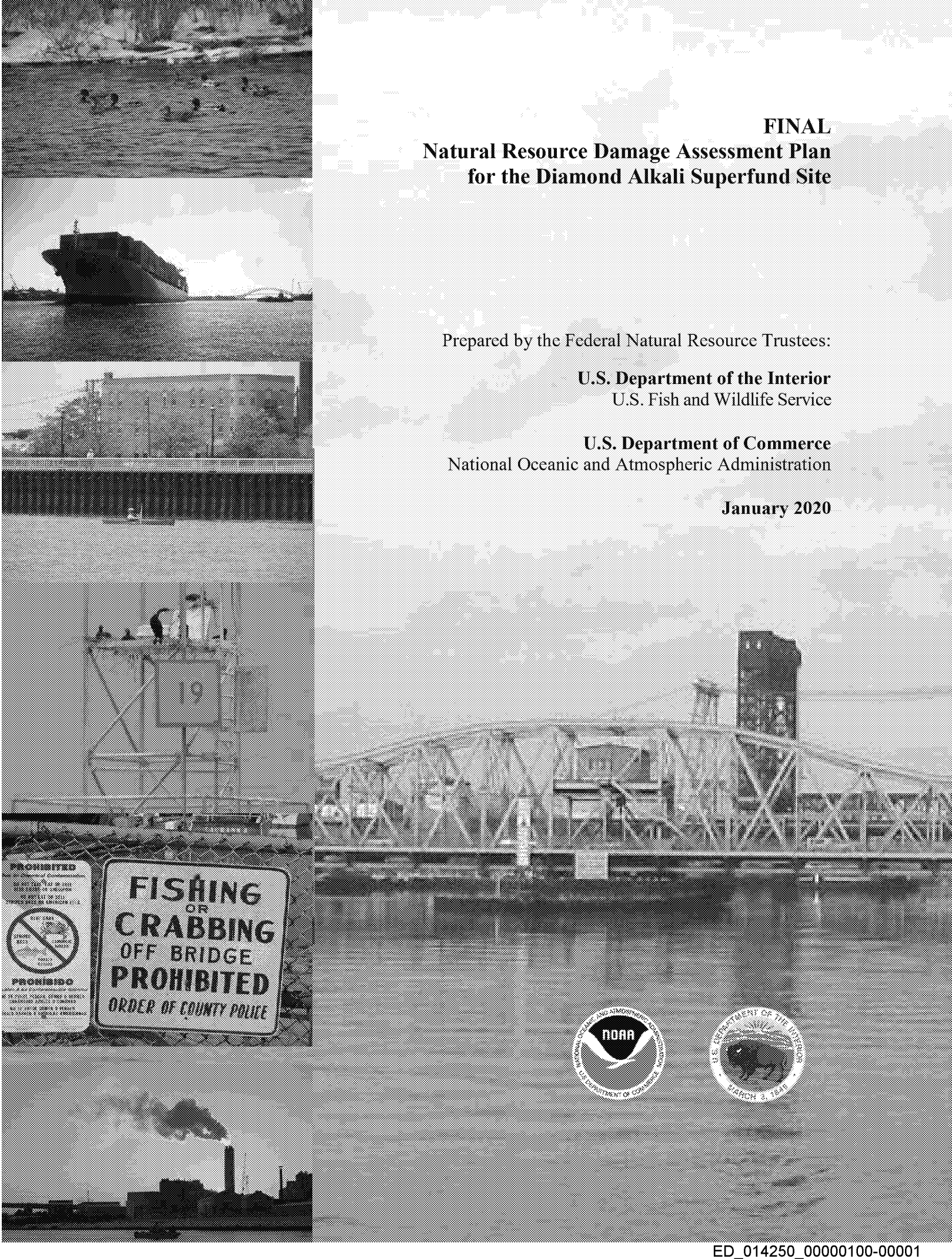

FINAL
Natural Resource Damage Assessment Plan for the Diamond Alkali Superfund Site

Prepared by the Federal Natural Resource Trustees:

U.S. Department of the Interior
U.S. Fish and Wildlife Service

U.S. Department of Commerce
National Oceanic and Atmospheric Administration

January 2020

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This Final Natural Resource Damage Assessment Plan was prepared by the Federal Natural Resource Trustees, consisting of the National Oceanic and Atmospheric Administration (part of the Department of Commerce) and the U.S. Fish and Wildlife Service (part of the Department of the Interior). These Federal Trustees are working cooperatively to conduct a Natural Resource Damage Assessment for the Diamond Alkali Superfund Site. The Natural Resource Damage Assessment Plan is one step in the damage assessment process. It serves to document exposure of natural resources to hazardous substances and identify anticipated procedures for evaluating natural resource injuries potentially caused by such exposure.

Credits:
Cover Photos of Passaic River Courtesy USFWS.

U.S. Department of the Interior Approval

of the

Diamond Alkali Superfund Site
Final Natural Resource Damage Assessment Plan

In accordance with U.S. Department of the Interior policy regarding documentation for natural resource damage assessment and restoration projects (521 DM 3), the Authorized Official for the Department must demonstrate approval of draft and final Assessment Plans with concurrence from the Department's Office of the Solicitor.

The Authorized Official for the Diamond Alkali Natural Resource Damage Assessment case is the Regional Director for the U.S. Fish and Wildlife Service's North Atlantic – Appalachian Region.

By the signatures below, the Final Assessment Plan (AP) is hereby approved.

Approved:

1/21/2020

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Concurred:

1/13/2020

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List of Acronyms

BCNH	Black crowned night heron
BMF	Biomagnification factor
CBR	Critical body residue
CB	Chlorinated biphenyl
CDD	Chlorinated dibenzo-*p*-dioxin
CDF	Chlorinated dibenzofuran
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
DCC	Double crested cormorant
DIVER	Data Integration, Visualization, Exploration, and Reporting tool
DDT	Dichlorodiphenyltrichloroethane
DOI	United States Department of the Interior
EPA	United States Environmental Protection Agency
FTL	Field Team Leader
HMW	High molecular weight
LC_{50}	50% lethal concentration
LD_{50}	50% lethal dose
LMW	Low molecular weight
LOAEL	Lowest observed adverse effects level
LPRSA	Lower Passaic River Study Area
MOU	Memorandum of Understanding
MPRSA	Marine Protection, Research and Sanctuaries Act
NA	Not applicable/available
NBSA	Newark Bay Study Area
ND	Not detected
NJMC	New Jersey Meadowlands Commission
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No observed adverse effect level
NPL	National Priorities List
NRDA	Natural Resource Damage Assessment
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbons
PAS	Preassessment Screen Determination
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzo-*para*-dioxin
PCDF	Polychlorinated dibenzofuran, or furan
PED	Preliminary Estimate of Damages
PI	Principal Investigator
ppb	Parts per billion
ppm	Parts per million

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pptr	Parts per trillion
PRP	Potentially Responsible Party
PSEG	Public Service Enterprise Group
PVSC	Passaic Valley Sewerage Commission
QA	Quality Assurance
QC	Quality Control
RCDP	Restoration Compensation and Determination Plan
RCRA	Resource Conservation and Recovery Act
REA	Resource Equivalency Analysis
RI/FS	Remedial Investigation/Feasibility Study
TCDD	2,3,7,8-tetrachlorodibenzo-*p*-dioxin
TEF	Toxic equivalency factor
TEQ	Toxic equivalent
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFDA	United States Food and Drug Administration
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization
WQC	Water quality criteria
WQS	Water quality standard
%	Percent

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Introduction

Background

The Diamond Alkali Superfund Site (DASS), the subject of this natural resource damage assessment (NRDA) plan, includes portions of the Passaic River beginning at the lower Passaic River Study Area (LPRSA), which runs 17.4 miles south from the Dundee Dam to the confluence with the Hackensack River, and the Newark Bay Study Area (NBSA), including Newark Bay, the Arthur Kill, the Kill Van Kull, and tidal portions of the Hackensack River. However, these areas incorporate only a portion of the New York Bight Watershed Estuary, which through tidal action, intricately connects the water bodies of the Passaic River to both the Upper and Lower New York Bays and the Hudson River.

Production of pesticides and other chemical products began at 80 Lister Avenue in the 1940s. In the 1950s and 1960s, the Diamond Alkali Company owned and operated the facility, manufacturing agricultural chemicals, including the herbicides used in the defoliant known as "Agent Orange." An unwanted by-product of these manufacturing processes was the extremely toxic chemical 2,3,7,8-tetrachlorodibenzo-*para*-dioxin, (2,3,7,8-TCDD and hereinafter referred to as "TCDD"). TCDD is commonly and interchangeably referred to as "dioxin," although dioxin(s) is actually a general name for a large group of chemical compounds, with similar chemical structures, that induce toxicity via a common mechanism of action, resulting in a common spectrum of biological responses.

In 1983, environmental sampling by the State of New Jersey and the U.S. Environmental Protection Agency (EPA) at and near 80 Lister Avenue, as well as in the river, revealed high levels of TCDD. The site was subsequently listed on the Superfund National Priorities List (NPL) in 1984. TCDD, pesticides and other hazardous substances were found in the soil and groundwater at 80-120 Lister Avenue. TCDD, polychlorinated biphenyls (PCBs), metals, polycyclic aromatic hydrocarbons (PAHs) and pesticides were also found in sediment of the lower Passaic River. Additional sampling revealed DASS-related hazardous substances throughout Newark Bay and its tributaries, the Hackensack River, the Arthur Kill River tidal strait and the Kill Van Kull tidal strait.

The Comprehensive Environmental Response, Compensation and Liability Act[1] (CERCLA) requires the cleanup for released hazardous substances, such as the those related to the DASS, that pose an adverse impact upon human health and/or the environment. CERCLA provides the EPA with comprehensive authority to respond to hazardous substance releases by initiating either response activities financed by the Hazardous Substance Superfund (Superfund), or enforcement actions to force responsible parties to pay for cleanups.

[1] 42 U.S.C. § 9601 *et seq.*

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Furthermore, CERCLA stipulates that "*natural resources*" be restored to the state that they were at before being adversely impacted, or lost due to the release of a hazardous substance. To this end, CERCLA authorizes Natural Resource Trustees, in the instant matter currently designated as the U.S. Department of the Interior (DOI), acting by and through the U.S. Fish and Wildlife Service (USFWS) and the U.S. Department of Commerce, acting by and through the National Oceanic and Atmospheric Administration (NOAA), hereinafter referred to as the "Federal Trustees," to act on behalf of the public for the purpose of preparing an "*injury*" claim to recover "*damages*" from potential responsible parties necessary to restore or replace injured natural resources.

CERCLA and its accompanying regulations[2] define "*natural resources*" or "resources" as land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources managed by or otherwise controlled by the United States, any state or local government, any foreign government, or any Indian Tribe. CERCLA further defines a natural resource "*injury*" as a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance, or exposure to a product of reactions resulting from the discharge of oil or release of a hazardous substance. As used in CERCLA, injury encompasses the phrases injury, destruction, and loss. Whereas, the term "*damages*" refers to the amount of money sought by the natural resource trustee to compensate the public for the injury. The scope of damages under CERCLA includes the cost of restoring injured resources to their baseline condition, compensation for the interim loss of injured resources pending recovery, and the reasonable cost of conducting a NRDA.

NRDA is a process of collecting, compiling, and analyzing information, statistics, or data through prescribed methodologies to determine damages for injuries to natural resources. There is no fixed amount of time for the damage assessment and restoration process to take place. Each case is unique and the amount of time can vary significantly. NRDAs are often quite complex and often take years to complete. As a matter of practice, potential responsible parties (PRP) are invited to participate in the development of assessment and restoration plans.

In order to determine whether to pursue a NRDA for the DASS, the Federal Trustees, prepared a Pre-assessment Screen (PAS)[3], a preliminary investigation using readily-available information to determine if potential injuries to natural resources under their jurisdiction may have occurred as the result of releases of hazardous substances at or from the DASS. Information gathered and presented in the PAS forms the basis of the Federal Trustees' conclusions that the following criteria prescribed by regulation have been met:

1. Releases of hazardous substances have occurred;
2. Natural resources, for which the Federal Trustees may assert trusteeship under CERCLA have been, or likely have been, adversely affected by the releases;

[2] 42 U.S.C. § 9601; 43 C.F.R. § 11.14.
[3] Available at: http://www.darrp.noaa.gov/northeast/passaic/injury.html.

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3. The quantity and concentration of the released hazardous substances are sufficient to potentially cause injury to those natural resources;
4. Data sufficient to pursue an assessment are readily available, or likely to be obtained at a reasonable cost; and,
5. Response actions, if any, carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

Based upon meeting the above five criteria, the Federal Trustees made the determination to perform a NRDA for the DASS. Therefore, this NRDA Plan has been prepared to describe the Federal Trustees' current understanding of the studies necessary to determine and quantify contaminant-related injury to the DASS natural resources and to assess associated service losses.

Since the 2007 release of the draft NRDA Plan for the DASS, the Federal Trustees, in coordination with the EPA, have been compiling analytical datasets collected as part of the DASS Remedial Investigation/Feasibility Study (RI/FS), in order to inform the nature, extent, and design of assessment studies that are focused and cost effective. Many of the RI/FS datasets, among others, are accessible to the public via NOAA's Data Integration, Visualization, Exploration, and Reporting (DIVER) tool (www.diver.orr.noaa.gov). Much of the data summarized in Exhibits in Chapter 2 was mined from DIVER. Additional data gleaned will inform and can supplement specific step-down studies in the future. The addition of these data support the Federal Trustees' decision to issue the Final Assessment Plan.

NRDA Plan: Purpose and Need

The purpose of this NRDA Plan is to guide the Federal Trustees toward restoration of natural resources injured as a result of hazardous substance releases into the environment. In partnership with the affected state(s) and other federal agencies, the Federal Trustees will conduct a damage assessment that is the first step toward natural resource restoration. The damage assessment will be used to provide the basis for determining restoration needs that address the public's loss and use of natural resources.

The need for the NRDA Plan is to ensure that the NRDA is done in a systematic manner and at a reasonable cost, as well as to encourage the involvement of other interested parties, including PRPs and the public.

NRDA Plan Organization

This NRDA Plan presents an array of potential studies to identify the scope and scale of injury and service losses to natural resources. Ultimately, these studies are intended to help the Federal Trustees select the appropriate scope and scale of restoration projects that will restore site natural resources to their baseline condition. Baseline condition is a condition in which the injured natural resources provides all of the services that would have been provided absent natural resource injury.

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Chapter 1: Ecological, Cultural, Economic Significance of the DASS.

This chapter presents a general overview of the locality, history, natural resources, commerce and industry, and recreational uses in the vicinity of the DASS.

Chapter 2: Hazardous Substances in the DASS.

This chapter presents information on the nature and extent of the various hazardous substances considered as part of this NRDA Plan. Information in this NRDA Plan documents exposure of natural resources such as biota (fish, birds, and benthic invertebrates) and surface water (including sediments) to hazardous substances within the DASS. The list of hazardous substances contemplated in this NRDA Plan is not intended to be an exhaustive inventory of every hazardous substance likely or known to occur in the DASS. Nevertheless, a vast and growing body of creditable, peer-reviewed scientific evidence exists that refines and focuses the Federal Trustees' attention to a list of hazardous substances of concern that, in addition to driving fish, shellfish, and waterfowl consumption advisories, can cause serious injuries to wildlife and other natural resources. As will be discussed in Chapter 2, hazardous substances include, but are not limited to, TCDD, PCBs, pesticides, PAHs, and heavy metals such as mercury.

Chapter 3: Role of the Federal Trustees and the NRDA Process.

This chapter introduces the Federal Trustees' role in the NRDA process. In addition, Chapter 3 presents an overview of the various steps in the NRDA process, including how to determine whether a NRDA is warranted, how to determine that injuries to natural resources occurred, how to quantify injuries to natural resources, how to identify the type and quantity of restoration required to compensate the public for those injuries, and what procedures may be used for planning projects to accomplish restoration goals. This chapter also briefly discusses Federal Trustee coordination with other government agencies and PRPs, and public participation in the NRDA process.

Chapter 4: Injury Assessment, Damage Quantification, and a Path to Restoration.

This chapter focuses on studies to be undertaken as part of the injury determination and quantification, and damage quantification phases of the assessment. The Federal Trustees may make modifications to this NRDA Plan over time to reflect new information and/or analyses as they become available. The Federal Trustees will develop and post future assessment planning documents, which will provide more technical details for particular studies, such as detailed sampling and analysis plans and statistical approaches. The implementation of studies generally described in this NRDA Plan, and to be described in study-specific work plans, will ultimately result in the identification and quantification of injury to natural resources resulting from hazardous substances released from the DASS. The identified studies fall generally within four categories as follows.

1) **Use of existing data to identify potential injury to site resources.**
   Since 1983 a tremendous volume of environmental data has been collected at the DASS, as well as from adjacent lands and waterways. These data present a valuable source of information on the past and recent condition of DASS natural resources, and they will be used, to the extent possible, to help evaluate occurrence and magnitude of potential injury to natural resources. Studies that

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may be undertaken in this regard include, for example, the comparison of existing data measuring concentrations of contaminants in various media to selected injury thresholds, and a compilation of the results of toxicity testing that has been conducted on-site for non-assessment purposes.[4]

2) **Collection of new data to determine injury to site resources, including changes in natural resource services.**
Preliminary analysis of existing site data indicates that those data alone will not be sufficient to characterize contamination and injury to site resources. For example, sampling of sediment has largely been collected for specific purposes, potentially limiting its utility for natural resource damage assessment. In addition, comparison of existing data to published thresholds may not, in itself, be enough to demonstrate injury.[5] Collection of new data, that may fill existing gaps, will represent a significant proportion of studies conducted under this injury assessment.

3) **Use of existing or newly collected data to identify pathways of exposure of DASS natural resources to hazardous releases.**
The fate and transport processes causally link source and release of hazardous substances with the resultant environmental concentrations through which natural resources can be injured. For some contaminants, however, upstream or otherwise off-site sources may be contributing to the contamination identified in site resources. Examination of existing data and collection of additional data, as warranted, will focus on demonstrating a causal link between on-site activities and observed contamination. Fate and transport studies involve the movement of hazardous substance from the abiotic compartment (*e.g.,* soils, sediments, water) into the biotic compartment (*e.g.,* food chain, fish or bird eggs, organs of toxicological relevance).

4) **Use of existing or newly collected data to quantify injury to DASS natural resources, including changes in natural resource services.**
Determination that the release has occurred does not provide sufficient information to allow for the selection and scaling of restoration projects needed to restore the resources and services to their baseline condition. Once injury is identified, the trustees must evaluate the scope and scale of the injury, as well as the degree of natural resource service loss. These studies will evaluate the type of injury that has occurred, and quantify that injury, providing information so that restoration may be selected and scaled appropriately.

As discussed in Chapter 4, to determine and quantify injury, as well as understand exposure pathways, the Federal Trustees are planning to investigate:

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[4] An "injury threshold" is a concentration of contaminant found in a given media type or resource which has been demonstrated (*e.g.*, in peer-reviewed scientific literature) to cause a "…measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource" (43 CFR § 11.14(v)).

[5] An exception may be in the case where the published threshold is based on a site-specific study.

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- Fish, shellfish, and bird consumption advisories;
- Biological injuries to fish and shellfish – preliminary evaluation(s), fish and shellfish community health studies, early life stage evaluation;
- Exceedances of United States Food and Drug Administration (USFDA) thresholds for fish, shellfish and birds;
- Biological injuries to birds – preliminary evaluation(s), breeding bird surveys, avian developmental studies, floodplain exposure studies;
- Injuries to surface water;
- Injuries to sediment;
- Injuries to geologic resources;
- Injuries to air resources;
- Sources of hazardous substances within the DASS; and
- Exposure pathways – soil, sediment, air, water, food web, floodplain

Using the results of the injury determination and quantification studies, the Federal Trustees will perform a damage determination, through which the compensable value for injured natural resources and services will be derived. The costs of restoring, rehabilitating, replacing, and/or acquiring the equivalent of the injured resources are the basic measure of damages. However, these costs are only one component of the damages that trustees may assess. Trustees also have the discretion to assess the value of the compensatory services that the public lost from the date of the release of the hazardous substance or the enactment of CERCLA[6] (whichever is later), until completion of restoration, rehabilitation, replacement, and/or acquisition of equivalent resources.

Potential investigations for the damage determination phase of the NRDA for the DASS include the following:

- Recreational fishing lost use study
- Avian lost use study
- Resource equivalency analysis
- Lost navigational services study

The NRDA regulations state that a Restoration Compensation and Determination Plan (RCDP) shall be part of the NRDA Plan[7]. The RCDP is a document that lists a reasonable number of possible alternatives for restoration, rehabilitation, replacement, and/or acquisition of equivalent resources, and their related services. The RCDP selects one or more of the alternatives, and provides a rationale for the alternatives. The NRDA regulations, however, allow the Federal Trustees to defer development and public release of a RCDP until after completion of injury determination or quantification phases if existing data are not sufficient to develop a RCDP at the time that the overall assessment plan is released. The Federal Trustees believe there is insufficient information to complete a RCDP at this time, and have chosen development a RCDP later in the NRDA process.

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[6] CERCLA enacted December 11, 1980

[7] 43 CFR § 11.81(d)(1)

Although the various phases and steps of the NRDA process are set forth as a sequential process within the NRDA regulations, in practice, evaluations for different natural resources may occur at different rates. The Federal Trustees may choose to proceed through the steps in a sequential order for some injury categories. However, for others, the availability of existing information or the ability to establish reasonable assumptions may allow the Federal Trustees to take an alternative and scientifically sound approach to establish the scale and scope of required restoration.

At the conclusion of the damage assessment, the Federal Trustees will issue a Report of Assessment documenting the studies undertaken as part of the NRDA, the conclusions of those studies, and the proposed restoration and compensation plan, along with public comments and responses to those comments for each document prepared during the damage assessment process. The Report of Assessment will be released to the public.

In addition, the Federal Trustees may identify early restoration opportunities, for example, opportunities to commence a restoration project before the earlier phases of the assessment are complete. Because these opportunities may be short-lived in duration, the Federal Trustees may agree to pursue them, and to estimate restoration credits for subsequent projects that could eventually be used to offset the totality of environmental liabilities.

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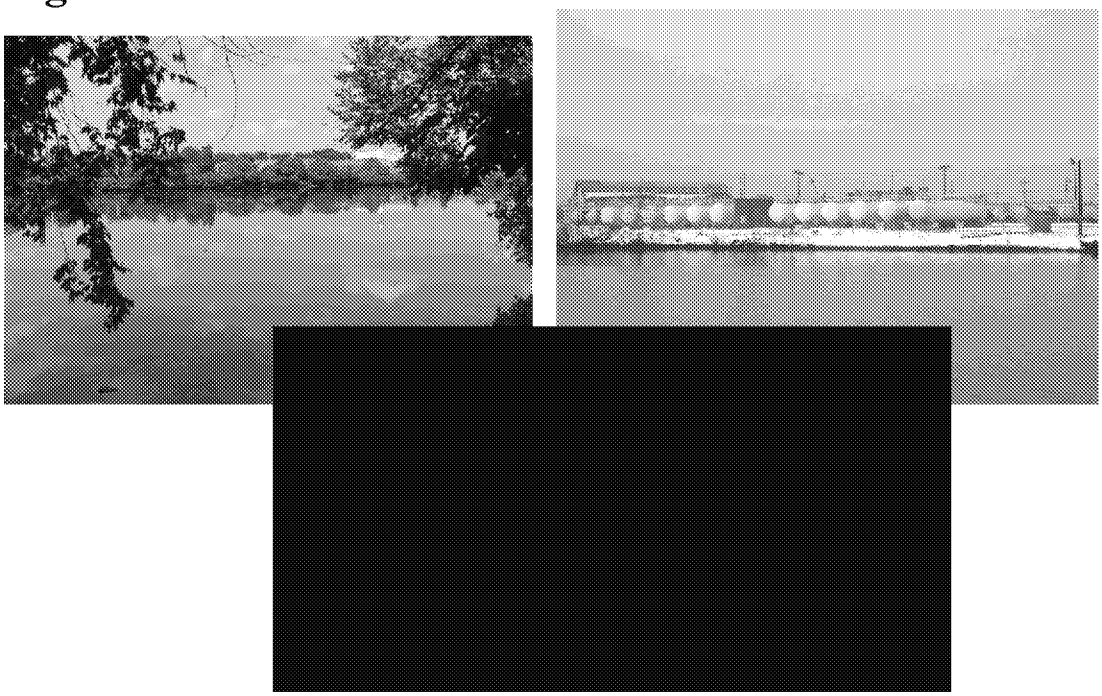
Chapter 1 : The Ecological, Cultural, and Economic Significance of the DASS



The Passaic River. Photos Courtesy Malcolm Pirnie, Inc. and EPA.

The Passaic River drains a watershed of 935 square miles. It begins in the hilly, wooded regions of northern New Jersey, flows through the meadows and bogs of the Central Basin, passes through the gorge at Little Falls, and finally enters the suburban and industrialized areas of the Lower Valley. At the port city of Newark, the Passaic empties into Newark Bay, one of the major water bodies of the New York/New Jersey Harbor (Exhibit 1-1).

The DASS was listed on the National Priorities List on September 21, 1984. As defined by EPA, the DASS consists of "...the former Diamond Alkali facility at 80-120 Lister Avenue in Newark, New Jersey, the Lower Passaic River Study Area (LPRSA), the Newark Bay Study Area and the areal extent of contamination."[8] The LPRSA is "...the 17-mile, tidal portion of the Passaic River, from RM [River Mile] 0 to Dundee Dam (RM 17.4), and its watershed, including the Saddle River (RM 15.6), Third River (RM 11.3) and Second River (RM 8.1)." The EPA has divided the DASS into four "operable units" (OUs):

- OU1, the former site of the Lister Avenue Plant
- OU2, the lower 8.3 miles of the Passaic River (the "Lower 8.3 Miles")
- OU3, the 17-mile LPRSA
- OU4, Newark Bay and portions of the Hackensack River, Arthur Kill, and Kill van Kull.

[8] EPA 2016

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Collectively, the four OUs incorporate only a portion of the New York Bight Watershed Estuary, which through tidal action intricately connects the water bodies of the DASS to both the Upper and Lower New York Bays and the Hudson River.

The LPRSA watershed includes the northeastern New Jersey counties of Bergen, Essex, Hudson, and Passaic. Most of the area is developed, with these counties having a combined population in 2018 of approximately 3 million people (U.S. Census Bureau 2018). Land use in the watershed is a mix of residential, commercial, and industrial. Intensive commercial and industrial uses occur near Newark Bay, which is in proximity to an extensive infrastructure of roadway, railway, and marine transportation services.

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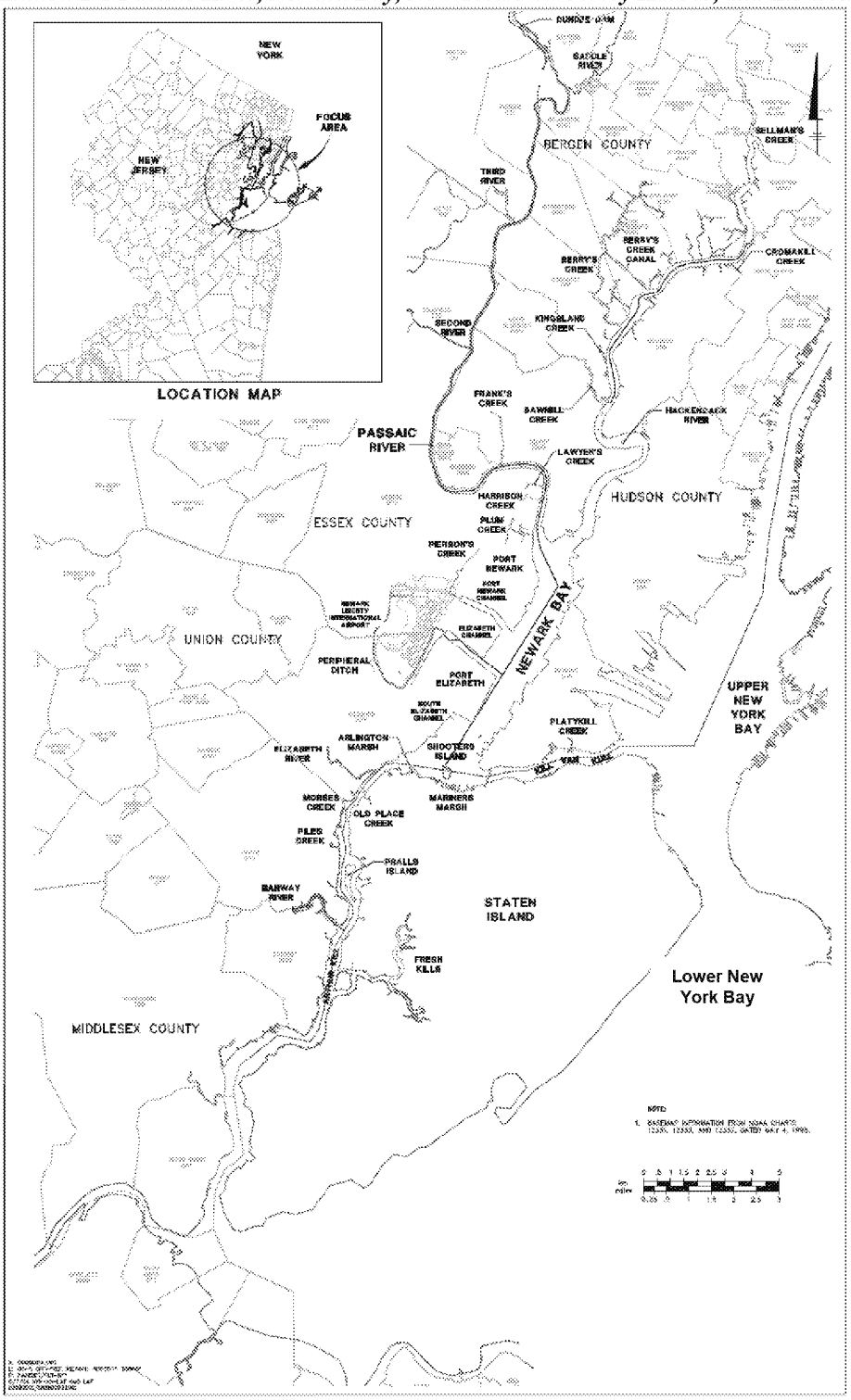
Exhibit 1-1 Passaic River, Newark Bay, New York/New Jersey Harbor, and Environs



Environments adjacent and within the DASS include a mixture of urbanized and degraded natural environments. The salt marshes of the New Jersey Meadowlands border the Hackensack River for about seven miles from just north of Newark Bay up to the confluence with the Overpeck Creek. Further north, the Hackensack is surrounded by suburban developed land up to the Oradell Dam. The Arthur Kill and Kill Van Kull, important shipping channels in the New York/New Jersey Harbor, border Staten Island on the west and north, respectively, separating the island from mainland New Jersey. The channels are surrounded by a mixture of industrial and commercial facilities, urban parks, and residential neighborhoods. Newark Bay is an urban estuary about six miles long, fed by fresh water entering from the Passaic and Hackensack Rivers at the north end and by salt water entering from the Arthur Kill and Kill Van Kull tidal straits from the south.

The Natural Environment of the DASS

Despite significant urban development in the surrounding watershed, the DASS supports an array of ecological resources that interact in a myriad of ways. While most of the shoreline habitats are degraded and vegetation is scarce, the DASS still contains an estimated 45 acres of wetlands (USACE New York District, EPA Region II, and NJDOT Office of Maritime Resources 2003). These habitats are characterized primarily by emergent vegetation including common reed (*Phragmites australis*) and smooth cordgrass (*Spartina alterniflora*). Other important natural environments include benthic habitat and small areas of non-vegetated tidal mudflats. These habitats currently or historically support a variety of benthic invertebrates and aquatic, semi-aquatic, and terrestrial vertebrates including clams, crabs, mussels, turtles, fish, birds, and mammals.

Historical Significance of the DASS

Commerce and industry have a long history in the Passaic River region (Exhibit 1-2). In 1791, Alexander Hamilton founded the Society for Establishing Useful Manufactures at Passaic Falls, in what is now Paterson, New Jersey. It was the nation's first effort to develop manufacturing capabilities to compete with Europe. When foreign supplies were interrupted during the War of 1812, manufacturing in the region grew. By the Civil War, an array of products, from locomotives to hats and shoes, were streaming out of the Passaic River valley. The Port of Newark opened in the early 20th century and Newark Bay, together with the nearby ocean channels, became a major center of transportation and commerce.

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Exhibit 1-2 Selected Events in the Recorded History of the DASS

1618	Dutch establish trading post in the area now known as Jersey City[1]
1666	British settlers colonize the area now known as Newark[2]
1679	Land tract known by Native Americans as Aquakanonk, which was to be divided later into Passaic and Clifton, purchased by English and Dutch colonists[1]
1792	Establishment of the Society of the Establishing Useful Manufacturers, whose funds would be used to establish Paterson, a planned industrial city powered by the Great Falls of the Passaic[3]
1825	Construction begins on Morris Canal, to run from Phillipsburg, on the Delaware River, to the Passaic River near Newark[1]
1836	Morris Canal extended to Jersey City[1]
1836	Newark Township given City status[4]
1845	Construction begins on Dundee dam[5]
1869	Front Street Gas Works, a manufactured gas plant, begins operation in Newark[6]
1873	Town of Passaic incorporated[1]
1889	Botany Mills factory built in Clifton; employs 6000 workers[1]
1894	Manhattan Rubber factory built in Clifton; employs 3000 workers[1]
1894	Acid fumes from Passaic River causes the paint on houses along the River to peel[7]
1896	State investigating commission created to undertake a comprehensive study of conditions in the Passaic River[7]
1897	Jersey City abandons use of Passaic River as a public water supply due to poor water quality[7]
1899	City of Newark abandons use of Passaic River as a public water supply[7]
1899	State Sewerage Commission established to protect all potable waters in the State of New Jersey[7]
1901	U.S. Quarantine Station built in Clifton[1]
1902	Passaic Valley Sewerage Commissioners created[8]
1908	Largest silk mill in U.S., the Henry Doherty Silk Company, built in Clifton; employs 1000 workers[1]
1912	Paterson Hydroelectric facility installed[5]
1915	Port Newark opens[4]
1922	By this time, nearly 1,000 industrial firms are located in Newark; primary industries include clothing and jewelry manufacturers, printing and publishing, foundry products, and leather goods[9]
1924	Morris Canal drained after expanding railroad routes make it obsolete[1]
1924	Passaic Valley trunk sewer line completed; carried sewage directly from towns along the Passaic River to New York Harbor[7]
1928	Newark Airport opens[4]
1935	Subway opens in bed of former Morris Canal in Newark[4]
Mid 1940s	Manufacturing of pesticides and phenoxy herbicides begins at 80 Lister Avenue property[10]
1951	First leg of New Jersey Turnpike opens[6]
1951	Diamond Alkali Co. acquires plant at 80 Lister Avenue and begins production of 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) and other herbicides[11]
1960	Explosion at Diamond Alkali Plant releases hazardous substances into soils, sediments, and groundwater near the DASS[11]
1965	Massive fish kill occurs, attributed to low dissolved oxygen concentrations[7]
1969	Passaic River Coalition is created[7]
1982	First fish consumption advisories for Passaic River issued by the State of New Jersey[12,13]
1983	Sampling at Diamond Alkali Plant and surrounding Passaic River shows high levels of dioxin[11]
1984	Diamond Alkali Superfund Site listed on the National Priorities List (NPL) [12]
1998	Passaic River named one of nation's Most Endangered Rivers[14]
2001	Interim remedy implemented at 80-120 Lister Avenue completed[15]
2003	Passaic River selected for a pilot project under the Urban River Restoration Initiative [16]
2012	Dredging of hot spot dioxin sediment contamination in Passaic River adjacent to 80-120 Lister Avenue facility.[15]

2013-14	Dredging and capping of removal area at RM10.9 in the Lyndburst section of the Passaic River.[15]
2016	EPA issues Record of Decision[17] for the Lower 8.3 miles of the Lower Passaic River that included bank to bank dredging (approximately 3.5 million cubic yards) to a depth of about 2.5 feet to accommodate an engineered cap covering the lower 8.3 miles. Remedy also includes institutional controls and long-term monitoring.

Sources:
[1] City of Clifton and Passaic River Coalition (2003).
[2] Newark Water and Sewer (Not Dated).
[3] Walt (2002).
[4] City of Newark, New Jersey (2006).
[5] Passaic Valley Water Commission (2005).
[6] PSEG (2007).
[7] Brydon (1974).
[8] PVSC (2007).
[9] Merchants Association of Newark (1922).
[10] EPA (2006a).
[11] EPA (2006b).
[12] EPA (1987).
[13] Hauge *et al.,* (1990).
[14] American Rivers (1998).
[15] EPA 2018 (https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0200613)
[16] Rothman (2003).
[17] EPA (2016)

Due to urbanization and heavy industrial use in the area, the natural environment of the DASS began to suffer as sewage and hazardous substances were released into the waterways. Past studies of the Lower Passaic River report the presence of fish and benthic organisms known to be highly tolerant of pollution or low dissolved oxygen conditions, indicating the presence of a stressed aquatic system (Chang *et al.,* 2000; Friedmann and Hamilton 1980; Santoro *et al.,* 1980). Depressed dissolved oxygen levels have been a chronic problem in the New York/New Jersey Harbor Estuary and its environs dating back to the early 1900s (Squires 1981). More recent studies indicate that sediment and water quality pollution control measures, along with the reduction or control of certain other environmental stressors, have marginally improved some measures of ecosystem quality. Hazardous substances however, continue to impair the ecological integrity of the DASS ecosystem. For example, TCDD concentrations in Passaic River fish and crabs are among the highest reported in the world (NJDEP 2005a). For this reason, American Rivers (1998), a Washington, D.C.-based conservation group, listed the Passaic among America's twenty "Most Endangered Rivers" in 1998 (American Rivers 1998). The annual list designates rivers that are environmentally at risk from threats such as pollution, damming, draining, and toxic waste. The Passaic River was selected based on its levels of hazardous substances, principally dioxin, which poses a risk to fish, wildlife, and human health (Traster 1998).

Commerce and Industry within the DASS Today

The Port of New York/New Jersey remains one of the major commercial hubs of the east coast. The waterways in this area lie at the heart of an industrial region, stretching from New York City to Plainfield, New Jersey. These waterways serve as a distribution and wholesale center for the mid-Atlantic region. Local industries include petroleum refining, tanneries, textiles, paints and dyes, pharmaceuticals, chemicals, and paper products. Today, the manufacturing sector is surpassed by services such as transportation, research and development, education, and health care.

The combined Port Newark/Elizabeth Marine Terminal forms the largest maritime cargo handling facility on the east coast of North America. Located on the western shore of Newark Bay and operated by the Port Authority of New York and New Jersey, the integrated complex covers 2,100 acres and includes major container handling terminals, automobile processing and storage facilities, warehousing and distribution buildings, trucking firms, and an on-dock rail terminal (National Museum of American History 2007). This port handles more than 85 million tons of bulk and general cargo and thousands of ships annually (The Port Authority of New York and New Jersey 2006, 2007). In 2015, The Port Authority of New York and New Jersey facilitated the movement of approximately 6.4 million twenty-foot equivalent units, (TEU)[9], an increase of over 10 percent (%) from 2014 (USACE 2019).

Dredging of navigation channels, essential to the Port's operations, is hindered by contamination of sediments in Newark Bay and associated restrictions regarding disposal of dredge materials. As part of the NRDA, the Federal Trustees may make a

[9] One TEU is the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks.

determination of the extent to which the marine transportation sector is adversely affected by chemical contamination.

Recreational Use within the DASS

Urban waterways have the potential to support a variety of recreational activities that contribute to public value and enhance the civic environment. With its miles of channels and open waters in close proximity to large urban populations, the DASS ecosystem can and should provide important resources for recreational enjoyment, including but not limited to, access to open space, recreational boating, and recreational fishing.

Access to Open Space

While industrial development can diminish some of the amenities a public waterway can provide, natural resources and their services within urban environments can also be enhanced for the public's use and benefit. For example, judicious urban planning can take advantage of a river's meandering channel or unobstructed view to mitigate the density of an urban setting. A number of public parks are located along the banks of the Newark Bay and adjacent waterways, including the waterfront parks in Perth Amboy on the Arthur Kill, the 16th Street Park in Bayonne on Newark Bay, and public parks in Passaic, Wallington, Clifton, Rutherford, East Rutherford, Lyndhurst, North Arlington, Kearny, and Newark along the Passaic River. Many of these parks are primarily ball fields and playgrounds, but some locations in the Newark Bay area, such as the Hackensack River County Park, offer access to open space amenities including hiking trails and bird watching. Additionally, the town of Clifton recently purchased the eastern portion of Dundee Island, which will be maintained as a wildlife sanctuary, enhancing opportunities for wildlife viewing and photography.

Recreational Boating

There is a long tradition of rowing on the Passaic River, beginning with regattas held annually in the late 1800s. That tradition survives in the form of the Passaic River Rowing Association and the Nereid Boat Club, along with several high school rowing programs, all based on the Passaic River. These organizations sponsor regular rowing practice and events on the Passaic River and elsewhere, and promote stewardship of the Passaic River environment. Other types of recreational boating occur throughout the DASS. The Hackensack River provides access to areas of the New Jersey Meadowlands that are undeveloped and relatively pristine in appearance. Municipal marinas, boat ramps, or private yacht clubs are located on all five waterways of the DASS, though in many areas there is demand for additional publicly available boating facilities.

Recreational Fishing and Crabbing

Fish advisories were first issued for the lower Passaic River in 1982 for striped bass, American eel, bluefish, white perch and white catfish due to PCB contamination. A prohibition on the sale of striped bass and American eel from the lower Passaic River was also issued at that time. Extremely high concentrations of dioxin within the DASS led the New Jersey Department of Environmental Protection (NJDEP) to issue an administrative order in 1983 prohibiting the consumption and sale of all fish and shellfish from the Passaic River from its mouth to Dundee Dam and advising against consumption of any

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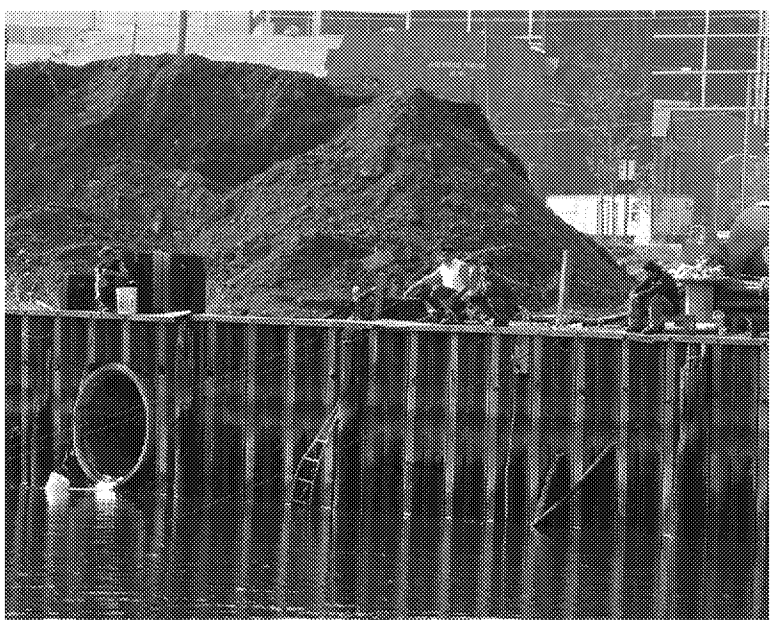
fish or shellfish from Newark Bay, the Hackensack River upstream to the Oradell Dam, the Arthur Kill, and the Kill Van Kull (NJ Administrative Order EO-40-17). In 1984, the sale or consumption of striped bass and blue crabs from Newark Bay, the Arthur Kill, the Kill Van Kull, and the tidal Hackensack River were prohibited as well (NJ Administrative Order EO-40-19) (Hauge *et al.,* 1990). Additionally, a ban on crab harvest ("no take") has been applied to crabs in the lower Passaic River and the Newark Bay Complex since 1994. In fact, the NJDEP stated that the calculated magnitude of cancer risk from consuming blue crabs from the DASS was "one of the highest encountered by the NJDEP in any context" (NJDEP 2002a). In 2003, advisories were modified to reflect the potential cancer risk and became more stringent for some species. New York has issued a series of similar advisories since 1985 for the Arthur Kill, Kill Van Kull, and Newark Bay. These have included "once a month" and "do not eat" advisories for up to fourteen species at various times.

While consumption of fish is banned on the Passaic River due to contamination, impacting the nature and extent of recreational angling, some recreational angling still occurs there. More significant fishing activity occurs in other areas of the DASS, where fish consumption advisories are in place but regulations are less restrictive. The waters of the DASS offer easy access to a large urban population, where inexpensive access to alternative options for outdoor activities can be limited. Fishing occurs at bridges, piers, and waterfront parks throughout the DASS, such as at the pier at Veterans Stadium in Bayonne, New Jersey, New Bridge Landing in Bergen, New Jersey, and elsewhere.

In implementation of the Final NRDA Plan, the Federal Trustees may assess the extent to which the public's recreational use is and has been adversely affected by hazardous substance releases or by the remedy.



Fishing along the Passaic River. Photo Courtesy Baykeeper.

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Chapter 2: Hazardous Substances in the DASS

Along the Passaic. Photos Courtesy Malcolm Pirnie, Inc.

Hazardous Substances of Concern

During the past two centuries, the lower Passaic River has suffered from rapidly expanding urban and industrial development. Hazardous substances released from multiple sources throughout the 1900s had a substantial impact on the ecological conditions of the region (Esser 1982; Squires 1981). During the 1980s and 1990s, several investigations were conducted to evaluate the concentrations of various chemicals in sediments within the lower Passaic River. Those investigations indicated that river sediments contain elevated and potentially injurious concentrations of numerous hazardous substances, including, among others, TCDD, PCBs, organochlorine pesticides such as dichlorodiphenyltrichloroethane (DDT), PAHs, and mercury (Exhibit 2-1).

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Exhibit 2-1 Concentrations of Select Hazardous Substances Measured in Sediments of the Lower Passaic River/Newark Bay Study Area, 1990–2016[1]

Waterway	COC	Sample Size	COC Range		Unit	Mean	Std Error
			Min	Max			
Passaic River -- Lower 17.4 to 8.3 miles	TCDD	297	0.02	51,100.00	ng/kg	1,804.41	304.60
Passaic River -- Lower 8.3 miles		478	0.02	34,100.00		10.02	147.68
Hackensack River		84	0.18	2,990.00		1,055.27	36.76
Newark Bay		179	0.95	592.00		69.86	5.13
Arthur Kill		73	0.30	347.00		25.00	6.42
Kill Van Kull		3	5.79	20.20		15.03	4.63
Passaic River -- Lower 17.4 to 8.3 miles	Hg	273	0.02	22.20	mg/kg	2.56	0.25
Passaic River -- Lower 8.3 miles		465	0.04	24.30		2.89	0.11
Hackensack River		429	0.01	21,382.50		101.91	50.20
Newark Bay		199	0.05	1,320.00		46.87	11.83
Arthur Kill		230	0.02	2,300.00		130.84	22.06
Kill Van Kull		3	0.77	7.70		3.99	2.02
Passaic River -- Lower 17.4 to 8.3 miles	tDDT	291	0.07	1,371.10	ug/kg	146.48	13.35
Passaic River -- Lower 8.3 miles		277	0.21	4,002.00		206.50	26.71
Hackensack River		2	13.80	15.30		14.55	0.75
Newark Bay		95	1.62	558.14		66.22	9.17
Arthur Kill		17	11.70	3,740.00		781.99	247.71
Kill Van Kull		3	15.60	464.00		180.47	142.39
Passaic River -- Lower 17.4 to 8.3 miles	tPAH	348	147.72	622,768.00	ug/kg	31,287.09	2,719.58
Passaic River -- Lower 8.3 miles		520	277.40	2,523,200.00		41,205.66	7,116.90
Hackensack River		291	262.50	51,620,000.00		295,568.57	180,628.43
Newark Bay		191	118.10	478,440.00		14,485.78	3,019.07
Arthur Kill		193	81.95	189,514.00		8,448.55	1,548.89
Kill Van Kull		3	6,780.00	20,730.00		12,779.00	4,143.60
Passaic River -- Lower 17.4 to 8.3 miles	tPCB	296	1.25	30,782.26	ug/kg	2,458.25	291.49
Passaic River -- Lower 8.3 miles		482	0.82	28,578.83		1,441.87	139.18
Hackensack River		320	0.18	2,000,000.00		24,122.82	7,800.76
Newark Bay		150	4.53	10,400.00		936.94	126.90
Arthur Kill		193	9.00	5,500.00		344.30	58.17
Kill Van Kull		3	442.09	538.85		498.54	29.08

Notes:

1. Concentrations represented are depth-weighted average of the surficial sediment interval from 0 to 15.24 centimeters below the sediment surface. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit.

