusion in 2011, consisting primarily of addressing basement sumps. The property owner subsequently installed a basement exhaust system in 2013 without notice to EPA or the PRP. Sampling performed by EPA has indicated that the exhaust system has reduced indoor air concentrations to below removal action levels; however, indoor air concentrations continue to exceed EPA's current chronic inhalation reference concentration for TCE. EPA is currently developing an administrative order on consent (AOC) for the property owner and PRP to install a vapor intrusion mitigation system to reduce indoor air concentrations to below the current chronic inhalation reference concentration for TCE. EPA expects the AOC to be signed in mid-FY18 and the vapor mitigation system completed shortly thereafter.

The Culpeper Wood Preservers, Inc. Superfund site is currently considered Human Exposure Not Under Control. This site is an active wood treating facility located in Culpeper, VA. Historic use of chromated copper arsenate (CCA) to produce pressure treated lumber has impacted various media at the site. The use of CCA was discontinued in 2002 and the facility has since used other preservative methods. Currently, surface soil contamination consisting of metals (primarily arsenic and hexavalent chromium) and polynuclear aromatic hydrocarbons (PAHs) poses a potential exposure pathway to human receptors. Portions of this surficial soil contamination have since been paved to reduce risk. Nearby private wells have also been impacted by arsenic and chromium and are being provided with bottled water to mitigate risks associated with groundwater ingestion. The remedial investigation has recently been finalized and Culpeper Wood Preservers is in the process of completing the Feasibility Study. Fact sheets have been distributed to nearby residents and EPA recently conducted a community availability session and went door to door to impacted residents (June 2017) to share site

The Koppers Co., Inc. (Newport Plant) Superfund site is considered "Current Human Exposure Not Under Control" because trespassers could come into contact with soils and sediments contaminated with creosote. A protracted remedial design delayed by a comprehensive cultural resource evaluation and modifications to the design resulting from additional data has delayed the start of the cleanup. EPA is re-evaluating the potential impacts on human health from creosote (primarily PAHs) in surface soils using current policies and guidelines. Ecological concerns were the primary risk drivers during the original risk assessment evaluation. Recent groundwater data will be used to locate additional monitoring wells to be installed in the late fall/early winter of 2017. There is a significant potential that the re-evaluation to be performed in 2018 coupled with the additional data will lead to a more favorable evaluation of human health under current conditions. The potential for Site access is limited by fencing, an adjacent active RCRA facility and a rail line.

The Lower Darby Creek Area Superfund sites is considered Human Exposure Not Under Control due to elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) that are present at residential properties in the Eastwick Neighborhood, which is part of OU1 of the Lower Darby Creek Area Site. EPA performed a removal action to address the contaminated soil at 33 residential properties with the highest PAH concentrations in 2016 and early 2017. EPA began a remedial action to address the remaining residential properties starting in September 2017, which is expected to last into 2019. Additionally, EPA began a separate remedial action to relocate businesses from the Site in September 2017. It is anticipated that these remedial actions will address current human exposures at the Site. EPA meets regularly with the Community Advisory Group and has prepared multiple Fact Sheets on a variety of topics. EPA has worked closely with the community to develop a Community Health and Safety Plan which provides recommendations and advice to minimize exposures in a practical way prior to EPA completing the residential soil cleanup.

The Price Battery Lead Smelter Site is currently considered "Human Exposure Not Under Control." EPA is currently preparing the fund-lead ecological risk assessment of the surface water (operable unit 3) as part of the Remedial Investigation/Feasibility Study (RI/FS) for the Price Battery Lead Smelter Site. Based on data collected and evaluations performed to date, there is a potential risk from recreational use of Kaercher Creek, Mill Creek, and the Schuylkill River from exposure to contaminated sediment and fish ingestion due to site-related metals (i.e., lead) contamination. EPA is focused on completing the RI/FS and a future ROD to fully evaluate risk, make a human health determination, and select a final remedy. Additionally, EPA will need to determine how to respond to the lowering of the lead RSL to 200 ppm and its potential impact to residential yards. EPA held a public availability session on October 3, 2017 and cleanup plans for the facility were well received by the community. EPA is available to answer questions and address community concerns as they

RESIN DISPOSAL	03	PA	PAD063766828	HENC	09-30-2018
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	03	PA	PAD001933175	HENC	11-01-2019
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	04	FL	FLD008161994	HENC	09-30-2018
ANNISTON PCB SITE (MONSANTO CO)	04	AL	ALD000400123	HENC	12-31-2023
ARMSTRONG WORLD INDUSTRIES	04	GA	GAN000410033	HENC	12-30-2021

The Resin Disposal Superfund site is currently considered "Human Exposure Not Under Control". The Resin Disposal Site is a two-acre landfill that received 85,000 tons of wastes including organic solvents, resin cakes, filter materials and oils from a resin manufacturing process. Several releases of untreated leachate in 2011 from the original leachate treatment system lead to this determination. Construction of the larger and improved leachate treatment system was completed in 2017. The Responsible Party is currently evaluating down gradient sediments potentially contaminated from historic releases. EPA will re-evaluate human exposure determination in FY 2018 and anticipates that human health will be considered under control based on the successful operation of the improved leachate treatment facility.
The Sharon Steel Corp. (Farrell Works Disposal Area) Superfund Site is considered human exposure not under control because of the estimated unacceptable risk from inhalation and/or ingestion of heavy metals (predominantly manganese) from soil and slag at the 2 business locations that are part of operable unit 2 (OU2). A company called, Dunbar, is the PRP at one of the business locations, an asphalt company, and is performing a Remedial Action to cover the two business properties with a planned completion date of November 2019. The cleanup action includes covering all exposed slag and soil with clean material (e.g., compacted aggregate, clean soil) at a minimum thickness of one (1) foot if clean soil or aggregate, or minimum of 3 inches if asphalt concrete or Portland cement concrete to prevent direct contact with and wind erosion of slag and soil, and alleviate migration of contaminants to surface water.
The American Creosote Works, Inc. (Pensacola Plant) Site is designated as "Human Exposure Not Under Control" because 55 residential properties have levels of dioxin above EPA's cleanup level in soil. A site wide Record of Decision (ROD) was signed in September 2017. The residential exposure units are triggered into CERCLA action by EPA's HI=1 of 50 parts per trillion (ppt). In each exposure unit, the residential yards will be cleaned up to FDEP's Soil Cleanup Target Level (SCTL) of 7 ppt. The Remedial Design begins in October 2017 and is expected to be completed by March 2019. The remedial action is expected to start in April 2019 and finish by December 2021.
The Anniston PCB Superfund site is considered "Current Human Exposure Not Under Control" because there is direct exposure to contaminated soil. Cleanup of soils on residential properties contaminated with Polychlorinated Biphenyls has been completed. However, some properties have not been cleaned-up because access has been denied or where no exposure occurs because the lots are wooded and overgrown. A ROD is expected in 2017 to address residual PCBs existing under soil caps or structures on residential properties, and provide a plan on how to address the residuals long-term. The remedial investigation on commercial properties has been completed. A ROD to select a remedy for PCB contamination on non-residential properties, in Snow Creek sediment, and in a small area with groundwater contamination is expected in late 2017. PCBs have been identified in floodplain soils and sediment for approximately 37 river miles of Choccolocco Creek. The RI/FS for the Creek will be completed in 2019. Unacceptable human exposure related to the creek is primarily attributed to consumption of PCB contaminated foods (i.e., contaminated fish or livestock grazing in the floodplains).
The Armstrong World Industries site is currently considered "Human Exposure Not Under Control" because workers and trespassers could be exposed to contaminated soil and fish/sediment from Rocky Creek. Contaminants of concern are metals, PCB and PAHs in sediment, and PCBs is fish tissue. The public has been informed not to eat fish from Rocky Creek and signs are posted at Houston Road. However, people have been observed trespassing on site to fish in the creek. As of October 2017, EPA is negotiating an agreement with the responsible parties to conduct the Remedial Investigation and Feasibility Study (RI/FS). The RI is expected to begin in 2018, and will provide EPA with the necessary information about site contaminants to ensure that any potentially unacceptable risks to human health are addressed in the cleanup design.

BROWN'S DUMP	04	FL	FLD980847016	HENC	12-31-2020
JACKSONVILLE ASH SITE	04	FL	FLSFN0407002	HENC	12-31-2020
FAIRFAX ST. WOOD TREATERS	04	FL	FLD000623041	HENC	07-31-2018
LCP CHEMICALS GEORGIA	04	GA	GAD099303182	HENC	12-30-2020

The Brown's Dump Superfund site is considered "Current Human Exposure Not Under Control" because ash contaminated soil with lead, arsenic, PAHs and dioxin above remedial goals is present at or near the surface at 16 parcels. Four of the 16 parcels of have access for remediation and will be cleanup by 2019. EPA has not been granted access to the remaining twelve parcels that need remediation. All parcels have been sampled. As of October2017, about 216 mostly residential properties have been remediated, which makes the remedial action about 97% complete. Some temporary engineering controls have been put in place. These controls include fencing, signs, grass cover and placing of clean soil over contaminated soil. The human exposure indicator will continue to be "not under control" until the remaining 12 parcels are addressed.

The Jacksonville Ash Superfund site is considered "Current Human Exposure Not Under Control" because ash from the City of Jacksonville's municipal solid waste incinerators has contaminated soil in residential areas with lead, arsenic, PAHs and dioxin above remedial goals. Contaminants are present at or near the surface at about 221 residential parcels. Approximately 175 parcels have access for remediation and will be cleaned up by 2019. EPA has not been granted access to 46 parcels that need remediation. Of the 221 parcels that need remediation about 140 are residential parcels, 22 parcels are commercial/industrial parcels and the remaining 55 are Florida Department of Transportation parcels, the contaminated soil staging area and Lonnie Miller Sr. Park. About 73 parcels have not yet been sampled. As of October, 2017, mostly residential properties have been remediated which makes the remedial action about 94% complete. Some temporary engineering controls have been put in place. These controls include fencing, signs, grass cover and placing of clean soil over contaminated soil. ATSDR has determined that there is not an immediate health threat, but the exposure is a long-term health threat. Contaminants of concern include lead, arsenic PAHs and Dioxin. The human exposure indicator will continue to be "not under control" until the remaining 221 parcels are addressed.

The current Human Exposure status for the Fairfax St. Wood Treaters site is Not Under Control. The remedial investigation for the Fairfax Wood Treaters site has been completed and has identified a current human exposure pathway from direct contact with contaminated soil on residential properties. The primary off-site contaminant of concern is Arsenic. The Record of Decision selected excavation and disposal of contaminated soil from residential properties found to exceed the cleanup levels. A public meeting was held on May 16, 2017 to discuss the findings of the remedial investigation and present the preferred remedy. The Record of Decision was issued on August 22, 2017. The remedial design is underway and expected to be completed by October 2018. EPA continues to engage the community and conduct monthly site inspections and report sampling results to the residents. The remedial action is expected to begin by late 2018.

EPA considers the LCP Chemicals Georgia site to be "Human Exposure Not Under Control" because EPA is aware that people are consuming contaminated fish, despite warning signs and fish advisories. The levels of methylmercury and PCBs (primarily Aroclor 1268) detected in fish fillets resulted in a fish consumption advisory for the Turtle River/Brunswick Estuary issued by the Georgia DNR from 1995 to the present. The cleanup plan for the marsh (Operable Unit 1) was issued by the Region in September 2015. The remedial design is currently being conducted and expected to be completed in 2019. The remedial action is expected to begin in 2019. EPA will continue to advise that fish at the site should not be consumed.

ALCOA PROPERTIES	05	IL	ILSFN0508010	HENC	12-30-2019
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER*	05	MI	MID006007306	HENC	09-30-2026
AMCAST INDUSTRIAL CORPORATION	05	WI	WIN000510210	HENC	12-31-2019
ASARCO TAYLOR SPRINGS	05	IL	ILN000508170	HENC	12-30-2020

The Alcoa Properties Superfund Alternative site is considered "Current Human Exposure Not Under Control" because the completed operable unit (OU) 1 risk assessment found unacceptable risks for residential and commercial/industrial exposure pathways through ingestion and/or inhalation for exposure to lead and radium compounds in soils. The actions to address this pathway will be to construct a solid waste landfill cap to cover the exposed soils. The cap construction began in 2014 and it is anticipated to be completed by the end of 2016. A construction trailer is on site and site security measures are in place with periodic site patrols to limit opportunities for trespassing. The OU2 remedial investigation is ongoing and covers the rest of the site where waste materials are similar to those in the OU1 area. A Record of Decision is anticipated in late 2017 that will select a remedy for the remainder of the site. A Community Involvement Plan was completed in 2014 following community interviews and is available at the site information repositories. Ongoing community outreach includes public meetings and informational mailings.

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site is considered "Current Human Exposure Not Under Control" because the fish in the river are contaminated above health-based levels for human consumption due to PCB contamination. Although there is a fish advisory for the river, and warning signs posted along the floodplains, there is evidence of subsistence fishing from the river. The warning signs have been vandalized in the past and repaired by the Michigan Department of Environmental Quality. In addition, in the floodplains along several miles of the river there may be PCB-contaminated sediments above health-based limits for direct contact for recreational users. A large portion of this land is owned by the State; there is evidence that this property is used as a recreational area, but it is not practical to fence all the floodplain areas or to keep people out of these areas. From 2007-2009, an excavation and dredging removal action was conducted to address these exposure pathways in a portion of the river near Plainwell, MI, and 130,000 cubic yards (CY) of PCB-contaminated sediment was removed. A second removal action to address the exposure pathways in the river near the Plainwell No. 2 Dam area was conducted in 2009-2010 and removed 14,000 CY of PCB-contaminated soil and sediment. A third removal project was conducted in 2011-2013 and removed 23,700 CY of PCB-contaminated sediment from Portage Creek. A fourth removal action to address the exposure pathways in the river near the Otsego Township Dam area began in August 2016 and will be completed in 2018, and will remove approximately 20,000 CY of PCB-contaminated soil and sediment. Approximately 75 additional miles of contaminated river sediments remain to be addressed. A supplemental Remedial Investigation/Feasibility Study in the Kalamazoo River is ongoing. EPA issued a Record of Decision (ROD) for the first river area (Area 1), which includes Portage Creek, in late 2015, and that remedy is currently in the remedial design phase. Investigative activities for Area 2 were completed in 2015 and EPA anticipates issuing a ROD for Area 2 in late 2017. Investigative activities for Area 3 began in 2012 and were completed in 2016, with a ROD anticipated in FY2019. Investigative activitiesfor Area 4 began in 2014 and will be completed by the end of 2017. Investigative activities for the entire river will

The Amcast Industrial Corporation Superfund site is considered “Current Human Exposure Not Under Control” because people could be exposed via dermal contact to the PCB-contaminated sediments in the ponds and/or by eating the PCB-contaminated fish from the ponds. One of the ponds is located in a city park. Signs are posted along the ponds warning people not to eat the fish, and that swimming and wading are not allowed. In addition, people could be exposed to PCB-contaminated soils on their property. EPA contacted nearby residents providing information regarding the Site and collected soil samples from their yards; then went door to door notifying residents of the results. Community outreach activities have included the establishment of public information repositories, meetings and informational mailings. EPA also provides updates on the Amcast web site on a regular basis.

The ASARCO Taylor Springs Superfund Site is considered “Current Human Exposure Not Under Control” because soil at some residential properties near the site contains concentrations of lead and other metals above health-based levels. Lead is the primary contaminant of concern but other metals are generally co-located with lead. Current known exposure pathways of concern are direct contact with soils in residential, public and industrial areas, and direct contact with soils on the ASARCO property. A Removal Action completed in 2008 addressed residential properties that had lead contamination above 1,200 parts per million (ppm). Approximately 50 residential properties with lead contamination above 400 ppm were not addressed by the removal action. The Illinois Department of Public Health sent letters to the residents whose properties were sampled, discussing the potential contamination in their yards. At the former plant property, surface soil contamination for lead is above likely acceptable levels for the current trespasser exposure scenario. Access at the former plant property is restricted via a fence that encloses it. In April 2016 the potentially responsible party discontinued the remedial investigation/feasibility study (RI/FS) work at the site due to bankruptcy issues. EPA took over the RI/FS in October 2016. The Site is currently in the final stage of the RI, and the draft FS Report is expected to be submitted in early 2018.

BAUTSCH-GRAY MINE	05	IL	ILN000510407	HENC	12-31-2022
CEDAR CREEK	05	WI	WID988590261	HENC	06-30-2018
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	05	IL	ILD062340641	HENC	03-31-2022
EAST TROY CONTAMINATED AQUIFER	05	OH	OHSFN0507962	HENC	12-31-2019
GENERAL MILLS/HENKEL CORP.	05	MN	MND051441731	HENC	12-31-2017
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	05	IN	INN000508142	HENC	09-30-2028

The Bautsch-Gray Mine Superfund site is considered “Current Human Exposures Not Under Control” because construction workers, utility workers, trespassers, and recreationalists can be exposed through direct contact with arsenic and lead contaminated soils and mine tailings.
The United States Environmental Protection Agency began addressing direct contact exposures through a series of removal actions completed in 2009and 2012. The Feasibility Study to address the remainder of the Site contamination will be complete in 2017. Public outreach efforts, including fact sheets and public meetings, will continue as cleanup progresses at the Site.

The Cedar Creek site is considered “Current Human Exposure Not Under Control” because humans could be exposed via dermal contact to the PCB-contaminated sediments in the creek and/or by eating the PCB-contaminated fish from the creek. Community outreach has included public meetings and fact sheets. Signs are posted along the creek warning people not to eat the fish or swim/wade in the creek. In addition, a fish consumption advisory has been issued for the creek. The creek runs through a populated area in the center of town, and is adjacent to a large city park. There is evidence that the signs and fish consumption advisories are not effectively preventing exposures to the contaminated sediments. EPA completed the Engineering Evaluation/Cost Analysis in late 2015. On May 31, 2016, EPA signed an Action Memorandum selecting a remedy for the site addressing the contaminated sediments. Following that, the potentially responsible party signed an administrative order on consent to conduct the cleanup, called a "non-time critical removal action". The cleanup began

The DePue/New Jersey Zinc/Mobil Chemical Corp. Superfund site is considered "Current Human Exposures Not Under Control" because surface and subsurface soil samples at off-site residential properties (operable unit 4) exceed health-based residential screening levels for lead, arsenic, and cadmium. This is based on data collected in the 2011 Removal Action Limit Assessment Report as well as the 2013 Off-Site Soils Pilot Study Report, which collected samples from 41 out of 814 properties, including garden areas at 14 properties. Illinois EPA plans to issue a Record of Decision (ROD) by the end of 2017 for portions of operable unit 4. The ROD will require excavation of metals-contaminated soils at residential properties, parks, and alleys. The remaining portions of operable unit 4 have not yet been tested and will be evaluated by 2020.

The East Troy Contaminated Aquifer Superfund site is considered “Current Human Exposure Not Under Control” because residents over the ground-water plume may be exposed to PCE in indoor air via the vapor intrusion pathway. EPA addressed the indoor air health risk by installing vapor abate-ment systems in 16 homes and at the St. Patrick Elementary School in the summer of 2007. VOCs have contaminated groundwater below the City of Troy as well as a local drinking water well field. To address this, Ohio EPA and the City of Troy have taken steps to contain one potential source of the contamination, and are treating contaminated groundwater prior to use as drinking water. As of August 2017, the planned activities to address the vapor intrusion pathway will be evaluated in a Focused Feasibility Study and a remedy will be selected in a Record of Decision in 2018. Community outreach activities have included informational mailings to homeowners, public meeting, and fact sheets.

The General Mills/Henkel Corp. Superfund site is considered “Current Human Exposure Not Under Control” because TCE in groundwater is causing a potential vapor intrusion risk for residences at the Site. The Minnesota Pollution Control Agency (MPCA) has overseen sub-slab sampling and installation of mitigation systems by General Mills, the potentially responsible party. General Mills mitigated approximately 95% of the properties, but has stopped work. MPCA is completing the work. Currently MPCA is installing vapor mitigation for an apartment building. Owners of six residences have refused access for investigation and MPCA is pursuing property affidavits for those properties. The work is expected to be completed by the end of 2017. Informational letters have been sent to all of the potentially affected property owners.

The Jacobsville Neighborhood Soil Contamination Superfund site is considered "Current Human Exposures Not Under Control" because residential properties have lead and arsenic levels in surface soils and soils at depth greater than the site specific risk-based cleanup goals of 400 and 30 ppm, respectively. There is a potential risk to human health through direct contact with lead- and arsenic-contaminated soil should soil be excavated. The first phase of the cleanup began in 2007. Subsequent cleanup phases have taken place in 2008 and 2010-2017. The combined cleanups through the beginning of 2017 have resulted in the removal of lead- and arsenic-contaminated soil from over 2,000 residential properties in Evansville. EPA estimates that a total of 4,000 residential properties will require cleanup. Cleanup of the residential areas is on-going. Information availability sessions are held before and during the remedial work, and fact sheets are periodically mailed to inform residents of the risks associated with the contaminated soil and about the cleanup.

KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	05	IN	INN000510399	HENC	12-31-2018
LUSHER STREET GROUND WATER CONTAMINATION	05	IN	IND982073785	HENC	12-31-2018
MATTHIESSEN AND HEGELER ZINC COMPANY	05	IL	IL0000064782	HENC	09-30-2027
NORTH SHORE GAS SOUTH PLANT	05	IL	ILD984809228	HENC	12-31-2026

The Keystone Corridor Ground Water Contamination Superfund Site is considered "Current Human Exposure Not Under Control" because of actual vapor intrusion (VI) issues discovered in spring 2017. EPA is evaluating the VI exposure pathway as part of the ongoing remedial investigation. In April 2017, preliminary draft results from sub-slab and/or indoor air sampling indicated exceedances of EPA's VI screening levels and/or removal management levels at both residential and commercial/industrial buildings. Shortly after this discovery, during a May 2017 time-critical removal action, EPA installed vapor mitigation systems at two residential properties where indoor air concentrations exceeded removal management levels. EPA anticipates issuing an Interim Record of Decision (ROD) to address impacted commercial/industrial properties, as well as other residential properties where sub-slab and/or indoor air concentrations did not warrant a removal action but would warrant a remedial action. The Interim ROD is currently planned for FY2018. All property owners have been notified of their draft results and informed about ways to reduce short-term exposure to vapors.

The Lusher Street Groundwater Contamination Superfund Site is considered "Current Human Exposure Not Under Control" because local residents may be exposed to Site contaminants of concern (COCs) via groundwater (private drinking water wells) and/or the vapor intrusion pathway. The following six VOCs were identified as COCs in groundwater: 1,1,1,-TCA, Chloroform, PCE, TCE, Vinyl chloride and Benzene. Six VOCs were identified as COCs in vapor, based on soil vapor, sub slab, and indoor air screening although only two of these, trichloroethene and tetrachloroethene, were confirmed to have a complete vapor intrusion pathway. The Indiana Department of Environmental Management provided and maintains water filters on homes whose private wells are impacted by contaminants above drinking water standards. A Record of Decision for Interim Action was finalized in September 2014 and provides for municipal water supply connections to all residents on groundwater within the plume area and provides for installa-tion of vapor intrusion mitigation systems to individual homes with complete pathway for vapor intrusion exposure. A Consent Decree with the potentially responsible parties was entered on March 29, 2016 to complete the municipal water hookups to and install vapor mitigation systems in homes in the main groundwater plume area and vapor intrusion zone.

The Matthiessen and Hegeler Zinc Company (M&H) Site is considered ""Current Human Exposure Not Under Control"" because soil at many properties within the residential portion of the site contains concentrations of lead and other metals above health-based levels. The M&H facility was historically used primarily for mining and smelting activities and is currently inactive, except for a portion operated by Carus Chemical Company which was never involved in smelting activities. The site also includes a large residential area (approximately 5,000 homes) surrounding the former facility. A remedial investigation (RI), which included testing a few hundred of the residential properties, was finalized in 2012. After completion of the feasibility study to evaluate various cleanup options for the site, EPA issued a Record of Decision in April 2017 which selected remedies for all areas of the site.

Thousands of properties will need to be tested during remedial design to determine which properties require cleanup. Given the extent and cost of the required cleanup work, it will be a number of years before the human exposure control status will be considered "under control." During the proposed plan public comment period, EPA held two public meetings and an informational session informing residents of the potential contamination

in the residential area. In addition, EPA mailed information to residents informing them about safe gardening practices to minimize ingestion of contaminated soil. EPA will conduct additional public outreach after the remedial design gets

The NSG South Plant is considered "current human exposure not under control" because industrial and commercial workers, per the baseline risk assessment in the approved Remedial Investigation, could potentially be exposed via direct contact to PAHs and other MGP-related contaminants in subsurface soils. EPA has conducted community interviews and continues to attend monthly meetings with the Waukegan Citizens' Advisory Group to provide relevant information on the contamination found at the site and update members on plans for cleaning up the contamination. An Interim Action Record of Decision for (ROD) for DNAPL remediation was signed in July 2015, with Remedial Design is underway for the DNAPL cleanup. EPA expects remedial action (RA) to be initiated in 2018, with work expected to be completed in 8 years. A final ROD is expected to be issued once the DNAPL cleanup is completed.

OLD AMERICAN ZINC PLANT	05	IL	IL0000034355	HENC	12-31-2020
OTTAWA RADIATION AREAS	05	IL	ILD980606750	HENC	09-30-2024
SANDOVAL ZINC COMPANY	05	IL	ILD053980454	HENC	12-31-2025
SHEBOYGAN HARBOR & RIVER	05	WI	WID980996367	HENC	09-30-2022

The Old American Zinc Plant Superfund site is considered “Current Human Exposure Not Under Control” because soil at some residential properties contains concentrations of lead and other metals above health-based levels. In 2002 and 2003 a removal action was conducted by the PRPs to address lead contamination in residential yards, commercial lots, and vacant lots. Some contaminated residential yards were not cleaned up during the removal action because the owners refused access for the cleanup work. In addition, the March 2009 RI Report documents concentrations of metals, including lead, zinc, cadmium, and arsenic, that exceed long-term health-based limits for human exposure in soils in several other residential yards, vacant lots, and alleyways near the site. Owners of contaminated residential property have been informed, via fact sheets and community interviews, about the contamination and how to control exposures. Contaminated properties will need to be remediated as part of the remedial action
selected in EPA's September 2012 Record of Decision. The selected remedy includes excavation of contaminated soils from residential yards, vacant lots, and alleyways. The remedial design (RD) began in fall 2014, but in April 2016 the potentially responsible party discontinued the RD work at the site due to bankruptcy issues. EPA took over the RD in December 2016 and will conduct sampling of additional off-site properties in summer 2017. EPA anticipates completing the RD by the end of 2018, and expects to negotiate with other PRPs for the performance of the remedial action.

The Ottawa Radiation Superfund site is considered "Current Human Exposures Not Under Control." The site includes sixteen areas of concern; some adjacent to the original facility, and others in the City of Ottawa where, in the past, site-contaminated materials were used as fill. Removal actions were completed at nine of the areas and remedial actions were completed at six of the areas. Current human exposures are under control in these fifteen areas. EPA prioritized the cleanup of those sites because they are in more densely populated areas. The one remaining area (NPL-8) is designated as "Current Human Exposures Not Under Control" because of the potential for exposure via direct contact, ingestion and/or inhalation to trespassers, construction workers, and/or commercial/industrial workers to radium contaminated soils.
EPA has not implemented the remedy at NPL-8. The timing for implementation of NPL-8 remedy is dependent on the availability of state funding for their 50% cost share. NPL-8 is fenced. The structural integrity of the fence is in good condition. There is no evidence of trespassing. NPL-8 is
covered with a dense vegetation. No soil disturbances are observed at NPL-8.
Remedial action at NPL-4 including the auto storage garage was completed the summer 2016.

The Sandoval Zinc Superfund Site is considered "Current Human Exposure Not Under Control" because soil at some residential properties contains concentrations of lead and other metals that exceed health-based levels. Concentrations of lead at some properties are well above 400 parts per million (ppm), United States Environmental Protection Agency (EPA) Region 5’s current interim default lead cleanup number for residential exposure. Additionally, some of those properties exceed 1200 ppm and are being evaluated for potential removal actions. EPA conducted lead bioavailability testing during the summer of 2017, and also conducted extensive outreach to inform the community about site status and how to mitigate the risks posed by lead-contaminated soil. EPA is preparing the feasibility study and expects to issue the Record of Decision in early 2019 to select a remedy to address the lead-contaminated soils.

The Sheboygan River and Harbor Superfund site is considered ""Current Human Exposure Not Under Control"" because of human ingestion of contaminated fish. Fish contaminants of concern are PCBs and heavy metals, including arsenic, chromium, copper, lead, and zinc. There is a fish advisory in place and numerous signs are posted throughout the area warning against fish consumption, however, fishing has been observed. Fish are taken off-site and likely consumed. During the remedial action, approximately 33,000 cubic yards of PCB-contaminated sediment were dredged from the Upper River and approximately 50,000 cubic yards were dredged from the Lower River and Inner Harbor. The remedial action sediment dredging work in the river was completed in December 2012. Monitored natural recovery is the selected remedy for the Middle River. Although the active cleanup work is complete, it may take some time for sediments to reach the selected long-term cleanup level and for fish tissue concentrations to decrease.

ST. LOUIS RIVER SITE	05	MN	MND039045430	HENC	12-30-2030
TEN-MILE DRAIN	05	MI	MIN000510063	HENC	09-30-2022
TOWN OF PINES GROUNDWATER PLUME	05	IN	INN000508071	HENC	12-31-2017
U.S. SMELTER AND LEAD REFINERY, INC.*	05	IN	IND047030226	HENC	12-31-2019

The St. Louis River Superfund site is considered "Current Human Exposure Not Under Control" because trespassing recreational users of both the St. Louis River/US Steel and St. Louis River/Interlake/Duluth Tar (SLRIDT) portions of the Site can be exposed through direct contact to contaminated soil and sediments (US Steel) and tar seeps (SLRIDT). The site is currently designated as State Enforcement Lead. Contaminated portions of both areas are fenced to prevent access; however, there is evidence of site trespassing. The State issues regular fact sheet mailings to the local community and periodically holds public meetings to inform the public about continuing risks and cleanup progress. The PRPs have completed several phases of cleanup under State oversight in both areas. Tar seep cleanup at SLRIDT and sediment cleanup at US Steel are expected to be completed by PRP actions in the coming several years, but the remaining soil cleanup at US

The Ten-Mile Drain Superfund Site is considered "Current Human Exposures Not Under Control" because EPA identified several residential properties with elevated concentrations of polychlorinated biphenyls (PCBs) in soils. EPA conducted a removal action in 2014 to address 10 properties with PCB concentrations exceeding removal action levels, but approximately 10 other properties remain with PCB concentrations exceeding likely remedial action cleanup levels. EPA is developing cleanup options and plans to issue a Record of Decision in FY18 for the residential/commercial properties. EPA implemented a second interim remedial action at the site in summer 2015 to address the highly-impacted backfill and bedding materials adjacent to two manhole vaults, and the 120-foot concrete pipe beneath Harper Avenue connecting these two vaults within the Ten Mile drain utility corridor. EPAis also developing cleanup options for the remainder of the site, including sediments in the Lange and Revere Street canal. In addition, fish in the Lange and Revere Street canals are contaminated above Michigan Department of Health and Human Services (MDHHS) health-based levels for human consumption due to PCBs, after which MDHHS has issued a "do not eat advisory" for fish taken from the canals. Furthermore, the EPA's site-wide human health risk assessment concluded that for fish consumption exposures by recreational anglers exceeded the hazard index threshold and target risk range for both adult and children receptors. EPA has observed people ice-fishing and believes the fish are being consumed. PCBs continue to infiltrate into the Ten Mile storm sewer drain system, which empties into the Lange and Revere Street canals connected to Lake St. Clair. The MDHHS periodically sends a mailing to the residents who live along the canals and to local schools, with the "Eat Safe Fish" guidelines for Lake St. Clair, and EPA hosts public meetings to provide updates on the progress of the Superfund site and upcoming activities.

The Town of Pines Superfund Alternative site is considered "Current Human Exposure Not Under Control" because a number of properties, including residential yards and a municipal park, were found to have levels of arsenic well above removal action levels. The soils impacted included surficial soils that could be inhaled or ingested through normal use. The planned activities to address this pathway include a time critical removal action. All property owners have been notified, and the removal action is on-going, and expected to be completed in the fall of 2017.

The U.S. Smelter Lead and Refinery, Inc. Site is considered "Current Human Exposures Not Under Control." During the remedial investigation (RI), EPA sampled more than 90 of the roughly 1,200 properties in operable unit 1 (OU1), the residential portion of the site. About half of the sampled properties had lead levels exceeding the 400 ppm selected cleanup level. EPA contacted those residents whose yards were sampled and informed them of their lead levels. EPA provided guidance to everyone whose property was sampled regarding how to reduce their risk of lead exposure, and EPA has repeatedly shared this guidance at public meetings for the site. Additionally, 29 properties with lead levels exceeding 1,200 ppm have been remediated through time-critical removal actions. The remaining contaminated properties identified during the RI, as well as other contaminated properties that will be identified through remedial design (RD) sampling, will be addressed by the upcoming remedial action (RA). EPA selected a remedy for OU1 in a November 2012 Record of Decision. The selected remedy for OU1 includes excavation and off-site disposal of contaminated soils. EPA reached a settlement with two potentially responsible parties (PRPs) in late 2014 that addresses two-thirds of OU1. The settlement requires the PRPs to (1) fully fund the RD and RA work to be conducted by EPA, and (2) implement the transportation and disposal portion of the RA work. EPA's RD work is complete. EPA has initiated excavation work in Zones 2 (under the removal program) and 3 of the site. Demolition of the West Calumet Housing Complex in Zone 1 is expected to be completed in 2018, and the Zone 1 remedy will be amended and completed after that. EPA will continue to inform residents as to the lead and arsenic concentrations in their yards as EPA samples properties and finalizes data.

VALLEY PIKE VOCS	05	OH	OHN000510489	HENC	01-20-2027
VELSICOL CHEMICAL CORP. (MICHIGAN)*	05	MI	MID000722439	HENC	09-30-2026
LITTLE SCIOTO RIVER	05	OH	OHN000509950	HENC	06-18-2028

The Valley Pike VOCs Superfund Site is considered "Current Human Exposure Not Under Control" because groundwater, soil and indoor air have been contaminated by volatile organic compounds (VOCs), including tetrachloroethylene (PCE) and trichloroethylene (TCE). Data from 2011-2015 investigations lead by the Ohio Environmental Protection Agency and the United States Environmental Protection Agency (EPA) have shown that indoor air at certain residences at the site has been contaminated by VOCs above the Ohio Department of Health screening levels. In 2013, the EPA Removal Program began activities to address the vapor intrusion pathway by sampling at homes and installing vapor mitigation systems in homes where VOCs exceed public health screening level values. In January 2016, Mullins Rubber Products, Inc. agreed to conduct a removal action which includes evaluation and mitigation of residential vapor intrusion and a source control action under EPA oversight.

The Valley Pike VOCs site was finalized on the National Priorities List (NPL) on September 9, 2016. Currently the EPA Remedial Program is conducting negotiations for a Remedial Investigation (RI) and Feasibility Study. There is limited data regarding groundwater contamination from Valley Pike VOCs, and the RI will include a comprehensive groundwater investigation to gather further information. The site is located near the Dayton Mad River Well Field to the south, and the Dayton Miami Well Field to the west. Collectively, these well fields provide drinking water for approximately 400,000 residents in Dayton and Riverside. Both towns municipalities monitor the wells in their distribution system to ensure that safe drinking water is being provided to the residents.

EPA prepared a Multi-Site Community Involvement Plan (CIP) to engage and support the community affected by three Superfund sites located in Montgomery County, Ohio. This CIP focuses on the Behr Dayton and Valleycrest Landfill sites in Dayton, and the Valley Pike site in Riverside. See the CIP at: https://semspub.epa.gov/src/document/05/919629. Outreach activities included an informal open house and public meeting, development and distribution of fact sheets for homes within the impacted neighborhood, and interviews regarding the contamination and removal efforts at the site. Since the NPL

The Velsicol Chemical Corp. (Michigan) site is considered "human exposures are not under control" until the completion of the remedy on the former Site plant property. The former Site plant property is fenced but hazardous chemicals remain uncontrolled on-site under an inadequate landfill cap. Hazardous substances that have been released at the Site in soil, sediment and groundwater include dichlorodiphenyltrichloroethane (DDT), polybrominated biphenyls, hexabromobenzene, 1,2-dibromo-3-chloropropane and chlorobenzene, among others. In June 2012, EPA signed a Record of Decision for the former plant property. The remedial action objectives include prevention of ingestion, inhalation, and direct contact of site-related contaminants of concern in soil and groundwater to human and ecological receptors. While fish tissue data has shown a significant decrease in DDT concentrations as a result of the sediment clean up, fish consumption advisories remain in place for the Pine River fish. Warning signs advising against eating fish are also posted at river access points. At the former plant property, the two largest contaminated areas are referred to as Areas 1 and 2. The following remedy implementation is in process: in situ thermal treatment of Area 1, in situ thermal treatment design for Area 2, and groundwater modeling for groundwater pump and treatment system. The following remedy implementation is slated to occur in the future: cleanup design for additional potential source areas, predesign investigation for groundwater collection trench, construction design for a vertical barrier wall, and construction design of an engineered cap. The community is kept up to date on the site and any potential site risks through mailings of factsheets, and holding public meetings and availability sessions.

The Little Scioto River site is considered "Current Human Exposure Not Under Control" due to contaminated sediment in the Little Scioto River, operable unit (OU) 1. The risks are driven by potential exposure to carcinogenic polyaromatic hydrocarbons (PAHs) and benzo(a)pyrene equivalents in the sediment. A Proposed Plan was provided to the public and comments were received. The response from the public was positive to the recommendation in the Record of Decision. EPA issued a Record of Decision on June 17, 2016 to address OU 1. The Baker Wood Creosoting facility, OU 2, has soil and groundwater contamination as well as non-aqueous phase liquids in the soil and groundwater. EPA will address OU 2 at a later date once Ohio EPA completes enforcement proceedings at Baker Wood and an adjacent site. EPA will ensure any

BANDERA ROAD GROUND WATER PLUME	06	TX	TXN000606565	HENC	09-30-2019
DONNA RESERVOIR AND CANAL SYSTEM	06	TX	TX0000605363	HENC	09-30-2026

The Bandera Road Ground Water Plume site is considered "Current Human Exposure Not Under Control" due to contaminated soil, vapor, indoor air, and groundwater. The site RI has been completed and the 2013 ROD selected remedies for soil, vapor, indoor air, and groundwater contamination. The start of the remedial design/remedial action is pending enforcement negotiations with the PRPs. However, all residents whose drinking water wells were found to be impacted by PCE contamination, have been hooked up to the local public water supply for their drinking water needs, eliminating the exposure pathway for contaminated ground water. The indoor air exposure pathway has been addressed, in the short term, by interim actions at two impacted buildings in AOI1. However, follow-up monitoring is needed to verify if those interim indoor air systems continue to be protective, in the short-term. The HE Determination is driven in the short-term by insufficient data to verify protectiveness for indoor air. Ground water is supplied by the Leon Valley municipal system, so that pathway is no longer complete. To ensure that Human Exposure is under control for the long-term, the source of the contamination to both ground water and indoor air must be mitigated. The Site determination should remain as "Current Human Exposure Not Controlled" until the vapor source is mitigated and the exposure pathway is eliminated, as the remedy is implemented. EPA plans to monitor and verify the indoor air levels and will take action to ensure that the necessary steps will be taken to address any unacceptable exposure. The community will be kept informed if any unacceptable exposure is detected and advised on follow-up actions.

The Donna Reservoir and Canal System site is currently designated as "Human Exposure Not Under Control" as a result of PCB-contaminated sediments and PCBs that are bioaccumulating and biomagnifying in fish tissue at the site.

An Institutional Control (IC), in the form of an aquatic life order, has been implemented at the reservoir and canal system (DRCS) for a number of years. The Texas Department of State Health Services (TDSHS) issued "Aquatic Life Order Number 9" in February 1994. This order stated that ". . . the Donna Irrigation System [Donna Site] located in Hidalgo County is declared a prohibited area for the taking of all species of aquatic life." According to a sign posted by the Texas Department of Health at Donna Lake, there is a $500 fine for keeping fish from the reservoir and canal system. This sign also states that, "Warning, it is illegal to possess fish from this water, fish caught from this water may contain harmful chemicals." The enforcement authority for this order is the Texas Parks and Wildlife Department (i.e., Game Wardens). The EPA expects that the TDSHS's aquatic life order will remain in place under all of the appropriate alternatives described in the Proposed Plan.

Informational ICs include the information distributed by the TDSHS concerning PCBs and the cooking options for fish caught from the DRCS. This document is titled "Guide on Fish Consumption and the Effects on Human Health" (Publication No. 09-14639, July 2015). To increase the awareness of the prohibitions on the taking of fish from the DRCS, each alternative would include enhanced outreach efforts conducted by the EPA, TDSHS, and other entities associated with the Site, and emphasize that they will remain in place during and after remediation until the Remedial Action Objectives identified in the Record of Decision have been achieved.

Other informational ICs include the fact sheets and pamphlets, in both English and Spanish, distributed by the TDSHS to the staff/owners of sixty restaurants located in Donna and Alamo. These visits, conducted from June 3 thru June 5, 2013, were prompted by a report that local residents were selling the fish to local restaurants.

The EPA and county representatives (Precinct 2) are currently considering access restrictions to Donna Lake, in the form of security gates. Several issues related to implementation will need to be resolved. The Donna Irrigation District, the owner/operator of the Site, is currently considering placing signs at the Donna Reservoir, constructed within the waters of the lake to prevent vandalism. The EPA is also considering the implementation of land use and zoning restrictions in the Proposed Plan.

The EPA's Superfund program has been working closely with the EPA's Environmental Justice program to address the concerns of the local communities and the non-governmental organizations. The concerns are mainly that anglers continue to have access to the reservoir and canal system and continue to consume the fish known to be contaminated with polychlorinated biphenyls, chemicals that are known to cause cancer and non-cancer effects.