COC = contaminant of concern

Std Error = standard error

ng/kg = nanogram per kilogram = parts per trillion

ug/kg = microgram per kilogram = parts per billion

mg/kg = milligram per kilogram = parts per million

TCDD = 2,3,7,8-TCDD (Dioxin)

Hg = mercury

tDDT = calculated total DDTs, total of 6 isomers

tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.

tPCBs = calculated total PCBs.

The chemicals listed in Exhibit 2-1 are environmentally persistent in sediments, degrade relatively slowly, and with the general exception of PAHs, preferentially bioaccumulate and biomagnify in higher trophic levels of the food chain including humans. A brief description of the primary hazardous substances of concern to the Federal Trustees, namely dioxins (including but not limited to TCDD and PCBs), DDT, PAHs and mercury within the DASS follows.

Dioxins, Generally

The term "dioxins" typically refers to a class of related chemicals including the polyhalogenated dibenzo-*p*-dioxins, dibenzofurans, biphenyls, naphthalenes, azo- and azoxy-benzenes (Birmbaum 1994; White and Birmbaum 2010). Although there are hundreds of chemicals in this class, the World Health Organization (WHO) recognizes 7 polychlorinated dibenzo-*p*-dioxins (PCDDs), 10 polychlorinated dibenzofurans (PCDFs), and 12 PCBs as dioxins or dioxin-like compounds (DLCs) because they are stereochemically similar to TCDD and demonstrate the same mode of toxicity (activation of the Aryl hydrocarbon Receptor) as TCDD (van den Berg *et al.,* 2006).

This relative potency of DLCs to TCDD is often calculated as the ratio of the half maximal effective dose (ED_{50}) for TCDD to the ED_{50} for the dioxin or dioxin-like compound of interest. The relative potency concept (expressed as Toxic Equivalency Factors [TEFs]) allows for the quantitative expression of the toxicity of a single chemical in terms of an equivalent concentration of TCDD. In the case of a mixture as is found in the environment or biological tissues, known TEFs for the individual dioxins or DLCs, and their concentrations in the mixture, can be utilized to determine a total toxic equivalency (TEQ) for the mixture. The TEQ is calculated as the sum of the individual products of the TEF and the concentration of each compound (van den Berg *et al.,* 1998; van den Berg *et al.,* 2006; Safe 1998).

The TCDD-TEQ methodology is primarily meant for estimating exposure via diet or oral dose. Therefore, application of TCDD-TEQ methodology for calculating TEQs in abiotic environmental matrices, such as sediments and soils, has limited toxicological relevance (van den Berg *et al.,* 2006). TEFs are most appropriately applied to dioxin concentrations in prey items (*e.g.*, fish or crab) or in the organ or sample of toxicological relevance (*e.g.,* mink liver, fish or bird egg).

As with any risk assessment uncertainties exist relative to data quality and evaluation, strength of biological rationale, and ability to determine whether the assumptions of the method being applied have been met. The TCDD-TEQ methodology has undergone numerous scientific reviews. The WHO completed a review of the TCDD-TEQ methodology in 2005 (van den Berg *et al.,* 2006). In that review they reaffirmed that the TCDD-TEQ approach, pragmatically, remains the most feasible approach for estimating the quantifying exposures (as TCDD-equivalents) to complex mixtures of dioxins and/or DLCs.

In 2004, the EPA asked the National Research Council of the National Academies to review its 2003 draft document titled *Exposure and Human Health Reassessment of*

2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. The National Research Council concluded that: "…even given the inherent uncertainties, the toxic equivalency factor (TEF) method provides a reasonable, scientifically justifiable, and widely accepted method to estimate the relative toxic potency of DLCs on human and animal health" (National Research Council 2006). In 1998, the application of TCDD-TEQ methodology to fish and wildlife was being developed by a joint planning committee of the EPA and DOI for a subsequent workshop. The resultant workshop produced the report entitled: *Workshop Report on the Application of 2,3,7,8-TCDD Toxicity Equivalents Factors to Fish and Wildlife* (EPA 2001). Among other things, the report started filling the data gaps and addressing uncertainties associated with the TCDD-TEQ methodology. In 2010, EPA issued a report entitled: *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds* (EPA 2010). In that report the EPA recommends that the toxicity TCDD-TEQ methodology be used to evaluate human health risks posed by these mixtures. The EPA also recommended the use of the consensus TEF values for TCDD and the DLCs published in 2005 by the WHO.

The Federal Trustees intend to incorporate the TCDD-TEQ methodology into future injury assessment studies as appropriate. The WHO 2005 TEFs (van den Berg, *et al., 2006)* are presented in Exhibit 2-2.

Exhibit 2-2 WHO Toxic Equivalency Factors for Dioxin, Furan, and PCB Congeners

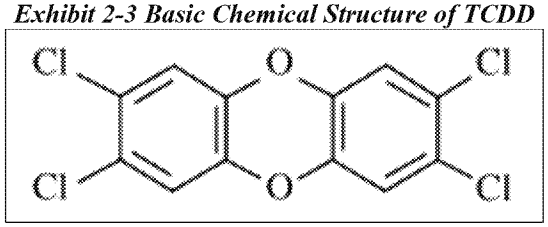
Compound	Fish TEF[1]	Avian TEF[1]	Mammalian TEF[2]
chlorinated dibenzo-p-dioxins			
2,3,7,8-TCDD	1	1	1
1,2,3,7,8-pentaCDD	1	1	1
1,2,3,4,7,8-hexaCDD	0.5	0.05	0.1
1,2,3,6,7,8-hexaCDD	0.01	0.01	0.1
1,2,3,7,8,9-hexaCDD	0.01	0.1	0.1
1,2,3,4,6,7,8-heptaCDD	0.001	<0.001	0.01
OctaCDD	<0.0001	0.0001	0.0003
chlorinated dibenzofurans			
2,3,7,8-TCDF	0.05	1	0.1
1,2,3,7,8-pentaCDF	0.05	0.1	0.03
2,3,4,7,8-pentaCDF	0.5	1	0.3
1,2,3,4,7,8-hexaCDF	0.1	0.1	0.1
1,2,3,6,7,8-hexaCDF	0.1	0.1	0.1
1,2,3,7,8,9-hexaCDF	0.1	0.1	0.1
2,3,4,6,7,8-hexaCDF	0.1	0.1	0.1
1,2,3,4,6,7,8-heptaCDF	0.01	0.01	0.01
1,2,3,6,7,8,9-heptaCDF	0.01	0.01	0.01
OCDF	<0.0001	0.0001	0.0003
non-ortho substituted PCBs			
3,3',4,4'-tetraCB (PCB 77)	0.0005	0.1	0.0001
3,4,4',5-tetraCB (PCB 81)	0.0001	0.05	0.0003
3,3',4,4',5-pentaCB (PCB 126)	0.005	0.1	0.1
3,3',4,4',5,5'-hexaCB (PCB 169)	0.00005	0.001	0.03
mono-ortho substituted PCBs			
2,3,3',4,4'-pentaCB (PCB 105)	<0.000005	0.0001	0.00003
2,3,4,4',5-pentaCB (PCB 114)	<0.000005	0.0001	0.00003
2,3',4,4',5-pentaCB (PCB 118)	<0.000005	0.00001	0.00003
2',3,4,4',5-pentaCB (PCB 123)	<0.000005	0.00001	0.00003
2,3,3',4,4',5-hexaCB (PCB 156)	<0.000005	0.0001	0.00003
2,3,3',4,4',5'-hexaCB (PCB 157)	<0.000005	0.0001	0.00003
2,3',4,4',5,5'-hexaCB (PCB 167)	<0.000005	0.00001	0.00003
2,3,3',4,4',5,5'-heptaCB (PCB 189)	<0.000005	0.00001	0.00003

WHO = World Health Organization
TEF = toxic equivalency factor
CDD = chlorinated dibenzo-*p*-dioxin
CDF = chlorinated dibenzofuran
PCBs = polychlorinated biphenyls
CB = chlorinated biphenyl.
[1]van den Berg *et al.* (1998).
[2] van den Berg *et al.* (2006).

TCDD

The most toxic and studied member of the dioxins is 2,3,7,8-tetrachlorodibenzo-*para*-dioxin, or simply TCDD (Exhibit 2-3). TCDD demonstrates an extremely low single-dose lethality in studied species such as adult guinea pigs (Schwetz *et al.*, 1973) and embryotoxicy in chicken eggs (Higginbotham *et al.*, 1968).

Exhibit 2-3 Basic Chemical Structure of TCDD



The toxic effects of TCDD vary between species and can be manifested in a number of ways including weight loss; abnormalities of the liver and other organs; impaired growth; edema; gastric ulcers; tumor production and carcinogenesis; immunosuppression; impaired endocrine function; birth and developmental defects; and death.

Concentrations of TCDD in biota from the lower Passaic River and Newark Bay have been measured at levels shown to produce harmful effects (Belton *et al.,* 1985; Hauge *et al.,* 1990; Parsons 2003; Rappe *et al.,* 1991; USFWS 2000a,b). Concentrations of TCDD in whole-body fish and shellfish tissue collected from the lower Passaic River/NBSA between 1990 and 2016 are presented in Exhibit 2-4, demonstrating that fish and shellfish have been, and likely continue to be, exposed to TCDD in the lower Passaic River and NBSA.

Exhibit 2-4 Concentrations of TCDD in Whole-body Fish and Shellfish Tissue in the Lower Passaic River/Newark Bay Study Area, 1990–2016[1]

COC	Species	Waterway	Sample Size	COC Range		Mean	Std Error
				Min	Max		
TCDD (ng/kg)	***Fish***						
	American eel	Passaic River -- Lower 17.4 to 8.3 miles	12	0.11	36.00	13.38	4.47
		Passaic River -- Lower 8.3 miles	19	4.53	47.00	19.38	2.63
	Atlantic menhaden	Passaic River -- Lower 8.3 miles	6	25.00	79.10	45.45	10.01
	Atlantic silverside	Passaic River -- Lower 8.3 miles	9	21.40	59.50	40.50	4.01
	Brown bullhead	Passaic River -- Lower 17.4 to 8.3 miles	4	7.80	81.00	49.45	17.18
		Passaic River -- Lower 8.3 miles	3	160.00	190.00	180.00	10.00
	Bluefish	Passaic River -- Lower 8.3 miles	2	37.80	66.70	52.25	14.45
	Channel catfish	Passaic River -- Lower 17.4 to 8.3 miles	11	22.00	160.00	70.09	14.30
	Common carp	Passaic River -- Lower 17.4 to 8.3 miles	9	5.20	640.00	318.13	82.09
		Passaic River -- Lower 8.3 miles	4	260.00	1400.00	630.00	264.35
	Gizzard shad	Passaic River -- Lower 17.4 to 8.3 miles	2	11.00	35.00	23.00	12.00
		Passaic River -- Lower 8.3 miles	1	44.00	44.00	44.00	0.00
	Largemouth bass	Passaic River -- Lower 17.4 to 8.3 miles	3	0.43	180.00	81.81	52.51
	Mummichog	Passaic River -- Lower 17.4 to 8.3 miles	3	28.00	100.00	54.67	22.78
		Passaic River -- Lower 8.3 miles	74	2.00	828.00	66.88	12.88
		Newark Bay study area[2]	46	0.43	57.40	10.20	1.43
	Shiner spp[3]	Passaic River -- Lower 17.4 to 8.3 miles	3	2.40	16.00	11.23	4.42
	Smallmouth bass	Passaic River -- Lower 17.4 to 8.3 miles	2	8.00	76.00	42.00	34.00
	Striped bass	Passaic River -- Lower 8.3 miles	9	4.14	101.00	75.27	9.89
	White catfish	Passaic River -- Lower 17.4 to 8.3 miles	13	20.00	330.00	149.08	26.26
		Passaic River -- Lower 8.3 miles	6	120.00	410.00	228.33	40.61
	White perch	Passaic River -- Lower 17.4 to 8.3 miles	9	18.00	230.00	82.22	26.55
		Passaic River -- Lower 8.3 miles	33	73.00	352.00	186.33	12.35
		Newark Bay study area[2]	36	20.00	354.00	49.67	8.97
	White suckerfish	Passaic River -- Lower 17.4 to 8.3 miles	3	3.10	130.00	48.03	41.05
		Passaic River -- Lower 8.3 miles	2	63.00	89.00	76.00	13.00
	Invertebrates						
	Blue Crab	Passaic River -- Lower 17.4 to 8.3 miles	2	31.00	53.00	42.00	11.00
		Passaic River -- Lower 8.3 miles	22	24.00	86.00	52.27	3.40
	Shrimp spp[4]	Passaic River -- Lower 8.3 miles	5	5.49	34.20	19.37	5.62
		Newark Bay study area[2]	11	4.70	20.90	10.82	1.20

Notes:
1. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit. Tissue concentrations are reported as wet-weight values.
2. Newark Bay study area includes Newark Bay, Hackensack River, and Arthur Kill for this summary.
3. Shiner species include: Silver and Spottail.
4. Shrimp species include: Grass, Opossum, and Sevenspine bay.
5. Sunfishes include: Pumkinseed and unspecified sunfish species.
COC = contaminant of concern
Std Error = standard error
TCDD = 2,3,7,8-TCDD (Dioxin)
ng/kg = nanogram per kilogram = parts per trillion
ug/kg = microgram per kilogram = parts per billion
mg/kg = milligram per kilogram = parts per million
tDDT = calculated total DDTs, total of 6 isomers
tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.
tPCBs = calculated total PCBs.

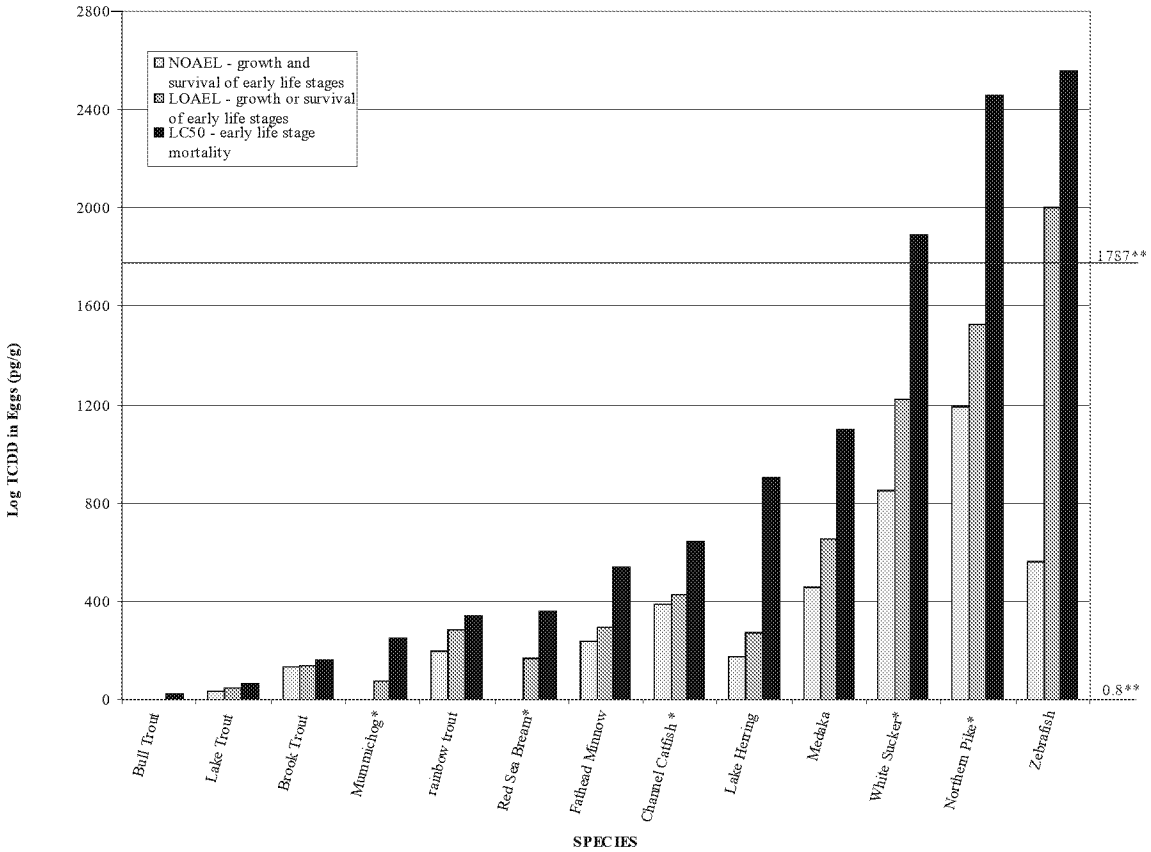
Different fish species vary in their sensitivity to TCDD, although for many species, early life stages (including embryos) are typically the most sensitive. For example, among fish, trout are typically very sensitive to TCDD exposure; zebra fish are relatively insensitive (Exhibit 2-5). Notably, mummichogs, which occur at the DASS, are also relatively sensitive. Sensitivity also varies with the effect being measured; morphological or biochemical effects, such as brain asymmetry and hormonal changes, respectively, or a functional effect such as a compromised immune response, are typically seen at lower concentrations than are effects on survival (Exhibit 2-5).

Literature-based critical body residues (CBRs), which represent tissue concentrations at which toxic effects have been observed, for TCDD have been exceeded in most fish thus far sampled from the DASS. For example, projected TCDD levels in site-specific fish eggs (transferred in lipid from females during egg formation), calculated based on the relationship between measured lipid and TCDD concentrations in fish from the DASS and egg lipid concentrations in mummichog (Bailey *et al.*, 1973), exceed no observable adverse effect levels (NOAELs), meaning the highest concentrations measured that do not produce measurable effects on survival of early life stages in all species evaluated in the lab (lake trout, brook trout, rainbow trout, fathead minnow, channel catfish, lake herring, medaka, white sucker, northern pike, and zebrafish) (Exhibit 2-5).

With the exception of zebrafish, TCDD levels also exceed the lowest observable adverse effect levels (LOAELs), meaning concentrations found to significantly affect survival, for early life stages for all laboratory-tested species evaluated (lake trout, brook trout, mummichog, rainbow trout, red sea bream, fathead minnow, channel catfish, lake herring, medaka, white sucker, and northern pike) (Exhibit 2-5). Finally, calculated egg concentrations exceeded LC_{50} (the exposure concentration causing 50% mortality in the study population) values for early life stages in 10 of the 13 species (77%) evaluated (including bull trout, lake trout, brook trout, mummichog, rainbow trout, red sea bream, fathead minnow, channel catfish, lake herring, and medaka. (Exhibit 2-5).

Given the elevated sediment TCDD concentrations within the DASS, TCDD concentrations in fish eggs are likely to be more than one to two orders of magnitude above those that significantly affect growth, increasing the proportion and severity of histopathological lesions following a virus challenge, and decreasing visual acuity and prey capture rate in species such as trout (Carvalho *et al.,* 2004; Carvalho and Tillitt 2004; Spitsbergen *et al.,* 1988; Exhibit 2-6).

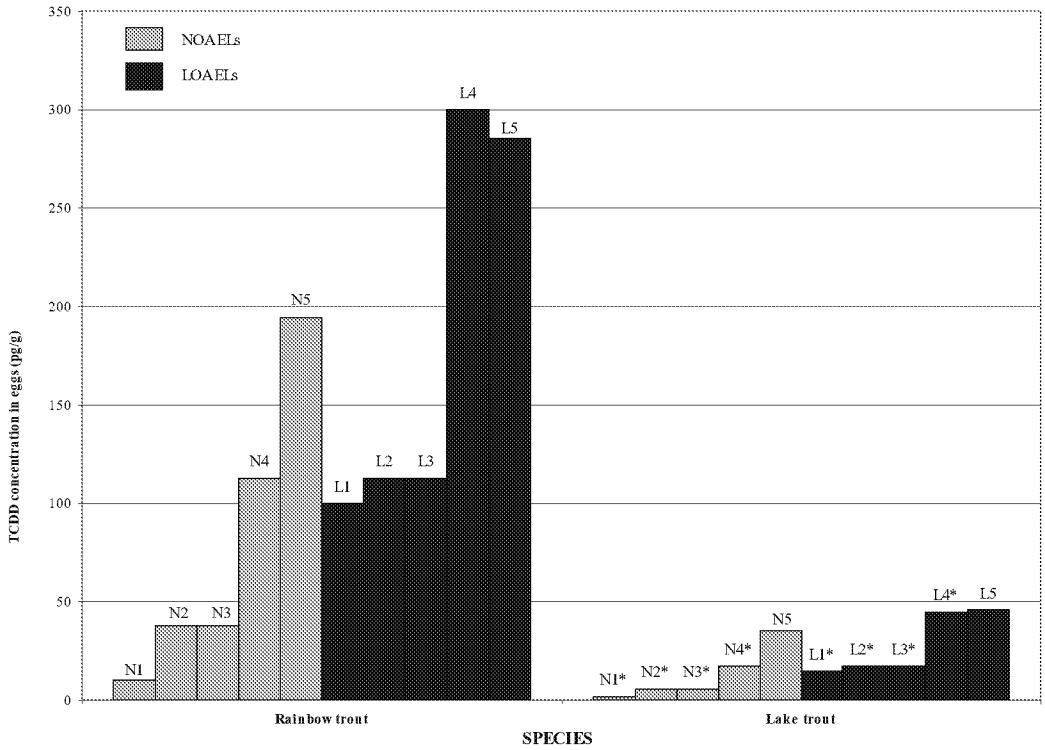
Exhibit 2-5 NOAELs, LOAELs, and LC50 Concentrations for Early Life Stages of Various Fish Species Following Exposure to 2,3,7,8 TCDD



NOAEL = no observable adverse effects level.
LOAEL = lowest observable adverse effects level.
LC 50 = concentration causing 50% mortality of the study population.
pg/g = picograms per gram.
Red lines indicate the range of tissue concentrations measured in fish from the DASS.
*Species or closely related species found at the DASS.
** Expected range of egg tissue concentrations for fish from the DASS based on the relationship between site-specific fish lipid and TCDD concentrations and egg lipid concentrations in mummichog published in Bailey *et al.,* (1973). Species-specific egg lipid concentrations could not be found in the literature for other species; the published egg lipid concentration for mummichog was used as a surrogate. Sexes of sampled fish were unknown; differences between lipid concentrations in female and male fish are assumed to be insignificant and data for all fish were used.
Data from:

Carvalho *et al.,* (2004)
Cook *et al.,* (1991)
Cook *et al.,* (2000)
Elonen *et al.,* (1998)
Guiney *et al.,* (1996)
Henry *et al.,* (1997)
Johnson *et al.,* (1998)
Spitsbergen *et al.,* (1988)
Spitsbergen *et al.,* (1991)
Toomey *et al.,* (2001)
Walker and Peterson (1991, 1994)
Walker *et al.,* (1991, 1992, 1994, 1996)
Yamauchi *et al.,* (2006)
Zabel (1995).

Exhibit 2-6 NOAELs and LOAELs for Non-Mortality Endpoints in Early Life Stages of Sensitive Fish Species Following Exposure to 2,3,7,8-TCDD



N1/L1 – NOAELs and LOAELs for proportion and severity of histopathological lesions in fry following a virus challenge (Spitsbergen *et al.* 1988).
N2/L2 - NOAELs and LOAELs for total length of fish at swim up (Carvalho *et al.*, 2004).
N3/L3 - NOAELs and LOAELs for visual acuity in fish at swim up (Carvalho and Tillitt 2004).
N4/L4 - NOAELs and LOAELs for prey capture rate in fry (Carvalho *et al.*, 2004).
N5/L5 - NOAELs and LOAELs for early life stage mortality in rainbow trout are from Walker *et al.*, (1992); NOAELs and LOAELs for lake trout are the average of 1) the average of respective values for sac fry mortality from Walker *et al.*, (1994), 2) respective values for growth and survival from Guiney *et al.*, (1996), and 3) the average of respective values for sac fry mortality from Walker *et al.*, (1992).
pg/g = picograms per gram.
NOAEL = no observable adverse effects level.
LOAEL = lowest observable adverse effects level.
Red lines indicate the range of tissue concentrations measured in fish from the DASS.
*Values for lake trout are predicted based on the relationship between measured lethal effects dose for 50% of the study population (LD_{50}) for rainbow trout (333 pg/g; Walker *et al.*, 1991) and lake trout (50 pg/g; Walker *et al.*, 1994) and the relationship between measured LD_{50}s and LOAEL/NOAEL values presented in the studies listed above.

Although birds tissues have not been analyzed to the extent of tissues from other animals occurring within the DASS, the likelihood for injury to birds from TCDD exposure can be evaluated by using biomagnification factors (BMFs) to estimate bird egg concentrations from fish (diet) tissue concentrations (Hoffman *et al.,* 1996; EPA 2001a; Norstrom *et al*., 2007). For example, using the alewife to herring gull egg BMF of 21 for TCDD, birds feeding exclusively on mummichogs or white perch from the lower Passaic River (containing average TCDD concentrations of 66.9 and 186.3 ng/kg [parts per trillion], respectively) may be expected to produce eggs containing approximately 1,600 to 4,400 ng/kg TCDD. These egg concentrations are expected to be toxic to many avian species endemic to the region, including herring gulls, Caspian terns, double-crested cormorants, bald eagles, black-crowned night herons, great blue herons, and peregrine falcons (Hoffman *et al.,* 1996). Other dioxin-like congeners would further elevate the risk of toxic effects to these species.

Similar to birds, potential injury of mammals exposed to dietary (fish) tissue concentrations of TCDD measured within the DASS can also be assessed using dietary effects data. A diet-based Toxic Effect Concentration of 1.9 ng TCDD equivalence/kg maternal diet was calculated as a mink kit survival threshold (Tillitt *et al.,* 1996). Average concentrations of TCDD, alone, from any fish species listed in Exhibit 2-4, represent a greater than 1.9 ng/kg dietary threshold kit survival. It should be noted that the dose-response relationship between TCDD exposure, alone, and kit survival was not examined in the Tillitt *et al.,* (1996) study, only the dietary mixture of TCDD and related compounds in the ground-crap diet was evaluated. However, using fish diet as an exposure metric, rather than maternal mink liver TCDD concentrations, would necessitate using the 1.9 ng TCDD equivalence/kg diet threshold along with the appropriate TCDD toxic equivalent factors for other TCDD-related analytes, the sum of which would exceed the 1.9 ng/kg diet threshold.

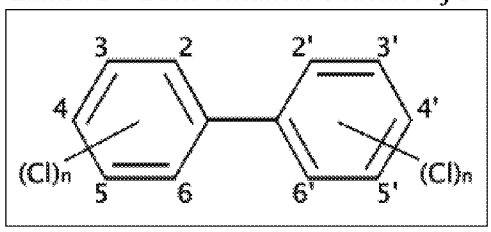
The Federal Trustees intend to perform more in-depth evaluations of species sensitivities and potential effects from exposure to TCDD and other hazardous substances through detailed injury assessments for specific resources. These assessments will add to multiple lines of evidence that will be used to evaluate injury to Trust resources from hazardous substances at the DASS.

PCBs

PCBs are a group of synthetic organic chemicals containing 209 possible congeners whose basic structure consists of chlorinated biphenyl rings (Exhibit 2-7). PCBs are stable at high temperatures and inflammable, and therefore were used extensively as insulating or cooling agents in the electricity generating industry. However, the chemical characteristics that made PCBs useful to industry also make them extremely persistent in the environment. PCBs were produced and sold under various names including Askarel and Pyranol but most commercially-developed PCB mixtures are known in the United States by their industrial trade name, Aroclor®[10], followed by a number indicating the

[10] Aroclor is a trade name of Monsanto.

Exhibit 2-7 Basic Chemical Structure of PCBs



number of carbon atoms and the chlorine content of the compound. For example, the trade name Aroclor 1254 refers to a mixture of PCBs containing twelve carbon atoms and approximately 54% chlorine by mass. PCBs typically exist in the environment as mixtures of various congeners. In 1976, the EPA, through the Toxics Substance Control Act (TSCA)[11], prohibited manufacturing and commercial use of PCBs and regulated PCB disposal. Notwithstanding, PCBs continue to pose a serious environmental hazard.

In environmental sampling, PCBs are frequently measured as Aroclors and reported as Total PCBs or Total Aroclors. This may not precisely represent the total concentrations of all PCBs congener present; in part a function of analytical method sensitivity. Aroclor analysis may over- or under-estimate PCB concentrations because it is not a measurement of individual congeners but is instead is a pattern recognition estimate. The toxicity of PCBs is congener-specific, and, therefore, measurement on an Aroclor basis may not accurately measure toxicity as such Aroclor analysis may severely underestimate toxicity. Nevertheless, Aroclor analysis is useful in the initial stages of investigation to determine presence or absence of PCBs or a preliminary estimation of risk as part of remedial actions.

Environmental transport of PCBs is primarily determined by molecular weight. Heavier PCBs are more likely to associate with soils and sediments, while lighter PCBs are more likely to evaporate to air. Sediments that contain PCBs can also release the PCBs into the surrounding water. PCBs have a high affinity to lipids and readily accumulate and biomagnify in the food web. Concentrations of PCBs in aquatic organisms may be up to a million times higher than the concentrations found in the surrounding water, with species at the top of the food web having the highest concentrations. Exposure to PCBs is never to just a single congener. Accumulation in biota varies by congener and generally increases with chlorine content until, in the most heavily chlorinated compounds, the size of the molecules hampers their accumulative properties. Environment exposure to PCBs is primarily through consumption of contaminated prey.

In addition to the toxic DLC activity of 12 of the 209 PCB congeners mentioned earlier, other toxic effects associated with PCB exposure include adverse endocrine changes, immunological alterations, neurodevelopmental and reproductive changes, cancer, and mortality (Faroon and Ruiz 2016).

[11] 15 U.S.C. § 2601 *et seq.*; 15 U.S.C. § 2605(e)(2), implemented by 40 C.F.R Part 761.

Concentrations of total-PCBs in whole-body fish and shellfish tissue collected from the lower Passaic River/NBSA between 1990 and 2016 are presented in Exhibit 2-8, demonstrating that fish and shellfish have been, and likely continue to be, exposed to total-PCBs in the lower Passaic River and NBSA.

Exhibit 2-8 Concentrations of Total PCBs in Whole-body Fish and Shellfish Tissue in the Lower Passaic River/Newark Bay Study Area, 1990–2016

COC	Species	Waterway	Sample Size	COC Range		Mean	Std Error
				Min	Max		
Total PCB (ug/kg)	***Fish***						
	American eel	Passaic River -- Lower 17.4 to 8.3 miles	12	51.93	1536.53	771.56	128.46
		Passaic River -- Lower 8.3 miles	20	202.12	5686.56	1667.93	269.03
		Newark Bay study area[2]	2	2530.00	3740.00	3135.00	605.00
	Atlantic menhaden	Passaic River -- Lower 8.3 miles	6	430.21	1727.49	902.35	195.72
	Atlantic silverside	Passaic River -- Lower 8.3 miles	9	278.45	580.89	427.18	29.67
	Bluefish	Passaic River -- Lower 8.3 miles	2	1089.98	1098.45	1094.21	4.24
	Brown bullhead	Passaic River -- Lower 17.4 to 8.3 miles	4	259.26	600.52	485.33	77.19
		Passaic River -- Lower 8.3 miles	3	39.93	1696.05	1120.45	193.95
	Channel catfish	Passaic River -- Lower 8.3 miles	11	351.81	2615.33	1298.50	231.42
	Common carp	Passaic River -- Lower 17.4 to 8.3 miles	9	143.39	7026.70	3470.63	754.12
		Passaic River -- Lower 8.3 miles	5	2794.31	7861.25	4299.42	923.26
	Gizzard shad	Passaic River -- Lower 17.4 to 8.3 miles	3	105.65	446.99	267.36	98.94
		Passaic River -- Lower 8.3 miles	1	452.99	452.99	452.99	0.00
	Largemouth bass	Passaic River -- Lower 17.4 to 8.3 miles	3	1145.85	7603.29	3608.68	2015.31
	Mummichog	Passaic River -- Lower 17.4 to 8.3 miles	3	429.74	708.16	529.96	89.33
		Passaic River -- Lower 8.3 miles	73	938.52	938.52	574.09	21.89
		Newark Bay study area[2]	511	4.15	7600.00	747.02	38.10
	Northern pike	Passaic River -- Lower 17.4 to 8.3 miles	1	2034.41	2034.41	2034.41	0.00
	Shiner spp[3]	Passaic River -- Lower 17.4 to 8.3 miles	2	397.37	477.59	437.48	40.11
	Smallmouth bass	Passaic River -- Lower 17.4 to 8.3 miles	2	981.62	1438.95	1210.28	228.67
		Passaic River -- Lower 8.3 miles	1	631.19	631.19	631.19	0.00
	Striped bass	Passaic River -- Lower 8.3 miles	11	370.99	2480.00	1508.74	173.45
		Newark Bay study area[2]	2	1610.00	2000.00	1805.00	195.00
	Sunfishes[5]	Passaic River -- Lower 17.4 to 8.3 miles	1	172.29	172.29	172.29	0.00
	Weakfish	Newark Bay study area[2]	1	683.50	683.50	683.50	0.00
	White catfish	Passaic River -- Lower 17.4 to 8.3 miles	13	624.41	7300.21	2397.38	475.14
		Passaic River -- Lower 8.3 miles	6	1562.24	5733.82	3282.92	597.04
	White perch	Passaic River -- Lower 17.4 to 8.3 miles	9	288.67	5141.91	1639.87	540.30
		Passaic River -- Lower 8.3 miles	36	184.63	4899.06	2325.14	158.45
		Newark Bay study area[2]	216	278.00	19500.00	3185.21	181.42
	White suckerfish	Passaic River -- Lower 17.4 to 8.3 miles	3	537.15	2941.13	1442.57	754.68
		Passaic River -- Lower 8.3 miles	2	1459.14	1545.76	1502.45	43.31
	Invertebrates						
	Blue Crab	Passaic River -- Lower 17.4 to 8.3 miles	3	116.80	284.58	205.07	48.63
		Passaic River -- Lower 8.3 miles	22	150.98	576.92	319.72	22.19
		Newark Bay study area[2]	22	49.00	765.48	200.73	42.69
	Fiddler crab	Newark Bay study area[2]	122	43.46	2740.00	484.00	53.82
	Mud crab	Newark Bay study area[2]	20	87.00	1070.00	308.90	52.31
	Ribbed Mussels	Passaic River -- Lower 8.3 miles	12	37.30	385.02	271.69	27.42
		Newark Bay study area[2]	11	171.62	901.32	344.10	59.19
	Shrimp spp[4]	Passaic River -- Lower 8.3 miles	5	59.51	426.73	195.86	65.61
		Newark Bay study area[2]	44	4.15	3168.56	149.85	71.11

Notes:
1. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit. Tissue concentrations are reported as wet-weight values.
2. Newark Bay study area includes Newark Bay, Hackensack River, and Arthur Kill for this summary.
3. Shiner species include: Silver and Spottail.
4. Shrimp species include: Grass, Opossum, and Sevenspine bay.
5. Sunfishes include: Pumkinseed and unspecified sunfish species.
COC = contaminant of concern
Std Error = standard error
TCDD = 2,3,7,8-TCDD (Dioxin)
ng/kg = nanogram per kilogram = parts per trillion
ug/kg = microgram per kilogram = parts per billion
mg/kg = milligram per kilogram = parts per million
tDDT = calculated total DDTs, total of 6 isomers
tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.
tPCBs = calculated total PCBs.

Pesticides

Pesticides include insecticides, fungicides, herbicides and other substances intended to control, destroy, repel, or mitigate pests. There are a wide variety of pesticides displaying a range of chemical structures and modes of toxicity. Major pesticide classes, grouped according to their mode of action, include the following:

- Organophosphate and carbamate pesticides, which are primarily insecticides and include such products as malathion, chlorpyrifos, and carbaryl.

- Pyrethroid pesticides, which are synthetic versions of the natural insecticide pyrethrin, found in chrysanthemums, and which include such products as sumithrin and resmethrin.

- Organochlorine pesticides that were widely used in the past and are now no longer in the marketplace, including such products as DDT, chlordane, and mirex.

While these classes of pesticides have different structures and modes of action, most of the associated compounds are neurotoxins and work by disrupting the transmission of nerve impulses. The severity and symptoms of toxicity to non-target species, however, are wide-ranging, and vary with chemical and organism.

Widespread use of environmentally-persistent pesticides, along with the tendency of pesticides to accumulate in higher levels of the food web, can lead to unintended consequences in fish, wildlife, and humans and subsequent natural resource injuries. For example, pesticides often leach into aquatic environments, causing long-term, chronic effects in fish and other aquatic organisms and their predators. One of the best-known examples of unintended pesticide impact is the eggshell thinning and reduced reproductive success in birds of prey that ingested fish contaminated with the insecticide DDT.

Concentrations of total-DDT (as the sum of six DDT isomers) in whole-body fish and shellfish tissue collected from the lower Passaic River/NBSA between 1990 and 2016 are presented in Exhibit 2-9, demonstrating that fish and shellfish have been, and likely continue to be, exposed to DDT in the lower Passaic River and NBSA.

Exhibit 2-9 Concentrations of Total DDT in Whole-body Fish and Shellfish Tissue in the Lower Passaic River/Newark Bay Study Area, 1990–2016[1]

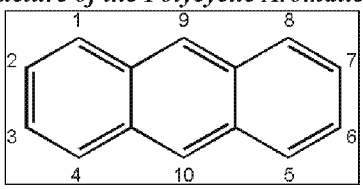
COC	Species	Waterway	Sample Size	COC Range		Mean	Std Error
				Min	Max		
Total DDT (ug/kg)	***Fish***						
	American eel	Passaic River -- Lower 17.4 to 8.3 miles	12	31.54	267.09	161.43	19.81
		Passaic River -- Lower 8.3 miles	13	59.15	484.52	303.13	34.46
	Brown bullhead	Passaic River -- Lower 17.4 to 8.3 miles	4	19.70	59.90	42.30	8.70
		Passaic River -- Lower 8.3 miles	3	186.50	210.77	200.24	7.19
	Channel catfish	Passaic River -- Lower 17.4 to 8.3 miles	11	51.00	487.80	215.78	36.98
	Common carp	Passaic River -- Lower 17.4 to 8.3 miles	9	112.40	885.63	484.59	89.44
		Passaic River -- Lower 8.3 miles	4	445.00	1113.00	661.20	152.41
	Gizzard shad	Passaic River -- Lower 17.4 to 8.3 miles	2	29.21	58.22	43.72	14.51
		Passaic River -- Lower 8.3 miles	1	61.34	61.34	61.34	0.00
	Largemouth bass	Passaic River -- Lower 17.4 to 8.3 miles	3	71.80	159.60	128.57	28.42
	Mummichog	Passaic River -- Lower 17.4 to 8.3 miles	3	49.10	80.50	65.50	9.09
		Passaic River -- Lower 8.3 miles	19	13.04	368.07	69.75	17.31
		Newark Bay study area[2]	5	4.40	293.93	103.03	52.99
	Northern pike	Passaic River -- Lower 17.4 to 8.3 miles	1	276.70	276.70	276.70	0.00
	Shiner spp[3]	Passaic River -- Lower 17.4 to 8.3 miles	3	32.94	61.26	50.19	8.74
	Smallmouth bass	Passaic River -- Lower 17.4 to 8.3 miles	2	102.20	152.20	127.20	25.00
		Passaic River -- Lower 8.3 miles	1	236.20	236.20	236.20	0.00
	Sunfishes[5]	Passaic River -- Lower 17.4 to 8.3 miles	1	22.03	22.03	22.03	0.00
	Weakfish	Passaic River -- Lower 8.3 miles	1	123.10	123.10	123.10	0.00
	White catfish	Passaic River -- Lower 17.4 to 8.3 miles	13	80.20	884.00	283.26	56.74
		Passaic River -- Lower 8.3 miles	6	174.20	486.00	280.87	46.29
	White perch	Passaic River -- Lower 17.4 to 8.3 miles	9	38.10	275.60	129.22	30.75
		Passaic River -- Lower 8.3 miles	18	136.00	899.00	278.71	42.21
		Newark Bay study area[2]	1	435.87	435.87	435.87	0.00
	White suckerfish	Passaic River -- Lower 17.4 to 8.3 miles	3	65.70	163.00	100.40	31.36
		Passaic River -- Lower 8.3 miles	2	131.50	146.70	139.10	7.60
	Invertebrates						
	Blue Crab	Passaic River -- Lower 17.4 to 8.3 miles	3	22.10	54.84	39.38	9.49
		Passaic River -- Lower 8.3 miles	22	29.00	106.59	64.88	3.61
		Newark Bay study area[2]	4	10.50	52.80	39.22	9.78
	Ribbed Mussels	Passaic River -- Lower 8.3 miles	12	4.25	75.27	57.85	5.70
		Newark Bay study area[2]	11	48.49	216.90	95.41	14.84
	Shrimp spp[4]	Passaic River -- Lower 8.3 miles	5	7.02	43.30	25.10	7.52
		Newark Bay study area[2]	11	9.16	36.30	24.76	2.54

Notes:
1. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit. Tissue concentrations are reported as wet-weight values.
2. Newark Bay study area includes Newark Bay, Hackensack River, and Arthur Kill for this summary.
3. Shiner species include: Silver and Spottail.
4. Shrimp species include: Grass, Opossum, and Sevenspine bay.
5. Sunfishes include: Pumkinseed and unspecified sunfish species.
COC = contaminant of concern
Std Error = standard error
TCDD = 2,3,7,8-TCDD (Dioxin)
ng/kg = nanogram per kilogram = parts per trillion
ug/kg = microgram per kilogram = parts per billion
mg/kg = milligram per kilogram = parts per million
tDDT = calculated total DDTs, total of 6 isomers
tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.
tPCBs = calculated total PCBs.

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons are a group of chemicals containing hydrogen and carbon atoms arranged in the form of two or more benzene rings[12] (Exhibit 2-10). There are hundreds of PAH compounds that vary in molecular weight, depending upon the number of benzene rings in their structure.

Exhibit 2-10 Chemical Structure of the Polycyclic Aromatic Hydrocarbon Anthracene



PAHs are formed by the incomplete combustion of carbon-containing fuels. They may be created through natural processes, such as forest fires, microbial synthesis, and volcanic activity, but they may also be anthropogenic, produced as byproducts of automobile exhaust, power generation, incineration processes, and petroleum refining. Some PAHs are volatile and can be transported over long distances in air currents; others condense onto aerosol particles in the atmosphere. PAHs may be broken down by reacting with sunlight and other chemicals over a period of days to weeks; those that are not broken down may be scoured from the air by rain and deposited in soils and surface waters. Aquatic environments may also receive PAHs directly through oil spills and discharges from industrial and wastewater treatment plants.

PAHs are readily absorbed into fatty tissues, but do not accumulate in organisms to the extent of some other hazardous substances. PAHs are less accumulative because they are readily metabolized by many organisms. Due to their complex mixtures and chemical interactions, biological responses to PAHs are quite variable, making study of their fate, transport, and toxicity difficult. However, the ubiquity and potential toxicity of PAHs make such efforts a necessity.

PAHs of primary toxicological concern include those with two to seven benzene rings. Lower molecular weight PAHs, containing 2-3 rings, cause significant acute (short-term, lethal) toxicity, but are non-carcinogenic (*i.e.*, do not cause cancer). In contrast, heavier PAHs, with 4-7 rings, are less acutely toxic, but are instead carcinogenic to a wide variety of organisms. For instance, fish from areas with sediments heavily contaminated by certain PAHs have a greater incidence of liver tumors than do fish from less contaminated sites (Baumann *et al.,* 1987, Baumann *et al.*, 1990, Baumman and Harshbarger 1995). In fact, some PAHs may be among the most highly carcinogenic compounds known to humans (Eisler 1987a).

Concentrations of total-PAHs in whole-body fish and shellfish tissue collected from the lower Passaic River/NBSA between 1990 and 2016 are presented in Exhibit 2-11,

[12] The benzene ring is a six-sided ring of carbon atoms with one hydrogen atom attached to each carbon. Its structure is written as C_6H_6. Benzene is the most basic form of aromatic hydrocarbons. Benzene is a colorless, toxic, and flammable liquid.

demonstrating that fish and shellfish have been, and likely continue to be, exposed to PAHs in the lower Passaic River and NBSA.

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Exhibit 2-10 Concentrations of Total PAH in Whole-body Fish and Shellfish Tissue in the Lower Passaic River/Newark Bay Study Area, 1990–2016[1]

COC	Species	Waterway	Sample Size	COC Range		Mean	Std Error
				Min	Max		
Total PAH (ug/kg)	***Fish***						
	American eel	Passaic River -- Lower 17.4 to 8.3 miles	12	950.18	3603.89	1833.21	204.71
		Passaic River -- Lower 8.3 miles	19	109.60	2010.00	1047.24	193.95
	Atlantic menhaden	Passaic River -- Lower 8.3 miles	6	764.40	1058.20	930.97	41.76
	Atlantic silverside	Passaic River -- Lower 8.3 miles	9	710.00	1069.00	868.82	50.57
	Bluefish	Passaic River -- Lower 8.3 miles	2	673.00	710.00	691.50	18.50
	Brown bullhead	Passaic River -- Lower 17.4 to 8.3 miles	4	4041.30	4346.66	4200.31	77.16
		Passaic River -- Lower 8.3 miles	3	768.13	4320.55	3124.75	1178.35
	Channel catfish	Passaic River -- Lower 8.3 miles	11	1809.42	2127.70	1952.39	29.11
	Common carp	Passaic River -- Lower 17.4 to 8.3 miles	9	287.91	4218.55	3467.83	402.94
		Passaic River -- Lower 8.3 miles	4	3603.06	4056.77	3868.54	97.63
	Gizzard shad	Passaic River -- Lower 17.4 to 8.3 miles	2	4134.40	4464.00	4299.20	164.80
		Passaic River -- Lower 8.3 miles	1	4701.30	4701.30	4701.30	0.00
	Largemouth bass	Passaic River -- Lower 17.4 to 8.3 miles	3	518.12	578.02	546.90	17.33
	Mummichog	Passaic River -- Lower 17.4 to 8.3 miles	3	3754.60	4143.05	4003.92	124.94
		Passaic River -- Lower 8.3 miles	73	40.10	4308.10	1322.23	159.28
		Newark Bay study area[2]	8	46.15	293.42	171.95	35.76
	Northern pike	Passaic River -- Lower 17.4 to 8.3 miles	1	814.90	814.90	814.90	0.00
	Shiner spp[3]	Passaic River -- Lower 17.4 to 8.3 miles	3	899.57	4547.80	3174.54	1145.60
	Smallmouth bass	Passaic River -- Lower 17.4 to 8.3 miles	2	535.40	865.40	700.40	165.00
		Passaic River -- Lower 8.3 miles	1	556.65	556.65	556.65	0.00
	Striped bass	Passaic River -- Lower 8.3 miles	9	121.70	1053.40	630.87	124.68
	Sunfishes[5]	Passaic River -- Lower 17.4 to 8.3 miles	1	4095.50	4095.50	4095.50	0.00
	Weakfish	Newark Bay study area[2]	1	19.62	19.62	19.62	0.00
	White catfish	Passaic River -- Lower 17.4 to 8.3 miles	13	1621.66	2278.79	1824.41	53.92
		Passaic River -- Lower 8.3 miles	6	1733.57	2022.66	1883.45	46.84
	White perch	Passaic River -- Lower 17.4 to 8.3 miles	10	532.55	4191.50	2537.24	456.27
		Passaic River -- Lower 8.3 miles	35	151.90	4096.95	1213.10	188.80
		Newark Bay study area[2]	1	125.14	125.14	125.14	0.00
	White suckerfish	Passaic River -- Lower 17.4 to 8.3 miles	3	1825.78	2011.99	1938.52	57.23
		Passaic River -- Lower 8.3 miles	2	1798.70	1934.23	1866.46	67.77
	Invertebrates						
	Blue crab	Passaic River -- Lower 17.4 to 8.3 miles	3	150.00	1066.20	716.46	285.82
		Passaic River -- Lower 8.3 miles	22	757.40	1311.20	1055.77	28.10
		Newark Bay study area[2]	3	49.26	150.00	83.10	33.45
	Ribbed mussels	Passaic River -- Lower 8.3 miles	12	32.23	1598.90	932.29	146.07
		Newark Bay study area[2]	11	185.45	1058.30	500.03	73.77
	Shrimp spp[4]	Passaic River -- Lower 8.3 miles	3	20.45	115.60	69.49	27.51
		Newark Bay study area[2]	6	52.69	246.22	115.07	28.71

Notes:
1. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit. Tissue concentrations are reported as wet-weight values.
2. Newark Bay study area includes Newark Bay, Hackensack River, and Arthur Kill for this summary.
3. Shiner species include: Silver and Spottail.
4. Shrimp species include: Grass, Opossum, and Sevenspine bay.
5. Sunfishes include: Pumkinseed and unspecified sunfish species.
COC = contaminant of concern
Std Error = standard error
TCDD = 2,3,7,8-TCDD (Dioxin)
ng/kg = nanogram per kilogram = parts per trillion
ug/kg = microgram per kilogram = parts per billion
mg/kg = milligram per kilogram = parts per million
tDDT = calculated total DDTs, total of 6 isomers
tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.
tPCBs = calculated total PCBs.

Metals

Almost 75% of all elements are classified as metals, distinguished primarily by the arrangement of electrons in their atomic structure and their resulting physical and chemical properties. While some metals are essential for life, all metals are toxic above specific threshold concentrations.

Many metals have important industrial applications. Since the Industrial Revolution, the production of metals such as lead, copper, and zinc has increased exponentially (Nriagu 1996). Once released to the environment, either through mining, smelting, the burning of fossil fuels, or other waste releases, metals can reside in the environment for hundreds of years or more.

The degree of toxicity induced by different metals varies with organism and environmental conditions, which greatly impact metal bioavailability. Metals typically of greatest environmental concern include mercury, lead, cadmium, hexavalent chromium, copper, silver, arsenic, nickel, and zinc.

Based on measured concentrations of metals in sediments, mercury is the primary metal of concern at the DASS (NOAA 2018; Tierra Solutions Inc. 2004). Mercury has been used as a fungicide in agriculture; in the manufacture of chlorine, sodium hydroxide, electronics, and plastics; as a slime control agent in the pulp and paper industry; and in mining and smelting operations (Eisler 1987b). It is present in the environment in both inorganic and organic forms, although inorganic forms are readily converted to the more toxic organic forms by bacteria, particularly in anaerobic sediment. The organic mercury compound of greatest environmental concern is methylmercury, which is known to biomagnify in food webs. Mercury and methylmercury act as potent neurotoxins, resulting in impaired muscular coordination, vision, and hearing, with early developmental stages being the most sensitive (Eisler 1987b). Other effects include weight loss, changes in enzyme activity levels and histopathology, and depressed growth and reproduction.

Concentrations of total mercury in whole-body fish and shellfish tissue collected from the Lower Passaic River/NBSA between 1990 and 2016 are presented in Exhibit 2-12, demonstrating that fish and shellfish have been, and likely continue to be, exposed to total mercury in the lower Passaic River and NBSA.

Exhibit 2-11 Concentrations of Mercury in Whole-body Fish and Shellfish Tissue in the Lower Passaic River/Newark Bay Study Area, 1990–2016

COC	Species	Waterway	Sample Size	COC Range		Mean	Std Error
				Min	Max		
Mercury (mg/kg)	***Fish***						
	American eel	Passaic River -- Lower 17.4 to 8.3 miles	12	0.11	0.98	0.28	0.08
		Passaic River -- Lower 8.3 miles	18	0.07	1.04	0.31	0.05
		Newark Bay study area[2]	3	0.70	4.90	2.83	1.21
	Atlantic menhaden	Passaic River -- Lower 8.3 miles	6	0.04	0.08	0.06	0.01
	Atlantic silverside	Passaic River -- Lower 8.3 miles	9	0.05	0.08	0.06	0.00
	Bluefish	Passaic River -- Lower 8.3 miles	2	0.07	0.10	0.09	0.01
	Brown bullhead	Passaic River -- Lower 17.4 to 8.3 miles	4	0.05	0.14	0.09	0.02
		Passaic River -- Lower 8.3 miles	3	0.05	0.19	0.10	0.05
		Newark Bay study area[2]	7	0.50	1.10	0.77	0.10
	Channel catfish	Passaic River -- Lower 8.3 miles	11	0.03	0.23	0.12	0.02
	Common carp	Passaic River -- Lower 17.4 to 8.3 miles	9	0.04	0.17	0.08	0.01
		Passaic River -- Lower 8.3 miles	4	0.05	0.07	0.05	0.01
	Gizzard shad	Passaic River -- Lower 17.4 to 8.3 miles	2	0.04	0.05	0.05	0.00
		Passaic River -- Lower 8.3 miles	1	0.08	0.08	0.08	0.00
	Largemouth bass	Passaic River -- Lower 17.4 to 8.3 miles	3	0.14	0.68	0.33	0.18
	Mummichog	Passaic River -- Lower 17.4 to 8.3 miles	3	0.04	0.05	0.05	0.00
		Passaic River -- Lower 8.3 miles	72	0.02	0.15	0.04	0.00
		Newark Bay study area[2]	552	0.02	7.68	0.28	0.02
	Northern pike	Passaic River -- Lower 17.4 to 8.3 miles	1	0.22	0.22	0.22	0.00
	Shiner spp[3]	Passaic River -- Lower 17.4 to 8.3 miles	2	0.03	0.04	0.04	0.01
	Smallmouth bass	Passaic River -- Lower 17.4 to 8.3 miles	2	0.22	0.30	0.26	0.04
		Passaic River -- Lower 8.3 miles	1	0.18	0.18	0.18	0.00
	Striped bass	Passaic River -- Lower 8.3 miles	9	0.08	0.27	0.18	0.03
	Sunfishes[5]	Passaic River -- Lower 17.4 to 8.3 miles	1	0.15	0.15	0.15	0.00
		Newark Bay study area[2]	9	0.20	1.80	0.68	0.16
	Weakfish	Newark Bay study area[2]	1	0.09	0.09	0.09	0.00
	White catfish	Passaic River -- Lower 17.4 to 8.3 miles	13	0.09	0.56	0.19	0.04
		Passaic River -- Lower 8.3 miles	6	0.08	0.63	0.28	0.08
	White perch	Passaic River -- Lower 17.4 to 8.3 miles	10	0.03	0.41	0.17	0.04
		Passaic River -- Lower 8.3 miles	37	0.05	0.57	0.20	0.02
		Newark Bay study area[2]	147	0.06	6.20	0.42	0.07
	White suckerfish	Passaic River -- Lower 17.4 to 8.3 miles	3	0.08	0.14	0.11	0.02
		Passaic River -- Lower 8.3 miles	2	0.09	0.12	0.11	0.01
	Invertebrates						
	Blue Crab	Passaic River -- Lower 17.4 to 8.3 miles	3	0.07	0.08	0.08	0.00
		Passaic River -- Lower 8.3 miles	22	0.09	0.19	0.14	0.01
		Newark Bay study area[2]	22	0.03	0.29	0.12	0.01
	Fiddler crab	Newark Bay study area[2]	122	0.02	70.20	1.94	0.73
	Mud crab	Newark Bay study area[2]	9	0.22	0.59	0.37	0.04
	Shrimp spp[4]	Passaic River -- Lower 8.3 miles	5	0.01	0.11	0.04	0.02
		Newark Bay study area[2]	23	0.02	0.24	0.09	0.01
	Ribbed Mussels	Passaic River -- Lower 8.3 miles	12	0.01	0.05	0.03	0.00
		Newark Bay study area[2]	11	0.01	0.05	0.03	0.00

Notes:
1. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit. Tissue concentrations are reported as wet-weight values.
2. Newark Bay study area includes Newark Bay, Hackensack River, and Arthur Kill for this summary.
3. Shiner species include: Silver and Spottail.
4. Shrimp species include: Grass, Opossum, and Sevenspine bay.
5. Sunfishes include: Pumkinseed and unspecified sunfish species.
COC = contaminant of concern
Std Error = standard error
TCDD = 2,3,7,8-TCDD (Dioxin)
ng/kg = nanogram per kilogram = parts per trillion
ug/kg = microgram per kilogram = parts per billion
mg/kg = milligram per kilogram = parts per million
tDDT = calculated total DDTs, total of 6 isomers
tPAHs = calculated total PAHs, NOAA Status and Trends 18 analytes.
tPCBs = calculated total PCBs.

Summary of Hazardous Substances of Concern

A summary of the hazardous substances of primary concern within the DASS and their associated ecological effects is presented in Exhibit 2-13.

Exhibit 2-123 Potential Ecological Effects of Hazardous Substances within the DASS

Chemical Categories	Primary Hazardous Substances	Selected Potential Ecological Effects
Dioxins & Furans	• Includes seven dioxin congeners of primary concern[1] • Includes ten furan congeners of primary concern[2]	• Mortality • Impaired growth • Liver failure • Chronic wasting • Reproductive and developmental impairment • Gastric ulcers • Carcinogenesis • Immunosuppression • Impaired endocrine function • Neurotoxicity • Dermal toxicity

PCBs	• Coplanar congeners – 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, 189
	• Aroclor mixtures – *e.g.*, 1254, 1260
		• "Dioxin-like" PCBs have effects similar to dioxins, above
		• Effects of "Non-dioxin-like" PCBs include the following:
		  • Mortality
		  • Endocrine disruption
		  • Decreased immune function
		  • Reproductive and developmental impairment
		  • Impaired behavioral responses
		  • Carcinogenesis

Pesticides	• Organophosphate – malathion, chlorpyrifos • Carbamate – carbaryl • Pyrethroids – sumithrin, resmethrin • Organochlorine – DDT, chlordane	• Mortality • Reproductive and developmental impairment • Neurotoxicity
PAHs	• Anthracene • Benzo(a)pyrene • Chrysene • Fluorene • Pyrene	• Mortality • Leukemia • Decreased reproductive success • Stunted growth • Impaired behavioral responses
Metals	• Mercury and methylmercury	• Decreased growth and reproduction • Impaired coordination • Vision and hearing loss • Weight loss • Altered enzyme activity

[1]The 7 dioxin congeners include 2,3,7,8- TCDD; 1,2,3,7,8-PentaCDD; 1,2,3,4,7,8-HexaCDD; 1,2,3,6,7,8-HexaCDD; 1,2,3,7,8,9-HexaCDD; 1,2,3,4,6,7,8-HeptaCDD; OCDD
[2]The 10 furan congeners include 2,3,7,8-TCDF; 1,2,3,7,8-PentaCDF; 2,3,4,7,8-PentaCDF; 1,2,3,4,7,8-HexaCDF; 1,2,3,6,7,8-HexaCDF; 1,2,3,7,8,9-HexaCDF; 2,3,4,6,7,8-HexaCDF; 1,2,3,4,6,7,8-HeptaCDF; 1,2,3,4,7,8,9-HeptaCDF; OCDF
PCBs = polychlorinated biphenyls
PAHs = polycyclic aromatic hydrocarbons

Sources of Contamination

Hazardous substances in the DASS likely originate from numerous sources, both direct (point sources) and indirect (non-point sources). The impact of chemicals, human waste, and other human influences over the past two centuries has resulted in the EPA declaring the Passaic River in 1970 the "second most polluted river in America", behind only the Cuyahoga, which caught fire in 1969 (Nussbaum 2004).

One of the major sources of dioxin contamination to the lower Passaic River was the Diamond Alkali Plant, which operated at 80 and 120 Lister Ave., in Newark, New Jersey

from 1951 until 1969 (Exhibit 2-14). The facility was used predominantly for making herbicides such as 2,4,5-trichlorophenoxyacetic acid (commonly known as 2,4,5-T), of which dioxins are a common production contaminant. An explosion at the plant in 1960 released TCDD as a byproduct of chemicals burned during the fire. Additionally, direct intentional and unintentional releases of chemical wastes occurred repeatedly between 1951 and 1969 (Diamond Shamrock Chemicals Company v. Aetna Casualty and Surety Company *et al.* 1989), and inundation of the plant during tidal surges resulted in further chemical releases to the River (EPA 1987). Sampling of sediments in the vicinity of this plant during the 1980s and 1990s revealed high levels of dioxins (Battelle 2005; EPA 2004; USACE New York District *et al.,* 2003). A Record of Decision was issued by EPA for the DASS OU1 indicating that TCDD and DDT were the primary contaminants of concern (EPA 1987). The release of TCDD from the Diamond Alkali Plant is reflected by the concentration gradient of the chemical in sediment from the tidal Passaic River, Newark Bay, and other parts of the Harbor (Exhibit 2-15).

The Diamond Alkali Plant is just one of approximately 120 point source discharges into the lower Passaic River watershed. More than 50% of these sources are from industrial facilities (*e.g.*, asphalt plants; plastic, metal, stone, clay, and glass manufacturers; sawmills; communications equipment; and various public utilities). In addition, non-point source discharges (*e.g.*, landfill leachate; leaking storage tanks, chemical drums, container boxes; and storm water runoff), along with illegal dumping, have contributed substantially to contamination along the river (NJDEP 2002b).

Exhibit 2-13 Location of the Diamond Alkali Plant in Relation to the Passaic River and New York/New Jersey Harbor

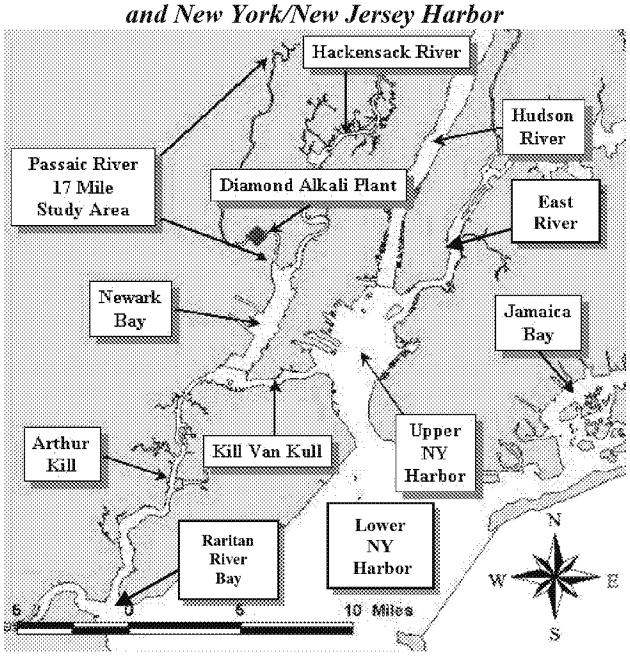

Exhibit 2-14 Concentrations of TCDD in Surficial Sediments of NY/NJ Waterways, 1990–2012[1]

Waterway	Sample Size	TCDD Range (ng/kg)		Mean	Std Error
		Min	Max		
Passaic River -- upstream Dundee Dam	52	0.02	290.00	10.02	5.97
Passaic River -- to Dundee Dam	297	0.02	51,100.00	1,804.41	304.60
Passaic River -- Lower 8.3 miles	478	0.02	34,100.00	10.02	147.68
Hackensack River	84	0.18	2,990.00	1,055.27	36.76
Newark Bay	179	0.95	592.00	69.86	5.13
Arthur Kill	73	0.30	347.00	25.00	6.42
Kill Van Kull	3	5.79	20.20	15.03	4.63
Upper NY Harbor/Narrows	5	7.93	18.65	11.02	1.99
Raritan Bay/Lower Bay	4	3.23	26.91	13.92	5.28
Jamaica Bay	71	0.04	16.33	2.80	0.35

Notes:
1. Concentrations represented are depth-weighted average of the surficial sediment interval from 0 to 15.24 centimeters below the sediment surface. Data accessed from NOAA's on-line database (2018). Non-detected analytes were treated as 1/2 of the analytical detection limit.
ng/kg = nanogram per kilogram = parts per trillion

Cleanup

The EPA undertakes cleanup actions at contaminated sites to reduce or eliminate risks to human health and the environment. EPA's activities are often directed at the hazardous substance itself – its physical removal from the environment or the creation of barriers between the contaminant and humans or wildlife. In most cases, cleanup actions will reduce future injury to natural resources within the DASS. By contrast, the natural resource trustees are responsible for implementing measures needed to compensate both for injury that occurred prior to completion of cleanup and future injury that is not prevented by EPA actions.

Within the LPRSA, three cleanup actions have been conducted under EPA oversight. In 2001, an interim remedial cleanup was performed at 80-120 Lister Avenue in Newark, New Jersey, consisting of a flood wall, subsurface slurry walls, a groundwater collection and treatment system, and capping to prevent exposure to contaminated soil (including contaminated soil that originated at the facility and that was brought to the facility from neighboring lots) and prevent further releases to the river. In 2012, contaminated sediment was removed from the lower Passaic River adjacent to the 80-120 Lister Avenue properties. In 2014, a highly contaminated mudflat on the east bank of the river near Lyndhurst, New Jersey, at river mile 10.9, was dredged and capped.

In 2016, EPA issued a Record of Decision for the Lower 8.3 miles of the Lower Passaic River that included bank to bank dredging (approximately 3.5 million cubic yards) to a depth of about 2.5 feet to accommodate an engineered cap covering the lower 8.3 miles. The remedy also includes institutional controls and long-term monitoring.

Cleanup for the remainder of LPRSA and for the NBSA are still in the investigation phase. CERCLA contains provisions for the Superfund program's use of the existing capabilities of other Federal agencies in meeting its objectives. The EPA and U.S. Army Corps of Engineers (USACE) signed agreements in 1982 and 1984 stating, that upon

EPA request, USACE will manage design and construction contracts and provide technical assistance to EPA in support of remedial response cleanup of hazardous waste sites. Under these agreements, USACE may be assigned the following responsibilities:

- Remedial Investigation and Feasibility Study (RI/FS) activities;
- Remedial Design and Remedial Action activities;
- Technical Assistance to EPA on PRP, State and EPA contractor lead projects;
- Preparing Environmental Impact Statements;
- Obtaining Permits;
- Legal Determinations; and
- Obtaining Real Estate.

The outcome of the ongoing EPA – USACE cooperative process and the plan for addressing contamination in the LPRSA and the NBSA are not yet determined. Other government agencies, including the Federal Trustees, are also involved stakeholders in that process. Whatever cleanup actions are undertaken, it is unlikely that they will completely eliminate contaminated sediments in the affected areas. Natural resources within the DASS will likely continue to be exposed to hazardous substances and adversely affected as a result of that exposure.

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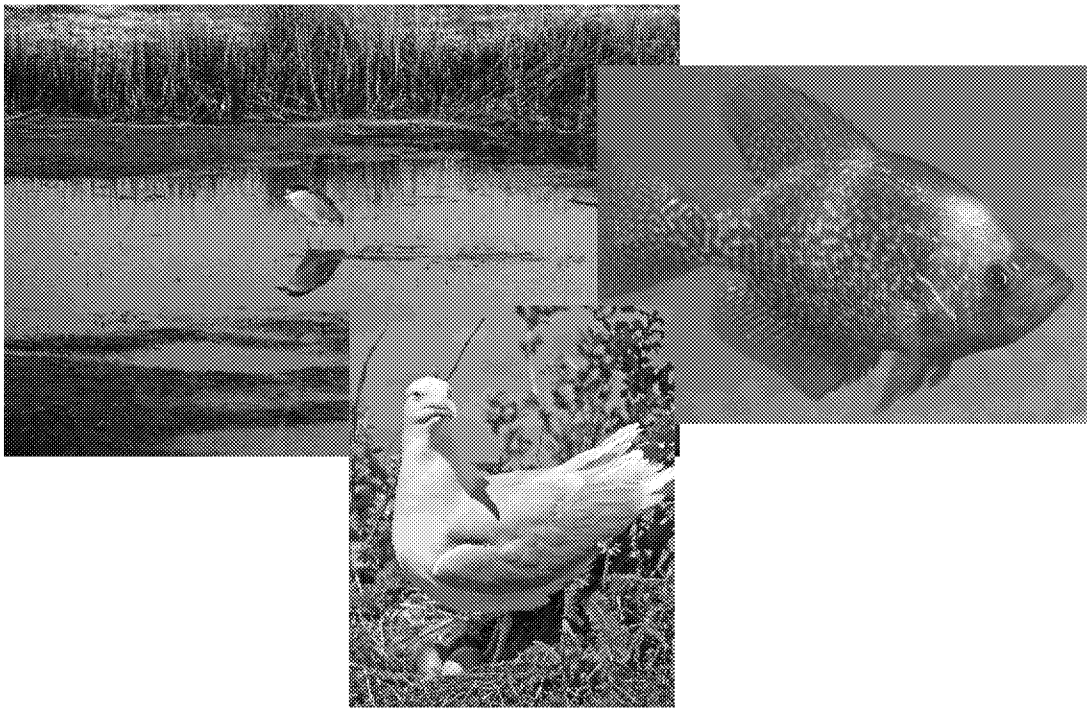
Chapter 3: The Role of the Federal Trustees



Clockwise from Upper Left: Black-crowned night heron feeding in mudflats; black crappie (Eric Engbretson, photographer); herring gull (Donna Dewhurst, photographer) (Photos Courtesy USFWS).

The authority for restoring natural resources injured by hazardous substances lies with the government agencies and Indian tribes identified as trustees.[13] The trustees act as stewards of our natural resources and hold these resources in trust for the public and future generations. Each trustee agency designates representatives to carry out NRDAs.

The trustees currently undertaking this NRDA for the DASS are the U.S. Department of the Interior and the U.S. Department of Commerce (the "Federal Trustees"). The respective designated representatives of these agencies are the USFWS and NOAA, respectively. The Federal Trustees intend to ensure that the public is adequately and appropriately compensated for injuries to trust resources incurred by releases of hazardous substances at the DASS.

The NRDA Process

The NRDA process involves injury assessment, damage determination, and resource restoration. The objective of NRDA is to quantify the nature and extent of injuries to trust resources resulting from exposure to hazardous substances and to either restore the injured resources to conditions that would have existed if the hazardous substances were not released ("baseline" conditions), or to provide for the restoration or replacement of

[13] The authority of the Federal Trustees is derived from CERCLA and the Clean Water Act. Based on CERCLA and the National Contingency Plan, the President has designated the Secretary of Commerce and the Secretary of the Interior to act as Trustees for particular natural resources managed or controlled by their agencies.

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the injured natural resource or for acquisition of an equivalent resource. In addition, the trustees may obtain compensation for impacts from the remedy that are unavoidable and for interim resource losses that occur between the onset of injury and the full return to baseline conditions. The NRDA process includes the components described below.

Preassessment Phase

During the preassessment phase, the trustees organize and assess available information about the area of concern and decide whether to proceed with a damage assessment. The findings of this evaluation for the DASS are summarized in the Pre-Assessment Screen for the Diamond Alkali Superfund Site, Newark, Essex County, New Jersey (NJDEP, NOAA, and USFWS 2004). The Trustees determined through the PAS that a damage assessment is warranted for the DASS because:

(1) hazardous substances were released to the Passaic River and Newark Bay Complex;
(2) natural resources within the jurisdiction of Trustee agencies have been or are likely to be adversely affected by the release;
(3) the quantity and concentrations of hazardous substances released are sufficient to potentially injure natural resources;
(4) the data sufficient to conduct a NRDA are available or can be obtained at a reasonable cost; and
(5) completed or planned response actions will not sufficiently remedy the injuries to natural resources without further action.

Preliminary Estimate of Damages

The Trustees completed a draft Preliminary Estimate of Damages (PED) for the DASS in July 2006 and concluded that the cost of the assessment will be less than the anticipated damages. The Federal Trustees will review and revise the PED at the end of the injury determination and quantification phases, or earlier, if appropriate. The PED and any significant modification of the PED will be discussed in the Report of Assessment, to be prepared by the Federal Trustees at the conclusion of the NRDA.

Assessment Plan Phase

Once the decision to conduct a NRDA is made, the trustees may develop a NRDA Plan. The purpose of the NRDA Plan is to ensure that the damage assessment is performed in a planned, systematic manner and that the studies proposed can be conducted for a reasonable cost. The NRDA Plan documents the exposure of natural resources to hazardous substance releases, and identifies the anticipated procedures for evaluating the injuries caused by this exposure. The trustees may then circulate the NRDA Plan for review and comment by the public and PRPs. The trustees may modify the NRDA Plan at any stage of the assessment as new information becomes available.

This Final NRDA Plan was prepared by the Federal Trustees for the DASS. It demonstrates that natural resources are exposed to hazardous substances, makes a preliminary determination of the recovery period, and outlines the currently proposed approach for the NRDA, including studies that have been completed, are in progress, or may be proposed. The Trustees sought public comment on the draft NRD Assessment

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Plan, and those comments, along with the Federal Trustees' responses, are provided in the Responsiveness Summary for the Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan (Appendix B). Later documents identifying specific studies to be undertaken and providing sampling and analytical details will be made available for stakeholder and public comment.

Injury Determination Phase

During this phase of the NRDA, the Federal Trustees will conduct investigations to determine whether natural resources have been injured by the release of hazardous substances. Injury is defined as "a measurable adverse change, either long-or short-term, in the chemical or physical quality or the viability of a natural resource" (43 C.F.R. § 11.14(v)), resulting either directly or indirectly from exposure to a hazardous substance. Injury determination is based upon investigations of: (1) the nature of the injury; and (2) the exposure pathway. The nature of the injury includes physical deformities, reproductive impairment, increased incidence of cancer, or death, behavioral abnormalities, or genetic mutations. Other impacts, such as exceedances of regulatory standards or the institution of fish consumption advisories or regulatory fishing closures in the assessment area, may also constitute injury. The exposure pathway refers to the way in which injured natural resources come into contact with a hazardous substance. For example, investigations may establish that fish are exposed through contact with contaminated water, suspended solids, or bedded sediments, or that birds are exposed through the consumption of contaminated fish.

After injury determination is complete, the Federal Trustees will review the NRDA Plan to ensure that methods proposed for the next phases, injury quantification and subsequently damage determination, are consistent with the results of the injury determination. The review will also ensure that selection of proposed methodologies remains consistent with the requirements of reasonable cost.

Injury Quantification Phase

In the injury quantification phase, the Federal Trustees will use the information developed during injury determination to quantify both the amount of each resource or service injured and the period of time over which the injury will occur. This will establish the total quantity of injured natural resources that must be restored or replaced.

The current proposed approaches to the injury determination and quantification phases are described in Chapter 4. Existing information and data will be used when possible. Where existing information is insufficient to establish the extent of a particular injury, the Federal Trustees may undertake new data collection and analysis.

Damage Determination and Restoration Phases

Once the injuries to natural resources and services are quantified, the Federal Trustees must determine how to restore or replace those resources, as well as the services those resources would normally provide. This can be done either by estimating the value of the injured resources and lost services, or by calculating the cost of the projects that will restore them. In some cases, it may be necessary for the Federal Trustees to use elements

of both approaches (while ensuring that there is no double-counting) to provide the most accurate account of injuries and ensure adequate restoration. For example, to address reproductive impairments in fish, the Federal Trustees may design projects that provide fish access to new breeding habitat that is free of contamination. The damage determination for such a project would involve calculating the costs of making the required ecological improvements. Alternatively, the Federal Trustees may undertake a study to calculate the value of the injuries in dollars.

The Federal Trustees will document their evaluation of restoration options in a RCDP, which will evaluate several restoration alternatives, summarize the rationale behind the selection of the preferred alternative, and establish the cost of the restoration activities. The RCDP will be distributed to the public and PRPs for review and comment. Such input facilitates the Federal Trustees' identification of restoration projects that focus on the natural resources injured and that provide the greatest benefits, while also taking cost into account.

At the conclusion of the NRDA, the Federal Trustees will prepare a Report of Assessment that includes the PAS, the PED, and the NRDA Plan. It will include documentation supporting evaluation determinations made during the injury determination, injury quantification, and damage determination phases. Finally, it will include the RCDP, along with comments received during the public review of that plan, and responses to those comments. The Report of Assessment will be released to the public.

Preliminary Determination of the Recovery Period

As part of the NRDA process, the trustees make a preliminary estimate of the time needed for the injured resources to recover. The recovery period is the length of time required to return the assessment area to baseline conditions. According to CERCLA, the recovery period may also refer to a lesser period of time (based on the facts of the case) selected by the authorized official (a federal or state official authorized to act on behalf of all affected federal or state agencies acting as trustees) and documented in the NRDA Plan.

Estimates of the recovery period must be based on the best available knowledge. Where appropriate, the estimates may be based on models develop using information gathered from published studies on the same or similar resources, the experience of resource specialists familiar with the injured resource or with restoration resulting from similar discharges elsewhere, or field and laboratory data acquired from assessment and reference areas. A number of factors are considered in estimating recovery times, including the ecological succession patterns in the area, the growth or reproductive patterns, life cycles, and ecological requirements of affected biological species, including their reaction or tolerance to the hazardous substances involved, the rate of bioaccumulation and the extent of hazardous substances in the food web, and the chemical, physical, and biological removal rates of those compounds from the exposed media.

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The biological, surface water, geologic resources, and air resources of the DASS continue to be exposed to hazardous substances. These natural resources will remain exposed as long as environmental media such as soils, sediments, groundwater, and surface water remain contaminated and provide pathways for exposure. Based on existing literature documenting the persistence of various hazardous substances found within the DASS, the evidence of continued toxicity and bioaccumulation of certain compounds, and the relatively long recovery periods estimated for other contaminated sites, the Federal Trustees' preliminary determination is that it will be decades before natural recovery occurs. Well-planned remedial actions would likely shorten the recovery period.

Federal Trustee Coordination with Other Government Agencies

Hazardous substances in the LPRSA are currently being addressed in an integrated effort among several federal and state agencies. The overall objectives are to characterize the nature and extent of contamination and harm to human health and the environment, and to evaluate alternatives for comprehensive cleanup and restoration.

EPA has undertaken studies to examine contamination of the local environment and evaluate potential cleanup options. Under a 2007 EPA administrative order, a group of 73 companies known as the Cooperative Parties[14] entered into a settlement agreement with EPA to conduct (with EPA oversight) a RI/FS of the LPRSA. In 2004, EPA entered into an agreement order with Occidental Chemical Corporation to conduct an RI/FS for the NBSA. These RI/FS will provide information needed to evaluate potential cleanup actions.[15] The Federal Trustees may use information obtained through remedial and restoration studies where suitable to assess injuries to natural resources within the DASS, with the ultimate objective of successfully restoring those injured resources. As appropriate, information exchange between the Federal Trustees, EPA, USACE, and the affected State(s) is ongoing and will continue in the future, and will help to avoid any duplication of efforts.

Importance of Public Participation

The Federal Trustees will provide opportunities that allow the public and PRPs to provide input on the decision-making process. The Federal Trustees will advertise those opportunities as they arise. As mentioned above, the Trustees sought public comment on the draft NRD Assessment Plan released in November 2007, and those comments, along with Federal Trustee responses, are provided in the Responsiveness Summary for the Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan (Appendix B).

Several specific points in the NRDA process provide important opportunities for public involvement. The most significant include:

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[14] The Administrative Order on Consent and the list of Cooperative Parties can be found at: http://www.epa.gov/region2/passaicriver/Passaic%202007%20AOC.pdf.

[15] Information on cleanup activities can be found in site repositories at the following locations: Newark Public Library, 5 Washington Street, Newark, NJ 07102; Elizabeth Public Library, 11 South Broad Street, Elizabeth, NJ 07202; and U.S. Environmental Protection Agency Records Center, 290 Broadway, 18th Floor, NY, NY 10007.

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(1) inviting comments on the Draft NRDA Plan, as well as on forthcoming plans for injury determination/quantification studies, which Federal Trustees will make available for public review; and
(2) inviting participation in restoration planning.

This Final NRDA Plan presents a framework for the Federal Trustees' planned activities, and is viewed as a living document that will continue to be developed and refined as the damage assessment progresses. During restoration planning, restoration objectives and criteria are discussed and restoration projects are considered. Individuals interested in participating in this process should visit the Federal Trustees' internet sites for the Passaic River[16], or contact the Federal Trustee representatives listed at the end of the Introduction.

Invitation for Cooperative Assessment

The Federal Trustees are interested in working with the DASS PRPs and encourage their active participation in the NRDA process. Such interactions provide for open dialog and identify common perspectives. The Federal Trustees believe that cooperative assessments have the potential to enhance the quality and acceptability of scientific studies, reduce costs, and expedite restoration. Cooperative assessments also provide PRPs the benefit of early involvement, the opportunity to participate in assessment and restoration, and an appreciation of the public's interest in restoring the resource.

At the option of the Federal Trustees, and with Federal Trustee oversight, PRPs interested in the cooperative process may implement all or any part of the damage assessment. A Notice of Intent to Perform an Assessment, including an invitation to participate in the Assessment, was sent to multiple PRPs as described in the Federal Register Notice of August 8, 2007. When PRPs express interest in a cooperative assessment, the Federal Trustees may enter into Funding and Participation Agreements, establishing procedures and schedules for sharing data, as well as to collaborate on analysis, documentation, data dissemination, data interpretation, and dispute resolution. Information on any such decisions and procedures will be shared with the public.

[16] USFWS: https://www.fws.gov/northeast/njfieldoffice/NRDAR/index.html.
NOAA: https://darrp.noaa.gov/hazardous-waste/lower-passaic-river-and-greater-newark-bayhttp://www.darrp.noaa.gov/northeast/passaic/index.html.

Chapter 4: The Diamond Alkali Superfund Site NRDA: Assessment and Restoration

The Federal Trustees are conducting a NRDA to evaluate injuries to natural resources exposed to hazardous substances within the DASS. In developing this Final NRDA Plan, the Federal Trustees are guided by the DOI regulations for performing NRDA under CERCLA.

Conducting a NRDA and restoring injured resources within the DASS is a significant undertaking. The size and difficulty of the effort are directly related to the complicated nature of the estuary and the hazardous substances within the ecosystem. For example, concentrations of hazardous substances vary significantly depending on location and whether samples are collected from sediment, soil, water, or animal tissues. Similarly, some animals may be exposed to large quantities of a hazardous substance due to their feeding habits, while others may be exposed only on occasion. Also, different species exhibit a wide range of effects following exposure to hazardous substances. Where one animal may show plainly visible abnormalities, others may exhibit responses that are more subtle. Finally, some biological effects can be observed only at certain developmental periods, such as sensitive early life stages.

As part of the assessment planning process, the trustees decide whether to conduct a simplified ("Type A") assessment or a comprehensive ("Type B") assessment. In light of the complexities noted above and other considerations, the Federal Trustees have determined that the simplified procedures of the "Type A" assessment provided under CERCLA are not appropriate for this NRDA, and that a "Type B" assessment should be conducted. The "Type A" procedures use minimal field observations and computer models to generate a damage claim, and are limited by the regulations to the assessment of relatively minor, short duration discharges. The Federal Trustees concluded that "Type B" procedures are justified because:

(1) the nature of the releases and exposures to hazardous substances in the DASS are long-term and spatially and temporally complicated;
(2) substantial site-specific data already exist to support the assessment; and
(3) additional site-specific data can be collected at a reasonable cost.

As required for "Type B" assessments, Quality Assurance (QA) Plans are developed for each investigative component; QA management is presented in the Appendix A.

The Federal Trustees intend to conduct the NRDA in two phases:

(1) injury determination and quantification; and
(2) damage determination and restoration planning.

The Federal Trustees' general approach to the assessment is to review the existing data, identify data gaps, and undertake, as warranted, additional testing and sampling. This minimizes the cost of the assessment and maximizes the use of existing information. Within each phase noted above, the Federal Trustees will, based on initial data review and additional preliminary investigations where necessary, develop individual robust and

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scientifically defensible investigations and modeling that together will define and compensate for the nature and extent of injuries caused by the release of hazardous substances within the DASS. This framework is consistent with CERCLA and its implementation regulations, providing for an effective means of evaluating injury to natural resources due to the release of hazardous substances within the DASS.
The remaining sections of this chapter provide overviews of each phase of the assessment and summarize the Federal Trustees' approach for each category of natural resource.

Injury Determination and Quantification
Injuries generally fall into two categories. The first category involves injury based on regulatory criteria, which may include violation of established standards for acceptable levels of contamination or the existence of state health advisories warning against the consumption of contaminated fish or wildlife. The second category establishes injury based on physical, chemical, or biological adverse changes in a resource resulting from exposure to hazardous substances. Examples of these injuries include changes in an organism's physical development, health, reproductive success, survivorship or behavior.

The injury to a resource can be quantified in terms of the loss of services that the resource would have provided had the release of hazardous substances not occurred. Loss of services may include impairment of a habitat that supports a native species or diminished human use of a resource. Injury determination and quantification studies typically are performed by scientists who compare their observations regarding samples collected from the contaminated area to samples collected from appropriate reference locations. These studies may be performed in a laboratory, in the field, or in a combination of the two settings.

The Federal Trustees are considering conducting injury assessments for the following natural resources: biological resources (such as fish and birds), surface water (including sediments), geologic resources, and air resources (Exhibit 4-2). The Federal Trustees intend to evaluate whether each resource should be included in the NRDA by using a phased approach. The phased approach can be categorized as either preliminary investigations or injury determination studies. Data from any preliminary investigation will be assessed by the Federal Trustees to determine whether injury determination studies are warranted. Should the Federal Trustees determine, based on preliminary investigation, that a full injury study is warranted, the Federal Trustees will develop a study plan for any such effort that will be released to the public for comment. For each resource, the Federal Trustees will gather existing information about past, present, and predicted future concentrations of hazardous substances. The Federal Trustees intend to maximize the use of data gathered in support of the DASS RI/FS. Where data are limited, the Federal Trustees may decide to conduct further assessment studies. The compiled concentration and exposure data will be compared to known criteria, standards, guidance values, or other threshold values which, if exceeded, may indicate that injury to that resources exists, or is likely to exist. Results will be evaluated by the Federal Trustees to determine whether more thorough injury determination and quantification studies are warranted, or whether a particular resource should not be assessed further for injury.

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The Federal Trustees may also undertake, as warranted, additional studies to evaluate the sources and pathways of hazardous substances within the DASS.

When the Federal Trustees determine, based on a preliminary investigation, that an injury study is warranted for a particular resource, the Federal Trustees will develop a study plan. Study plans will include detailed information including, but not limited to: objectives to be achieved by testing and sampling, sampling locations, sampling and survey design, numbers and types of samples to be collected, analyses to be performed, and other information required to perform the selected methodologies. The Federal Trustees presently expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the Federal Trustees also presently intend that the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used.

Fish and Shellfish

Fish and shellfish are critical links in the food web of the DASS. They serve as both predators and prey in the food web, where they consume plants, insects, shellfish, worms, and other organisms. In turn, fish and shellfish are consumed by amphibians, reptiles, birds, and mammals. The DASS provides habitat to shellfish and resident and migratory fish, including several species of special concern. The resource is used by recreational and subsistence anglers and crabbers. It has also historically supported a vibrant catch, including perch, herring, sturgeon, alewife, shad, oyster, and crabs (Holmes ca. 1895, Squires 1981). Because many of the fish and shellfish within the DASS are in direct contact with contaminated sediment, water, and prey, they are an important indicator of the overall health of the ecosystem.

Injury to fish and shellfish will be based on the definitions contained under CERCLA and its implementing regulations. Injuries may potentially include, but are not limited to: mortality, reduced growth, osmoregulatory impairment, lowered disease resistance, behavioral avoidance and other behavioral abnormalities, reproductive impairment, endocrine effects, developmental abnormalities, narcosis, lesions, as well as lost human uses such as cultural service losses and fish consumption restrictions. The studies under consideration by Federal Trustees to evaluate injuries to fish within the DASS follow.

<u>Fish and Shellfish Consumption Prohibitions / Advisories</u>

Public use of the DASS includes recreational and potentially subsistence angling, with fishery resources in close proximity to a large number of people. These estuarine waterways traditionally supported a variety of freshwater, anadromous, and marine fish species that are popular with recreational and subsistence anglers. Fish advisories were first issued for the lower Passaic River in 1982 for striped bass, American eel, bluefish, white perch and white catfish based on PCBs quantified in edible tissues. A prohibition on the sale of striped bass and American eels from the lower Passaic River was also issued at that time.

Extremely high concentrations of dioxin within the DASS led the NJDEP to issue an Administrative Order in 1983 prohibiting the consumption and sale of all fish and

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shellfish from the Passaic River, from its mouth to Dundee Dam. This order also advised against consumption of any fish or shellfish from Newark Bay, the Hackensack River upstream to the Oradell Dam, the Arthur Kill, and the Kill Van Kull (NJ Administrative Order EO-40-17). In 1984, the sale or consumption of striped bass and blue crabs from Newark Bay, the Arthur Kill, the Kill Van Kull, and the tidal Hackensack River were prohibited as well (NJ Administrative Order EO-40-19) (Hauge *et al*. 1990). Additionally, a ban on crab harvest ("no take") has applied to crabs in the lower Passaic River and the Newark Bay Complex since 1994. In fact, the NJDEP stated that the calculated magnitude of cancer risk due to consuming blue crabs from the DASS was "one of the highest encountered by the NJDEP in any context" (NJDEP 2002a). In 2003, advisories were modified to reflect the potential cancer risk, becoming more stringent for some species. The State of New Jersey routinely issues Fish and Shellfish Consumption Prohibitions / Advisories with the annual State fishing regulations. The 2019 Fish and Shellfish Consumption Prohibitions / Advisories (NJDEP and NJDOH 2019) for the waters of the DASS follow (Exhibit 4-1).

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Exhibit 4-1 2019 Fish and Shellfish Consumption Prohibitions / Advisories

Newark Bay Complex *Including Newark Bay, Tidal Hackensack River, Arthur Kill, Kill Van Kull, and all tidal tributaries*		
Species	General Population[2,3]	High-Risk Population[1,2,3]
Blue Crab[4]	Do not harvest or eat[5]	Do not harvest or eat[5]
Striped Bass[4]	Four meals per year	Do not eat
White Perch	Four meals per year	Do not eat
White Catfish	One meal per year	Do not eat
American Eel	Four meals per year	Do not eat
Atlantic Needlefish	One meal per month	Do not eat
Rainbow Smelt	One meal per month	Do not eat
Gizzard Shad	Do not eat	Do not eat
Bluefish	One meal per month	Do not eat
Summer Flounder	One meal per month	Do not eat
Passaic River (Tidal) *From the head of tide at Garfield to Newark Bay and all tidal tributaries*		
Species	General Population[2,3]	High-Risk Population[1,2,3]
Blue Crab[4]	Do not harvest or eat[5]	Do not harvest or eat[5]
All finfish & shellfish[5]	Do not eat	Do not eat

[1] High-Risk Individuals include infants, children, pregnant women, nursing mothers and women of childbearing age.

[2] One meal is defined as an eight-ounce serving.

[3] Eat only the fillet portions of the fish. Use proper trimming techniques to remove fat, and cooking methods that allow juices to drain from the fish (*e.g.*, baking, broiling, frying, grilling, and steaming).

[4] Selling these species for human consumption from designated New Jersey waters is prohibited.

[5] No harvest means no taking or attempting to take any blue crabs from these waters.

Source: (NJDEP and NJDOH 2019)

New York has issued a series of similar advisories since 1985 for the Arthur Kill, Kill Van Kull, and Newark Bay. These have included "once a month" and "do not eat" advisories for up to fourteen species at various times. The current level of use of the resource by recreational and subsistence anglers may be considerably lower than would be the case without the fishing restrictions. It is the intention of the Federal Trustees to undertake an assessment of losses to recreational and potentially subsistence angling within the DASS as part of the NRDA process.

The EPA also has developed guidance regarding fish consumption limits for non-cancer and cancer health endpoints (EPA 2000). For unrestricted consumption (more than

sixteen meals per month), the recommended maximum fish tissue concentrations of methylmercury, DDT, PAHs, PCBs, and dioxin/furan TEQs are 0.029 parts per million (ppm) (noncancer health endpoint), 0.0086 ppm (cancer health endpoint), 0.0004 ppm (cancer health endpoint), 0.00015 ppm (cancer health endpoint), and 0.019 pptr (cancer health endpoint), respectively. These numbers are risk-based default values, and are subject to change by the states, where states have not presented alternative values, or where states' numbers are considerably different from one another. EPA values may help reconcile those differences.

Under CERCLA, fish consumption advisories such as those issued by New Jersey and New York, constitute an injury. To document this injury, the Federal Trustees are evaluating the events that led to the imposition of fishing restrictions, the changing scope of restrictions over time, and the nature of restrictions that exist today. The Federal Trustees intend to analyze the extent of injuries and the type and amount of restoration that may be necessary to compensate the public for such loss.

Biological Injury of Fish and Shellfish

Under CERCLA, biological injury exists when the concentration of a hazardous substance is sufficient to cause a variety of adverse health effects in fish, such as death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including reproductive malfunctions), or physical deformations. A variety of hazardous substances are found of fish and shellfish tissues within the DASS.

As a first step in evaluating the potential presence and severity of such effects, the Federal Trustees will identify tissue-based thresholds in the literature associated with adverse impacts to fish and shellfish. Potentially appropriate thresholds have been published for some hazardous substances of concern (*e.g.*, Beckvar *et al.,* 2005, Spitsbergen *et al.,* 1991, Toomey *et al.,* 2001, Wintermyer and Cooper 2003). The Federal Trustees will review these and other potentially relevant CBRs for applicability to the DASS NRDA. The Federal Trustees may also develop additional CBRs based on available eco-toxicological literature.

When temporal, spatial, and species data gaps are found, the Federal Trustees may determine that additional sampling is necessary to better characterize the extent of contamination in fish and shellfish. In that event, the Federal Trustees may perform additional data collection activities to provide a better understanding of potential injury to the DASS's fish and shellfish resources.

Fish and Shellfish Community Health

Available literature suggests causal linkages between some hazardous substances and health impacts to fish and shellfish. For instance, PAHs have been linked to a wide range of adverse effects in fish including deformities, lesions, and tumors (Logan 2007, Pinkney *et al.*, 2004).

In light of the potential for such impacts, the Federal Trustees may evaluate fish and shellfish health as indicated by the presence of abnormalities (such as deformities, eroded

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fins, lesions, and tumors), as well as the incidence of diseases, parasitic infections, or other health metrics in one or more species. This information, combined with data on DASS contaminant levels, will help the Federal Trustees better understand the incidence, severity, and potential extent of injuries to the fish and shellfish communities. The Federal Trustees may also evaluate the overall status of the fish and shellfish communities through studies designed to assess community composition, species abundance, distribution patterns, or other similar metrics. As part of such studies, the Federal Trustees would identify and characterize appropriate reference areas to understand the likely baseline condition.

The Federal Trustees may supplement fish and shellfish community health with a comprehensive literature review. The review would compare the results of previous studies of fish and shellfish at the DASS to current studies performed as part of the damage assessment, as well as to studies from other locations (particularly those subject to similar degrees of contamination, to the extent available).

Fish and Shellfish Early Life Stages

Fish and oysters are among the most sensitive species to the effects of dioxins, being especially vulnerable during early life stages (Boening 1998, Elonen *et al.,* 1998, Tietge *et al.,* 1998, Hahn 2001, Wintermyer and Cooper 2003). Young fish exposed to sufficiently high concentrations of TCDD exhibit symptoms resembling blue-sac disease, including edema, hemorrhaging, cardiac impairment, craniofacial deformity, and death (Elonen *et al.,* 1998, Cook *et al.*, 2003, King-Heiden *et al.,* 2011, Singleman 2017), while oysters show altered embryonic development (Wintermyer and Cooper 2003). Other DASS contaminants, including PAHs and PCBs, are also particularly toxic to early life stages, adversely affecting the development of fish eggs and/or young of the year (EPA 2008, Barron *et al.,* 2004, Chambers *et al.,* 2012).

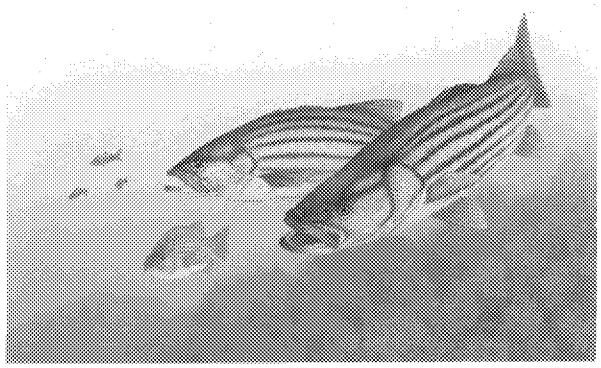
To better understand the impacts that these or other hazardous substances may have on fish and shellfish at or from the DASS, the Federal Trustees may conduct studies on the effects of these substances on the early life stages of relevant species. The specifics of any such studies are yet to be determined, but could potentially include laboratory toxicity evaluations and/or *in situ* investigations. Results would be interpreted in the context of site-specific conditions as well as prior research on the contaminant(s) and species of interest.