JONES ROAD GROUND WATER PLUME	06	TX	TXN000605460	HENC	09-28-2018
MARION PRESSURE TREATING	06	LA	LAD008473142	HENC	09-21-2018
TAR CREEK (OTTAWA COUNTY)*	06	OK	OKD980629844	HENC	02-20-2038
WEST COUNTY ROAD 112 GROUND WATER	06	TX	TXN000606992	HENC	09-30-2021
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	07	MO	MOD981126899	HENC	12-31-2025

The Jones Road Ground Water Plume Superfund Site is considered Human Exposure Not Under Control because residents are dependent on private wells for their domestic water supply and can be exposed to a tetrachloroethene (and other chlorinated solvent degradation products) plume in the ground water. In November of 2008, an alternate water supply line was completed and 144 residential and commercial users were connected to a municipal water supply system. A small number of residences chose not to be connected to the municipal supply and may still be exposed to the contaminated ground water. On September 29, 2017, EPA amended the Record of Decision to addressetwo key soil zones, the Shallow Source Area Soil and the Deep Unsaturated Chicot Sand, with vapor-phase contaminant concentrations with the potential to impact the underlying groundwater in the "Shallow Water-Bearing Zone" ("Shallow WBZ") and the "Deep Chicot Aquifer". The purpose of the Selected Remedy is to implement a sitewide strategy to reduce the source of contaminants in the soil to the underlying groundwater. EPA ensures community members know about and participate in site issues and activities by awarding a Technical Assistance Grant to a local citizens' group, conducting community interviews, implementing a community relations plan, briefing local government officials, holding public meetings and/or availability sessions, mailing fact sheets about the site to residents, publishing ads in local newspapers; and assigning an EPA Community Involvement Coordinator to the site to answer community member questions and concerns. Additional community involvement activities will occur throughout the Superfund activities for the site.

The Marion Pressure Treating Company Superfund Site is considered "Current Human Exposure Not Under Control" due to creosote contamination in sediment and soil. Creosote has impacted the groundwater beneath the site, however residents are on a public water supply that is not impacted. The site Feasibility Study Reassessment has been completed. An Amended Record of Decision was issued on September 30, 2016 to address the creosote contamination in source material. The groundwater will be monitored and an Amended Record of Decision for groundwater will be issued at a later date. The site is fenced and secured with warning signs that this is a Superfund site.

The Tar Creek site is considered Human Exposure Not Under Control because local communities may be exposed to lead in soils, chat piles, chat bases, and mill ponds. Tribal members live throughout the area and eat plants grown on, or animals feeding near, the contaminated areas, and some people continue to trespass and use the contaminated areas for recreational purposes. The contaminated area is vast, and it is not possible to prevent all access to the waste. Consequently, EPA is overseeing the cleanup of contaminated source areas and conducting community outreach to educate people with respect to avoiding exposure to the contamination. These actions will significantly reduce the exposure of Tribal members to the contamination. In addition, the voluntary buyout EPA worked with the State of Oklahoma to perform in the former mining towns of Picher, Cardin, and Hockerville was completed in 2011. This effort relocated more than 700 residences. With this milestone achieved, and the continued outreach efforts in adjacent communities that are within the site's boundary, EPA views the exposure to site contamination to be Under Control within those areas.

The West County Road 112 Ground Water site is currently designated as "Human Exposure Not Under Control" due to chromium contaminated ground water that has impacted private residential water supply wells used for drinking water. The State of Texas has installed and maintains filtration systems pending the availability of a public water supply line. An alternative water supply is not currently available for this Site. Groundwater monitoring is continuing to determine if other residential wells are being impacted.

The Big River Mine Tailings/St. Joseph Mineral Superfund site is considered Human Exposure Not Under Control because lead-contaminated waste piles and residential yard soils remain unaddressed. Contaminated soil and sediments pose a direct contact and ingestion threat to young children and pregnant women. The planned activities to address this pathway were a series of removal actions to stabilize waste piles, replace highly contaminated surface soil in residential yards and child high-use areas, and complete two remedial actions to address remaining yard soils and watershed sediments. A total of 2,100 yards have been sampled. Of those 1,775 had one or more areas > 400 parts per million lead. Over 300 removals have been completed where high levels of lead were found in residential properties or where children with elevated blood lead were identified. The third of seven mine waste piles is nearly stabilized. Stabilization Activity is ongoing at the fourth and fifth of seven mine waste piles. Surface water, sediment, and various forms of biota contain elevated concentrations of lead throughout the mining area. Fish in Big River have shown elevated concentrations of lead. Fish advisories have been in place at the site since 1981. EPA has worked with the St. Francois County Watershed Group, a group of local concerned citizens and other federal and state agencies, to help educate the community on the effects of lead contaminated soil, sediment, and surface water.

CHEROKEE COUNTY	07	KS	KSD980741862	HENC	09-30-2022
FORMER UNITED ZINC & ASSOCIATED SMELTERS	07	KS	KSN000705026	HENC	09-30-2020
MADISON COUNTY MINES	07	MO	MOD098633415	HENC	09-30-2020
NEWTON COUNTY MINE TAILINGS	07	MO	MOD981507585	HENC	06-30-2019

The Cherokee County Superfund site is considered Human " Exposure Not Under Control" because children and pregnant women can be exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. Many residential properties are located immediately adjacent to lead contaminated mine waste piles. These piles are used for recreation by nearby residents including young children, and are also a continual source of contamination to nearby soil and surface water through run-off and movement of the mine waste for other purposes. Mine waste cleanups and health education have been successfully implemented in many portions of the site; however, there are additional areas that remain to be addressed. EPA issued a Record of Decision (ROD) Amendment in 2006 to address the remaining mine waste in Cherokee County. The cleanup plan would consolidate and cover the mine waste as much as possible to minimize the potential for exposure, and implement controls to maintain the integrity of the capped areas. Cleanup work began in 2008 on the remaining areas and is currently ongoing.

The Former United Zinc and Associated Smelters Superfund site is considered "Current Human Exposure Not Under Control" because lawns of homes are contaminated with lead. Children six years of age and younger living at these homes have direct exposure to lead contaminated soil.

EPA is continuing to perform a time critical removal action on highly contaminated (i.e. lead concentrations above 800 parts per million) soil at residential properties. A proposed plan to address residences between 400 and 800 parts per million is being written. This plan will be made available for public comment during the summer. Comments received during the comment period will be considered while the Plan is finalized into a Record of Decision. The Record of Decision will be completed by September 30, 2016. The cleanup described by the ROD is planned to begin in the Summer of 2017.

The Madison County site is considered Human Exposure Not Under Control due to ongoing exposures to heavy metals. Surficial mine and mill waste is the source of the heavy metal contamination at the site, which has affected surface soil, sediment, surface water, groundwater, and fish tissue. The heavy metal of most urgent concern with regard to human health at the site is lead. A significant site-related health risk is to children from elevated levels of lead in soil at unremediated residential properties. Another potential health risk would be exposure of pregnant commercial workers to elevated levels of lead in soil. Additional exposure scenarios of potential concern include ingestion of groundwater in current residential wells by residents and commercial workers; hypothetical future ingestion of groundwater at mine areas by residents and commercial workers; ingestion and inhalation of soil at mine areas by ATV riders; ingestion of fish by both child and adult recreational visitors at some of the mine areas; and ingestion of surface water, sediment, and floodplain soil by a recreational child at some of the mine areas.

In response, the EPA Superfund program has made a concerted effort to protect human health at the site. To date, EPA has sampled the majority of residential properties in Madison County and has removed lead-contaminated residential soil at over 800 of the most highly contaminated properties as part of time critical removal actions. As a result of these cleanups, the site has been designated as Some Exposure Control Achieved. Due to extensive investigation activities, it is estimated that over 1,000 additional residential properties in Madison County will require soil remediation as a result of elevated heavy metal concentrations. The EPA issued an Interim Record of Decision for soil at residential properties in July 2008. The RA contract for addressing approximately 800 residences was issued in September 2008 and construction began in Janurary 2009.

The Newton County Mine Tailings Site is considered Human Exposure Not Under Control people can be exposed to lead contamination through direct contact and ingestion of contamination soil and dust. Mine waste piles containing high concentrations of lead and other heavy metals are located on approximately 1,000 acres of land throughout this county wide site. These waste piles cause lead and other heavy metals contamination in surrounding soils, groundwater, and surface water resulting in potential exposure of people living on the site, drinking shallow groundwater, or recreating on the piles. EPA identified unacceptable levels of lead in the yard soil at approximately 300 residential properties in the site. The cleanup of those contaminate yards has been completed. However, many residences are located immediately adjacent to the uncontrolled mine waste piles. These piles are used for recreation by nearby residents including young children. The piles are also a continual source of contamination to nearby soil, including residential yards, and surface water through erosion and run-off. EPA has completed a remedial investigation of the mine waste piles and is currently preparing a feasibility study to determine appropriate methods to control the risks to human health. A Record of Decision that will describe the cleanup plans for the mine waste piles is scheduled for 2010.

OMAHA LEAD	07	NE	NESFN0703481	HENC	09-30-2022
ORONOGO-DUENWEG MINING BELT	07	MO	MOD980686281	HENC	12-31-2020
PCE FORMER DRY CLEANER	07	IA	IAD039954300	HENC	09-30-2018
PLATING, INC.	07	KS	KSD065735912	HENC	09-30-2020
SOUTHWEST JEFFERSON COUNTY MINING	07	MO	MON000705443	HENC	06-23-2022

The Omaha Lead Superfund site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. EPA has completed soil remediation at more than 3,800 highly contaminated residential properties at the Omaha Lead Site and these actions are ongoing. EPA plans cleanup for an additional 10,000 residential properties with more moderate levels of contamination. EPA is actively funding health education activities in the Omaha community to increase awareness and reduce exposure levels during the period until the soil cleanup is completed for all affected properties. There are a number of action community groups including the OLS Community Advisory Group, Lead Safe Omaha Coalition, and Omaha Healthy Kids Alliance. EPA has entered into partnering agreements with the city, county, and state governments to implement the cleanup.

The Oronogo-Duenweg Mining Belt Superfund site is considered Human Exposure Not Under Control because children and pregnant women can be exposed to lead contamination through direct contact and ingestion of contaminated soil and dust. Mine waste piles containing high levels of lead and other heavy metals are located on approximately 7,000 acres of land throughout this county wide site. These waste piles cause lead and other heavy metals contamination in surrounding soils, groundwater, and surface water resulting in potential exposure to people living in the site, drinking the shallow groundwater, or recreating on the waste piles. EPA identified unacceptable levels of lead in the yard soil at 2,700 residential properties in the site. The cleanup of those contaminated yards has been completed. Also, alternate sources of drinking water have been provided to homes with lead and cadmium contaminated groundwater used as drinking water throughout the site. However, many residential properties are located immediately adjacent to lead contaminated mine waste piles. These piles are used for recreation by nearby residents including young children, and are also a continual source of contamination to nearby soil and surface water through run-off. Significant development within the communities has also resulted in encroachment of new housing into contaminated mine areas with new homes being built very near mine waste piles. EPA has issued a Record of Decision to address the mine waste at the site, and the remedial action has begun on a portion of these waste piles. The remedial action will consolidate and cover the mine waste to minimize the risk of exposures. EPA will develop controls to maintain the integrity of these wastes. Due to the large size of this site, it is expected the cleanup action will take approximately ten years to complete. Existing institutional controls on the use of contaminated areas as residential property are in place. Extensive public outreach by EPA and the local health department are helping to inform the communities about the dangers of exposure to the mine waste area.

The PCE Former Dry Cleaner Superfund site is considered 'Current Human Exposure Not Under Control' because the vapor intrusion pathway requires additional investigation/evaluation. PCE is the main COC associated with the site. Additional rounds of vapor intrusion sampling is warranted to ensure exposures above risk based levels are not occurring.

The Plating, Inc. site was put on the National Priorities List on March 19, 2008 due to high concentrations of hexavalent chromium in groundwater. Human Exposure is not under control because at least two private wells are contaminated with hexavalent chromium. There have been several discussions (internal to EPA) to try and come up with a risk number that would be relevant to this site. There is no Maximum Contaminant Level for hexavalent, only total chrome which is 100 ppb. In 2010, Region 7 came up with a regional policy to support the use of 3.5 ppb (at 10-4 level) as a human health risk number for hexavalent chromium in drinking water. If the Region continues to use the 3.5 ppb number, the number of wells affected by the contaminated groundwater will increase to about 20 wells. Planned activities to bring HEUC is to have Superfund and Risk Managers determine if 3.5 ug/L will continue to be used as the drinking water risk number for hexavalent chromium. If the 3.5 ug/L number is used, a proposal to remove the Plating, Inc. building and its source area will be initiated to cut-off the source of the contamination in the groundwater. The proposal will also need to include bottled water for residents with contaminated drinking water.

The Southwest Jefferson County Mining Site is considered "Human Exposure Not Under Control" because lead contamination in soil exceeds health-based criteria in hundreds of residential properties. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through direct contact and ingestion of contamination soil and dust. As of April 20, 2009, EPA has completed remediation of soil at 129 residences. Residential soil remediation is ongoing as an additional 294 properties have been identified with elevated lead contamination that will need to be addressed. Site assessment activities are ongoing as all of the properties at the site have not been screened for soil lead contamination. 41 properties have been identified lead contamination exceeding the federal drinking water standard and are currently being provided an alternative drinking water source under CERCLA removal authority.

WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	07	MO	MON000705842	HENC	09-30-2020
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	07	MO	MON000705027	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	07	MO	MON000705023	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	07	MO	MON000705032	HENC	09-30-2043
ACM SMELTER AND REFINERY	08	MT	MTD093291599	HENC	09-30-2030
ANACONDA CO. SMELTER	08	MT	MTD093291656	HENC	12-31-2022

The Washington County Lead District-Furnace Creek site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through ingestion of soil, dust and groundwater. Time critical removal actions to replace lead-contaminated surface soil have been completed at 169 properties. Cleanup is ongoing. In addition, an alternative drinking water supply is being provided to 16 residences. Remedial action for an additional 293

The Washington County Lead District-Old Mines site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria in hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through ingestion of soil, dust and ground water. Time critical removal actions to replace lead-contaminated surface soil had been completed at 54 properties. Cleanup is ongoing. In addition, an alternative drinking water supply is being provided to 102 residences.

The Washington County Lead District-Potosi site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria at hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through ingestion of soil, dust, and groundwater. Time critical removal actions to replace lead-contaminated surface soil has been completed at 181 properties. An alternative drinking

The Washington County Lead District-Richwoods site is considered Human Exposure Not Under Control because lead contamination in soil exceeds health-based cleanup criteria at hundreds of residential properties. The lead concentration in private drinking water wells also exceeds the Federal Drinking Water Standard at numerous properties where only bottled drinking water and point-of-use filters are being employed. The target population is children under seven years of age and pregnant women that are exposed to lead contamination through ingestion of soil, dust and ground water. Time critical removal actions to replace lead-contaminated surface soil had been completed at 18 properties. Cleanup is onging. An alternative drinking water supply is being provided to 42 residences.

The ACM Smelter & Refinery Superfund site is considered "Current Human Exposure Not Under Control" because residents can be exposed, through direct contact, to lead and arsenic in contaminated source materials and residential soils. EPA has completed the remedial investigations. As of September 2017, the planned activities to address this exposure are to finalize a record of decision in early 2018, followed by the remedial designs and implementation of the selected remedies in 2018/2019 to reduce exposures to contaminated source areas and lead and arsenic soils. EPA has already completed a removal action to remove contaminated soils associated with a residential development. EPA has also coordinated with the Montana Department of Transportation to remove and treat contaminated waste associated with a street project. EPA has coordinated with the Potentially Responsible Party to reduce exposures to waste and soils in the community park. EPA continues to coordinate with the Cascade County Health Department to provide residents with information to reduce exposures to potentially contaminated sources and residential soils.

The ACM Smelter & Refinery Superfund site is considered "Current Human Exposure Not Under Control" because residents can be exposed, through direct contact, to lead and arsenic in contaminated source materials and residential soils. EPA has completed the remedial investigations. As of September 2017, the planned activities to address this exposure are to finalize a record of decision in early 2018, followed by the remedial designs and implementation of the selected remedies in 2018/2019 to reduce exposures to contaminated source areas and lead and arsenic soils. EPA has already completed a removal action to remove contaminated soils associated with a residential development. EPA has also coordinated with the Montana Department of Transportation to remove and treat contaminated waste associated with a street project. EPA has coordinated with the Potentially Responsible Party to reduce exposures to waste and soils in the community park. EPA continues to coordinate with the Cascade County Health Department to provide residents with information to reduce exposures to potentially contaminated sources and residential soils.

BARKER HUGHESVILLE MINING DISTRICT	08	MT	MT6122307485	HENC	03-31-2032
CALIFORNIA GULCH	08	CO	COD980717938	HENC	03-31-2021
CARPENTER SNOW CREEK MINING DISTRICT	08	MT	MT0001096353	HENC	12-31-2026
CENTRAL CITY, CLEAR CREEK	08	CO	COD980717557	HENC	09-30-2019
COLORADO SMELTER	08	CO	CON000802700	HENC	03-31-2027

The Barker Hughesville Mining District Superfund site is considered "Current Human Exposure Not Under Control" because residents and recreationalists can be exposed, through direct contact, to mine waste containing thallium, manganese, lead and arsenic in contaminated source materials and residential soils. EPA has completed the remedial investigations. As of September 2017, the planned activities to address this exposure are to finalize a record of decision in 2018, followed by the remedial designs and implementation of the selected remedies anticipated in 2020 to reduce exposures to contaminated source areas. EPA has already overseen the completion of two Potentially Responsible Party (PRP)-lead removal actions to the waste rock and tailings associated with the Block P Mining Complex that resulted in over 500,000 cubic yards of waste being placed in an onsite repository. EPA also continues to provide residents and recreationalists with information to reduce exposures to potentially contaminated sources and residential soils.

The California Gulch site is considered "Current Human Exposure Not Under Control". The Parkville Water District supplies water to the majority of homes and businesses in the area. The OU12 Site-wide Water Quality remedy is in the remedial action phase to address groundwater contamination. The institutional controls limiting use of the groundwater, once implemented, will prevent unacceptable human exposure to contaminants of concern. Routine ground water monitoring indicates that contaminant levels have generally declined or remain stable. Human exposure to lead in soils is no longer occurring in the populated residential areas in Operable Unit 9. This area (OU9) was remediated and deleted from the National Priorities List on September 21, 2011. The Lake County Community Health Program is implementing phase two of a blood-lead testing, outreach and education program. Under this Program, if a child's blood lead test results are elevated, the home drinking water is one of the potential sources tested for lead. EPA has an ongoing community outreach program including continuing to provide residents and recreationalists with information to reduce exposures to potentially

The Carpenter Snow Creek Mining District Superfund site is considered "Current Human Exposure Not Under Control" because permanent and seasonal residents can be exposed, through direct contact, to lead and arsenic in contaminated residential soils. As of September 2017, the planned activities to address this pathway at OU1 are to implement the selected remedial action to remove soils contaminated with lead and arsenic, and to implement institutional controls. A Record of Decision is planned for 2018 for OU2. EPA worked with ATSDR and the County Health Department on a fact sheet to provide the community with information on how to reduce exposures to potentially contaminated sources.

The Central City, Clear Creek Superfund Site is considered "Current Human Exposure Not Under Control" because human health hazards from this site involve potential exposure to heavy metals (primarily lead, arsenic and cadmium), from historic mining activities. As of September 2017, remedial activities at this site involve treatment of contaminated water and capping of tailings and waste rock piles. Impacts to the remedy from potential development and changes in future land use are being considered as well as the need for additional community outreach. A water treatment plant designed to remediate heavy metals at North Clear Creek was completed in March 2017. EPA is working to address unacceptable exposures.

The Colorado Smelter Superfund Site is considered "Current Human Exposure Not Under Control" because residents are being exposed to lead and arsenic in contaminated residential soils and, in some cases, to contaminated indoor dust from former smelting operations. The Site was placed on the National Priorities List in December 2014 and remedial investigations are underway. Initial sampling results from some residences indicated elevated levels of lead and arsenic in the residential soils and indoor dust. Emergency removal actions were conducted to address the indoor dust at 27 residences. A plan proposing an early interim action was issued for the residential properties in Operable Unit 1 in July 2017. EPA expects to sign a Record of Decision in September 2017 and begin additional cleanups of residential soils and indoor dust soon thereafter. EPA has an extensive and ongoing community outreach program. This includes working with the Pueblo City County Health Department who conducts blood-lead testing, consumer product testing, and an outreach and education program in the Site study area.

JACOBS SMELTER	08	UT	UT0002391472	HENC	09-30-2022
LIBBY ASBESTOS SITE	08	MT	MT0009083840	HENC	12-31-2022
STANDARD MINE	08	CO	CO0002378230	HENC	12-31-2018
UPPER TENMILE CREEK MINING AREA	08	MT	MTSFN7578012	HENC	09-30-2027
US MAGNESIUM	08	UT	UTN000802704	HENC	09-30-2022

The Jacobs Smelter Superfund site is considered "Current Human Exposure Not Under Control" because human exposure to lead and arsenic through inhalation or ingestion of contaminated soil is possible. Remedial action has not been implemented at the Waterman Smelter and B&B subdivision portions of Operable Unit 2 (OU2). Some work has been completed by the Bureau of Land Management on OU5, however, the sufficiency of this work has yet to be determined. EPA plans to conduct additional investigative work at OU6 to assess the potential ecological and human health exposures. Cleanup activities have been completed at OU1, OU3, OU4 and at the Rawhide Ranchettes subdivision in OU2. These areas are protective of human health and the environment. Community outreach is being conducted and informational signs have been installed.

The Libby Asbestos Superfund Site is considered "Current Human Exposure Not Under Control" due to current and ongoing exposures to soil and building materials contaminated with Libby Amphibole asbestos. EPA selected a final remedy in early 2016 for residential and commercial properties in the communities of Libby and Troy (Operable Units 4 and 7), transportation corridors (OUs 6 and 8), and an industrial park (OU5). EPA has completed investigations at more than 7,500 properties and cleanup at 2,400 of these properties. EPA estimates that fewer than 100 additional properties will require cleanup. OUs 1, 2 and 5 (the former export plant, former screening plant, and the industrial park), where remedial actions are complete, are considered under control for human exposures. Investigations are underway at the former mine site (OU3). There are known elevated concentrations of Libby Amphibole asbestos which may pose a risk of exposure. Access to the area is controlled pending completion of EPA investigations and development of a Feasibility Study to evaluate alternatives to address the contamination. EPA has an extensive community outreach program including continuing to provide residents and recreationalists with information to reduce exposures to potentially contaminated sources.

The Standard Mine Site is considered “Current Human Exposure Not Under Control” because recreational All-Terrain Vehicle (ATV) users can be exposed to manganese dust while riding ATVs across waste rock piles containing high levels of manganese. As of September 2017, the planned activity to address this pathway is to cap the remaining waste rock piles with either soil/rock caps or a vegetative cover. Community outreach is being conducted.

The Upper Tenmile Creek Mining Area Site is considered to have the status of "Current Human Exposure Not Under Control" for direct contact and ingestion. This determination is based the potential for direct contact with contamination by the residents of the four remaining residential properties that have arsenic and/or lead levels which exceed the Record of Decision action levels and through recreational exposure to unreclaimed mine wastes and discharging acid mine drainage in the watershed. EPA continues to conduct cleanup activities as funds are made available for remedial action. The groundwater in the Rimini Community and Landmark subdivision is contaminated with arsenic, and residents are being supplied with bottled water or have been provided point-of-use treatment systems until the final remedy can be implemented. EPA is working with Lewis & Clark County to designate a Controlled Groundwater Area to prevent the installation of new domestic use wells. EPA is also working with the county to expand its Lead Education and Assessment Program for East Helena to include the Upper Tenmile Creek site.

As of September 2017, US Magnesium Site is considered "Current Human Exposure Not Under Control". An evaluation of the human health exposure and risk is ongoing at this site. Preliminary remedial investigations (PRI) are underway to collect data from soils, sediments, solid-wastes, surface- and ground-water and air for organochlorine chemicals across eighteen segments of the study area. The initial risk assessment evaluation, are being overseen by the EPA and the State, (in collaboration with the Potentially Responsible Party), of this data has determined the chemicals of potential concern for baseline human and ecological risk assessments. The US Department of the Interior Bureau of Land Management (BLM) has posted signs at the major public access routes to inform the public of the site investigations, with EPA and BLM contacts.

ADVANCED MICRO DEVICES, INC.	09	CA	CAD048634059	HENC	12-30-2020
ARGONAUT MINE	09	CA	CAD983650011	HENC	07-27-2022
ASARCO HAYDEN PLANT	09	AZ	AZD008397127	HENC	09-30-2023
CARSON RIVER MERCURY SITE	09	NV	NVD980813646	HENC	01-01-2040

This site was transferred from the State back to EPA in August 2014, subsequent to which EPA ordered the Responsible Parties to conduct vapor intrusion evaluations at on- and off-property buildings associated with the site to determine whether the vapor intrusion pathway is complete and whether a remedy is required. The on-property evaluation showed evidence of unacceptable vapor intrusion and a mitigation system was installed and confirmed to be working effectively. The off-property evaluations are in progress and show evidence of unacceptable vapor intrusion in residential and school buildings. Steps were taken to address the immediate risk, primarily consisting of building ventilation improvements and upgrades. Additionally, residents, parents, school staff and school administrators were informed via fact sheets and community meetings. To address long-term risk, reliable mitigation systems are being designed for the affected buildings and further outreach and investigation is ongoing to fully delineate the extent of the vapor intrusion-affected area.

The Argonaut Mine Superfund site is currently Human Exposure Not Under Control. The site was added to the NPL in September 2016. The primary exposure pathways are dermal exposure from direct contact with mine waste piles and sediment and possibly surface water at the edge of a residential neighborhood, as well as near a junior high and high school. Windblown dust inhalation exposures from mine waste are also possible. In 2015, EPA took several short-term removal actions to keep people from being exposed to the highest levels of contamination. This work included several residential yard cleanups, a cleanup at the vacant lot on the corner of Argonaut Lane and Pioneer Street, and the installation of a protective cover on steep slopes at Jackson Junior High School to prevent soil erosion and reduce exposure to the contamination. EPA also cleaned up contamination found in the Junior High lunch area next to the playing field.

The Asarco Hayden Plant is currently designated as Human Exposure Not Under Control. Asarco currently operates the smelter facility located in Hayden, Arizona. Asarco is finalizing a Phase 2 Remedial Investigation (RI) report to characterize soil, sediment, surface water, groundwater and air contamination. The most significant pathway for potential human exposure is inhalation of airborne contaminants from the currently operating smelter facility which is adjacent to the towns of Hayden and Winkelman. Asarco is currently upgrading the smelter facility in compliance with an EPA Air Division Consent Decree that was signed in December of 2015. Air monitoring continues at the site during the facility upgrades which will be completed in several phases in 2018, 2019 and 2020.

The Carson River, including the Lahontan Reservoir, is a recreational, fishing, and hunting destination in Nevada. EPA considers the Carson River Mercury Site "Current Human Exposure Not Under Control" for two reasons. First, people are known to catch, consume, or sell (for consumption) fish from the area. Second, people may be exposed to mercury-contaminated soil under the surface or on the surface.

People should not consume fish caught in the area. The Nevada Department of Health and Human Services has issued health advisories for fish consumption from Big and Little Washoe Lakes, Lahontan Reservoir, and the Carson River downstream from Dayton. The Nevada Division of Environmental Protection (NDEP) recommends not eating fish downstream of the Mexican Mill Dam, which is further upstream from Dayton. Fish with very high levels of mercury have been found in these areas. At heavily used access locations to these water bodies, EPA and the NDEP have posted health advisory signs to warn the public that fish should not be consumed.

EPA is also concerned people may be exposed to mercury-contaminated soil located under the surface or on the surface in areas around the Virginia City, Silver City, Gold Canyon, Six-Mile Canyon, and within the Carson River 100 year flood plain. EPA has conducted multiple cleanup actions to dig up (excavate) or cover with clean fill (cap) mercury-contaminated surface soil in the surrounding area. However, some areas still have mercury-contaminated soils (as well as arsenic and lead associated with the mining) under the surface or on the surface. These areas must be managed appropriately. The EPA and NDEP work with local jurisdictions, residents, and commercial enterprises to implement the Long Term Sampling and Response Plan to address these concerns. In 2017, EPA is completing a Five-Year Review of the mercury-contaminated soil areas near the source (Operable Unit 1). The Five-Year Review will be issued in 2018, and will document how cleanup actions are working to protect human health and the environment.

In March 2017, EPA released a Remedial Investigation (RI) report for Operable Unit 2 of the Carson River and associated impacted waterways and wetlands. The RI gathered critical environmental information to help understand the nature and extent of site contamination and risks to the community. That information is being used to evaluate the costs and benefits of cleaning up the contamination (a Feasibility Study). In 2019, EPA plans to issue a document with our preferred cleanup remedy (a Proposed Plan for public comment) followed by the decision in 2020 (Record of Decision).

IRON KING MINE - HUMBOLDT SMELTER	09	AZ	AZ0000309013	HENC	01-01-2025
KLAU/BUENA VISTA MINE	09	CA	CA1141190578	HENC	03-30-2029
LAVA CAP MINE	09	CA	CAD983618893	HENC	12-31-2017

The Iron King Mine Humboldt Smelter is currently designated as "Human Exposure Not Under Control". EPA has completed a remedial investigation and removal actions in 2006, 2011, and 2017 that have eliminated human exposures to contaminated residential soils. However, actions to address the mine tailings in tailings piles, drainages, flood plains, behind the dam, and on the former smelter property, are ongoing, pending completion of the feasibility study. While exposure is not certain, there could be human contact with these tailings and occasional inhalation hazards in the tailings areas during high winds. The tailings can move to new locations by water migration, deposition, and scour. The primary chemicals of concern at the site are arsenic and lead. Sampling results indicate the presence of elevated levels of arsenic and lead that could present health risks if a person is exposed to these metals over an extended period of time. EPA has posted caution signs near contaminated areas and conducted door-to-door outreach for residents living near contaminated areas. EPA also sent flyers to the Humboldt Elementary School for distribution to the students and parents. EPA also communicates to Dewey-Humboldt residents on a regular basis via the Town Newsletter and meetings with the Town Council.

The Klau / Buena Vista Mine Superfund site is currently considered Human Exposure Not Under Control. This mercury mine has released large amounts of mercury to on-site soils and surface water bodies. Contaminated sediment downstream indicate elevated levels of mercury, and fish tissue data has resulted in a advisory for Lake Nacimiento. The current completed human exposure pathway is ingestion of methyl mercury contaminated fish tissue.

The site consists of three OUs; OU 1) the 320 acre mercury mine site property, OU 2) seven miles of Las Tablas Creek downstream from the mine which includes a man-made reservoir of 7 acres with a 15 foot depth, and OU 3) which is Lake Nacimiento reservoir at the end of Las Tablas Creek which covers 1,800 acres is 14 miles long and up to 180 feet deep and is used for irrigation and drinking water.

The State of California has issued fish consumption advisories for methyl mercury in fish tissue in Lake Nacimiento in 1994 and 2007. People have been seen fishing in all of these water bodies in the recent past and are assumed to be doing so currently. The State of California has issued fish consumption advisories for methyl mercury in fish tissue in Lake Nacimiento in 1994 and 2007 and the state issued fishing licenses for Lake Nacimiento and Las Tablas Creek watershed also include the advisory. Additionally signage has been posted all of the water bodies providing an advisory concerning fish consumption and OU 1 has fencing and controlled access as do the private property owners along OU 2.

A Public Health Assessment was issued in July 2009 by ATSDR working with the State of California and community outreach is provided through the site's community advisory group meetings held twice a year. A great deal of characterization and sampling has already been performed, and is ongoing. The final cleanup approach will be determined once the nature and extent of contamination has been identified. In late 2010, a site stabilization emergency response is planned to address recent landslides on the site.

The Lava Cap Mine Superfund site is considered "Current Human Exposure Not Under Control" because recreational users of the area below the mine (the Lost Lake operable unit) can be exposed to mine tailings, leading to incidental ingestion of arsenic in soil and airborne particulates and skin contact with contaminated sediments that are deposited along shoreline and upland areas. We have informed all the residents in the area of concern (this is not a public area and is on private lands) that there can be exposure to arsenic from the tailings if they walk or use vehicles (bikes, motorcycles, ATVs, etc.) in the area, but there is still evidence that people use the area for recreational purposes. The impacted area is a series of private properties that is too large to be fenced. We have not put signs up since the parcels are privately owned; however, we have informed each owner personally of the potential risk. Clean up of the Mine Area Operable Unit (OU) began in 2005 with the mine tailings cap construction completed in early 2007. Design for the surface water remedy at the mine area began in Spring 2008 and a pilot treatability study is in progress. The groundwater (OU) is currently being studied, but all current drinking water pathways have been addressed through the installation of drinking water treatment units. An Interim Record of Decision for groundwater was signed in September 2008, which selected a remedy that provides hook-ups of private residences to a public water supply. The design of this water supply system is ongoing.

MCCORMICK & BAXTER CREOSOTING CO.	09	CA	CAD009106527	HENC	12-31-2018
MONTROSE CHEMICAL CORP.	09	CA	CAD008242711	HENC	09-30-2035
SULPHUR BANK MERCURY MINE	09	CA	CAD980893275	HENC	09-30-2040
TRW MICROWAVE, INC (BUILDING 825)	09	CA	CAD009159088	HENC	12-30-2020

The McCormick & Baxter Superfund site is considered "Current Human Exposure Not Under Control" because contaminants (including dioxins, polycyclic aromatic hydrocarbons (PAHs), arsenic, chromium & copper) in the sediment of a slough adjacent to the site have bioaccumulated in fish. The levels of contaminants in certain locally-caught fish species may pose a health risk to anglers who consume them. EPA posted signs advising people not to catch or eat the fish and conducted extensive public education campaigns about the fish contamination; however, there have been confirmed reports of people continuing to fish in the slough. In September 2006, EPA completed placement of a two-foot thick sand cap over the contaminated sediment to prevent direct human contact and to cut off the pathway for bioaccumulation in fish, but it will take several years for the existing population of contaminated fish to be replaced by clean fish. EPA will collect additional post-cap fish tissue data and continue its outreach programs to keep the public informed.

The Montrose superfund site is considered Human Exposure Not Under Control because the Palos Verdes Operable Unit has ocean sediment contaminated with significant levels of DDT and PCBs. These contaminants impact fish that reside in the area, especially the white croaker. Human exposure occurs through consumption of contaminated fish caught with the Palos Verdes Shelf area. Recently released fish advisory from the State of California (OEHHA June 2009) added barred sand bass and topsmelt to the "do not consume" list for PV Shelf. There are institutional controls (ICs) in place, which include white croaker bag limits, advisories and warnings for the area, educational outreach programs, and a commercial fishing ban on catching white croaker from the PV Shelf.
However, periodic monitoring of the local fishing piers and local fish markets show that white croaker are being caught by independent fishermen for consumption and sale. The selected remedy includes continuation of the Institutional Controls (ICs) program along with monitored natural recovery (MNR) and capping the most contaminated sediments. The comprehensive ICs program has been effective in reducing-but not completely eliminating--the sale and consumption of white croaker and fishing of white croaker in the contaminated area. All aspects of the ICs program (education, outreach, monitoring and enforcement) will continue into the future. EPA will evaluate the effectiveness of capping through the Five-Year Review process and continue the ICs program until contaminants in fish reach cleanup levels.

The Sulphur Bank Mercury Mine site is considered Human Exposure Not Under Control because nearby residents and recreational trespassers on the mine property come into contact with mine wastes and soils contaminated with mercury, arsenic and antimony and the consumption of mercury contaminated fish. EPA's human health risk assessment shows that the recreational trespass scenerio is an unacceptable risk due to the high levels of mercury and arsenic present in the mine waste. The risk assessment is based on exposures to youth, ages 6-17, that are most likely to recreate at the mine property. Mercury bioaccumulation in excess of the recommended Federal limit for human consumption has been documented in Clear Lake fish; one of the major health threats associated with the site is eating mercury contaminated fish. The State of California has issued an advisory for the consumption of Clear Lake fish which are distributed to resorts and posted at the lake. In 2007 EPA completed the removal of all of the contaminated mine wastes and soils from the residential area at the Elem Indian Colony. EPA installed a fence around the mine property and posted signs advising people not to trespass. EPA recently identified the presence of contaminated mine wastes that were used historically to maintain gravel roadways and parking areas in a nearby residential area. EPA is performing a feasibility study to select a cleanup plan to prevent the continued discharge of mercury and other contaminants to Clear Lake, to cleanup the contaminated mine wastes at the mine property and to cleanup the access road to the Elem Indian Colony and recently identified residential area roadways and parking areas. EPA is continuing its remedial investigation to characterize the nature and extent of contamination in Clear Lake sediments and the North Wetland. EPA ensures community members know about and participate in site issues by holding community meetings, distributing outreach materials, and coordinating with the Clear Lake Environmental Action Network (CLEAN), a Technical Assistance Grantee, and the Elem Pomo Tribe.

The TRW Microwave, Inc. site is currently designated Human Exposure Not Under Control. This site was transferred from the State back to EPA in August 2014, subsequent to which EPA ordered the Responsible Parties to conduct vapor intrusion evaluations at on- and off-property buildings associated with the site to determine whether the vapor intrusion pathway is complete and whether a remedy is required. The on-property evaluation showed evidence of unacceptable vapor intrusion and a mitigation system was installed and confirmed to be working effectively. The off-property evaluations are in progress and show evidence of unacceptable vapor intrusion in residential and school buildings. Steps were taken to address the immediate risk, primarily consisting of building ventilation improvements and upgrades. Additionally, residents, parents, school staff and school administrators were informed via fact sheets and community meetings. To address long-term risk, reliable mitigation systems are being designed for the affected buildings and further outreach and investigation is ongoing to fully delineate the extent of the vapor intrusion-affected area.

UNITED HECKATHORN CO.	09	CA	CAD981436363	HENC	12-31-2020
BLACK BUTTE MINE	10	OR	OR0000515759	HENC	04-30-2023
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD048340921	HENC	09-30-2060
COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD980726368	HENC	03-30-2020

The United Heckathorn Superfund site is considered "Current Human Exposure Not Under Control" because fishermen and their families may be exposed to dichlorodiphenyltrichloroethane (DDT) and dieldrin when fish or other edible biota (e.g. mussels) from the site are consumed. The area is restricted by fencing and multilingual warning signs are posted on the upland fence and along the marine channel, visible to fishermen in boats; however, there have been reports of fishermen in the area. These measures do not prevent contaminated fish from migrating outside of the site where they might be harvested and consumed by fishermen. EPA is continuing preparation of a focused feasibility study to evaluate alternatives for addressing the remaining contamination. EPA presented to the National Remedy Review Board and is currently working on revising the focused feasibility study. In addition, EPA sends fact sheets to the site's mailing list and updates the site's Web page, and presents to the City as needed.

The upland (soil) portion of the site is considered under control. The 5 acre site has been capped and in reuse for industrial purpose since October 1999.

The Black Butte Mine Superfund site is currently considered Human Exposure Not Under Control. The site was placed on the National Priorities List in 2010. The main pathway of concern is surface water, with the potential for people to eat fish which have bioaccumulated mercury or other heavy metals. The Cottage Grove Reservoir has collected mine tailings producing methyl mercury which bioaccumulates in fish. There currently is a fish advisory for the reservoir. EPA is conducting a Remedial Investigation/Feasibility Study to collect and evaluate data on potential site risks at the mine site and, if necessary, develop options for cleanup as soon as possible. In addition, EPA intends to implement a removal action at the mine site in 2018 to reduce the erosion and delivery of mercury contaminated mine tailings into the watershed.

The Bunker Hill Superfund site is considered Human Exposure Not Under Control because some people in the area are exposed to hazardous levels of lead and arsenic via residential soils, house dust, and drinking water. Site cleanups are underway for residential soils, recreational areas, and several mining areas that are used for recreational activities within the site. Areas affecting human health receive highest priority for cleanup. In the Bunker Hill Box communities (Operable Unit 2), about 3200 properties have been cleaned up and 17 contaminated residential drinking water wells have been closed, with a further 20 wells being provided with filters. In 2008, EPA certified as complete the Upstream Mining Group's remediation of residential and commercial properties and rights-of-way within Operable Unit 1. In Operable Unit 3 (the Coeur d'Alene Basin), about 3400 properties have been remediated to date. While the exact number of properties that will require remediation is not known at this time because sampling has not been completed, it is currently estimated that property cleanups will continue for 2-3 more years. The residential soil remedy reduces soil concentrations using information and intervention, community greening, and partial removal and replacement of residential soils. The drinking water exposure pathway is addressed by public information and multiple alternative sources. An Institutional Controls Program is in place which includes locally developed and enforced rules and regulations to protect the remedy and limit future exposure to contaminated soil that is left in place. Recreational sites and mine/mill sites idenfitied in the ROD with human health exposures are addressed using a combination of access controls, capping and removals. The site's vast size and high levels of contamination mean that cleanup will take several decades, but many of the worst areas that affect human health exposure have been addressed.

The Commencement Bay, Near Shore/Tide Flats CERCLA site is considered Human Exposure Not Under Control. Despite considerable remedial action within this site, which covers approximately 12 square miles, isolated areas of contaminated sediment remain within the biologically active zone, areas of contaminated groundwater discharge through bottom sediments into surface water, and fish consumption advisories issued by the local health department remain in effect. Contaminated sediment remediation has mostly been accomplished but some work remains within Hylebos Waterway, within Commencement Bay between Blair and Hylebos waterways, and within Commencement Bay offshore from the former Asarco smelter site. Areas of contaminated groundwater which discharge into surface water sediments will take several more years to address. Fish tissue sampling from the site will need to occur over the next several years to ascertain when shellfish and bottom fish can safely be consumed by humans.

HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN1002174	HENC	09-30-2018
HARBOR ISLAND (LEAD)	10	WA	WAD980722839	HENC	12-30-2024
LOCKHEED WEST SEATTLE	10	WA	WAN001002655	HENC	09-30-2018
LOWER DUWAMISH WATERWAY	10	WA	WA0002329803	HENC	09-30-2048

The Hamilton/Labree Superfund site is considered "Current Human Exposure Not Under Control" for the following reasons: In Operable Unit 1, recreational users can be exposed to PCE contamination by ingestion and inhalation of Berwick Creek sediment and soil. Also under current uses, construction and utility workers who work in trenches can be exposed to PCE via inhalation of PCE and TCE in groundwater vapors. Discussions regarding fencing and signage along the west side of Berwick Creek have been initiated (there is already a fence along the east side of Berwick Creek adjacent to Interstate 5), but most likely will not take place until the OU1 interim Remedial Action is initiated in 2018. The City of Chehalis does have a "call before you dig" ordinance which would be used to educate and limit exposures in trenches within OU1. In Operable Unit 2, the remedial investigation has yet to be completed. A number of properties within OU2 were connected to the Chehalis public-water supply system via an EPA removal action in the early 2000s, but many still obtain their drinking and shower water from private wells. To date, no site contamination has been found in these private wells; however, if PCE in groundwater continues to exist there is concern that the contaminated plume will reach these properties in the future. In response, EPA installed two groundwater monitoring wells upgradient of Rice Road properties that still use private drinking water wells. These two wells act as sentinels should the PCE plume change direction. To date, no PCE has been detected in these wells.
Human Exposure is Not Under Control for the East Waterway (EW) Operable Unit (OU) of the Harbor Island Superfund Site. Under a legal consent order with EPA, the Port of Seattle is conducting a final Supplemental Remedial Investigation/Feasibility Study (SRI/FS) that has assessed risk to human and environmental receptors for the East Waterway operable unit of the Harbor Island Superfund Site. Sediments and fish tissue in East Waterway are contaminated with PCBs, tributyl tin, TCDD, PAHs and metals. The most likely exposure pathway for people is fish and shellfish consumption. Dermal exposure is the next likely pathway. East Waterway is within the usual and accustomed fishing area of the Suquamish and Muckleshoot Tribes and there is anecdotal evidence that despite fish advisories people fish off the Spokane Street Bridge in East Waterway. All other operable units of this site have been cleaned up, have cleanups underway, or have been found not to need cleanup under Superfund. The results of the SRI/FS will enable EPA to make a cleanup decision for the EW OU of Harbor Island to ensure that appropriate actions are taken to control human exposures.
The Lockheed West Seattle Site is considered Human Exposure Not Under Control because sediment and tissue data samples have shown that eating certain fish and shellfish from the river and Elliott Bay may result in unacceptable exposures to humans. The contaminants on the Site include polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPAH) arsenic, copper, lead, mercury and dioxins/furans. This site is within the Muckleshoot and Suquamish Tribes' Usual and Accustomed fishing area and is accessible by boat to the Tribe and the public. The shoreline is accessible to the public by boat but is not accessible by walking along the shoreline. The Washington Department of Health has posted and publicized fishing advisories, but people are still harvesting and eating shellfish from this area. A Record of Decision was signed in 2013 and Lockheed Martin is conducting the Remedial Design. Final cleanup will begin in 2018.
The Lower Duwamish Waterway Superfund site is considered Human Exposure Not Under Control because sediment and tissue data samples have shown that eating certain fish and shellfish from the river may result in unacceptable exposures to humans. The contaminants in the waterway sediments include polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), arsenic, and dioxins/furans. The Washington Department of Health has posted and publicized fishing advisories, but people are still harvesting and eating bottom fish and shellfish from the river. Several Potentially Responsible Parties conducted a Remedial Investigation/Feasibility Study for this site to learn the full nature and extent of contamination. EPA selected a final cleanup plan in 2014 after consideration of public comments. The PRPs have initiated early cleanups at some particularly contaminated areas, mostly completed as of September 2017, and these cleanups have reduced exposure to a degree. Remedial design and remedial action will take many years. Monitoring should demonstrate improvements as progress continues.

MIDNITE MINE	10	WA	WAD980978753	HENC	09-30-2025
NORTH RIDGE ESTATES	10	OR	ORN001002476	HENC	06-30-2019
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA0000026534	HENC	06-30-2021
PORTLAND HARBOR*	10	OR	ORSFN1002155	HENC	09-20-2028
QUENDALL TERMINAL*	10	WA	WAD980639215	HENC	09-30-2020

The Midnite Mine Superfund site is considered "Current Human Exposure Not Under Control" because people visiting areas affected by contaminant migration may be exposed to radionuclides and metals from mine waste, soil, sediments, and surface water. Contaminant levels are above acceptable levels for the exposure pathways of concern, which include ingestion of water, sediments, soil, plants and animals. The levels are higher in the mined areas than other adjacent affected areas. Areas near the mine are used for recreation, hunting and gathering, and traditional tribal activities, and sediment and surface water in these areas are affected by acid mine drainage. Groundwater is affected but not currently used for drinking. To reduce exposure, the mined area is completely fenced in, warning signs are posted, access is restricted via locked gates, and warning signs are posted in affected areas outside the fence. EPA continues to work with the Spokane Tribe on advisories and outreach. Also, spilled uranium ore along public roads was removed and contaminated seeps from the mine are collected and treated onsite. EPA selected a site-wide cleanup plan calling for consolidations of waste in mine pits, vegetated soil covers, removal of drainage sediments, and long-term water collection and treatment. Pursuant to a 2012 RD/RA Consent Decree, the Remedial Design was approved in November 2015. As of September 2017, the planned activities to address these exposure pathways is to implement the cleanup. Remedial Action construction started in May 2016 and is estimated for completion in 2025.

The North Ridge Estates site is considered Human Exposure Not Under Control because asbestos contamination in soils poses current human health risk by inhalation of asbestos fibers in air released during soil disturbance activities. EPA began a Remedial Action to address unacceptable exposures in September 2014 and has completed half of the necessary work thus far.

The Palermo Well Field Ground Water Contamination Superfund site is currently considered Human Exposure Not Under Control because there is a residential portion of the site where groundwater contaminant conditions exist that may pose a threat to human health from TCE vapors. EPA is overseeing the active monitoring of vapor intrusion in this area and will provide tailored remediation of any house where TCE concentrations exceed the 2 µg/m3 over a three-week period. EPA anticipates that this threat will be addressed through remedial actions at the promulgation of a ROD amendment.

Portland Harbor is considered Human Exposure Not Under Control based on data collected as part of the Remedial Investigation. The Portland Harbor Potentially Responsible Parties, under EPA and DEQ oversight, have collected and analyzed sediment, surface water, groundwater, and fish tissue data at the site. Contaminants of concern include heavy metals, pesticides, PCBs, PAHs, and dioxins/furans. The known exposure pathways for people are fish and shellfish consumption, ingestion of surface water, and direct contact with sediments. All of these pathways result in unacceptable exposures to humans. EPA has determined that the greatest health risk from exposure to contamination in Portland Harbor is from eating resident fish and to infants that are breast-fed by mothers who eat resident fish on a regular basis. The State Health Department has issued a health advisory and posted signs advising people to limit consumption of fish from the site. However, people are likely still eating the fish and fishing is observed daily at the site. The Oregon Department of Environmental Quality (DEQ) is working with upland facilities to investigate and control ongoing sources of contamination to the site. Two early cleanup actions to address hot spots of PAH contamination in the river have been completed under EPA oversight and a third was completed by DEQ. A separate CERCLA cleanup within the site, McCormick & Baxter, also addressed cleanup of PAHs in the river sediments. EPA issued a Record of Decision in 2017. EPA posts major documents on its website and sends information regarding meetings and availability of major documents to a listserv (over 1,000 people) and has monthly meetings with the Citizen Advisory Group (which are open to the public). EPA has also reached out to neighborhood associations, non-profit environmental representatives and local organizations to provide training, small group discussions, presentations and multilingual materials regarding human health risks.

The Quendall Terminal Superfund site is considered Human Exposure Not Under Control because surface and subsurface soil, groundwater, and off-shore sediments are contaminated with coal tars, creosote, creosote by-products and arsenic. Mobile DNAPL has been transported by groundwater to off-shore sediments. Dissolved constituents of DNAPL are still being transported by groundwater and upwelling through lake sediments. The risk assessment indicates that use of groundwater for drinking water, dermal contact with surface and subsurface soils, vapor intrusion into occupied buildings, and consumption of even modest quantities of shellfish would all pose unreasonable risks to humans. Benthic organisms, benthic macroinvertebrates, and terrestrial and aquatic-dependent wildlife are all subject to unacceptable ecological risks. No one is currently using contaminated water as a drinking water supply, installation of wells is currently prohibited, and the site is vacant, fenced and posted, thus limiting human exposure to contaminated soils. However, children may be exposed to contaminants when wading and, most importantly, EPA is concerned about shellfish consumption by the local community.

WYCKOFF CO./EAGLE HARBOR	10	WA	WAD009248295	HENC	05-02-2021

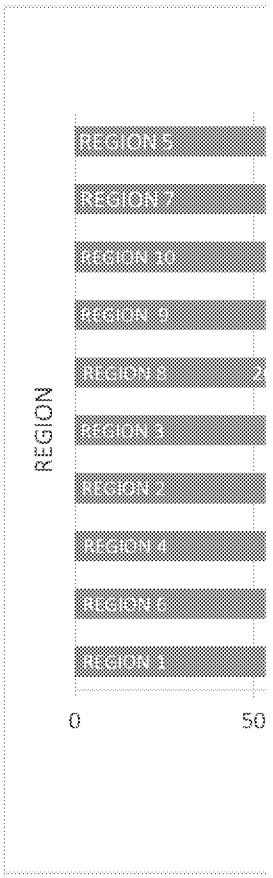
The Wyckoff/Eagle Harbor Site is considered Human Exposure Not Under Control. Ongoing creosote seeps on the beaches adjacent to a former wood treating facility provide a complete and direct exposure pathway to recreational and tribal beach users. Dermal contact and incidental ingestion of contaminated beach sediments results in a cancer risk above EPA's risk range. Contaminant levels in shellfish tissue pose an unacceptable risk to both recreational and tribal shellfish harvesters. Signs are in place on the beach and in nearby parking lots and information kiosks to warn people of the risk. Fact sheets have been mailed to local residents and information about the beach contamination is available on EPA's web site. The beaches are closed to shellfish harvesting. The Washington Department of Health provides information about the closure on its web site. EPA released a Proposed Plan in April 2016, recommending additional cleanup actions. After considering public comments, EPA plans to issue a ROD amendment for the site in FY 2018. EPA will use signage, fact sheets and social media to advise people of the contamination on the beaches until cleanup goals are achieved.

Hu

**Includes Non-Fed*

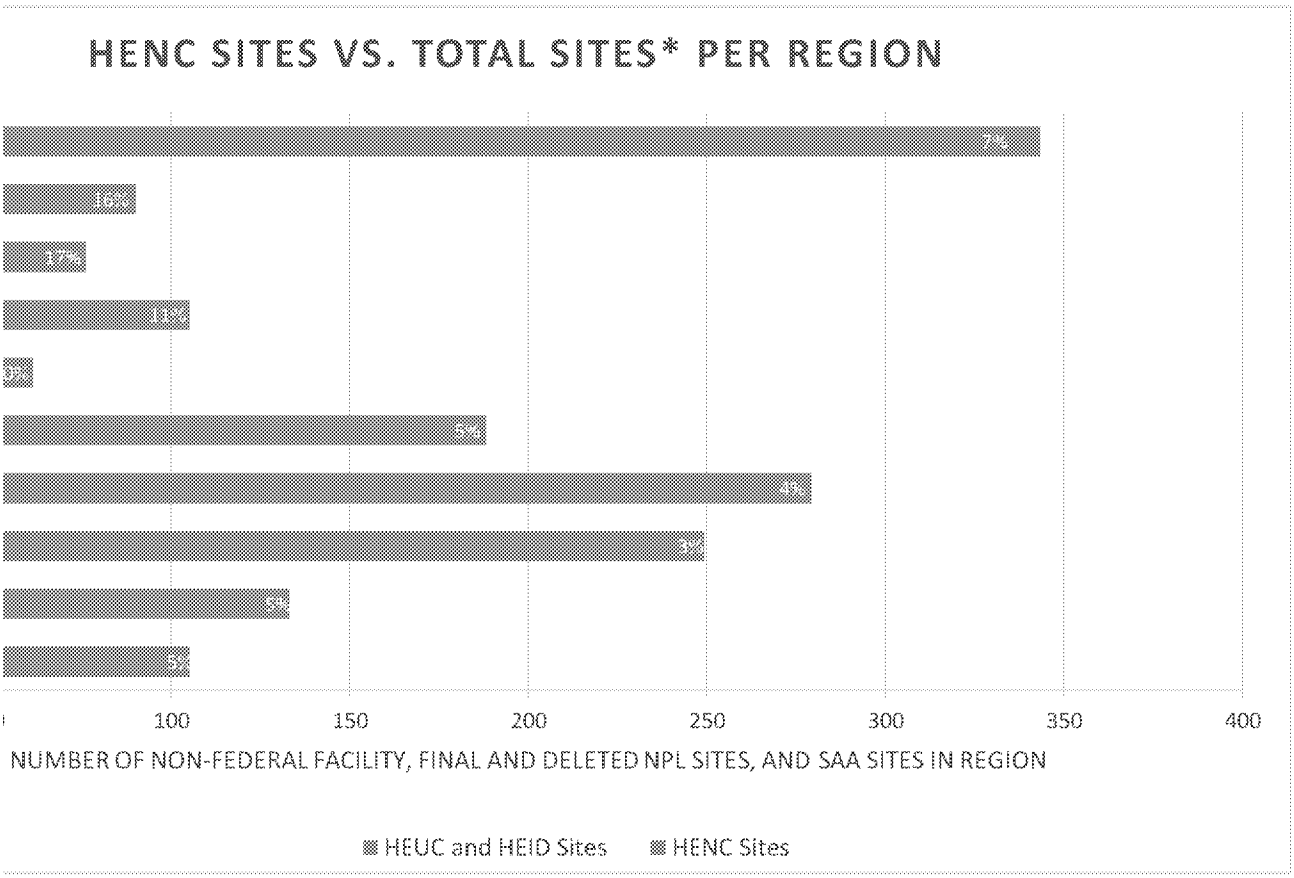
Region	HEUC and HEID Sites	HENC Sites	Total Universe of Sites* Per Region	% HENC out of Total Universe of Sites* Per Region
1	100	5	105	5%
6	127	6	133	5%
4	242	7	249	3%
2	269	10	279	4%
3	178	10	188	5%
8	49	12	61	20%
9	93	12	105	11%
10	63	13	76	17%
7	76	14	90	16%
5	318	25	343	7%
Total	**1515**	**114**	**1629**	**7%**

*Sites include Non-Federal Facility, Final and Deleted NPL Sites, and SAA Sites



man Exposure Not Under Control (HENC) Sites Per Region

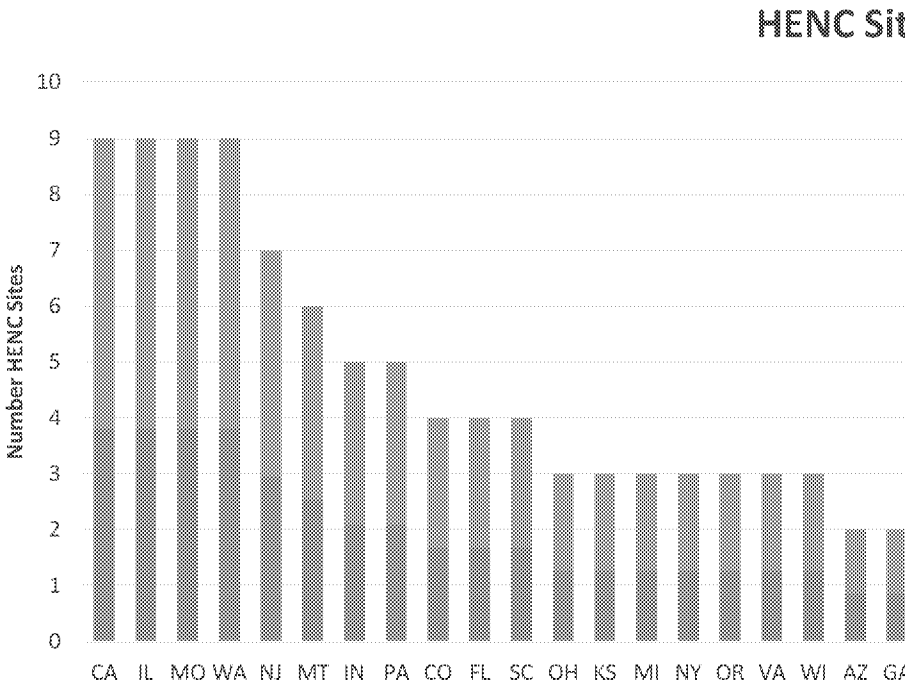
eral Facility, Final and Deleted NPL Sites, and SAA Sites - SEMS data as of 10/17/2017



US States/Territories with Human Exposure N

Includes Non-Federal Facility, Final and Deleted NPL Sites, a

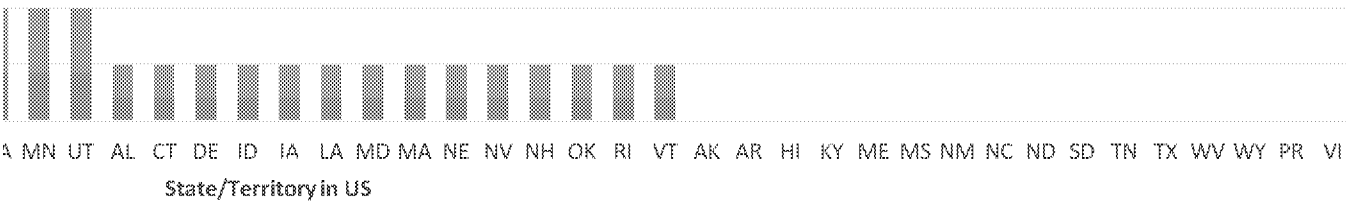
State	Number HENC Sites
CA	9
IL	9
MO	9
WA	9
NJ	7
MT	6
IN	5
PA	5
CO	4
FL	4
SC	4
OH	3
KS	3
MI	3
NY	3
OR	3
VA	3
WI	3
AZ	2
GA	2
MN	2
UT	2
AL	1
CT	1
DE	1
ID	1
IA	1
LA	1
MD	1
MA	1
NE	1
NV	1
NH	1
OK	1
RI	1
VT	1
AK	0
AR	0
HI	0
KY	0
ME	0
MS	0
NM	0
NC	0



Not Under Control (HENC) Sites

and SAA Sites - SEMS data as of 10/17/2017

tes Distribution by State/Territory



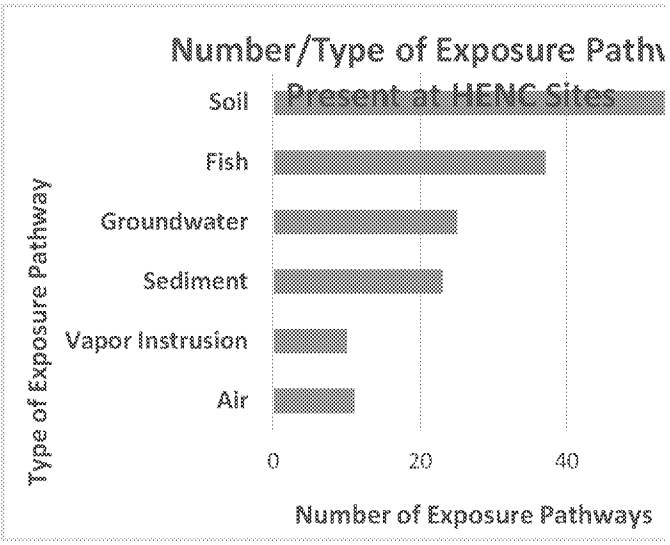
ND	0
SD	0
TN	0
TX	0
WV	0
WY	0
PR	0
VI	0
Total	**114**

Key Human Exposure Pathway

Note: There are currently 114 non-federal facilty, Final and Deleted NPL sites c

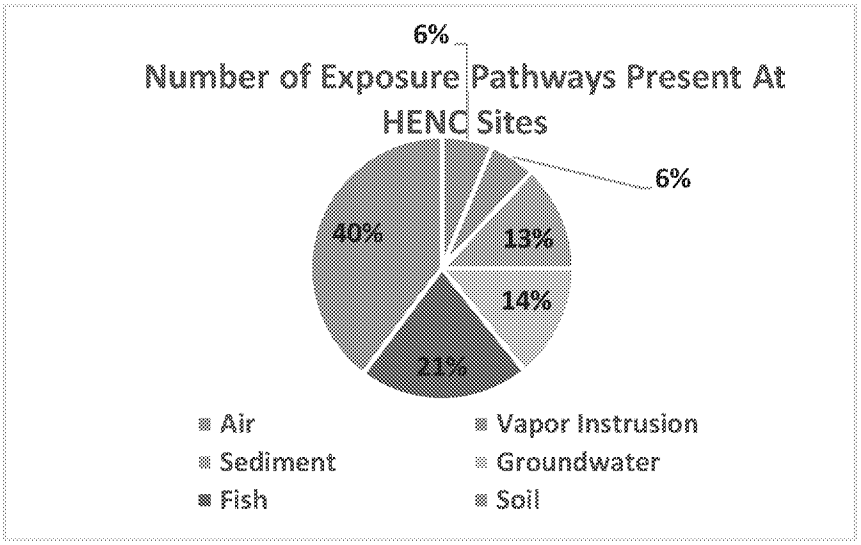
Main Exposure Pathway Type	Number of Times An Exposure Pathway is Present At HENC Sites
Air	11
Vapor Instrusion	10
Sediment	23
Groundwater	25
Fish	37
Soil	70
Total Exposure Pathways Identified at HENC Sites	**176**

Note: Each site may have more than one exposure



's Present at HENC Sites

ınd SAA sites that are designated HENC. SEMS data as of 10/17/2017.



Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/12/2018 3:02:24 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: FW: Tar creek

Quick question – who is Erin Chancellor and are we making the same or alternate arrangements for her travel and participation?

Thanks,
Casey

Casey Luckett Snyder
EPA R6 Project Manager and
Superfund Reuse Coordinator
214.665.7393
luckett.casey@epa.gov

From: Edlund, Carl
Sent: Thursday, February 08, 2018 3:03 PM
To: Atkins, Blake <Atkins.Blake@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Coltrain, Katrina <coltrain.katrina@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>
Cc: Phillips, Pam <phillips.pam@epa.gov>
Subject: Fwd: Tar creek

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 8, 2018 at 12:46:08 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Re: Tar creek**
>
> Hello Carl. Erin Chancellor is going to join us at Tar Creek. When should we have agenda? I would like to see Mrs. Jim while there. Also, should we visit Chairman Berry?
>
> Sent from my iPad
>
> On Feb 5, 2018, at 10:58 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>
>> Great...I'll ask my folks to send you schedules and agendas for the 20th. No inconvenience at all.
>>
>> Sent from my iPad
>>
>> On Feb 5, 2018, at 9:30 AM, Kelly, Albert <kelly.albert@epa.gov> wrote:

Thanks. Would it be acceptable to plan for the 20th? I don't want to inconvenience anyone.

Sent from my iPhone

On Feb 5, 2018, at 7:20 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:

> Thanks Blake....a good list.
>
> Kell- interested in any of these events?
>
> Sent from my iPad
>
> On Feb 5, 2018, at 8:41 AM, Atkins, Blake <Atkins.Blake@epa.gov> wrote:
>
>> Carl, here are some upcoming Tar Creek trips that might be of interest. The reuse/redevelopment opportunity in Miami, and discussion regarding institutional controls with BIA may be of particular interest.
>>
>> 2/20/18: Meeting with the City of Miami and ODEQ to discuss Miami's interest in acquiring a commercial property and inactive rail spur located within the Tar Creek Superfund site. The acquisition is an economic development project for the City which will provide rail access to several companies located near the rail spur. A local chat processors has expressed interest in using the commercial property to ship chat.
>>
>> 2/20/18: Host a Tar Creek site tour for the BIA Miami Agency. The tour will include visits to restricted properties which need institutional controls (ICs) to protect the cleanup and ensure long term stewardship. EPA is working with BIA to reach an agreement on the

ICs issue since the BIA is the federal agency with the regulatory authority to place deed notices on restricted properties.

2/21/18: Monthly Tar Creek meeting. Meeting attendees include representatives from EPA, ODEQ, the Quapaw Tribe and the BIA. All entities are involved with on-going remedial activities at the site.

3/28/18: Region 6 and Region 7 Managers meeting to discuss coordinated efforts for all operable units of the Tar Creek Superfund site.

3/28/18: Tar Creek Stakeholder meeting: EPA Regions 6 and 7 will participate in a meeting with the Tar Creek stakeholders to provide site updates and action status.

Blake Atkins, Chief
LA/NM/OK Remediation Section
EPA Region 6 Superfund Division
1445 Ross Ave (6SF-RL)
Dallas, TX 75202
214-665-2297 w
214-406-5907 c

From: Edlund, Carl
Sent: Sunday, February 04, 2018 7:40 PM
To: Phillips, Pam <phillips.pam@epa.gov>; Sanchez, Carlos <sanchez.carlos@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>; Atkins, Blake <Atkins.Blake@epa.gov>
Subject: Fwd: Tar creek

Any thoughts? Events that he could hook into?

Sent from my iPad

Begin forwarded message:

From: "Kelly, Albert" <kelly.albert@epa.gov>
Date: February 4, 2018 at 2:01:17 PM CST
To: "Edlund, Carl" <Edlund.Carl@epa.gov>
Subject: Tar creek

I would like to schedule a visit to Tar Creek. What would you suggest?

Sent from my iPhone

Message

From: Snyder, Jessica [Snyder.Jessica@epa.gov]
Sent: 8/3/2017 7:52:20 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: TLEF - Registration/hotel info

3133e West

Jessica Snyder
Office of Land and Emergency Management
Tribal Program Coordinator
snyder.jessica@epa.gov
Office: (202) 564-1478
Mobile: (202) 340-8395

From: Falvo, Nicholas
Sent: Thursday, August 03, 2017 3:51 PM
To: Snyder, Jessica <Snyder.Jessica@epa.gov>
Subject: RE: TLEF - Registration/hotel info

Thanks

Where's your office and I'll swing by.

From: Snyder, Jessica
Sent: Thursday, August 3, 2017 3:47 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Cc: Wright, Felicia <Wright.Felicia@epa.gov>; Brooks, Becky <Brooks.Becky@epa.gov>; Benjamin, Kent <Benjamin.Kent@epa.gov>
Subject: TLEF - Registration/hotel info

Hi Nick,

We are putting together talking points and background material for Kell for the Tulsa Tribal event. They should be ready to share by Monday/Tuesday AM for our 8/8 Briefing. The 8/8 briefing has 2 purposes: 1) overview of EPA's Tribal Program and 2) TLEF Prep.

Just an FYI, Kell will need to register for the event and he may want to stay at one of the host hotel. All that information can be found here: http://www7.nau.edu/itep/main/Conferences/confr_tlef

I've sketched out the trip (attached) so you can get a sense of the activities we have lined up for Kell, Jane, Sarah Greenwalt, and Sam Coleman. Monday's site visit to Tar Creek will be hot and dusty. We recommend casual attire. We are scheduling a dinner for Monday night with the EPA Tribal Partnership Chairs. Tuesday is the Plenary – that's where he will make his remarks. Jane is arriving Sunday and staying through Tuesday night. Let me know if you think Kell will also follow this schedule, or if you expect him to stay longer.

Stay tuned for more briefing info, but in the meantime, let me know if you need help with anything.

Jessica

Jessica Snyder
Office of Land and Emergency Management
Tribal Program Coordinator
snyder.jessica@epa.gov
Office: (202) 564-1478
Mobile: (202) 340-8395

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/21/2017 3:08:27 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: SF Tables for HENC_9-23-17 revised 12.10.17.xlsx
Attachments: SF Tables for HENC_9-23-17 revised 12.10.17.xlsx

Sites with Human Exposure Not Under Control (HENC) and Estimated Control Dates

Data pulled from SEMS on 09/14/2017

Site Name	Region	State	EPA ID	NPL Status	Federal Facility	HE Status	HE Estimated Control Date
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	03	MD	MDD980918387	P	N	HENC	12-31-2017
ACM SMELTER AND REFINERY	08	MT	MTD093291599	F	N	HENC	09-30-2030
ADVANCED MICRO DEVICES, INC.	09	CA	CAD048634059	F	N	HENC	12-30-2020
ALCOA PROPERTIES	05	IL	ILSFN0508010	N	N	HENC	12-30-2019
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER	05	MI	MID006007306	F	N	HENC	09-30-2026
AMCAST INDUSTRIAL CORPORATION	05	WI	WIN000510210	F	N	HENC	12-31-2019
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	04	FL	FLD008161994	F	N	HENC	09-30-2018
ANACONDA CO. SMELTER	08	MT	MTD093291656	F	N	HENC	12-31-2022
ANNISTON PCB SITE (MONSANTO CO)	04	AL	ALD000400123	N	N	HENC	12-31-2023
ARGONAUT MINE	09	CA	CAD983650011	F	N	HENC	07-27-2022
ARMSTRONG WORLD INDUSTRIES	04	GA	GAN000410033	F	N	HENC	12-30-2021
ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	03	VA	VAD042916361	F	N	HENC	06-30-2020
ASARCO HAYDEN PLANT	09	AZ	AZD008397127	N	N	HENC	09-30-2023
ASARCO TAYLOR SPRINGS	05	IL	ILN000508170	F	N	HENC	12-30-2020
ATLANTIC WOOD INDUSTRIES, INC.	03	VA	VAD990710410	F	N	HENC	10-01-2020
BANDERA ROAD GROUND WATER PLUME	06	TX	TXN000606565	F	N	HENC	09-30-2019
BARKER HUGHESVILLE MINING DISTRICT	08	MT	MT6122307485	F	N	HENC	03-31-2032
BAUTSCH-GRAY MINE	05	IL	ILN000510407	F	N	HENC	12-31-2022
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	07	MO	MOD981126899	F	N	HENC	12-31-2025
BLACK BUTTE MINE	10	OR	OR0000515759	F	N	HENC	04-30-2023
BOARHEAD FARMS	03	PA	PAD047726161	F	N	HENC	09-30-2018
BROWN'S DUMP	04	FL	FLD980847016	N	N	HENC	12-31-2020
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD048340921	F	N	HENC	09-30-2060
CALDWELL TRUCKING CO.	02	NJ	NJD048798953	F	N	HENC	09-30-2018
CALIFORNIA GULCH	08	CO	COD980717938	F	N	HENC	03-31-2021
CARPENTER SNOW CREEK MINING DISTRICT	08	MT	MT0001096353	F	N	HENC	12-31-2026
CARSON RIVER MERCURY SITE	09	NV	NVD980813646	F	N	HENC	01-01-2040
CEDAR CREEK	05	WI	WID988590261	N	N	HENC	06-30-2018
CENTRAL CITY, CLEAR CREEK	08	CO	COD980717557	F	N	HENC	09-30-2019

CENTREDALE MANOR RESTORATION PROJECT	01	RI	RID981203755	F	N	HENC	09-29-2020
CHEROKEE COUNTY	07	KS	KSD980741862	F	N	HENC	09-30-2022
COLORADO SMELTER	08	CO	CON000802700	F	N	HENC	03-31-2027
COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD980726368	F	N	HENC	03-30-2020
COMMERCE STREET PLUME	01	VT	VTD098352545	F	N	HENC	09-28-2018
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879	F	N	HENC	09-30-2030
CULPEPER WOOD PRESERVERS, INC.	03	VA	VAD059165282	F	N	HENC	09-30-2023
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	05	IL	ILD062340641	F	N	HENC	03-31-2022
DIAMOND ALKALI CO.	02	NJ	NJD980528996	F	N	HENC	09-30-2037
DONNA RESERVOIR AND CANAL SYSTEM	06	TX	TX0000605363	F	N	HENC	09-30-2026
EAST TROY CONTAMINATED AQUIFER	05	OH	OHSFN0507962	F	N	HENC	12-31-2019
FAIRFAX ST. WOOD TREATERS	04	FL	FLD000623041	F	N	HENC	07-31-2018
FLETCHER'S PAINT WORKS & STORAGE	01	NH	NHD001079649	F	N	HENC	03-30-2018
FORMER UNITED ZINC & ASSOCIATED SMELTERS	07	KS	KSN000705026	F	N	HENC	09-30-2020
GENERAL MILLS/HENKEL CORP.	05	MN	MND051441731	F	N	HENC	12-31-2017
GOWANUS CANAL	02	NY	NYN000206222	F	N	HENC	09-30-2025
HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN1002174	F	N	HENC	09-30-2018
HARBOR ISLAND (LEAD)	10	WA	WAD980722839	F	N	HENC	12-30-2024
HUDSON RIVER PCBS	02	NY	NYD980763841	F	N	HENC	09-30-2020
IRON KING MINE - HUMBOLDT SMELTER	09	AZ	AZ0000309013	F	N	HENC	01-01-2025
JACKSONVILLE ASH SITE	04	FL	FLSFN0407002	N	N	HENC	12-31-2020
JACOBS SMELTER	08	UT	UT0002391472	F	N	HENC	09-30-2022
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	05	IN	INN000508142	F	N	HENC	09-30-2028
JONES ROAD GROUND WATER PLUME	06	TX	TXN000605460	F	N	HENC	09-28-2018
KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	05	IN	INN000510399	F	N	HENC	12-31-2018
KLAU/BUENA VISTA MINE	09	CA	CA1141190578	F	N	HENC	03-30-2029
KOPPERS CO., INC. (NEWPORT PLANT)	03	DE	DED980552244	F	N	HENC	09-30-2018
LAVA CAP MINE	09	CA	CAD983618893	F	N	HENC	12-31-2017
LCP CHEMICALS GEORGIA	04	GA	GAD099303182	F	N	HENC	12-30-2020
LIBBY ASBESTOS SITE	08	MT	MT0009083840	F	N	HENC	12-31-2022
LITTLE SCIOTO RIVER	05	OH	OHN000509950	F	N	HENC	06-18-2028
LOCKHEED WEST SEATTLE	10	WA	WAN001002655	F	N	HENC	09-30-2018
LOWER DARBY CREEK AREA	03	PA	PASFN0305521	F	N	HENC	12-28-2018

LOWER DUWAMISH WATERWAY	10	WA	WA0002329803	F	N	HENC	09-30-2048
LUSHER STREET GROUND WATER CONTAMINATION	05	IN	IND982073785	F	N	HENC	12-31-2018
MADISON COUNTY MINES	07	MO	MOD098633415	F	N	HENC	09-30-2020
MARION PRESSURE TREATING	06	LA	LAD008473142	F	N	HENC	09-21-2018
MATTHIESSEN AND HEGELER ZINC COMPANY	05	IL	IL0000064782	F	N	HENC	09-30-2027
MCCORMICK & BAXTER CREOSOTING CO.	09	CA	CAD009106527	F	N	HENC	12-31-2018
MIDNITE MINE	10	WA	WAD980978753	F	N	HENC	09-30-2025
MONTROSE CHEMICAL CORP.	09	CA	CAD008242711	F	N	HENC	09-30-2035
NEW BEDFORD	01	MA	MAD980731335	F	N	HENC	09-30-2022
NEWTON COUNTY MINE TAILINGS	07	MO	MOD981507585	F	N	HENC	06-30-2019
NORTH RIDGE ESTATES	10	OR	ORN001002476	F	N	HENC	06-30-2019
NORTH SHORE GAS SOUTH PLANT	05	IL	ILD984809228	N	N	HENC	12-31-2026
OLD AMERICAN ZINC PLANT	05	IL	IL0000034355	F	N	HENC	12-31-2020
OMAHA LEAD	07	NE	NESFN0703481	F	N	HENC	09-30-2022
ONONDAGA LAKE	02	NY	NYD986913580	F	N	HENC	09-30-2025
ORONOGO-DUENWEG MINING BELT	07	MO	MOD980686281	F	N	HENC	12-31-2020
OTTAWA RADIATION AREAS	05	IL	ILD980606750	F	N	HENC	09-30-2024
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA0000026534	F	N	HENC	06-30-2021
PCE FORMER DRY CLEANER	07	IA	IAD039954300	F	N	HENC	09-30-2018
PLATING, INC.	07	KS	KSD065735912	F	N	HENC	09-30-2020
PORTLAND HARBOR	10	OR	ORSFN1002155	F	N	HENC	09-20-2028
PRICE BATTERY LEAD SMELTER	03	PA	PAN000305679	F	N	HENC	06-30-2019
QUENDALL TERMINAL	10	WA	WAD980639215	F	N	HENC	09-30-2020
RAYMARK INDUSTRIES, INC.	01	CT	CTD001186618	F	N	HENC	09-30-2021
RESIN DISPOSAL	03	PA	PAD063766828	D	N	HENC	09-30-2018
SANDOVAL ZINC COMPANY	05	IL	ILD053980454	F	N	HENC	12-31-2025
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	03	PA	PAD001933175	F	N	HENC	11-01-2019
SHEBOYGAN HARBOR & RIVER	05	WI	WID980996367	F	N	HENC	09-30-2022
SOUTHWEST JEFFERSON COUNTY MINING	07	MO	MON000705443	F	N	HENC	06-23-2022
ST. LOUIS RIVER SITE	05	MN	MND039045430	F	N	HENC	12-30-2030
STANDARD MINE	08	CO	CO0002378230	F	N	HENC	12-31-2018
SULPHUR BANK MERCURY MINE	09	CA	CAD980893275	F	N	HENC	09-30-2040
TAR CREEK (OTTAWA COUNTY)	06	OK	OKD980629844	F	N	HENC	02-20-2038

TEN-MILE DRAIN	05	MI	MIN000510063	F	N	HENC	09-30-2022
TOWN OF PINES GROUNDWATER PLUME	05	IN	INN000508071	N	N	HENC	12-31-2017
TRW MICROWAVE, INC (BUILDING 825)	09	CA	CAD009159088	F	N	HENC	12-30-2020
U.S. SMELTER AND LEAD REFINERY, INC.	05	IN	IND047030226	F	N	HENC	12-31-2019
UNITED HECKATHORN CO.	09	CA	CAD981436363	F	N	HENC	12-31-2020
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106	F	N	HENC	09-30-2027
UPPER TENMILE CREEK MINING AREA	08	MT	MTSFN7578012	F	N	HENC	09-30-2027
US MAGNESIUM	08	UT	UTN000802704	F	N	HENC	09-30-2022
VALLEY PIKE VOCS	05	OH	OHN000510489	F	N	HENC	01-20-2027
VELSICOL CHEMICAL CORP. (MICHIGAN)	05	MI	MID000722439	F	N	HENC	09-30-2026
VENTRON/VELSICOL	02	NJ	NJD980529879	F	N	HENC	09-30-2034
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664	F	N	HENC	06-30-2035
WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	07	MO	MON000705842	F	N	HENC	09-30-2020
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	07	MO	MON000705027	F	N	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	07	MO	MON000705023	F	N	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	07	MO	MON000705032	F	N	HENC	09-30-2043
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995	F	N	HENC	09-30-2024
WEST COUNTY ROAD 112 GROUND WATER	06	TX	TXN000606992	F	N	HENC	09-30-2017
WYCKOFF CO./EAGLE HARBOR	10	WA	WAD009248295	F	N	HENC	05-02-2021

KEY

P- PROPOSED

F-FINAL

D-DELETED

N-NON NPL

Site Name	Region	State	EPA ID	NPL Status
HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN10021 74	F
LOCKHEED WEST SEATTLE	10	WA	WAN0010026 55	F
CENTREDALE MANOR RESTORATION PROJECT	1	RI	RID98120375 5	F
COMMERCE STREET PLUME	1	VT	VTD09835254 5	F
FLETCHER'S PAINT WORKS & STORAGE	1	NH	NHD0010796 49	F
NEW BEDFORD	1	MA	MAD9807313 35	F
RAYMARK INDUSTRIES, INC.	1	CT	CTD00118661 8	F
JACKSON PARK HOUSING COMPLEX (USNAVY)	10	WA	WA31700900 44 WA31700900 44	F
NORTH RIDGE ESTATES	10	OR	ORN00100247 6	F
COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD9807263 68	F
QUENDALL TERMINAL	10	WA	WAD9806392 15	F
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA00000265 34	F
WYCKOFF CO./EAGLE HARBOR	10	WA	WAD0092482 95	F
PUGET SOUND NAVAL SHIPYARD COMPLEX	10	WA	WA21700234 18 WA21700234 18	F
BLACK BUTTE MINE	10	OR	OR000051575 9	F
HARBOR ISLAND (LEAD)	10	WA	WAD9807228 39	F
MIDNITE MINE	10	WA	WAD9809787 53	F
PORTLAND HARBOR	10	OR	ORSFN100215 5	F
LOWER DUWAMISH WATERWAY	10	WA	WA00023298 03	F
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD04834092 1	F
CALDWELL TRUCKING CO.	2	NJ	NJD04879895 3	F
CORNELL DUBILIER ELECTRONICS INC.	2	NJ	NJD98155787 9	F
DIAMOND ALKALI CO.	2	NJ	NJD98052899 6	F
GOWANUS CANAL	2	NY	NYN00020622 2	F
HUDSON RIVER PCBS	2	NY	NYD98076384 1	F
ONONDAGA LAKE	2	NY	NYD98691358 0	F
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	2	NJ	NJD00200510 6	F
VENTRON/VELSICOL	2	NJ	NJD98052987 9	F
VINELAND CHEMICAL CO., INC.	2	NJ	NJD00238566 4	F

Federal Facility	HE Status	HE Estimated Control Date	HEC Year
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N	HENC	09-30-2020	20
N	HENC	09-30-2025	25
N	HENC	09-30-2027	27
N	HENC	09-30-2034	34
N	HENC	06-30-2035	35

WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	2	NJ	NJD986620995		F
ATLANTIC FLEET WEAPONS TRAINING AREA	2	PR	PRN000204694	PRN000204694	F
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	3	MD	MDD980918387		P
ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	3	VA	VAD042916361		F
ATLANTIC WOOD INDUSTRIES, INC.	3	VA	VAD990710410		F
BOARHEAD FARMS	3	PA	PAD047726161		F
CULPEPER WOOD PRESERVERS, INC.	3	VA	VAD059165282		F
KOPPERS CO., INC. (NEWPORT PLANT)	3	DE	DED980552244		F
LOWER DARBY CREEK AREA	3	PA	PASFN0305521		F
PRICE BATTERY LEAD SMELTER	3	PA	PAN000305679		F
RESIN DISPOSAL	3	PA	PAD063766828		D
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	3	PA	PAD001933175		F
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	4	FL	FLD008161994		F
ANNISTON PCB SITE (MONSANTO CO)	4	AL	ALD000400123		N
ARMSTRONG WORLD INDUSTRIES	4	GA	GAN000410033		F
BROWN'S DUMP	4	FL	FLD980847016		N
FAIRFAX ST. WOOD TREATERS	4	FL	FLD000623041		F
JACKSONVILLE ASH SITE	4	FL	FLSFN0407002		N
LCP CHEMICALS GEORGIA	4	GA	GAD099303182		F
TYNDALL AIR FORCE BASE	4	FL	FL1570024124	FL1570024124	F
GENERAL MILLS/HENKEL CORP.	5	MN	MND051441731		F
TOWN OF PINES GROUNDWATER PLUME	5	IN	INN000508071		N
CEDAR CREEK	5	WI	WID988590261		N
KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	5	IN	INN000510399		F
LUSHER STREET GROUND WATER CONTAMINATION	5	IN	IND982073785		F
ALCOA PROPERTIES	5	IL	ILSFN0508010		N
AMCAST INDUSTRIAL CORPORATION	5	WI	WIN000510210		F
EAST TROY CONTAMINATED AQUIFER	5	OH	OHSFN0507962		F
U.S. SMELTER AND LEAD REFINERY, INC.	5	IN	IND047030226		F
ASARCO TAYLOR SPRINGS	5	IL	ILN000508170		F
OLD AMERICAN ZINC PLANT	5	IL	IL0000034355		F

N	HENC	09-30-2024	24
Y	HENC	09-30-2025	25
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N	HENC	12-31-2019	19
N	HENC	12-31-2019	19
N	HENC	12-30-2020	20
N	HENC	12-31-2020	20

BAUTSCH-GRAY MINE	5	IL	ILN000510407	F
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	5	IL	ILD062340641	F
SHEBOYGAN HARBOR & RIVER	5	WI	WID980996367	F
TEN-MILE DRAIN	5	MI	MIN000510063	F
OTTAWA RADIATION AREAS	5	IL	ILD980606750	F
SANDOVAL ZINC COMPANY	5	IL	ILD053980454	F
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER	5	MI	MID006007306	F
NORTH SHORE GAS SOUTH PLANT	5	IL	ILD984809228	N
VELSICOL CHEMICAL CORP. (MICHIGAN)	5	MI	MID000722439	F
MATTHIESSEN AND HEGELER ZINC COMPANY	5	IL	IL0000064782	F
VALLEY PIKE VOCS	5	OH	OHN000510489	F
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	5	IN	INN000508142	F
LITTLE SCIOTO RIVER	5	OH	OHN000509950	F
ST. LOUIS RIVER SITE	5	MN	MND039045430	F
BANDERA ROAD GROUND WATER PLUME	6	TX	TXN000606565	F
DONNA RESERVOIR AND CANAL SYSTEM	6	TX	TX0000605363	F
JONES ROAD GROUND WATER PLUME	6	TX	TXN000605460	F
MARION PRESSURE TREATING	6	LA	LAD008473142	F
TAR CREEK (OTTAWA COUNTY)	6	OK	OKD980629844	F
WEST COUNTY ROAD 112 GROUND WATER	6	TX	TXN000606992	F
PCE FORMER DRY CLEANER	7	IA	IAD039954300	F
NEWTON COUNTY MINE TAILINGS	7	MO	MOD981507585	F
FORMER UNITED ZINC & ASSOCIATED SMELTERS	7	KS	KSN000705026	F
MADISON COUNTY MINES	7	MO	MOD098633415	F
ORONOGO-DUENWEG MINING BELT	7	MO	MOD980686281	F
PLATING, INC.	7	KS	KSD065735912	F
WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	7	MO	MON000705842	F
CHEROKEE COUNTY	7	KS	KSD980741862	F
OMAHA LEAD	7	NE	NESFN0703481	F
SOUTHWEST JEFFERSON COUNTY MINING	7	MO	MON000705443	F
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	7	MO	MOD981126899	F

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N	HENC	06-23-2022	22
N	HENC	12-31-2025	25

WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	7	MO	MON000705032		F
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	7	MO	MON000705027		F
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	7	MO	MON000705023		F
ACM SMELTER AND REFINERY	8	MT	MTD093291599		F
ANACONDA CO. SMELTER	8	MT	MTD093291656		F
BARKER HUGHESVILLE MINING DISTRICT	8	MT	MT6122307485		F
CALIFORNIA GULCH	8	CO	COD980717938		F
CARPENTER SNOW CREEK MINING DISTRICT	8	MT	MT0001096353		F
CENTRAL CITY, CLEAR CREEK	8	CO	COD980717557		F
COLORADO SMELTER	8	CO	CON000802700		F
JACOBS SMELTER	8	UT	UT0002391472		F
LIBBY ASBESTOS SITE	8	MT	MT0009083840		F
STANDARD MINE	8	CO	CO0002378230		F
UPPER TENMILE CREEK MINING AREA	8	MT	MTSFN7578012		F
US MAGNESIUM	8	UT	UTN000802704		F
HILL AIR FORCE BASE	8	UT	UT0571724350	UT0571724350	F
ADVANCED MICRO DEVICES, INC.	9	CA	CAD048634059		F
ARGONAUT MINE	9	CA	CAD983650011		F
ASARCO HAYDEN PLANT	9	AZ	AZD008397127		N
CARSON RIVER MERCURY SITE	9	NV	NVD980813646		F
IRON KING MINE - HUMBOLDT SMELTER	9	AZ	AZ0000309013		F
KLAU/BUENA VISTA MINE	9	CA	CA1141190578		F
LAVA CAP MINE	9	CA	CAD983618893		F
MCCORMICK & BAXTER CREOSOTING CO.	9	CA	CAD009106527		F
MONTROSE CHEMICAL CORP.	9	CA	CAD008242711		F
SULPHUR BANK MERCURY MINE	9	CA	CAD980893275		F
TRW MICROWAVE, INC (BUILDING 825)	9	CA	CAD009159088		F
UNITED HECKATHORN CO.	9	CA	CAD981436363		F
FORT ORD	9	CA	CA7210020676	CA7210020676	F
PEARL HARBOR NAVAL COMPLEX	9	HI	HI4170090076	HI4170090076	F

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Y	HENC	09-30-2025	25
Y	HENC	06-30-2030	30

Region 10

HEC Year	Private (13)	Fed Fac (2)
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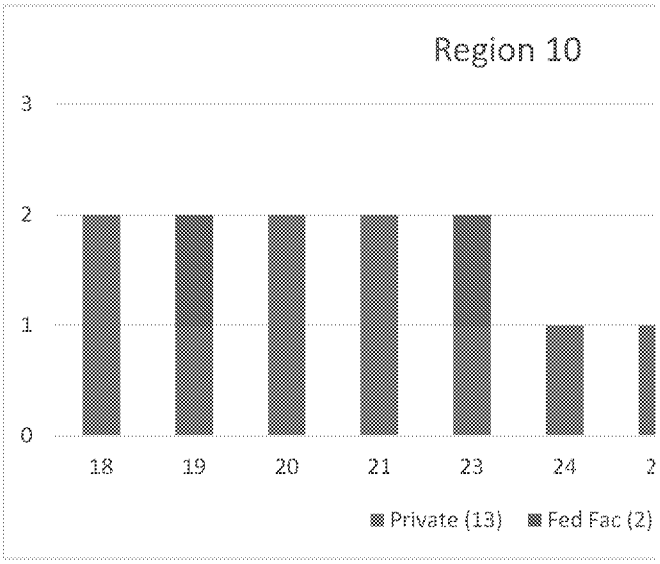
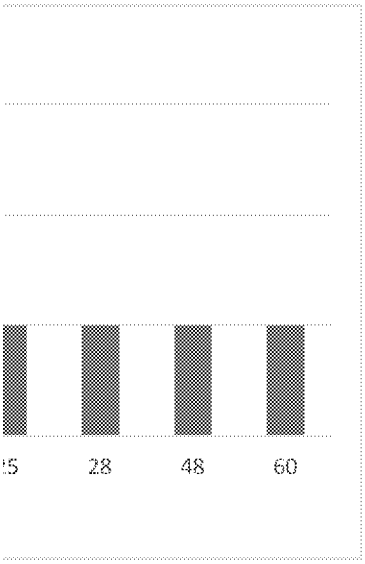
20	2	
21	2	
23	1	1
24	1	
25	1	
28	1	
48	1	
60	1	

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28
48
60

Region 7

		Private (14)	Fed Fac (0)
HEC Year	18	1	
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	20	5	
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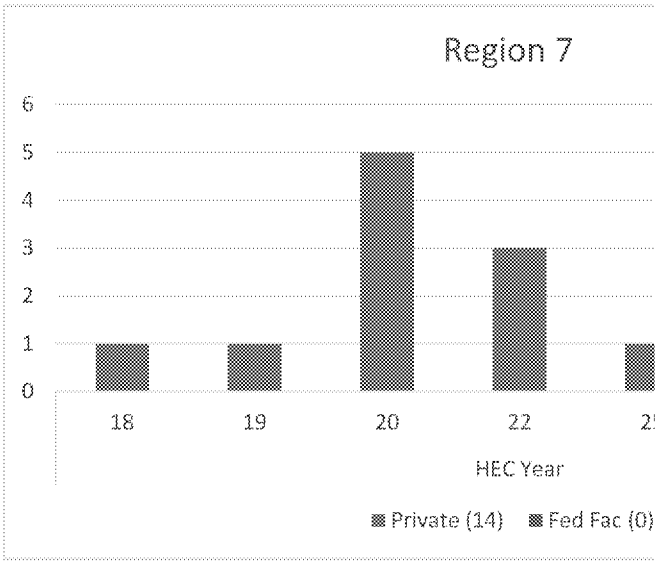
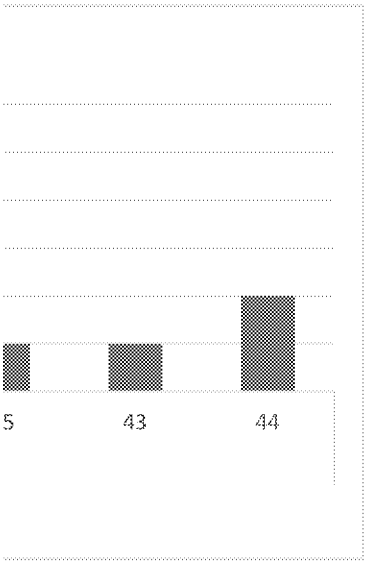
	43	1	
	44	2	

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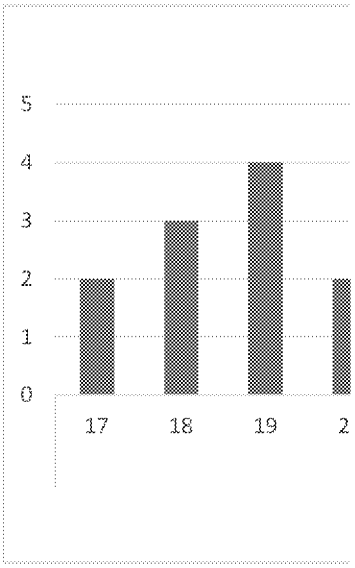
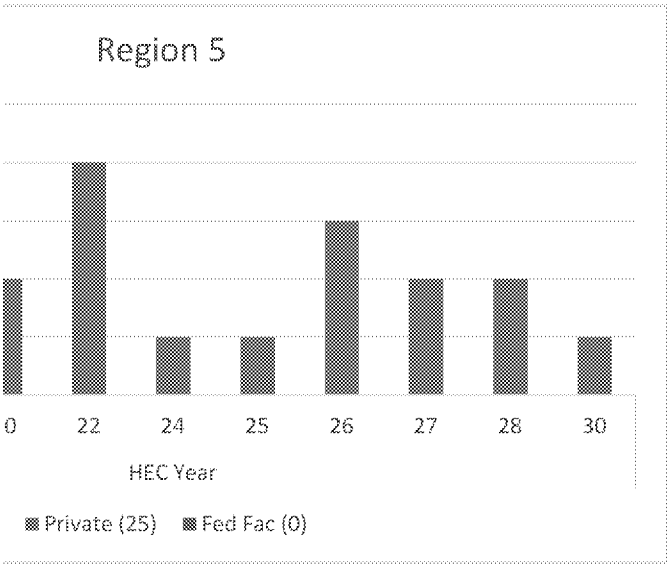
43
44

Site Name				Fed Fac				HEC Year
GENERAL MILLS/HENKEL CORP.	5	MN	MND051441731	F	N	HENC	12-31-2017	17
TOWN OF PINES GROUNDWATER PLUME	5	IN	INN000508071	N	N	HENC	12-31-2017	17
CEDAR CREEK	5	WI	WID988590261	N	N	HENC	06-30-2018	18
KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	5	IN	INN000510399	F	N	HENC	12-31-2018	18
LUSHER STREET GROUND WATER CONTAMINATION	5	IN	IND982073785	F	N	HENC	12-31-2018	18
ALCOA PROPERTIES	5	IL	ILSFN0508010	N	N	HENC	12-30-2019	19
AMCAST INDUSTRIAL CORPORATION	5	WI	WIN000510210	F	N	HENC	12-31-2019	19
EAST TROY CONTAMINATED AQUIFER	5	OH	OHSFN0507962	F	N	HENC	12-31-2019	19
U.S. SMELTER AND LEAD REFINERY, INC.	5	IN	IND047030226	F	N	HENC	12-31-2019	19
ASARCO TAYLOR SPRINGS	5	IL	ILN000508170	F	N	HENC	12-30-2020	20
OLD AMERICAN ZINC PLANT	5	IL	IL0000034355	F	N	HENC	12-31-2020	20
BAUTSCH-GRAY MINE	5	IL	ILN000510407	F	N	HENC	12-31-2022	22
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	5	IL	ILD062340641	F	N	HENC	03-31-2022	22
SHEBOYGAN HARBOR & RIVER	5	WI	WID980996367	F	N	HENC	09-30-2022	22
TEN-MILE DRAIN	5	MI	MIN000510063	F	N	HENC	09-30-2022	22
OTTAWA RADIATION AREAS	5	IL	ILD980606750	F	N	HENC	09-30-2024	24
SANDOVAL ZINC COMPANY	5	IL	ILD053980454	F	N	HENC	12-31-2025	25
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER	5	MI	MID006007306	F	N	HENC	09-30-2026	26
NORTH SHORE GAS SOUTH PLANT	5	IL	ILD984809228	N	N	HENC	12-31-2026	26
VELSICOL CHEMICAL CORP. (MICHIGAN)	5	MI	MID000722439	F	N	HENC	09-30-2026	26
MATTHIESSEN AND HEGELER ZINC COMPANY	5	IL	IL0000064782	F	N	HENC	09-30-2027	27
VALLEY PIKE VOCS	5	OH	OHN000510489	F	N	HENC	01-20-2027	27
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	5	IN	INN000508142	F	N	HENC	09-30-2028	28
LITTLE SCIOTO RIVER	5	OH	OHN000509950	F	N	HENC	06-18-2028	28
ST. LOUIS RIVER SITE	5	MN	MND039045430	F	N	HENC	12-30-2030	30

Region 5

		Private (25)	Fed Fac (0)
HEC Year	17	2	
	18	3	
	19	4	
	20	2	
	22	4	
	24	1	
	25	1	
	26	3	
	27	2	
	28	2	
	30	1	

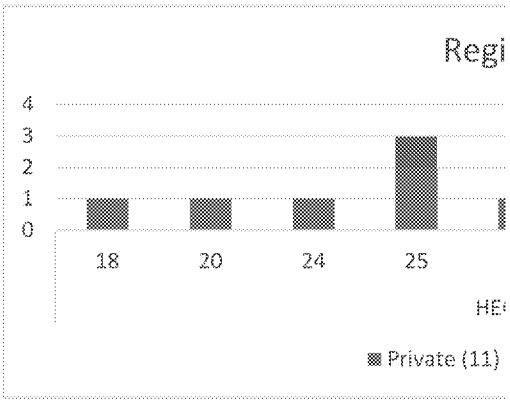


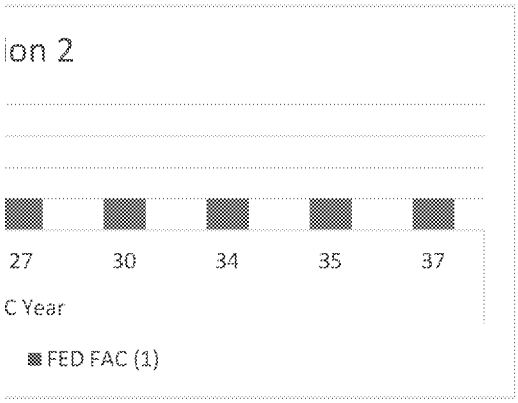

Region 5
0
22
24
25
26
27
28
30
HEC Year
Private (25)
Fed Fac (0)

Site					Fed Fac			
CALDWELL TRUCKING CO.	2	NJ	NJD048798953		F	N	HENC	09-30-2018
HUDSON RIVER PCBS	2	NY	NYD980763841		F	N	HENC	09-30-2020
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	2	NJ	NJD986620995		F	N	HENC	09-30-2024
GOWANUS CANAL	2	NY	NYN000206222		F	N	HENC	09-30-2025
ONONDAGA LAKE	2	NY	NYD986913580		F	N	HENC	09-30-2025
ATLANTIC FLEET WEAPONS TRAINING AREA	2	PR	PRN000204694	PRN000204694	F	Y	HENC	09-30-2025
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	2	NJ	NJD002005106		F	N	HENC	09-30-2027
CORNELL DUBILIER ELECTRONICS INC.	2	NJ	NJD981557879		F	N	HENC	09-30-2030
VENTRON/VELSICOL	2	NJ	NJD980529879		F	N	HENC	09-30-2034
VINELAND CHEMICAL CO., INC.	2	NJ	NJD002385664		F	N	HENC	06-30-2035
DIAMOND ALKALI CO.	2	NJ	NJD980528996		F	N	HENC	09-30-2037

HEC Year	Region 2		
18		Private (11)	FED FAC (1)
	HEC Year	18	1
20		20	1
24		24	1
25		25	2
25		27	1
25		30	1
27		34	1
30		35	1
34		37	1
35			
37			

1

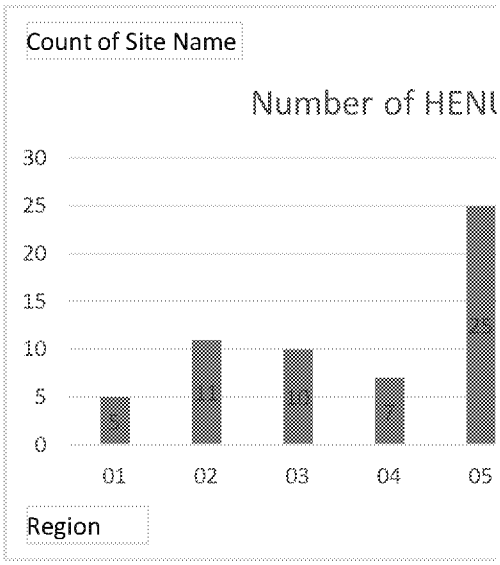


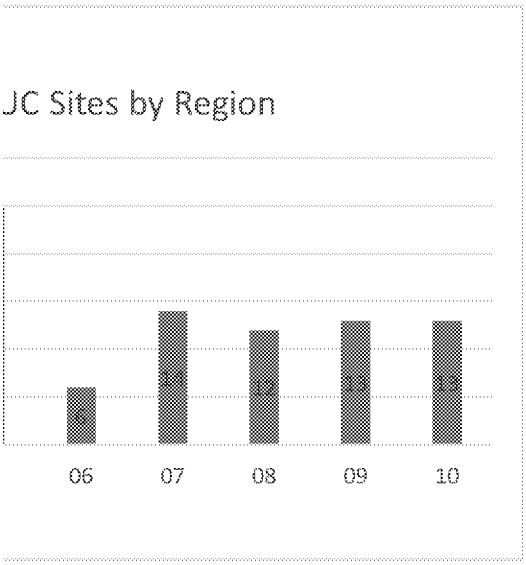

ion 2
27
30
34
35
37
C Year
FED FAC (1)

Site Name	Region	State	EPA ID
DIAMOND ALKALI CO.	02	NJ	NJD980528996
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664
VENTRON/VELSICOL	02	NJ	NJD980529879
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106
ONONDAGA LAKE	02	NY	NYD986913580
GOWANUS CANAL	02	NY	NYN000206222
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995
CALDWELL TRUCKING CO.	02	NJ	NJD048798953
HUDSON RIVER PCBS	02	NY	NYD980763841

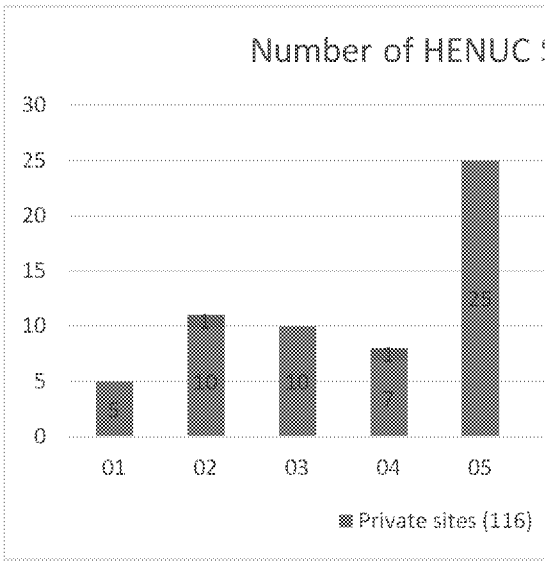
NPL Status	Federal Facility	HE Status	HE Estimated Control Date	Year
F	N	HENC	9/30/2037 4:00	37
F	N	HENC	6/30/2035 4:00	35
F	N	HENC	9/30/2034 4:00	34
F	N	HENC	9/30/2030 4:00	30
F	N	HENC	9/30/2027 4:00	27
F	N	HENC	9/30/2025 4:00	25
F	N	HENC	9/30/2025 20:51	25
F	N	HENC	9/30/2024 4:00	24
F	N	HENC	9/30/2018 4:00	18
F	N	HENC	9/30/2020 4:00	20

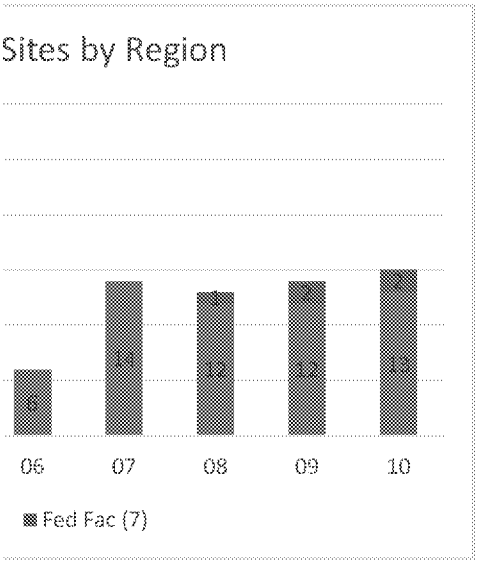
Region	Count of Site Name	Fed Fac
01	5	
02	11	1
03	10	
04	7	1
05	25	
06	6	
07	14	
08	12	1
09	13	2
10	13	2



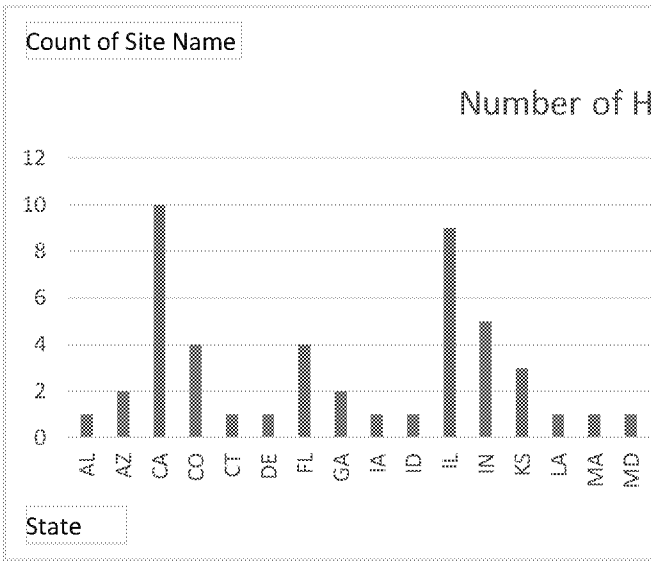

JC Sites by Region
06
07
08
09
10

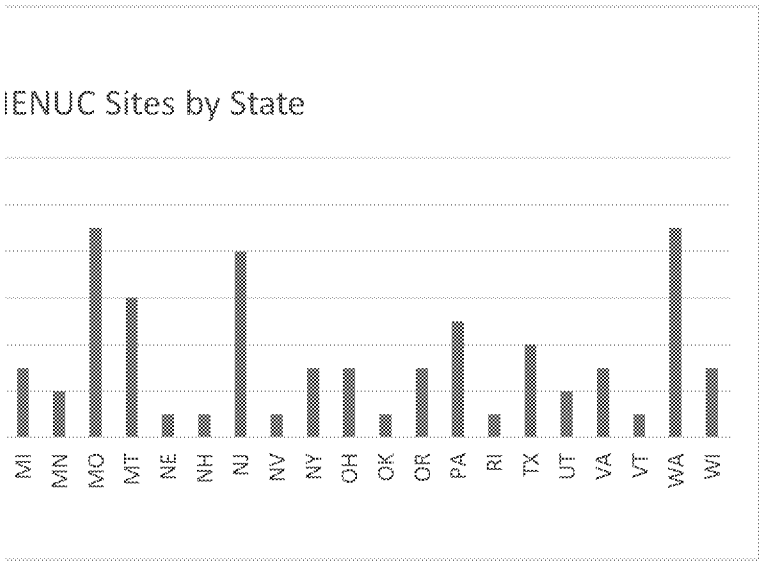
Region	Private sites (116)	Fed Fac (7)
01	5	
02	10	1
03	10	
04	7	1
05	25	
06	6	
07	14	
08	12	1
09	12	2
10	13	2



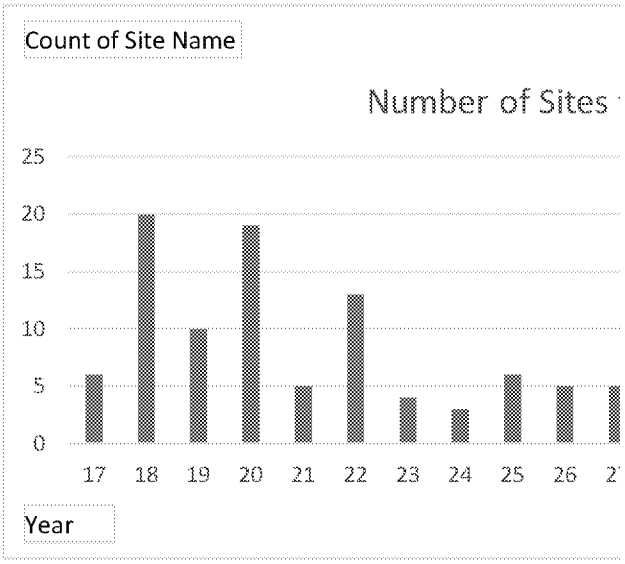

Sites by Region
06
07
08
09
10
Fed Fac (7)

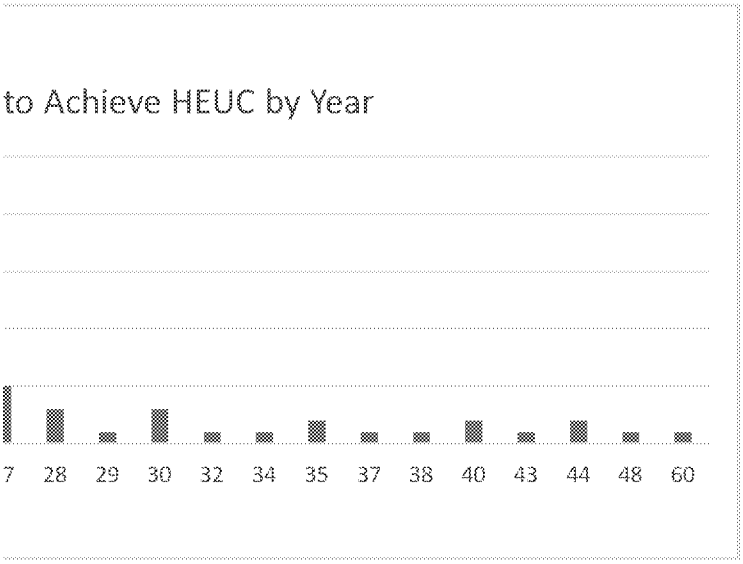
State	Count of Site Name
AL	1
AZ	2
CA	10
CO	4
CT	1
DE	1
FL	4
GA	2
IA	1
ID	1
IL	9
IN	5
KS	3
LA	1
MA	1
MD	1
MI	3
MN	2
MO	9
MT	6
NE	1
NH	1
NJ	8
NV	1
NY	3
OH	3
OK	1
OR	3
PA	5
RI	1
TX	4
UT	2
VA	3
VT	1
WA	9
WI	3




IENUC Sites by State
MI
MN
MO
MT
NE
NH
NJ
NV
NY
OH
OK
OR
PA
RI
TX
UT
VA
VT
WA
WI

Year	Count of Site Name
17	6
18	20
19	10
20	19
21	5
22	13
23	4
24	3
25	6
26	5
27	5
28	3
29	1
30	3
32	1
34	1
35	2
37	1
38	1
40	2
43	1
44	2
48	1
60	1




to Achieve HEUC by Year
7
28
29
30
32
34
35
37
38
40
43
44
48
60

Site Name	Region	State	EPA ID	NPL Status
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	03	MD	MDD980918387	P
GENERAL MILLS/HENKEL CORP.	05	MN	MND051441731	F
TOWN OF PINES GROUNDWATER PLUME	05	IN	INN000508071	N
WEST COUNTY ROAD 112 GROUND WATER	06	TX	TXN000606992	F
LAVA CAP MINE	09	CA	CAD983618893	F
OMEGA CHEMICAL CORPORATION	09	CA	CAD042245001	F
COMMERCE STREET PLUME	01	VT	VTD098352545	F
FLETCHER'S PAINT WORKS & STORAGE	01	NH	NHD001079649	F
CALDWELL TRUCKING CO.	02	NJ	NJD048798953	F
RINGWOOD MINES/LANDFILL	02	NJ	NJD980529739	F
BOARHEAD FARMS	03	PA	PAD047726161	F
KOPPERS CO., INC. (NEWPORT PLANT)	03	DE	DED980552244	F
LOWER DARBY CREEK AREA	03	PA	PASFN0305521	F
RESIN DISPOSAL	03	PA	PAD063766828	D
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	04	FL	FLD008161994	F
FAIRFAX ST. WOOD TREATERS	04	FL	FLD000623041	F
CEDAR CREEK	05	WI	WID988590261	N
KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	05	IN	INN000510399	F
LUSHER STREET GROUND WATER CONTAMINATION	05	IN	IND982073785	F
JONES ROAD GROUND WATER PLUME	06	TX	TXN000605460	F
MARION PRESSURE TREATING	06	LA	LAD008473142	F
PCE FORMER DRY CLEANER	07	IA	IAD039954300	F
STANDARD MINE	08	CO	CO0002378230	F
MCCORMICK & BAXTER CREOSOTING CO.	09	CA	CAD009106527	F
HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN1002174	F
LOCKHEED WEST SEATTLE	10	WA	WAN001002655	F
PRICE BATTERY LEAD SMELTER	03	PA	PAN000305679	F
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	03	PA	PAD001933175	F
ALCOA PROPERTIES	05	IL	ILSFN0508010	N
AMCAST INDUSTRIAL CORPORATION	05	WI	WIN000510210	F
EAST TROY CONTAMINATED AQUIFER	05	OH	OHSFN0507962	F
U.S. SMELTER AND LEAD REFINERY, INC.	05	IN	IND047030226	F
BANDERA ROAD GROUND WATER PLUME	06	TX	TXN000606565	F
NEWTON COUNTY MINE TAILINGS	07	MO	MOD981507585	F
CENTRAL CITY, CLEAR CREEK	08	CO	COD980717557	F
NORTH RIDGE ESTATES	10	OR	ORN001002476	F
CENTREDALE MANOR RESTORATION PROJECT	01	RI	RID981203755	F
HUDSON RIVER PCBS	02	NY	NYD980763841	F
ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	03	VA	VAD042916361	F
ATLANTIC WOOD INDUSTRIES, INC.	03	VA	VAD990710410	F
BROWN'S DUMP	04	FL	FLD980847016	N
JACKSONVILLE ASH SITE	04	FL	FLSFN0407002	N
LCP CHEMICALS GEORGIA	04	GA	GAD099303182	F
ASARCO TAYLOR SPRINGS	05	IL	ILN000508170	F
OLD AMERICAN ZINC PLANT	05	IL	IL0000034355	F

Federal Facility	HE Status	HE Estimated Control Date	Year
N	HENC	12-31-2017	17
N	HENC	12-31-2017	17
N	HENC	12-31-2017	17
N	HENC	09-30-2017	17
N	HENC	12-31-2017	17
N	HENC	10-31-2017	17
N	HENC	09-28-2018	18
N	HENC	03-30-2018	18
N	HENC	09-30-2018	18
N	HENC	09-30-2018	18
N	HENC	09-30-2018	18
N	HENC	09-30-2018	18
N	HENC	12-28-2018	18
N	HENC	09-30-2018	18
N	HENC	09-30-2018	18
N	HENC	07-31-2018	18
N	HENC	06-30-2018	18
N	HENC	12-31-2018	18
N	HENC	12-31-2018	18
N	HENC	09-28-2018	18
N	HENC	09-21-2018	18
N	HENC	09-30-2018	18
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N	HENC	12-31-2019	19
N	HENC	09-30-2019	19
N	HENC	06-30-2019	19
N	HENC	09-30-2019	19
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N	HENC	12-31-2020	20
N	HENC	12-31-2020	20
N	HENC	12-30-2020	20
N	HENC	12-30-2020	20
N	HENC	12-31-2020	20

FORMER UNITED ZINC & ASSOCIATED SMELTERS	07	KS	KSN000705026	F
MADISON COUNTY MINES	07	MO	MOD098633415	F
ORONOGO-DUENWEG MINING BELT	07	MO	MOD980686281	F
PLATING, INC.	07	KS	KSD065735912	F
WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	07	MO	MON000705842	F
ADVANCED MICRO DEVICES, INC.	09	CA	CAD048634059	F
TRW MICROWAVE, INC (BUILDING 825)	09	CA	CAD009159088	F
UNITED HECKATHORN CO.	09	CA	CAD981436363	F
COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD980726368	F
QUENDALL TERMINAL	10	WA	WAD980639215	F
RAYMARK INDUSTRIES, INC.	01	CT	CTD001186618	F
ARMSTRONG WORLD INDUSTRIES	04	GA	GAN000410033	F
CALIFORNIA GULCH	08	CO	COD980717938	F
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA0000026534	F
WYCKOFF CO./EAGLE HARBOR	10	WA	WAD009248295	F
NEW BEDFORD	01	MA	MAD980731335	F
BAUTSCH-GRAY MINE	05	IL	ILN000510407	F
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	05	IL	ILD062340641	F
SHEBOYGAN HARBOR & RIVER	05	WI	WID980996367	F
TEN-MILE DRAIN	05	MI	MIN000510063	F
CHEROKEE COUNTY	07	KS	KSD980741862	F
OMAHA LEAD	07	NE	NESFN0703481	F
SOUTHWEST JEFFERSON COUNTY MINING	07	MO	MON000705443	F
ANACONDA CO. SMELTER	08	MT	MTD093291656	F
JACOBS SMELTER	08	UT	UT0002391472	F
LIBBY ASBESTOS SITE	08	MT	MT0009083840	F
US MAGNESIUM	08	UT	UTN000802704	F
ARGONAUT MINE	09	CA	CAD983650011	F
CULPEPER WOOD PRESERVERS, INC.	03	VA	VAD059165282	F
ANNISTON PCB SITE (MONSANTO CO)	04	AL	ALD000400123	N
ASARCO HAYDEN PLANT	09	AZ	AZD008397127	N
BLACK BUTTE MINE	10	OR	OR0000515759	F
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995	F
OTTAWA RADIATION AREAS	05	IL	ILD980606750	F
HARBOR ISLAND (LEAD)	10	WA	WAD980722839	F
GOWANUS CANAL	02	NY	NYN000206222	F
ONONDAGA LAKE	02	NY	NYD986913580	F
SANDOVAL ZINC COMPANY	05	IL	ILD053980454	F
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	07	MO	MOD981126899	F
IRON KING MINE - HUMBOLDT SMELTER	09	AZ	AZ0000309013	F
MIDNITE MINE	10	WA	WAD980978753	F
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER	05	MI	MID006007306	F
NORTH SHORE GAS SOUTH PLANT	05	IL	ILD984809228	N
VELSICOL CHEMICAL CORP. (MICHIGAN)	05	MI	MID000722439	F
DONNA RESERVOIR AND CANAL SYSTEM	06	TX	TX0000605363	F
CARPENTER SNOW CREEK MINING DISTRICT	08	MT	MT0001096353	F
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106	F

N	HENC	09-30-2020	20
N	HENC	09-30-2020	20
N	HENC	12-31-2020	20
N	HENC	09-30-2020	20
N	HENC	09-30-2020	20
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N	HENC	12-30-2020	20
N	HENC	12-31-2020	20
N	HENC	03-30-2020	20
N	HENC	09-30-2020	20
N	HENC	09-30-2021	21
N	HENC	12-30-2021	21
N	HENC	03-31-2021	21
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N	HENC	03-31-2022	22
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N	HENC	09-30-2022	22
N	HENC	09-30-2022	22
N	HENC	06-23-2022	22
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N	HENC	12-31-2022	22
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N	HENC	09-30-2023	23
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N	HENC	09-30-2024	24
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N	HENC	12-31-2026	26
N	HENC	09-30-2026	26
N	HENC	09-30-2026	26
N	HENC	12-31-2026	26
N	HENC	09-30-2027	27

MATTHIESSEN AND HEGELER ZINC COMPANY	05	IL	IL0000064782	F
VALLEY PIKE VOCS	05	OH	OHN000510489	F
COLORADO SMELTER	08	CO	CON000802700	F
UPPER TENMILE CREEK MINING AREA	08	MT	MTSFN7578012	F
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	05	IN	INN000508142	F
LITTLE SCIOTO RIVER	05	OH	OHN000509950	F
PORTLAND HARBOR	10	OR	ORSFN1002155	F
KLAU/BUENA VISTA MINE	09	CA	CA1141190578	F
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879	F
ST. LOUIS RIVER SITE	05	MN	MND039045430	F
ACM SMELTER AND REFINERY	08	MT	MTD093291599	F
BARKER HUGHESVILLE MINING DISTRICT	08	MT	MT6122307485	F
VENTRON/VELSICOL	02	NJ	NJD980529879	F
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664	F
MONTROSE CHEMICAL CORP.	09	CA	CAD008242711	F
DIAMOND ALKALI CO.	02	NJ	NJD980528996	F
TAR CREEK (OTTAWA COUNTY)	06	OK	OKD980629844	F
CARSON RIVER MERCURY SITE	09	NV	NVD980813646	F
SULPHUR BANK MERCURY MINE	09	CA	CAD980893275	F
WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	07	MO	MON000705032	F
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	07	MO	MON000705027	F
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	07	MO	MON000705023	F
LOWER DUWAMISH WATERWAY	10	WA	WA0002329803	F
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD048340921	F
ATLANTIC FLEET WEAPONS TRAINING AREA	02	PR	PRN000204694	F
TYNDALL AIR FORCE BASE	04	FL	FL1570024124	F
HILL AIR FORCE BASE	08	UT	UT0571724350	F
FORT ORD	09	CA	CA7210020676	F
PEARL HARBOR NAVAL COMPLEX	09	HI	HI4170090076	F
JACKSON PARK HOUSING COMPLEX (USNAVY)	10	WA	WA3170090044	F
PUGET SOUND NAVAL SHIPYARD COMPLEX	10	WA	WA2170023418	F

N	HENC	09-30-2027	27
N	HENC	01-20-2027	27
N	HENC	03-31-2027	27
N	HENC	09-30-2027	27
N	HENC	09-30-2028	28
N	HENC	06-18-2028	28
N	HENC	09-20-2028	28
N	HENC	03-30-2029	29
N	HENC	09-30-2030	30
N	HENC	12-30-2030	30
N	HENC	09-30-2030	30
N	HENC	03-31-2032	32
N	HENC	09-30-2034	34
N	HENC	06-30-2035	35
N	HENC	09-30-2035	35
N	HENC	09-30-2037	37
N	HENC	02-20-2038	38
N	HENC	01-01-2040	40
N	HENC	09-30-2040	40
N	HENC	09-30-2043	43
N	HENC	03-31-2044	44
N	HENC	03-31-2044	44
N	HENC	09-30-2048	48
N	HENC	09-30-2060	60
Y	HENC	09-30-2025	25
Y	HENC	09-30-2017	17
Y	HENC	12-31-2025	25
Y	HENC	09-30-2025	25
Y	HENC	06-30-2030	30
Y	HENC	02-04-2019	19
Y	HENC	09-30-2023	23

Federal Facility Sites with Human Exposure Not Under Control (HENC) and Estimated Control Dates

Data pulled from SEMS on 09/14/2017

Site Name	Region	State	EPA ID	NPL Status	Federal Agency	HE Status	HE Estimated Control Date	HE Scenario	Pathway Description
ATLANTIC FLEET WEAPONS TRAINING AREA	2	PR	PRN000204694	F	US Navy	HENC	09-30-2025	Trespasser	Trespassers ignoring land use control, including signage, may be exposed to munitions. Ongoing sweeps of the area occur to minimize exposure.
TYNDALL AIR FORCE BASE	4	FL	FL1570024124	F	US Air Force	HENC	09-30-2017	Trespasser	Trespassers ignoring site controls may be exposed to contaminated fish and sediment within Shoal Point Bayou.
HILL AIR FORCE BASE	8	UT	UT0571724350	F	US Air Force	HENC	12-31-2025	Resident	Ongoing investigation and response actions related to vapor intrusion in a community adjacent to the base.
FORT ORD	9	CA	CA7210020676	F	US Army	HENC	09-30-2025	Trespasser	Trespassers ignoring signage may be exposed to munitions despite an extensive site security program.
PEARL HARBOR NAVAL COMPLEX	9	HI	HI4170090076	F	US Navy	HENC	06-30-2030	Trespasser	Recreational tresspassers ignoring signage may be exposed to contaminated seafood through consumption.
JACKSON PARK HOUSING COMPLEX (USNAVY)	10	WA	WA3170090044	F	US Navy	HENC	02-04-2019	Recreational users	Recreational users may come in contact with munitions. Proposed Plan in development will address the concern.
PUGET SOUND NAVAL SHIPYARD COMPLEX	10	WA	WA2170023418	F	US Navy	HENC	09-30-2023	Recreational users	Recreational user may be exposed to contaminated seafood through consumption.

Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/12/2018 2:47:49 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: FW: Concur Itinerary 02/20/2018: TRIP FROM DALLAS TO TULSA (VZJP3S)
Attachments: DAL-TUL.ics; TUL-DAL.ics

From: Concur Travel [mailto:TravelWizard@concursolutions.com]
Sent: Wednesday, January 31, 2018 3:28 PM
To: Luckett, Casey <Luckett.Casey@epa.gov>
Subject: Concur Itinerary 02/20/2018: TRIP FROM DALLAS TO TULSA (VZJP3S)

Trip Overview

Trip Name: Trip from Dallas to Tulsa
Start Date: February 20, 2018
End Date: February 21, 2018
Created: January 31, 2018, CASEY LUCKETT SNYDER *(Modified: January 31, 2018)*
Description: Travel to Miami to meet with City re: potential purchase of BNSF rail spur. Attend Tar Creek monthly meeting on 2/21
Trip Purpose: 1-SUPERFUND SITE TRAVEL
Agency Record Locator: VZJP3S
Passengers: Casey L Luckettsnyder
Total Estimated Cost: $**404.59** USD

Important: Reservations must be approved and ticketed no later than: 02/18/2018 7:35 AM Eastern
The trip will be automatically cancelled if it is not approved before the deadline.

Agency Name: BCD_EPA

Reservations
Tuesday, February 20, 2018

Flight Dallas, TX (DAL) to Tulsa, OK (TUL)

Southwest 240

Departure: 08:35 AM
Seat:No seat assignment
Love Field (DAL)
Duration: 1 hour
Nonstop

Arrival: 09:35 AM
Tulsa Intl (TUL)

Additional Details
Distance: 238 miles
E-Ticket
Emissions: 126.1 lbs CO_2
Cabin: Gov Contract Discounted (M)

Confirmation: Ex. 6 - Personal Privacy
Status: Booked directly in Southwest /MJIOQQ
Air Frequent Flyer Number: Ex. 6 - Personal Privacy

Enterprise Car Rental at: Tulsa US (TUL)

Pick-up at: Tulsa US (TUL)

Pick Up: 09:35 AM ***Tue Feb 20***
Pick-up at:Tulsa US (TUL)
Number of Cars:1

Confirmation: Ex. 6 - Personal Privacy
Status:Confirmed
Rate Code:EM2A

Return: 02:15 PM ***Wed Feb 21***
Returning to:Tulsa US (TUL)

Additional Details

Rate: $13.00 USD daily rate, unlimited miles; $2.00 USD extra hourly rate, unlimited miles

Total Rate: $49.99 USD

Corporate Discount: Ex. 6 - Personal Privacy

Rental Details

Intermediate / Car / Automatic transmission / Air conditioning

Wednesday, February 21, 2018

Flight Tulsa, OK (TUL) to Dallas, TX (DAL)

Southwest 1948

Departure: 02:15 PM
Seat:No seat assignment
Tulsa Intl (TUL)
Duration: 1 hour
Nonstop

Confirmation: Ex. 6 - Personal Privacy
Status: Booked directly in Southwest /MJIOQQ
Air Frequent Flyer Number: Ex. 6 - Personal Privacy

Arrival: 03:15 PM
Love Field (DAL)

Additional Details

Distance: 238 miles

E-Ticket

Emissions: 126.1 lbs CO_2

Cabin: Gov Contract Discounted (M)

Total Estimated Cost

Air	
Airfare quoted amount:	**$303.26** USD
Taxes and fees:	**$51.34** USD
Air Total Price:	**$354.60** USD
Car:	**$49.99** USD
Total Estimated Cost:	**$404.59** USD

TICKET NOT YET ISSUED. AIRFARE QUOTED IN ITINERARY IS NOT GUARANTEED UNTIL TICKETS ARE ISSUED.

Remarks

FOR 24/7 TRAVEL ASSISTANCE PLEASE CONTACT
THE BCD TRAVEL TEAM AT 1-866-964-1346
FOR OUTSIDE THE US CALL COLLECT 770-829-2609
FOR THE HEARING IMPAIRED- PLEASE DIAL 711
TO ACCESS RELAY SERVICE- PROVIDE PHONE
NUMBER OF 1-866-964-1346 TO ACCESS TRAVEL
****
DUE TO RECENT CHANGES IN THE FY15 GOVERNMENT CITY PAIR
PROGRAM/CPP YOUR AIR RESERVATIONS ARE SUBJECT TO
CANCELLATION BY THE AIRLINES IF NOT TICKETED AT LEAST
48 HOURS PRIOR TO SCHEDULED DEPARTURE
PLEASE ENSURE ALL NECESSARY APPROVALS ARE PROCESSED IN
ACCORDANCE WITH YOUR AGENCYS BUSINESS RULES BUT NOLESS
THAN 3 BUSINESS DAYS PRIOR TO DEPARTURE TO ENSURE TICKETING.
THIS 48 HOUR CANCELLATION RULE DOES NOT APPLY TO
INTERNATIONAL RESERVATIONS UNLESS YOUR TRIP HAS DOMESTIC
CONNECTIONS ON MORE THAN ONE AIRLINE OR THESE
RESERVATIONS REQUIRE SEPARATE AIR TICKETS.
****

Appointment

Subject: Flight# WN240 from DAL -> TUL (1 hour)

Start: 2/20/2018 2:35:00 PM
End: 2/20/2018 3:35:00 PM
Show Time As: Busy

Importance: High

Recurrence: (none)

Trip Overview
~~~~~~~~~~~~~

Trip Name: Trip from Dallas to Tulsa
Start Date: February 20, 2018
End Date: February 21, 2018
Created: January 31, 2018, CASEY LUCKETT SNYDER (Modified: January 31, 2018)
Description: Travel to Miami to meet with City re: potential purchase of BNSF rail spur. Attend Tar Creek monthly meeting on 2/21
Trip Purpose: 1-SUPERFUND SITE TRAVEL
Agency Record Locator: VZJP3S
Passengers: Casey L Luckettsnyder
Total Estimated Cost: $ 404.59 USD
Important: Reservations must be approved and ticketed no later than: 02/18/2018 7:35 AM Eastern
The trip will be automatically cancelled if it is not approved before the deadline.
Agency Name: BCD_EPA

Reservations
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Tuesday, February 20, 2018

Flight Dallas, TX (DAL) to Tulsa, OK (TUL)
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Southwest 240

Departure: 08:35 AM
Seat: No seat assignment
Love Field (DAL)
Duration: 1 hour
Nonstop
Arrival: 09:35 AM
Tulsa Intl (TUL)
Confirmation: Ex. 6 - Personal Privacy
Status: Booked directly in Southwest Ex. 6 - Personal Privacy
Air Frequent Flyer Number: Ex. 6 - Personal Privacy
Distance: 238 miles
E-Ticket
Emissions: 126.1 lbs CO 2
Cabin: Gov Contract Discounted (M)

Enterprise Car Rental at: Tulsa US (TUL)
```

Pick-up at: Tulsa US (TUL)

Pick Up: 09:35 AM Tue Feb 20
Pick-up at: Tulsa US (TUL)
Number of Cars: 1
Return: 02:15 PM Wed Feb 21
Returning to: Tulsa US (TUL)
Confirmation: Ex. 6 - Personal Privacy
Status: Confirmed
Rate Code: EM2A
Rate: $ 13.00 USD daily rate, unlimited miles; $ 2.00 USD extra hourly rate, unlimited miles
Total Rate: $ 49.99 USD
Corporate Discount: FGTDYEP

Intermediate / Car / Automatic transmission / Air conditioning

Wednesday, February 21, 2018

Flight Tulsa, OK (TUL) to Dallas, TX (DAL)
``

Southwest 1948

Departure: 02:15 PM
Seat: No seat assignment
Tulsa Intl (TUL)
Duration: 1 hour
Nonstop
Arrival: 03:15 PM
Love Field (DAL)
Confirmation: Ex. 6 - Personal Privacy
Status: Booked directly in Southwest / Ex. 6 - Personal Privacy
Air Frequent Flyer Number: Ex. 6 - Personal Privacy
Distance: 238 miles
E-Ticket
Emissions: 126.1 lbs CO 2
Cabin: Gov Contract Discounted (M)

Total Estimated Cost
~~~~~~~~~~~~~~~~~~~

Air
Airfare quoted amount: $ 303.26 USD
Taxes and fees: $ 51.34 USD
Air Total Price: $ 354.60 USD
Car: $ 49.99 USD
Total Estimated Cost: $ 404.59 USD

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CONNECTIONS ON MORE THAN ONE AIRLINE OR THESE
RESERVATIONS REQUIRE SEPARATE AIR TICKETS.
****

Appointment

Subject: Flight# WN1948 from TUL -> DAL (1 hour)

Start: 2/21/2018 8:15:00 PM
End: 2/21/2018 9:15:00 PM
Show Time As: Busy

Importance: High

Recurrence: (none)

Trip Overview
~~~~~~~~~~~~~

Trip Name: Trip from Dallas to Tulsa
Start Date: February 20, 2018
End Date: February 21, 2018
Created: January 31, 2018, CASEY LUCKETT SNYDER (Modified: January 31, 2018)
Description: Travel to Miami to meet with City re: potential purchase of BNSF rail spur. Attend Tar Creek monthly meeting on 2/21
Trip Purpose: 1-SUPERFUND SITE TRAVEL
Agency Record Locator: VZJP3S
Passengers: Casey L Luckettsnyder
Total Estimated Cost: $ 404.59 USD
Important: Reservations must be approved and ticketed no later than: 02/18/2018 7:35 AM Eastern
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Confirmation: Ex. 6 - Personal Privacy
Status: Booked directly in Southwest Ex. 6 - Personal Privacy
Air Frequent Flyer Number: Ex. 6 - Personal Privacy
Distance: 238 miles
E-Ticket
Emissions: 126.1 lbs CO 2
Cabin: Gov Contract Discounted (M)

Enterprise Car Rental at: Tulsa US (TUL)
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Pick-up at: Tulsa US (TUL)

Pick Up: 09:35 AM Tue Feb 20
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Number of Cars: 1
Return: 02:15 PM Wed Feb 21
Returning to: Tulsa US (TUL)
Confirmation: Ex. 6 - Personal Privacy
Status: Confirmed
Rate Code: EM2A
Rate: $ 13.00 USD daily rate, unlimited miles; $ 2.00 USD extra hourly rate, unlimited miles
Total Rate: $ 49.99 USD
Corporate Discount: FGTDYEP

Intermediate / Car / Automatic transmission / Air conditioning

Wednesday, February 21, 2018

Flight Tulsa, OK (TUL) to Dallas, TX (DAL)
``

Southwest 1948

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Seat: No seat assignment
Tulsa Intl (TUL)
Duration: 1 hour
Nonstop
Arrival: 03:15 PM
Love Field (DAL)
Confirmation: MJIOQQ
Status: Booked directly in Southwest Ex. 6 - Personal Privacy
Air Frequent Flyer Number: Ex. 6 - Personal Privacy
Distance: 238 miles
E-Ticket
Emissions: 126.1 lbs CO 2
Cabin: Gov Contract Discounted (M)