U.S. Food and Drug Administration Evaluation

To protect human health, the USFDA requires that fishery products containing certain hazardous substances in excess of safe levels be removed from commerce. Under CERCLA, fishery resources are injured if they contain concentrations of a hazardous substance sufficient to exceed action levels or tolerances established by the USFDA. Current USFDA tolerances, action levels, or guidance values for PCBs, DDTs, and methylmercury in edible fish tissue are 2.0, 5.0, and 1.0 ppm, respectively (USFDA 2001). The USFDA does not have a uniform guidance value for dioxin or dioxin TEQs. However, in response to an incident involving contamination of animal feed by dioxin, USFDA scientists established a "level of concern" of 1 pptr in edible tissues of fish, eggs, meat,

poultry, and other food products (FSIS 1997). Tissues containing higher concentrations were deemed adulterated and unfit as food (General Accounting Office 1998). In another incident, egg and egg-containing products from Belgium, France, and the Netherlands and animal feed containing products from Europe were prohibited from importation unless demonstrated to contain less than 1 pptr dioxins (USFDA 1999).

The Federal Trustees will compare the available fish and shellfish tissue data from the DASS with USFDA tolerances and action levels. Upon completion, results will be made available to the public.



Striped Bass Illustration by Timothy Knepp (Courtesy USFWS).

Birds

Birds are an integral part of the ecosystem and provide a number of important ecosystem services such as seed distribution, plant pollination, and insect control. Birds are also an important source of prey to other species. Birds are valued by the public through participation in activities such as bird watching, nature study, and bird feeding.

Birds may be exposed to hazardous substances through the direct ingestion of contaminated water, sediment, or soil. There is general scientific consensus that dietary ingestion of hazardous substances such as dioxins, PCBs, certain classes of pesticides and mercury, via contaminated prey, is the most significant exposure pathway. Food items contaminated by releases of hazardous substances into the estuary ecosystem include fish, benthic invertebrates, amphibians, aquatic insects, adult insects that develop from aquatic larvae, plants growing in or near the river, or mammals that forage in the floodplains. The Federal Trustees intend to assess the potential injuries to birds from exposure to hazardous substances in the DASS based on definitions of injury under CERCLA and its implementing regulations. Potential injuries may include, but are not limited to: reproductive impairment, chronic metabolic toxicity from dietary exposure, and acute/chronic toxicity from direct contact with and/or ingestion of sediments. The studies that the Federal Trustees are considering to evaluate potential injuries to birds follow.

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Waterfowl Consumption Advisory

The State of New York has statewide waterfowl consumption advisory due to contamination by PCBs, mirex, chlordane, and DDT (NYSDOH 2006); this advisory remains in effect for the 2019-2020 waterfowl hunting season. Specifically, the State recommends that mergansers should not be eaten, and that other waterfowl should not be eaten more than two times per month. While the State of New Jersey has not issued an advisory for species other than fish or shellfish, the Federal Trustees may evaluate concentrations of hazardous substances in tissues of waterfowl in relation to a waterfowl advisory in the future.

Biological Injuries to Birds

Estuaries, when healthy, provide a rich source of food in the form of fish and benthic invertebrates, thereby supporting a diverse array of avian species. The DASS and surrounding New York and New Jersey Harbor Estuary support over 70 species of birds, including waterfowl, wading birds, shorebirds, songbirds, and birds of prey, that could have varying levels of sensitivity to contamination (*e.g.,* Farmahin 2013a, b). Some species live in and around the river throughout the year, while others use the river only for breeding, feeding, as an over-wintering area, or as a stopover during long migrations.

Hazardous substances adversely affect reproduction, growth, health, and survival of numerous bird species. A limited number of studies document the presence of hazardous substances in birds from the DASS; concentrations of TCDD and dioxin-like compounds, PCBs, mercury, and PAHs were found to be elevated in blood, feathers, and/or eggs of double-crested cormorants and black-crowned night herons from in the Kill Van Kull and Arthur Kill, respectively (Parsons 2003, USFWS 1997b, USFWS 2000b) (Exhibit 4-2).

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Exhibit 4-2 Concentrations of Select Hazardous Substances Measured in Birds from New York Harbor

Chemical	Location	Species	Source	Tissue	Sample Size	Range	Mean
2,3,7,8-TCDD (pg/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	8.59 - 201	59.8
				Plasma	11	1.13 - 10.1	3.14
	Swinburne Island	DCC	a	Eggs	13	7.76 - 48.1	28.2
				Plasma	13	0.58 - 1.63	1.03
	Shooter's Island	DCC	b	Eggs	8	44.1 - 161	83
	Isle of Meadows	BCNH	b	Eggs	10	3.2 - 86.8	13.41 (g)
	Shooter's Island	DCC	c	Eggs	5	16 - 241	103
Total dioxins and furans[1] (pg/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	44.2 - 440	191
				Plasma	11	6.23 - 18.0	11.2
	Swinburne Island	DCC	a	Eggs	13	70.7 - 186.0	121
				Plasma	13	6.46 - 58.6	12.4
Total dioxins and furans (total homologues)[2] (pg/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	23 - 393	155
				Plasma	11	0 - 10.1	3.93
	Swinburne Island	DCC	a	Eggs	13	47.1 - 143	96.9
				Plasma	13	0 - 10.7	2.94
Dioxin and Furan TEQs[3] (pg/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	NA	92
				Plasma	11	NA	3.99
	Swinburne Island	DCC	a	Eggs	13	NA	55.8
				Plasma	13	NA	2.00
	Shooter's Island	DCC	c	Eggs	5	34 - 289	138
Dioxin, Furan, and PCB TEQs[4] (pg/g wet wt.)	Shooter's Island	DCC	c	Eggs	5	254 - 767.0	604
Total PCBs (Total Aroclors) (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	3380 - 69200	24700
				Plasma	11	158 - 544	323
	Swinburne Island	DCC	a	Eggs	13	3208 - 20300	12700
				Plasma	13	39.2 - 145	107
Total PCBs (Total Congeners) (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	1980 - 40400	13900
				Plasma	11	105 - 331	209
	Swinburne Island	DCC	a	Eggs	13	1930 - 13200	8000
				Plasma	13	30.3 - 108	77.5
PCB TEQs[5] (pg/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	NA	322
				Plasma	11	NA	8.48
	Swinburne Island	DCC	a	Eggs	13	NA	249
Total DDTs (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	NA	3870
				Plasma	11	NA	48
	Swinburne Island	DCC	a	Eggs	13	NA	1790
				Plasma	13	NA	9.7
2,4'-DDT (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	0.25 13.9	2.60
				Plasma	11	0 0.31	0.0788
	Swinburne Island	DCC	a	Eggs	13	0 - 0.44	0.252
				Plasma	13	NA	NA
4,4'-DDT (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	3.19 50.2	18.8
				Plasma	11	0.13 2.24	1.02
	Swinburne Island	DCC	a	Eggs	13	1 16.7	7.28
				Plasma	13	0 0.31	0.129
2,4'-DDD (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	0.12 60.5	6.44
				Plasma	11	0 0.42	0.126
	Swinburne Island	DCC	a	Eggs	13	0 0.52	0.164
				Plasma	13	NA	NA
4,4'-DDD (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	2.59 2150	181
				Plasma	11	0.17 8.00	2.54
	Swinburne Island	DCC	a	Eggs	13	0.43 6.82	2.93
				Plasma	13	0 0.11	0.062
2,4'-DDE (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	0 28.9	2.64
				Plasma	11	0 0.18	0.0622
	Swinburne Island	DCC	a	Eggs	13	0 0.98	0
				Plasma	13	NA	NA
4,4'-DDE (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	487 12100	3660
				Plasma	11	12.8 88.9	44.1
	Swinburne Island	DCC	a	Eggs	13	300 5700	1780
				Plasma	13	3.40 16.8	9.49

Exhibit 4-2 continued

Chemical	Location	Species	Source	Tissue	Sample Size	Range	Mean
PAHs (ng/g wet wt.) (Naphthalene[6])	Shooter's Island	DCC	a	Eggs	14	2.63 - 9.6	4.605
				Plasma	10	5.52 - 11	7.28
	Swinburne Island	DCC	a	Eggs	13	2.07 - 3	2.53
				Plasma	12	5.99 - 15	8.01
Total mercury (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	14	85.4 - 1130	338
				Down	10	2540 - 5560	3672
				Feather	11	2310 - 13800	5630
				Blood	11	65.9 - 401	195
	Swinburne Island	DCC	a	Eggs	13	154 - 673	342
				Down	12	2390 - 5060	3600
				Feather	12	3350 - 5840	4590
				Blood	14	99.7 - 198	168.3
Methylmercury (ng/g wet wt.)	Shooter's Island	DCC	a	Eggs	3	175 - 320	230
				Down	2	3160 - 5900	4530
				Feather	2	2750 - 3310	3030
				Blood	2	160 - 167	163.5
	Swinburne Island	DCC	a	Eggs	3	146 - 525	282
				Down	2	2890 - 4330	3610
				Feather	2	3260 - 4400	3830
				Blood	2	169 - 204	186.5

[1]Total dioxins and furans include 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; 1,2,3,4,7,8-HxCDD; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDD; 1,2,3,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDD; 1,2,3,7,8,9-HxCDF; 1,2,3,7,8-PeCDD; 1,2,3,7,8-PeCDF; 2,3,4,6,7,8-HxCDF; 2,3,4,7,8-PeCDF; 2,3,7,8-TCDD; 2,3,7,8-TCDF; OCDD; OCDF.
[2]Total dioxins and furans (total homologues) includes homologue groups HPCDD, HPCDF, HXCDD, HXCDF, PECDD, PECDF, TCDD and TCDF.
[3]Predicted toxic equivalents of Ah receptor-active dioxins and furans based on WHO avian toxic equivalent factors from van den Berg *et al.*, (1998).
[4]Predicted toxic equivalents of Ah receptor-active dioxins, furans, and PCBs based on WHO avian toxic equivalent factors from van den Berg *et al.*, (1998).
[5]Predicted toxic equivalents of Ah receptor-active PCB congeners (77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, 189) based on WHO avian toxic equivalent factors from van den Berg *et al.*, (1998).
[6]Data for total PAHs, high molecular weight PAHs, and low molecular weight PAHs are not available. Only data for naphthalene, the PAH analyte contributing the greatest concentration to total are presented.
pg/g = picograms per gram
ng/g = nanograms per gram
wt. = weight
DCC = double crested cormorant
BCNH = black crowned night heron
(g) = geometric mean
PCBs = polychlorinated biphenyls
PAHs = polycyclic aromatic hydrocarbons
HMW = high molecular weight
LMW = low molecular weight
NA = not applicable/available
Sources:
a Data from Parsons (2003). Values for non-detects assumed to be zero.
b Data from USFWS (1997b). Values for non-detects assumed to be one-half detection limit.
c Data from USFWS (2000b). Values for non-detects assumed to be one-half detection limit.

The Federal Trustees presently intend to conduct an evaluation of the effects of hazardous substances within the DASS on birds. This work will involve reviewing existing scientific studies, evaluating exposure and tissue concentrations associated with avian injury, and summarizing bird exposure data. Based on the results of this work, the Federal Trustees may undertake, as warranted, additional studies to elucidate a better understanding of exposure and potential injury of avian resources in the area.

Breeding Bird Surveys

Every bird species found within the DASS uses specific types of habitats for feeding, breeding, and nesting. To perform injury studies involving birds, it is important that the Federal Trustees understand the relationship between the DASS and each species'

particular habitat and foraging preferences. Such relationships help define the likelihood that a given species is at risk for adverse impacts from hazardous substances. To confirm the presence, relative abundance, and breeding and foraging habitat requirements of bird species across the DASS, the Federal Trustees will review information available from previous breeding bird surveys of the area. The Federal Trustees will review temporal and spatial trends of breeding birds within the DASS in relation to chemical distributions. Further surveys may be undertaken as needed. The results of these investigations would provide information useful in planning future avian injury determination studies, as well as help the Federal Trustees decide which species to include in the damage determination.

For example, the New York City Audubon Society, as part of its Harbor Heron Project, has performed surveys of colonial wading birds in New York/New Jersey Harbor for the past 30 years. Those surveys show that the breeding activity of colonial wading birds on Shooter's Island was low during the 1970s and 1980s, began increasing in the 1990s, and has declined to nearly zero since 2001 (Exhibit 4-7). These bird use declines in breeding activity caused the USFWS to conduct a 2003 pre-assessment investigation on Hoffman and Swinburne Islands of herring gulls and black-crowned night herons (Grasman *et al.,* 2013). Additional studies could help the Federal Trustees design studies to characterize the effects of hazardous substances on local bird populations.

Avian Developmental Studies

There are limited studies in and around the DASS to evaluate the exposure of birds to some hazardous substances at sensitive early life stages. Quantifiable concentrations of several hazardous substances were detected in bird eggs of a variety of species that inhabit the DASS at levels found in other studies to be associated with harmful effects. For example, studies (Parsons 2003,USFWS 1997b, 2000b) show that eggs from black-crowned night herons and double-crested cormorants in the Harbor contain concentrations of dioxins and PCBs at levels that induced brain asymmetries in great blue herons (Henshel 1998). The concentrations also correlate with reduced embryo weight in black-crowned night herons (Hoffman *et al.,* 1986) and vitamin A depletion and porphyria in herring gulls (Fox *et al.* 1988; Spear *et al.,* 1990). Concentrations were also consistent with reduce hatching success and developmental abnormalities in common terns (Hoffman *et al.,* 1993).

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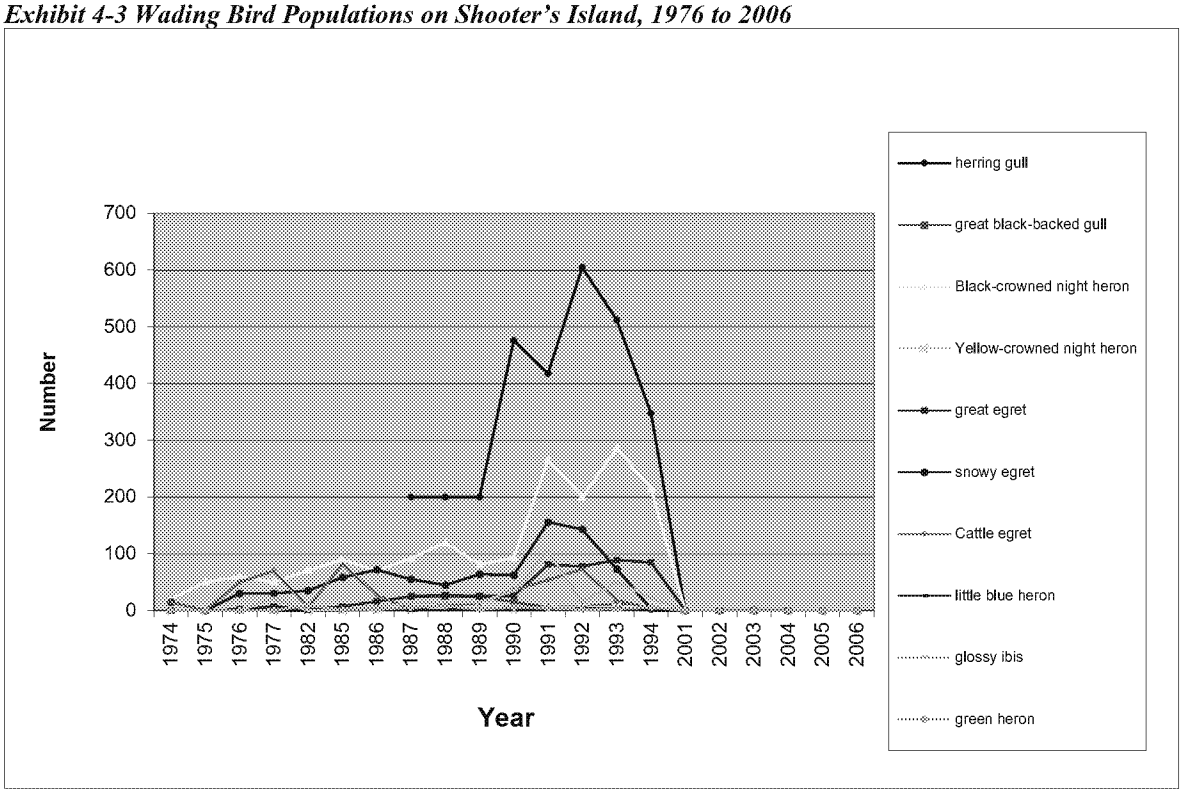
Exhibit 4-3 Wading Bird Populations on Shooter's Island, 1976 to 2006



Data from Bernick (2005, 2006); Kerlinger(2004); and Parsons (1994).

Further, these levels increase the frequency of beak and foot abnormalities, reduce egg hatchability, and decrease weight of embryos and hatchlings in Forster's tern (Hoffman *et al.,* 1987; Kubiak *et al.,* 1989), negatively correlated with reproductive success in bald eagles (Bowerman *et al.,* 1994; Kubiak and Best 1991), and induce beak deformities in double-crested cormorants (Yamashita *et al.,* 1993; Exhibit 4-2). Finally, DDE concentrations in blood plasma and eggs of double-crested cormorants in the Harbor occur at levels that correlate with egg abnormalities and death in double-crested cormorants (Yamashita *et al.,* 1993) and reduce reproductive success of bald eagles (Bowerman *et al.* 1994; Kubiak and Best 1991; Wiemeyer *et al.,* 1984). Studies of herring gulls in the Great Lakes, for which long-term monitoring efforts provide a wealth of information regarding exposure to and effects of a variety of hazardous substances (for example, Fox *et al.,* 2002; Hebert *et al.,* 1999), may also be used to evaluate injury to birds in the DASS.

To provide further insight into the effects of hazardous substances on sensitive life stages in birds, the Federal Trustees may implement additional studies that evaluate chemical concentrations in eggs from other species and areas within and near the DASS. Such studies may help determine whether further avian injury determination and quantification studies are warranted.

Evaluation of Avian Exposure from Feeding on Floodplain Organisms

Some bird species use floodplains extensively for feeding. For example, American robins forage on the ground or in low vegetation by probing with their beaks or by gleaning. They may also forage along the edge of streams. American robins feed heavily on ground-dwelling invertebrates, particularly during the months before and during the breeding season when they feed their young such items as earthworms and grubs obtained in moist forests and open woodlands. Other avian species occurring in the DASS that frequently feed in floodplains include red-winged blackbird, gray catbird, eastern meadowlark, mourning dove, northern oriole, thrushes, woodpeckers, wrens, goldfinch, catbird, rose-breasted grosbeak, rufous-sided towhee, blue jay, cardinal, scarlet tanager, flycatchers, yellow-throated vireo, and Kentucky warbler.

Relatively few soil screening benchmarks are available that are based on potential risk to wildlife from the bioaccumulation of hazardous substances. Available values include Preliminary Remediation Goals (PRGs) for Ecological Endpoints developed by the U.S. Department of Energy (Efroymson *et al.,* 1997), Ecological Screening Levels developed by EPA Region 5 (EPA Region 5 2003), and a set of risk-based guidance values for TCDD, intended to protect wildlife, developed by the Health Council of the Netherlands (Health Council of the Netherlands 1996). These values and the endpoints on which they are based, are shown in Exhibit 4-8. Other screening values can be derived from loading rates developed for land application of sewage sludge containing TCDD or other compounds, such as done previously (Thiel *et al.,* 1995). This method may have advantages over soil concentration-based criteria in situations where hazardous substances are deposited in a relatively thin layer on the surface, as might occur through flooding during storm events.

Exhibit 4-4 Soil Screening Values Based on Risk to Wildlife for Some Hazardous Substances Found within the DASS

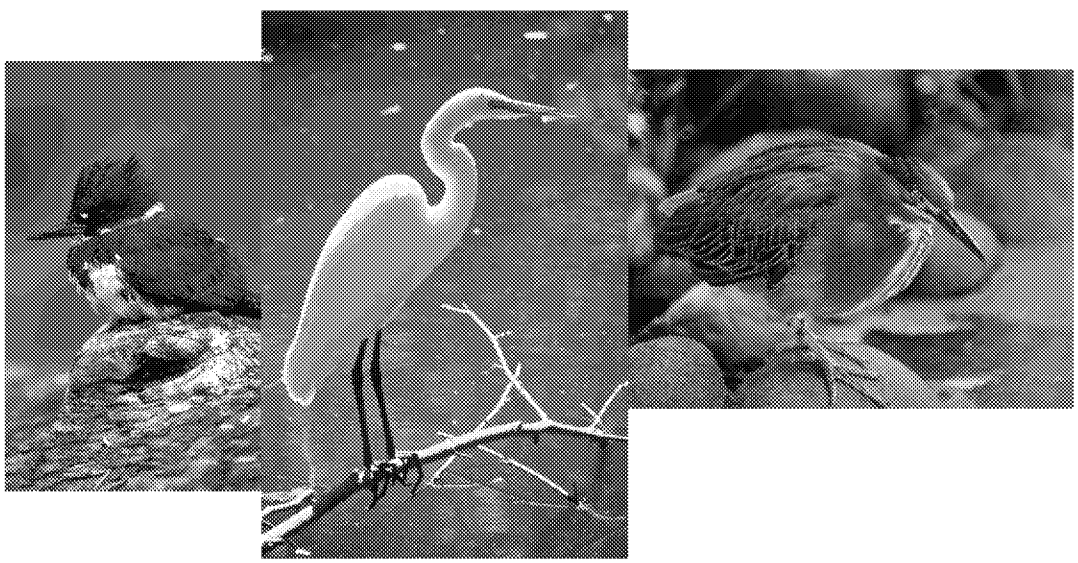
Hazardous Substance(s)	Soil Concentration	Units	Endpoint	Source
TCDD	0.199 2 3.15	pptr pptr pptr	Shrew Wildlife Shrew	EPA Region 5 (2003) Health Council of the Netherlands (1996) Efroymson *et al.* (1997)
TCDF	0.84	ppb	Hawk	Efroymson *et al.* (1997)
PCDDs	0.199	pptr	Shrew	EPA Region 5 (2003)
PCDFs	0.0386	ppb	Shrew	EPA Region 5 (2003)
PCBs	371 0.332	ppb ppb	Shrew Shrew	Efroymson *et al.* (1997) EPA Region 5 (2003)
DDD	4.88	ppb	Shrew	EPA Region 5 (2003)
DDE	3.16	ppb	Shrew	EPA Region 5 (2003)
DDT	4.15	ppb	Shrew	EPA Region 5 (2003)
Mercury	0.51	ppb	Woodcock	Efroymson *et al.* (1997)

TCDD= 2,3,7,8 tetrachlorodibenzo-*p*-dioxin
PCDDs = dioxin congeners
PCDFs = furan congeners
PCBs = polychlorinated biphenyls
DDD = 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane
DDE = 1,1-dichloro-2,2-bis(chlorophenyl)ethylene
DDT = 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane
pptr = parts per trillion
ppb = parts per billion

Little information is available regarding the concentrations of hazardous substances in floodplain soils within the DASS. The Federal Trustees may undertake studies to determine whether those concentrations are sufficiently high to cause injury to avian species feeding on floodplains in the study area. Such an evaluation may potentially involve measuring concentrations of hazardous substances in soils from the DASS and comparing those concentrations to screening values, determining concentrations of hazardous substances in dietary items of birds within the DASS and comparing those concentrations to toxicity reference values from the scientific literature, and evaluating tissue concentrations and resulting health effects of hazardous substances in floodplain-dependent bird species, including sensitive life stages, within the DASS. Additionally, a risk-based approach developed for sewage-sludge applications could be applied to floodplain soils contaminated by hazardous substances carried in sediments and deposited during flood events (Meyn *et al.,* 1997). This approach incorporates information such as application (*i.e.*, flooding) rate, depth, soil bulk density, percent solids, application (flooding) frequency, and contaminant half-life into a model that evaluates risk through dietary exposure to contaminated soil.

USFDA Evaluation

Natural resources are injured when concentrations of PCBs in wild waterfowl exceed the USFDA's tolerance for poultry. To protect human health, the USFDA requires that poultry containing PCB concentrations in excess of safe levels be removed from commerce. For PCBs, this tolerance level is currently 3 ppm in the fat tissue, or 5 ppm in the muscle tissue (USFDA 1987). While there are no federal tolerances for dioxin in food or feed, the USFDA restricts the importation of bird eggs for consumption to those with a maximum of 1 pptr PCBs or dioxins as TCDD TEQs (USFDA 1999). To evaluate bird injuries based on USFDA requirements, the Federal Trustees may assess concentrations of hazardous substances such as PCBs and dioxins in waterfowl and compare those concentrations with USFDA actions.



Photos (left to right): Belted kingfisher (C. Schlawe), great egret (Lee Karney), and green heron (Lee Karney) (Courtesy USFWS).

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Mammals

While available habitat along the lower portion of the DASS is limited for mammalian species, some may rely on the DASS for food and as a breeding ground. The potential exists for mammals that feed in or around contaminated waters to accumulate harmful levels of hazardous substances. Mammals may accumulate chemicals by consuming fish, insects, and other river-dependent species. They also may be directly exposed to hazardous substances in water, sediment, soil, and plants as they physically manipulate their environment by building dens, foraging for food, and marking territory. Potential injury to mammals will be based on definitions of injury to biological resources subject to CERCLA and its implementing regulations. Potential injuries may include, but are not limited to, acute and chronic toxicity, reproductive impairment, immunosuppression, and endocrine effects.

At present, there are sparse data available to evaluate concentrations of hazardous substances in mammals at the DASS. The Federal Trustees are contemplating potential studies to evaluate exposure or injury to mammals. However, no studies have been identified at this time. The Federal Trustees may, in the future, decide that further investigation into mammalian resource injuries is warranted.

Surface Water

The waters of the DASS represent critical habitat for many plants and animals. The rivers and bays provide food and shelter for adults, as well as critical nursery habitat for many species. The DASS also provides recreational opportunities for people to boat, swim, fish, and observe wildlife.

The Federal Trustees presently intend to investigate injury to surface water resources of the DASS. The categories of surface water investigations include both water and sediment quality. River sediments (bed, bank, and shore) are included within the regulatory definition of surface waters for NRDA purposes, due in part to the close association between contamination in sediment and water.

Surface Water Quality Evaluation

Under CERCLA, when hazardous substances are present in waterways at levels that exceed a standard set by a state or the Federal government, the surface water resource is injured. For this provision to apply, the surface water must have met the standard before the release and must be a "committed use" as a habitat for aquatic life, water supply, or recreation. Further, CERCLA stipulates that when the surface water is used for multiple uses, the most stringent criterion apply.

According to the State of New Jersey[17] the freshwater section of the Passaic River south of Dundee Dam is classified by the State of New Jersey as Fresh Water-2, Non-trout, meaning that designated uses are:

(1) maintenance, migration, and propagation of the natural and established biota;
(2) primary and secondary contact recreation;

[17] See N.J.A.C. 7:9B

(3) industrial and agricultural water supply;
(4) public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and
(5) any other reasonable uses.

The waters of the saltwater section of the DASS are classified as Saline Esutarine-2 and Saline Esturarine-3, meaning that designated uses are:
(1) maintenance, migration, and propagation of the natural and established biota;
(2) maintenance of diadromous fish;
(3) maintenance of wildlife;
(4) secondary contact recreation; and
(5) any other reasonable uses.

Thus, the New Jersey waters of the DASS fit the definition of the designated use provision.

Surface waters of the DASS located in New York State are subject to New York State Water Quality Standards and Classifications.[18] Designated uses of such waters vary by area, but include classifications that have standards for protection for:
(1) human health through consumption of fish;
(2) fish propagation;
(3) fish survival; and
(4) wildlife protection.

Additional applicable water quality criteria include EPA National Recommended Water Quality Criteria for human health through the consumption of fish tissue and for the protection of aquatic life, and New Jersey-specific wildlife values derived to protect the peregrine falcon, bald eagle, and dwarf wedgemussel, but are considered to be protective of other species as well (NJDEP *et al.,* 2001).

Applicable New Jersey, New York, and EPA water quality criteria and standards, as well as New Jersey-specific wildlife values, are shown in Exhibit 4-10. The Federal Trustees presently intend to evaluate existing water quality data in comparison to established water quality standards to document where and when the surface waters of the DASS exceeded these standards, thus documenting injury to surface water resources.

[18] See 6 NYCRR Part 703

Exhibit 4-5 New Jersey, New York, and EPA Aquatic Water Quality Criteria for Primary Contaminants of Concern in the DASS

Contaminant of Concern	Freshwater				Saltwater				Saltwater and Freshwater		
	New Jersey State FW2 Aquatic WQC[1] (µg/L)	New Jersey State Human Health WQC[2] (µg/L)	EPA Chronic WQC[3] (µg/L)	EPA Human Health WQC[4] (µg/L)	New Jersey State SE Aquatic WQC[5] (µg/L)	New Jersey State Human Health WQC[2] (µg/L)	EPA Chronic WQC[3] (µg/L)	EPA Human Health WQC[4]	New York State Ecological WQS (µg/L)[6]	New York State Human Health WQS (µg/L)[7]	New Jersey Specific WQC for Wildlife (µg/L)[8]
2,3,7,8-TCDD	NA	0.000000005	NA	0.000000005	NA	0.0000000051	NA	0.0000000051	0.0000000031 [9]	0.0000000006 [10]	NA
Total PCBs	0.014	0.000064	0.014	0.000064	0.03	0.000064	0.03	0.000064	0.00012 [9]	0.000001	0.000072
4,4'-DDD	NA	0.00031	NA	0.00031	NA	0.00022	NA	0.00022	NA	0.00008	NA
4,4'-DDE	NA	0.00022	NA	0.00022	NA	0.00022	NA	0.00022	NA	0.00007	NA
4,4'-DDT	0.001	0.00022	0.001	0.00022	0.001	0.00022	0.001	0.00022	0.000011 [9,11]	0.00001	0.000004 [11]
PAHs											
High molecular weight PAHs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Low molecular weight PAHs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals											
Mercury[12]	0.77	0.05	0.77	0.3	0.94	0.051	0.94	0.3	0.0026 [9]	0.0007	0.00053

[1]Chronic WQC for aquatic life, for water bodies designated FW2 (see text) (NJDEP 2006).
[2] WQC for human health due to the consumption of organism and water (NJDEP 2006).
[3] Chronic WQC from EPA (2006c).
[4] Chronic WQC for human health due to the consumption of organism only (EPA 2006c).
[5] Chronic WQC for aquatic life, for waterbodies designated SE (see text) (NJDEP 2006).
[6] According to the Clean Water Act, waters must be protected for the most stringent of their applicable uses. Therefore, when more than one type of value is available (*i.e.*, fish propagation, fish survival, or wildlife), the lowest water quality standard is presented. Standards apply to all designated classes of surface water as identified under 6 NYCRR §890 (NYSDEC 1998).
[7] WQS are for the protection of human health through fish consumption (NYSDEC 1998).
[8] WQC derived to minimize adverse effects on the bald eagle, peregrine falcon, and dwarf wedgemussel. These maximum allowable surface water concentrations should adequately protect at-risk wildlife species in the State of New Jersey (NJDEP *et al.* 2001).
[9] WQS for the protection of wildlife (NYSDEC 1998).
[10] Applies to the sum of chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans. The TCDD equivalent for a congener for the standard for human consumption of fish is obtained by multiplying the concentration of that congener by its TEF and its Bioaccumulation Equivalency Factor (BEF) listed in NYSDEC (1998).
[11] WQS is for the sum of DDD, DDE, and DDT (NYSDEC 1998).
[12] New Jersey WQC for aquatic life, New York WQS, and EPA chronic WQC based on dissolved, inorganic form. New Jersey WQC, EPA WQC for human health, and New Jersey-specific WQC for wildlife are based on total recoverable mercury (EPA 2006c; NJDEP 2006; NJDEP *et al.*, 2001; NYSDEC 1998).
WQC = Water quality criteria
µg/L = micrograms per liter
WQS = Water quality standard
NA = Not applicable/available
PCB = Polychlorinated biphenyls
PAHs = Polycyclic aromatic hydrocarbons
TEF = toxic equivalency factor

Sediment Evaluation

The Federal Trustees presently intend to evaluate contamination of river sediments. Two potential investigations, supported by specific injury provisions pursuant to CERCLA, are described below.

Sediments Characteristic of Solid Waste

When concentrations of hazardous substances on bed, bank, or shoreline sediments are sufficient to characterize the sediment as hazardous under the Solid Waste Disposal Act (SWDA, amended by Resource Conservation and Recovery Act (RCRA))[19], the resource is injured. For example, sediments containing chemicals tied to specific industries, included in lists of hazardous waste, or that have measurable properties indicating they pose enough of a threat to be regulated, are defined as hazardous waste. EPA policy states that environmental media containing hazardous waste must be managed as hazardous waste until they no longer contain the waste. The Federal Trustees may investigate whether, when, and to what extent the sediments of the DASS are adversely affected such that they exhibit contamination characteristics defined under SWDA/RCRA. Available data indicate that some areas of the DASS are contaminated to such a degree that they show such characteristics. Such an investigation would serve to document the nature and extent of potential surface water injury as defined under CERCLA.

Sediments Injury: Pathway and Biota

Sediments are also injured when they contain hazardous substances of sufficient concentration and duration to cause injury to other natural resources (*e.g.*, air, geologic, or biological resources) when such resources are exposed to surface water, suspended sediments, or bed, bank, or shoreline sediments.

The Federal Trustees may perform an investigation to determine whether the concentrations of hazardous substances in sediments of the DASS are sufficient to cause injury to other natural resources, such as biota, that are exposed to those sediments. This evaluation could be primarily focused on evaluating injury to sediment-dwelling biota due to exposure to contaminated sediments and associated water.

A variety of studies have evaluated the effects of contaminated sediments on biota. These studies led to the establishment of various sediment quality criteria and sediment quality guidelines, as well as suggested values for clean-up that would be protective for species that come into contact with hazardous substances in sediment. The Federal Trustees may compare existing sediment data with thresholds, effect levels, and clean-up values identified in the literature to determine where, when, and for how long sediments in the DASS exceeded those values. Data collected thus far indicate that sediments in some areas of the DASS exceed such thresholds and effect levels; *i.e.*, that the concentrations of some hazardous substances may be sufficiently high to cause injury to other natural resources, particularly sediment-dwelling biota.

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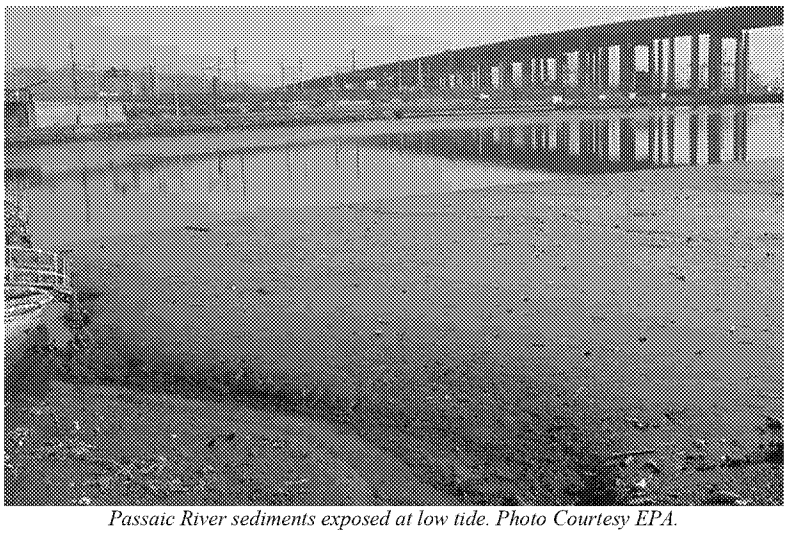
[19] See 42 U.S.C. § 6901 *et seq.*



Passaic River sediments exposed at low tide. Photo Courtesy EPA.

Geologic Resources

Geologic resources include elements of the Earth's crust, such as soils, sediments, rocks, and minerals. A geologic resource is injured by the release of a hazardous substance when, among other things, as a result of the release, the resource contains concentrations of hazardous substances sufficient to:

(1) exhibit characteristics identified under Section 3001 of the Solid Waste Disposal Act;
(2) cause injury to groundwater from physical or chemical changes in gases or water from the unsaturated zone;
(3) cause a toxic response in soil invertebrates;
(4) cause a phytotoxic response such as retardation of plant growth;
(5) impede soil microbial respiration to an extent that plant and microbial growth are inhibited; or
(6) cause injury to other resources including surface water, air, groundwater, or biological resources.

Thus, contaminated geologic resources can be injured by, and can injure, other resources by serving as a source and pathway for hazardous substances.

The Federal Trustees may evaluate injuries to geologic resources by compiling existing information regarding the presence of hazardous substances in those resources, such as floodplains, in and around the DASS. The results may be compared to relevant standards and thresholds to evaluate the possibility of injury. The Federal Trustees may also undertake additional investigations to help determine the extent of injury to geologic resources, and prepare a report documenting the extent of the injury. Such injuries would be distinct from any injuries to biological resources of the floodplains, such as birds and mammals, and may be treated separately in damage quantification. The Federal Trustees may alternatively make a determination that removes this resource from the assessment, and provide the basis for doing so in a report available to the public.

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Air Resources

Air may be injured when a hazardous substance is present at concentrations that exceed air quality standards established under the Clean Air Act[20], or other standards issued by a state or the Federal government to protect public welfare or natural resources. Like geologic resources, contaminated air resources can be injured by other resources, and can injure other resources by serving as a source and pathway for hazardous substances.

Some hazardous substances, for example, mercury, dioxins, PAHs, and PCBs, are known to enter the atmosphere from water or wet sediments through volatilization. The Federal Trustees may investigate existing information regarding the presence of these substances in the air in and around the DASS, and compare that information to relevant standards and injury thresholds. Following that review, the Federal Trustees may undertake additional investigations, including an injury determination study that includes a report documenting the extent of the injury. Federal Trustees may alternatively make a determination that removes this resource from the assessment and provide the basis for doing so in a report available to the public.

Pathway Determination

Through pathway determination, the Federal Trustees will document how hazardous substances enter and move through the environment, including how they move among species in the food web. Pathway studies are frequently very technical, focusing on the chemical composition of the hazardous substances and how they interact with the physical environment and the biological processes they encounter. Pathway determination usually relies on a combination of empirical data and modeling assumptions. The interpretation of these data helps the Federal Trustees determine whether a link exists between the release of hazardous substances and the injured natural resource.

Sources of Hazardous Substances within the DASS

Existing data show that a variety of hazardous substances are present in the soil, sediment water, and biota of the DASS. Analytical results from over a thousand sediment, water, soil, and tissue samples document elevated concentrations of substances including dioxins, furans, PCBs, DDTs, PAHs, and metals (Exhibits 2-1, 2-4, 2-8, 2-9, 2-11, 2-12, and 4-5). EPA notified hundreds of PRPs of their potential liability for hazardous material releases under CERCLA. The Federal Trustees' investigation will assess evidence regarding the sources of various hazardous substances in the DASS and evaluate available data on sediment chemistry, deposition/erosion, and transport. Should the Federal Trustees conclude from the preliminary investigation that a more detailed study is warranted, a study plan will be developed and released for public review and comment.

[20] 42 U.S.C. § 7401 *et seq.*

Food Web Pathway Evaluation

Several of the hazardous substances found in the DASS have chemical properties that cause them to accumulate in biota. Such compounds, including dioxins, PCBs, and methylmercury, tend to accumulate to the highest levels in long-lived, upper trophic level organisms, such as predatory fish and wildlife that feed on fish. The State of New Jersey and the EPA conducted a series of studies that indicate that sediment-dwelling organisms in the DASS are exposed to hazardous substances and that such substances reside in their tissues. Sediment-dwelling organisms provide one of the primary means of transfer of hazardous substances from the sediment into the food web.

The Federal Trustees may develop studies to explore more completely how hazardous substances move through the food web based on ecological, biological, and chemical principles. This effort may provide insight into restoration options for those resources that are injured by hazardous substances in the DASS. It may also help identify the need for future studies.

Additional Pathway Evaluation

Contaminant pathways for the DASS include soil, sediment, air and water, which are important habitats for species at the base of the food web. For example, the sediment in the DASS provides habitat for a wide range of invertebrates such as shellfish, worms, and insects. These organisms are key components of the ecosystem, providing food for other animals, cycling nutrients, and constantly modifying the river bottom. Because sediment may contain large quantities of organic matter, to which hazardous substances often bind, exposure of sediment-dwelling organisms to contaminated sediments provides a route for entry of those compounds into the food web. Organisms that live in direct contact with the sediment or water may accumulate substantial amounts of hazardous substances in their bodies and, when consumed, then pass their contaminant body burden to the predatory species.

The Federal Trustees intend, as appropriate, to implement preliminary investigations to determine which hazardous substances and pathways in the DASS are most significant for the purposes of the damage assessment. The investigations will consider information from other injury determination studies as it becomes available.

Floodplain Evaluation

Although limited in scope, floodplains within the DASS provide habitat to a range of wildlife including soil invertebrates, amphibians, reptiles, birds, and mammals. These organisms are often an important component to the diets of predators. If floodplain soils contain hazardous substances, they may provide a source of contaminants for floodplain biota. Additionally, the floodplain may be a source of aquatic contamination through runoff and flooding, and may in turn, be contaminated by floodwaters carrying contaminated sediment overflowing river banks and depositing sediment on the floodplain.

Few data sets are available regarding the concentrations of hazardous substances in floodplain soils within the DASS, and no studies on floodplain soils are identified at this

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time. However, the Federal Trustees may decide to acquire or evaluate evidence of hazardous substances that may justify further investigation into the extent to which floodplains should be considered an exposure pathway within the damage assessment.

Injury Quantification/Damage Determination

The Federal Trustees currently are considering studies in support of the damage determination and restoration phases of the assessment. The specific studies are described below. The studies will guide the Federal Trustees in development of the RCDP. The results of studies undertaken by the Federal Trustees will be contained within the Report of Assessment.

Recreational Fishing Lost Use Study

The Federal Trustees are presently considering a study of the lost use of the recreational fishery as part of the damage determination. Public use of the DASS includes recreational angling, as the resource is in close proximity to a large number of people. The estuary's waters support a variety of freshwater, marine, and anadromous fish species that are popular with anglers. However, hazardous substances in the DASS have likely changed the way that anglers view the river and its fishery. In particular, fishing bans and consumption restrictions and advisories issued by the State of New York and New Jersey may affect anglers' choices about whether to fish in the affected waterbodies, and may reduce the enjoyment of those who do. Common responses of anglers faced with resource contamination and associated fish consumption restrictions and advisories include reducing their total number of fishing trips, taking fewer or no trips to the affected areas, and frequenting less desirable alternative sites. They may also travel further to reach uncontaminated sites, convert to catch-and-release angling, or pursue a different activity altogether. These behavioral impacts are associated with a loss in recreational value.

Based on the results of monitoring and research undertaken since the mid-1970s, the State of New Jersey has taken a number of steps, in the form of consumption advisories, closures, and sales bans, to limit the public's exposure to contaminated fish in this region. In 1982, an emergency order was introduced prohibiting the sale, and advising against the consumption, of several species of fish and eel. This initial measure was based on the presence of PCB contamination in fish. The discovery of widespread TCDD contamination within the DASS led the State of New Jersey to issue a number of additional Administrative Orders in 1983 and 1984, which prohibited the sale or consumption of all fish, shellfish, and crustaceans from portions of the lower Passaic River.

The Federal Trustees are considering studies that will examine past, present, and future fishing restrictions and advisories within the DASS, evaluate the effect of the restrictions and advisories on recreational activity, quantify the resulting lost value to the public, and identify appropriate restoration projects. Subsistence fishing may also occur at the DASS. If warranted, lost use of subsistence angling may be evaluated in the future.

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Avian Lost Use Study

The Federal Trustees may assess the lost use of avian resources, specifically wading bird, waterfowl and passerines within the DASS. The State of New York has issued waterfowl consumption advisories based on PCB levels in avian tissues. While the State of New Jersey does not have consumption advisories in effect for waterfowl, it may institute such an advisory in the future. The Federal Trustees are considering studies that would determine the degree to which hazardous substance releases have or are likely to impact hunting and consumption of waterfowl within the DASS, quantify the resulting loss in recreational value to the public, and identify appropriate restoration projects.

Resource Equivalency Analyses

In order to quantify the amount of injury and restoration needed to compensate the public for losses occurring during the period between the onset of injury and the resource's return to baseline, the Federal Trustees intend to conduct Resource Equivalency Analyses (REA) (Sperduto *et al.*, 2003, Cole 2010). This method is based on the principal that the public can be compensated for past and future losses of natural resources by providing additional resources of the same type and quality. REA determines compensation by establishing the equivalence between the quantity of injured resource measured, for example as a change in reproduction, biomass, or population and the quantity of restoration in terms of number of individuals (*e.g.*, bird years, mammal years). The Federal Trustees will evaluate the appropriateness of using this method or others to derive compensation following completion of the injury determination.

The Federal Trustees may also evaluate the application, as they become available, of new methods to quantify the amount of injury and restoration needed to compensate the public for losses occurring during the period between the onset of injury and the resources' return to baseline.

Assessment of Lost Navigational Services

The DASS is a vital economic resource both regionally and nationally. It is a major part of the largest port on the East Coast, which incorporates a system of waterways that directly and indirectly supports more than 230,000 jobs, generates over $15 billion in gross domestic product, and serves 18 million consumers in the region (New York City Council 2006, Port Authority of New York and New Jersey 2003). In 2005, the Port generated 58.4% of the total North Atlantic market share, handling more than 85 million metric tons of cargo and thousands of ships annually (Port Authority of New York and New Jersey 2005; 2006). Current expansion of the Port's container facilities will lead to further demands on Newark Bay commercial shipping channels.

Approximately 24 federal navigation channels are within the New York and New Jersey Harbors, ranging in depth of 8 feet to 50 feet. Periodic dredging of navigation channels is required to maintain channel depths, including those with in the DASS. In many locations, Newark Bay and surrounding ocean channels are naturally shallower than the currently maintained channel depth of 40 feet. Safe navigation channels for many modern oil tankers, bulk vessels, and container ships require depths exceeding 45 feet. Economic analyses performed by the USACE demonstrated a need for dredging not only to

maintain existing channel depths but also to deepen certain channels to better accommodate present and projected future shipping needs (USACE 1999, 2008).

Some environmental benefits may also result from dredging. Removal of contaminated sediments can prevent uptake of hazardous substances by aquatic organisms and their subsequent incorporation into the ecological food web. If dredge material can be suitably cleaned, it may be used to remediate and restore degraded upland areas, potentially providing substantial environmental benefits.

Historically, depositing of dredge spoils took place at specific sites in the New York Harbor area, or further out to sea off the New York and New Jersey coasts. Regulation of contaminated spoil dumping in the ocean began in 1972 with the implementation of the Marine Protection, Research, and Sanctuaries Act (or the Ocean Dumping Act[21]; EPA 1977). Beginning in 1977, spoils were classified into three categories based upon their degree of contamination, with material suitable for unrestricted ocean disposal classified Category I, material suitable for ocean disposal if capped with Category I material classified Category II, and material unsuitable for ocean disposal classified Category III (McLaughlin *et al.,* 1999). Under 1984 criteria, 95% of the dredged material the Port of New York and New Jersey was classified Category I and about 5% was classified Category II. However, criteria were made increasingly more stringent over the years. A 1992 revision resulted in approximately 66% of the dredge spoils in the Port of New York and New Jersey being classified as Category III and 9% being classified Category II. This change greatly increased dredging and disposal costs. Further, ocean disposal of Category II material was halted by Executive Order in 1996, and in 2000, the criteria were yet again revised, becoming even more stringent (Litten 2003).

Certain losses that result from reduced ability to maintain authorized Federal shipping channels and an increase in dredging costs resulting from contamination due to problems with disposal of contaminated dredge material are compensable damages under CERCLA. As part of this NRDA, the Federal Trustees presently intend to consider whether injuries to surface water resources led to a loss or impairment of navigational services provided by the DASS. The Federal Trustees could also evaluate whether proposed remedial actions by the EPA will adequately restore potential navigational use of this waterway to its baseline condition. Based on these evaluations, the Federal Trustees may institute additional studies of the potential loss of navigational services within the DASS and investigate potential restoration options.

Restoration

The Federal Trustees will seek and consider a variety of potential restoration options and opportunities throughout the NRDA. Restoration is designed to return injured resources to their baseline condition and to compensate the public for the resources that were lost during the period of injury. To accomplish this objective, the Federal Trustees may use one or both of the following approaches depending on the circumstances of the case:

[21] See 33 U.S.C. § 1401 *et seq.*

(1) calculate the cost of restoring, rehabilitating, replacing, or acquiring the equivalent of the injured resources and the services they provide; or
(2) determine the value of the losses due to the resource injuries and apply that amount to resource restoration.

The Federal Trustees will develop a RCDP that establishes the procedures for determining the appropriate restoration.

Restoration is the goal of a NRDA. It is an active component of damage assessment that can be seen and enjoyed for generations. For example, restoration projects may improve or create aquatic habitats, thereby providing fish with clean spawning habitat and anglers with opportunities to catch fish with reduced levels of hazardous substances. Similarly, restoration may involve creating conservation areas and nesting locations that are attractive to waterfowl or other birds. Restoration also may include increasing the viability and abundance of threatened or rare species. Public access to natural resources may also be improved through restoration.

The restoration planning process is initiated and managed by the trustees. The trustees identify restoration goals; restoration projects; and the type and amount of restoration that is necessary to effectively compensate the public for the injured natural resources and the loss of the services those resources provide. The Federal Trustees will consider a number of restoration alternatives, including taking no action and estimating the time required for natural recovery as to be outlined in the RCDP, which will be distributed to the public and PRPs for comment. The Federal Trustees will review and respond to comments received on the proposed restoration alternatives. After the public comment and response process is complete, the Federal Trustees will then select the most appropriate alternative or set of alternatives. Ultimately, the Federal Trustees will develop and issue a RCDP that documents the restoration process. This plan will be distributed to the public and potentially responsible parties for review and comment.

Throughout the restoration planning process, the Federal Trustees will seek assistance and input from individuals who are interested in the future of the DASS. The Federal Trustees may periodically advertise opportunities for public involvement, develop fact sheets or information packets that explain the restoration process and avenues for public participation, hold public meetings, and seek comments on potential restoration goals and projects. Ideas for restoration projects may be solicited through internet sites maintained by the Federal Trustee agencies and through public contacts at the agencies. Through these avenues, the Federal Trustees intend to keep the public apprised of the ongoing restoration program and facilitate the exchange of information among interested parties. By actively involving people with different perspectives, it is hoped the DASS will be restored with a rich range of projects that will fulfill the needs of the surrounding communities.

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Glossary

Acute toxicity - immediate or short-term health effects occurring after exposure to a hazardous substance.

Air resources – naturally-occurring gas constituents of the atmosphere, including those essential for human, plant, and animal life.

Anadromous - reproducing in freshwater and then living as adults in marine waters. Generally the term is used to describe fish species that ascend rivers and streams from saltwater habitat for the purpose of spawning.

Anthropogenic - caused by humans; relating to or resulting from the influence that humans have on the natural world.

Aroclor - commercially prepared PCB mixture, consisting of individual PCB compounds (congeners) differing in position and degrees of chlorination, that was manufactured by the Monsanto Chemical Company.

Authorized Official - a federal, or state, or tribal official authorized to act on behalf of all affected federal or state agencies or Indian tribes acting as Trustees.

Baseline - the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred.

Behavioral avoidance - avoidance of potentially harmful conditions, which reduces contact with or exposure to hazardous substances.

Benthic - relating to the ocean bottom.

Bioaccumulation - the accumulation of substances from the environment in the tissues of exposed organisms.

Bioavailability - a measure of the physicochemical access that a toxicant has to the biological processes of an organism. The less bioavailable a toxicant, the less its toxic effect on an organism.

Biological resources - plants and animals; those natural resources referred to in section 101(16) of CERCLA as fish and wildlife and other biota. Fish and wildlife include marine and freshwater aquatic and terrestrial species; game, non-game, and commercial species; and threatened, endangered, and state sensitive species. Other biota include shellfish, terrestrial and aquatic plants, and other living organisms not otherwise listed in this definition.

Biomagnification - the sequence of processes resulting in higher concentrations of hazardous substances in organisms at higher trophic levels in the food web.

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Biomagnification factor - a number that relates the concentration of a hazardous substance in the lipids of animals at a certain level in the food web to the concentration in the lipids of its prey. The higher the number, the greater the degree of biomagnification.

Birds of prey - a bird that captures its food using its beak and talons.

Carcinogenic - capable of causing cancer.

Carcinogenesis - the process by which normal cells are transformed into cancer cells.

Catadromous - reproducing in marine waters and then migrating as adults to freshwater.

Chronic toxicity - effects of repeated or long-term exposure to a substance.

Clean Water Act - Public Law 95-217 as amended, 33 U.S.C. 1251 *et seq.*; designed to restore and maintain the chemical, physical, and biological integrity of the nation's waters by achieving a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and for recreation on the water, to eliminate the discharge of pollutants into surface waters, and to promote a policy that the discharge of toxic pollutants in toxic amounts be prohibited. Under the authority of the Clena Water Act, EPA develops water quality criteria that reflect the latest scientific knowledge on the type and extent of all identifiable effects on health and welfare of aquatic species and human health.

Code of Federal Regulations - the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) - Public Law 95- 510 as amended, 42 U.S.C. Sec. 9601 *et seq.*; designed to respond to situations involving the disposal of hazardous substances; regulates the cleanup of sites where hazardous substances are located and the distribution of cleanup costs among the parties who generated and handled hazardous substances at these sites.

Committed use - either a current public use; or a planned public use of a natural resource for which there is a documented legal, administrative, budgetary, or financial commitment established before the discharge of oil or release of a hazardous substance is detected.

Congener - with respect to PCBs (polychlorinated biphenyls), a compound with a specific number and position of chlorine atoms attached to a biphenyl; a member of the group of compounds known as PCBs.

Criterion - the level of a compound or material set by a governmental agency to be protective of human health, wildlife health, and/or the environment.

Critical Body Residue - the concentration of a hazardous substance in tissue(s) of an organism at which harmful effects occur.

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Diamond Alkali Superfund Site (DASS) As defined by EPA, the DASS consists of "...the former Diamond Alkali facility at 80-120 Lister Avenue in Newark, New Jersey, the Lower Passaic River Study Area (LPRSA), the Newark Bay Study Area and the areal extent of contamination." The LPRSA is "...the 17-mile, tidal portion of the Passaic River, from RM [River Mile] 0 to Dundee Dam (RM 17.4), and its watershed, including the Saddle River (RM 15.6), Third River (RM 11.3) and Second River (RM 8.1)." The EPA has divided the DASS into four "operable units" (OUs):

- OU1, the former site of the Lister Avenue Plant
- OU2, the lower 8.3 miles of the Passaic River (the "Lower 8.3 Miles")
- OU3, the 17-mile LPRSA
- OU4, Newark Bay and portions of the Hackensack River, Arthur Kill, and Kill Van Kull.

Damages - the amount of money sought by the natural resource Trustees as compensation for injury, destruction, or loss of natural resources as set forth in section 107(a) or 111(b) of CERCLA.

Damage determination - establishment of the amount of restoration or money to be sought in compensation for injuries to natural resources resulting from a discharge of oil or release of a hazardous substance.

Degradation - decomposition of a compound or material.

Deposition - setting down of particles on a surface.

Diadromous - organisms that migrate between fresh and salt water, including anadromous and catadromous species

Dredged material or dredge spoils - accumulated sediment (or existing rock) that is excavated, or dredged, from the bottom of channels, berthing areas, and other navigation facilities to create or maintain sufficient depth for safe and efficient vessel operation.

Drinking water supply - any raw or unfinished water source that is or may be used by a public water system, as defined by the Safe Water Drinking Act, or as drinking water by one or more individuals.

Ecological succession - a gradual process of change in the number of individuals of each species of a community and through the establishment of new species that may gradually replace the original inhabitants.

Ecosystem - the complex of a community and its environment functioning as an ecological unit in nature.

Effects Dose$_{50}$ - the dose of a hazardous substance found to cause a measurable physiological or biological effect in 50% of the study population.

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Endocrine - the secretion of substances, such as hormones, internally, most commonly into the systemic circulation.

Endangered species - any species that is in danger of extinction throughout all or a significant portion of its range.

Emergent vegetation - plants that are rooted underwater in sediment but that grow above the water's surface.

Essential Fish Habitat - those waters and substrate necessary for fish to spawn, breed, feed, and grow to maturity (NMFS 2006).

Exposure pathway - the course a hazardous substance takes from its source to an exposed organism.

Floodplain - low-lying lands near a river that are submerged when the river overflows its banks.

Food web - complex of interacting organisms, accounting for feeding relations, production, consumption, decomposition, and energy flow.

Foraging - to search for or collect food.

Fungicide - a chemical substance that destroys or inhibits the growth of fungi.

Geologic resources - those elements of the earth's crust such as soils, sediments, rocks, and minerals, including petroleum and natural gas, that are not included in the definitions of ground and surface water resources.

Gleaning - gathering of food from widely scattered places; to collect food bit by bit.

Groundwater - the water beneath the Earth's surface.

Groundwater resources - water in a saturated zone or stratum beneath the surface of land or water and the rocks or sediments through which groundwater moves.

Guidance value - ambient water quality value set to protect water quality. A guidance value may be used where a standard does not exist for a particular water class and type of value.

Habitat - place where a plant or animal species naturally exists.

Hazardous substance - substances designated in sections 311(b)(2)(A) or 307 (a) of the Federal Water Pollution Control Act; any element, compound, mixture, solution, or substance as defined in section 102 of CERCLA; any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste

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Disposal Act; any hazardous air pollutant listed under section 112 of the Clean Air Act; and any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act (does not include petroleum, natural gas, or synthetic gas).

Hazardous waste - waste containing substances designated as hazardous as described in section 3001 of the Resource Conservation and Recovery Act (see "hazardous substance").

Histopathology - microscopic changes in diseased tissues.

Immunosuppression - a decrease in the ability of the body's immune system to respond to disease.

Injury - a measurable adverse change, either long- or short-term, in a chemical or physical quality affecting the viability of a natural resource and resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance, or exposure to a product of reactions resulting from the discharge of oil or release of a hazardous substance.

Inorganic - relating to the class of compounds not having a carbon basis.

LC_{50} - 50% lethal concentration; the concentration of a substance that is expected to cause death in 50% of an experimental test population when administered over a specified period of time.

Lesion - abnormal change in the structure of an organ or tissue due to injury or disease.

Lower Passaic River Study Area (LPRSA) - the area of the Diamond Alkali Superfund Site that incorporates the 17.4-mile stretch of the Passaic River from Dundee Dam to the mouth at Newark Bay and the tributaries to this portion of the river.

Magnuson-Stevens Act - Public Law 94-265, the Fishery Conservation and Management Act. An act providing for the conservation and management of fisheries, and for other purposes.

Migratory - groups of animals (especially birds or fishes) that periodically move from one region to another for feeding or breeding.

Narcosis - a state of stupor brought on by a substance that depresses nerve excitability.

National Priorities List (NPL) - a list of sites prepared according to the statutory criteria of the hazard ranking system that evaluates the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States; Appendix B of the National Contingency Plan.

Natural resources - land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining

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to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Magnuson Fishery Conservation and Management Act of 1976), any state or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction or alienation, any member of an Indian tribe. These natural resources are categorized into the following five groups: surface water resources, groundwater resources, air resources, geologic resources, and biological resources.

Natural Resource Damage Assessment (NRDA) - the process of collecting, compiling, and analyzing information, statistics, or data to determine damages for injuries to natural resources.

Natural Resource Damage Assessment Plan (NRDA Plan) - a plan created by the Trustees and reviewed by the public that serves as a means of evaluating whether the approach used for assessing damages is likely to be cost-effective and meets the definition of reasonable cost; includes descriptions of the natural resources and geographical areas involved, the methodologies proposed for injury assessment, and a statement of Trusteeship.

Newark Bay Study Area (NBSA) – The area of the Diamond Alkali Superfund Site that incorporates Newark Bay, portions of the Hackensack River, and the Arthur Kill and Kill Van Kull channels.

Non-point source - diffuse pollution sources (*i.e.*, those without a single point of origin).

Nursery habitat - portions of an estuary used by early life stages of marine species.

Organic - relating to the class of compounds having a carbon basis.

Osmoregulatory - any physiological mechanism involved in the maintenance of an optimal level of osmotic activity of the fluid in and around the cells of a living organism.

Pathway - the route or medium through which oil or a hazardous substance is or was transported from the source of the discharge or release to the injured resource.

Phytotoxic response - the response of plants to toxic substances.

Piscivorous - fish eating.

Point source - a pollution source occupying a small area and having a concentrated output.

Polychlorinated biphenyls (PCBs) - a group of 209 congeners consisting of a biphenyl ring with between 1 and 10 chlorine atoms attached, known to be persistent in the environment and to cause adverse effects in organisms.

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Porphyria - overproduction of porphyrin, which is a foundation structure for heme (an iron-containing blood pigment) and certain enzymes, creating various physical symptoms.

Practical Quantitation Limit - the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions.

Predator - an animal with a mode of life in which food is primarily obtained by the killing and consuming of animals.

Prey - an animal taken by a predator as food.

Pyrolysis - decomposition or transformation of a compound by heat.

Quality Assurance Project Plan - a document outlining procedures that those who conduct a monitoring project will take to ensure that the data they collect and analyze meets project requirements.

Record of Decision – in the context of this document, a signed EPA document representing the culmination of the federal environmental document review and approval process, and documenting federal project environmental approval.

Recovery period - the amount of time it takes for an injured resource to return to baseline conditions.

Reference Area - A study population or area expected to be relatively unaffected by contamination that is evaluated for comparative purposes.

Remediation - an action that alleviates contamination or injury.

Resource - see "Natural Resource".

Resource Equivalency Analysis - a method for determining the amount of "natural resource services" that the affected resourceswould have provided had it not been injured, and it equates the quantity of lost services withthose created by proposed compensatory restoration projects that would provide similar services.

Resource Conservation and Recovery Act – 42 U.S.C. §6901 *et seq.* ; an act providing, among other things, comprehensive cradle-to-grave regulation of hazardous waste and authorizing environmental agencies to order the cleanup of contaminated sites.

Restoration - actions undertaken to return an injured resource to its baseline condition, as measured in terms of the injured resource's physical, chemical, or biological properties, or the services it previously provided, when such actions are in addition to response actions completed or anticipated, and when such actions exceed the level of response actions determined appropriate to the DASS pursuant to the National Contingency Plan.

Restrictions/Advisories - state-generated health prohibitions and warnings regarding the consumption of contaminated animals (*e.g.*, fish and waterfowl). These include advice on how to eliminate or reduce exposures to hazardous substances in fish and game by banning the catching of contaminated animals, avoiding or reducing their consumption by the use of filleting/trimming and cooking techniques to further reduce contaminant levels.

Safe Drinking Water Act - Public Law 93-523 as amended, 42 U.S.C. 300f *et seq.*; designed to ensure that the water that comes from the tap in the United States is fit to drink (according to EPA national drinking water standards) and prevent contamination of groundwater.

Services - physical and biological functions performed by a resource including the human uses of those functions. These services are the result of the physical, chemical, or biological quality of the resource.

Spawning - the production of eggs in large numbers, usually in reference to aquatic animals (*e.g.*, fish and frogs).

Species of special concern - species of fish and wildlife found to be at risk of becoming either endangered or threatened.

Standard - see criterion.

Superfund - see CERCLA.

Surface water resources - the waters of the United States, including the sediments suspended in water or lying on the bank, bed, or shoreline and sediments in or transported through coastal and marine areas. This term does not include groundwater or water or sediments in ponds, lakes, or reservoirs designated for water treatment under the Resource Conservation and Recovery Act of 1976 or the Clean Water Act and applicable regulations.

Threatened species - any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Tolerance - the USFDA-established maximum amount of a hazardous substance that may be legally in or on a raw agricultural commodity.

Toxic - poisonous.

Toxic Equivalent - the potency or toxicity of one substance in comparison to another.

Trophic level - position of an organism in a food web in terms of what it eats and what eats it.

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Trustee – for the purpose of this NRDA, any federal natural resource management agency designated in the National Contingency Plan.

Trust Resource – for the purposes of this NRDA, resources (see "Natural Resources") in the possession or care of a Federal Trustee.

Unsaturated zone - the area below the land surface and above the water table where soil pores are not fully saturated, although some water may be present.

Volatile - evaporating readily at normal temperatures and pressures.

Watershed - the total land area from which water drains into a particular stream or river.

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Appendix A: Quality Assurance Management

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The Federal Trustees will collect and analyze chemical, biological, and physical data as part of the NRDA for the DASS. For the Federal Trustees to have confidence in the data developed during the damage assessment, a structured process for ensuring quality must exist. Therefore, QA Plans will be developed for each data collection effort that is part of the NRDA and is identified in the NRDA Plan. The QA Plans may be independent documents or be incorporated into project-specific work plans.

The purpose of each QA Plan will be to assist the Federal Trustees in developing defensible data that will provide a solid foundation for their decisions. The QA Plans developed for this damage assessment will be based on EPA requirements for QA Project Plans (EPA 2001b) and EPA Guidance for QA Project Plans (EPA 2002a). In general, each QA Plan should provide sufficient detail to demonstrate that:

- The project's technical and quality objectives (*i.e.*, data quality objectives) are identified;
- The intended measurements or data acquisition methods are appropriate for achieving project objectives;
- Assessment procedures are sufficient for confirming that data of the type and quality needed and expected are obtained; and
- Any limitations on the use of the data can be identified and documented.

Accordingly, the plans developed for this assessment will address the four general elements identified by EPA guidance as described below:

1) Project Management - documents that the project has a defined goal(s), that the participants understand the goal(s) and the approach to be used, and that the planning outputs are documented;
2) Data Generation and Acquisition - ensures that all aspects of project design and implementation including methods for sampling, measurement and analysis, data collection or generation, data handling, and Quality Control (QC) activities are identified and documented;
3) Assessment and Oversight - assesses the effectiveness of the implementation of the project and associated QA and QC activities; and
4) Data Validation and Usability - addresses the QA activities that occur after the data collection or generation phase of the project is completed.

Each of these elements is discussed briefly below.

Project Management

Project organization, roles, and responsibilities help ensure that individuals are aware of specific areas of responsibility for QA, as well as internal lines of communication and authority. Organizational roles and responsibilities may vary by study or task, depending on the lead agency and project team performing the investigation, and should be described in the project-specific QA Plan (Exhibit A-1).

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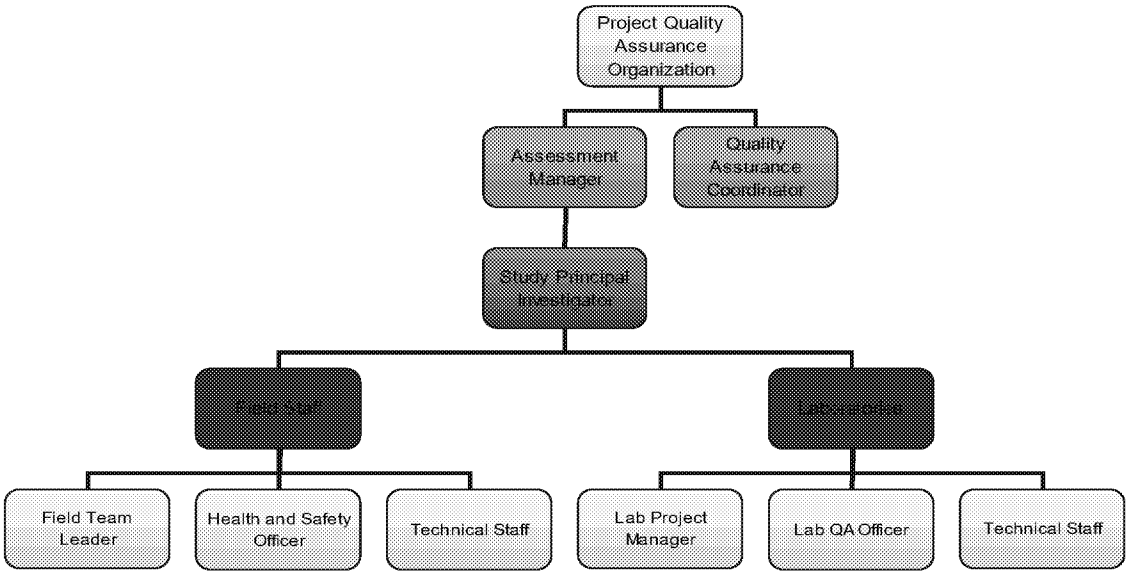
Exhibit A-1 Project QA Organization



The Assessment Manager is the designated Federal Trustee representative responsible for the review and acceptance of each QA Plan and ensuring that Federal Trustee agency efforts are in accordance with requirements of the damage assessment.

The overall conduct of the quality system for the damage assessment is the responsibility of the QA Coordinator appointed by the Federal Trustees. The responsibilities of this individual include, but are not limited to: development of an analytical QA Plan; reviewing/assisting project leaders with the development of QA Plans; conducting audits and ensuring implementation of both the project and the relevant QA Plans; archiving samples, data, and all documentation supporting the data in a secure and accessible form; and reporting to the Federal Trustees.

Study-specific Principal Investigators (PIs) ensure that QA guidance and requirements are followed. The PI or the designee will note significant deviations from the QA Plan for the study, and report the deviations to the Assessment Manager and the QA Coordinator.

The Field Team Leader (FTL) supervises day-to-day field investigations, including sample collection, field observations, and field measurements. The FTL generally is responsible for all field QA procedures defined in the QA Plan. The Laboratory Project Manager is responsible for monitoring and documenting the quality of laboratory work.

Data Generation and Acquisition

Studies identified in the NRDA Plan that will either generate or acquire data to be used in the damage assessment will include a study plan that will be submitted to and approved by the QA Coordinator or designee. Each study plan should include, at a minimum:

- Rationale for generating or acquiring the data;
- Proposed method(s) for generating or acquiring the data;
- Data quality requirements for the study or project and the types of quality control materials and procedures to be used in determining if the data meet these requirements;
- In-house quality assessment procedures to be used in evaluating the outcome; and
- Description of the interpretation, including statistical analyses, of the data.

The QA Plan for each study may be based on EPA guidance, such as EPA Guidance for QA Project Plans (EPA 2002a) or some other model, and will describe the experimental data generation or data collection design for the project, including the types and number of samples required, the design of the sampling network, sampling locations and frequencies, and the rationale for the design.

In addition, QA Plans will describe or reference (and include as appendices) Standard Operating Procedures for all sampling or data-generating and analytical methods, including sample handling and custody in the field, in the laboratory, and during transport. Documentation to be included with the final report(s) from each study will include field logs for the collection or generation of the samples, chain of custody records, and QA/QC documentation. Documentation will be specific for each study, but each QA Plan will identify the appropriate documentation and provide for retention. All studies are required to comply with Good Laboratory Practice Standards for facilities, apparatus, and physical/chemical and biological test systems. These standards include descriptions of maintenance, inspections of instruments, and acceptance testing of instruments, equipment, and their components, as well as the calibration of such equipment and the maintenance of all records relating to these exercises.

Assessment and Oversight

All studies that include the generation or acquisition of data will be audited by the QA Coordinator or designee. These audits will include both technical system audits (*i.e.*, qualitative evaluations of operational details) and data and report audits (*i.e.*, evaluations of data quality, adequacy of documentation, and technical performance characteristics). The purpose of these audits is to ensure that QA Plans are being implemented as described.

If, in the professional opinion of the QA Coordinator, the results of an audit indicate a compromise in the quality of the data, the QA Coordinator has the authority to stop work by oral direction. The QA Coordinator will submit to the Federal Trustees a written report describing the necessity for this direction.

Data Validation and Usability

Present intention is to have plans, work plans, and final reports will be reviewed for adequacy of design and appropriateness of methodology. Analytical data will be validated by an independent third party. Prompt validation of analytical data will assist the analyst or analytical facility in developing data that meet the requirements for precision and

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accuracy. It is expected that data validation will use the QA Plans and EPA Guidance on Environmental Verification and Validation (EPA 2002b).

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Appendix B: Responsiveness Summary for the Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan

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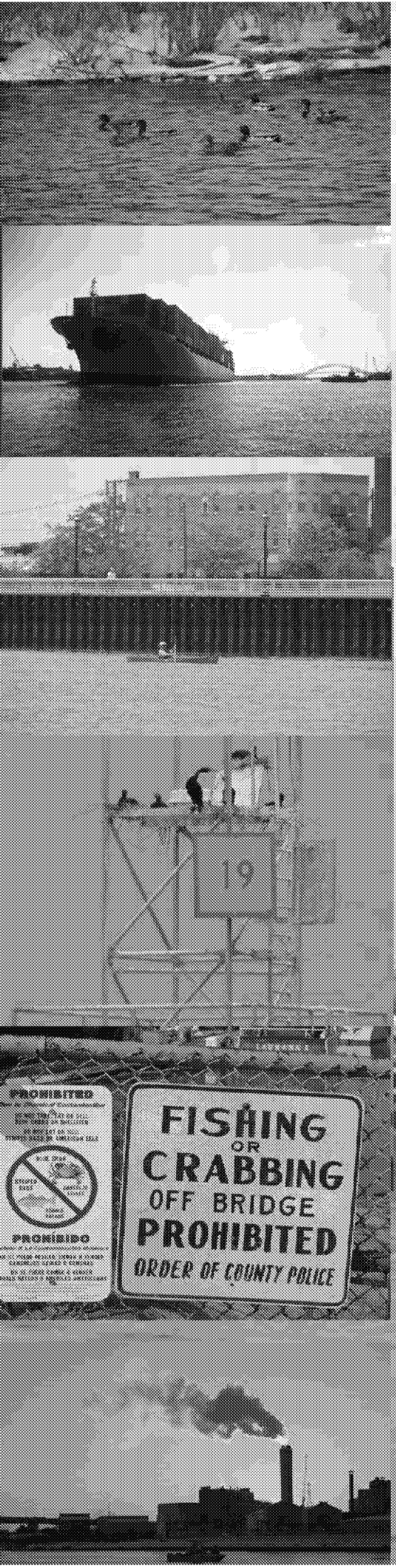

Responsiveness Summary

for the Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan

Prepared by the Federal Natural Resource Trustees

U.S. Department of Commerce
National Oceanic and Atmospheric Administration

U.S. Department of the Interior
U.S. Fish and Wildlife Service

Fianl
January 2020

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CHAPTER 1 | INTRODUCTION

The Federal Passaic River Natural Resource Trustees, NOAA and DOI (the "Federal Trustees"), received a variety of comments on the *Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan* ("the Plan"), released on November 21, 2007 via Federal Register Notice [72(224):65566]. The comment period initially was to be closed after 30 days, but was extended to accommodate interests of commenting parties. This document addresses general topics and specific issues raised in the public comments (Appendix A).

The Federal Trustees will continue to develop and refine the Plan as the natural resource damage assessment (NRDA) progresses. As described in this responsiveness summary, some questions raised are answered by providing additional information, citations, clarifications, and corrections within the revised Plan. Other questions are best addressed in future documents, such as individual study plans, which the Federal Trustees intend to provide to the public as they become available. In addition, the Federal Trustees have made (and, in the future, may continue to make) changes to the Plan that do not originate as responses to comments received.

Overall, the Federal Trustees believe that none of the comments received warrants extensive revision of the Plan, nor are the current Federal Trustee-initiated changes sufficiently substantive as to warrant a new public notice period.

RESPONSE APPROACH

In reviewing the comments received, it became evident that a number of the comments addressed common topics. Rather than repeatedly provide the same response, a group response has been developed for each topic, and the reader is referred to the appropriate topic number(s) for a response. The identified group topics and associated responses are provided in Chapter 2.

Some comments could not be readily classified into one or more general topic areas, and for these, more specific responses are provided. Commenters provided reactions in a variety of formats: some briefer, and some more lengthy. In addition, some commenters provided a broader comment followed by one or more descriptive paragraphs expanding on the first remark. It was necessary, therefore, to develop an approach for identifying specific "comments" to which to respond.

In general, this responsiveness summary treats individual paragraphs as individual comments, although in some cases a comment was considered to span more than one paragraph. Some paragraphs addressed one topic, while others addressed two or more. Chapter 3 contains a detailed table of all identified comments,

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including responses whether specific or consisting of a reference to a general topic. Where sensible, the original text of the comment is provided; however, in some cases, the comment was paraphrased for the sake of brevity. The original comment documents, as received, are included in Appendix A.

The Federal Trustees note that for some "comments," a response was not necessary. These "comments" are remarks not directly about the Plan but rather may be general statements about the commenter's intent, provide background information, or represent transitional paragraphs in the author's overall document. These remarks are included for the sake of completeness but are responded to only with "N/A" (no answer).

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CHAPTER 2 | RESPONSE TO GENERAL TOPICS

The following paragraphs list the general topics identified during the course of comment review and provide responses to each.

TOPIC 1: BASELINE

Issue: Several commenters expressed concern about the issue of baseline, and in particular, the extent to which (and methods whereby) the Federal Trustees will address baseline considerations in injury studies. Commenters point to the long and complex history of urban and industrial influences in the area and note the challenge in distinguishing causes of environmental degradation potentially compensable under CERCLA from other causes.

Response: As defined in 43 CFR 11.14(e), baseline means "the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred."

The Federal Trustees have been, and will continue to be, guided by the U.S. Department of Interior (DOI) regulations on the development of Natural Resource Damage Assessments, 43 CFR Part 11, and will demonstrate any injuries to natural resources and their services in relation to baseline. The Federal Trustees will also adhere to accepted scientific practices when evaluating baseline. For example, the Federal Trustees will consider applicable available and (potentially) newly developed information on the effects of area hazardous substances on natural resources, as well as site-specific information on the condition of area natural resources, relative to the condition of similar natural resources in reference areas. The Federal Trustees will consider results from available and (potentially) newly developed information from *in situ* studies, and may also consider modeling approaches. The Federal Trustees will also consider available information about potential causes for impacts to wild organisms that are unrelated to hazardous substances. All such information will be considered when evaluating the extent to which natural resources may have been impacted by the release of hazardous substances.

The DOI regulations define five categories of natural resources that may become the subject of a natural resource damage assessment: surface water resources, ground water resources, air resources, geologic resources, and biological resources (43 CFR §11.62). Here, the Federal Trustees will consider baseline in relation to the following:

Surface Water and Sediments: The surface water resources in the assessment area include the water and bed and bank sediments. The contamination of these resources has both direct and indirect impacts on

biological resources. The assessment will include both establishment of the pathway component of the injury as well as identification of the potential injury to surface water and sediments.

Geologic Resources: Geologic resources include soils and sediments that are not otherwise accounted for under the definition of surface water or ground water resources. In this case, geologic resources include the soils and sediments located in upland and wetland areas closely associated with the Diamond Alkali site.

Air Resources: Air resources are typically assessed in the context of their ability to serve as a pathway for hazardous substances to reach, and potentially injure, other resource categories.

Biological Resources: The Federal Trustees will assess injuries to fish, benthos, birds and mammals, as well as the important ecological and human-use services that they provide.

TOPIC 2: USE OF/RELIANCE ON AVAILABLE INFORMATION

Issue: Several commenters referenced information--including general categories of information as well as references to specific documents-- that the commenters believe should be referenced and/or discussed in the Plan.

Response: The Plan is not the appropriate document to provide a detailed discussion of all existing information and an analysis of that information in relation to an injury assessment. The preliminary investigations and studies that will be undertaken in accordance with the Plan will result in a better understanding of the sources and scope of contamination of the Passaic River and Newark Bay Complex. The Federal Trustees will address specific relevant hazardous substances and the associated injury assessment in more depth in the Report of Assessment.

TOPIC 3: COORDINATION WITH TRUSTEES AND OTHERS

Issue: Several commenters wanted a more detailed description of the nature of the coordination between the Federal Trustees and other involved parties, including the State of New Jersey, the U.S. Environmental Protection Agency (EPA), and the U.S. Army Corps of Engineers (ACE). Some commenters stated that, in the absence of a more detailed approach to coordination in the Plan, there is the potential for duplication in effort between groups (and therefore, in assessment costs) and/or the potential for double recovery with respect to NRDA claims.

Response: The Federal Trustees have and continue to coordinate with the State of New Jersey. Although New Jersey elected not to participate in the development of the Plan, the State and the Federal Trustees have had communications regarding the Diamond Alkali NRDA and its implementation.

Moreover, the Federal Trustees have and continue to coordinate extensively with EPA and its RI/FS activities, and all data collected through the RI/FS process will be evaluated by the Federal Trustees and utilized to the extent relevant and appropriate. EPA has issued guidance on coordination of its response activities with natural resource trustees. See Memorandum from Timothy Fields and Steve Herman to Superfund Division Directors and Regional Counsel, CERCLA Coordination with Natural Resource Trustees (July 31, 1997).

The Federal Trustees' coordination with other agencies is ongoing and will continue in the future, and will help to avoid any duplication of efforts. The Plan has been revised to identify this coordination.

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TOPIC 4: LEVEL OF DETAIL PROVIDED IN THE NRDA PLAN

Issue: Several commenters wanted more detail to be provided, and in particular requested: (a) a more complete description of the injury studies to be undertaken by the Federal Trustees, including information such as species, endpoints, methods, analyses, sampling numbers and locations; (b) a description of studies to be undertaken after injury determination; (c) a detailed description of pathway determination studies; (d) quality assurance/quality control plans; (e) information on how the Federal Trustees may identify and select early restoration projects; and other specifics. Commenters opined that this information is important to evaluate the overall reasonableness and cost-effectiveness of the assessment.

Response: As already noted, the Plan is designed to be a "living document," amended as appropriate to incorporate additional elements, including specific study plans, QA/QC plans, objectives, sampling sites, etc., all of which will be available for public review and comment. The Federal Trustees may engage in preliminary investigations to help inform the Federal Trustees' understanding of contaminant pathway, exposure to natural resources, and potential injury. Data from any preliminary investigations will be assessed by the Federal Trustees to determine whether injury determination studies are warranted. Should the Federal Trustees determine, based on preliminary investigations, that a full injury study is warranted, the Federal Trustees will develop a study plan for any such effort that will be released to the public for comment. The Federal Trustees believe that the Plan, as presented and as amended in the future to incorporate additional specific study plans, meets the requirements of the DOI Regulations, and appropriately apprises the public of the studies the Federal Trustees will or may undertake. The Federal Trustees believe that the Plan provides sufficient detail to permit determinations regarding the cost effectiveness and reasonability of assessment actions to be undertaken. The Federal Trustees consider the iterative development of the assessment based on information collected to be fully in compliance with the DOI regulations, and, in fact, necessary to the performance of a cost-effective assessment. As previously noted, individual study plans will be provided for public review and comments as amendments to this Plan.

TOPIC 5: CONTAMINANT LIST/FOCUS OF THE NRDA PLAN

Issue: Several commenters wanted more information about how the list of identified contaminants of concern was developed, and some commenters expressed concern that the included list was insufficiently comprehensive. One commenter noted that certain exhibits and parts of the text focused on dioxin and stated that similar exhibits and text should be developed for all other contaminants present at the Site.

Response: The list of contaminants stems from various sources, including but not limited to literature, EPA remedial information, and ongoing studies. The perceived emphasis on various contaminants and their scope reflects the Federal Trustees' current understanding of the nature and scope of contamination. In addition, please see response to topic 1.

TOPIC 6: SOURCE RECOGNITION AND DETERMINATION

Issue: Several commenters pointed to the long and complex history of urban and industrial influences in the area, and the large number of past and current sources of contaminants to the study area, and wanted a more comprehensive identification of sources (e.g., including landfills, combined sewer overflows, and other sources) as well as a discussion as to how the Federal Trustees will determine sources for contaminants, when such sources are multiple.

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Response: The Federal Trustees recognize that there are numerous past and current sources of contaminants to the study area. The Diamond Alkali site includes multiple releases of hazardous substances from many Potentially Responsible Parties (PRPs). Because these PRPs can be held jointly and severally liable under federal law to address these releases, the Federal Trustees are not required to identify the sources of specific hazardous substances. For these reasons, the Plan is not the appropriate document to provide a detailed discussion of all existing information on that subject (see response to topic 4 for additional information on source compilation and data gathering).

TOPIC 7: CAUSATION

Issue: Several commenters wanted more detail on how the Federal Trustees plan to link any identified injuries to specific causes of the injuries, given the complex mixtures of chemical and non-chemical causes of environmental impairment in the area.

Response: The Federal Trustees will adhere to accepted scientific practices in evaluating causation. For example, laboratory-based exposure studies can demonstrate the ability of specific contaminants or mixes of contaminants to cause certain effects on organisms. Field studies that compare potentially affected sites with reference sites can help determine the extent to which effects may be occurring under field conditions. *In situ* exposure studies can be useful in assessing the effects of site exposures on captive organisms. In some circumstances, models may be the most appropriate method to estimate effects.

TOPIC 8: IDENTIFICATION OF, AND COMMUNICATION WITH, PRPs

Issue: Several commenters suggested that the Federal Trustees broaden the number of PRPs to be noticed as part of this NRDA. Some commenters requested more detail as to how the Federal Trustees plan to communicate and coordinate with PRPs, including providing opportunities to share data and split samples.

Response: EPA continues to pursue PRPs, as the data are gathered. Furthermore, 43 C.F.R. §11.32(a)(2) specifically provides that: "In the event the number of potentially responsible parties is large or if some of the potentially responsible parties cannot be located, the authorized official may proceed against any one or more of the parties identified. The authorized official should use reasonable efforts to proceed against most known potentially responsible parties or at least against all those potentially responsible parties responsible for significant portions of the potential injury." The number of potentially responsible parties is large. Further, "those potentially responsible parties responsible for significant portions of the potential injury" have been noticed.

The Federal Trustees invited all PRPs noticed by EPA to participate in a cooperative assessment. Subsequently, Federal Trustees entered into prior cooperative agreements with a subsection of the noticed PRP. The Federal Trustees will continue to coordinate with PRPs as the Federal Trustees move forward in the assessment process. Any potential coordination, such as split samples or data sharing, will be handled via cooperative assessment agreements if and when any PRPs choose to enter into them.

TOPIC 9: STUDY AREA BOUNDARY

Issue: Some commenters requested clarification of the study area boundary generally and also with respect to the inclusion or exclusion of specific areas such as floodplain and ground water.

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Response: The site is defined in Chapter 1 of the Plan. Please also see the Preassessment Screen and Determination for the Diamond Alkali Superfund Site, Newark, Essex County, New Jersey, issued by the State of New Jersey Department of Environmental Protection, the United States Department of Commerce/National Oceanic and Atmospheric Administration, and the United States Department of the Interior/U.S. Fish and Wildlife Service.

TOPIC 10: TRUSTEESHIP

Issue: One commenter stated that the Plan should include an assertion of trusteeship. Two commenters also requested clarification on the issue of trusteeship, one stating that the Plan should clearly identify the natural resources subject to sole Federal trusteeship, sole state trusteeship, or joint trusteeship, and if joint, to specify the specific division of trusteeship between the Federal and state Trustees. Specific natural resources/potential claims that were highlighted with respect to these concerns include groundwater and lost navigational services including any reduced ability to maintain authorized Federal shipping channels and increased dredging costs associated with problems with disposal. Along similar lines, some comments asserted that the Plan did not identify the authority under which the Federal Trustees propose to assess navigational losses.

Response: The resources over which the Federal Trustees are exercising jurisdiction are identified in Chapter 4 of the Plan. The authority of the Federal Trustees is derived from major environmental laws and regulations, including the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601 *et. seq.*, (1980), the Oil Pollution Act (OPA), 33 U.S.C. § 2701, *et. seq.* (1990), the Clean Water Act, 33 U.S.C. 1251, *et. seq.* (1972), and the National Contingency Plan (NCP), 40 C.F.R. Part 300. Both NOAA and DOI are empowered to act as natural resource Trustees, as outlined in Executive Order 12580, *Superfund Implementation*, 52 Fed Reg. 2923, January 23, 1987.

Trust resources – which can be exclusive or shared – include (but are not limited to) wildlife, fish, benthos, and related species, their supporting habitat, and the services these resources provide. The term "natural resources" is defined by the NCP as: "…land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled (hereinafter referred to as "managed or controlled") by the United States (including the resources of the exclusive economic zone)." 40 CFR Sec, 300.600(a); (b)(1). The NCP further specifies that the scope of such federal trusteeship extends to "supporting ecosystem" resources. 40 C.F.R. § 300.600(b), (b)(2), and (b)(3).

The Federal Trustees possess the authority to address injuries to natural resources within navigable waterways (as well as underlying sediment), while navigation is itself is an important natural resource service provided by surface water. The CWA authorizes Federal Trustees to assess and recover damages for injuries to natural resources resulting from the discharge of oil into or upon the navigable waters of the United States, adjoining shorelines, or waters of the contiguous zone; any connection with activities under the Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331, *et seq.)* or the Deepwater Port Act of 1974 (33 U.S.C. §§ 1501, *et seq.*); or that which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States. CWA § 311(f)(5), 33 U.S.C. § 1321(f)(5). In addition, the NCP defines DOC's (NOAA's) trusteeship in terms of navigable waterways. NOAA is empowered to address injuries to… "[n]atural resources managed or controlled by other federal agencies and that are found in, under, or using waters navigable by deep draft vessels, tidally influenced waters, or

waters of the contiguous zone, the exclusive economic zone, and the outer continental shelf." 40 CFR Sec 300.600(b)(1). In the Passaic River area, NOAA would coordinate specific actions with the Army Corps of Engineers.

In addressing injuries to trust resources, the Federal Trustees have and will continue to coordinate their restoration activities with State of New Jersey, as well as EPA. Dividing trust management responsibility, on a percentage basis or otherwise, is unnecessary and not useful to the Plan process. Instead, any potential restoration would be conducted to offset injured natural resources on an equivalent scale (i.e., units of injury equal units of restoration) with Federal Trustee coordination of decision-making.

TOPIC 11: DATA GATHERING AND AVAILABILITY

Issue: Some commenters expressed concern about the relative amounts of information presently available for different operable units and requested more information about how data gaps will be identified and addressed for these different geographic areas.

Response: The Federal Trustees recognize that differing amounts of information are available for different areas and different natural resources. Preliminary investigations using existing data will integrate and interpret the available data, as discussed in Chapter 4 of the NRDA Plan. If investigations of existing data indicate data gaps that require the collection of additional data, study plan(s) will be developed to address those needs.

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CHAPTER 3 | SPECIFIC RESPONSES

Exhibit 1 lists the sets of comments received from outside the partner agencies. Exhibits 2 through 8 summarize the individual comments and provide responses. In most cases, comments are provided in their original form, although for the sake of brevity, some are paraphrased. However, all comments are presented as plain text (i.e., text formatting, such as bold, underline, and italics, has been removed). The original versions of all comments are provided in Appendix A.