Total Estimated Cost
~~~~~~~~~~~~~~~~~~~

Air
Airfare quoted amount: $ 303.26 USD
Taxes and fees: $ 51.34 USD
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****

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/21/2017 3:07:14 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: Emailing: HENUC 12.7.2017 Site names only.xlsx
Attachments: HENUC 12.7.2017 Site names only.xlsx

Your message is ready to be sent with the following file or link attachments:

HENUC 12.7.2017 Site names only.xlsx

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

Human Exposure Not Under Control

Site Name	Region	State	EPA ID	HE Status	HE Est. Control Date
CENTREDALE MANOR RESTORATION PROJECT	01	RI	RID981203755	HENC	09-29-2020
COMMERCE STREET PLUME	01	VT	VTD098352545	HENC	09-28-2018
FLETCHER'S PAINT WORKS & STORAGE	01	NH	NHD001079649	HENC	03-30-2018
NEW BEDFORD	01	MA	MAD980731335	HENC	09-30-2022
RAYMARK INDUSTRIES, INC.	01	CT	CTD001186618	HENC	09-30-2021
CALDWELL TRUCKING CO.	02	NJ	NJD048798953	HENC	09-30-2018
CORNELL DUBILIER ELECTRONICS INC.	02	NJ	NJD981557879	HENC	09-30-2030
DIAMOND ALKALI CO.	02	NJ	NJD980528996	HENC	09-30-2037
GOWANUS CANAL	02	NY	NYN000206222	HENC	09-30-2025
HUDSON RIVER PCBS	02	NY	NYD980763841	HENC	09-30-2020
ONONDAGA LAKE	02	NY	NYD986913580	HENC	09-30-2025
UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)	02	NJ	NJD002005106	HENC	09-30-2027
VENTRON/VELSICOL*	02	NJ	NJD980529879	HENC	09-30-2034
VINELAND CHEMICAL CO., INC.	02	NJ	NJD002385664	HENC	06-30-2035
WELSBACH & GENERAL GAS MANTLE (CAMDEN RADIATION)	02	NJ	NJD986620995	HENC	09-30-2024
68TH STREET DUMP/INDUSTRIAL ENTERPRISES	03	MD	MDD980918387	HENC	12-31-2017
ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	03	VA	VAD042916361	HENC	06-30-2020
ATLANTIC WOOD INDUSTRIES, INC.*	03	VA	VAD990710410	HENC	10-01-2020
BOARHEAD FARMS	03	PA	PAD047726161	HENC	09-30-2018
CULPEPER WOOD PRESERVERS, INC.	03	VA	VAD059165282	HENC	09-30-2023
KOPPERS CO., INC. (NEWPORT PLANT)	03	DE	DED980552244	HENC	09-30-2018
LOWER DARBY CREEK AREA	03	PA	PASFN0305521	HENC	12-28-2018
PRICE BATTERY LEAD SMELTER	03	PA	PAN000305679	HENC	06-30-2019
RESIN DISPOSAL	03	PA	PAD063766828	HENC	09-30-2018
SHARON STEEL CORP (FARRELL WORKS DISPOSAL AREA)	03	PA	PAD001933175	HENC	11-01-2019
AMERICAN CREOSOTE WORKS, INC. (PENSACOLA PLANT)	04	FL	FLD008161994	HENC	09-30-2018
ANNISTON PCB SITE (MONSANTO CO)	04	AL	ALD000400123	HENC	12-31-2023
ARMSTRONG WORLD INDUSTRIES	04	GA	GAN000410033	HENC	12-30-2021
BROWN'S DUMP	04	FL	FLD980847016	HENC	12-31-2020
JACKSONVILLE ASH SITE	04	FL	FLSFN0407002	HENC	12-31-2020
LCP CHEMICALS GEORGIA	04	GA	GAD099303182	HENC	12-30-2020
FAIRFAX ST. WOOD TREATERS	04	FL	FLD000623041	HENC	07-31-2018
ALCOA PROPERTIES	05	IL	ILSFN0508010	HENC	12-30-2019
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER*	05	MI	MID006007306	HENC	09-30-2026
AMCAST INDUSTRIAL CORPORATION	05	WI	WIN000510210	HENC	12-31-2019
ASARCO TAYLOR SPRINGS	05	IL	ILN000508170	HENC	12-30-2020
BAUTSCH-GRAY MINE	05	IL	ILN000510407	HENC	12-31-2022
CEDAR CREEK	05	WI	WID988590261	HENC	06-30-2018
DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP.	05	IL	ILD062340641	HENC	03-31-2022
EAST TROY CONTAMINATED AQUIFER	05	OH	OHSFN0507962	HENC	12-31-2019
GENERAL MILLS/HENKEL CORP.	05	MN	MND051441731	HENC	12-31-2017
JACOBSVILLE NEIGHBORHOOD SOIL CONTAMINATION	05	IN	INN000508142	HENC	09-30-2028

KEYSTONE CORRIDOR GROUND WATER CONTAMINATION	05	IN	INN000510399	HENC	12-31-2018
LUSHER STREET GROUND WATER CONTAMINATION	05	IN	IND982073785	HENC	12-31-2018
MATTHIESSEN AND HEGELER ZINC COMPANY	05	IL	IL0000064782	HENC	09-30-2027
NORTH SHORE GAS SOUTH PLANT	05	IL	ILD984809228	HENC	12-31-2026
OLD AMERICAN ZINC PLANT	05	IL	IL0000034355	HENC	12-31-2020
OTTAWA RADIATION AREAS	05	IL	ILD980606750	HENC	09-30-2024
SANDOVAL ZINC COMPANY	05	IL	ILD053980454	HENC	12-31-2025
SHEBOYGAN HARBOR & RIVER	05	WI	WID980996367	HENC	09-30-2022
ST. LOUIS RIVER SITE	05	MN	MND039045430	HENC	12-30-2030
TEN-MILE DRAIN	05	MI	MIN000510063	HENC	09-30-2022
TOWN OF PINES GROUNDWATER PLUME	05	IN	INN000508071	HENC	12-31-2017
U.S. SMELTER AND LEAD REFINERY, INC.*	05	IN	IND047030226	HENC	12-31-2019
VALLEY PIKE VOCS	05	OH	OHN000510489	HENC	01-20-2027
VELSICOL CHEMICAL CORP. (MICHIGAN)*	05	MI	MID000722439	HENC	09-30-2026
LITTLE SCIOTO RIVER	05	OH	OHN000509950	HENC	06-18-2028
BANDERA ROAD GROUND WATER PLUME	06	TX	TXN000606565	HENC	09-30-2019
DONNA RESERVOIR AND CANAL SYSTEM	06	TX	TX0000605363	HENC	09-30-2026
JONES ROAD GROUND WATER PLUME	06	TX	TXN000605460	HENC	09-28-2018
MARION PRESSURE TREATING	06	LA	LAD008473142	HENC	09-21-2018
TAR CREEK (OTTAWA COUNTY)*	06	OK	OKD980629844	HENC	02-20-2038
WEST COUNTY ROAD 112 GROUND WATER	06	TX	TXN000606992	HENC	09-30-2021
BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	07	MO	MOD981126899	HENC	12-31-2025
CHEROKEE COUNTY	07	KS	KSD980741862	HENC	09-30-2022
FORMER UNITED ZINC & ASSOCIATED SMELTERS	07	KS	KSN000705026	HENC	09-30-2020
MADISON COUNTY MINES	07	MO	MOD098633415	HENC	09-30-2020
NEWTON COUNTY MINE TAILINGS	07	MO	MOD981507585	HENC	06-30-2019
OMAHA LEAD	07	NE	NESFN0703481	HENC	09-30-2022
ORONOGO-DUENWEG MINING BELT	07	MO	MOD980686281	HENC	12-31-2020
PCE FORMER DRY CLEANER	07	IA	IAD039954300	HENC	09-30-2018
PLATING, INC.	07	KS	KSD065735912	HENC	09-30-2020
SOUTHWEST JEFFERSON COUNTY MINING	07	MO	MON000705443	HENC	06-23-2022
WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	07	MO	MON000705842	HENC	09-30-2020
WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	07	MO	MON000705027	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - POTOSI	07	MO	MON000705023	HENC	03-31-2044
WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	07	MO	MON000705032	HENC	09-30-2043
ACM SMELTER AND REFINERY	08	MT	MTD093291599	HENC	09-30-2030
ANACONDA CO. SMELTER	08	MT	MTD093291656	HENC	12-31-2022
BARKER HUGHESVILLE MINING DISTRICT	08	MT	MT6122307485	HENC	03-31-2032
CALIFORNIA GULCH	08	CO	COD980717938	HENC	03-31-2021
CARPENTER SNOW CREEK MINING DISTRICT	08	MT	MT0001096353	HENC	12-31-2026
CENTRAL CITY, CLEAR CREEK	08	CO	COD980717557	HENC	09-30-2019
COLORADO SMELTER	08	CO	CON000802700	HENC	03-31-2027
JACOBS SMELTER	08	UT	UT0002391472	HENC	09-30-2022
LIBBY ASBESTOS SITE	08	MT	MT0009083840	HENC	12-31-2022
STANDARD MINE	08	CO	CO0002378230	HENC	12-31-2018
UPPER TENMILE CREEK MINING AREA	08	MT	MTSFN7578012	HENC	09-30-2027

US MAGNESIUM	08	UT	UTN000802704	HENC	09-30-2022
ADVANCED MICRO DEVICES, INC.	09	CA	CAD048634059	HENC	12-30-2020
ARGONAUT MINE	09	CA	CAD983650011	HENC	07-27-2022
ASARCO HAYDEN PLANT	09	AZ	AZD008397127	HENC	09-30-2023
CARSON RIVER MERCURY SITE	09	NV	NVD980813646	HENC	01-01-2040
IRON KING MINE - HUMBOLDT SMELTER	09	AZ	AZ0000309013	HENC	01-01-2025
KLAU/BUENA VISTA MINE	09	CA	CA1141190578	HENC	03-30-2029
LAVA CAP MINE	09	CA	CAD983618893	HENC	12-31-2017
MCCORMICK & BAXTER CREOSOTING CO.	09	CA	CAD009106527	HENC	12-31-2018
MONTROSE CHEMICAL CORP.	09	CA	CAD008242711	HENC	09-30-2035
SULPHUR BANK MERCURY MINE	09	CA	CAD980893275	HENC	09-30-2040
TRW MICROWAVE, INC (BUILDING 825)	09	CA	CAD009159088	HENC	12-30-2020
UNITED HECKATHORN CO.	09	CA	CAD981436363	HENC	12-31-2020
BLACK BUTTE MINE	10	OR	OR0000515759	HENC	04-30-2023
BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	IDD048340921	HENC	09-30-2060
COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	WAD980726368	HENC	03-30-2020
HAMILTON/LABREE ROADS GW CONTAMINATION	10	WA	WASFN1002174	HENC	09-30-2018
HARBOR ISLAND (LEAD)	10	WA	WAD980722839	HENC	12-30-2024
LOCKHEED WEST SEATTLE	10	WA	WAN001002655	HENC	09-30-2018
LOWER DUWAMISH WATERWAY	10	WA	WA0002329803	HENC	09-30-2048
MIDNITE MINE	10	WA	WAD980978753	HENC	09-30-2025
NORTH RIDGE ESTATES	10	OR	ORN001002476	HENC	06-30-2019
PALERMO WELL FIELD GROUND WATER CONTAMINATION	10	WA	WA0000026534	HENC	06-30-2021
PORTLAND HARBOR*	10	OR	ORSFN1002155	HENC	09-20-2028
QUENDALL TERMINAL*	10	WA	WAD980639215	HENC	09-30-2020
WYCKOFF CO./EAGLE HARBOR	10	WA	WAD009248295	HENC	05-02-2021

Message

From: Luckett, Casey [Luckett.Casey@epa.gov]
Sent: 2/12/2018 2:27:20 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: FW: Tar creek - Kel's visit on 2/20

Hi,
I'm the Tar Creek project manager who's organized the trip and our meetings on 2/20. Please call me today so we can discuss trip logistics and arrange a time for Kel and Erin to meet with Rebecca Jim and Chairman Berrey.
Thanks much,
Casey

Casey Luckett Snyder
EPA R6 Project Manager and
Superfund Reuse Coordinator
214.665.7393
luckett.casey@epa.gov

From: Edlund, Carl
Sent: Thursday, February 08, 2018 3:03 PM
To: Atkins, Blake <Atkins.Blake@epa.gov>; Luckett, Casey <Luckett.Casey@epa.gov>; Coltrain, Katrina <coltrain.katrina@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>
Cc: Phillips, Pam <phillips.pam@epa.gov>
Subject: Fwd: Tar creek

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 8, 2018 at 12:46:08 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Re: Tar creek**
>
> Hello Carl. Erin Chancellor is going to join us at Tar Creek. When should we have agenda? I would like to see Mrs. Jim while there. Also, should we visit Chairman Berry?
>
> Sent from my iPad
>
> On Feb 5, 2018, at 10:58 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>
>> Great...I'll ask my folks to send you schedules and agendas for the 20th. No inconvenience at all.
>>
>> Sent from my iPad

On Feb 5, 2018, at 9:30 AM, Kelly, Albert <kelly.albert@epa.gov> wrote:

> Thanks. Would it be acceptable to plan for the 20th? I don't want to inconvenience anyone.
>
> Sent from my iPhone
>
> On Feb 5, 2018, at 7:20 AM, Edlund, Carl <Edlund.Carl@epa.gov> wrote:
>
>> Thanks Blake....a good list.
>>
>> Kell- interested in any of these events?
>>
>> Sent from my iPad
>>
>> On Feb 5, 2018, at 8:41 AM, Atkins, Blake <Atkins.Blake@epa.gov> wrote:
>>
>>> Carl, here are some upcoming Tar Creek trips that might be of interest. The reuse/redevelopment opportunity in Miami, and discussion regarding institutional controls with BIA may be of particular interest.
>>>
>>> 2/20/18: Meeting with the City of Miami and ODEQ to discuss Miami's interest in acquiring a commercial property and inactive rail spur located within the Tar Creek Superfund site. The acquisition is an economic development project for the City which will provide rail access to several companies located near the rail spur. A local chat processors has expressed interest in using the commercial property to ship chat.
>>>
>>> 2/20/18: Host a Tar Creek site tour for the BIA Miami Agency. The tour will include visits to restricted properties which need institutional controls (ICs) to protect the cleanup and ensure long term

stewardship. EPA is working with BIA to reach an agreement on the ICs issue since the BIA is the federal agency with the regulatory authority to place deed notices on restricted properties.

2/21/18: Monthly Tar Creek meeting. Meeting attendees include representatives from EPA, ODEQ, the Quapaw Tribe and the BIA. All entities are involved with on-going remedial activities at the site.

3/28/18: Region 6 and Region 7 Managers meeting to discuss coordinated efforts for all operable units of the Tar Creek Superfund site.

3/28/18: Tar Creek Stakeholder meeting: EPA Regions 6 and 7 will participate in a meeting with the Tar Creek stakeholders to provide site updates and action status.

Blake Atkins, Chief
LA/NM/OK Remediation Section
EPA Region 6 Superfund Division
1445 Ross Ave (6SF-RL)
Dallas, TX 75202
214-665-2297 w
214-406-5907 c

From: Edlund, Carl
Sent: Sunday, February 04, 2018 7:40 PM
To: Phillips, Pam <phillips.pam@epa.gov>; Sanchez, Carlos <sanchez.carlos@epa.gov>; Casanova, Rafael <Casanova.Rafael@epa.gov>; Atkins, Blake <Atkins.Blake@epa.gov>
Subject: Fwd: Tar creek

Any thoughts? Events that he could hook into?

Sent from my iPad

Begin forwarded message:

> **From:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Date:** February 4, 2018 at 2:01:17 PM CST
> **To:** "Edlund, Carl" <Edlund.Carl@epa.gov>
> **Subject: Tar creek**
>
> I would like to schedule a visit to Tar Creek. What would you suggest?
>
> Sent from my iPhone

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 6/20/2018 6:19:35 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: HQ Site Visits

Have you had a chance to add on you and Kell's visits?

Thanks,

Erin E. Chancellor
Counsel to the Administrator
U.S. Environmental Protection Agency
(202) 566-1757 (office)
(202) 731-2835 (cell)
chancellor.erin@epa.gov

From: Falvo, Nicholas
Sent: Wednesday, June 6, 2018 3:23 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>
Subject: RE: HQ Site Visits

We could add to bottom or add another sheet?

From: Chancellor, Erin
Sent: Wednesday, June 6, 2018 3:20 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: HQ Site Visits

Adding speaking engagements is a great idea! Like in the bottom section? What do you think?

Erin E. Chancellor

From: Falvo, Nicholas
Sent: Wednesday, June 6, 2018 3:18 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>
Subject: RE: HQ Site Visits

I'll fill this in for mine and Kell's no problem. Just need to go back through the voucher report that Helena gave us.

Also, do we want to include things like ECOS/ASTSWMO meetings? Other stakeholder meetings were Kell/Veronica/Silvina spoke at?

From: Chancellor, Erin
Sent: Wednesday, June 6, 2018 3:06 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: HQ Site Visits

Ok so, from the below, I've compiled the attached spreadsheet. Will you either send me your running list, or please fill in what you can? I filled in some of the community meetings, but not sure abt all of them. Mainly need filled in the reason for Kell (and/or your) visit and the date. Region 1 is a good example of multiple types of events happening on the same or different days. Does that make sense? Can you plz leave the line with the state name blank? Lastly, community meeting (like Lois's) that are multi-site are listed at the bottom. If you fill in whatever you know, I'll bother Ken, Silvina, and Veronica next.

Gracias!

Community Meetings:
Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden

SP
~~-4/19/17, USS Lead~~
~~-8/4/17, Bonita Peak~~
~~-9/15, San Jac, US Oil, Brio refining~~
~~-10/19, San Jac~~
~~-2/5/18, Anaconda Copper Mine in NV~~
~~-2/13/18, Mohawk Tannery in NH~~

Ken
~~-9/4 San Jac, US Oil, Highland Acid Pit~~

Kell
~~-9/4 San Jac, US Oil, Highland Acid Pit~~
~~-East Chicago (5 times, I went once)~~
~~-West Lake Landfill MO (at least 3 times)~~
~~-Gold King Mine/BPMD~~
~~-Big River Mine Tailings/Doe Run Mine Tailings/St. Joe Mineral Corp. MO~~
~~-Bunker Hill Mining & Metallurgical Complex/Coeur d'Alene Basin ID~~
~~-Eastern Michaud Flats Contamination ID~~
~~-Anaconda Co. Smelter MT~~
~~-Libby Abestos MT~~
~~-Silver Bow Creek/Butte Area MT~~
~~-Anaconda Mine~~
~~-Tar Creek OK~~
~~-Eagle Industries OK~~
~~-Fox River NRDA/PCB Releases WI~~
~~-Torch Lake/Stamp Sands MI~~
~~-Operating Industries Inc. Landfill CA~~

Erin
~~-2/20 Tar Creek community meeting with local activists, local government meeting, tribal meeting w/ federal partners (+Ken)~~
~~-4/10 Bunker Hill/Coeur d'Alene site tour + tribal meetings~~
~~-4/11 Bunker Hill/Coeur d'Alene community meeting with local activists~~
~~-4/27 Lowry Landfill site tour with local & state government~~
~~-5/16 Rocky Mountain Arsenal site tour (+Steven & Silvina)~~

Silvina

~~-B.F. Goodrich KY~~
~~-MS Phosphates Corporation~~
~~-West Lake~~
~~-Harbor Island (Lead)/East Waterway in WA~~
~~-5/16/18 – Rocky Mountain Arsenal~~

Veronica
~~-Hudepohl Brewery in OH – site visit~~
~~-Tremont Field/Clark Fields Park in OH – site visit~~
~~-Mukluk Preserve site in Connecticut – site visit with informal stakeholder engagement~~
~~-Solvents Recovery & Service in Connecticut – site visit with informal stakeholder engagement~~

Nick
~~-E. Chicago once with Kell~~
~~-MS Phosphates with Silvina~~
~~-Operating Industries Inc.~~
~~-Stamp Sands/Torch Lake~~
~~-Fox River~~

Message

From: Snyder, Jessica [Snyder.Jessica@epa.gov]
Sent: 8/3/2017 7:46:44 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Wright, Felicia [Wright.Felicia@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Benjamin, Kent [Benjamin.Kent@epa.gov]
Subject: TLEF - Registration/hotel info
Attachments: Schedule Overview for TLEF.docx

Hi Nick,

We are putting together talking points and background material for Kell for the Tulsa Tribal event. They should be ready to share by Monday/Tuesday AM for our 8/8 Briefing. The 8/8 briefing has 2 purposes: 1) overview of EPA's Tribal Program and 2) TLEF Prep.

Just an FYI, Kell will need to register for the event and he may want to stay at one of the host hotel. All that information can be found here: http://www7.nau.edu/itep/main/Conferences/confr_tlef

I've sketched out the trip (attached) so you can get a sense of the activities we have lined up for Kell, Jane, Sarah Greenwalt, and Sam Coleman. Monday's site visit to Tar Creek will be hot and dusty. We recommend casual attire. We are scheduling a dinner for Monday night with the EPA Tribal Partnership Chairs. Tuesday is the Plenary – that's where he will make his remarks. Jane is arriving Sunday and staying through Tuesday night. Let me know if you think Kell will also follow this schedule, or if you expect him to stay longer.

Stay tuned for more briefing info, but in the meantime, let me know if you need help with anything.

Jessica

Jessica Snyder
Office of Land and Emergency Management
Tribal Program Coordinator
snyder.jessica@epa.gov
Office: (202) 564-1478
Mobile: (202) 340-8395

SCHEDULE OVERVIEW

SUNDAY, AUGUST 13, 2017

Time	Event	Location
Attendees Arrive Suggest taxi for transport to/from hotel		

MONDAY, AUGUST 14, 2017

Time	Event	Location
7:15am	Meet in hotel lobby	Double Tree Hotel
	Tar Creek Site Visit	
7:30-9:30am	Drive from Tulsa to Tar Creek	
9:00- 10:30am	Fischer Pile/Intro to Tar Creek	
10:30-11:30am	Catholic 40, Tar Creek, OK	
11:30-1230pm	Lunch with Chairman Berry at Downstream Casino	
12:30-2:30pm	Travel to Douthit Bridge and Distal 10/Distal 12	
2:30-4:30pm	Drive Tar Creek to Tulsa, OK	
	BREAK	
6:30pm	Dinner with Tribal Leaders and representatives from NTC, TWRAP, NTWC, etc.	Baxters Interurban Grill, 717 S Houston Ave #100, Tulsa, 74119

TUESDAY, AUGUST 15, 2017

Time	Event	Location
10:00am	Meeting with ITEP Executive Director (Anne Marie Chischilly)	TBD
1:30pm-3:00pm	Opening Plenary	Tulsa Ballroom

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 6/19/2018 3:44:22 PM
To: Cook, Steven [cook.steven@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill
Attachments: AO SF Team - Site List - 06.19.18.pdf

Veronica is on it! FYSA- updated site list attached.

Erin E. Chancellor

From: Cook, Steven
Sent: Monday, June 18, 2018 6:16 PM
To: Darwin, Veronica <darwin.veronica@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

Can we get some details on the contaminants and the work done? Also the basis for the OGC/OECA liability release decision.

From: Darwin, Veronica
Sent: Monday, June 18, 2018 5:18 PM
To: Cook, Steven <cook.steven@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

Just spoke with D. Ballotti.

- Bubble Creek was a Superfund Alternative Approach site and EPA has completed all work at the site.
- EPA met with COE as recently as last week.
- COE no longer wants to do restoration work at the site due to concerns about future liability; as a matter of policy, COE will not do restoration work on SF sites due to liability concerns.
- COE will consider restoration work if EPA provides relief from any future liability.
- EPA believes there are no liability issues; we won't do any more because we believe no more work is needed so not planning to recover from anyone.
- EPA's explanations are not enough to convince COE.
- OGC, OECA, and R5 Counsel have weighed in and determined EPA cannot give COE the liability release they are asking for.
- There was discussion about potential legislation to protect COE from liability re: these type of restoration projects – Doug hasn't seen proposed legislation.
- The Manager's Amendment to the Approps Bill "strongly encourages" EPA and COE to reach an agreement.

Happy to explore next steps.
V.

From: Darwin, Veronica
Sent: Monday, June 18, 2018 4:48 PM
To: Cook, Steven <cook.steven@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

I found the information below on Region 5's Web page. I understand the COE halted a restoration project due to site contamination in 2015. I reached out to R5 to learn more re: ongoing discussions with COE on the site. I will share what I learn.
V.

Superfund Site Name:
Manufactured Gas Plant Sites (Peoples Gas and North Shore Gas) - https://www.epa.gov/il/manufactured-gas-plant-sites-peoples-gas-and-north-shore-gas

- October 2017: EPA determined that no further remedial or investigatory activities by U.S. EPA are planned or anticipated to be needed in the area identified as Bubbly Creek OU. https://semspub.epa.gov/work/05/936354.pdf.
- November 2017: EPA removed the Bubbly Creek OU from the SAA ~~NPL~~. http://semspub.epa.gov/src/document/05/938086.

From: Cook, Steven
Sent: Friday, June 15, 2018 6:21 PM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>
Subject: FW: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

What's the story on Bubbly Creek?

From: Breen, Barry
Sent: Thursday, June 14, 2018 8:46 PM
To: Wilbur, Jennifer <Wilbur.Jennifer@epa.gov>; Sebring, Meridith <Sebring.Meridith@epa.gov>
Cc: Simon, Nigel <Simon.Nigel@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Hilosky, Nick <Hilosky.Nick@epa.gov>; Brooks, Becky <Brooks.Becky@epa.gov>
Subject: Fwd: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

Begin forwarded message:

From: "Greaves, Holly" <greaves.holly@epa.gov>
Date: June 14, 2018 at 7:31:57 PM EDT
To: "Pruitt, Scott" <pruitt.scott@epa.gov>, "Wheeler, Andrew" <wheeler.andrew@epa.gov>
Cc: "Darwin, Henry" <darwin.henry@epa.gov>, "Leopold, Matt (OGC)" <Leopold.Matt@epa.gov>, Leadership_Assistant_Administators <Leadership_Assistant_Administators@epa.gov>, "Elkins, Arthur" <Elkins.Arthur@epa.gov>, "Jackson, Ryan" <jackson.ryan@epa.gov>, Leadership_Associate_Administrators <Leadership_Associate_Administrators@epa.gov>, Appointed Deputy Assistant Administrators <Appointed_Deputy_Assistant_Administrators@epa.gov>, "Minoli, Kevin" <Minoli.Kevin@epa.gov>, Leadership_Deputy_Assistant_Administrators <Leadership_Deputy_Assistant_Administrators@epa.gov>, "Sheehan, Charles" <Sheehan.Charles@epa.gov>, "Wooden-Aguilar, Helena" <Wooden-Aguilar.Helena@epa.gov>,

Leadership_Deputy_Associate_Administrators <Leadership_Deputy_Associate_Administrators@epa.gov>, Associate Assistant Administrator <Associate_Assistant_Administrator@epa.gov>, Leadership_Regional_Administrators <Leadership_Regional_Administrators@epa.gov>, Leadership_Deputy_Regional_Administrators <Leadership_Deputy_Regional_Administrators@epa.gov>, Career Assistant Regional Administrators <Career_Assistant_Regional_Administrators@epa.gov>, OCFO-SR-MGRS <OCFOSRMGRS@epa.gov>, "Hanson, Paige (Catherine)" <hanson.catherine@epa.gov>, "Hope, Brian" <Hope.Brian@epa.gov>
Subject: Senate Appropriations Committee -- Markup of FY 2019 Interior, Environment, and Related Agencies Appropriations Bill

Administrator and Deputy Administrator,

Today, the Senate Appropriations Full Committee on Interior, Environment and Related Agencies considered and reported the FY 2019 Appropriations Bill by a unanimous vote of 31-0. Title II of the bill funds the U.S. Environmental Protection Agency at $8.058 billion, and is $1.878 billion above the FY 2019 President's Budget request. Additionally, the committee provided $766 million to the EPA separately designated for infrastructure investments to the states. Combined, the total agency funding agreed to by the Senate committee for FY 2019 is $8.824 billion which equals the FY 2018 Enacted Budget. See Attachment A for further details.

The committee adopted a bipartisan manager's amendment package by unanimous consent, and its full text is included in Attachment B. This amendment contained seven requirements affecting EPA including report language on the following topics:

1. Ethics Compliance and Spending Federal Funds,
2. Harmful Algal Blooms,
3. Electric Pathway applications under the renewable Fuels Pathway II rule,
4. Minden, West Virginia,
5. Lead Standards,
6. Bubbly Creek, and
7. Kootenai Watershed.

Next Steps: The House and Senate floor actions have not yet been scheduled.

I will continue to monitor Congressional action and provide updates, as needed, and would be pleased to answer any questions you may have.

Holly W. Greaves
Chief Financial Officer
Office of the Chief Financial Officer
Environmental Protection Agency
(202) 564-1151

Active Superfund Sites

Erin; Nick; Silvina; Veronica

Region 1

- Connecticut
  - Raymark Industries, Inc. – Veronica
- Maine – None active at this time.
- Massachusetts
  - Housatonic River/GE-Pittsfield – Nick
  - Industri-Plex – Nick
  - New Bedford Harbor – Erin
  - Norwood PCBs – Veronica
  - Olin Chemical – Veronica
  - W.R. Grace & Co., Inc. – Veronica
- New Hampshire
  - Coakley Landfill – Erin
  - Mohawk Tannery – Silvina
  - South Municipal Water Supply Well/New Hampshire Ball Bearings – Nick
- Rhode Island
  - Centerdale Manor – Nick
- Vermont – None active at this time.

Region 2

- New Jersey
  - American Cyanamid Co. – Silvina
  - Berry's Creek/Ventron/Velsicol – Silvina
  - Lower Passaic River/Diamond Alkali Co. – Silvina
  - Matteo & Sons Inc. – Silvina
  - Pierson's Creek – Nick
  - Quanta Resources – Veronica
  - Woodbrook Road Dump – Silvina
- New York
  - Dewey Loeffel Landfill – Veronica
  - Gowanus Canal – Silvina
  - Hoosick Falls/Saint-Gobain Performance Plastics – Erin
  - Hudson River PCBs – Silvina
  - Newtown Creek – Nick
- Puerto Rico
  - PROTECO – Veronica
- USVI – None active at this time.

Active Superfund Sites

Region 3

- Delaware
  - Delaware Sand & Gravel Landfill – Silvina
  - E.I. Du Pont De Nemours & Co., Inc./Newport Pigment Plant Landfill – Veronica
  - Hockessin Groundwater – Veronica
- Maryland – None active at this time.
- Pennsylvania
  - Lower Darby Creek Area – Nick
- Virginia
  - L.A. Clarke & Son – Silvina
- Washington, D.C.
  - Washington Navy Yard – Nick
- West Virginia
  - Minden/Shaffer Equipment Co. – Erin

Region 4

- Alabama
  - 35th Avenue – Silvina
- Florida
  - Cabot/Koppers – Erin
- Georgia – None at this time.
- Kentucky
  - B.F. Goodrich/Calvert City – Silvina
  - Paducah Gaseous Diffusion Plant (U.S. DOE) – Nick
- Mississippi
  - Grenada/Rockwell International Wheel & Trim – Silvina
  - Mississippi Phosphates – Nick
- North Carolina
  - CTS of Ashville, Inc. – Silvina
- South Carolina
  - Burlington Industries Cheraw – Veronica
  - Columbia Nitrogen – Veronica
- Tennessee
  - Oak Ridge Reservation – Silvina
  - Southside Chattanooga Lead – Erin

Active Superfund Sites

Region 5

- Illinois
  - Peoples Gas Pitney Court Former MGP/ Bubbly Creek – Veronica
- Indiana
  - Federated Metals Corp. – Silvina
  - Franklin Street Groundwater Contamination – Veronica
  - USS Lead/East Chicago/U.S. Smelter & Lead Refinery, Inc. – Silvina
  - West Vermont Drinking Water Contamination – Nick
- Michigan
  - Aircraft Components/D&L Sales – Veronica
  - Allied Paper/Kalamazoo/Portage Creek – Erin
  - DSC McLouth Steel Gibralter Plant – Nick
  - Forest Waste Products – Erin
  - Gelman Dioxane Plume – Nick
  - Pall Corporation/Gelman Sciences – Nick
  - Tittabawassee River, Saginaw River & Bay – Nick
  - Torch Lake/Stamp Sands – Nick
  - Velsicol (Michigan) Chemical Corp. – Nick
  - Wolverine Worldwide Former Tannery – Nick
- Minnesota
  - Arrowhead Refinery – Veronica
  - General Mills/Henkel Corp. – Nick
  - Spring Park Municipal Well Field – Veronica
  - St. Louis River/Interlake Duluth Tar/SLRIDT – Erin
  - St. Regis Paper Co. – Silvina
- Ohio
  - Chemical & Minerals Reclamation – Erin
  - Donnelsville Contaminated Aquifer – Veronica
  - Peters Cartridge Factory – Nick
- Wisconsin – None at this time.

Region 6

- Arkansas – None active at this time.
- Louisiana
  - Camp Minden – Veronica
- New Mexico
  - Griggs & Walnut Groundwater Plume – Nick
  - San Mateo Creek Basin – Erin
- Oklahoma
  - Eagle Industries – Veronica
  - Tar Creek/Ottawa County – Erin
- Texas
  - Delfasco Forge – Veronica
  - Donna Reservoir & Canal System – Veronica
  - Lane Plating Works, Inc. – Erin
  - Many Diversified Interests/MDI – Erin
  - River City Metal Finishing – Nick
  - San Jacinto River Waste Pits – Silvina

Region 7

- Iowa
  - Des Moines TCE/Dico Company – Erin
  - Peoples Natural Gas Co. – Nick
- Kansas – None active at this time.
- Missouri
  - Big River Mine Tailings/St. Joe Minerals Corp. – Silvina
  - Carter Carburetor – Veronica
  - Southwestern Jefferson County Mining – Nick
  - West Lake Landfill/Bridgeton – Silvina
- Nebraska – None active at this time.

Active Superfund Sites

Region 8

- Colorado
  - Bonita Peak Mining District/Gold King Mine – Erin
  - Colorado Smelter – Silvina
  - Lowry Landfill – Veronica
- Montana
  - Anaconda Co. Smelter – Erin
  - East Helena – Erin
  - Libby Asbestos Site – Erin
  - Silver Bow Creek/Butte Area – Erin
  - Smurfit-Stone Mill Frenchtown – Erin
- North Dakota – None active at this time.
- South Dakota – None active at this time.
- Utah
  - Richardson Flats/United Park City Mines – Nick
- Wyoming – None active at this time.

Region 9

- Arizona
  - Motorola/52nd Street Plant – Silvina
  - Tucson International Airport – Silvina
- California
  - Aerojet General Corp. – Veronica
  - Casmalia Resources – Silvina
  - Halaco Engineering Company – Veronica
  - Orange County North Basin – Nick
  - Treasure Island Naval Station – Hunters Point Annex – Erin
- Hawaii – None active at this time.
- Nevada
  - Anaconda Copper Mine – Veronica
- Territories (Guam, Trust Territories, American Samoa, Northern Mariana Islands) – None active at this time.

Active Superfund Sites

Region 10

- Alaska
  - Dutch Harbor Station (USDOT) – Nick
- Idaho
  - Bunker Hill Mining/Coeur d'Alene Basin Cleanup – Erin
  - Eastern Michaud Flats/FMC – Silvina
- Oregon
  - Portland Harbor – Silvina
- Washington
  - Hanford 100-Area – Silvina
  - Quendall Terminal – Silvina
  - Wyckoff Co./Eagle Harbor – Silvina

Active Brownfields Sites

- Weirton, WV – Erin

Other Superfund Projects

- AEL Process – Silvina
- Ducks Unlimited SF Partnership – Erin
- Midas Gold/Stibnite – Erin
- Superfund Task Force – Veronica

Message

From: Snyder, Jessica [Snyder.Jessica@epa.gov]
Sent: 8/1/2017 7:35:04 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Tulsa meeting

Sure thing! Thanks, Nick.

Jessica Snyder
Office of Land and Emergency Management
Tribal Program Coordinator
snyder.jessica@epa.gov
Office: (202) 564-1478
Mobile: (202) 340-8395

From: Falvo, Nicholas
Sent: Tuesday, August 01, 2017 3:34 PM
To: Snyder, Jessica <Snyder.Jessica@epa.gov>
Subject: RE: Tulsa meeting

Can I follow up with you tomorrow?

From: Snyder, Jessica
Sent: Tuesday, August 1, 2017 2:50 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>; Brooks, Becky <Brooks.Becky@epa.gov>
Cc: Hilosky, Nick <Hilosky.Nick@epa.gov>
Subject: RE: Tulsa meeting

Thanks! Happy to be the go-between. Feel free to call me.

Jessica Snyder
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Tribal Program Coordinator
snyder.jessica@epa.gov
Office: (202) 564-1478
Mobile: (202) 340-8395

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Sent: Tuesday, August 01, 2017 2:49 PM
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Cc: Hilosky, Nick <Hilosky.Nick@epa.gov>; Snyder, Jessica <Snyder.Jessica@epa.gov>
Subject: RE: Tulsa meeting

I will find the answers to all of these and will let you know.

Jessica – I received your VM and will follow up once I have a chance to sit down with Kell.

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Cc: Hilosky, Nick <Hilosky.Nick@epa.gov>; Snyder, Jessica <Snyder.Jessica@epa.gov>
Subject: FW: Tulsa meeting

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Becky Brooks
Special Assistant
Office of Land and Emergency Management
U.S. Environmental Protection Agency
ph. 202-566-2762

From: Davis, Patrick
Sent: Tuesday, August 01, 2017 10:11 AM
To: Brooks, Becky <Brooks.Becky@epa.gov>; Breen, Barry <Breen.Barry@epa.gov>; Hill, Teresa <Hill.Teresa@epa.gov>; Kenely, Caroline <Kenely.Caroline@epa.gov>
Subject: Fwd: Tulsa meeting

I will not be attending the Tulsa Tribal event. Kell is available. Please cancel my flight arrangements for Oklahoma.

Thanks,

Patrick Davis
Environmental Protection Agency
Deputy Associate Administrator, Office of Land and Emergency Management
202-564-3103 office
202-380-8341 cell

Information sent to this email address may be subject to FOIA.

Sent from my iPad

Begin forwarded message:

> **From:** "Nishida, Jane" <Nishida.Jane@epa.gov>
> **Date:** August 1, 2017 at 8:06:04 AM MDT
> **To:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Cc:** "Jackson, Ryan" <jackson.ryan@epa.gov>, "Greenwalt, Sarah" <greenwalt.sarah@epa.gov>, "Davis, Patrick" <davis.patrick@epa.gov>
> **Subject: Re: Tulsa meeting**
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> Sent from my iPhone

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>
> Albert Kelly
> Senior Advisor to the Administrator
> 1200 Pennsylvania Avenue, NW
> Washington, DC 20460
> 202 306 8830

Message

From: Edlund, Carl [Edlund.Carl@epa.gov]
Sent: 2/8/2018 8:23:17 PM
To: Kelly, Albert [kelly.albert@epa.gov]
CC: Atkins, Blake [Atkins.Blake@epa.gov]; Luckett, Casey [Luckett.Casey@epa.gov]; Casanova, Rafael [Casanova.Rafael@epa.gov]; Coltrain, Katrina [coltrain.katrina@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: Tar Creek Trip on 02/20 [and 02.21]
Attachments: Tar Creek Superfund SiteTrip Itinerary 2.20 and 21.2018.docx

Kell- Attached is an itinerary that Region 6 will follow for Tar Creek visits on both the 20th and 21st of February. You are welcome to join us on the 20th [and 21st, if you have time]. Casey Luckett, our Reuse Coordinator, prepared the outline. Chairman Berrey has requested to meet with on the 20th. The afternoon is pretty booked, unless would be available to meet after 5:00 pm. Alternatively, if you are already in the area we could set up a meeting with the Chairman in the morning. Let us know and Casey will schedule a separate meeting time with Chairman Berrey's executive assistant.

February 20, 2018

9:35am - Arrive Tulsa from Dallas

12:00pm – Arrive Miami, OK

12:00pm-1:00pm – Lunch

1:00pm-3:00pm – Meeting with representatives from Miami and Commerce to discuss economic development project and potential acquisition of property and inactive BNSF rail spur that are both part of the Tar Creek Superfund site.

Meeting Location:
Miami Civic Center; 129 5th Ave NW, Miami, OK; the second floor to the left.
Meeting Attendees:
EPA Region 6
Casey Luckett Snyder, Superfund Redevelopment Coordinator and Tar Creek RPM
Blake Atkins, Acting Associate Director, Superfund Division
Local Representatives
Dean Kruithof, Miami City Manager
Kristi McClain, Miami Economic Development Coordinator
Steve Gilbert, Miami Regional Chamber of Commerce, and
Tommy Long, City of Commerce
ODEQ
Brian Stanilla, Tar Creek Project Manager for OU2
Amy Brittain, Superfund Site Remediation Manager

3:30pm-5:00pm – Site Tour with BIA and Quapaw: Site tour will focus on restricted properties where EPA is requesting the BIA implement institutional controls to ensure long term protectiveness.

Site Tour Location:
Quapaw Environmental Office, 334 Main Street, Quapaw, OK 74363
Site Tour Attendees:
EPA Region 6

Casey Luckett Snyder, Superfund Redevelopment Coordinator and Tar Creek RPM
Blake Atkins, Acting Associate Director, Superfund Division

BIA Miami Agency
Rhonda Loftin, Deputy Superintendent

Quapaw Tribe
Tim Kent, Environmental Director
Trenton Stand, Realty Director

February 21, 2018

9:00am – 2:00pm – Tar Creek Monthly Meeting

Meeting Location: Quapaw Environmental Office, 334 Main Street, Quapaw, OK 74363

Meeting Attendees: Representatives EPA Region 6, BIA, ODEQ, Quapaw and Jacobs (formerly CH2M Hill). Meeting agenda under development. Focus of monthly meeting is site updates and remedial activities for all operable units.

**11:30am – Some R6ers will travel back to Tulsa for a 2:10pm flight.*

Tar Creek Superfund Site Trip Itinerary

February 20-21, 2018

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Sent: 8/1/2017 6:49:52 PM
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CC: Hilosky, Nick [Hilosky.Nick@epa.gov]
Subject: RE: Tulsa meeting

Thanks! Happy to be the go-between. Feel free to call me.

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Special Assistant
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ph. 202-566-2762

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Environmental Protection Agency
Deputy Associate Administrator, Office of Land and Emergency Management
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>> 202 306 8830

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To: Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Hilosky, Nick [Hilosky.Nick@epa.gov]; Snyder, Jessica [Snyder.Jessica@epa.gov]
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Office of Land and Emergency Management
U.S. Environmental Protection Agency
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Environmental Protection Agency
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> Senior Advisor to the Administrator
> 1200 Pennsylvania Avenue, NW
> Washington, DC 20460
> 202 306 8830

Message

From: Edlund, Carl [Edlund.Carl@epa.gov]
Sent: 2/5/2018 3:17:00 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Phillips, Pam [phillips.pam@epa.gov]; Peycke, Mark [Peycke.Mark@epa.gov]; Meyer, John [Meyer.John@epa.gov]; Banipal, Ben [banipal.ben@epa.gov]; Talton, Anthony [Talton.Anthony@epa.gov]; Carroll, Craig [Carroll.Craig@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]
Subject: Re: Call with Kell today.

Ok, we'll e-mail him about potential Tar Creek visit

Sent from my iPad

On Feb 5, 2018, at 9:02 AM, Falvo, Nicholas <falvo.nicholas@epa.gov> wrote:

> All –
> Kell is out of the office today and will need to cancel today's call. Unless there is anything pressing, we'll talk to you in 2 weeks.
>
> Thanks
> Nick
>
> Nicholas Falvo
> Special Assistant to the Senior Advisor
> Environmental Protection Agency
> Office of the Administrator
> Falvo.Nicholas@epa.gov
> Office: (202) 564-5075
> Cell: (202) 760-0581

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 4/11/2018 3:35:37 PM
To: Ferguson, Lincoln [ferguson.lincoln@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Grantham, Nancy [Grantham.Nancy@epa.gov]
Subject: RE: Superfund list

Lincoln,

Here is the most current list, the sites crossed out are proposed to be removed and the red sites are being added to this update. Please let me know if you have any questions.

Mohawk Tannery	1	Nashua	New Hampshire
Centredale Manor Restoration Project	1	North Providence	Rhode Island
American Cyanamid Co.	2	Bound Brook	New Jersey
Diamond Alkali Co. (aka Upper Lower Passaic)	2	Newark	New Jersey
Ventron/Velsicol (aka Berry's Creek)	2	Wood Ridge Borough	New Jersey
L. A. Clarke & Son	3	Spotsylvania	Virginia
Delaware Sand & Gravel Landfill	3	New Castle	Delaware
B.F. Goodrich	4	Calvert City	Kentucky
Mississippi Phosphates Corporation	4	Pascagoula	Mississippi
U.S. Smelter and Lead Refinery, Inc. (aka USS Lead or East Chicago)	5	East Chicago	Indiana
Allied Paper, Inc./Portage Creek/Kalamazoo River	5	Kalamazoo	Michigan
Tar Creek (Ottawa County)	6	Ottawa County	Oklahoma
~~San Jacinto Waste Pits~~	~~6~~	~~Channelview~~	~~Texas~~
Des Moines TCE (aka Dico Company)	7	Des Moines	Iowa
West Lake Landfill	7	Bridgeton	Missouri

Bonita Peak Mining District	8	San Juan County	Colorado
Anaconda Co. Smelter	8	Anaconda	Montana
Silver Bow Creek/Butte Area	8	Butte	Montana
Orange County North Basin	9	Fullerton	California
~~Anaconda Copper Mine~~	~~9~~	~~Yerington~~	~~Nevada~~
Casmalia Resources	9	Casmalia	California
~~Portland Harbor~~	~~10~~	~~Portland~~	~~Oregon~~
Harbor Island - East Waterway	10	Seattle	Washington
Quendall Terminal	10	Renton	Washington

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

From: Ferguson, Lincoln
Sent: Wednesday, April 11, 2018 11:20 AM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Cc: Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: Superfund list

Yes please. Just names and locations.

From: Fonseca, Silvina
Sent: Wednesday, April 11, 2018 11:20 AM
To: Ferguson, Lincoln <ferguson.lincoln@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Cc: Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: Superfund list

Do you just need the names? I can give you those, but there may be some changes today.

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency

Desk: 202.564.1955
Cell: 202.306.6844

From: Ferguson, Lincoln
Sent: Wednesday, April 11, 2018 11:13 AM
To: Kelly, Albert <kelly.albert@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: Superfund list

Can you send me the new Administrator's list that is supposed to be announced soon? We are finalizing travel plans for the month and want to incorporate

Lincoln Ferguson
Senior Advisor to the Administrator
U.S. EPA
(202) 564-1935

Message

From: Abboud, Michael [abboud.michael@epa.gov]
Sent: 1/29/2018 7:52:55 PM
To: Gray, David [gray.david@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: FW: FOX23 Request: Tar Creek

David—do you know if this is happening and if so what we are saying about it?

From: Andes, Natalie (CMG-TulsaTV) [mailto:nandes@fox23.com]
Sent: Monday, January 29, 2018 2:40 PM
To: Ferguson, Lincoln <ferguson.lincoln@epa.gov>
Subject: FOX23 Request: Tar Creek

Hi Lincoln.

I ran across a Tulsa World report that says that the EPA is asking people in Picher about the Tar Creek Superfund site. Can you tell me if that's true? If so, what is being asked of the residents in the survey? When are the results due? What's the project this is related to? What is the goal of the survey?

Thank you,
Natalie

Natalie Andes | **FOX23 Assignment Manager**
918.388.5352 office | 918.814.2778 cell | **nandes@FOX23.com**

This email (including any attachments) may contain material that is confidential and for the sole use of the intended recipient. Any review, reliance or distribution by others or forwarding without express permission is strictly prohibited. If you are not the intended recipient, please contact the sender and delete all copies.

To: Falvo, Nicholas[falvo.nicholas@epa.gov]
From: Woolford, James
Sent: Wed 12/20/2017 3:43:34 PM
Subject: Re: Google Alert - Superfund

Just tried. Listen to VM. After 1230/1245.

Sent from my iPhone, please excuse spelling errors.
Thanks, Jim.

On Dec 20, 2017, at 10:26 AM, Falvo, Nicholas <falvo.nicholas@epa.gov> wrote:

Give me a call.

(202) 564-5075

From: Woolford, James
Sent: Wednesday, December 20, 2017 10:26 AM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: Fwd: Google Alert - Superfund

Are you familiar with the following articles on the TF? If someone said this... it's wrong.

Sent from my iPhone, please excuse spelling errors.

Thanks, Jim.

Begin forwarded message:

From: Google Alerts <googlealerts-noreply@google.com>
Date: December 20, 2017 at 7:01:03 AM EST
To: woolford.james@epa.gov
Subject: Google Alert - Superfund

Superfund

Daily update December 20, 2017

NEWS

EPA Says **Superfund** Task Force Left Behind Little Paper Trail

U.S. News & World Report

EPA Says **Superfund** Task Force Left Behind Little Paper Trail. EPA says an internal task ... EPA Administrator Scott Pruitt in May announced the creation of a **Superfund** Task Force he said would reprioritize and streamline procedures for remediating more than 1,300 sites. In June, the group issued 42 ...

EPA says **Superfund** Task Force left behind little paper trail - Minneapolis Star Tribune

EPA says **Superfund** Task Force left behind little paper trail - Dayton Daily News

EPA puts 6 companies on the hook for East Chicago cleanup - E&E News

Full Coverage

Flag as irrelevant

Agreement Sets Pollution Testing Plan For Portland Harbor **Superfund** Site

OPB News

The U.S. Environmental Protection Agency has finalized the next big step in cleaning up the Portland Harbor **Superfund** site: inking an agreement for how pollution levels will be tested. The Oregon Department of Environmental Quality, which raised concerns about the agreement in October, says the ...

Flag as irrelevant

Lincoln school on board for **Superfund** cleanup

LaSalle News Tribune

The La Salle Elementary School board on Tuesday approved allowing the U.S. Environmental Protection Agency to sample for and, if necessary, clean up contaminated soil on the Lincoln Junior High School grounds as part of the EPA's **Superfund** cleanup of the Matthiessen and Hegeler Zinc smelting ...

Flag as irrelevant

EPA inks deal with industrial polluters to lead next phase of Portland Harbor **Superfund** work

Pamplin Media Group

TRIBUNE FILE PHOTO: STEVE LAW - Travis Williams of Willamette Riverkeeper, in center, Four industrial companies will take the lead on the next phase of the Portland Harbor **Superfund** cleanup. The U.S. Environmental Protection Agency announced Tuesday that it signed a consent order with the ...

Flag as irrelevant

EPA inks deal with industrial polluters to lead next phase of Portland Harbor **Superfund** work

Pamplin Media Group

Four industrial companies will take the lead on the next phase of the Portland Harbor **Superfund** cleanup. The U.S. Environmental Protection Agency announced Tuesday that it signed a consent order with the companies to fund and oversee a round of environmental sampling to determine baseline ...

EPA, four companies reach key Portland Harbor **Superfund** cleanup deal - Portland Business Journal

Full Coverage
Flag as irrelevant

John Berrey: Politico got it wrong on Tar Creek

Joplin Globe

This piece indicated that Oklahoma Sen. Jim Inhofe bears significant blame for the complicated nature of the cleanup of the Tar Creek **Superfund** site located on Quapaw land in Northeast Oklahoma. Even casual observers know that the complications at Tar Creek existed long before the tenure of Sen.

Flag as irrelevant

Industry **super fund** names new chair

Financial Standard

An industry **super fund** with more than $3.5 billion under management will see in the New Year with a new independent chair. Former general counsel of Australian Unity Kirsten Mander stepped up to the role on December 15, replacing David Miles retired after 12 years at the helm. Mander has accrued ...

Flag as irrelevant

More tax on super, but savers are winners anyway

The Australian Financial Review

Mr Clare said the headline tax rate for **super fund** earnings was 15 per cent but when tax breaks were taken into account the average rate was only about 8 per cent. "The government takes 8 per cent of the higher-than-assumed investment returns and the fund members are actually taking 92 per cent, ...

Flag as irrelevant

Three Months After Harvey, Water Quality Questions Linger

Water Online (press release)

Even three months after Hurricane Harvey hit land and decimated areas of Texas, there are still questions about the water quality aftermath. In particular, as storm waters washed over so-called "**Superfund** sites," federally-designated areas containing hazardous waste, they brought unknown levels of ...

Flag as irrelevant

This is how your investments are taxed

Yahoo7 News

Recent research shows that 36% of the adult Australian population own investments listed on the stock market. That's nearly 6.5 million investors, some investing as individuals and some investing through Self- Managed **Super Funds** (SMSFs). Millions more own shares in privately owned companies, ...