EXHIBIT 1 COMMENTS RECEIVED FROM NON-PARTNER AGENCIES

DOCUMENT ID	ENTITY	DOCUMENT NO.	AUTHOR	DOCUMENT TYPE	DATE
ADHOC-1	Ad-Hoc Industry Natural Resource Damage Assessment Group	1	Barbara J. Goldsmith	letter with enclosure	15-Jan-08
CPG-1	Lower Passaic River Study Area Cooperating Parties Group	1	William H. Hyatt, Jr.	letter	15-Jan-08
ISP-1	International Specialty Products	1	J. David McNichol	letter	15-Jan-08
ISP-2	S.S. Papadoupulos & Associates, Inc.	2	Stephen P. Larson	letter	15-Jan-08
MAXUS-1	Maxus Energy Corporation	1	Sara Galley	letter	6-Mar-08
TIERRA-1	Vinson & Elkins	1	Carol E. Dinkins	letter with attachment (listed as separate document)	15-Jan-08
TIERRA-2	Tierra Solutions, Inc., Maxus Energy Corporation, Occidental Chemical Corporation	2		attachment to TIERRA-1	15-Jan-08

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EXHIBIT 2 COMMENTS FROM ADHOC-1 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	Enclosure p. 2, para. 2	Enclosure p. 2, para. 2	The Ad-Hoc Industry Natural Resource Damage Group ("Group") is a large group of multinational companies that is focused on natural resource damage assessment and restoration (NRDAR) issues. The Group, which will commemorate the 20th year of its founding this year, broke new ground as to industry/trustee communications and practice exchange and continues to work collaboratively with key federal and state trustee departments and agencies on NRDA practice issues. While the Group has provided comments on national NRDA regulatory proposals at various times in the past and has weighed in on many other national NRDAR practice issues over the years, it has not commented on site-specific NRDA plans or issues before now. We have decided to break with tradition due to our concern about the absence of an expressed approach for determining baseline and the injury caused by the releases in question ("causation") at this extremely complex site. In our view, the Diamond Alkali Superfund Site -- involving heavy industrialization over a long time period and numerous historical influences other than those associated with industrial operations -- mandates that these two fundamental issues be defined earlier rather than later in the NRDA process, especially for this site. It would then logically establish a stepwise process to assessment. If baseline and causation are not determined early, it can potentially set up an unending process with great associated costs and minimal environmental benefits. We believe that this issue is not only germane to the Diamond Alkali site but also has nationwide significance. In its discussions with national and state trustees in recent years, the Group has noted that baseline and causation -- which are so fundamental to defining the bounds of compensable damages -- need to be addressed at every site.	Please see responses to topics 1 and 7.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
2	Enclosure p. 2, para. 3	Enclosure p. 2, para. 3	The Group is not submitting detailed comments on the Diamond Alkali Superfund Site NRDA Plan because we are aware that others in the industrial community, including Lower Passaic River Study Area Cooperating Parties Group, will be filing detailed comments. Rather, the Group is filing comments today to bring attention to the need to work together - on a national basis as well as a site-specific basis - to define approaches for establishing baseline and causation, especially at complex river and harbor sites such as this one.	Please see responses to topics 1 and 7.
3	Enclosure p. 2, para. 4	Enclosure p. 3, para. 1	The Diamond Alkali Superfund Site NRDA Plan has the potential to lead the way and serve as a model for determining how to address these issues in the presence of such extraordinary site and technical complexity. In fact, we are surprised, that the Plan does not acknowledge how difficult it will be to establish baseline and causation at this site.	Please see responses to topics 1 and 7.
4	Enclosure p. 3, para. 2	Enclosure p. 3, para. 2	We are aware that trustees are bringing more NRD claims in urban waterways, like the Lower Passaic River. It is essential for NRDA plans to identify both human use and ecological baseline conditions and their impact on natural resources in these challenging environments. Baseline conditions in urban waterways include commercial harbors with man-made channels, docks, dredged and filled areas, boats and barges, bridges, dams, railways and roadways, and other types of urban development that may impact natural resources (e.g., studies show that boat traffic, dredging, channelization, dams, bridges and other obstructions can change water depth, flow, temperature and quality, potentially destroying or degrading habitat). In addition, the NRDA Plan needs to set forth how it will differentiate injuries resulting from PRP releases from other influences (e.g., agricultural/urban runoff, habitat destruction, etc.).	Please see responses to topics 1 and 7.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
5	Enclosure p. 3, para. 3	Enclosure p. 3, para. 3	The Group will continue to seek ways to actively work through some of the "tough" issues inherent in NRDAs, by continuing collaborative projects and meetings with the trustee community and other stakeholders related to these and other NRDA practice issues. We also plan to aggressively move forward within the industrial community nationwide, working with the best available experts, to develop documentation that defines best practices for determining baseline and causation at river and harbor sites and other types of sites across the country.	N/A
6	Enclosure p. 3, para. 4	Enclosure p. 3, para. 4	In short, we look forward to continuing the open dialogue and practice exchange on critical NRDAR practice issues. It is hoped that some of the documentation to be developed by the industrial community will positively benefit the conduct of the Diamond Alkali Superfund Site NRDA.	N/A
7	Enclosure p. 3, para. 5	Enclosure p. 3, para. 5	Given that the Group has been closely following NRDA practices for nearly 20 years, we would be pleased to serve as a resource and a conduit to the broad industrial community regarding the kinds of practice issues that need to be addressed at this and similar sites.	N/A

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EXHIBIT 3 COMMENTS FROM CPG-1 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p. 1, para. 1	p. 1, para. 1	The Lower Passaic River Study Area Cooperating Parties Group (CPG) appreciates the opportunity to comment on the Public Review Draft of the "Natural Resource Damage Assessment Plan" (November, 2007) (Draft Plan) for Operable Unit 2 (OU 2) and Operable Unit 3 (OU 3) of the Diamond Alkali Superfund Site (Site). OU 2 is defined as the Lower Passaic River Study Area (LPRSA), including the lower 17 miles of the Passaic River. OU 3 is defined as the Newark Bay Study Area (NBSA), including Newark Bay, portions of the Hackensack River, and the Arthur Kill and Kill Van Kull channels. Hereinafter, the "Study Area" will refer to both OU 2 and OU 3.	N/A
2	p. 1, para. 2	p. 1, para. 2	NOAA and FWS (Federal Trustees) are identified in the Draft Plan as the Federal Trustees for natural resources at the Site. Draft Report at 9-10. The New Jersey Department of Environmental Protection (NJDEP), the state trustee for natural resources at the Site, "has chosen not to participate as an active party in [the] development [of the Draft Plan]." Id. at 10.	N/A

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
3	p. 1, para. 3	p. 1, para. 3	The Draft Plan purports to comply with the requirements of 43 C.F.R. Part II, the DOI regulations (DOI Regulations) governing natural resource damage assessments (NRDAs) for a Type B assessment; however, for a variety of reasons, some of which are detailed in these comments, the Draft Plan is materially deficient and fails to meet the letter or spirit of the DOI Regulations. Consequently, an NRDA performed in accordance with the Draft Plan would not be entitled to a rebuttable presumption under Section 1 07ffl(2)(C) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9607(f)(2)(C). Moreover, the Draft Plan is so lacking in the essential detail of how the NRDA is proposed to be conducted that the public, including the CPG, has been deprived of a meaningful opportunity to make substantive comments. Accordingly, the Draft Plan should be withdrawn and revised to include the content prescribed by the DOI Regulations, and then reissued to the public for comment, before any NRDA activities are commenced.	Please see response to topic 4. Determination of rebuttable presumption is to be made solely by a Federal District Court.
4	p.1, para. 4	p.1, para. 4	As acknowledged in the Draft Plan, OU 2 and OU 3 have been subject to intense urbanization and heavy industrialization since at least the middle of the 19th century. That urbanization and industrialization is chronicled in Timothy J. lannuzzi's A Common Tragedy: History of an Urban River (2002). Moreover, OU 2 and OU 3 are downstream of or impacted by other intensely urbanized and industrial areas (e.g., the upper Passaic River) that have not been fully characterized and/or controlled as sources. Both OU 2 and OU 3 also are affected, as they have been for decades, by a large number of uncharacterized, uncontrolled combined sewer overflows, sanitary sewer overflows and storm water runoff from the surrounding industrial and urban areas.	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
5	p.1, para. 1	p.1, para. 1	The Draft Plan does not provide sufficient detail to allow the public and potentially responsible parties (PRPs) to determine whether the technical approach being outlined by the Federal Trustees will provide the data needed to conduct a meaningful NRDA. It appears that significant planning is still required by the Federal Trustees before a full plan can be presented to the public for review and comment. The Draft Plan indicates that individual study elements will be made available for public review, suggesting that the Federal Trustees are not currently contemplating an overarching document that presents the detail as to how the entire damage assessment will be conducted. Such a document is required to allow the public to fully evaluate the proposed approach the Federal Trustees plan to take for the Study Area.	Please see response to topic 4.
6	p. 1, para. 2	p. 1, para. 2	The DOI Regulations require that a causation link be made between a specific release of a hazardous substance and an injured resource. Establishing such a link is a key requirement in the injury determination phase of the assessment. While the Draft Plan discusses in general terms how pathways between a hazardous substance and a resource will be addressed, it does not discuss the technical approach the Federal Trustees intend to use to establish the link between a specific release of a hazardous substance and a resource injury.	Please see responses to topic 7.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
7	p.1, para. 3	p.1, para. 3	Furthermore, the Draft Plan provides no explanation for how baseline conditions will be accounted for during injury quantification, even though accounting for such conditions is one of the principal elements in correctly quantifying injuries. Section 11.72(a) of the DOI Regulations states that "[t]he authorized official shall determine the physical, chemical, and biological baseline conditions and associated baseline services for injured resources at the assessment area.. . ." (emphasis added). Given the complex history and nature of the Site, the Draft Plan must provide a clear plan on how baseline conditions will be defined and incorporated into the injury quantification phase, and a description of the data required to define baseline conditions.	Please see response to topic 1.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
8	p. 1, para. 4	p. 1, para. 4	Section 107(f)(2)(C) of CERCLA provides, in relevant part, that "[a]ny determination or assessment of damages to natural resources for the purposes of [CERCLA] made by a Federal or State trustee in accordance with the [DOI Regulations] shall have the force and effect of a rebuttable presumption on behalf of the trustee in any administrative or judicial proceeding under [CERCLA]." Subpart C of the DOI Regulations, entitled "Assessment Plan Phase," prescribes in specific terms the contents of an NRDA that must be included for the study to be conducted "in accordance with" the DOI Regulations. A comparison of the Draft Plan with Subpart C of the DOI Regulations clearly demonstrates that material elements of an NRDA that are required to be included in an assessment plan are missing from the Draft Plan. These deficiencies are so significant that the Federal Trustees should withdraw the Draft Plan, issue a new assessment plan that satisfies the DOI Regulations, and solicit public comment on the new assessment plan. Otherwise, the public, including the CPG, will be deprived of a meaningful opportunity to comment on the steps the Federal Trustees actually will take to assess damages for the Study . The deficiencies of the Draft Plan include, but are not limited to, the following:	Please see response to topic 4. Determination of rebuttable presumption is to be made solely by a Federal District Court.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
9	p. 2, para. 5	p. 3, para. 2	• § 11.30(b) provides that "[t]he purpose of the Assessment Plan is to ensure that the Assessment is performed in a planned and systematic manner and that methodologies selected from - - - subpart E for a type B assessment, including the Injury Determination, Quantification, and Damage Determination phases, can be conducted at reasonable cost, as that phrase is used in this part." The Draft Plan does not provide enough detail to ensure that the damage assessment will be performed in a planned and systematic manner. Indeed, the Draft Plan purports to cover only the Injury Determination Phase of the NRDA, leaving the public to speculate as to the contents and approach of the later phases of the NRDA. Of particular concern is that the Draft Plan provides a discussion of the information available regarding conditions for OU 2 without addressing how the Trustees will develop or establish current conditions in or continuing sources to OU 3. Indeed, the Draft Plan acknowledges that far more data are available with respect to OU 2 than with respect to OU 3, but provides no program for gathering the necessary data in OU 3.	Please see response to topic 11.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
10	p. 3, para. 3	p. 3, para. 4	• § 11.31 (a)(2) provides that "[t]he Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost, as those terms are used in this part" (emphasis added). Despite this requirement, the Draft Plan does not include any information that could be used to develop a credible estimate of the cost of implementation, or to determine whether the NRDA will be cost effective or conducted at reasonable cost. For example, the Draft Plan does not include any detail on any data collection efforts that will be undertaken or the approaches that will be used to determine and quantify injury. Instead, the Draft Plan states that detailed study plans will be submitted to the public as needed for review and comment. This approach does not meet the requirement of this section of the DOI Regulations, and deprives the public of a meaningful opportunity to comment on the reasonableness or cost effectiveness of the NRDA.	Please see response to topic 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
11	p. 3, para. 5	p. 4, para. 1	• § 11.31 (a)(2) further provides that "[t]he Assessment Plan shall also include a statement of the authority for asserting trusteeship, or co-trusteeship, for those natural resources considered within the Assessment Plan" (emphasis added). The Draft Plan does not include a "statement of authority" by the Federal Trustees "for asserting trusteeship or co-trusteeship" over all of the resources proposed to be assessed. Instead, the Draft Plan simply lists various categories of natural resources, including many for which the State is the sole trustee or co-trustee. The Draft Plan is deficient because it fails to state clearly which natural resources proposed to be assessed are the responsibility of which trustees, with the result that the public cannot determine from the Draft Plan which resources will be assessed by which trustees or whether potentially duplicative assessments will later be sought to be performed by the state. The Federal Trustees need to provide a statement of authority that clearly establishes the basis for asserting trusteeship over each of the natural resources proposed to be assessed, and if the resource is the joint responsibility of more than one trustee, the percentage breakdown in trustee responsibility.	Please see response to topic 10.
12	p. 4, para. 1	p. 4, para. 1	Furthermore, although NJDEP apparently did not participate in the preparation of the Draft Plan, the Federal Trustees propose to assess natural resources that would appear to be under the exclusive or shared trusteeship of the State, such as the air, geologic, surface water, ground water and certain biological resources. The Draft Plan also fails to identify the authority under which the Federal Trustees propose to assess alleged navigational losses.	Please see responses to topics 3 and 10.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
13	p. 4, para. 2	p. 4, para. 3	• § 11.31 (a)(2) further provides that "[i]n addition, for Type B assessments, the Assessment Plan shall include the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies" (emphasis added). The Draft Plan contains none of the information required by § 11.31(a)(2). Instead, the Draft Plan simply identifies resources that might be assessed, information that might be reviewed, and studies that might be conducted, leaving the door open for the Trustees to conduct any number of future studies of unknown scope, complexity, benefit and cost. The absence of this specifically required information in the Draft Plan is a fatal omission and renders the Draft Plan inconsistent with the DOI Regulations. Furthermore, because this important and required information is omitted, the Federal Trustees will be unable to conduct an NRDA using the Draft Plan and the public, including the CPG, is unable to determine whether an NRDA conducted under the Draft Plan will be adequate or cost-effective. These omissions are particularly problematic in the case of the Draft Plan, in which there appears to be an inappropriate bias in the sampling and data, potentially overstating the contribution of OU 2, and potentially understating the contribution of OU 3, to the impact on the relevant natural resources.	Please see response to topic 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
14	p. 4, para. 4	p. 4, para. 5	• § 11.31 (a)(3) provides that "[t]he Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation feasibility study or other investigation performed pursuant to the NCP" (emphasis added). The Draft Plan contains no discussion of how the NRDA will be coordinated with the RT/FS studies currently being conducted in OU 2 and OU 3. Indeed, the Draft Plan barely acknowledges the RT/FS activities currently underway in OU 2 and OU 3. At a minimum, the Draft Plan should be revised to list all CERCLA actions, or other investigations performed or being performed pursuant to the NCP, and to describe in detail the steps the Federal Trustees have taken and will take to coordinate the NRDA with those investigations. Further, the Draft Plan should spell out those efforts that will be taken to coordinate with the RT/FS activities to minimize the NRDA costs, and make the NRDA more cost-effective.	Please see response to topic 3.
15	p. 5, para. 1	p. 5, para. 2	• § 11.31 (a)(4) provides that "[t]he Assessment Plan shall contain procedures and schedules for sharing data, split samples, and results of analyses, when requested, with any identified potentially responsible parties...." (emphasis added). The Draft Plan contains none of this information, even though this NRDA would be one of the largest and most complex such undertakings ever attempted, both in terms of the geographic area covered and the number of PRPs. The Draft Plan does little to acknowledge this fact, and does not explain how the Federal Trustees will manage this effort and keep the public and the PRPs informed as the NRDA proceeds. The Federal Trustees need to provide additional detail on how PRPs will be informed of data collection efforts in sufficient time to allow for coordination and transfer of split samples.	Please see response to topic 8.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
16	p. 5, para. 3	p. 5, para. 4	• § 11.31 (c)(2) provides that an Assessment Plan "must also include ... [a] Quality Assurance Plan that satisfies the requirements listed in the NCP and applicable EPA guidance for quality control and quality assurance plans" (emphasis added). The Draft Plan does not contain a Quality Assurance (QA) plan. Instead, the Draft Plan merely states that QA plans will be developed for each data collection effort that is part of the NRDA. Draft Plan at 101. This does not satisfy the mandatory requirements of § 11.31 (c)(2) for a Type B assessment, as the Federal Trustees propose in the Draft Plan. Without fully developed quality control and quality assurance plans that comply with the NCP and EPA guidance, the public cannot know whether the plans are adequate and fulfill the regulatory mandate. The public simply cannot meaningfully comment on plans that have yet to be developed. The Draft Plan should be withdrawn and republished for public comment when the required contents have been included. Unless those required contents are included, the Draft Plan cannot constitute an assessment plan under Subpart C.	Please see response to topic 4.
17	p. 5, para. 5	p. 5, para. 6	• § 11.31 (c)(3) provides that the Assessment Plan "must also include... [t]he objectives, as required in § 11 .64(a)(2) of any testing and sampling for injury or pathway determinations...." (emphasis added). The Draft Plan does not identify the objectives of any studies or data collection efforts that would be undertaken as part of an injury assessment. Without such stated objectives, neither the trustees nor the public can know whether such studies or data collection efforts will have any relationship to the goals of the NRDA.	Please see response to topic 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
18	p. 5, para. 7	p. 5, para. 7	Because of all these deficiencies or omissions in the Draft Plan, it cannot serve as an acceptable assessment plan under the DOI Regulations and would not result in an NRDA that would be entitled to a rebuttable presumption under Section 107(f)(2)(C) of CERCLA. More importantly, there is no reason to believe that implementation of the Draft Plan would produce the credible, relevant information needed to devise a restoration plan for the Study Area in a timely, cost-effective manner.	With respect to the issue of rebuttable presumption, we respectfully note that any such determination is to be made solely by a Federal District Court. In addition, the Federal Trustees disagree with the assertion that implementation of the Draft Plan would not produce credible, relevant information needed to devise an appropriate restoration plan.
19	p. 6, para. 2	p. 6, para. 2	The NRDA that the Federal Trustees are proposing to undertake is one of the largest and most complex such undertakings ever attempted. The Draft Plan does little to acknowledge this fact and provides no discussion of how the Federal Trustees plan to manage this effort nor how they plan to keep the public and the potentially responsible parties informed as the NRDA proceeds. As stated previously, the Federal Trustees must provide procedures that allow for potentially responsible parties to receive split samples, and yet the Draft Plan has no provision to meet this requirement. Given the large geographic area included in the proposed NRDA and the huge number of potentially responsible parties, the Federal Trustees need to provide additional detail on how potentially responsible parties will be informed of data collection efforts in sufficient time to allow for coordination and transfer of split samples.	Please see response to topic 8.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
20	p. 6, para. 3	p. 6, para. 3	The Draft Plan places undue emphasis on OU 2, while virtually ignoring the larger area subsumed in OU 3. This raises concerns that the NRDA will rely largely on data collected from OU 2 during the RI/FS, and not develop or take into account data that establishes the actual conditions in OU 3. The document should be revised to explain how the trustees will establish the conditions of resources in OU 3 as well as OU2. To the extent inadequate or less extensive data are available for OU 3 than for OU 2, the Draft Plan should contain a description of how the missing data will be gathered.	Please see response to topic 11.
21	p. 6, para. 4	p. 6, para. 4	While the Draft Plan cites the Kill Van Kull and the Arthur Kill as being within OU 3, it is unclear from the text and the map presented in Exhibit 1-I whether OU 3 includes all of the Kill Van Kull and the Arthur Kill, or just selected portions of either water body. Both Exhibit 1-1 and the text should be revised to clearly define the limits of the study area.	Please see response to topic 9.
22	p. 6, para. 5	p. 6, para. 5	The Draft Plan's discussion of the historical significance of OU 2 focuses almost entirely on the history of development in and around the LPRSA and presents no historical information about development activities that occurred in OU 3, most notably Newark Bay, the Hackensack River, the Kill Van Kull and the Arthur Kill. Such an uneven presentation of historical and current information on areas included in the assessment is likely to lead to a skewed, incomplete understanding of the baseline conditions against which injury and damages must be assessed. For example, Exhibit 1-3 on page 17 presents several historical events in the LPRSA, but does not present similar information for any other location within the assessment area.	Please see responses to topics 1 and 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
23	p. 7, para. 1	p. 7, para. 1	Exhibit 1-2 presents an exhaustive list of biological resources. Is it the intent of the Federal Trustees to conduct an assessment for all species listed? If not, what species will be the subject of the assessment? Will the trustees attempt to extrapolate from those species to other species?	The Federal Trustees do not intend to pursue separate injury investigations for each species listed. Particular species to be investigated will be determined at a later stage in the assessment, along with other study-specific details as described in the response to topic 4.
24	p. 7, para. 2	p. 7, para. 2	Many of the species listed in Exhibit 1-2 have life histories and home ranges that extend beyond the boundaries of the proposed assessment area. How will exposure to hazardous substances outside the study area be addressed given the requirement for the trustees to establish causation between a release of a hazardous substance and injury?	Please see responses to topic 7.
25	p. 7, para. 3	p. 7, para. 3	The Draft Plan states that "[d]ue to urbanization and heavy industrial use in the area, the natural environment of the Site began to suffer as a toxic soup of sewage and hazardous substances was dumped into the waterway." The Federal Trustees should keep this statement in mind when considering the conditions at the Site because such conditions are the result of multiple releases, chemical and otherwise, over multiple years, and from multiple sources, including multiple potentially responsible parties. Therefore, any attempt for the Draft Plan to focus on certain contaminants or locations at this stage is inappropriate.	Please see response to topic 5.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
26	p. 7, para. 4	p. 7, para. 4	Furthermore, at least as significant in impacting natural resources in the area was the massive loss of habitat, both in upland areas and within the waterways that occurred as early as the 17th century. Iannuzzi, at 10-II, Figure 1-2. According to Iannuzzi, 55% of the wetlands in the lower Passaic River and Newark Bay region, or some 13,548 of 24,728 acres, had been lost by 1940. Iannuzzi, at 59, Table 5-1. Nearly 2,500 acres of wetlands, or more than 10% of the wetlands in the study area, were reclaimed just to construct Newark Airport. Iannuzzi, at 64. Moreover, significant impacts to the fish and shellfish resources were well-known and publicly reported in the late 19th century and the early 20th century. Iannuzzi, at 98 to 106. There is significant documentation that both biotic diversity and abundance were severely impacted in the Study Area more than a century ago. These losses in habitat as well as disturbance to the biota had a significant impact on the health and well being of natural resources and the Draft Plan should include a comprehensive discussion and listing of habitat losses that have occurred in the assessment area.	Please see responses to topics 1 and 2.
27	p. 7, para. 5	p. 7, para. 5	While Chapter 2 of the Draft Plan is apparently intended to present a discussion of hazardous substances in the entire Site, the opening discussion focuses solely on the LPRSA, thereby erroneously implying that it is the only portion of the study area that contains hazardous substances. The Draft Plan must acknowledge all of the hazardous substances — and the sources of those substances — that are present at the Site. For example, historical and ongoing sources of hazardous substance and sediment deposition from the urban and industrial watershed, POTW's, all four connecting rivers and numerous direct sources into the Site need to be examined further as they present significant influences.	Please see response to topics 5 and 6.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
28	p. 8, para. 2	p. 8, para. 2	The section regarding "Types and Effects of Contamination" discusses the "primary contaminants of concern." However, nowhere in the Draft Plan does it state how this list of contaminants was derived, nor how these contaminants relate to the baseline, both temporally and in terms of environmental impacts.	Please see response to topic 5.
29	p. 8, para. 3	p. 8, para. 3	The Draft Plan discusses how various hazardous substances might cause injury, but does not demonstrate, and does not explain how the trustees intend to establish, that the hazardous substances present at the Site have actually caused adverse effects. It is not sufficient to infer that the mere presence of hazardous substances could be associated with effects; rather, specific criteria must be developed against which to assess exposure and effect, and toxic endpoints and the uncertainty surrounding them must be addressed. The trustees are authorized to recover only for damages, not potential risks.	For some natural resources and hazardous substances, the presence of the hazardous substance in sufficient concentrations is, in fact, sufficient to demonstrate injury in accordance with the DOI NRDA regulations (43 CFR 11.62). The Federal Trustees will determine injury in accordance with the DOI regulations. In addition, please see response to topic 7.
30	p. 8, para. 4	p. 8, para. 4	This section of the Draft Plan appears to be intended to provide a discussion of sources of contamination to the entire assessment area, but fails to do so. Given the nature and scope of the other numerous environmental investigations occurring throughout and upstream of the assessment area, the Federal Trustees must present a detailed discussion of all that is currently known in order to meet their burden of proving that specific injuries resulted from specific releases of hazardous substances.	Please see response to topic 6.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
31	p. 8, para.6	p. 8, para.6	The Draft Plan states that the State of New Jersey has chosen not to be involved in developing the Draft Plan for the Study Area, but that the Federal Trustees intend to ensure that the public is adequately and appropriately compensated for injuries to trust resources. Section 11.15(d) of the DOI Regulations states that "[t]here shall be no double recovery under this rule for damages or for assessment costs, that is, damages or assessment costs may only be recovered once, for the same discharge or release and natural resource, as set forth in section 107(0(1) of CERCLA." However, the Draft Plan does not describe the steps that the Federal Trustees will take to ensure compliance with § 11.15(d) and prevent double counting of injured resources or duplicative assessment costs. Chapter 3 should be expanded to present a more thorough discussion on how the Federal Trustees will coordinate with the State to prevent double counting and duplicative assessment costs.	This concern is premature and unfounded.The Federal Trustees will evaluate all relevant factors, including actions by the State of New Jersey, to avoid double counting. None of the submitted public comments demonstrate that double recovery has occurred to date or will occur in the future.
32	p. 8, para. 5	p. 8, para. 5	The Draft Plan does not identify the natural resources for which the Federal Trustees claim trust management responsibility. The Federal Trustees need to provide a clear listing of resources for which they assert management authority, and if the resource is co-managed by multiple resource agencies at both the federal and state level, what is the percent breakdown in trust responsibility.	Please see response to topic 10.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
33	p. 9, para. 1	p. 9, para. 1	While the State of New Jersey is not a participant in the Draft Plan, natural resources which would appear to be NJDEP's responsibility are included, for example, the air, geologic, surface water, ground water and certain biological resources. Does an assessment conducted by the Federal Trustees pursuant to the plans presented in this document constitute a state-approved assessment of resources for which the state has trust responsibility? If not, then why are the Federal Trustees undertaking an assessment of resources for which they do not have trust responsibility?	The Federal Trustees' assessment will focus on resources for which they have trust responsibility, including pathways through which those resources may have been injured. Moreover, scientific information will be useful to both the state and the Federal Trustees regardless of which agency collects and reports the data. The state and the Federal Trustees have a history of sharing data and coordinating restoration projects between them and will continue in that vein.
34	p. 9, para. 2	p. 9, para. 2	The Draft Plan states that the Federal Trustees intend to maximize the use of data assembled by the LPRSA Restoration Project for OU 2, but does not identify data sources for OU 3 (e.g., Newark Bay, the Hackensack River, the Kill Van Kull, and the Arthur Kill). LPRSA data will almost exclusively be collected within the lower 17 miles of the Lower Passaic River and will be of little use in determining and quantifying injuries in OU 3. The Federal Trustees must present a comprehensive plan for collecting necessary data on actual conditions in and contributing sources to OU 3.	Please see response to topic 11.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
35	p. 9, para. 3	p. 9, para. 3	The Draft Plan does not provide sufficient detail to allow the public and potentially responsible parties to determine whether the technical approach being outlined by the Federal Trustees will result in adequate data meaningful to the damage assessment process. It appears that significant planning is still required by the Federal Trustees before a full plan can be presented to the public for review and comment.	Please see response to topic 4.
36	p. 9, para. 4	p. 9, para. 4	Regarding the multiple statements on "advisories" on fish in the Passaic River (see also pages 8 and 29), the Draft Plan does not properly present the correct dates and corresponding advisory types/basis. The advisory type/basis and dates should be confirmed and more clearly defined in the Draft Plan.	The damage assessment plan has been changed to correct the presented information.
37	p. 9, para. 5	p. 9, para. 5	The Draft Plan presents data from a report by Parsons (2003) on cormorants, including data on chemical concentrations in plasma, feathers and eggs. However, under the discussion of developmental studies, the authors do not cite the results of the observations made by Parsons (2003) on egg production, hatching success, and fledgling survival. These portions of the report should also be included in the discussion of potential injuries to birds from consuming prey within the Study Area. While parties can differ on interpretation of environmental data, the Trustees need to present and discuss all relevant data and findings.	Please see responses to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
38	p. 9, para. 6	p. 10, para. 1	The Draft Plan states that "The specific studies that the Federal Trustees have in progress to determine injuries to surface water resources of the Site are described below and shown in Exhibit 4-11." Furthermore, page 48 of the Draft Plan states that "The Trustees expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used." Where is the plan and report on the associated peer review that was to be released to the public associated with the "studies" shown in Exhibit 4-ll?	The referenced review of injuries to surface water resources is based on readily available historical information; consequently, it is not necessary to generate a study plan for this effort.
39	P. 10, PARA. 2	P. 10, PARA. 2	The Draft Plan discusses in general terms how pathways between a hazardous substance and a resource will be addressed, but does not discuss the technical approach the Federal Trustees intend to use to establish the necessary link between a specific release of a hazardous substance and a resource injury. Establishing such a link is a key requirement in the injury determination phase of the assessment. While the Draft Plan presents a discussion on how relatively small scale pathways will be evaluated (e.g., use of food web model, sources within the Study Area, etc.), the Draft Plan fails to describe how sources and pathways will be evaluated in the larger context of the Study Area. For example, how have external sources of hazardous substances to the Study Area affected resources within the Study Area (e.g., hazardous substances entering the Study Area from above Dundee Dam, or upstream of the tidally influenced portion of the Hackensack River, or from storm drains and CSOs, or from New York Harbor, or Raritan Bay). The DOI Regulations require that a clear causation link be established between a specific release of a hazardous substance and an injured resource. Quantifying the influence of these external sources will be critical in accounting for injuries not associated with releases within the Study Area.	Please see responses to topics 7 and 9, as well as the site definition and response to comment no. 50 on page 38 herein.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
40	p. 10, para. 3	p. 10, para. 3	The Draft Plan does not explain how baseline conditions will be established or accounted for during injury quantification, even though accounting for such conditions is one of the principal elements in correctly quantifying injuries. Section 11.72(a) of the DOI Regulations states that "[t]he authorized official shall determine the physical, chemical, and biological baseline conditions and associated baseline services for injured resources at the assessment area. . . ." (emphasis added). Furthermore, § 11.72(b)(3) provides that "[b]aseline data should be as accurate, precise, complete, and representative of the resource as the data used or obtained in § 11.71 of this part" (Section 11.71 covers the Injury Quantification Phase – service reduction quantification). Given the complex history and nature of the Site, especially in relation to impacts to natural resources associated with activities (e.g., dredging, upland and in-water habitat losses, shoreline construction, CSO and storm water discharges, commercial navigation activities, intense urban development and required services to support development, ambient noise and artificial lighting) that would be considered baseline conditions, the Draft Plan must provide a clear plan on how baseline conditions will be defined and incorporated into the injury quantification phase, and a description of the data required to define baseline conditions.	Please see response to topic 1.
41	p. 10, para. 4	p. 10, para. 4	Under what authority is a claim for navigation losses being made?	Please see response to topic 10.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
42	p. 10, para. 5	p. 11, para. 1	The QA Plan(s) that will be prepared by the Federal Trustees (as described in this Appendix) do not reflect that they will be prepared in accordance with the most recent EPA standard, the Uniform Federal Policy for Implementing Quality Systems (UFP-QS) EPA-SOS-F-03-001 March 2005. This Appendix should be revised to comply with this standard or the Federal Trustees should explain why they are not using the UFP QAPP format?	The UFP-IQS Manual and its policy has not been adopted by any of the natural resource trustee agencies involved in this case.
43	p. 11, para. 2	p. 11, para. 2	As stated above, the Draft Plan lacks essential details regarding how the NRDA will be conducted. To correct that deficiency, information responsive to the following questions should be provided in a revised assessment plan:	Please see response to topic 4.
44	p. 11, para. 3	p. 11, para. 3	Since determining risk is based on the evaluation of a future probability and evaluation of injury is a demonstration of past adverse effects of hazardous substances, what specific scientific studies will be conducted to identify any injuries to fish and shellfish? How will baseline and causation be taken into account and what, if any, RI data will be used?	Please see responses to topics 1, 2 and 4.
45	p. 11, para. 4	p. 11, para. 4	How will assessment of alleged losses to recreational and potential subsistence angling be conducted? Since many of the fish found in the Study Area have regional foraging areas, please describe how only the alleged losses of recreational and potential subsistence angling in the LPRSA will be evaluated.	Please see response to topic 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
46	p. 11, para. 5	p. 11, para. 5	Why are risk-based numbers being utilized to determine injury? As noted in the first bullet in this section, risk does not equate to injury. Injury is a demonstrated past adverse effect. It is not clear from the text how the Federal Trustees plan on demonstrating this.	For some natural resources and hazardous substances, the presence of the hazardous substance in sufficient concentrations is, in fact, sufficient to demonstrate injury in accordance with the DOI NRDA regulations (43 CFR 11.62). The Federal Trustees will determine injury in accordance with these regulations.
47	p. 11, para. 6	p. 11, para. 6	Comparison to literature values is not an appropriate or reliable measure of injury, as such values are merely correlative, and not indicative of causation. The use of these methods clearly does not meet the requirements of § 11.15(d). Please see previous specific comments in this section on determining injury.	In some cases, exceedances of certain criteria constitute an injury as defined under the DOI NRDA regulations (43 CFR 11.62). In other cases, injury determination requires additional information; however, in all cases, comparing existing data on contaminant concentrations to relevant standards, criteria, or other threshold values is an extremely cost-effective way to begin to assess potential injuries. After such comparisons have been made, better decisions can be made as to the need for subsequent investigations.
48	p. 11, para. 7	p. 11, para. 7	How will appropriate reference areas be identified and will the Federal Trustees be coordinating with the RI/FS team, who are also identifying appropriate reference areas? If so, how will that coordination be accomplished?	Please see responses to topics 3 and 4.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
49	p. 11, para. 8	p. 11, para. 8	What specific scientific studies will be conducted by the Federal Trustees to determine injury to birds? How will baseline and causation be taken into account and what, if any, RI data will be used?	Please see responses to topic 1, 4 and 7.
50	p. 11, para. 9	p. 12, para. 1	(Text and Exhibits 4-8): Swinburne Island is well outside of the Study Area, and the presentation of study results for birds on the Island serves to further confuse the possible relationship (if any) between possible observed conditions and environmental releases that are purported to be the basis for the NRDA.	The Diamond Alkali Superfund site is defined by the United States Environmental Protection Agency (USEPA) as "...the tidal portion of the Passaic River, including the Passaic River Study Area ... and the areal extent of contamination to which hazardous substances from the Study Area were transported, have or may have migrated or threatened to migrate or have come to be located and shall also include those sources from which contamination outside of the Study Area may be transported, have or may have migrated or threatened to migrate or have come to be located within the Study Area."

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
51	p. 12, para. 2	p. 12, para. 2	Screening values are for use in identifying chemicals that might present a risk, not for determining injury. The Draft Plan should describe how injury will be determined.	Comparing existing data on contaminant concentrations to relevant standards, criteria, or other threshold values including screening values is an extremely cost-effective way to begin to identify contaminants that might cause injuries. Such comparisons are one of the tools used to prioritize subsequent investigations.
52	p. 12, para. 3	p. 12, para. 3	Variations in avian populations are due to many factors, including predation, habitat loss, and changes in prey availability. How will the Federal Trustees establish that hazardous substances, as opposed to other factors, are responsible for variations in bird populations?	The Federal Trustees do not agree with the implicit assumption that injuries must be assessed at the population level; specific biological injury categories listed in the DOI regulations at 43 CFR § 11.62(F) do not require the demonstration of population effects. In addition, please see responses to topic 7.
53	p. 12, para. 4	p. 12, para. 4	How will population-level effects be determined for birds? As noted above, populations and even individual bird fecundity is highly variable, with many contributing factors. How will the Federal Trustees establish and take into account baseline conditions?	The Federal Trustees do not agree with the implicit assertion that it is necessary to establish population-level effects in birds or in other species; specific biological injury categories listed in the DOI regulations at 43 CFR § 11.62(F) do not require the demonstration of population effects. In addition, please see response to topic 1.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
54	p. 12, para. 5	p. 12, para. 5	What are the boundaries of the Study Area? This is important to understand since data needs will be based on the boundaries of the Study Area. For example, there is a plethora of data in the LPRSA as compared to the other OUs identified in the Draft Plan. How and when will an adequate database of information be acquired for the other OUs such that the different OUs can be assessed with regard to potential contributions?	Please see response to topic 9 and 11.
55	p. 12, para. 6	p. 12, para. 6	How are the boundaries of the Study Area determined? For example, why are floodplain soils within the Study Area? Will the Federal Trustees assert that the mere presence of hazardous substances in flood plain soils constitutes an injury? If so, how will the Federal Trustees determine causation?	Please see responses to topics 9 and 7.
56	p. 12, para. 7	p. 12, para. 7	There are many inputs to surface water and temporal changes in surface water conditions. Will the Federal Trustees assert that the mere presence of hazardous substances in surface water constitutes an injury? If so, how will the Federal Trustees determine causation?	In some cases, exceedances of certain criteria constitute an injury as defined under the DOI NRDA regulations (43 CFR 11.62). Please refer to topic 7 for discussion of causation.
57	p. 12, para. 8	p. 12, para. 8	Sediment quality values are used to estimate potential effects (please see earlier comments on the difference between risk and injury). How will actual injury, if any, be determined?	Please see response to topic 4.
58	p. 12, para. 9	p. 12, para. 9	Exceedance of a threshold value does not constitute an injury. How will injuries to ground water be determined?	In some cases, exceedances of certain criteria constitute an injury as defined under the DOI NRDA regulations (43 CFR 11.62).

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
59	p. 13, para. 1	p. 13, para. 1	As noted above, the Draft Plan does not explain how the Study Area boundaries are to be delineated. This is particularly relevant to ground water.	Please see response to topic 9.
60	p. 13, para. 2	p. 13, para. 2	How will injuries be determined?	Please see response to topic 4.
61	p. 13, para. 3	p. 13, para. 3	Why are floodplain soils being evaluated (please see earlier comments on Study Area boundary)?	Please see responses to topic 9.
62	p. 13, para. 4	p. 13, para. 4	How will injuries be determined? (Air)	Please see response to topic 4.
63	p. 13, para. 5	p. 13, para. 5	There is insufficient detail to determine how the pathway determination will be conducted. The Draft Plan should provide this information.	Please see response to topic 4.
64	p. 13, para. 6	p. 13, para. 6	There are a number of tools listed, yet no details are provided as to how these tools will be used in the damage assessment. The Draft Plan should provide that detail.	Please see response to topic 4.
65	p. 13, para. 7	p. 13, para. 7	The CPG agrees that restoration planning is critical. How will implementation of early restoration projects be assessed? How will the Federal Trustees select early restoration projects?	Restoration projects will be selected in accordance with the criteria set forth in 43 CFR 11.82.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
66	p. 13, para. 8	p. 13, para. 8	The Draft Plan presented by the Federal Trustees fails to meet many of the requirements for Type B assessments, 43 CFR Part 11, Subpart C. The deficiencies in the Draft Plan are so significant that the Draft Plan should be withdrawn and a revised plan should be issued. The revised document should also provide a detailed description of any study plans being considered by the Federal Trustees, as well as a discussion of the critically important question of how baseline conditions in OU 2 and OU 3 will be established and incorporated during the injury quantification phase and how the Federal Trustees will establish causation.	Please see responses to topics 1, 4 and 7.

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EXHIBIT 4 COMMENTS FROM ISP-1 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p. 1, para. 2	p.3, para 2	The Draft NRDA Plan Does Not Adequately Address Baseline Issues (examples: permitted and unpermitted waste disposal, navigational dredging, loss of natural wetlands/shoreline, presence of disease vectors).	Please see response to topic 1.
2	p. 3, para. 3	p. 4, para. 2	The Draft NRDA Plan misuses sediment quality guidelines in its identification of contaminants of concern: SQGs may be used to eliminate contaminants of concern but not to identify or rank contaminants because the derivation of sediment quality guidelines is scientifically flawed (e.g., the derivation does not consider bioavailability or regional conditions). Instead, contaminants for evaluation should be selected based on a careful review of the literature including regional studies.	Sediment quality guidelines are used to interpret chemical data from analyses of sediments. Chemicals elevated in concentration above the guidelines have been associated with measures of adverse effects. The guidelines are commonly used both to rank and to prioritize chemicals of concern.
3	p. 4, para. 3	p. 5, para. 2	ISP recommends "more thorough" injury determination studies rather than comparisons of concentrations to known criteria, standards, guidance values, or other threshold values, since such comparisons ignore issues of bioavailability. Exposure to "elevated" levels of chemicals, even if in excess of critical body residues, does not constitute biological injury, particularly in the case of metals. Furthermore, more weight should be given to studies that evaluate endpoints linked to population stability, and to population and community studies generally.	In some cases, exceedances of certain criteria constitute an injury as defined under the DOI NRDA regulations (43 CFR 11.62). In other cases, injury determination requires additional information; however, in all cases, comparing existing data on contaminant concentrations to relevant standards, criteria, or other threshold values is an extremely cost-effective way to begin to assess potential injuries. After such comparisons have been made, better decisions can be made as to the need for subsequent investigations. The Federal Trustees also do not agree that estimating injury at the population or community level is required.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
4	p.5, para.3	p.5, para.3	ISP provides the above preliminary comments in response to the Draft NRDA Plan. In sum, the draft NRDA Plan contains a number of important deficiencies, including the misuse of sediment quality guidelines, the implied correlation between contaminant concentrations and injury, and the failure to systematically evaluate baseline.	The Federal Trustees disagree with the assertion that the draft damage assessment plan misuses sediment quality guidelines, and it is a well-established principle of ecotoxicology that increasing contaminant concentrations frequently results in adverse effects that constitute injuries as defined under DOI's NRDA regulations. In addition, please see response to topic 1.
5	p. 5, para. 4	p. 5, para. 4	ISP would be pleased to discuss any of these issues with you in more detail. Finally, ISP hereby requests an opportunity to review and comment on any future drafts of the NRDA Plan or any of the associated studies.	ISP, along with other stakeholders and the general public, will have the opportunity to comment on key NRDA documents including, but not limited to, study plans.

EXHIBIT 5 COMMENTS FROM ISP-2 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p.1, para. 1	p. 6, para. 2	The entirety of this letter criticizes the EPA / ACE *Draft Geochemical Evaluation (Step 2)*, and a document cited therein (Lowe et al. 2005).	As the draft damage assessment plan neither references nor relies upon the referenced documents, the Federal Trustees are not responding to the issues raised in this letter.

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EXHIBIT 6 COMMENTS FROM MAXUS-1 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p.1, para. 1	p.1, para. 1	On February 4, 2008, Maxus Energy Corporation ("Maxus") and its affiliate, Tierra Solutions, Inc. ("Tierra"), each received a copy of the attached letter from your office, dated January 25, 2008 ("January Letter"). The January Letter enclosed a copy of Captain Ken Barton's letter of August 2, 2007 ("August Letter"), which provided notice that the National Oceanic and Atmospheric Administration and the U.S. Department of the interior ("Federal Trustees") had made a determination to perform a natural resource damage assessment for the Diamond Alkali Superfund Silt Maxus and Tierra have previously responded to the August Letter as part of collective responses made by the Lower Passaic River Study Area Cooperating Parties Group ("CPG"), through the CPG's Coordinating Counsel. William Hyatt. In addition, on January 15, 2008, Tierra, Maxus and Occidental Chemical Corporation submitted comments to the November 2007 Public Review Draft of the Federal Trustees' Natural Resource Damage Assessment Plan for the Diamond Alkali Superfund Site.	N/A
2	p.1, para. 2	p. 2, para. 1	I write merely to clarify that Maxus's and Tierra's responses to the Federal Trustees (individually or as part of the CPG), as well as any participation by them in the NRD Assessment process, should not be construed as conceding that Maxus or Tierra qualify as potentially responsible parties ("PRPs") for natural resource damages. Rather, Maxus has responded in compliance with private, contractual indemnity obligations that Maxus owes to another party, and Tierra is responding because it separately contracted with Maxus to perform those indemnity obligations. It is in those capacities (i.e. on behalf of the indemnified party) that Maxus arid Tierra have been participating in the CPG and will to continue to be as responsive as possible to the Federal Trustees' assessment process.	N/A

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EXHIBIT 7 COMMENTS FROM TIERRA-1 AND RESPONSES

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p. 1, para. 1	p. 1, para. 1	Tierra Solutions, Inc. ("Tierra"), for itself and on behalf of Maxus Energy Corporation and Occidental Chemical Corporation ("OCC," as successor to Diamond Shamrock Chemicals Company [f/k/a Diamond Alkali Company]), presents the attached comments on the Federal Natural Resource Trustees' Natural Resource Damage Assessment (NRDA) Plan for the Diamond Alkali Superfund Site; Public Review Draft (November 2007) (the "Plan"). While this document provides numerous detailed comments, the following list provides a general overview:	N/A
2	p. 1, para. 2	p. 1, para. 2	Trustee Participation: The absence of the New Jersey Department of Environmental Protection as a participant in its role as the State's natural resource trustee presents a significant risk that unnecessary costs will be incurred through duplicative and uncoordinated efforts.	Please see response to topic 3.
3	p. 1, para. 3	p. 1, para. 3	Cost Effectiveness: The Plan lacks sufficient detail to allow an evaluation of whether or not the proposed assessment would be cost-effective.	Please see response to topic 4.
4	p. 1, para. 4	p. 1, para. 4	Coordination With Other Investigations: The Plan lacks sufficient detail to determine the degree to which the damage assessment process will be coordinated with the ongoing interagency Passaic River Restoration Project and the related Remedial Investigation/Feasibility Study (RI/FS) activities both in the Lower Passaic River and Newark Bay Complex.	Please see response to topic 3.
5	p. 1, para. 5	p. 2, para. 1	Secondary Data analysis: The Plan does not incorporate analysis/findings set forth in the large body of available, relevant reports and recognized in peer-reviewed publications dealing with natural resources and natural resource services in the Newark Bay Complex (Site). In the Uniform Federal Policy on Quality Assurance Project Plans, the importance of the review and analysis of Secondary Data is clearly established.	Please see responses to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
6	p. 2, para. 2	p. 2, para. 2	Baseline: The Plan does not specify a method for determining baseline conditions, which is an essential element of an NRD assessment, particularly in the context of an area in which the habitat and natural resources have been significantly degraded beginning in the 1800s.	Please see response to topic 1.
7	p. 2, para. 3	p. 2, para. 3	Multi-Chemical Influence: The Plan provides for assessment of only a small number of chemical contaminants, ignoring many chemicals present in the Site at elevated levels that may present a risk to, or have damaged, the natural resources.	Please see response to topic 5.
8	p. 2, para. 4	p. 2, para. 4	Multi-Party Responsibility: the Plan contains a section entitled "Sources of Contamination" but includes a description of only one source—the Diamond Alkali Plant—despite acknowledging that there are at least 120 contaminant point sources in the lower Passaic River portion of the Site alone. This focus on a single source is both technically and legally insupportable.	Please see response to topic 6.
9	p. 2, para. 5	p. 2, para. 5	Cause of Injury: The Plan must meaningfully discuss how the Trustees intend to evaluate the causal connection between particular releases and particular injuries—a necessary element of NRDA under relevant regulations—in the context of a Site involving large numbers of environmental stressors, extensive historic impairment of habitat, and the many different chemical substances present at the Site.	Please see responses to topic 7.
10	p. 2, para. 6	p. 2, para. 6	Inadequate detail on methods: The Plan provides insufficient detail regarding injury and damage assessment methods.	Please see response to topic 4.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
11	p. 2, para. 7	p. 2, para. 8	In addition to these overarching comments, this document offers additional observations and suggestions related to specific items contained in the Plan. Most importantly, we believe that given the many areas in which the Plan is inadequate on legal and technical grounds, an assessment conducted pursuant to this plan would not qualify for the rebuttable presumption under section 107(f)(2)(C) of CERCLA.	We respectfully note that any such determination with respect to rebuttable presumption is to be made solely by a Federal District Court.
12	p. 2, para. 8	p. 3, para. 1	Moreover, and perhaps more importantly, unless the Trustees address the Plan's failure to specify a method for addressing the critical issues of baseline and causation, and its arbitrary decision to focus on particular substances and limited areas of the Site while excluding assessment of others, the assessment, from its inception, is incapable of accurately assessing natural resource damages, if any, at the Site, which will in turn make it impossible to accurately identify the particular entities that may have been responsible for such damages. Therefore, we strongly recommend that the assessment not move forward until these technical and legal issues in the Plan are corrected, and the corrected Plan re-issued for further comments.	Please see responses to topics 1, 5 and 7.
13	p. 3, para. 2	p. 3, para. 2	Tierra notes that it strongly supports the Trustees' intent for parties to participate in cooperative assessment activities, hopes that a cooperative process will assist in correcting these and other problems with the Plan before any assessment activities begin, and is committed to work cooperatively with the Trustees to accomplish these goals.	N/A

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EXHIBIT 8 COMMENTS FROM TIERRA-2 AND RESPONSES

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
1	p. 1, para. 2	p. 1, para. 2	The lack of participation by New Jersey State Trustees is inappropriate. The lack of formal participation by the State of New Jersey's Natural Resource Trustee, the New Jersey Department of Environmental Protection ("NJDEP"), is a troubling and complicating circumstance. The Plan references the State's "complementary authority" with regard to NRDA, but does not explain how the relationship between the Federal and State Trustees will function going forward, or how the Trustees will ensure coordination of activities and avoid duplication of assessment costs.'	Please see response to topic 3.
2	p. 2, para. 1	p. 2, para. 1	The Plan's failure to account for the non-participation of the State Trustee is inconsistent with the NRD regulations (see 43 C.F.R. § 11.32(a)), which mandate cooperation, or at least coordination, between the State and Federal Trustees in NRD assessment activities. These regulations set forth a number of requirements that the Trustees must "fulfill...before developing an Assessment Plan." One of these is "Coordination." Although the regulations provide some authority allowing various Natural Resource Trustees to act independently, that authority is limited to cases where there is "a reasonable basis for dividing the assessment," which is a prerequisite for a Natural Resource Trustee to "act independently and pursue separate assessments, actions, or claims." Even then (1) the claims shall "not overlap," and (2) "the Natural Resource Trustees shall coordinate their efforts, particularly those concerning the sharing of data and the development of the Assessment Plans" (see 43 CFR § 11.32(a)(1)(iii)). The Plan does not articulate a reasonable basis for dividing the assessment, nor does it describe how the Federal Trustees will avoid duplicative efforts or share data. Because the coordination requirement is expressly made a precondition to development of the Assessment Plan, failure to adhere to this requirement will disqualify any assessment performed under that plan from the rebuttable presumption contained in section 107(f)(2)(C) of CERCLA.	Please see response to topics 3 and 10. In addition, we respectfully note that any determinations on rebuttable presumption are to be made solely by a Federal District Court.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
3	p. 2, para. 2	p. 2, para. 2	Whatever the reason for the State's lack of participation, the Plan clearly identifies and proposes to analyze specific resources (e.g., groundwater and submerged tidelands) that are under the sole or co-trusteeship of the State. Yet, the plan is silent on how the Federal Trustees plan to coordinate their efforts with those of the State Trustee. As such, the proposed Plan is flawed by failing to address how the assessment process can be reasonable, cost-effective and avoid duplication when, from all appearances, injury and damage analyses are being conducted independently and redundantly by both the Federal and State Trustees. Overall, it is unclear how a cooperative assessment can proceed for the Site without the full and integrated cooperation of all Trustees. This problem is particularly important to Tierra, which currently is a named defendant in a lawsuit in which the State-while explicitly disavowing any claim to recover natural resource damages-is attempting to recover NRD assessment costs for the same Site. Nor is the potential for impermissible duplication limited to assessment costs alone. The lack of coordination-and the concomitant potential for double recovery-is equally apparent with respect to alleged damages, including (without limitation) those regarding navigation, dredging and dredge disposal costs. On the one hand, the State treats the alleged "impact" of hazardous substances on "navigation, dredging, and disposal" as "economic injuries to the State and the Newark Bay Complex," for which the State seeks monetary compensation, and which the State believes are distinct from any injuries to "the ecosystem and natural resources of the Newark Bay Complex." The Federal Trustees obviously take a different view of the matter. The Plan announces that the Federal Trustees regard "lost navigational services"-including any "reduced ability to maintain authorized federal shipping channels" and "increased dredging costs associated with problems with disposal"-as "compensable damages under NRDA laws and regulations," which the Federal Trustees clearly intend to pursue under the NRD rubric (see pages 78-79 of the Plan).	Please see response to topics 3 and 10.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
4	p. 3, para. 2	p. 3, para. 2	The Plan does not explain how the two positions can be harmonized. The Plan provides no support for the proposition that "lost navigational services" are "compensable damages under NRD laws and regulations." Nor does it clarify how the Federal Trustees propose to assess, as natural resource damages, alleged injuries or losses that the State of New Jersey, a purported co-trustee, apparently believes are purely economic and altogether outside the scope of NRD.	Please see response to topics 3 and 10.
5	p. 3, para. 3	p. 3, para. 3	The proposed Plan also contains no mention of the 2003 Memorandum of Agreement among the State of New Jersey, Department of Environmental Protection, Office of Natural Resource Restoration, National Oceanic and Atmospheric Administration, and the United States Fish and Wildlife Service. That Agreement was enacted to "ensure the coordination and cooperation of the Trustees in addressing their respective natural resource damage and restoration concerns and responsibilities arising from the release of hazardous substances at and from the Diamond Alkali Superfund Site and Environs." A copy of the Memorandum of Agreement is attached hereto and incorporated herein as Exhibit 3. To our knowledge, this agreement is still in effect. However, it is unclear, based on the statements set forth in the Plan, whether it is being observed by the signatories thereto. The dual track assessment activities contravene the expressed intent of this Memorandum of Agreement.	Describing the absence of NJDEP's participation in the NRDA Plan document as a dual track assessment is a mischaracterization. In addition, please see response to topic 3.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
6	p. 4, para. 2	p. 4, para. 3	The Plan fails to establish reasonableness and likely cost-effectiveness of assessment. Federal regulations require that natural resource damage assessment ("NRDA") plans "be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost." 43 C.F.R. § 11.31(a) (2). Under the relevant regulations, the Assessment Plan must be sufficiently detailed to allow an evaluation of whether the costs of the assessment are likely to exceed the natural resource damages being studied—an important point given the apparent breadth of the Plan—and to allow comparison among various assessment activities that might obtain the same information or data at lower cost (see 43 C.F.R. § 11.14 regarding definitions of "cost-effective" and "reasonable cost"). This detail must be added to the Plan to comply with the NRD regulations.	Please see response to topic 4.
7	p. 4, para. 5	p. 4, para. 5	The Plan presented by the Federal Trustees, which proposes the subject *Type B* assessment for the Diamond Alkali Superfund Site, fails to meet this pivotal, threshold requirement. Although limited portions of the Plan contain detail sufficient to provide relevant analytical and technical comment, overall the Plan lacks the specificity needed for meaningful evaluation of whether the Plan is reasonable and cost effective.	Please see response to topic 4.
8	p. 4, para. 6	p. 4, para. 6	The Plan fails to contain sufficient information to demonstrate that it will be coordinated to the extent possible with the ongoing interagency Lower Passaic River Restoration Project and the related RI/FS in the Lower Passaic River and Newark Bay Complex.	Please see response to topic 3.
9	p. 4, para. 7	p. 4, para. 7	The federal NRD regulations, specifically 43 CFR § 11.31(a)(3), provide that "The Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation, feasibility study or other investigation performed pursuant to the NCP" [i.e., CERCLA activities].	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
10	p. 4, para. 8	p. 5, para. 1	The Plan must provide detailed discussion of how this coordination will be accomplished to comply with this mandatory requirement for NRD Assessment Plans. As is, the Plan merely notes in passing the existence of ongoing CERCLA actions at the Site (see pages 42-43 of the Plan). For example, the Plan states that restoration options are "being coordinated with USEPA remedial actions" and further provides that the "Federal Trustees may use information obtained through remedial and WRDA restoration studies where suitable to assess injuries to natural resources within the site." The Plan should articulate with specificity how such coordination will occur, where in the ongoing remedial investigation the Trustees will insert themselves, and how the Trustees plan to utilize information obtained to plan and consider future restoration activities. This is necessary for the Plan to be "sufficient" to "demonstrate" the necessary coordination, particularly at a Site as complex as this one. The Trustees should take steps to assure the required coordination, and should revise the Plan to address and describe such coordination as required; failure to do so will disqualify any assessment performed under the current version of the Plan from the rebuttable presumption under CERCLA and may render assessment costs unrecoverable.	Please see response to topic 3. In addition, we respectfully note that any determinations on rebuttable presumption are to be made solely by a Federal District Court.
11	p. 5, para. 2	p. 5, para. 2	The Plan fails to acknowledge and incorporate relevant peer reviewed assessments and related data and information.	Please see responses to topic 2.
12	p. 5, para. 3	p. 5, para. 3	Among the specifications for properly prepared damage assessment plans is a requirement under 43 CFR § 11.31(a)(3) that "The Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation, feasibility study, or other investigation performed pursuant to the NCP."	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
13	p. 5, para. 4	p. 5, para. 4	Investigation activities in the lower Passaic River, other areas of the watershed and the Newark Bay Estuary have been conducted intensively for years, resulting in many reports and peer-reviewed publications. ... Much of that accumulated body of knowledge regarding the Site has been ignored in the Plan. The Plan must address and incorporate this vast body of knowledge as mandated by 43 C.F.R. § 11.15(a)(3), which provides that "the natural resource trustee who has performed an assessment in accordance with this rule may recover.. .the reasonable and necessary costs of the assessment." Under the current circumstances, the application of that rule should be expected to preclude recovery by the Trustees of costs associated with duplicative studies that are unnecessary in this instance.	Please see responses to topic 2.
14	p. 5, para. 5	p. 6, para. 1	The Plan identifies and references many site-specific chemistry data sources, including some documents/databases compiled by Tierra, and utilizes a number of toxicological and ecological references that are either unrelated to, or only marginally related to the Site. However, the Plan neither identifies, nor makes use of, many of the substantial number of relevant (and readily available) peer-reviewed toxicological, ecological, human health and related assessment publications that exist in the scientific literature and are specifically related to the Site. A select list of these references is provided as Attachment 1 to these comments. Additional publications, reports and studies for the Site were cataloged in Volume 1 of the Newark Bay Study Area Remedial Investigation Work Plan, Sediment Sampling and Source Identification Program, Newark Bay, New Jersey entitled Inventory and Overview Report of Historical Data that was prepared by Tierra and approved by USEPA in 2004. Collectively, these peer-reviewed publications and other reports/datasets contain the majority of the data and information that have been collected to date on the environmental conditions that exist in this system and must, under the regulations, be considered.	Please see responses to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
15	p. 6, para. 2	p. 6, para. 2	The Plan identifies the Urban Rivers Restoration Initiative ("URRI"; see page 37 of the Plan) and even commits to "maximize the use of Lower Passaic River Restoration Project ("LPRRP") data and information" (page 47 of Plan) but no detail is provided on how this will be accomplished. Given the Plan's lack of inclusion of the key published studies that have been conducted at the Site to date, it is not at all clear that, without more of a focus on this critical issue in the Plan, the assessment process will maximize the use of pre-existing site-specific data and information. At the very least, the Plan should acknowledge that such studies are relevant to the injury analyses it proposes. Furthermore, the Plan should commit to reducing unnecessary costs and avoid duplication of efforts by using available data in every possible instance.	Please see responses to topic 2.
16	p. 6, para. 3	p. 6, para. 3	The Plan does not contain a baseline conditions assessment.	Please see response to topic 1.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
17	p. 6, para. 4	p. 6, para. 4	The Plan must explain how baseline conditions will be established; this is an essential component of an NRD assessment under the law that currently is not fulfilled in the Plan. The NRD regulations, at 43 C.F.R. § 11.72, detail the requirements for conducting a baseline services determination, none of which are discussed in any detail or specificity in the Plan, especially regarding the use of historical data (43 C.F.R. § 11.72(c)) establishment of control areas, if applicable (43 C.F.R. §§ 11.72(d)) and determining baseline services generally (43 C.F.R. § 11 .72(e)-(k)). Absent the Plan addressing this critical issue, it is demonstrably inadequate under the regulations, as it is impossible to evaluate the "reasonable cost" of the proposed assessment—a regulatory requirement for an Assessment Plan (see 43 C.F.R. § 11.31 (a)(2))—without some meaningful consideration of the baseline issue. Baseline is a key element of the Quantification phase of the assessment, which must be considered in assessing "reasonable cost" (43 C.F.R. § 11. 14(et seq.)). Any NRDA that fails to set forth complete baseline conditions will be fundamentally flawed and rendered incapable of supporting the rebuttable presumption.	Please see response to topic 1. In addition, we respectfully note that any determinations on rebuttable presumption are to be made solely by a Federal District Court.
18	p. 6, para. 5	p. 6, para. 5	The Site has a well-documented long history of environmental damage and resource degradation which makes establishing the correct baseline one of the most important tasks in this assessment process. More than two centuries of habitat destruction through draining, filling, and bulkheading must be evaluated, as natural resources were destroyed by such activities well before much of the chemical input to the Site. Although the Plan makes isolated historical references to the compromised environmental conditions of the Site, there is no explicit statement regarding the importance of such information in establishing "baseline" conditions, nor is there any description regarding the Trustees' use of such information in the damage assessment process. This is a fundamental flaw in the Plan as proposed, notwithstanding extensive contamination of the Site dating back to the 1700s and early 1800s.	Please see response to topic 1.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
19	p. 7, para. 2	p. 7, para. 2	The book entitled A Common Tragedy: History of an Urban River by Iannuzzi et al. (2002) is not cited anywhere in this Plan, despite the fact that it systematically identifies, characterizes and thoroughly documents (including with myriad contemporaneous materials) historical environmental baseline conditions for the Site. Indeed, broadly-published sources have long acknowledged the deplorable baseline environmental condition of the Site. As early as September 24, 1895, the New York Times reported that, "from Paterson down to the point of discharge in Newark Bay, the [Passaic] [R]iver is little better than a large open sewer. Passaic, Rutherford, Belleville, Kearny, East Newark, or Harrison; Newark, and the Oranges, one and all discharge their sewage direct into the river, which nowhere is much more than a quarter mile in width."° The NRDA for this Site must emphasize the quantification of baseline conditions as part of the assessment process; only then can incremental injuries and damages be properly quantified.	Please see response to topic 1.
20	p. 7, para. 3	p. 7, para. 3	Indeed, in Chapter 4, page 57, second full paragraph, the Plan refers to possible studies ". . .to assess community composition, species abundance, distribution patterns, or other community metrics. As part of such studies, the Trustees would identify and characterize appropriate reference areas to understand the likely baseline condition." This is a necessary and required assessment under 43 CFR Part 11 (for example, at 43 CFR § 11.71 which specifies evaluation relative to baseline). Yet, the Plan only specifies this kind of assessment for fish and shellfish. For other important natural resources—birds and mammals—the Plan provides only for evaluation of chemical exposure thresholds, and does not propose community structure analyses or assessment of baseline impairments. Given that such analyses have been conducted, reported, and published in the peer-reviewed scientific literature, and that those reports and publications are readily available to the author(s) of this Plan, the Plan's failure to cite those reports and publications, and to build the planned assessment activities on that existing and readily available information base, is insupportable and must be corrected.	Please see responses to topics 1 and 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
21	p. 7, para. 4	p. 8, para. 1	Furthermore, the Trustees have not adequately identified certain critical considerations with regard to the status of water quality and biological conditions in the Passaic River/Newark Bay system. Specifically, the Trustees have not acknowledged the relevance and importance of water quality standards and waterbody impairment status under the Clean Water Act. The State of New Jersey (and USEPA) includes the lower Passaic River on its 303(d) list for multiple contaminants, contaminant categories (e.g., "petroleum hydrocarbons") and biological impairment ranging from moderate to severe. While some of the parameters identified by the Trustees in the Plan are responsible for some portion of these impairment listings, additional parameters should be addressed for baseline considerations as well as specific injury determinations within the Plan. The Trustees include a specific reference in the Plan to "designated waterbody uses" (pages 68-69 of the Plan) but fail to clarify their anticipated use of this information in informing baseline decision-making or for identifying parameters of interest.	Please see response to topic 1.
22	p. 8, para. 2	p. 8, para. 2	The Plan contains an inadequate and incomplete assessment of chemical contaminants.	Please see response to topic 5.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
23	p. 8, para. 3	p. 8, para. 3	It is clearly recognized in the Plan (see page 10 of the Plan) that a large number of hazardous substances exist in the Site, including "in addition to dioxins and PCBs. . . semivolatile organic compounds, herbicides, insecticides, polycyclic aromatic hydrocarbons (PAHs), and metals." The existence of these contaminants throughout the Site has been well documented by a number of entities in both CERCLA- and nonCERCLA-related studies. Despite this recognition, this Plan identifies (as listed in Exhibit 2-10 on page 34) only a limited group of contaminants as the focus of the NRDA. No basis is provided in the Plan for the small number of contaminants being investigated, which is inconsistent with NRD regulations at 43 CFR Part 11 12 The NRDA should evaluate the incremental injuries and damages from all known chemical contaminants that exist in the system at elevated levels. At a minimum, this would include a substantially larger list of metals/inorganics, PAHs, petroleum hydrocarbons and various volatile and semivolatile compounds. There is a significant body of existing information, much of it available through USEPA Region II, demonstrating that a substantially greater list of contaminants should be included for evaluations.	Please see response to topic 5.
24	p. 8, para. 4	p. 8, para. 4	In addition, the entire Plan places inordinate focus on dioxins and dioxin-like toxic effects, relative to other contaminants. Even the limited number of other chemicals that are addressed in this Plan are not given the same level of attention as are dioxins in terms of presenting source information, site-specific data summaries, toxicity data, etc. Given that this Site is contaminated with a wide range of substances that have originated from a large number of sources for more than 200 years, both within and outside of the Site, the focus of this Plan should be redirected to presenting consistent levels of data and information on all known contaminants/contaminant classes, for the various natural resources that are being investigated under the proposed NRDA.	Please see response to topic 5.
25	p. 9, para. 1	p. 9, para. 1	The Plan contains an incomplete characterization and assessment of the myriad sources of chemical contaminants to the site.	Please see response to topic 6.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
26	p. 9, para. 2	p. 9, para. 2	While it is recognized in the Plan (see page 34) that "hazardous substances in the Site likely originate from numerous sources, both direct (point sources) and non-direct (non-point sources)", this Plan does not contain even a cursory characterization of these myriad sources, nor a program for conducting a systematic injury assessment for the many chemical contaminants that originated from these sources. In fact, pages 34 and 35 of the Plan which contain the section entitled "Sources of Contamination" include a description of only one source—the Diamond Alkali Plant—despite acknowledging that there are at least 120 contaminant point sources in the lower Passaic River portion of the Site alone. This focus on a single source is both technically and legally insupportable.	Please see response to topic 6.
27	p. 9, para. 3	p. 9, para. 3	The absence of even a cursory inventory of the types and numbers of contaminant sources from the other waterways of the Site (besides the Passaic River) is puzzling and insupportable. Limitation of the of the [sic] acknowledged sources of contamination (page 34 of the Plan) to a limited group of possible PRP sources in the "Lower Passaic River watershed" (see page 35 of the Plan) displays a fundamentally flawed perception of the historic reality, and indeed with the stated geographical scope of the assessment envisioned by the Plan. Over the course of time—dating virtually to the founding of the country and evolution of the Site as the veritable cradle of the Industrial Revolution— there have been literally thousands of contaminant sources located along or proximate to the Newark Bay Complex, including its other direct tributaries (the Hackensack River, Passaic River, Arthur Kill and Kill Van Kull) and the tributaries of those tributaries.	Please see response to topic 6.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
28	p. 9, para. 4	p. 9, para. 4	Furthermore, even though the Plan tacitly acknowledges discharges from "public utilities" (page 34), not a single public utility or municipality is included as a noticed party to this Plan. Since their earliest settlement, through at least the early 1900s, the municipalities and industries along and proximate to the Site discharged their untreated wastewater directly into the surface waters of the Site. Many municipalities within the Site continued to discharge untreated wastewater into the Site through at least the 1 950s. Furthermore, to this day, untreated wastewater continues to discharge into the Site from municipal and regional sewer systems as a result of systemic design flaws and improper maintenance.	Please see response to topic 6.
29	p. 9, para. 5	p. 9, para. 5	Tierra understands that not every recipient of a general notice letter ("GNL") from USEPA has been included as a noticed party to this Plan. In addition, there exist many other PRPs, to which the USEPA is considering issuing GNLs, not to mention scores (if not hundreds) more public and private entities that are known to have discharged hazardous substances into the Site but have so far escaped regulatory focus. All these other parties should be included in the "cooperative approach" and the Plan re-noticed accordingly. Failure to include these public and private entities represents a data gap and unreasonably omits significant PRPs from the NRDA process in direct contravention of 43 C.F.R. § 11.32(a)(2).	Please see response to topic 8.
30	p. 10, para. 1	p. 10, para. 1	The Plan does not discuss how the assessment intends to establish causation.	Please see responses to topic 7.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
31	p. 10, para. 2	p. 10, para. 2	The NRD regulations make it clear that one of the principal tasks that must be performed in an NRD assessment is determining whether releases of particular hazardous substances were, in fact, the cause of the injuries being assessed. For example, the Type B procedures should be applied only to "injuries resulting from the . . . release of a hazardous substance" 43 C.F.R. § 11.61(b) (emphasis added). The Plan contains no discussion of how the Trustees intend to pursue such an assessment, and much in the Plan suggests that the proposed assessment will be inadequate to do so. For example, it would be necessary, at a minimum, for the assessment to comprehensively examine the hazardous substances that have been released into the Site, not just a limited subset of those substances as the Plan proposes, to determine whether particular injuries were caused by release(s) of any particular hazardous substance(s). Without such an analysis, the assessment would be inadequate to establish the existence of any compensable natural resource damages.	Please see responses to topic 7.
32	p. 10, para. 3	p. 10, para. 3	The assessment/presentation of dioxin/furan toxicology and Toxic Equivalency Factors ("TEFs") contains inaccuracies.	Please see responses to specific concerns delineated below.
33	p. 10, para. 4	p. 10, para. 4	The Plan contains broad statements regarding adverse health effects reported for TCDD without discussing the uncertainties or controversies associated with the toxicity of this class of compounds to humans, but it does not support such statements with any references. Similarly, discussions and statements made regarding the ecological effects of TCDD on various receptor groups (invertebrates, fish, shellfish and birds) are based on a limited set of publications addressing studies primarily of freshwater sites, the application of which are highly uncertain in the context of this estuarine Site.	Please see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
34	p. 10, para. 5	p. 10, para. 5	The Plan briefly discusses the toxic equivalency factor (TEF) approach to quantifying mixtures of dioxins and dioxin-like compounds and includes an entire page (page 26 of the Plan) consisting of a summary TEF table listing the consensus-based avian, fish and mammalian World Health Organization (WHO) TEFs for 29 dioxin, furan and dioxin-like PCB congeners. However, there is no discussion of TEF applications to the levels of dioxins and dioxin-like compounds that have been measured in sediment samples from the Site. Further, the Plan does not contain any discussion of the various well-known uncertainties and shortcomings associated with specific TEFs, or the TEF approach in general.	The NRDA Plan does not discuss the TEF scheme and TEQ methodology applications to site sediments because these methods are primarily meant for estimating exposure via dietary intake situations. The section on TEF/TEQ methodology has been updated to reference the consideration of TEFs and TEQs as the scientific standard for measuring the collective potency of a mixture of TCDD and dioxin-like compounds in birds, fish, and mammals. In addition, please see response to topic 2.
35	p. 11, para. 1	p. 11, para. 1	The Plan lacks sufficient detail with respect to injury and damage assessment methods.	Please see response to topic 4.
36	p. 11, para. 2	p. 11, para. 2	The NRDA regulations specifically address the level of technical detail to be included in an NRDA Plan. The regulations state that "The Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost... The Assessment Plan shall include descriptions of the natural resources and geographical areas involved...In addition, for Type B assessments, the Assessment Plan shall include the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies" 43 CFR-11.31(a)(2).	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
37	p. 11, para. 3	p. 11, para. 3	The specification at 43 CFR § 11.31(a)(2) requiring the Assessment Plan to provide sufficient detail to support evaluation of the likely cost-effectiveness of the assessment is a key component. ... To make this judgment, it is imperative that the Assessment Plan provide sufficient detail to demonstrate the likelihood that damages attributable to the specific hazardous substances at issue in the assessment can be discerned, quantified, and recovered relative to baseline.	Please see response to topics 1 and 4.
38	p. 11, para. 4	p. 11, para. 4	While, as our comments elsewhere demonstrate, the Plan is insufficient in that it mentions baseline only as a general issue for shellfish and fish injury assessment, it also is notably insufficient by failing even to recognize baseline conditions for other resources. In order to comply with the requirements identified in 43 CFR § 11.31(a)(2), the Plan should be revised to provide explicit details regarding assessment and quantification of baseline impairments relative to impairments associated with site-specific releases. Absent that level of detail, given the massive and pervasive baseline degradation in this intensely urbanized ecosystem (see comments elsewhere regarding detailed investigations of baseline and other impairments available in reports, publications, and in presentations given to natural resource trustees), the assessment cannot be performed cost-effectively nor can it be legally supportable.	Please see response to topics 1 and 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
39	p. 11, para. 5	p. 12, para. 1	The Plan does not provide any detail regarding ". . . sampling locations.., sample and survey design, numbers and types of samples.. .analyses to be performed..." and other specifications of 43 CFR § 11.31 (a)(2). Ideally, the Plan would provide this required information to allow reasoned judgments to be made regarding the proposed investigations. However, if it is decided to forego that information in the Plan, the Plan should at least specify in detail when in the process such information will be made available, what technical bases will support decisions regarding sample types, numbers, locations and analyses, and what document(s) will provide such information. In particular, the Plan should explain that later documents providing sampling and analytical details will be made available for stakeholder and public comment.	Please see response to topic 4. Additionally, as noted in Chapter 4, "Study plans will include detailed information including, but not limited to: objectives to be achieved by testing and sampling, sampling locations, sampling and survey design, numbers and types of samples to be collected, analyses to be performed, and other information required to perform the selected methodologies."
40	p. 12, para. 2	p. 12, para. 2	The list of "specific [NRDA] investigations that are proposed" as bulleted on page 11 of the Executive Summary and described in Chapter 4 of this Plan is actually a simple restatement of the possible kinds of investigations listed at 43 CFR § 11.61, 11.62, and elsewhere. Given that detailed assessments of natural resources (invertebrate, shellfish, finfish, birds, and wildlife) have been conducted, reported, and published for CERCLA related and other studies for this Site and region, and that those reports and publications are readily available, it is impermissible for the Plan to revert to a generic listing lifted from the regulations at 43 CFR Part 11. The information base for the Site is well advanced regarding the presence, community structure, baseline impairments, and chemical impairments of natural resources. This Plan must meet the requirements of 43 CFR § 11.31 and other regulations by coordinating with other investigations and must incorporate existing and available information so that the revised plan will be Site-specific, useful, effective, and otherwise comply with the regulations.	Please see response to topics 2 and 3.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
41	p. 12, para. 2	p. 12, para. 2	Furthermore, throughout its provisions concerning injury determination and quantification, the Plan frequently states that the Trustees "may" or "might" undertake a particular study, investigation, survey, or series thereof.'4 The Plan's frequent lack of specificity, and its heavy reliance on a "plan as we go" approach, is inconsistent with the requirement that the "Assessment Plan" shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective." 43 C.F.R. § 11.3 1(a)(2). Tierra appreciates that the assessment process will be iterative, to some extent, but a plan so replete with hedges about what the assessment "may" or "might" "potentially" entail thwarts the ability to conduct the requisite, up-front evaluation regarding whether the assessment process will be both systematic and cost-effective.	Please see response to topic 4.
42	p. 12, para. 4	p. 12, para. 4	The Site boundaries and geographic focus of the Plan are unclear.	Please see response to topic 9.
43	p. 12, para. 5	p. 13, para. 1	The boundary of the Site is defined in Chapter 1 of this Plan as the lower Passaic River and the Newark Bay Study Area. However, throughout the Plan, much of the focus is on small portions of the Site (as defined), primarily the lower Passaic River, and it is unclear how the various proposed studies apply to the Site as a whole. We suggest that a clear and definitive definition of the Site be included, and that the discussions, particularly in Chapter 4 (Assessment and Restoration), describe how they will be conducted on a Site-wide basis. Moreover, the current Lower Passaic River-centric approach in the Plan is likely to result in a biased assessment that disproportionately attributes natural resource damages to releases into the Lower Passaic River instead of objectively evaluating all of the releases of hazardous substances into other portions of the Site.	Please see response to topic 9.
44	p. 13, para. 2	p. 13, para. 2	The Plan's statements regarding the fish consumption advisories are contradictory and inaccurate.	Please see responses to more specific issues raised below.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
45	p. 13, para. 3	p. 13, para. 3	The multiple statements in the Plan regarding fish consumption advisories and bans are contradictory and, in many instances, inaccurate. From the Executive Summary onward, multiple statements suggest that fish and seafood consumption advisories by the State of New Jersey were triggered by the detection of PCBs and dioxin. *See* page 8 (the detection of dioxin and PCBs adjacent to the Diamond Alkali Company plant "led to the institution of fish and seafood consumption advisories by the State of New Jersey . . .page 29 ("high concentrations of dioxins and PCBs within the Site led" to a fish consumption ban in 1983;); page 49 ("[a] 'do not eat' prohibition for all fish and shellfish species has been in place for the lower Passaic River since 1982 due to dioxin and PCB contamination."). In fact, the first fish consumption advisory was issued by the State of New Jersey in 1982 as a result of the detection of PCBs, before dioxin was even detected at the Site.	The damage assessment plan has been changed to correct the presented information. In particular, fish advisories were first issued for the lower Passaic River in 1982 for striped bass, American eel, bluefish, white perch and white catfish based on PCBs. A prohibition on the sale of striped bass and American eels from the lower Passaic R. was also issued at that time. A "do not eat" prohibition for all fish and shellfish species has been in place for the lower Passaic River since 1983 due to dioxin contamination. Additionally, a ban on crab harvest ("no take") has applied to crabs in the lower Passaic River and the Newark Bay Complex since 1994. In 2003, advisories were modified to reflect the potential cancer risk and became more stringent for some species. New York has issued a series of similar advisories since 1985 for the Arthur Kill, Kill van Kull, and Newark Bay. These have included "once a month" and "do not eat" advisories for up to fourteen species at various times. The current fish and shellfish consumption advisories for New York and New Jersey are shown in Exhibit 4-1.

46	p. 13, para. 4	p. 13, para. 4	In December 1982, the NJDEP banned the sale of American eels and striped bass taken from, among other places, Newark Bay, the Lower Passaic River, the Lower Hackensack River, the Arthur Kill and the Kill Van Kull as a result of PCB contamination. At the same time, the NJDEP issued a fish-consumption advisory for other types of fish taken from these waters due to PCB contamination. The 1982 fishing bans and advisories remain in effect today. NJAC 7:25-18A. NJDEP did not issue a fish advisory related to dioxin until 1983. NJDEP Administrative Order No. EO-40-17, dated 10/19/83. At page 77, the Plan correctly recognizes that the first fish consumption advisory in 1982 “was based on the presence of PCB contamination in fish” and that an advisory relating to dioxin did not issue until 1983. Finally, in concluding that the NJDEP has “identified use impairments including aquatic life support and fish consumption for the lower Passaic River and Newark Bay,” the Plan inappropriately relies on allegations made by the NJDEP in a pending lawsuit. See page 68, citing, NJDEP and the Administrator of the New Jersey Spill Compensation Fund v. Occidental Chemical Corporation, et al. The NJDEP’ s allegations in that lawsuit already have been amended once, are currently subject to multiple motions to dismiss, and remain unproven.	The stated advisory basis (i.e., dioxin and PCBs) for the Passaic River is correct. Regarding dates for each advisory, fish advisories were first issued for the lower Passaic River in 1982 for striped bass, American eel, bluefish, white perch and white catfish based on PCBs. A prohibition on the sale of striped bass and American eels from the lower Passaic River was also issued at that time. A "do not eat" prohibition for all fish and shellfish species has been in place for the lower Passaic River since 1983 due to dioxin contamination. Additionally, a ban on crab harvest ("no take") has applied to crabs in the lower Passaic River and the Newark Bay Complex since 1994. In 2003, advisories were modified to reflect the potential cancer risk and became more stringent for some species. The NRDA Plan no longer references NJDEP and the Administrator of the New Jersey Spill Compensation Fund v. Occidental Chemical Corporation, et al. The NRDA Plan relies on promulgated State regulations to show that the waters of the State fit the definition of the committed use provision.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
47	p. 14, para. 1	p. 14, para. 1	The discussion regarding the surroundings of the Site omits landfills and other CERCLA sites.	Please see response to topic 6.
48	p. 14, para. 2	p. 14, para. 2	The effects of many sources of baseline degradation (habitat quality declines, habitat loss, impacts of physical and nonpoint-source chemical releases, sewage and combined sewer overflow [CSO] inputs and others) has been documented in many reports and publications to have enormous consequences for natural resources and natural resource services, constraining such services to very low levels. An important component of those constraints is related to loss and degradation of wetland habitats. Given all the data and information that are available, this section does not accurately represent the full extent and nature of impairments to the environment of the Site. Indeed, by citing the figure "45 acres" and acknowledging that those acres are functionally impaired (by, for example, presence of invasive clones of common reed), this introductory section of the Plan appears to acknowledge those baseline impacts. However, this section must be substantially expanded to give an accurate accounting of the myriad non-chemical service losses that have occurred for more than 200 years at this Site.	Please see responses to topics 1, 2 and 7.
49	p. 14, para. 3	p. 14, para. 3	In addition, the Plan states without support that "(t)hese habitats support a variety of benthic invertebrates and aquatic, semi-aquatic, and terrestrial vertebrates including clams, mussels, turtles, fish, birds, and mammals." For example, we have seen no documentation to date of clams or mussels existing at the Site. This statement should be revised to set forth the types of organisms that have been documented to exist at the Site and provide supporting references.	The listing is correct, and additional citations have been included in the Final Assessment Plan. Further, the Pre-Assessment Screen and Determination (NJDEP, NOAA, and USFWS 2004) provides a listing of species.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
50	p. 14, para. 4	p. 15, para. 1	The purpose of this table is unclear and given the citation to the table on page 15—". . .the Site supports an array of ecological resources that interact in myriad ways (Exhibit 1 -2)"—it is inaccurate. A number of the animal species listed in this table have little or no viable support habitat remaining at the Site and, thus, it clearly is inaccurate for the Plan to claim that these are resources "of' or "supported by" the Site. It also is unclear why no vegetation species are listed as "Select Natural Resources of the Site," given the critically important roles that plants play in functional ecosystems. For many of these species, a more accurate characterization relative to the Site conditions is that they are constrained by the degraded baseline conditions. The Plan should be revised to reflect this condition. This is a critically important point from the damage assessment perspective for two reasons. First, organisms that are not present because of baseline constraints cannot be injured by Site-related releases, and so cannot be included in estimated damages. Second, species impaired by baseline conditions may well be important as focal points for restoration. The overall scope for restoration planning encompasses natural resources regardless of the fundamental reasons for their impairment. The Plan should be revised to identify species whose populations are excluded or impaired by baseline conditions, and incorporate those species as appropriate in planning for and scaling of restoration actions.	It would be premature at this point in the assessment process to draw conclusions as to which species may at present be impacted by hazardous substances versus other factors. Please also see response to topic 1.
51	p. 15, para. 2	p. 15, para. 2	The last sentence discusses the "primary contaminants of concern." However, nowhere does the Plan explain the derivation of this limited list of contaminants, nor how these contaminants relate to the baseline, both temporally and in terms of. environmental impacts. A substantially larger number of contaminants must be addressed under this NRDA, as discussed in General Comment 7 above. Arbitrarily limiting the list of contaminants to be addressed under the NRDA is inconsistent with guidance and scientifically lacking.	Please see response to topic 5.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
52	p. 15, para. 3	p. 15, para. 3	In addition, this chapter of the Plan (beginning on page 21) places a great deal of focus on dioxins and dioxin-like toxic effects. Even the limited numbers of other chemicals addressed in the current version of the Plan are not given the same level of attention as dioxins in terms of presenting toxicity data and study results/summaries from the literature, summarizing the Site-specific data on the contaminants in biota, etc. Given that this Site is known to be contaminated with a wide range of substances that originated from a large number of sources, both within and outside of the Site, the focus of the Plan should be re-directed to presenting a concise summary of all known information on the various contaminants, as well as descriptions and tabulated summaries of the toxicological effects of the various contaminants on the biological trust resources that are being investigated under this NRDA.	Please see response to topics 2 and 6.
53	p. 15, para.4	p. 16, para. 1	A statement is made that "The term 'dioxin' typically refers to one of the most toxic compounds known to humans, 2,3,7,8-tetrachlorodibenzo-para-dioxin (2,3,7,8-TCDD or simply TCDD)." This statement of the Plan inaccurately characterizes the scientific data concerning the toxicity of this class of compounds, and it lacks supporting references. While 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) has been one of the most extensively researched environmental chemicals over the last three decades, no available human toxicological data support this statement. Recent studies of human exposure to TCDD have shown that even at high blood serum levels, the symptoms and effects have been limited to few clinical and biochemical effects, primarily chloracne (see Young and Regens, 2005). These findings are inconsistent with the concept set forth in the Plan that TCDD is one of the "most toxic compounds known to humans."	TCDD is often described in the literature as the most toxic congener of its class. The discussion of dioxins in the NRDA Plan has been updated to include sources for this statement on toxicity. Please also see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
54	p. 16, par. 2	p. 16, par. 2	TCDD has been shown to induce a broad spectrum of toxicological effects in laboratory animals, though most of the effects occur at levels well above those typically encountered as a result of environmental exposures. In addition, extrapolating from data in laboratory animals to predict potential adverse health effects in humans poses many difficulties and, as a result, toxicity estimates based on such laboratory data have substantial uncertainty associated with them. In the Toxicological Profile for TCDD, the ATSDR (1998) outlined several of the critical challenges associated with using animal data to quantify dioxin health risks in people. Examples of some of the issues raised by the ATSDR (1998) include uses of dose levels that result in body burdens that are at least 10 to more than 1,000 times higher than background body burdens in humans; significant differences in species sensitivity; and shortcomings in experimental study design such as exposures to only a single dioxin-like compound when, in reality, people are exposed to mixtures of these compounds. While animal data routinely are used to predict responses in humans, it is important to recognize the uncertainties inherent in such interspecies extrapolations.	As stated in the NRDA plan, concentrations of dioxin-like substances in biota from the lower Passaic River and Newark Bay have been measured at levels shown to produce harmful effects in biota. The NRDA plan does not address human health. Please also see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
55	p. 16, para. 3	p. 16, para. 3	Since the mid-1980s, the USEPA has spearheaded an enormous effort to assemble a comprehensive risk assessment of dioxin and dioxin-like compounds. The fact that this assessment has undergone multiple draft revisions over the last twenty years is a clear indication of the vast amount of literature pertaining to these compounds, as well as the uncertainty, and oftentimes conflicting studies, associated with them. The most current draft of this assessment, known as the 2003 Dioxin Reassessment, recently was commented upon by a committee of the National Academy of Sciences (NAS). One of the more telling critiques made by the NAS committee regarding the 2003 report is the following statement: "...the EPA Reassessment continues to rely on the approach that diverse human data collected across disparate studies of different types and inherent strengths can be interpreted with confidence without applying the more formalized tools of evidence-based medicine. Thus, the EPA Reassessment (as well as Institute of Medicine [IOM] committee report) relies largely on committee-based, consensus evaluation of the available data rather than on specifically commissioned, rigorous analyses constructed according to established criteria that both formally evaluate the strengths of the available evidence and integrate, by quantitative systematic review, the data across available studies. "(NAS 2006)	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
56	p. 16, para. 4	p. 17, para. 1	Especially relevant to the NRDA are the extreme differences in animal sensitivity that have been observed over the last four decades of dioxin research. Male Hartley guinea pigs were found to be sensitive to TCDD, with Schwetz et al. (1973) reporting 50% lethality at an acute dose (LD50) of 0.0006 mg/kg. On the other end of the animal sensitivity spectrum, Henck et al. (1981) demonstrated that male Syrian Golden Hamsters were significantly less sensitive to the effects of TCDD, reporting an acute LD50 for TCDD of over 5 mg/kg, or more than 8000 fold higher than was reported for the guinea pigs. There also is significant variability among different strains of the same species of animal. Pohjanvirta et al. (1999) reported a more than 1000 fold difference in acute LD50 between the Han/Wistar Kuopio strain and Long Evans Turku AB strain of rats. And it should be noted that, although wasting syndrome is a characteristic sign common to most animals in toxicology studies of TCDD, the symptoms of toxicity can vary among animals, with atrophy of the thymus and lymphatic tissue apparently the most sensitive toxicity marker in guinea pigs, and the liver being the primary organ affected in rodents and rabbits (USEPA, 2003a). Overall, these examples highlight the considerable variability associated with TCDD exposure and biological effects in animals, as well as the uncertainties associated with human health and wildlife risk assessment. Tierra recommends that the Trustees incorporate language into the Plan that reflect these uncertainties, as well as include supporting references. Additionally, the Plan should describe how they plan to address species differences in the toxicity associated with PCDD/Fs.	The discussion on evaluating toxicity of dioxin-like compounds on pages 25-31 of the Draft NRDA Plan has been edited. As noted in prior comments in this section, and highlighted in the revised NRDA Plan, the TEQ scheme and TEQ methodology remain the scientific standard for measuring the impact of dioxin-like compounds on vertebrate health. As appropriate, species-specific differences in dioxin and dioxin-like compound sensitivity will be considered and addressed in future study plans, and as new information becomes available, to the extent relevant for study planning and subsequent data use. Please also see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
57	p. 17, para. 2	p. 18, para. 1	A statement is made that "However, dioxins exist in a variety of forms, or isomers, which along with other 'dioxin-like' compounds share many or all of the toxic characteristics of TCDD via a common receptor-mediated mechanism of action." This statement regarding the basic chemical and toxicological concepts of dioxins and dioxin-like compounds is not accurate for several reasons. It implies that, relative to TCDD, all forms of dioxin elicit some degree of toxicity, which is refuted by the World Health Organization Toxic Equivalency Factors (TEF) scheme. Also, it contradicts later statements on page 24, paragraph 1 (e.g., "Some congeners are extremely toxic, while others are believed to be relatively innocuous."). Of the 75 polychlorinated dibenzo-p-dioxin (PCDD) congeners that comprise this group of chemicals, the current state-of-the-science suggests that only six of these congeners are capable of producing some degree of adverse biological effects relative to TCDD. Likewise, a small fraction of polychlorinated dibenzofuran (PCDF) congeners (10 of the 135) are considered to interact with biological systems in a manner similar to, but to varying degrees as, TCDD. There are a number of reasons not all dioxin and furan congeners are considered toxic, including congener structural instability and a lack of affinity for the aryl hydrocarbon receptor (AhR). The Plan further confuses the issue by using the word 'isomer' to describe the various forms of dioxins. Chemical isomers are defined as compounds that have the same chemical formula but different atomic arrangements to their structures. Since not all 8 groups of PCDD isomers are represented in the TEF scheme, it is inaccurate to suggest that all PCDD isomers "share many or all of the toxic characteristics of TCDD." Finally, the Plan fails to provide references from the peer-reviewed literature to support this statement. Tierra recommends the Trustees clarify this statement to reflect what is generally accepted by the scientific community, as well as include references.	The term isomer has been removed. The text has been edited to clarify the common toxicological mechanism of action that is shared by some dioxin congeners as well as other dioxin-like compounds. However, contrary to the commenter's interpretation, the language does not state that all dioxin or furan congeners act through this mechanism, nor does it state that all dioxin or furan congeners share many or all of the toxic characteristics of TCDD.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
58	p. 18, para. 2	p. 18, para. 2	The text on page 21 references Exhibit 2-1 after explaining that earlier studies of sediment from the lower Passaic River demonstrated "elevated and potentially injurious concentrations" of PCDDs and PCDFs, among other chemicals. This exhibit displays sparse information to support this statement. In fact, Exhibit 2-1 presents only an average and a maximum concentration for TCDD in sampled sediment. The Plan does not include analogous sampling data for any of the other PCDDs, nor does it provide any information on levels of PCDFs found in these sediment samples. The table should be amended to provide information about other PCDD/Fs and a summary of TEQ values.	Exhibit 2-1 from the draft Assessment Plan compared selected chemicals of concern to sediemt quality screen values, Long and Morgan (1993), Long *et al.*, (1995), among others footnoted. At the time of the Long and Morgan (1993) and Long *et al.*, (1995) papers, and for several years thereafter, ecologically relevant sediment screening values for PCDDs/PCDF or dioxin-like PCBs had not been established. Exhibit 2-1 as seen in the draft Assessment Plan has been removed. Information will be presented on other PCDDs/Fs in any reports indicating injury to trust resources from those congeners. Please refer to EPA (2001) page 10 Conclusion 16 and footnote 1.
59	p. 18, para. 3	p. 18, para. 3	We object to the use of the term "criteria" in this exhibit and the associated text. The NOAA ER-M values are published sediment benchmarks. The authors of the study from which they were derived (Long et al. 1995—this is incorrectly cited as Long and Morgan, 1995 in Exhibit 2-1) clearly state that these are not promulgated sediment criteria to be used as clean-up standards. They are simply benchmarks for screening for potential risks to benthic invertebrates.	The word criteria, where appropriate, has been changed to "values." Note that due to editorial changes, Exhibit 2-1 is no longer in the final text.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
60	p. 18, para. 4	p. 18, para. 4	The simple listing of an average concentration of a contaminant along with the maximum concentration recorded for the area does not appropriately convey the variability and uncertainty associated with the measurements from the many samples that have been collected under various programs/studies. At a minimum, a measure of variability (the standard deviation of the mean) should be included along with the average, as was done later in this chapter in Exhibit 2-12. Additionally, the Trustees should include a description of how the statistics were calculated (was the distribution of the data set considered, etc.).	Standard deviations have been added to this table.
61	p. 19, para. 1	p. 19, para. 1	A comparison of the TCDD concentration average listed in Exhibit 2-1 and those listed for the various regional samples in Exhibit 2-12 (page 36) indicates inconsistencies in the calculations of the TCDD average concentrations between the two tables. Apparent similarities between the data represented in the two exhibits (e.g., TCDD maximum concentrations are the same) would suggest that some or most of the same data were used to generate these exhibits. The Trustees should address these inconsistencies.	There was a typographical error in in the former Exhibit 2-12 and information has been updated in Exhibit 2-15 in the Final Plan.
62	p. 19, para. 2	p. 19, para. 2	This paragraph initiates a section discussing dioxin-like compounds and begins with "Dioxin-like compounds include the various isomers of dioxin, furans, and certain PCBs." However, the discussion of all known, and emerging, dioxin-like compounds is incomplete. The Trustees should develop a discussion of compounds such as polybrominated compounds, chlorinated PAHs and any other compounds with potential dioxin-like toxicity.	Please see response to topic 2.
63	p. 19, para. 3	p. 19, para. 3	summary profiles of contaminant classes: The summary profiles for the various contaminant classes are generic and lack appropriate references. In addition, some level of information should be provided regarding the toxicology of these contaminants to estuarine receptors that are found at the Site.	Please see response to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
64	p. 19, para. 4	p. 19, para. 4	This exhibit portrays only a small portion of the Site and does not seem to support any key point in this chapter of the Plan. In fact, it confuses the issue regarding the actual geographical boundaries and focus of the Site, as described in General Comment 11 above. As such, we suggest that it be removed from the Plan.	Exhibits 2-1 and 2-2 have both been removed from the NRDA Plan as part of editorial changes.
65	p. 19, para. 5	p. 20, para. 1	A statement is made that: "Toxic effects of dioxin include weight loss, abnormalities of the liver and other organs, impaired growth, edema, gastric ulcers, tumor production and carcinogenesis, immunosuppression, impaired endocrine function, embryo mortality, birth and developmental defects, and death." This statement is misleading, given that there is no context regarding the animal species, or the type of exposure, that have been documented to exhibit the adverse biological effects listed. And, once again, there are no references provided to support this statement. Have these effects been confirmed in all manner of species? Do these effects manifest themselves in humans exposed to dioxin? What about ecological receptors that would be expected at the Site? And what level of exposure would produce such effects in the sensitive species? These are all questions that must be addressed in order to qualify such a broad and controversial assertion. In commenting on the USEPA's 2003 Dioxin Reassessment Draft, the NAS acknowledged the controversy surrounding these questions and addressed the weight of evidence regarding many of these issues as they pertain to the literature on human exposure and animal experiments. It is very clear that, for each of the adverse biological effects listed in this statement, there is a varying degree of certainty that surrounds scientific knowledge of the susceptibility of various wildlife and humans to each effect. Therefore, the statement as it is structured is inaccurate. Tierra recommends that this statement be removed from the revised Plan.	The statement has been clarified to indicate that different effects have been observed in different species.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
66	p. 20, para. 2	p. 20, para. 3	A statement is made that: "Effects of non-dioxin like PCBs include neurotoxicity, endocrine disruption, and immunosuppression (EPA 2003)." There is no reference to these non-dioxin PCB effects in the reference cited: USEPA (2003b). Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans and Biphenyls in Ecological Risk Assessment. External Review Draft. Risk Assessment Forum. 630/P-03/002A. Washington, D.C. June. We request that the Trustees replace this reference with one that supports this statement.	The reference has been corrected. The correct document is EPA (2003) but is titled "Non-Dioxin-Like PCBs: Effects and Considerations in Ecological Risk Assessment." http://www.epa.gov/oswer/riskassessment/pdf/1340-erasc-003.pdf The commenter's citation to the left has been updated with a citation to the final version of this document (i.e., EPA 2008, EPA 100/R-08 /004), instead of the previously-referenced external review draft.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
67	p. 20, para. 4	p. 21, para. 1	A statement is made that: "The total dioxin-like activity is therefore typically described using 'toxic equivalency factors,' or TEFs (van den Berg et al. 1998; van den Berg et al. 2006). The TEF approach uses the potency of individual PCDD, PCDF, and PCB congeners, relative to TCDD, along with measured concentrations of these chemicals to calculate a toxic equivalent (TEQ) for each compound. The individual TEQs are then summed to derive a total TEQ, which gives an estimate of the total TCDD-like activity to which an organism is exposed." In summarizing the TEF approach, the Plan should recognize the uncertainty and variability inexorably linked to the TEF concept and derivation process. In developing TEFs for dioxin and dioxin-like compounds, the WHO constructed databases in which relative potencies (REPs) were derived and compiled for each congener based on relevant studies in the literature (van den Berg et al., 1998; van den Berg et al., 2006; flaws et al., 2006a). The current TEF methodology has been identified as "interim," and, as such, is subject to periodic review as new information becomes available. The dynamic and iterative nature of TEF derivation was demonstrated most recently with the release of updated TEF values (van den Berg et al., 2006), which were derived following review of a refined REP database [e.g., addition of more recent studies and a refined set of criteria for data inclusion (Haws et al., 2006)].	Please see response to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
68	p. 21, para. 2	p. 21, para. 2	When the current WHO TEFs were established, the expert panel relied upon a series of decision criteria to assess the relative importance of the underlying REPs in assigning a consensus-based TEF for each congener. However, because this was a qualitative process, it is not possible to characterize the variability and uncertainty inherent in the risk estimates that are based on the WHO TEFs. As such, the current mammalian TEFs established by the WHO represent single assigned point values, despite the fact that they are derived from distributions of individual REP values. Although the WHO relied upon only the most relevant literature in deriving the REPs, these studies represented a cornucopia of methodologies, biological endpoints and dose regimens, the culmination of which resulted in a largely heterogeneous data set. As demonstrated in the figure below, the distributions of REP values for some congeners range over several orders of magnitude.	N/A
69	p. 21, para. 3	p. 21, para. 3	It therefore has been proposed that TEFs (and subsequent estimates of risk for dioxin-like compounds) be based on the distribution of REP values for each congener. This approach would allow for better characterization of the uncertainty and variability inherent in estimates that are based on TEFs. These distributions potentially could be used to establish point estimate TEFs based on a common point in the underlying distribution, thereby ensuring a more uniform degree of conservatism in the TEF values. Notably, during their most recent re-evaluation of the TEF methodology in June 2005, the WHO expressed interest in discussing a probabilistic approach (which utilize REP distributions) for derivation of TEFs for dioxin-like compounds (Scott et al., 2006).	N/A

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
70	p. 21, para. 4	p. 21, para. 4	The application of such quantitative weighting schemes to REP distributions allows for greater emphasis to be placed on those REP values believed to be better suited for the purposes of human-health risk assessment, while concomitantly yielding a transparent and consistent method for deriving TEFs. Furthermore, those involved in risk management have the flexibility to tailor the desired level of protection to the specific situation under consideration, thus facilitating the establishment of a consistent level of protection for all congeners (Scott et al., 2006; Haws et al., 2006b). Therefore, Tierra suggests that the Trustees utilize a weight-based distribution system prior to applying the TEFs in their future studies to ensure that they characterize the uncertainty in their results.	While several dioxin and furan congeners are considered hazardous to human as well as fish and wildlife health, the NRDA Plan does not address human health. Please see the Introduction to the NRDA Plan for a discussion of the NRDA process. TEFs and TEQs are the scientific standard for evaluating impacts of dioxins to biota. Additional sources on and discussion of the TEF scheme and TEQ methodology have been added to the NRDA Plan.
71	p. 23, para. 1	p. 23, para. 2	A statement is made that: "The World Health Organization (WHO) has used numerous toxicity studies of dioxins, furans, and PCBs to develop consensus-based TEFs for a variety of compounds for birds, fish, and mammals including humans (van den Berg et al. 1998; van den Berg et al. 2006) (Exhibit 2-5)." The mammalian TEFs developed by the WHO-TEF committee are based on a large volume of literature. In contrast, the fish and avian TEFs are based on a small number of literature sources (van den Berg et al., 1998). Additionally, since the publication of the fish and avian TEFs, a variety of errors have been identified with some of the congener REPs as derived from their source studies, thus calling into question the accuracy of these two groups of TEFs. The Trustees should acknowledge these errors in their discussion/text.	Please see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
72	p. 23, para. 3	p. 23, para. 3	The fish WHO TEFs are based on an REP database that was comprised of only nine fish studies. As listed in this database, 38 individual REPs were derived from these studies. However, discrepancies exist in the fish REP database. For example, there are 12 REPs listed in the database that represent 10 compounds as evaluated by Walker and Peterson (1991). Two of these compounds, PCB 77 and PCB 126, listed duplicate REPs in the database. Additionally, the REP listed for 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin as derived by Helder and Seinen (1986) was mislabeled in the database as 1,2,3 ,7,8,9-hexachlorodibenzofuran.	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
73	p. 23, para. 4	p. 23, para. 4	The avian TEFs were derived from data published in a total of 16 studies, many of them only focusing on a few of the dioxin and dioxin-like congeners. There are 84 REPs in the avian REP database based on these 16 studies. Among these 84 REPs, a number of significant discrepancies have been identified. For example, the database lists a total of 16 REPs for the 13 compounds assessed by Bosveld et al. (1992). PCBs 77, 126, and 169 are each assigned two REPs in the database, which turn out to be duplicates in the cases of PCB 77 (0.02) and 169 (<0.001). PCB 126 is assigned two different REPs (0.1 and 0.06); however, one of them (0.06) has no basis in the literature, so its origins are uncertain. Another example includes the REPs derived from Brunstrom & Andersson (1988). In the avian database there is a REP for PCB 153 that appears to be based on a single dose. Also, the PCB 169 REP (0.017) was mislabeled PCB 153 in the database, a congener that is not even listed in any of the TEFs published by the WHO. A third example of the errors present in the avian REP database is evident after inspecting the REPs based on the investigations of Machala et al. (1996). In their paper, Machala et al. present dose response curves based on ethoxyresorufin-O-deethylase (EROD) activity, but do not calculate EC50 values for any of the compounds tested. However, it can be visually determined from inspecting Figure 1A of this paper that PCB 77 has an EROD EC50 that is > 2 orders of magnitude greater than TCDD. Therefore, PCB 77 should have a REP of roughly ~ 0.01. Yet in this case the TEF database has the PCB 77 REP listed as 0.05.	N/A