Flag as irrelevant

You have received this email because you have subscribed to **Google Alerts**.

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Receive this alert as RSS feed
Send Feedback

To: Falvo, Nicholas[falvo.nicholas@epa.gov]
From: Woolford, James
Sent: Wed 12/20/2017 3:25:33 PM
Subject: Fwd: Google Alert - Superfund

Are you familiar with the following articles on the TF? If someone said this... it's wrong.

Sent from my iPhone, please excuse spelling errors.
Thanks, Jim.

Begin forwarded message:

From: Google Alerts <googlealerts-noreply@google.com>
Date: December 20, 2017 at 7:01:03 AM EST
To: woolford.james@epa.gov
Subject: Google Alert - Superfund

Superfund

Daily update December 20, 2017

NEWS

EPA Says **Superfund** Task Force Left Behind Little Paper Trail
U.S. News & World Report
EPA Says **Superfund** Task Force Left Behind Little Paper Trail. EPA says an internal task ... EPA Administrator Scott Pruitt in May announced the creation of a **Superfund** Task Force he said would reprioritize and streamline procedures for remediating more than 1,300 sites. In June, the group issued 42 ...
EPA says **Superfund** Task Force left behind little paper trail - Minneapolis Star Tribune
EPA says **Superfund** Task Force left behind little paper trail - Dayton Daily News
EPA puts 6 companies on the hook for East Chicago cleanup - E&E News
Full Coverage
Flag as irrelevant

Agreement Sets Pollution Testing Plan For Portland Harbor **Superfund** Site
OPB News
The U.S. Environmental Protection Agency has finalized the next big step in cleaning up the Portland Harbor **Superfund** site: inking an agreement for how pollution levels will be tested. The Oregon Department of Environmental Quality, which raised concerns about the agreement in October, says the ...
Flag as irrelevant

Lincoln school on board for **Superfund** cleanup
LaSalle News Tribune
The La Salle Elementary School board on Tuesday approved allowing the U.S. Environmental Protection Agency to sample for and, if necessary, clean up contaminated soil on the Lincoln Junior High School grounds as part of the EPA's **Superfund** cleanup of the Matthiessen and Hegeler Zinc smelting ...
Flag as irrelevant

EPA inks deal with industrial polluters to lead next phase of Portland Harbor **Superfund** work
Pamplin Media Group
TRIBUNE FILE PHOTO: STEVE LAW - Travis Williams of Willamette Riverkeeper, in center, Four industrial companies will take the lead on the next phase of the Portland Harbor **Superfund** cleanup. The U.S.

Environmental Protection Agency announced Tuesday that it signed a consent order with the ...

Flag as irrelevant

EPA inks deal with industrial polluters to lead next phase of Portland Harbor **Superfund** work

Pamplin Media Group

Four industrial companies will take the lead on the next phase of the Portland Harbor **Superfund** cleanup. The U.S. Environmental Protection Agency announced Tuesday that it signed a consent order with the companies to fund and oversee a round of environmental sampling to determine baseline ...

EPA, four companies reach key Portland Harbor **Superfund** cleanup deal - Portland Business Journal

Full Coverage

Flag as irrelevant

John Berrey: Politico got it wrong on Tar Creek

Joplin Globe

This piece indicated that Oklahoma Sen. Jim Inhofe bears significant blame for the complicated nature of the cleanup of the Tar Creek **Superfund** site located on Quapaw land in Northeast Oklahoma. Even casual observers know that the complications at Tar Creek existed long before the tenure of Sen.

Flag as irrelevant

Industry **super fund** names new chair

Financial Standard

An industry **super fund** with more than $3.5 billion under management will see in the New Year with a new independent chair. Former general counsel of Australian Unity Kirsten Mander stepped up to the role on December 15, replacing David Miles retired after 12 years at the helm. Mander has accrued ...

Flag as irrelevant

More tax on super, but savers are winners anyway

The Australian Financial Review

Mr Clare said the headline tax rate for **super fund** earnings was 15 per cent but when tax breaks were taken into account the average rate was only about 8 per cent. "The government takes 8 per cent of the higher-than-assumed investment returns and the fund members are actually taking 92 per cent, ...

Flag as irrelevant

Three Months After Harvey, Water Quality Questions Linger

Water Online (press release)

Even three months after Hurricane Harvey hit land and decimated areas of Texas, there are still questions about the water quality aftermath. In particular, as storm waters washed over so-called "**Superfund** sites," federally-designated areas containing hazardous waste, they brought unknown levels of ...

Flag as irrelevant

This is how your investments are taxed

Yahoo7 News

Recent research shows that 36% of the adult Australian population own investments listed on the stock market. That's nearly 6.5 million investors, some investing as individuals and some investing through Self- Managed **Super Funds** (SMSFs). Millions more own shares in privately owned companies, ...

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Message

From: Rothenstein, Cliff L. [Cliff.Rothenstein@klgates.com]
Sent: 3/12/2018 6:19:33 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE:

From what I've been told everything for the Industriplex site is on track. I believe the NAUL is being prepared as well as the ESD (which requires review by HQ). I'm going to reach out to Woolford to see if he has gotten it yet and check on the status. I'll keep you posted.

Also thanks for tracking down the extension of comment period letter last week.

From: Falvo, Nicholas [mailto:falvo.nicholas@epa.gov]
Sent: Monday, March 12, 2018 2:17 PM
To: Rothenstein, Cliff L.
Subject: RE:

And the mayor of north providence. Not sure on the meetings, other than they were on twitter.

From: Rothenstein, Cliff L. [mailto:Cliff.Rothenstein@klgates.com]
Sent: Monday, March 12, 2018 2:17 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: RE:

Thanks for both pieces of info!

From: Falvo, Nicholas [mailto:falvo.nicholas@epa.gov]
Sent: Monday, March 12, 2018 2:14 PM
To: Rothenstein, Cliff L.
Subject: RE:

Not yet. But I'll get something.

Also, by the looks of R1's twitter, RA Alexis Dunn met with the mayor of Johnston, Joe Polisena, last Friday.

From: Rothenstein, Cliff L. [mailto:Cliff.Rothenstein@klgates.com]
Sent: Monday, March 12, 2018 2:12 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject:

Hi Nick - did you get any more background on Tar Creek?

K&L GATES
Cliff Rothenstein

K&L Gates LLP
1601 K Street, NW
Washington, DC 20006
Phone: 202-778-9381
Cell: 240-778-3247
cliff.rothenstein@klgates.com
www.klgates.com

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Message

From: Rothenstein, Cliff L. [Cliff.Rothenstein@klgates.com]
Sent: 3/12/2018 6:16:33 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE:

Thanks for both pieces of info!

From: Falvo, Nicholas [mailto:falvo.nicholas@epa.gov]
Sent: Monday, March 12, 2018 2:14 PM
To: Rothenstein, Cliff L.
Subject: RE:

Not yet. But I'll get something.

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Sent: Monday, March 12, 2018 2:12 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject:

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Message

From: Rothenstein, Cliff L. [Cliff.Rothenstein@klgates.com]
Sent: 3/12/2018 6:12:14 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]

Hi Nick - did you get any more background on Tar Creek?

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Cliff Rothenstein
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Cell: 240-778-3247
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www.klgates.com

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Message

From: Kelly, Albert [kelly.albert@epa.gov]
Sent: 12/8/2017 3:35:14 AM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: Fwd: Lead Overview
Attachments: Lead Overview 12 6 17.docx; ATT00001.htm

See the difference in your submission and Yamadas. Ryan wants the Yamaha style

Sent from my iPhone

Begin forwarded message:

> **From:** "Grantham, Nancy" <Grantham.Nancy@epa.gov>
> **Date:** December 7, 2017 at 2:22:01 AM PST
> **To:** "Kelly, Albert" <kelly.albert@epa.gov>
> **Cc:** "Fonseca, Silvina" <Fonseca.Silvina@epa.gov>
> **Subject: Fwd: Lead Overview**
>
> Attached is the lead summary Ryan asked ord to compile - I believe it is now with liz and Ryan thx ng
>
> Sent from my iPhone
>
> Begin forwarded message:
>
> > **From:** "Hubbard, Carolyn" <Hubbard.Carolyn@epa.gov>
> > **Date:** December 6, 2017 at 2:00:02 PM EST
> > **To:** "Bowman, Liz" <Bowman.Liz@epa.gov>, "Orme-Zavaleta, Jennifer" <Orme-Zavaleta.Jennifer@epa.gov>, "Yamada, Richard (Yujiro)" <yamada.richard@epa.gov>, "Grantham, Nancy" <Grantham.Nancy@epa.gov>
> > **Subject: RE: Lead Overview**
> >
> > One more draft- I think this is it from me unless we get more or you want additional changes. Let me know!
> >
> > Thanks.
> >
> > Carolyn Hubbard
> > Communications Director
> > EPA Office of Research and Development
> > 202-564-2189
> > 202-379-6744
> >
> > ---
> >
> > **From:** Bowman, Liz
> > **Sent:** Wednesday, December 06, 2017 11:24 AM
> > **To:** Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>
> > **Subject:** RE: Lead Overview
> >
> > Thank you!

From: Hubbard, Carolyn
Sent: Wednesday, December 6, 2017 11:20 AM
To: Bowman, Liz <Bowman.Liz@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: Lead Overview

Hi All,

Attached is the latest draft with a placeholder for OLEM. When I receive their input I will add it, but I wanted to get this to you given the time.

Thanks!

Carolyn Hubbard
Communications Director
EPA Office of Research and Development
202-564-2189
202-379-6744

From: Bowman, Liz
Sent: Tuesday, December 05, 2017 9:00 PM
To: Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: RE: RE: FW:

Awesome.

From: Hubbard, Carolyn
Sent: Tuesday, December 5, 2017 8:36 PM
To: Bowman, Liz <Bowman.Liz@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: RE: RE: FW:

Great- I will add what I get from OLEM and OECA in the morning and send the revised draft then.

Thanks!

Carolyn Hubbard
Communications Director
EPA Office of Research and Development
202-564-2189
202-379-6744

From: Bowman, Liz
Sent: Tuesday, December 05, 2017 8:27 PM

To: Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: RE: RE: FW:

This is awesome; I think this is exactly what Ryan is looking for. Thank you all for helping us pull this together.

From: Hubbard, Carolyn
Sent: Tuesday, December 5, 2017 7:42 PM
To: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Bowman, Liz <Bowman.Liz@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: RE: RE: RE: FW:

Got it- checking w Valerie for the bottom line and will add that to that section. The attached should include the headings for each program office. Richard did you mean you want a page break between each?

Carolyn Hubbard
Communications Director
EPA Office of Research and Development
202-564-2189
202-379-6744

From: Orme-Zavaleta, Jennifer
Sent: Tuesday, December 05, 2017 6:39 PM
To: Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>
Cc: Bowman, Liz <Bowman.Liz@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: Re: RE: RE: FW:

I would like to include bottom line from exposure analysis Valerie lead that highlights sources of exposure-with greatest exposures from soil and dust etc

Jennifer Orme-Zavaleta, PhD
Principal Deputy Assistant Administrator for Science
USEPA Office of Research and Development
DC Office 202-564-6629
RTP Office 919-541-2283
Cell 919-699-1564

On Dec 5, 2017, at 6:33 PM, Hubbard, Carolyn <Hubbard.Carolyn@epa.gov> wrote:

> Yes. I am attaching the draft now too. I hope to get info from OLEM and OECA tonight. Please tell me if this is way off the mark- I can work on it tonight. Adding Nancy, she and I discussed this earlier too, and Jennifer.
>
> <attachment 1.docx>

Carolyn Hubbard
Communications Director
EPA Office of Research and Development
202-564-2189
202-379-6744

On Dec 5, 2017, at 6:13 PM, Bowman, Liz <Bowman.Liz@epa.gov> wrote:

> Ryan is really anxious to get this done ASAP – can you send first thing in the morning? Like by 10?
>
> ---
>
> **From:** Hubbard, Carolyn
> **Sent:** Tuesday, December 5, 2017 6:10 PM
> **To:** Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
> **Cc:** Bowman, Liz <Bowman.Liz@epa.gov>
> **Subject:** Re: RE: FW:
>
> I have a decent draft but am still waiting for some input from programs. I will send you something in the morning if that's ok.
>
> Carolyn Hubbard
> Communications Director
> EPA Office of Research and Development
> 202-564-2189
> 202-379-6744
>
> On Dec 5, 2017, at 6:02 PM, Yamada, Richard (Yujiro) <yamada.richard@epa.gov> wrote:
>
>> We are still getting the info from all the other offices - did you want me to get you just ORD materials?? - we can get that to you first thing tomorrow morning. Thanks.
>>
>> I've cc'ed Carolyn who can give us an update - thanks much, Richard
>>
>> -----Original Message-----
>> From: Bowman, Liz
>> Sent: Tuesday, December 5, 2017 5:57 PM
>> To: Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
>> Subject: RE: FW:
>>
>> What is the status of this?

-----Original Message-----
From: Yamada, Richard (Yujiro)
Sent: Tuesday, December 5, 2017
9:16 AM
To: Jackson, Ryan
<jackson.ryan@epa.gov>
Cc: Brown, Byron
<brown.byron@epa.gov>; Bowman,
Liz <Bowman.Liz@epa.gov>
Subject: Re: FW:

Ryan - I will get you this info ASAP
- thanks, Richard

Sent from my iPhone

> On Dec 5, 2017, at
> 8:35 AM, Jackson,
> Ryan
> <jackson.ryan@epa.g
> ov> wrote:
>
> Alright, I'm trying to
> develop a one pager
> on what EPA is
> involved in dealing
> with lead.
>
> What first occurs to
> me are the SRFs, but
> there are other
> programs.
>
> We need this
> developed really as
> soon as it's possible –
> I would like a one
> pager on what all
> EPA is currently
> involved in,
> commissions,
> programs, major
> expenditures which
> address lead
> abatement and
> treatment. Can you
> help me develop that
> as soon as you can?

Byron, I also need to talk with you about FOIA now that hardrock mining is done.

From: Falvo, Nicholas

Sent: Tuesday, December 5, 2017 8:16 AM

To: Kelly, Albert <kelly.albert@epa.gov>; Jackson, Ryan <jackson.ryan@epa.gov>

Cc: Bowman, Liz <Bowman.Liz@epa.gov>

Subject: RE:

Eleven EPA activities and the remaining federal activities.

EPA and HHS/ATSDR: Pediatric Environmental Health Specialty Units

EPA: Addressing Lead at Corrective Action Sites

EPA: Lead-Based Paint Program

EPA: Deterrent Enforcement to Lead Exposure

EPA: Evaluation of air pollution associated with lead

emitted from piston-engine aircraft

EPA/Office of International and Tribal Affairs and Office of Chemical Safety and Pollution Prevention: Global Elimination of Childhood Lead Poisoning from Lead in Paint

EPA: Improving Assessment of the Benefits of Lead Exposure Reductions

EPA: Lead Research

EPA/Office of Water and Office of Enforcement and Compliance Assurance: Reducing Lead in Drinking Water through Regulations, Enhanced Implementation and Enforcement

EPA: Providing Outreach, Improving National Consistency in the Lead-Based Paint Inspection Program and Identifying Priority Areas for Inspections

EPA: Review and Implementation of the National Ambient Air Quality Standards for Lead

CPSC: Lead Content Limits for Children's Products and Paint

ED: Education Facilities Clearinghouse Technical Assistance, Training and Online Resources

DOJ: Environment and Natural Resources Division

DOL: Occupational Safety and Health Administration

DOT/FAA: Piston Aviation Fuel Initiative

HHS/ACF: Child Care and Development Fund

HHS/ACF: Early Head Start (EHS) Child Care Partnerships Funding Opportunities

HHS/ACF: EHS and Head Start Services

HHS/ACF: Guidance on Basic Health and Safety Standards for Early Care and Education for State Child Care Licensing and Quality Rating Improvement Systems (QRIS)

HHS/ACF: Memorandum of Understanding (MOU) between EPA, Region 2 and HHS/ACF, Region 2

HHS/ACF: Outreach to Head Start and Child Care and Development Fund Grantees on Lead Exposure in Children
HHS/CDC/ATSDR: Conducting public health assessments on lead exposure

HHS/CDC/ATSDR: Guidance on Choosing Safe Places for Child Care

HHS/CDC/ATSDR: Geospatial Research, Analysis and Services Program (GRASP) Support for Site-Specific Lead Investigations and Response

HHS/CDC/ASTDR: Toxicological Profile for Lead

HHS/CDC: Lead Poisoning Prevention Program

HHS/CDC/ATSDR: Lead Poisoning Prevention Subcommittee of the NCEH/ATSDR Board of Scientific

HHS/CDC: National Biomonitoring Program

HHS/CMS: Blood Lead Screening for Children Enrolled in Medicaid

HHS/FDA: Monitoring domestic and imported foods for unsafe levels of lead and developing regulations or guidance to establish appropriate maximum lead levels in foods

HHS/FDA: Decrease the Codex maximum levels for lead in various foods through the Codex Committee on Contaminants in Food

HHS/HRSA/BPHC: Provides funds to National Training and Technical Assistance Cooperative Agreement

HHS/HRSA: Reproductive and Environmental Health Network (REHN) program at the Organization of Teratology Information Specialists

HHS/IHS: Provision of comprehensive public health services

to tribes to ensure safe drinking water, healthy homes and children's environments

HHS/NIH: NICHD Research on the Effects of Lead Across the Lifespan

HHS/NIH: Data review and monograph development on lead

HHS/NIH: Disaster Research Response Program

HHS/NIH: Environmental Influences on Child Health Outcomes (ECHO) including the Children's Health Exposure Analysis Resource (CHEAR)

HHS/NIH: NIEHS extramural research portfolio on health impacts of exposure to lead

HHS/NIH: Lead exposure and health outreach and communications

HHS/NIH: National Toxicology Program Monograph on Health Effects of Low-Level Lead

HHS/NIH: National Institute of Environmental Health Sciences (NIEHS) Worker Training Program (WTP)

HHS/NIH: Enviro-Health Links – Lead and Human Health

HHS/NIH: Hazardous Substances Data Bank Lead Overview and Chemical Records

HHS/NIH: Outreach to students, teachers, and consumers

HHS/NIH: Online Databases in Toxicology and Environmental Health and Medicine

HHS/OASH: Lead-based Paint Pilot Program in Memphis, Tennessee

HHS/ODPHP: Healthy People 2020

HHS/OGA: Role of the health sector in the sound management of chemicals

HHS/SAMHSA: Addressing Behavioral Health Impacts of Adverse Environmental Exposures

HUD: Enforcement of the Lead Disclosure Rule and the Lead-Safe Housing Rule, plus providing technical support

HUD: Lead-Based Paint Hazard Control (LHC) and Reduction Demonstration (LHRD) Grant Program

HUD: Lead-Safe Homes, Lead-Free Kids Toolkit

HUD: Support for Research to Improve Methods to Identify and Control Residential Lead-Based Paint Hazards and Track Lead Hazards in U.S. Housing

USDA/NIFA: Michigan State University Extension

HUD & USDA: Healthy Homes Initiative

USDA/Food and Nutrition Service: Using Nutrition as a Tool to Reduce Lead Absorption

From: Kelly, Albert

Sent: Monday, December 4, 2017 9:41 PM

To: Jackson, Ryan <jackson.ryan@epa.gov<mailto:jackson.ryan@epa.gov>>

Cc: Bowman, Liz <Bowman.Liz@epa.gov<mailto:Bowman.Liz@epa.gov>>; Falvo, Nicholas <falvo.nicholas@epa.gov<mailto:falvo.nicholas@epa.gov>>

Subject: Re:

Yes. Nick can provide that electronically which is the summary issued in late 2016. Nick confirm you have that and that it is sent

Sent from my iPhone

On Dec 4, 2017, at 7:44 PM, Jackson, Ryan <jackson.ryan@epa.gov<mailto:jackson.ryan@epa.gov>> wrote:

Do you have the list of the lead related activities and boards we are on?

Ryan Jackson

Chief of Staff

U.S. Environmental Protection Agency

(202) 564-6999

<key_federal_programs_to_reduce_childhood_lead_exposures_and_eliminate_as....pdf>

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/7/2017 10:35:26 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Grantham, Nancy [Grantham.Nancy@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]; Adams, Elizabeth [Adams.Elizabeth@epa.gov]; Richardson, RobinH [Richardson.RobinH@epa.gov]
CC: Ferguson, Lincoln [ferguson.lincoln@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Ammon, Doug [Ammon.Doug@epa.gov]
Subject: XSEL 12.7.17 draft final 5.03 pm.xlsx
Attachments: XSEL 12.7.17 draft final 5.03 pm.xlsx

Good afternoon,

Attached is the most recent (all site names corrected) XSEL.

At Kell's request I am distributing it to Superfund Division Directors. I will cc everyone on it.

Let me know if you have any questions.

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Site	Reg	State	NPL	Issue/Upcoming Milestone	Administrator's Potential Actions
Centredale Manor Resotration Project	1	RI	F	On the NPL for an extended period of time. Litigation with PRP has now resulted in scheduled mediation.	Provide close oversight to ensure completion of a successful mediation and initiate remediation.
Mohawk Tannery	1	NH	P	Finalize NTCRA and facilitate redevelopment with current interested developer	Facilitate regional activities with all relevant parties to finalize NTCRA and facilitate redevelopment.
American Cyanamid Co.	2	NJ	F	Issue Proposed Plan for public comment.	Approval of proposed remedy >$50M.
Diamond Alkali Co. (aka Upper Lower Passaic)	2	NJ	F	Finalize the RI and consider taking early actions.	Provide support, as needed, to the Region on evaluating/considering taking early actions.
Ventron/Velsicol (aka Berry's Creek)	2	NJ	F	Issue Proposed Plan for public comment.	Approval of proposed remedy >$50M.
L. A. Clarke & Son	3	VA	F	On the NPL for an extended period of time. Dispute with PRP regarding OU2 work plan for groundwater. Need resolution on issue to determine if PRP will perform work, or if formal dispute resolution is invoked.	Provide support to the Region to require PRP to perform remedial investigation and achieve closure on the groundwater remedy for the site.
B.F. Goodrich	4	KY	F	Proposed remedy out for comment. Comments will be considered and addressed in the ROD.	Continue to support Region on remedy selection activities and sign ROD.
Mississippi Phosphates Corporation	4	MS	P	Potential release of hazardous waste to environmentally sensitive area/NPL listing for remedial takeover.	Authorize a new Agency rulemaking to list the site on the NPL. Support expedited remedy development and selection.
Allied Paper, Inc./Portage Creek/Kalamazoo River	5	MI	F	RI/FS delays caused by PRP litigation/Resolution on AOC amendment or renegotiation.	Facilitate discussions with PRPs to continue RI/FS work expeditiously, support regional position on current AOC.
USS Lead (aka East Chicago)	5	IN	F	In OU1-Zone 1 land use decision/Proposed Plan release. Complete all soil remediation in OU 1-Zones 2 and 3.	Provide input and direction to complete all aspects of the lead remediation in all three zones in OU 1 and continue remedy selection for OU 2.
San Jacinto Waste Pits	6	TX	F	Initiate and complete RD/RA negotiations. Sign CD.	Facilitate discussions with PRPs to agree to implement ROD.
Tar Creek (Ottawa County)	6	OK	F	Long term stewardship/Implement institutional controls to protect cleanup	Facilitate dialogue with Federal parties to reach agreement on Ics.
Des Moines TCE (aks Dico Company)	7	IA	F	Asbestos site in downtown Des Moines. Has been delayed by litigation. Make a decision regarding actions to be taken in light of the judgements in favor of EPA. Initiate actions toward resolution to allow revitalization of this site.	Provide support, as needed, to complete the negotiations to put the site into reuse.

West Lake Landfill	7	MO	F	Develop a preferred alternative and issue Proposed Plan.	Evaluate all relevant studies and prepare a Proposed Plan that provides EPA's preferred alternative to address OU 1.
Anaconda Co. Smelter	8	MT	F	Initiate and complete negotiations to begin implementation of early actions to address human health exposure, followed by site wide work	Facilitate activities to address human health exposure and overall site wide actions.
Bonita Peak Mining District (aka Gold King Mine)	8	CO	F	Remediation plan with short and long term objectives	Facilitate and develop a long term plan to achieve remediation and long term protectiveness.
Silver Bow Creek/Butte	8	MT	F	Administrator's site visit pending in 2018. State disagreement with PRP on implementation of the remedy. Region facilitating discussions to reach agreement to implement remedy.	Facilitate negotiations with state and PRP to achieve a conclusion.
Anaconda Copper Mine	9	NV	P	State request for deferral/NPL listing decision; Tribes want site listed. Reach agreement on deferral agreement with State and Tribes.	Meet with State and tribes to reach decision on NPL deferral or listing.
Orange County North Basin	9	CA	Pre-NPL	Basin wide groundwater cleanup needed quickly to protect drinking water for millions of Californians/NPL proposal, then listing.	Monitor and assist, as needed, early action commenced by Orange County. List site on the NPL and coordinate with relevant parties.
Portland Harbor	10	OR	F	Baseline sampling negotiations for pre-RD AOC agreement. Initiate pre-RD Sampling.	Provide support necessary to achieve RD AOC for baseline sampling/SMA delineation. Continue dialogue with responsible parties for negotiating a RD Consent Decree.
Quendall Terminal	10	WA	F	Substantial redevelopment opportunity/determine preferred alternative and issue the Proposed Plan for public comment	Encourage dialogue with PRPs and potential developers to facilitate cleanup and redevelopment at the site once the remedy has been selected.

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/7/2017 6:07:02 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Grantham, Nancy [Grantham.Nancy@epa.gov]; Richardson, RobinH [Richardson.RobinH@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]
Subject: XSEL 12.7.17 draft final.xlsx
Attachments: XSEL 12.7.17 draft final.xlsx

Here is the final draft with Region 3 site added. Please take a look one last time that I did not miss anything. Please let me know if we need to send it to anyone else prior to official finalization.

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Site	Reg	State	NPL	Issue/Upcoming Milestone	Administrator's Potential Actions
Centredale Manor	1	RI	F	On the NPL for an extended period of time. Litigation with PRP has now resulted in scheduled mediation.	Provide close oversight to ensure completion of a successful mediation and initiate remediation.
Mohawk Tannery	1	NH	P	Finalize NTCRA and facilitate redevelopment with current interested developer	Facilitate regional activities with all relevant parties to finalize NTCRA and facilitate redevelopment.
American Cyanamid	2	NJ	F	Issue Proposed Plan for public comment.	Approval of proposed remedy >$50M.
Upper Lower Passaic	2	NJ	F	Finalize the RI and consider taking early actions.	Provide support, as needed, to the Region on evaluating/considering taking early actions.
Ventron/Velsicol (aka Berry's Creek)	2	NJ	F	Issue Proposed Plan for public comment.	Approval of proposed remedy >$50M.
L. A. Clark	3	VA	F	On the NPL for an extended period of time. Dispute with PRP regarding OU2 work plan for groundwater. Need resolution on issue to determine if PRP will perform work, or if formal dispute resolution is invoked.	Provide support to the Region to require PRP to perform remedial investigation and achieve closure on the groundwater remedy for the site.
B.F. Goodrich	4	KY	F	Proposed remedy out for comment. Comments will be considered and addressed in the ROD.	Continue to support Region on remedy selection activities and sign ROD.
Mississippi Phosphates	4	MS	P	Potential release of hazardous waste to environmentally sensitive area/NPL listing for remedial takeover.	Authorize a new Agency rulemaking to list the site on the NPL. Support expedited remedy development and selection.
Allied Paper, Inc./Portage Creek/Kalamazoo River	5	MI	F	RI/FS delays caused by PRP litigation/Resolution on AOC amendment or renegotiation.	Facilitate discussions with PRPs to continue RI/FS work expeditiously, support regional position on current AOC.
USS Lead (aka East Chicago)	5	IN	F	In OU1-Zone 1 land use decision/Proposed Plan release. Complete all soil remediation in OU 1-Zones 2 and 3.	Provide input and direction to complete all aspects of the lead remediation in all three zones in OU 1 and continue remedy selection for OU 2.
San Jacinto Waste Pits Site	6	TX	F	Initiate and complete RD/RA negotiations. Sign CD.	Facilitate discussions with PRPs to agree to implement ROD.
Tar Creek	6	OK	F	Long term stewardship/Implement institutional controls to protect cleanup	Facilitate dialogue with Federal parties to reach agreement on Ics.
Dico (Des Moines)	7	IA	F	Asbestos site in downtown Des Moines. Has been delayed by litigation. Make a decision regarding actions to be taken in light of the judgements in favor of EPA. Initiate actions toward resolution to allow revitalization of this site.	Provide support, as needed, to complete the negotiations to put the site into reuse.

West Lake Landfill	7	MO	F	Develop a preferred alternative and issue Proposed Plan.	Evaluate all relevant studies and prepare a Proposed Plan that provides EPA's preferred alternative to address OU 1.
Anaconda (Montana)	8	MT	F	Initiate and complete negotiations to begin implementation of early actions to address human health exposure, followed by site wide work	Facilitate activities to address human health exposure and overall site wide actions.
Bonita Peak Mining District (aka Gold King Mine)	8	CO	F	Remediation plan with short and long term objectives	Facilitate and develop a long term plan to achieve remediation and long term protectiveness.
Silver Bow Creek/Butte	8	MT	F	Administrator's site visit pending in 2018. State disagreement with PRP on implementation of the remedy. Region facilitating discussions to reach agreement to implement remedy.	Facilitate negotiations with state and PRP to achieve a conclusion.
Anaconda Copper Mine	9	NV	F	State request for deferral/NPL listing decision; Tribes want site listed. Reach agreement on deferral agreement with State and Tribes.	Meet with State and tribes to reach decision on NPL deferral or listing.
Orange County North Basin	9	CA	Pre-NPL	Basin wide groundwater cleanup needed quickly to protect drinking water for millions of Californians/NPL proposal, then listing.	Monitor and assist, as needed, early action commenced by Orange County. List site on the NPL and coordinate with relevant parties.
Portland Harbor	10	OR	F	Baseline sampling negotiations for pre-RD AOC agreement. Initiate pre-RD Sampling.	Provide support necessary to achieve RD AOC for baseline sampling/SMA delineation. Continue dialogue with responsible parties for negotiating a RD Consent Decree.
Quendall Terminal	10	WA	F	Substantial redevelopment opportunity/determine preferred alternative and issue the Proposed Plan for public comment	Encourage dialogue with PRPs and potential developers to facilitate cleanup and redevelopment at the site once the remedy has been selected.

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/6/2017 9:12:26 PM
To: Grantham, Nancy [Grantham.Nancy@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]
Subject: XSEL 12.6.17 draft final 4.09 pm.xlsx
Attachments: XSEL 12.6.17 draft final 4.09 pm.xlsx

Nancy,

Veronica made some edits, please use this most recent version.

Thanks!

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 12/6/2017 7:07:37 PM
To: Grantham, Nancy [Grantham.Nancy@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]
Subject: Revised XSEL and draft Superfund Task Force Language
Attachments: Copy of KK Expanded AEL 12-6-17 sf comments.xlsx

Attached is the revised XSEL and below is the draft Task Force Language.

The Superfund program is a cornerstone of the EPA' mission to protect the health of our citizens and communities across the country. On July 25, 2017 Administrator Pruitt accepted recommendations from the task force he established on May 22, 2017 to revitalize the Superfund program. "My goal as Administrator is to restore the Superfund program to its rightful place at the center of the agency's core mission."

The task force's recommendations focused on five overarching goals: expediting cleanup and remediation, reinvigorating cleanup and reuse efforts by potentially responsible parties, encouraging private investment to facilitate cleanup and reuse, promoting redevelopment and community revitalization and engaging with partners and stakeholders. We have started the work to implement those recommendations to achieve those goals. The work will continue into the future and we will regularly update the task force progress and accomplishments.

The Superfund Task Force Recommendations can be viewed at https://www.epa.gov/superfund/superfund-task-force-recommendations

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Stalcup, Dana [Stalcup.Dana@epa.gov]
Sent: 12/5/2017 1:41:47 PM
To: Breen, Barry [Breen.Barry@epa.gov]; Kelly, Albert [kelly.albert@epa.gov]
CC: Hilosky, Nick [Hilosky.Nick@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Simon, Nigel [Simon.Nigel@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Gartner, Lois [Gartner.Lois@epa.gov]; Adams, Elizabeth [Adams.Elizabeth@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Ammon, Doug [Ammon.Doug@epa.gov]; Duteau, Helen [Duteau.Helen@EPA.GOV]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; DeLeon, Rafael [Deleon.Rafael@epa.gov]
Subject: FW: AEL sorted by quarter - close hold
Attachments: Expanded AEL 12.5.17 sorted by FYQ.XLSX

Barry / Kell,
Per Cyndy's note below, **Ex. 5 - Deliberative Process** Attached is this latest revision. Please let us know if you have any questions. Thanks - Dana

Dana Stalcup
Deputy Director
OLEM/Office of Superfund Remediation and Technology Innovation (OSRTI)
Desk – 703-603-8702
Cell – 202-309-5473
Follow us on Twitter @EPALand

From: Woolford, James

Begin forwarded message:

From: "Mackey, Cyndy" <Mackey.Cyndy@epa.gov>
Date: December 1, 2017 at 1:34:53 PM EST
To: "Woolford, James" <Woolford.James@epa.gov>, "Hovis, Jennifer" <Hovis.Jennifer@epa.gov>
Cc: "Manzanilla, Enrique" <Manzanilla.Enrique@epa.gov>
Subject: RE: AEL sorted by quarter - close hold

Jim

Ex. 5 - Deliberative Process

Cyndy Mackey
Director, Office of Site Remediation Enforcement
EPA-Office of Enforcement and Compliance Assurance (Mail Code-2271A)
1200 Pennsylvania Ave., N.W. (Room-WJC 5206) Washington, DC 20460

202 564-8206 (Direct Line)
202 564-5110 (Office Line)
202 591-6184(Office Cell)

This email is for the intended recipient only and may contain material that is privileged and/or confidential. If you believe you have received this email in error, please notify the sender. Thank you

---

From: Woolford, James
Sent: Friday, December 01, 2017 12:54 PM
To: OLEM SF Reg DDs <OLEMSFRegDDs@epa.gov>
Cc: Mackey, Cyndy <Mackey.Cyndy@epa.gov>
Subject: Fwd: AEL sorted by quarter - close hold

Next to Last list for now.

Sent from my iPhone, please excuse spelling errors.

Thanks, Jim.

Begin forwarded message:

> **From:** "Hovis, Jennifer" <Hovis.Jennifer@epa.gov>
> **Date:** November 20, 2017 at 4:55:53 PM EST
> **To:** "Woolford, James" <Woolford.James@epa.gov>, "Stalcup, Dana" <Stalcup.Dana@epa.gov>, "Gartner, Lois" <Gartner.Lois@epa.gov>
> **Cc:** "Fitz-James, Schatzi" <Fitz-James.Schatzi@epa.gov>, "Adams, Elizabeth" <Adams.Elizabeth@epa.gov>
> **Subject: AEL sorted by quarter**

Message

From: Woolford, James [Woolford.James@epa.gov]
Sent: 7/29/2017 2:33:55 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Davis, Patrick [davis.patrick@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Bertrand, Charlotte [Bertrand.Charlotte@epa.gov]; Cheatham, Reggie [cheatham.reggie@epa.gov]
CC: Stalcup, Dana [Stalcup.Dana@epa.gov]; Crossland, Ronnie [Crossland.Ronnie@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Jennings, Robert [Jennings.Robert@epa.gov]; Poore, Christine [Poore.Christine@epa.gov]; Dailey, Anne [Dailey.Anne@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Gervais, Gregory [Gervais.Gregory@epa.gov]; Clark, Becki [Clark.Becki@epa.gov]; Irizarry, Gilberto [Irizarry.Gilberto@epa.gov]
Subject: FW: Tribal List
Attachments: image001.gif; ATT00001.htm; Tribal Nation Site LIst.pdf; ATT00002.htm

Kell, Barry, et.al

Per Kell's request Thursday's briefing on Superfund and Tribes, attached is a data run from SEMS reflecting current Final National Priorities List sites by Region where federally recognized tribes have signaled interest in the site. The list includes both federal facilities and non- federal facilities (see federal facility flag), The tribal interest data element (Native American Flag) is simply a yes/no flag that Regions maintain, so from the SEMS system, one cannot tell whether the interest is high, medium or low. We've also included the tribal names associated with the site and whether the site is on tribal land. (unfortunately that column is duplicated on the report – so you can ignore the second "on tribal land" column.)

Some caveats/observations - You also won't see the Navajo Abandoned Uranium Mine cleanup as that is non-NPL. Ringwood Mine in NJ also not included because the Ramapough Tribe is not federally recognized. Upper Columbia River in Washington State also not listed (non-NPL).

We did a second data pull for non-Final NPL sites. There were over 1,000 sites that were flagged. We did not include that report.

Quick Regional Summary:

Region	Number of final NPL sites with Tribal Interest	Number of sites identified as on tribal lands
1	8	0
2	5	0
3	0	0
4	4	0
5	11	0
6	9	3
7	0	0
8	4	0
9	5	2
10	24	1
Total	70	6

Please let me know whether this hits the mark.

Per Patrick's request, we are preparing a list of tribes/stories for the upcoming TLEF conference. Some of these will involve Fed. Facs., so we will be coordinating with FFRRO. We will also coordinate with OEM for any removal sites.

Jim Woolford, Director
Office of Superfund Remediation and Technology Innovation
Office of Land and Emergency Management
US Environmental Protection Agency
1200 Penn. Ave., NW
Washington, DC 20460
(Mail Code 5201-P)

Our mission is to return the most contaminated areas of the country to communities for safe reuse in a healthy environment.

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622
One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

Region	Site Name	Native American Flag	NPL Status Code	Federal Facility Flag	Tribe Name	Tribe State	On Tribal Land	On Tribal Land
01	CENTREDALE MANOR RESTORATION PROJECT	Y	F	N	Narragansett Indian Tribe of Rhode Island	RI	N	N
	EASTERN SURPLUS	Y	F	N	Passamaquoddy Tribe of Maine	ME	N	N
	EASTLAND WOOLEN MILL	Y	F	N	Penobscot Tribe of Maine	ME	N	N
	ELIZABETH MINE	Y	F	N	Abenaki of Mazipskwik & Related Bands	VT	N	N
	LORING AIR FORCE BASE	Y	F	Y	Aroostook Band of Micmac Indians of Maine	ME	N	N
	NEW BEDFORD	Y	F	N	Wampanoag Tribe of Gay Head of Massachusetts	MA	N	N
	NEWPORT NAVAL EDUCATION & TRAINING CENTER	Y	F	Y	Narragansett Indian Tribe of Rhode Island	RI	N	N
	OTIS AIR NATIONAL GUARD BASE/CAMP EDWARDS	Y	F	Y	Wampanoag Tribe of Gay Head of Massachusetts	MA	N	N
02	CAYUGA GROUNDWATER CONTAMINATION SITE	Y	F	N	Cayuga Nation of New York	NY	N	N
	GENERAL MOTORS (CENTRAL FOUNDRY DIVISION)	Y	F	N	St. Regis Band of Mohawk Indians of New York	NY	N	N
	ONONDAGA LAKE	Y	F	N	Onondaga Nation of New York	NY	N	N
	PETER COOPER	Y	F	N	Seneca Nation of New York	NY	N	N
	SENECA ARMY DEPOT	Y	F	Y	Cayuga Nation of New York	NY	N	N
04	AMERICAN BRASS INC.	Y	F	N	Poarch Band of Creek Indians of Alabama	AL	N	N
	AMERICAN CREOSOTE WORKS INC (LOUISVILLE)	Y	F	N	Mississippi Band of Choctaw Indians, Mississippi	MS	N	N
	CAPE FEAR WOOD PRESERVING	Y	F	N	Eastern Band of Cherokee Indians of North Carolina	NC	N	N
	CAROLINA TRANSFORMER CO.	Y	F	N	Eastern Band of Cherokee Indians of North Carolina	NC	N	N
05	ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER	Y	F	N	Huron Potawatomi, Inc., Michigan	MI	N	N
					Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan	MI	N	N
					Pokagon Band of Potawatomi Indians, Michigan and Indiana	MI	N	N
	ASHLAND/NORTHERN STATES POWER LAKEFRONT	Y	F	N	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation, Wisconsin	WI	N	N
					Lac Vieux Desert Band of Lake Superior Chippewa Indians, Michigan	MI	N	N
					Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	WI	N	N
	CANNELTON INDUSTRIES, INC.	Y	F	N	Bay Mills Indian Community, Michigan	MI	N	N
					Sault Ste. Marie Tribe of Chippewa Indians of Michigan	MI	N	N

Region	Site Name	Native American Flag	NPL Status Code	Federal Facility Flag	Tribe Name	Tribe State	On Tribal Land	On Tribal Land
05	FEED MATERIALS PRODUCTION CENTER (USDOE)	Y	F	Y	Chickasaw Nation, Oklahoma	OK	N	N
	GRAND TRAVERSE OVERALL SUPPLY CO.	Y	F	N	Grand Traverse Band of Ottawa and Chippewa Indians, Michigan	MI	N	N
	PENTA WOOD PRODUCTS	Y	F	N	St. Croix Chippewa Indians of Wisconsin	WI	N	N
	ST. LOUIS RIVER SITE	Y	F	N	Minnesota Chippewa Tribe, Minnesota	MN	N	N
	ST. REGIS PAPER CO.	Y	F	N	Minnesota Chippewa Tribe, Minnesota	MN	N	N
	TAR LAKE	Y	F	N	Little River Band of Ottawa Indians, Michigan	MI	N	N
	TORCH LAKE	Y	F	N	Keweenaw Bay Indian Community, Michigan	MI	N	N
	VELSICOL CHEMICAL CORP. (MICHIGAN)	Y	F	N	Sault Ste. Marie Tribe of Chippewa Indians of Michigan	MI	N	N
06	HUDSON REFINERY	Y	F	N	Sac & Fox Nation, Oklahoma	OK	Y	Y
	JACKPILE-PAGUATE URANIUM MINE	Y	F	N	Pueblo of Laguna, New Mexico	NM	N	N
	NORTH RAILROAD AVENUE PLUME	Y	F	N	Pueblo of Santa Clara, New Mexico	NM	N	N
	OKLAHOMA REFINING CO.	Y	F	N	Caddo Indian Tribe of Oklahoma	OK	Y	Y
	PREWITT ABANDONED REFINERY	Y	F	N	Navajo Nation, Arizona, New Mexico & Utah	UT	N	N
	TAR CREEK (OTTAWA COUNTY)	Y	F	N	Eastern Shawnee Tribe of Oklahoma	OK	N	N
	TULSA FUEL AND MANUFACTURING	Y	F	N	Ponca Tribe of Indians of Oklahoma	OK	Y	Y
	UNITED NUCLEAR CORP.	Y	F	N	Navajo Nation, Arizona, New Mexico & Utah	UT	N	N
	WILCOX OIL COMPANY	Y	F	N	Cherokee Nation, Oklahoma	OK	N	N
					Muscogee Nation, Oklahoma	OK	N	N
					Sac & Fox Nation, Oklahoma	OK	N	N
08	ANACONDA CO. SMELTER	Y	F	N	Confederated Salish & Kootenai Tribes of the Flathead Reservation, Montana	MT	N	N
	GILT EDGE MINE	Y	F	N	Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota	SD	N	N
	MILLTOWN RESERVOIR SEDIMENTS	Y	F	N	Confederated Salish & Kootenai Tribes of the Flathead Reservation, Montana	MT	N	N
	SILVER BOW CREEK/BUTTE AREA	Y	F	N	Confederated Salish & Kootenai Tribes of the Flathead Reservation, Montana	MT	N	N
09	CARSON RIVER MERCURY SITE	Y	F	N	Paiute-Shoshone Tribe of the Fallon Reservation and Colony, Nevada	NV	Y	Y
	IRON MOUNTAIN MINE	Y	F	N	Rumsey Indian Rancheria of Wintun Indians of California	CA	N	N

Region	Site Name	Native American Flag	NPL Status Code	Federal Facility Flag	Tribe Name	Tribe State	On Tribal Land	On Tribal Land
09	LEVIATHAN MINE	Y	F	N	Washoe Tribe of Nevada & California	CA	N	N
	SULPHUR BANK MERCURY MINE	Y	F	N	Elem Indian Colony of Pomo Indians of the Sulphur Bank Rancheria, California	CA	Y	Y
	TUCSON INTERNATIONAL AIRPORT AREA	Y	F	N	Tohono O'odham Nation of Arizona	AZ	N	N
10	BREMERTON GASWORKS	Y	F	N	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	BUNKER HILL MINING & METALLURGICAL COMPLEX	Y	F	N	Coeur D'Alene Tribe of the Coeur D'Alene Reservation, Idaho	ID	N	N
					Spokane Tribe of the Spokane Reservation, Washington	WA	N	N
	COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	Y	F	N	Puyallup Tribe of the Puyallup Reservation, Washington	WA	N	N
	EASTERN MICHAUD FLATS CONTAMINATION	Y	F	N	Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho	ID	N	N
	FORMOSA MINE	Y	F	N	Cow Creek Band of Umpqua Indians of Oregon	OR	N	N
	HAMILTON/LABREE ROADS GW CONTAMINATION	Y	F	N	Cowlitz Indian Tribe, Washington	WA	N	N
	HANFORD 100-AREA (USDOE)	Y	F	Y	Confederated Tribes and Bands of the Yakama Nation, Washington	WA	N	N
	HANFORD 200-AREA (USDOE)	Y	F	Y	Confederated Tribes and Bands of the Yakama Nation, Washington	WA	N	N
	HANFORD 300-AREA (USDOE)	Y	F	Y	Confederated Tribes and Bands of the Yakama Nation, Washington	WA	N	N
	HARBOR ISLAND (LEAD)	Y	F	N	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	IDAHO NATIONAL ENGINEERING LABORATORY (USDOE)	Y	F	Y	Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho	ID	N	N
	JACKSON PARK HOUSING COMPLEX (USNAVY)	Y	F	Y	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	LOCKHEED WEST SEATTLE	Y	F	N	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	LOWER DUWAMISH WATERWAY	Y	F	N	Muckleshoot Indian Tribe of the Muckleshoot Reservation, Washington	WA	N	N
					Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	MAKAH RESERVATION WARMHOUSE BEACH DUMP	Y	F	N	Makah Indian Tribe of the Makah Indian Reservation, Washington	WA	N	N
	MCCORMICK & BAXTER CREOSOTING CO. (PORTLAND PLANT)	Y	F	N	Confederated Tribes and Bands of the Yakama Nation, Washington	WA	N	N
					Confederated Tribes of the Grand Ronde Community	OR	N	N

Region	Site Name	Native American Flag	NPL Status Code	Federal Facility Flag	Tribe Name	Tribe State	On Tribal Land	On Tribal Land
10	MCCORMICK & BAXTER CREOSOTING CO. (PORTLAND PLANT)	Y	F	N	of Oregon			
					Confederated Tribes of the Umatilla Reservation, Oregon	OR	N	N
					Confederated Tribes of the Warm Springs Reservation of Oregon	OR	N	N
					Nez Perce Tribe of Idaho	ID	N	N
	MIDNITE MINE	Y	F	N	Spokane Tribe of the Spokane Reservation, Washington	WA	Y	Y
	NAVAL UNDERSEA WARFARE ENGINEERING STATION (4 WASTE AREAS)	Y	F	Y	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	OLD NAVY DUMP/MANCHESTER LABORATORY (USEPA/NOAA)	Y	F	Y	Port Gamble Indian Community of the Port Gamble Reservation, Washington	WA	N	N
					Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N
	PACIFIC SOUND RESOURCES	Y	F	N	Muckleshoot Indian Tribe of the Muckleshoot Reservation, Washington	WA	N	N
	PORTLAND HARBOR	Y	F	N	Confederated Tribes and Bands of the Yakama Nation, Washington	WA	N	N
					Confederated Tribes of the Grand Ronde Community of Oregon	OR	N	N
					Confederated Tribes of the Siletz Reservation, Oregon	OR	N	N
					Confederated Tribes of the Umatilla Reservation, Oregon	OR	N	N
					Confederated Tribes of the Warm Springs Reservation of Oregon	OR	N	N
					Nez Perce Tribe of Idaho	ID	N	N
	SALT CHUCK MINE	Y	F	N	Organized Village of Kasaan	AK	N	N
	TAYLOR LUMBER AND TREATING	Y	F	N	Confederated Tribes of the Grand Ronde Community of Oregon	OR	N	N
	WYCKOFF CO./EAGLE HARBOR	Y	F	N	Suquamish Indian Tribe of the Port Madison Reservation, Washington	WA	N	N

Rows 1 - 89 (All Rows)

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 5/22/2018 1:58:33 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Subject: RE: AO SF Email
Attachments: AO SF Team - Email - 5.22.18.docx; AO SF Team - Site List - 05.22.18.pdf

Nick,

Attached is the email draft that should be the body of the email, and the PDF of the site list, which should be attached. Below are the email recipients. Please work with Nick H. and Becky to get this out. Thank you!

AO/RAs:
Ryan Jackson, Nick Falvo, Silvina Fonseca, Mike Stoker, Helena Wooden-Aguilar, Karen Maher, Doug Ammon, Cook, Steven <cook.steven@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Hughes, Hayley <hughes.hayley@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Fotouhi, David <Fotouhi.David@epa.gov>; Leopold, Matt <Leopold.Matt@epa.gov>; Bodine, Susan <bodine.susan@epa.gov>; Traylor, Patrick <traylor.patrick@epa.gov>; Ross, David P <ross.davidp@epa.gov>; Wehrum, Bill <Wehrum.Bill@epa.gov>; Dunn, Alexandra <dunn.alexandra@epa.gov>; Lopez, Peter <lopez.peter@epa.gov>; Servidio, Cosmo <Servidio.Cosmo@epa.gov>; Glenn, Trey <Glenn.Trey@epa.gov>; Stepp, Cathy <stepp.cathy@epa.gov>; Idsal, Anne <idsal.anne@epa.gov>; Gulliford, Jim <gulliford.jim@epa.gov>; Benevento, Douglas <benevento.douglas@epa.gov>; Hladick, Christopher <hladick.christopher@epa.gov>; Wheeler, Andrew <wheeler.andrew@epa.gov>; Darwin, Henry <darwin.henry@epa.gov>; Ferguson, Lincoln <ferguson.lincoln@epa.gov>; Wilcox, Jahan <wilcox.jahan@epa.gov>; Lyons, Troy <lyons.troy@epa.gov>; Gunasekara, Mandy <Gunasekara.Mandy@epa.gov>; Beck, Nancy <Beck.NancyB@epa.gov>; Baptist, Erik <Baptist.Erik@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Traylor, Patrick <traylor.patrick@epa.gov>; Greaves, Holly <greaves.holly@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>; Bolen, Brittany <bolen.brittany@epa.gov>; Gordon, Stephen <gordon.stephen@epa.gov>; Woods, Clint <woods.clint@epa.gov>; Darwin, Henry <darwin.henry@epa.gov>; Hanson, Paige (Catherine) <hanson.catherine@epa.gov>; Ford, Hayley <ford.hayley@epa.gov>; Konkus, John <konkus.john@epa.gov>; Beach, Christopher <beach.christopher@epa.gov>; Hupp, Millan <hupp.millan@epa.gov>; Letendre, Daisy <letendre.daisy@epa.gov>

OLEM:
Barry Breen, Nigel Simon, Paul Leonard, Greg Garvais, Brigid Lowery, Kent Benjamin, Jim Woolford, Dana Stalcup, Bob Jennings, Schatzi Fitz-James, Pamela Barr, Marc Greenberg, Dennisses Valdes, Barnes Johnson, Kathleen Salyer, Carolyn Hoskinson, Mark Barolo, David Lloyd, Reggie Cheatham, Becki Clark, Nick Hilosky, Becky Brooks, Ellen Manges

OSRE:
Cyndy Mackey, Rafael DeLeon, Monica Gardner, Helena Healy, Ken Patterson, Benjamin Lammie, Shereta Pointer

SF DD:
Bryan Olson, Nancy Barmakian, Karen Melvin, Linda Dietz, Franklin Hill, Randall Chaffins, Doug Balloti, Carl Edlund, Mary Peterson, Betsy Smidinger, Bill Murray, Enrique Manzanilla, John Lyons, Sheryl Bilbrey, John Prince, Walter Mugdon, Tom Short, Dana Barton, Lynn Juette

Erin E. Chancellor

From: Chancellor, Erin
Sent: Tuesday, May 22, 2018 8:33 AM

To: Steven Cook (Cook.steven@Epa.gov) <Cook.steven@Epa.gov>
Subject: FW: superfund administrator's list -- superfund task force -- lead initiative

This is a good AO/RA/politicals email list to work off of (but adding Silvina and Nick and OLEM/OSRE/DDs to it).

OLEM suggestions:
Barry Breen, Nigel Simon, Paul Leonard, Greg Garvais, Brigid Lowery, Kent Benjamin, Jim Woolford, Dana Stalcup, Bob Jennings, Schatzi Fitz-James, Pamela Barr, Marc Greenberg, Dennisses Valdes, Barnes Johnson, Kathleen Salyer, Carolyn Hoskinson, Mark Barolo, David Lloyd, Reggie Cheatham, Becki Clark, Doug Ammon, Karl Gustavson

OSRE suggestions:
Cyndy Mackey, Rafael DeLeon, Monica Gardner, Helena Healy, Ken Patterson, Benjamin Lammie, Shereta Pointer

SF DD suggestions:
Bryan Olson, Nancy Barmakian, Karen Melvin, Linda Dietz, Franklin Hill, Randall Chaffins, Doug Balloti, Carl Edlund, Mary Peterson, Betsy Smidinger, Bill Murray, Enrique Manzanilla, John Lyons, Sheryl Bilbrey

Erin E. Chancellor

From: Jackson, Ryan
Sent: Friday, May 4, 2018 10:53 AM
To: Cook, Steven <cook.steven@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Hughes, Hayley <hughes.hayley@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Fotouhi, David <Fotouhi.David@epa.gov>; Leopold, Matt <Leopold.Matt@epa.gov>; Breen, Barry <Breen.Barry@epa.gov>; Simon, Nigel <Simon.Nigel@epa.gov>; Woolford, James <Woolford.James@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Bodine, Susan <bodine.susan@epa.gov>; Traylor, Patrick <traylor.patrick@epa.gov>; Ross, David P <ross.davidp@epa.gov>; Wehrum, Bill <Wehrum.Bill@epa.gov>; Dunn, Alexandra <dunn.alexandra@epa.gov>; Lopez, Peter <lopez.peter@epa.gov>; Servidio, Cosmo <Servidio.Cosmo@epa.gov>; Glenn, Trey <Glenn.Trey@epa.gov>; Stepp, Cathy <stepp.cathy@epa.gov>; Idsal, Anne <idsal.anne@epa.gov>; Gulliford, Jim <gulliford.jim@epa.gov>; Benevento, Douglas <benevento.douglas@epa.gov>; Strauss, Alexis <Strauss.Alexis@epa.gov>; Hladick, Christopher <hladick.christopher@epa.gov>; Wheeler, Andrew <wheeler.andrew@epa.gov>; Darwin, Henry <darwin.henry@epa.gov>; Ferguson, Lincoln <ferguson.lincoln@epa.gov>; Wilcox, Jahan <wilcox.jahan@epa.gov>
Cc: Lyons, Troy <lyons.troy@epa.gov>; Bowman, Liz <Bowman.Liz@epa.gov>; Gunasekara, Mandy <Gunasekara.Mandy@epa.gov>; Beck, Nancy <Beck.NancyB@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Baptist, Erik <Baptist.Erik@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Traylor, Patrick <traylor.patrick@epa.gov>; Greaves, Holly <greaves.holly@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>; Bolen, Brittany <bolen.brittany@epa.gov>; Gordon, Stephen <gordon.stephen@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Woods, Clint <woods.clint@epa.gov>; Darwin, Henry <darwin.henry@epa.gov>; Hanson, Paige (Catherine) <hanson.catherine@epa.gov>; Ford, Hayley <ford.hayley@epa.gov>; Wilcox, Jahan <wilcox.jahan@epa.gov>; Konkus, John <konkus.john@epa.gov>; Beach, Christopher <beach.christopher@epa.gov>; Hupp, Millan <hupp.millan@epa.gov>; Letendre, Daisy <letendre.daisy@epa.gov>
Subject: superfund administrator's list -- superfund task force -- lead initiative

Good morning --

Great progress has been made in advancing the Administrator's goal of reinvigorating the Superfund program through the Superfund Task Force and accelerating clean-up progress at sites across the country through the Administrator's emphasis list. While partially or entirely completing 7 sites this past year, we are on track to complete in whole or part another 33 this year. All the while the emphasis list is focusing on completing new milestones on targeted sites to keep processes moving forward. While we will miss Kell's leadership, it is imperative that we build on the successes of the

past year and continue to pursue implementation of the Task Force recommendations. In support of this objective, we are making the following announcements –

- In addition to the responsibilities as OLEM Deputy AA, Steven Cook will now take the lead as Chair of the Superfund Task Force and oversee Kell's responsibilities in the Administrator's Office providing support to Erin, Silvina, Hayley, Veronica, and Nick.
- Erin Chancellor will take over the public outreach, travel, and organization and management of the Administrator's Superfund emphasis list.
- Silvina Fonseca and Hayley Hughes will manage the Administrator's National Lead Remediation Program.
- Veronica Darwin will continue coordinating the Administrator's Superfund Task for and implementing its recommendations.
- Nick Falvo will be a Special Assistant to Steven Cook.

Part of the success of the Administrator's Emphasis List has been its constant attention in the Administrator's Office. Erin will work to ensure our progress continues, and our outreach efforts to local communities will continue to be a priority. For those involved in the day-to-day activities of the Superfund program, you can expect to hear more details soon from Steven as some refinements will need to be made to the mechanics of the process. However, we must not lose our momentum on the Task Force or at any site.

Please share this with those in your organization that may be affected.

Ryan Jackson
Chief of Staff
U.S. Environmental Protection Agency
(202) 564-6999

Active Superfund Sites

Erin; Nick; Silvina; Veronica

Region 1

- Connecticut
  - Raymark Industries, Inc. – Veronica
- Maine – None active at this time.
- Massachusetts
  - Housatonic River/GE-Pittsfield – Nick
  - Industri-Plex – Nick
  - New Bedford Harbor – Erin
  - Norwood PCBs – Veronica
  - Olin Chemical – Veronica
  - W.R. Grace & Co., Inc. – Veronica
- New Hampshire
  - Coakley Landfill – Erin
  - Mohawk Tannery – Silvina
  - South Municipal Water Supply Well/New Hampshire Ball Bearings – Nick
- Rhode Island
  - Centerdale Manor – Nick
- Vermont – None active at this time.

Region 2

- New Jersey
  - American Cyanamid Co. – Silvina
  - Berry's Creek/Ventron/Velsicol – Silvina
  - Lower Passaic River/Diamond Alkali Co. – Silvina
  - Matteo & Sons Inc. – Silvina
  - Pierson's Creek – Nick
  - Quanta Resources – Veronica
  - Woodbrook Road Dump – Silvina
- New York
  - Dewey Loeffel Landfill – Veronica
  - Gowanus Canal – Silvina
  - Hoosick Falls/Saint-Gobain Performance Plastics – Erin
  - Hudson River PCBs – Silvina
  - Newtown Creek – Nick
- Puerto Rico
  - PROTECO – Veronica
- USVI – None active at this time.

Active Superfund Sites

Region 3

- Delaware
  - Delaware Sand & Gravel Landfill – Silvina
  - E.I. Du Pont De Nemours & Co., Inc./Newport Pigment Plant Landfill – Veronica
  - Hockessin Groundwater – Veronica
- Maryland – None active at this time.
- Pennsylvania – None active at this time.
- Virginia
  - L.A. Clarke & Son – Silvina
- Washington, D.C.
  - Washington Navy Yard – Nick
- West Virginia
  - Minden/Shaffer Equipment Co. – Erin

Region 4

- Alabama
  - 35th Avenue – Silvina
- Florida
  - Cabot/Koppers – Erin
- Georgia – None at this time.
- Kentucky
  - B.F. Goodrich/Calvert City – Silvina
  - Paducah Gaseous Diffusion Plant (U.S. DOE) – Nick
- Mississippi
  - Grenada/Rockwell International Wheel & Trim – Silvina
  - Mississippi Phosphates – Nick
- North Carolina
  - CTS of Ashville, Inc. – Silvina
- South Carolina
  - Burlington Industries Cheraw – Veronica
  - Columbia Nitrogen – Veronica
- Tennessee
  - Oak Ridge Reservation – Silvina
  - Southside Chattanooga Lead – Erin

Active Superfund Sites

Region 5

- Illinois - None active at this time.
- Indiana
  - Federated Metals Corp. – Silvina
  - Franklin Street Groundwater Contamination – Veronica
  - USS Lead/East Chicago/U.S. Smelter & Lead Refinery, Inc. – Silvina
  - West Vermont Drinking Water Contamination – Nick
- Michigan
  - Aircraft Components/D&L Sales – Veronica
  - Allied Paper/Kalamazoo/Portage Creek – Erin
  - DSC McLouth Steel Gibralter Plant – Nick
  - Forest Waste Products – Erin
  - Pall Corporation/Gelman Sciences – Nick
  - Tittabawassee River, Saginaw River & Bay – Nick
  - Torch Lake/Stamp Sands – Nick
  - Velsicol (Michigan) Chemical Corp. – Nick
  - Wolverine Worldwide Former Tannery – Nick
- Minnesota
  - Arrowhead Refinery – Veronica
  - General Mills/Henkel Corp. – Nick
  - Spring Park Municipal Well Field – Veronica
  - St. Louis River/Interlake Duluth Tar/SLRIDT – Erin
  - St. Regis Paper Co. – Silvina
- Ohio
  - Chemical & Minerals Reclamation – Erin
  - Donnelsville Contaminated Aquifer – Veronica
- Wisconsin – None at this time.

Region 6

- Arkansas – None active at this time.
- Louisiana
  - Camp Minden – Veronica
- New Mexico
  - Griggs & Walnut Groundwater Plume – Nick
  - San Mateo Creek Basin – Erin
- Oklahoma
  - Eagle Industries – Veronica
  - Tar Creek/Ottawa County – Erin
- Texas
  - Delfasco Forge – Veronica
  - Donna Reservoir & Canal System – Veronica
  - Lane Plating Works, Inc. – Erin
  - Many Diversified Interests/MDI – Erin
  - River City Metal Finishing – Nick
  - San Jacinto River Waste Pits – Silvina

Region 7

- Iowa
  - Des Moines TCE/Dico Company – Erin
  - Peoples Natural Gas Co. – Nick
- Kansas – None active at this time.
- Missouri
  - Big River Mine Tailings/St. Joe Minerals Corp. – Silvina
  - Carter Carburetor – Veronica
  - Southwestern Jefferson County Mining – Nick
  - West Lake Landfill/Bridgeton – Silvina
- Nebraska – None active at this time.

Active Superfund Sites

Region 8

- Colorado
  - Bonita Peak Mining District/Gold King Mine – Erin
  - Colorado Smelter – Silvina
  - Lowry Landfill – Veronica
- Montana
  - Anaconda Co. Smelter – Erin
  - East Helena – Erin
  - Libby Asbestos Site – Erin
  - Silver Bow Creek/Butte Area – Erin
- North Dakota – None active at this time.
- South Dakota – None active at this time.
- Utah
  - Richardson Flats/United Park City Mines – Nick
- Wyoming – None active at this time.

Region 9

- Arizona
  - Motorola/52nd Street Plant – Silvina
  - Tucson International Airport – Silvina
- California
  - Aerojet General Corp. – Veronica
  - Casmalia Resources – Silvina
  - Halaco Engineering Company – Veronica
  - Orange County North Basin – Nick
  - Treasure Island Naval Station – Hunters Point Annex – Erin
- Hawaii – None active at this time.
- Nevada
  - Anaconda Copper Mine – Veronica
- Territories (Guam, Trust Territories, American Samoa, Northern Mariana Islands) – None active at this time.

Active Superfund Sites

Region 10

- Alaska
  - Dutch Harbor Station (USDOT) – Nick
- Idaho
  - Bunker Hill Mining/Coeur d'Alene Basin Cleanup – Erin
  - Eastern Michaud Flats/FMC – Silvina
- Oregon
  - Portland Harbor – Silvina
- Washington
  - Hanford 100-Area – Silvina
  - Quendall Terminal – Silvina
  - Wyckoff Co./Eagle Harbor – Silvina

Active Brownfields Sites

- Weirton, WV – Erin

Other Superfund Projects

- AEL Process – Silvina
- Ducks Unlimited SF Partnership – Erin
- Midas Gold/Stibnite – Erin
- Superfund Task Force – Veronica

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 5/22/2018 12:44:51 PM
To: Cook, Steven [cook.steven@epa.gov]
CC: Falvo, Nicholas [falvo.nicholas@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]; Darwin, Veronica [darwin.veronica@epa.gov]
Subject: RE: Site List
Attachments: AO SF Team - Site List - 05.22.18.pdf; AO SF Team - Site List - 05.22.18.docx

Forgot about Forest Waste, added to Region 5. Doc and PDF attached.

Erin E. Chancellor

From: Chancellor, Erin
Sent: Wednesday, May 16, 2018 4:12 PM
To: Steven Cook (Cook.steven@Epa.gov) <Cook.steven@Epa.gov>
Cc: Nick Falvo <falvo.nicholas@epa.gov>; Silvina Fonseca (Fonseca.Silvina@epa.gov) <Fonseca.Silvina@epa.gov>; Veronica Darwin (darwin.veronica@epa.gov) <darwin.veronica@epa.gov>
Subject: Site List

Hi Steven,

We've split up the sites, and that list is attached. If you have any questions or edits, please let us know.

Thanks,

Erin E. Chancellor
Counsel to the Administrator
U.S. Environmental Protection Agency
(202) 566-1757 (office)
(202) 731-2835 (cell)
chancellor.erin@epa.gov

Erin; Nick; Silvina; Veronica

Region 1

- Connecticut
  - Raymark Industries, Inc. – Veronica
- Maine – None active at this time.
- Massachusetts
  - Housatonic River/GE-Pittsfield – Nick
  - Industri-Plex – Nick
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  - Norwood PCBs – Veronica
  - Olin Chemical – Veronica
  - W.R. Grace & Co., Inc. – Veronica
- New Hampshire
  - Coakley Landfill – Erin
  - Mohawk Tannery – Silvina
  - South Municipal Water Supply Well/New Hampshire Ball Bearings – Nick
- Rhode Island
  - Centerdale Manor – Nick
- Vermont – None active at this time.

Region 2

- New Jersey
  - American Cyanamid Co. – Silvina
  - Berry's Creek/Ventron/Velsicol – Silvina
  - Lower Passaic River/Diamond Alkali Co. – Silvina
  - Matteo & Sons Inc. – Silvina
  - Pierson's Creek – Nick
  - Quanta Resources – Veronica
  - Woodbrook Road Dump – Silvina
- New York
  - Dewey Loeffel Landfill – Veronica
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  - Hoosick Falls/Saint-Gobain Performance Plastics – Erin
  - Hudson River PCBs – Silvina
  - Newtown Creek – Nick
- Puerto Rico
  - PROTECO – Veronica
- USVI – None active at this time.

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Region 3

- Delaware
  - Delaware Sand & Gravel Landfill – Silvina
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  - Washington Navy Yard – Nick
- West Virginia
  - Minden/Shaffer Equipment Co. – Erin

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- Alabama
  - 35th Avenue – Silvina
- Florida
  - Cabot/Koppers – Erin
- Georgia – None at this time.
- Kentucky
  - B.F. Goodrich/Calvert City – Silvina
  - Paducah Gaseous Diffusion Plant (U.S. DOE) – Nick
- Mississippi
  - Grenada/Rockwell International Wheel & Trim – Silvina
  - Mississippi Phosphates – Nick
- North Carolina
  - CTS of Ashville, Inc. – Silvina
- South Carolina
  - Burlington Industries Cheraw – Veronica
  - Columbia Nitrogen – Veronica
- Tennessee
  - Oak Ridge Reservation – Silvina
  - Southside Chattanooga Lead – Erin

Active Superfund Sites

Region 5

- Illinois - None active at this time.
- Indiana
  - Federated Metals Corp. – Silvina
  - Franklin Street Groundwater Contamination – Veronica
  - USS Lead/East Chicago/U.S. Smelter & Lead Refinery, Inc. – Silvina
  - West Vermont Drinking Water Contamination – Nick
- Michigan
  - Aircraft Components/D&L Sales – Veronica
  - Allied Paper/Kalamazoo/Portage Creek – Erin
  - DSC McLouth Steel Gibralter Plant – Nick
  - Forest Waste Products – Erin
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  - Tittabawassee River, Saginaw River & Bay – Nick
  - Torch Lake/Stamp Sands – Nick
  - Velsicol (Michigan) Chemical Corp. – Nick
  - Wolverine Worldwide Former Tannery – Nick
- Minnesota
  - Arrowhead Refinery – Veronica
  - General Mills/Henkel Corp. – Nick
  - Spring Park Municipal Well Field – Veronica
  - St. Louis River/Interlake Duluth Tar/SLRIDT – Erin
  - St. Regis Paper Co. – Silvina
- Ohio
  - Chemical & Minerals Reclamation – Erin
  - Donnelsville Contaminated Aquifer – Veronica
- Wisconsin – None at this time.

Region 6

- Arkansas – None active at this time.
- Louisiana
  - Camp Minden – Veronica
- New Mexico
  - Griggs & Walnut Groundwater Plume – Nick
  - San Mateo Creek Basin – Erin
- Oklahoma
  - Eagle Industries – Veronica
  - Tar Creek/Ottawa County – Erin
- Texas
  - Delfasco Forge – Veronica
  - Donna Reservoir & Canal System – Veronica
  - Lane Plating Works, Inc. – Erin
  - Many Diversified Interests/MDI – Erin
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  - San Jacinto River Waste Pits – Silvina

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  - Peoples Natural Gas Co. – Nick
- Kansas – None active at this time.
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  - Carter Carburetor – Veronica
  - Southwestern Jefferson County Mining – Nick
  - West Lake Landfill/Bridgeton – Silvina
- Nebraska – None active at this time.

Active Superfund Sites

Region 8

- Colorado
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  - Colorado Smelter – Silvina
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- Montana
  - Anaconda Co. Smelter – Erin
  - East Helena – Erin
  - Libby Asbestos Site – Erin
  - Silver Bow Creek/Butte Area – Erin
- North Dakota – None active at this time.
- South Dakota – None active at this time.
- Utah
  - Richardson Flats/United Park City Mines – Nick
- Wyoming – None active at this time.

Region 9

- Arizona
  - Motorola/52nd Street Plant – Silvina
  - Tucson International Airport – Silvina
- California
  - Aerojet General Corp. – Veronica
  - Casmalia Resources – Silvina
  - Halaco Engineering Company – Veronica
  - Orange County North Basin – Nick
  - Treasure Island Naval Station – Hunters Point Annex – Erin
- Hawaii – None active at this time.
- Nevada
  - Anaconda Copper Mine – Veronica
- Territories (Guam, Trust Territories, American Samoa, Northern Mariana Islands) – None active at this time.

Active Superfund Sites

Region 10

- Alaska
  - Dutch Harbor Station (USDOT) – Nick
- Idaho
  - Bunker Hill Mining/Coeur d'Alene Basin Cleanup – Erin
  - Eastern Michaud Flats/FMC – Silvina
- Oregon
  - Portland Harbor – Silvina
- Washington
  - Hanford 100-Area – Silvina
  - Quendall Terminal – Silvina
  - Wyckoff Co./Eagle Harbor – Silvina

Active Brownfields Sites

- Weirton, WV – Erin

Other Superfund Projects

- AEL Process – Silvina
- Ducks Unlimited SF Partnership – Erin
- Midas Gold/Stibnite – Erin
- Superfund Task Force – Veronica

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 6/6/2018 7:19:56 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: HQ Site Visits

Adding speaking engagements is a great idea! Like in the bottom section? What do you think?

Erin E. Chancellor

From: Falvo, Nicholas
Sent: Wednesday, June 6, 2018 3:18 PM
To: Chancellor, Erin <chancellor.erin@epa.gov>
Subject: RE: HQ Site Visits

I'll fill this in for mine and Kell's no problem. Just need to go back through the voucher report that Helena gave us.

Also, do we want to include things like ECOS/ASTSWMO meetings? Other stakeholder meetings were Kell/Veronica/Silvina spoke at?

From: Chancellor, Erin
Sent: Wednesday, June 6, 2018 3:06 PM
To: Falvo, Nicholas <falvo.nicholas@epa.gov>
Subject: HQ Site Visits

Ok so, from the below, I've compiled the attached spreadsheet. Will you either send me your running list, or please fill in what you can? I filled in some of the community meetings, but not sure abt all of them. Mainly need filled in the reason for Kell (and/or your) visit and the date. Region 1 is a good example of multiple types of events happening on the same or different days. Does that make sense? Can you plz leave the line with the state name blank? Lastly, community meeting (like Lois's) that are multi-site are listed at the bottom. If you fill in whatever you know, I'll bother Ken, Silvina, and Veronica next.

Gracias!

Community Meetings:
Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden

SP
~~-4/19/17, USS Lead~~
~~-8/4/17, Bonita Peak~~
~~-9/15, San Jac, US Oil, Brio refining~~
~~-10/19, San Jac~~
~~-2/5/18, Anaconda Copper Mine in NV~~
~~-2/13/18, Mohawk Tannery in NH~~

Ken
~~-9/4 San Jac, US Oil, Highland Acid Pit~~

Kell
~~-9/4 San Jac, US Oil, Highland Acid Pit~~
~~-East Chicago (5 times, I went once)~~
~~-West Lake Landfill MO (at least 3 times)~~
~~-Gold King Mine/BPMD~~
~~-Big River Mine Tailings/Doe Run Mine Tailings/St. Joe Mineral Corp. MO~~
~~-Bunker Hill Mining & Metallurgical Complex/Coeur d'Alene Basin ID~~
~~-Eastern Michaud Flats Contamination ID~~
~~-Anaconda Co. Smelter MT~~
~~-Libby Abestos MT~~
~~-Silver Bow Creek/Butte Area MT~~
~~-Anaconda Mine~~
~~-Tar Creek OK~~
~~-Eagle Industries OK~~
~~-Fox River NRDA/PCB Releases WI~~
~~-Torch Lake/Stamp Sands MI~~
~~-Operating Industries Inc. Landfill CA~~

Erin
~~-2/20 Tar Creek community meeting with local activists, local government meeting, tribal meeting w/ federal partners (+Ken)~~
~~-4/10 Bunker Hill/Coeur d'Alene site tour + tribal meetings~~
~~-4/11 Bunker Hill/Coeur d'Alene community meeting with local activists~~
~~-4/27 Lowry Landfill site tour with local & state government~~
~~-5/16 Rocky Mountain Arsenal site tour (+Steven & Silvina)~~

Silvina
~~-B.F. Goodrich KY~~
~~-MS Phosphates Corporation~~
~~-West Lake~~
~~-Harbor Island (Lead)/East Waterway in WA~~
~~-5/16/18 – Rocky Mountain Arsenal~~

Veronica
~~-Hudepohl Brewery in OH – site visit~~
~~-Tremont Field/Clark Fields Park in OH – site visit~~
~~-Mukluk Preserve site in Connecticut – site visit with informal stakeholder engagement~~
~~-Solvents Recovery & Service in Connecticut – site visit with informal stakeholder engagement~~

Nick
~~-E. Chicago once with Kell~~
~~-MS Phosphates with Silvina~~
~~-Operating Industries Inc.~~
~~-Stamp Sands/Torch Lake~~
~~-Fox River~~

Message

From: Chancellor, Erin [chancellor.erin@epa.gov]
Sent: 6/6/2018 7:06:22 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: HQ Site Visits
Attachments: EPA HQ Site Visits.xlsx

Ok so, from the below, I've compiled the attached spreadsheet. Will you either send me your running list, or please fill in what you can? I filled in some of the community meetings, but not sure abt all of them. Mainly need filled in the reason for Kell (and/or your) visit and the date. Region 1 is a good example of multiple types of events happening on the same or different days. Does that make sense? Can you plz leave the line with the state name blank? Lastly, community meeting (like Lois's) that are multi-site are listed at the bottom. If you fill in whatever you know, I'll bother Ken, Silvina, and Veronica next.

Gracias!

Community Meetings:
Westlake (multiple meetings), East Chicago (multiple meetings), Hoosick Falls, Montana (3 - need to make sure I get the right ones), Idaho (2 - need to get right groups), Tar Creek, Shoshone Bannock Tribe, Quapaw Tribe, Kansas City (Richard Mabion), Tucson Airport, Texas (three different groups with Lois Gibbs), CTS of Ashville, Newson Brothers/Old Reichold Chemicals (Mississippi), Coakley Landfill, Minden

SP
~~-4/19/17, USS Lead~~
~~-8/4/17, Bonita Peak~~
~~-9/15, San Jac, US Oil, Brio refining~~
~~-10/19, San Jac~~
~~-2/5/18, Anaconda Copper Mine in NV~~
~~-2/13/18, Mohawk Tannery in NH~~

Ken
~~-9/4 San Jac, US Oil, Highland Acid Pit~~

Kell
~~-9/4 San Jac, US Oil, Highland Acid Pit~~
~~-East Chicago (5 times, I went once)~~
~~-West Lake Landfill MO (at least 3 times)~~
~~-Gold King Mine/BPMD~~
~~-Big River Mine Tailings/Doe Run Mine Tailings/St. Joe Mineral Corp. MO~~
~~-Bunker Hill Mining & Metallurgical Complex/Coeur d'Alene Basin ID~~
~~-Eastern Michaud Flats Contamination ID~~
~~-Anaconda Co. Smelter MT~~
~~-Libby Abestos MT~~
~~-Silver Bow Creek/Butte Area MT~~
~~-Anaconda Mine~~
~~-Tar Creek OK~~
~~-Eagle Industries OK~~
~~-Fox River NRDA/PCB Releases WI~~
~~-Torch Lake/Stamp Sands MI~~
~~-Operating Industries Inc. Landfill CA~~

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Veronica
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Nick
~~-E. Chicago once with Kell~~
~~-MS Phosphates with Silvina~~
~~-Operating Industries Inc.~~
~~-Stamp Sands/Torch Lake~~
~~-Fox River~~

Region	State	Related Site	Activity	Date
1	**Connecticut**			
		Mukluk Preserve	Site Visit w/ Informal Stakeholder Engagement	
		Solvents Recovery Service of New England	Site Visit w/ Informal Stakeholder Engagement	
	Maine			
	Massachusetts			
		Blackburn Union & Privileges	Site Visit	6/5/2018
		Creese & Cook Tannery	Site Visit	6/4/2018
		Former Ash Street Tannery	Site Visit	6/4/2018
		Industri-Plex	Site Visit	6/4/2018
		Norwood PCBs	Site Visit	6/5/2018
		Olin Chemical	Site Visit	6/4/2018
		Wells G&H	Site Visit	6/4/2018
	New Hampshire			
		Coakley Landfill	Site Visit	6/4/2018
		Coakley Landfill	Community meeting	6/4/2018
		Coakley Landfill	Press Event	6/4/2018
		Coakley Landfill	Community meeting	6/4/2018
		Mohawk Tannery	Site Visit	2/13/2018
	Rhode Island			
	Vermont			
2	**New Jersey**			
	New York			
		Hoosik Falls/Saint-Gobain Performance Plastics	Local Government Meeting	5/22/2018
	Puerto Rico			
	U.S. Virgin Islands			
3	**Delaware**			
	Maryland			
	Pennsylvania			
	Virginia			
	Washington, DC			
	West Virginia			

Participants
Veronica Darwin
Veronica Darwin
Erin Chancellor
Steven Cook & Erin Chancellor
Steven Cook & Erin Chancellor
Steven Cook & Erin Chancellor
Erin Chancellor
Steven Cook & Erin Chancellor
Steven Cook & Erin Chancellor
Steven Cook & Erin Chancellor
Steven Cook & Erin Chancellor
Erin Chancellor
Erin Chancellor
Administrator Scott Pruitt
Administrator Scott Pruitt, Lee Forsegren, & Erin Chancellor

4	**Alabama**			
	Florida			
	Georgia			
	Kentucky			
		B.F. Goodrich		
	Mississippi			
		Mississippi Phosphates Corporation		
	North Carolina			
	South Carolina			
	Tennessee			
5	**Illinois**			
	Indiana	USS Lead/East Chicago		4/19/2017
		USS Lead/East Chicago		
		USS Lead/East Chicago		
		USS Lead/East Chicago		
		USS Lead/East Chicago		
	Michigan			
		Torch Lake/Stamp Sands		
	Minnesota			
	Ohio			
		Hudepohl Brewery (*Need correct SF site name)	Site Visit	
		Tremont Field/Clark Fields Park	Site Visit	
	Wisconsin			
		Fox River NRDA/PCB Releases		
	Arkansas			
	Louisiana			
	New Mexico			
	Oklahoma			
		Eagle Industries		
		Tar Creek		

Silvina Fonseca
Nick Falvo & Silvina Fonseca
Administrator Scott Pruitt
Kell Kelly
Kell Kelly
Kell Kelly
Kell Kelly & Nick Falvo
Kell Kelly & Nick Falvo
Veronica Darwin
Veronica Darwin
Kell Kelly & Nick Falvo
Kell Kelly
Kell Kelly

		Tar Creek	Local Community Activists Meeting	2/20/2018
6		Tar Creek	Local Government Meeting	2/20/2018
		Tar Creek	Tribal Meeting w/ Federal Partners	2/20/2018
	Texas			
		Brio Refining, Inc.	Site Visit	9/15/2017
		Highland Acid Pits	Site Visit w/ Press	9/4/2017
		San Jacinto Waste Pits	Site Visit w/ Press	9/4/2017
		San Jacinto Waste Pits	Site Visit	9/15/2017
		San Jacinto Waste Pits	Site Visit	10/19/2017
		U.S. Oil Recovery	Site Visit w/ Press	9/4/2017
		U.S. Oil Recovery	Site Visit	9/15/2017
	Iowa			
		Des Moines TCE	Local Government Meeting	5/10/2018
	Kansas			
	Missouri			
7		Big River Mine Tailings/Doe Run Mine Tailings/St. Joe Mineral Corp.		
		West Lake Landfill		
		West Lake Landfill		
		West Lake Landfill		
	Nebraska			
	Colorado			
		Bonita Peak Mining District (BPMD)/ Gold King Mine		8/4/2017
		BPMD		
		Lowry Landfill	Site Visit w/ State & Local Government	4/27/2018
		Rocky Mountain Arsenal	Local Government Meeting	3/8/2018
		Rocky Mountain Arsenal	Site Tour	5/16/2018
8	**Montana**			
		Anaconda Co. Smelter		
		Libby Asbestos		
		Silver Bow Creek/Butte Area		
	North Dakota			
	South Dakota			

Ken Wagner & Erin Chancellor
Ken Wagner & Erin Chancellor
Ken Wagner & Erin Chancellor
Administrator Scott Pruitt
Kell Kelly & Ken Wagner
Kell Kelly & Ken Wagner
Administrator Scott Pruitt
Administrator Scott Pruitt
Kell Kelly & Ken Wagner
Administrator Scott Pruitt
Steven Cook, Nick Falvo, Silvina Fonseca, & Erin Chancellor
Kell Kelly
Kell Kelly
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Administrator Scott Pruitt
Kell Kelly
Erin Chancellor
Kell Kelly, Silvina Fonseca, Nick Falvo, & Erin Chancellor
Steven Cook, Silvina Fonseca, & Erin Chancellor
Kell Kelly
Kell Kelly
Kell Kelly

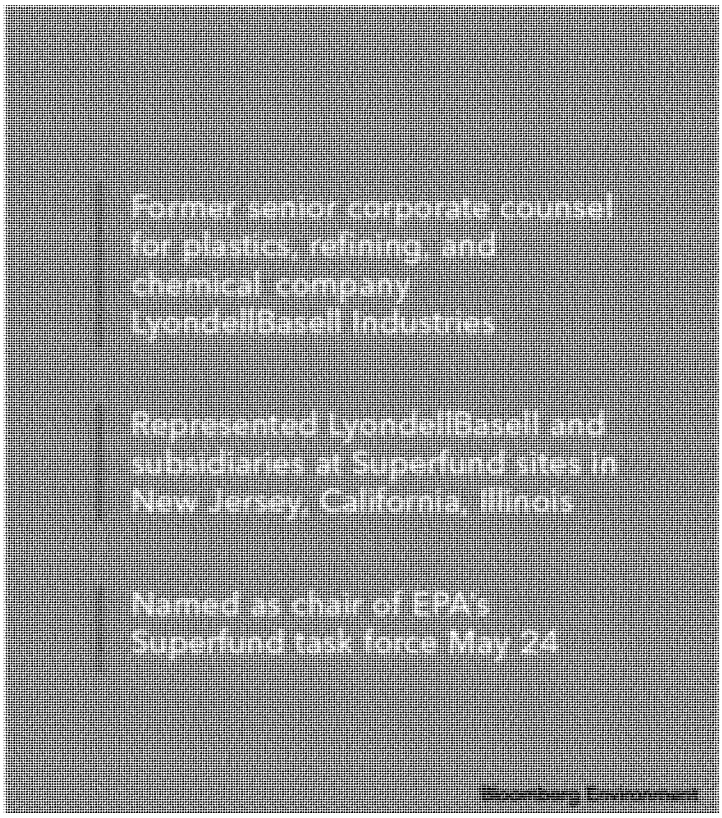
	Utah			
	Wyoming			
9	**Arizona**			
	California			
		Operating Industries Inc. Landfill		
	Hawaii			
	Nevada			
		Anaconda Copper Mine	Site Visit	2/5/2018
	U.S. Territories			
10	**Alaska**			
	Idaho			
		Bunker Hill Mining & Metallurgical Complex/ Coeur d'Alene Basin (BHMM)		
		BHMM	Tribal Meeting	4/10/2018
		BHMM	Site Visit	4/10/2018
		BHMM	Local Community Activists Meeting	4/11/2018
		Eastern Michaud Flats Contamination		
		Eastern Michaud Flats Contamination	Tribal Meeting	4/18/2018
	Oregon			
	Washington			
		Harbor Island (Lead)/ East Waterway		
Multi-Region/ Multi-Site			Quarterly Meeting with Lois Gibbs & Co.	3/29/2018

Kell Kelly & Nick Falvo
Administrator Scott Pruitt & Kell Kelly
Kelly Kelly
Erin Chancellor
Erin Chancellor
Erin Chancellor
Kelly Kelly
Steven Cook, Kelly Kelly, Nick Falvo, Erin Chancellor, & Silvina Fonseca
Silvina Fonseca
Steven Cook, Kelly Kelly, Nick Falvo, Erin Chancellor, & Silvina Fonseca

To: Cook, Steven[cook.steven@epa.gov]; Chancellor, Erin[chancellor.erin@epa.gov]; Falvo, Nicholas[falvo.nicholas@epa.gov]; Darwin, Veronica[darwin.veronica@epa.gov]
Cc: Harwood, Jackie[Harwood.Jackie@epa.gov]; Abboud, Michael[abboud.michael@epa.gov]; Beach, Christopher[beach.christopher@epa.gov]; Daniell, Kelsi[daniell.kelsi@epa.gov]; Ferguson, Lincoln[ferguson.lincoln@epa.gov]; Hewitt, James[hewitt.james@epa.gov]; Konkus, John[konkus.john@epa.gov]; Wilcox, Jahan[wilcox.jahan@epa.gov]
From: Block, Molly
Sent: Fri 6/29/2018 2:56:31 PM
Subject: Bloomberg Environment: Could Quicker, Cheaper Superfund Cleanups Create Uncertainty?

Headline kinda suck, but Steve got his own graphic!

Steven Cook
Chair of EPA's Superfund task force



Could Quicker, Cheaper Superfund Cleanups Create Uncertainty?

Sylvia Carignan

•□□ Superfund task force chair favoring 'adaptive' approach to Superfund

•□□ Companies likely on board with less costly, faster approach

The start-and-stop approach the EPA wants to use for toxic site cleanup could be quicker, cheaper, and more effective than the process the agency has used for decades, but some are concerned it could increase uncertainty for the companies involved.

Steven Cook, head of the Environmental Protection Agency's Superfund task force, told Bloomberg Environment June 28 he is focusing on creating sustainable reforms to the agency's contaminated site cleanup program. To do that, the agency wants to expand to all 1,300 of the nation's most contaminated sites the use of adaptive management, an approach that has been used in many other cleanups.

"The adaptive management concept has got real potential," Cook told Bloomberg Environment. The approach allows the agency to be more flexible in its cleanup decisions and adapt to the contaminants found at a site, he said.

Under the approach, the EPA or a company would assess the immediate, apparent risks at a site, get them cleaned up, then stop and re-assess if more work is needed. This differs from EPA's conventional approach to Superfund sites, which typically requires a full site assessment before taking any action.

"The result would be more sharply focused on what you want to achieve, and perhaps, more cost effective," Jonathan Z. Cannon, professor at the University of Virginia's School of Law and former acting administrator for the EPA's Superfund and land office, told Bloomberg Environment.

The adaptive approach can be helpful at complicated sites where the EPA and involved companies disagree about what needs to be done, John Gullace, partner at Manko, Gold, Katcher & Fox LLP in Bala Cynwyd, Pa., told Bloomberg Environment. Gullace has represented companies involved with Superfund sites.

The EPA has already started using the adaptive management approach at Berry's Creek, part of the Ventron/Velsicol Superfund site in Bergen County, N.J. At Berry's Creek, industrial and sewage discharges as well as urban runoff have contaminated sediment and water and entered the food chain. The area is contaminated with enough mercury, chromium, and other substances that the fish and crabs are unsafe to eat.

The EPA proposed an interim plan to address some of the contamination while it develops a cleanup plan for the entire site. Agency staff are now reviewing public comments on the proposal.

The agency is planning to implement adaptive management principles at pilot sites by the end of the year, Molly Block, spokeswoman for the EPA, told Bloomberg Environment in an email.

At the same time, the adaptive management approach could create uncertainty for the parties involved because the entire site isn't necessarily assessed, leaving the potential for hidden contaminants, and because remedies may be more experimental, Cannon, who also was the EPA's general counsel during the Clinton administration, said.

Cook said while there may be some uncertainty, it can be outweighed by the benefits.

“Sometimes you find unexpected things, and they add costs. But other times you learn a better way to do it, and achieve the same environmental result that you’re looking for: protectiveness,” Cook said.

Cannon, the agency, and some companies involved in Superfund sites believe the benefits of the approach exceed the costs of uncertainty.

“I think the regulated industry, as a whole, favors adaptive management, because it allows them to address a problem more quickly, and hopefully, more cost effectively,” Duke K. McCall III, partner at the law firm, Morgan, Lewis & Bockius LLP, in Washington, told Bloomberg Environment. McCall has represented companies involved with Superfund sites.

“There isn’t unanimity in that view,” Gullace said. Some potentially responsible parties, or PRPs, are concerned that the adaptive management approach could prolong the cleanup process.

“As a PRP, you bear some risk that after you’ve spent years and millions of dollars, you have to go back and do some more,” he said.

EPA Administrator Scott Pruitt’s Superfund task force issued a report in July 2017, outlining how the agency would reform the contaminated site cleanup program. The task force’s 42 recommendations focus on administrative ways the agency can ensure accountability, accelerate cleanup, and prepare sites for reuse.

Adaptive management is a theme across several of the recommendations. As part of that plan, the agency’s regional offices are encouraged to take early cleanup actions at sites with immediate risks or the potential for a contaminant to spread.

The EPA’s National Priorities List contains the most contaminated properties in the country, also known as Superfund sites. They include the Gowanus Canal in New York, Portland Harbor in Oregon, and Tar Creek in Oklahoma.

Properties with the EPA’s Superfund designation are eligible to receive federal funds for cleanup, although the agency aims to compel companies responsible for the sites, or third parties, to pay those cleanup bills.

Message

From: Fonseca, Silvina [Fonseca.Silvina@epa.gov]
Sent: 6/28/2018 11:02:59 PM
To: Olson, Bryan [Olson.Bryan@epa.gov]; Prince, John [Prince.John@epa.gov]; Melvin, Karen [Melvin.Karen@epa.gov]; Hill, Franklin [Hill.Franklin@epa.gov]; Ballotti, Doug [ballotti.douglas@epa.gov]; Edlund, Carl [Edlund.Carl@epa.gov]; Peterson, Mary [Peterson.Mary@epa.gov]; Smidinger, Betsy [Smidinger.Betsy@epa.gov]; Manzanilla, Enrique [Manzanilla.Enrique@epa.gov]; Bilbrey, Sheryl [Bilbrey.Sheryl@epa.gov]
CC: Cook, Steven [cook.steven@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Chancellor, Erin [chancellor.erin@epa.gov]; Woolford, James [Woolford.James@epa.gov]; Leonard, Paul [leonard.paul@epa.gov]; Bodine, Susan [bodine.susan@epa.gov]; Mackey, Cyndy [Mackey.Cyndy@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Brooks, Becky [Brooks.Becky@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Worthman, Gary [Worthman.Gary@epa.gov]
Subject: AEL Updates 6.28.2018.docx
Attachments: AEL Updates 6.28.2018.docx

Good evening,

Attached you will find a draft revised AEL. This document is internal and provides status and updates based on discussions with the Administrator and the Regions. This document is not the document that will be released to public on the next AEL update. Please review and revise, as needed and based on current activities. Additionally, since there are several sites that are being considered to be taken off the AEL we recommend that you start to consider potential sites to be added to the AEL. Those sites will be provided to the Administrator for his consideration and final determination to add to the AEL for the next release. We are happy to discuss with you any site you may be considering prior to making a recommendation to the Administrator.

Please send your revisions, additions and deletions to me by COB, Friday July 6, 2018. If you have any questions please let me know.

Thank you!

Silvina Fonseca
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Desk: 202.564.1955
Cell: 202.306.6844

Message

From: Edlund, Carl [Edlund.Carl@epa.gov]
Sent: 6/28/2018 4:54:01 PM
To: Falvo, Nicholas [falvo.nicholas@epa.gov]
Subject: RE: Visitable Sites

There were 14 NPL sites located in Houston that Pruitt saw from the air when he visited the San Jacinto site. We also gave him a windshield tour of a half dozen Oklahoma City NPL sites last week. Tar Creek could be approached by flying in to Joplin Missouri.

Other visible sites tend to be a bit more remote [e.g. Chevron Questa former molybdenum mine, Jackpile open pit uranium mine on the Laguna Pueblo, Grants mining district with over 90 large abandoned uranium mines……]

Is he interested in Brownfield sites? E.G. in Dallas, he $200,000 brownfield grant led to the American Airlines Center and Victory Park community now valued at $3.5 billion. The cleanup of the RSR smelter in West Dallas resulted in redevelopment of a depressed neighborhood. Ok. City and Little Rock have lots of Brownfields successes.

From: Falvo, Nicholas
Sent: Tuesday, June 26, 2018 1:35 PM
To: Olson, Bryan <Olson.Bryan@epa.gov>; Melvin, Karen <Melvin.Karen@epa.gov>; Hill, Franklin <Hill.Franklin@epa.gov>; Ballotti, Doug <ballotti.douglas@epa.gov>; Bilbrey, Sheryl <Bilbrey.Sheryl@epa.gov>; Edlund, Carl <Edlund.Carl@epa.gov>; Smidinger, Betsy <Smidinger.Betsy@epa.gov>; Manzanilla, Enrique <Manzanilla.Enrique@epa.gov>; Peterson, Mary <Peterson.Mary@epa.gov>
Subject: Visitable Sites

All –
I'm trying to gather a list of sites the Administrator/Deputy Administrator/AA/DAA could possibly visit. Typically we'd be looking for something that's close to an airport (45 minutes or so) and something tangible to see (no ground water plumes). I've already mapped out the sites on the AEL and redevelopment list.
You may have received a similar request from Erin a while back, this is the same request.

Thanks
Nick

Nicholas Falvo
Environmental Protection Agency
Office of the Administrator
Falvo.Nicholas@epa.gov
Office: (202) 564-5075
Cell: (202) 760-0581

To: Grantham, Nancy[Grantham.Nancy@epa.gov]; Falvo, Nicholas[falvo.nicholas@epa.gov]
From: Kelly, Albert
Sent: Thur 10/12/2017 7:40:32 PM
Subject: FW: Google Alert - Superfund

Since this is our release on Shpack, I assume we orchestrated all of the publicity we could muster on this release. Are we getting the releases the proper coverage? Also have we made any headway on celebrating our site reuse?

Albert Kelly

Senior Advisor to the Administrator

1200 Pennsylvania Avenue, NW

Washington, DC 20460

202 306 8830

From: Google Alerts [mailto:googlealerts-noreply@google.com]
Sent: Thursday, October 12, 2017 9:07 AM
To: Kelly, Albert <kelly.albert@epa.gov>
Subject: Google Alert - Superfund

Superfund

Daily update October 12, 2017

NEWS

EPA Vows To Speed Cleanup Of Toxic **Superfund** Sites Despite Funding Drop

Maine Public

An aerial photo showing hills of mining waste known as 'chat' scattered throughout the abandoned lead and zinc mine at the Tar Creek **Superfund** site ...

Flag as irrelevant

Desperate for water, Puerto Rico residents may be drinking from hazardous **Superfund** sites

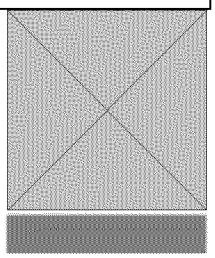
MyPalmBeachPost (blog)

The U.S. Environmental Protection Agency said Wednesday desperate Puerto Ricans may be drinking from

hazardous "**Superfund**" sites on the ...

US warns Puerto Rico against tapping water at toxic waste sites - Reuters

Full Coverage
Flag as irrelevant



EPA approves $115 million plan to clean **Superfund** site

KTRK-TV

Decades of burying what's described as one of the world's most toxic substances along the San Jacinto River put the area on the EPA's **Superfund** list ...

EPA OKs plan to rid toxics from waste pits - Houston Chronicle

EPA announces $115 million cleanup for Houston site - Fresno Bee

EPA approves plan to remove San Jacinto Waste pits from river - Chron.com

Full Coverage
Flag as irrelevant

EPA delays signing Portland **Superfund** agreement

KOIN.com

PORTLAND, Ore. (PORTLAND TRIBUNE) — The U.S. Environmental Protection Agency will delay signing a controversial agreement with a number of ...
Flag as irrelevant

EPA Removes the Shpack Landfill Site from the National Priorities List

U.S. EPA.gov (press release)

BOSTON - The U.S. Environmental Protection Agency has removed the Shpack Landfill, a **superfund** site located in Attleboro and Norton, Mass., from ...
Flag as irrelevant

ASX stalls as **super funds** hoard cash: Citi

InvestorDaily

Foreign investors and superannuation funds recorded reduced inflows over the first half of 2017, and large inflows into **super funds** as a result of ...
Flag as irrelevant

Underperforming **super funds** drop 18% in 2017

InvestorDaily

The number of consistently underperforming superannuation and managed funds in Australia has fallen to 521 this year, down from 638 in 2016, says ...

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Rensselaer County law would set limit on chemical discharge in water

Albany Times Union

The effort is a result of a push by town of Nassau officials and residents to protect water around the Dewey Loeffel Landfill **Superfund** Site.

Flag as irrelevant

As Puerto Rico Struggles With Lack of Drinking Water, Residents Turn to Toxic Waste Sites

TIME

Superfund sites are areas contaminated by hazardous industrial waste that have been identified by the EPA as candidates for a federal clean-up ...

Flag as irrelevant

Now Trump's Messing with the Willamette River?

The Portland Mercury

... the 17-year struggle to clean up the toxic, 10-mile Portland Harbor **Superfund** site. The agency announced a secretive proposal it had reached with ...

Flag as irrelevant

WEB

EPA's plan to clean up San Jacinto Waste Pits **Superfund** site approved

FOX 26 Houston

The San Jacinto Waste Pits are getting moved after the EPA's plan was approved earlier today.

Flag as irrelevant

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Receive this alert as RSS feed
Send Feedback

Message

From: Gartner, Lois [Gartner.Lois@epa.gov]
Sent: 11/20/2017 4:49:35 PM
To: Kelly, Albert [kelly.albert@epa.gov]; Falvo, Nicholas [falvo.nicholas@epa.gov]; Fonseca, Silvina [Fonseca.Silvina@epa.gov]
CC: Woolford, James [Woolford.James@epa.gov]; Stalcup, Dana [Stalcup.Dana@epa.gov]; Hovis, Jennifer [Hovis.Jennifer@epa.gov]; Adams, Elizabeth [Adams.Elizabeth@epa.gov]; Fitz-James, Schatzi [Fitz-James.Schatzi@epa.gov]; Flaks, Art [Flaks.Art@epa.gov]; Sharon, Jenee [sharon.jenee@epa.gov]; Breen, Barry [Breen.Barry@epa.gov]; Hilosky, Nick [Hilosky.Nick@epa.gov]
Subject: HENC Site "Why" Info
Attachments: HENC Sites with Descriptions_Final 10 31 17.xlsx

Kell, Nick and Silvina:

In late September, the Superfund Remedial and Federal Facilities programs submitted the first "Human Exposure"-related Task Force deliverable to the Administrator's office, which *identified sites where the risk of human exposure is not fully controlled and provided estimated dates for when such risks are expected to be controlled.* In response, you had requested additional information on why each *non-Federal Facility site* was considered "Human Exposure Not Under Control" (HENC). Please find that information for that universe of sites in the attached Excel document, which identifies sites designated as HENC as of the end of the FY 2017 reporting period (114 sites).

More specifically, the attached Excel document provides the following information:

- **Sheet 1 "HENC Sites Brief Descriptions"** provides short descriptions of why these sites are designated HENC as well as the main exposure pathways (e.g., how people could come into contact with contamination) and the main Contaminants of Concern. * Indicates site is proposed for the Administrator's Emphasis List, as of 10/30/2017.
- **Sheet 2 "HENC Sites Full Descriptions"** provides more detailed explanations of why the sites are designated HENC. Blue text highlights what actions are being taken at the site to address it. * Indicates site is proposed for the Administrator's Emphasis List, as of 10/30/2017.
- **Sheet 3 "No. HENC Sites Per Region"** provides an overview of the total sites per EPA region with a breakout of HENC vs. HEID and HEUC sites with percentages.
- **Sheet 4 "No. HENC Sites Per State"** displays the number of HENC sites in each state or territory.
- **Sheet 5 "Main Exposure Pathways"** provides an overview of the main types of human exposure pathways present at sites. Each HENC site many have multiple types of exposure pathways.

Please note that the "Human Exposure" environmental indicator is a program measure that denotes a sitewide accomplishment. Site determinations can change over time as conditions across portions of a site change. For example, a site can shift from "Human Exposure Under Control" to either of the other indications of "Human Exposure Not Under Control (HENC)" or "Human Exposure Insufficient Data (HEID)." The change often occurs when a previously unknown exposure pathway (i.e., vapor intrusion) or contaminant (i.e., lead, PFAS, etc.) is discovered and a reasonable expectation exists that people could be exposed. Furthermore, the estimated dates when exposure is anticipated to be controlled are subject to change as site information becomes available.

We apologize for not sending this information forward sooner; we thought that we had and then realized it had fallen through the cracks. Please don't hesitate to let us know if you have any questions.

Thank you-

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