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
74	p. 24, para. 1	p. 24, para. 1	Further examples of inconsistencies between the avian REP database and the literature cited as supporting such can be found by examining those REPs derived from Powell et al. (1996a, b). As listed in the database, the PCB 77 REP of 0.01 derived from the Powell studies is not correct. Using the lethality value (LD50) of PCB 77 (8.8 ug/kg egg) (Powell et al., l996a) and the TCDD LD50 (0.15 ug/kg egg) (Powell et al., 1996b) results in a REP of 0.017. Another problem is that the avian REP database indicates that one of the PCB 105 REPs is based on chicken embryonic abnormality data from Powell et al. (1996a). However, it is clearly stated by the investigators that only the highest of the five PCB 105 doses produced any significant frequency of observed abnormalities in the chicken embryo population studied. As such, it was not possible for the authors to extrapolate an ED5O that could be used to derive a plausible REP for PCB 105 from this study. Thus, the PCB 105 REP of 0.001 listed in the avian database as being derived from the Powell et al. (1996a) study is not valid. Based on these and other inconsistencies with the fish and avian TEF scheme, Tierra recommends that the Trustees, at a minimum, note these discrepancies as a part of their discussion of the WHO TEFs and the TEF approach in general.	Please also see response to topic 2.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
75	p. 24, para. 2	p. 24, para. 2	The Trustees have gathered, analyzed and summarized in the Plan a select group of publications from the literature regarding potential dioxin toxicity to fish, yet did not include such data/analyses for other receptor groups and chemical contaminants. This insupportable selective reliance on scientific information fails to comply with the requirements of 43 CFR § l1.31(a)(3) and 43 C.F.R. § 11.62(f) (concerning defining injuries to biological resources), 43 C.F.R. § 11.63(f) (concerning defining exposure pathways to biological resources), 43 C.F.R. § 11.64(1) (concerning testing and sampling methods for biological resources), and 43 C.F.R § 11.70(1) (concerning quantification of service reduction to biological resources). The Trustees should either generate and include this same level of data/information for the other receptors and contaminants of interest at the Site, or remove these two exhibits [Exhibit 2-6 and Exhibit 2-7 in the draft NRDA Plan] from the Plan. In addition, if retained in the Plan, some discussion should be provided regarding the substantial uncertainties that exist both in the application of the datasets from the literature that were used to generate these exhibits, and the extrapolation techniques that were used to convert the data to hypothetical effects levels for fish.	Please see responses to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
76	p. 24, para. 3	p. 25, para. 2	Also, there are several instances in which the crab consumption data collected by Pflugh and colleagues (NJDEP 1995; Pflugh et al., 1999) were not interpreted in a reasonable or valid manner. In virtually every instance, these flawed, or otherwise unfounded, assumptions served to artificially inflate the risk estimates. These are summarized as follows: First... the NJDEP's survey... is certain to have suffered from avidity bias (i.e., they likely surveyed a disproportionate number of the most avid crabbers). ... Second, the NJDEP assumed in its risk assessment that the consumption-rate information from its 39-day survey was representative of year-round crab consumption rates (NJDEP 2002)... Third, the Department assumed that all of the crabbers will eat the whole hepatopancreas of the crab all of the time (NJDEP 2002). ... Fourth, the NJDEP (2002) relied on unrealistic and scientifically indefensible consumption rates.	The Federal Trustees accurately quoted a statement from a document issued by NJDEP in 2002. In addition, please see response to topic 2.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
77	p. 26, para. 3	p. 27, para. 1	The fish and crab tissue chemistry data (available at http://www.ourpassaic.org), and the results of a recent comprehensive creel angler survey (CAS) specific to the lower Passaic River (Finley et al., 2003; Ray et al., 2007), lead to and support an entirely different conclusion than the 2002 NJDEP report. Statistical evaluation of the crab tissue data indicates that the average concentration of dioxin TEQ from crab muscle in Passaic River samples collected between 1995 and 2000 was 18.1 ppt (see Table 1 below). Results of the site-specific CAS, which was conducted to determine scientifically defensible ingestion rates for fish and shellfish from this segment of the river (Finley et al., 2003; Ray et al., 2007), indicated that no crabs from this region are consumed (Ray et al., 2007). As such, the consumption rate and corresponding intake from Passaic River crabs is assumed to be zero. However, as a conservative measure of analysis, we also determined daily dioxin intake from Passaic River crab muscle using the USEPA's consumption rate for crab (USEPA, 1997). Combining the dioxin concentration data observed in lower Passaic River crab muscle with the USEPA' s crab meat consumption rate for a 70 kg person (0.28 g/day) indicates that such an individual would ingest 0.007 pg TEQ/kg/day from fish (Table 1). The results of this CAS have been previously provided to the NJDEP and USEPA. Additionally, this CAS was subject to peer review by an expert panel as reported in Finley et al. 2003, to ensure the scientific rigor and defensibility of the results.	See response to prior comment.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
78	p. 27, para. 2	p. 27, para. 3	The daily TEQ intake associated with ingesting Passaic River fish and crabs can be put into perspective by comparing the intakes to other known dietary intakes. The daily contributions of beef, pork, poultry, eggs, dairy products (excluding milk but including table fats), milk, freshwater fish and shellfish, and marine fish and shellfish were considered. The total daily estimated intake of dioxin from these foods by the general U.S. population is estimated to be 0.58 pg TEQ/kg/day (Table 1). Thus, the estimated average daily dioxin intake from the Passaic River crab is below the daily dioxin levels that humans in the general population routinely ingest on a daily basis (see Table 1 below). Furthermore, the hypothetical daily intake from Passaic River crab is below the typical dose received by a nursing infant as a result of ingesting breast milk that is contaminated with background levels of dioxin. In developing the Dioxin Reassessment (USEPA, 2003a), USEPA scientists estimated that an infant receives 242 pg TEQ/kg/day at birth and 87 pg TEQ/kg/day during the first year of life as a result of breastfeeding.	See response to prior comment.
79	p. 27, para. 4	p. 27, para. 4	Since higher daily intakes result from both breastfeeding and ingesting a normal diet (than those from Site-specific intake from crab ingestion), it is clear that the NJDEP report cited in the Plan relies on assumptions and arrives at conclusions that are flawed. Table 2 presents acceptable daily intakes of TEQ established by domestic and international health agencies. Comparison of these acceptable daily intakes to the estimated average daily intake by humans of TEQ arising from Passaic River crab indicates that this dose is well below the criteria established by these reputable public health agencies. Based on a comparison to acceptable daily intakes for TEQ developed by reputable public health agencies and to the TEQ that humans normally ingest, it is not reasonable to conclude that the crab from this river is unsafe for consumption or that TCDD poses an imminent and substantial danger. Tierra recommends that the Trustees either remove this statement from the Plan, or put it into the appropriate context by following it with the information discussed above.	See response to prior comment.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
80	p. 29, para. 1	p. 30, para. 1	A statement is made that "...projected dioxin levels in fish eggs, calculated based on the relationship between measured lipid concentrations in mummichog (Bailey et al. [sic] 1973), exceeded no observable adverse effects levels (NOAELs)..." This statement goes on to compare these calculated levels of dioxin in eggs to a variety of egg-based thresholds that have been published in the literature for trout and other freshwater species. There are two critical problems with this assessment. First, the calculation/estimation of dioxin or any other chemical concentrations in the eggs of fish (in this case mummichog) based on parameters taken from a single 35 year old study (i.e., Bailey et al.[sic], 1973 as cited in the Plan) that was not even conducted in the Newark Bay system is a highly unreliable means for assessing potential injury to fish. Without actual Site-specific or even region-specific egg data being available, this assessment is scientifically indefensible. As such, it should be removed from this Plan. Second, the use of egg thresholds (critical body residues or CBRs) from studies of freshwater fish species, many of which are known by scientists to be the most sensitive species to dioxin-like toxicological effects, is inappropriate for an injury assessment of an estuarine species such as the mummichog. Even recognizing that only a limited amount of dioxin toxicity data are available in the scientific literature for fish, and that this type of assessment in the Plan is a screening-level evaluation, the Plan does not adequately portray the substantial level of uncertainties that exist in the conclusions that are drawn from this assessment. These uncertainties should be characterized clearly in the Plan or this presentation of the freshwater fish data should be removed.	The assessment plan is based on readily available data. The determination to collect particular types of site-specific data will be made during the assessment. Individual injury assessment reports will discuss any relevant uncertainties. Please see responses for topics 2 and 4.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
81	p. 30, para. 2	p. 30, para. 2	As with Exhibits 2-6 and 2-7, this exhibit includes a selective assessment of the available data from the literature to establish benchmarks—in this case "critical body residues" (CBRs) for dioxin effects on fish and wildlife. Again, it is misleading and highly biased that the same analysis was not performed for any of the other contaminants of concern in this Plan.' In addition, the data that were used to develop these CBRs is only a portion of that which is available in the literature, and the application/extrapolations used to generate the CBRs are highly uncertain. No discussion is provided in the text regarding these uncertainties. Accordingly, this exhibit should be removed from the Plan. Alternately, a more thorough assessment of the literature on dioxin ecotoxicology should be conducted and an appropriate uncertainties assessment provided. The same level of assessment is conducted and presented for all other contaminants at the Site.	Please see response to topic 2.
82	p. 30, para. 3	p. 30, para. 3	The extrapolation of dioxin concentrations in fish to concentrations in bird eggs is technically unsupportable. This extrapolation is based on a single limited study using herring gulls in the Great Lakes (Hoffman et al., 1996 as cited in the Plan). The idea that this one study on a single species of fish and bird somehow suggests that a simple biomagnification factor (BMF) exists to extrapolate from fish tissue data through adult birds (of differing species) and then into their eggs is fraught with uncertainties to the point where it is unusable for a site-specific injury assessment. This text and concept should be removed from the Plan.	Additional references have been added to the NRDA Plan. Please see response to topic 2.
83	p. 30, para. 4	p. 30, para. 4	There has been no documentation of mink occurrence at this Site. Therefore, the pre-selection of mink as a mammal of concern is inappropriate and unsupportable. This text should be removed from this Plan.	The basic habitat requirements for mink, including suitable permanent waters and the availability of adequate den sites such as bank burrows, holes, or crevices are all provided in the study area. No surveys have been conducted to date but mink would be expected to occur.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
84	p. 30, para. 5	p. 30, para. 5	This exhibit (along with the contaminant profiles in Chapter 2) should be expanded to include additional contaminants that occur at the Site as previously discussed.	Please see response to topics 2 and 5.
85	p. 30, para. 6	p. 31, para. 1	The focus on one source and two chemicals is woefully inadequate and fails to characterize the hundreds of sources of chemical contaminants to the Site. This section must be expanded to include a characterization of the multiple sources of various chemicals to the Site, including those that have historically existed, or currently exist, both within and outside of (but that contribute to) the Site.	Please see response to topic 6.
86	p. 31, para. 2	p. 31, para. 3	The Plan states that the "Diamond Alkali Plant is just one of approximately 120 New Jersey point source discharges into the Lower Passaic River watershed; more than 50% of these are from industrial facilities (e.g., asphalt plants; plastic, metal, stone, clay, and glass manufacturers; sawmills; communications equipment; and various public utilities). In addition, non-point source discharges (e.g., landfill leachate; leaking storage tanks, chemical drums, container boxes; and storm water runoff), along with illegal dumping, have contributed substantially to contamination along the river." Limitation of the scope of this description to "hundreds" of possible PRP sources, and to the "Lower Passaic River watershed," displays a fundamentally flawed perception of the historic reality, and indeed with the stated geographical scope of the assessment envisioned by the Plan. Over the course of time—dating virtually to the founding of the country and evolution of the Site as the veritable cradle of the Industrial Revolution—there have been literally thousands of contaminant sources located along or proximate to the Passaic River. Realistically, however, the number of sources is even more vastly understated, given that the Plan does not purport to undertake an assessment of the "Lower Passaic River watershed," but rather the entire Newark Bay Complex, including its other direct tributaries (the Hackensack River, Arthur Kill and Kill Van Kull) and the tributaries of those tributaries.	Please see response to topic 6.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
87	p. 31, para. 4	p. 32, para. 1	Furthermore, even though the Plan tacitly acknowledges discharges from "public utilities," not a single public utility or municipality is included as a noticed party to this Plan. Since their earliest settlement, through at least the early 1900s, the municipalities and industries along and proximate to the Site discharged their untreated wastewater directly into the surface waters of the Site. Since at least the mid-1800s, the continuous and systematic discharge of untreated, or only partially treated, wastewater into the surface waters of the Site from regional and local sewer systems has significantly polluted the waters and sediments of the Site with pathogenic organisms, hazardous substances, including heavy metals, and other compounds. Many municipalities within the Site continued to discharge untreated wastewater into the Site through at least the 1950s. Even when wastewater treatment plants were constructed, many of the treatment facilities provided only rudimentary primary treatment to remove gross solids and floatables or were otherwise grossly incapable of providing adequate treatment of wastewater discharged from the municipalities. Furthermore, to this day, untreated wastewater continues to discharge into the Site. from municipal and regional sewer systems as a result of systemic design flaws and improper maintenance. Untreated wastewater is also continuously and systematically discharged into the surface waters of the Site from combined sewer systems, which are designed to overflow and discharge untreated wastewaters directly into the Site from one or more outfalls when wet-weather runoff entering the system exceeds the capacity of the combined sewer system. Each municipality, regional sewer system, public utility, and the like should be included in the "cooperative approach" and the Plan re-noticed accordingly.	Please see response to topic 8.
88	p. 32, para. 2	p. 32, para. 2	Failure to include these public and private entities represents a data gap and unreasonably omits significant PRPs from the NRDA process in direct contravention of 43 C.F.R. § 11.32(a)(2).	Please see response to topic 8.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
89	p. 32, para. 3	p. 32, para. 3	Finally, Tierra understands that not every recipient of a GNL from USEPA has been included as a noticed party to this Plan. In addition, there exist many other PRPs, to which the USEPA is considering issuing GNLs, not to mention scores (if not hundreds) more public and private entities that are known to have discharged hazardous substances into the Site but have so far escaped regulatory focus. All these additional parties should be included in the "cooperative approach" and the Plan renoticed accordingly.	Please see response to topic 8.
90	p. 32, para. 4	p. 32, para. 4	These exhibits are improperly and indefensibly focused on only one of the many sources and a single contaminant of concern at this Site. They should be removed from the Plan and replaced with a more relevant figure(s) that depict(s) the many sources of contaminants that exist throughout the Site.	Please see response to topics 5 and 6.
91	p. 32, para. 5	p. 32, para. 5	This section identifies the Trustees for the Site as the State of New Jersey, U.S. Department of Commerce and U.S. Department of the Interior. As explained in more detail in General Comment 1 above, the roles of each Trustee should be more clearly defined and the specific Trust Resources for which each Trustee is responsible should be laid out clearly in this section.	Please see response to topic 10.

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COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
92	p. 33, para. 1	p. 33, para. 1	An uncoordinated approach to the process will result in additional and unnecessary costs, delay and confusion. Concern for costs is evident throughout the NRD regulations and the NRDA Plan. For example, 43 CFR § 11 .30(c)(2) states: "Activities undertaken as part of the Assessment Plan phase shall be taken in a manner that is cost-effective, as that phrase is used in this part." In addition, 43 CFR § 11.31(a)(2) states that "the Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damages is likely to be cost-effective and meets the definition of a reasonable costs, as those terms are used in this part." The NRDA regulations state: "The purpose of the NRDA Plan is to ensure that NRDA is done in a systematic manner and at a reasonable cost." Too fulfill this purpose, this Plan must incorporate existing data related to the Site, not rely on an unspecified series of studies to investigate an undefined geographical area. Otherwise, the Plan ensures that the costs associated with the NRDA will be far from reasonable.	Please see response to topics 3 and 4.
93	p. 33, para. 2	p. 33, para. 2	This paragraph is remiss in not citing the multiple chemicals throughout the Site as a reason for the complexity of the NRDA.	The referenced paragraph notes that the presence of hazardous substances (plural) adds to the size and difficulty of the effort.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
94	p. 33, para. 3	p. 33, para. 3	From page 47 to page 76, the Plan offers superficial description of generic categories of injury assessment and quantification methodologies, including simple box-chart graphics. These pages repeat some of the language and concepts found at 43 CFR § 11.61 through 11.64. However, a careful evaluation of the Plan's content reveals fundamental misunderstandings regarding the scientific specifications for injury determination and quantification at 43 CFR, and a fundamental lack of familiarity with the extensive body of data and information available as a result of investigations conducted under the direction of USEPA for CERCLA activities. For example, Exhibit 4-2 shows a hierarchy of studies "under consideration." Subsequent exhibits show simple boxes and tables that apparently are intended to guide the reader to understand how the Trustees will determine and quantify injury. However, the need for baseline analysis and baseline quantification as a fundamental assessment parameter is not mentioned in any of these figures or in the text discussing assessment methods, despite the emphasis and detail given for baseline at 43 CFR § 11.70 et seq. This problem is pervasive throughout the Plan.	Please see response to topic 1.
95	p. 34, para. 2	p. 34, para. 2	In addition, the Plan (throughout this chapter) identifies a number of "selected potential ecological effects" for the various biological resources including survival, growth and reproduction effect endpoints, which is appropriate; but it also identifies several biomarker and related more subtle effect endpoints (e.g., behavioral abnormalities, impaired endocrine function, etc.) that are not supportable for evaluating potential damages to populations of organisms.	The Federal Trustees do not agree with the implicit assertion that it is necessary to establish population-level effects in to determine or quantify natural resource injuries to biota; the stated adverse effects represent potential injuries as defined in 43 CFR 11.62(f)(i): "death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations."

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
96	p. 34, para. 3	p. 34, para. 3	This section discusses fish and shellfish as food resources for "amphibians, reptiles, birds, and mammals," and is followed by Exhibit 4-3, which lists generic study categories, some repeated from 43 CFR § 11. The discussion cites Exhibit 1-2 as a basis for concluding that "(t)he Site provides habitat to shellfish and resident and migratory fish, including several species of special concern..." and goes on to state that the site "historically supported a vibrant catch." This is, as a general statement, true. However, a number of detailed quantitative reports and publications based on studies conducted for CERCLA activities document in detail, both qualitative and quantitative, that baseline impairments including habitat loss, habitat degradation, physical stressors such as storm-flow, and point and non-point chemical releases unrelated to the specific releases at issue for the Diamond Alkali site play an important role in constraining biological resources and resource services. In keeping with the specifications at 43 CFR § 11.70, the Plan should be revised to reflect the ubiquity of baseline impairments, and the study methods needed to characterize and quantify injuries relative to baseline conditions (as specified at 43 CFR § 11.71)	Please see response to topic 1.
97	p. 34, para. 4	p. 34, para. 5	This paragraph indicates that the Trustees are currently engaged in an analysis of fish consumption advisories. However, on page 48, the Plan states that "The Trustees expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used." The plan and report on the associated peer review that was to be released to the public related to the Trustee fish consumption advisory assessment should be formally issued by the Trustees for comment.	The review of fish consumption advisories is based on readily available historical information; consequently, it is not necessary to generate a study plan for this effort.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
98	p. 35, para. 1	p. 35, para. 1	The generic study categories presented here and in Exhibit 4-7 (page 59) for biological bird injuries include "breeding survey," "developmental studies," and "floodplain food webs." Given the widely understood relationship between bird community structure and the area of available, high-quality wetland, the authors' determination that 45 acres of emergent wetland are extant should have triggered the authors to include and describe baseline characterization and quantification. The first paragraph on page 64 lists "avian species occurring in the Site that frequently feed in floodplains." The list includes eastern meadowlark, northern oriole, thrushes, rose-breasted grosbeak, scarlet tanager (which is a species requiring extensive tracts of canopied forest habitat), yellow-throated vireo, and Kentucky warbler. Among the shortcomings of this section is that no description of the "floodplain" on which these species might feed is provided. Reference to available reports and peer-reviewed publications prepared for CERCLA activities document the important role played by habitat constraints on the floodplain (e.g., Iannuzzi et al. 2002). Where a floodplain is present at all adjacent to the lower Passaic River, it is narrow and baseline habitat quality is very low. Under these conditions, the Plan's exclusive focus on injuries that might be attributable to a very few chemicals originating via very few releases indicates a misunderstanding on the part of the author(s) regarding the need for baseline assessment as a regulatory requirement (43 CFR 11.70 et seq.) and as a basis for scientifically sound estimation of damages attributable to the specific releases associated with any given source or contaminant.	Please see response to topic 1.

COMMENT NO.	START OF COMMENT	END OF COMMENT	COMMENT (OR PARAPHRASE)	RESPONSE
99	p. 35, para. 2	p. 35, para. 3	The first sentence in this section on Surface Water explains: "The specific studies that the Federal Trustees have in progress to determine injuries to surface water resources of the Site are described below and shown in Exhibit 4-11." However, on page 48, the Plan states that: "The Trustees expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used." The Plan and report on the associated peer review that was to be released to the public should be formally issued by the Trustees for comment.	The referenced review of injuries to surface water resources is based on readily available historical information; consequently, it is not necessary to generate a study plan for this effort.
100	p. 35, para. 4	p. 35, para. 4	The dramatic reduction in recent years of bird numbers on Shooter's Island, as depicted on this graph, is both troubling and unexplained. This information should be carefully analyzed with specific regard to the conduct of the censuses and potentially relevant conditions at the census site(s).	Please see response to topic 2.

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APPENDIX A | ORIGINAL COMMENTS

AD-HOC INDUSTRY
Natural Resource Damage Group

A Program of Barbara J. Goldsmith & Company

January 15, 2008

Mr. Tim Kubiak
Ms. Melissa Foster
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street
Pleasantville, NJ 08232

RE: Comments on the Diamond Alkali Superfund Site
Natural Resource Damage Assessment Plan Draft for Public Comment

Dear Mr. Kubiak and Ms. Foster:

The attached comments are being submitted by the Ad-Hoc Industry Natural Resource Damage Group ("Group") in response to the "Diamond Alkali Superfund Site, Passaic River, New Jersey: Notice and Availability of and Request for Public Comments on the Draft Natural Resource Damage Assessment Plan", published in the *Federal Register* on November 21, 2007 (Volume 72, Number 224).

Sincerely,

[original signed]

Barbara J. Goldsmith
Director

BJG:pjs

Copies to:
Frank M. DeLuise, US Department of the Interior
Robert Haddad, US Department of Commerce, National Oceanic and Atmospheric Administration
William H. Hyatt, Jr., Lower Passaic River Study Area Cooperating Parties Group

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AD-HOC INDUSTRY
Natural Resource Damage Group

A Program of Barbara J. Goldsmith & Company

COMMENTS ON DRAFT NATURAL RESOURCE DAMAGE ASSESSMENT PLAN, DIAMOND ALKALI SUPERFUND SITE, PASSAIC RIVER, NEW JERSEY

JANUARY 15, 2008

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This document provides limited comments on the Public Review Draft of the "Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan" ("Plan"), issued November 2007, by the US Department of Commerce, National Oceanic and Atmospheric Administration ("NOAA") and the US Department of the Interior, United States Fish and Wildlife Service ("USFWS").

The Ad-Hoc Industry Natural Resource Damage Group ("Group") is a large group of multinational companies that is focused on natural resource damage assessment and restoration (NRDAR) issues. The Group, which will commemorate the 20th year of its founding this year, broke new ground as to industry/trustee communications and practice exchange and continues to work collaboratively with key federal and state trustee departments and agencies on NRDA practice issues. While the Group has provided comments on national NRDA regulatory proposals at various times in the past and has weighed in on many other national NRDAR practice issues over the years, it has not commented on site-specific NRDA plans or issues before now. We have decided to break with tradition due to our concern about the absence of an expressed approach for determining baseline and the injury caused by the releases in question ("causation") at this extremely complex site. In our view, the Diamond Alkali Superfund Site -- involving heavy industrialization over a long time period and numerous historical influences other than those associated with industrial operations -- mandates that these two fundamental issues be defined earlier rather than later in the NRDA process, especially for this site. It would then logically establish a stepwise process to assessment. If baseline and causation are not determined early, it can potentially set up an unending process with great associated costs and minimal environmental benefits. We believe that this issue is not only germane to the Diamond Alkali site but also has nationwide significance. In its discussions with national and state trustees in recent years, the Group has noted that baseline and causation -- which are so fundamental to defining the bounds of compensable damages -- need to be addressed at every site.

The Group is not submitting detailed comments on the Diamond Alkali Superfund Site NRDA Plan because we are aware that others in the industrial community, including Lower Passaic River Study Area Cooperating Parties Group, will be filing detailed comments. Rather, the Group is filing comments today to bring attention to the need to work together – on a national basis as well as a site-specific basis -- to define approaches for establishing baseline and causation, especially at complex river and harbor sites such as this one.

The Diamond Alkali Superfund Site NRDA Plan has the potential to lead the way and serve as a model for determining how to address these issues in the presence of such extraordinary site and technical

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complexity. In fact, we are surprised, that the Plan does not acknowledge how difficult it will be to establish baseline and causation at this site.

We are aware that trustees are bringing more NRD claims in urban waterways, like the Lower Passaic River. It is essential for NRDA plans to identify both human use and ecological baseline conditions and their impact on natural resources in these challenging environments. Baseline conditions in urban waterways include commercial harbors with man-made channels, docks, dredged and filled areas, boats and barges, bridges, dams, railways and roadways, and other types of urban development that may impact natural resources (e.g., studies show that boat traffic, dredging, channelization, dams, bridges and other obstructions can change water depth, flow, temperature and quality, potentially destroying or degrading habitat). In addition, the NRDA Plan needs to set forth how it will differentiate injuries resulting from PRP releases from other influences (e.g., agricultural/urban runoff, habitat destruction, etc.).

The Group will continue to seek ways to actively work through some of the "tough" issues inherent in NRDAs, by continuing collaborative projects and meetings with the trustee community and other stakeholders related to these and other NRDA practice issues. We also plan to aggressively move forward within the industrial community nationwide, working with the best available experts, to develop documentation that defines best practices for determining baseline and causation at river and harbor sites and other types of sites across the country.

In short, we look forward to continuing the open dialogue and practice exchange on critical NRDAR practice issues. It is hoped that some of the documentation to be developed by the industrial community will positively benefit the conduct of the Diamond Alkali Superfund Site NRDA.

Given that the Group has been closely following NRDA practices for nearly 20 years, we would be pleased to serve as a resource and a conduit to the broad industrial community regarding the kinds of practice issues that need to be addressed at this and similar sites.

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January 15, 2008

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By Overnight Delivery
Via E-Mail tim_kubiak@fws.gov and melissa_foster@fws.gov

Mr. Tim Kubiak and Ms. Melissa Foster
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main St.
Pleasantville, NJ 08232

Re: Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan: Public Review Draft (November 2007)

Dear Mr. Kubiak and Ms. Foster:

Enclosed please find the comments of the Lower Passaic River Study Area Cooperating Parties Group on the above referenced document.

Very truly yours,

William H. Hyatt, Jr.

cc: Mark Barash (via email w/ enclosure)

Enclosure

NW-185029 v1

COMMENTS ON THE DRAFT "NATURAL RESOURCE DAMAGE ASSESSMENT PLAN" ON BEHALF OF THE LOWER PASSAIC RIVER STUDY AREA COOPERATING PARTIES GROUP

January 15, 2008

I. INTRODUCTION

The Lower Passaic River Study Area Cooperating Parties Group (CPG) appreciates the opportunity to comment on the Public Review Draft of the "Natural Resource Damage Assessment Plan" (November, 2007) (Draft Plan) for Operable Unit 2 (OU 2) and Operable Unit 3 (OU 3) of the Diamond Alkali Superfund Site (Site). OU 2 is defined as the Lower Passaic River Study Area (LPRSA), including the lower 17 miles of the Passaic River. OU 3 is defined as the Newark Bay Study Area (NBSA), including Newark Bay, portions of the Hackensack River, and the Arthur Kill and Kill Van Kull channels. Hereinafter, the "Study Area" will refer to both OU 2 and OU 3.

NOAA and FWS (Federal Trustees) are identified in the Draft Plan as the Federal Trustees for natural resources at the Site. Draft Report at 9-10. The New Jersey Department of Environmental Protection (NJDEP), the state trustee for natural resources at the Site, "has chosen not to participate as an active party in [the] development [of the Draft Plan]." Id. at 10.

The Draft Plan purports to comply with the requirements of 43 C.F.R. Part 11, the DOI regulations (DOI Regulations) governing natural resource damage assessments (NRDAs) for a Type B assessment; however, for a variety of reasons, some of which are detailed in these comments, the Draft Plan is materially deficient and fails to meet the letter or spirit of the DOI Regulations. Consequently, an NRDA performed in accordance with the Draft Plan would not be entitled to a rebuttable presumption under Section 107(f)(2)(C) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9607(f)(2)(C). Moreover, the Draft Plan is so lacking in the essential detail of how the NRDA is proposed to be conducted that the public, including the CPG, has been deprived of a meaningful opportunity to make substantive comments. Accordingly, the Draft Plan should be withdrawn and revised to include the content prescribed by the DOI Regulations, and then reissued to the public for comment, before any NRDA activities are commenced.

II. GENERAL COMMENTS

As acknowledged in the Draft Plan, OU 2 and OU 3 have been subject to intense urbanization and heavy industrialization since at least the middle of the 19th century. That urbanization and industrialization is chronicled in Timothy J. Iannuzzi's *A Common Tragedy: History of an Urban River* (2002). Moreover, OU 2 and OU 3 are downstream of or impacted by other intensely urbanized and industrial areas (e.g., the upper Passaic River) that have not been fully characterized and/or controlled as sources. Both OU 2 and OU 3 also are affected, as they have been for decades, by a large number of uncharacterized, uncontrolled combined sewer overflows, sanitary sewer overflows and storm water runoff from the surrounding industrial and urban areas.

The Draft Plan does not provide sufficient detail to allow the public and potentially responsible parties (PRPs) to determine whether the technical approach being outlined by the Federal Trustees will provide the data needed to conduct a meaningful NRDA. It appears that significant planning is still required by the Federal Trustees before a full plan can be presented to the public for review and comment. The Draft Plan indicates that individual study elements will be made available for public review, suggesting that the Federal Trustees are not currently contemplating an overarching document that presents the detail as to how the entire damage assessment will be conducted. Such a document is required to allow the public to fully evaluate the proposed approach the Federal Trustees plan to take for the Study Area.

The DOI Regulations require that a causation link be made between a specific release of a hazardous substance and an injured resource. Establishing such a link is a key requirement in the injury determination phase of the assessment. While the Draft Plan discusses in general terms how pathways between a hazardous substance and a resource will be addressed, it does not discuss the technical approach the Federal Trustees intend to use to establish the link between a specific release of a hazardous substance and a resource injury.

Furthermore, the Draft Plan provides no explanation for how baseline conditions will be accounted for during injury quantification, even though accounting for such conditions is one of the principal elements in correctly quantifying injuries. Section 11.72(a) of the DOI Regulations states that "[t]he authorized official *shall determine* the physical, chemical, and biological baseline conditions and associated baseline services for injured resources at the assessment area. . . ." (emphasis added). Given the complex history and nature of the Site, the Draft Plan must provide a clear plan on how baseline conditions will be defined and incorporated into the injury quantification phase, and a description of the data required to define baseline conditions.

III. THE DRAFT PLAN DOES NOT COMPLY WITH THE DOI REGULATIONS FOR TYPE B ASSESSMENTS

Section 107(f)(2)(C) of CERCLA provides, in relevant part, that "[a]ny determination or assessment of damages to natural resources for the purposes of [CERCLA] made by a Federal or State trustee in accordance with the [DOI Regulations] shall have the force and effect of a rebuttable presumption on behalf of the trustee in any administrative or judicial proceeding under [CERCLA]." Subpart C of the DOI Regulations, entitled "Assessment Plan Phase," prescribes in specific terms the contents of an NRDA that must be included for the study to be conducted "in accordance with" the DOI Regulations. A comparison of the Draft Plan with Subpart C of the DOI Regulations clearly demonstrates that material elements of an NRDA that are required to be included in an assessment plan are missing from the Draft Plan. These deficiencies are so significant that the Federal Trustees should withdraw the Draft Plan, issue a new assessment plan that satisfies the DOI Regulations, and solicit public comment on the new assessment plan. Otherwise, the public, including the CPG, will be deprived of a meaningful opportunity to comment on the steps the Federal Trustees actually will take to assess damages for the Study Area. The deficiencies of the Draft Plan include, but are not limited to, the following:

- § 11.30(b) provides that "[t]he purpose of the Assessment Plan is to ensure that the Assessment is performed in a planned and systematic manner and that methodologies selected from … subpart E for a type B assessment, including the

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Injury Determination, Quantification, and Damage Determination phases, can be conducted at reasonable cost, as that phrase is used in this part."

The Draft Plan does not provide enough detail to ensure that the damage assessment will be performed in a planned and systematic manner. Indeed, the Draft Plan purports to cover only the Injury Determination Phase of the NRDA, leaving the public to speculate as to the contents and approach of the later phases of the NRDA. Of particular concern is that the Draft Plan provides a discussion of the information available regarding conditions for OU 2 without addressing how the Trustees will develop or establish current conditions in or continuing sources to OU 3. Indeed, the Draft Plan acknowledges that far more data are available with respect to OU 2 than with respect to OU 3, but provides no program for gathering the necessary data in OU 3. Thus, the Draft Plan implies that the Federal Trustees will rely upon available data for OU 2 to reach conclusions regarding conditions in OU 3, instead of collecting the necessary data from OU 3.

- § 11.31(a)(2) provides that "[t]he Assessment Plan *shall be of sufficient detail* to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost, as those terms are used in this part" (emphasis added).

  Despite this requirement, the Draft Plan does not include any information that could be used to develop a credible estimate of the cost of implementation, or to determine whether the NRDA will be cost effective or conducted at reasonable cost. For example, the Draft Plan does not include any detail on any data collection efforts that will be undertaken or the approaches that will be used to determine and quantify injury. Instead, the Draft Plan states that detailed study plans will be submitted to the public as needed for review and comment. This approach does not meet the requirement of this section of the DOI Regulations, and deprives the public of a meaningful opportunity to comment on the reasonableness or cost effectiveness of the NRDA.

- § 11.31(a)(2) further provides that "[t]he Assessment Plan *shall also include* a statement of the authority for asserting trusteeship, or co-trusteeship, for those natural resources considered within the Assessment Plan" (emphasis added).

  The Draft Plan does not include a "statement of . . . authority" by the Federal Trustees "for asserting trusteeship or co-trusteeship" over all of the resources proposed to be assessed. Instead, the Draft Plan simply lists various categories of natural resources, including many for which the State is the sole trustee or co-trustee. The Draft Plan is deficient because it fails to state clearly which natural resources proposed to be assessed are the responsibility of which trustees, with the result that the public cannot determine from the Draft Plan which resources will be assessed by which trustees or whether potentially duplicative assessments will later be sought to be performed by the state. The Federal Trustees need to provide a statement of authority that clearly establishes the basis for asserting

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trusteeship over each of the natural resources proposed to be assessed, and if the resource is the joint responsibility of more than one trustee, the percentage breakdown in trustee responsibility. Furthermore, although NJDEP apparently did not participate in the preparation of the Draft Plan, the Federal Trustees propose to assess natural resources that would appear to be under the exclusive or shared trusteeship of the State, such as the air, geologic, surface water, ground water and certain biological resources. The Draft Plan also fails to identify the authority under which the Federal Trustees propose to assess alleged navigational losses.

- § 11.31(a)(2) further provides that "[i]n addition, for Type B assessments, the Assessment Plan *shall include* the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies" (emphasis added).

  The Draft Plan contains none of the information required by § 11.31(a)(2). Instead, the Draft Plan simply identifies resources that might be assessed, information that might be reviewed, and studies that might be conducted, leaving the door open for the Trustees to conduct any number of future studies of unknown scope, complexity, benefit and cost. The absence of this specifically required information in the Draft Plan is a fatal omission and renders the Draft Plan inconsistent with the DOI Regulations. Furthermore, because this important and required information is omitted, the Federal Trustees will be unable to conduct an NRDA using the Draft Plan and the public, including the CPG, is unable to determine whether an NRDA conducted under the Draft Plan will be adequate or cost-effective. These omissions are particularly problematic in the case of the Draft Plan, in which there appears to be an inappropriate bias in the sampling and data, potentially overstating the contribution of OU 2, and potentially understating the contribution of OU 3, to the impact on the relevant natural resources.

- § 11.31(a)(3) provides that "[t]he Assessment Plan *shall contain* information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation feasibility study or other investigation performed pursuant to the NCP" (emphasis added).

  The Draft Plan contains no discussion of how the NRDA will be coordinated with the RI/FS studies currently being conducted in OU 2 and OU 3. Indeed, the Draft Plan barely acknowledges the RI/FS activities currently underway in OU 2 and OU 3. At a minimum, the Draft Plan should be revised to list all CERCLA actions, or other investigations performed or being performed pursuant to the NCP, and to describe in detail the steps the Federal Trustees have taken and will take to coordinate the NRDA with those investigations. Further, the Draft Plan should spell out those efforts that will be taken to coordinate with the RI/FS activities to minimize the NRDA costs, and make the NRDA more cost-effective.

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- § 11.31(a)(4) provides that "[t]he Assessment Plan *shall contain* procedures and schedules for sharing data, split samples, and results of analyses, when requested, with any identified potentially responsible parties…." (emphasis added).

  The Draft Plan contains none of this information, even though this NRDA would be one of the largest and most complex such undertakings ever attempted, both in terms of the geographic area covered and the number of PRPs. The Draft Plan does little to acknowledge this fact, and does not explain how the Federal Trustees will manage this effort and keep the public and the PRPs informed as the NRDA proceeds. The Federal Trustees need to provide additional detail on how PRPs will be informed of data collection efforts in sufficient time to allow for coordination and transfer of split samples.

- § 11.31(c)(2) provides that an Assessment Plan "*must also include* … [a] Quality Assurance Plan that satisfies the requirements listed in the NCP and applicable EPA guidance for quality control and quality assurance plans" (emphasis added).

  The Draft Plan does not contain a Quality Assurance (QA) plan. Instead, the Draft Plan merely states that QA plans will be developed for each data collection effort that is part of the NRDA. Draft Plan at 101. This does not satisfy the mandatory requirements of § 11.31(c)(2) for a Type B assessment, as the Federal Trustees propose in the Draft Plan. Without fully developed quality control and quality assurance plans that comply with the NCP and EPA guidance, the public cannot know whether the plans are adequate and fulfill the regulatory mandate. The public simply cannot meaningfully comment on plans that have yet to be developed. The Draft Plan should be withdrawn and republished for public comment when the required contents have been included. Unless those required contents are included, the Draft Plan cannot constitute an assessment plan under Subpart C.

- § 11.31(c)(3) provides that the Assessment Plan "*must also include*…[t]he objectives, as required in § 11.64(a)(2) of any testing and sampling for injury or pathway determinations…." (emphasis added).

  The Draft Plan does not identify the objectives of any studies or data collection efforts that would be undertaken as part of an injury assessment. Without such stated objectives, neither the trustees nor the public can know whether such studies or data collection efforts will have any relationship to the goals of the NRDA.

Because of all these deficiencies or omissions in the Draft Plan, it cannot serve as an acceptable assessment plan under the DOI Regulations and would not result in an NRDA that would be entitled to a rebuttable presumption under Section 107(f)(2)(C) of CERCLA. More importantly, there is no reason to believe that implementation of the Draft Plan would produce the credible, relevant information needed to devise a restoration plan for the Study Area in a timely, cost-effective manner.

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IV. SPECIFIC COMMENTS ON THE DRAFT PLAN

In addition to the comments set forth above, the CPG has the following specific comments on the Draft Plan.

Chapter 1: The Ecological, Cultural, and Economic Significance of the Site

- Page 13: The NRDA that the Federal Trustees are proposing to undertake is one of the largest and most complex such undertakings ever attempted. The Draft Plan does little to acknowledge this fact and provides no discussion of how the Federal Trustees plan to manage this effort nor how they plan to keep the public and the potentially responsible parties informed as the NRDA proceeds. As stated previously, the Federal Trustees must provide procedures that allow for potentially responsible parties to receive split samples, and yet the Draft Plan has no provision to meet this requirement. Given the large geographic area included in the proposed NRDA and the huge number of potentially responsible parties, the Federal Trustees need to provide additional detail on how potentially responsible parties will be informed of data collection efforts in sufficient time to allow for coordination and transfer of split samples.

- Page 13: The Draft Plan places undue emphasis on OU 2, while virtually ignoring the larger area subsumed in OU 3. This raises concerns that the NRDA will rely largely on data collected from OU 2 during the RI/FS, and not develop or take into account data that establishes the actual conditions in OU 3. The document should be revised to explain how the trustees will establish the conditions of resources in OU 3 as well as OU2. To the extent inadequate or less extensive data are available for OU 3 than for OU 2, the Draft Plan should contain a description of how the missing data will be gathered.

- Page 14: While the Draft Plan cites the Kill Van Kull and the Arthur Kill as being within OU 3, it is unclear from the text and the map presented in Exhibit 1-1 whether OU 3 includes all of the Kill Van Kull and the Arthur Kill, or just selected portions of either water body. Both Exhibit 1-1 and the text should be revised to clearly define the limits of the study area.

- Page 15: The Draft Plan's discussion of the historical significance of OU 2 focuses almost entirely on the history of development in and around the LPRSA and presents no historical information about development activities that occurred in OU 3, most notably Newark Bay, the Hackensack River, the Kill Van Kull and the Arthur Kill. Such an uneven presentation of historical and current information on areas included in the assessment is likely to lead to a skewed, incomplete understanding of the baseline conditions against which injury and damages must be assessed. For example, Exhibit 1-3 on page 17 presents several historical events in the LPRSA, but does not present similar information for any other location within the assessment area.

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- Page 16: Exhibit 1-2 presents an exhaustive list of biological resources. Is it the intent of the Federal Trustees to conduct an assessment for all species listed? If not, what species will be the subject of the assessment? Will the trustees attempt to extrapolate from those species to other species?

- Page 16: Many of the species listed in Exhibit 1-2 have life histories and home ranges that extend beyond the boundaries of the proposed assessment area. How will exposure to hazardous substances outside the study area be addressed given the requirement for the trustees to establish causation between a release of a hazardous substance and injury?

- Page 18: The Draft Plan states that "[d]ue to urbanization and heavy industrial use in the area, the natural environment of the Site began to suffer as a toxic soup of sewage and hazardous substances was dumped into the waterway." The Federal Trustees should keep this statement in mind when considering the conditions at the Site because such conditions are the result of multiple releases, chemical and otherwise, over multiple years, and from multiple sources, including multiple potentially responsible parties. Therefore, any attempt for the Draft Plan to focus on certain contaminants or locations at this stage is inappropriate.

  Furthermore, at least as significant in impacting natural resources in the area was the massive loss of habitat, both in upland areas and within the waterways that occurred as early as the 17th century. Iannuzzi, at 10-11, Figure 1-2. According to Iannuzzi, 55% of the wetlands in the lower Passaic River and Newark Bay region, or some 13,548 of 24,728 acres, had been lost by 1940. Iannuzzi, at 59, Table 5-1. Nearly 2,500 acres of wetlands, or more than 10% of the wetlands in the study area, were reclaimed just to construct Newark Airport. Iannuzzi, at 64. Moreover, significant impacts to the fish and shellfish resources were well-known and publicly reported in the late 19th century and the early 20th century. Iannuzzi, at 98 to 106. There is significant documentation that both biotic diversity and abundance were severely impacted in the Study Area more than a century ago. These losses in habitat as well as disturbance to the biota had a significant impact on the health and well being of natural resources and the Draft Plan should include a comprehensive discussion and listing of habitat losses that have occurred in the assessment area.

Chapter 2: Hazardous Substances in the Site

- Page 21: While Chapter 2 of the Draft Plan is apparently intended to present a discussion of hazardous substances in the entire Site, the opening discussion focuses solely on the LPRSA, thereby erroneously implying that it is the only portion of the study area that contains hazardous substances. The Draft Plan must acknowledge all of the hazardous substances – and the sources of those substances – that are present at the Site. For example, historical and ongoing sources of hazardous substance and sediment deposition from the urban and industrial watershed, POTW's, all four connecting rivers and numerous direct

sources into the Site need to be examined further as they present significant influences.

- Page 21: The section regarding "Types and Effects of Contamination" discusses the "primary contaminants of concern." However, nowhere in the Draft Plan does it state how this list of contaminants was derived, nor how these contaminants relate to the baseline, both temporally and in terms of environmental impacts.

- Page 25 and following: The Draft Plan discusses how various hazardous substances might cause injury, but does not demonstrate, and does not explain how the trustees intend to establish, that the hazardous substances present at the Site have actually caused adverse effects. It is not sufficient to infer that the mere presence of hazardous substances could be associated with effects; rather, specific criteria must be developed against which to assess exposure and effect, and toxic endpoints and the uncertainty surrounding them must be addressed. The trustees are authorized to recover only for damages, not potential risks.

- Page 34: This section of the Draft Plan appears to be intended to provide a discussion of sources of contamination to the entire assessment area, but fails to do so. Given the nature and scope of the other numerous environmental investigations occurring throughout and upstream of the assessment area, the Federal Trustees must present a detailed discussion of all that is currently known in order to meet their burden of proving that specific injuries resulted from specific releases of hazardous substances.

Chapter 3: The Role of the Trustees

- Page 38: The Draft Plan states that the State of New Jersey has chosen not to be involved in developing the Draft Plan for the Study Area, but that the Federal Trustees intend to ensure that the public is adequately and appropriately compensated for injuries to trust resources. Section 11.15(d) of the DOI Regulations states that "[t]here shall be no double recovery under this rule for damages or for assessment costs, that is, damages or assessment costs may only be recovered once, for the same discharge or release and natural resource, as set forth in section 107(f)(1) of CERCLA." However, the Draft Plan does not describe the steps that the Federal Trustees will take to ensure compliance with § 11.15(d) and prevent double counting of injured resources or duplicative assessment costs. Chapter 3 should be expanded to present a more thorough discussion on how the Federal Trustees will coordinate with the State to prevent double counting and duplicative assessment costs.

- Page 38: The Draft Plan does not identify the natural resources for which the Federal Trustees claim trust management responsibility. The Federal Trustees need to provide a clear listing of resources for which they assert management authority, and if the resource is co-managed by multiple resource agencies at both the federal and state level, what is the percent breakdown in trust responsibility.

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- Page 38: While the State of New Jersey is not a participant in the Draft Plan, natural resources which would appear to be NJDEP's responsibility are included, for example, the air, geologic, surface water, ground water and certain biological resources. Does an assessment conducted by the Federal Trustees pursuant to the plans presented in this document constitute a state-approved assessment of resources for which the state has trust responsibility? If not, then why are the Federal Trustees undertaking an assessment of resources for which they do not have trust responsibility?

Chapter 4: The Diamond Alkali Superfund Site NRDA: Assessment and Restoration

- Page 46: The Draft Plan states that the Federal Trustees intend to maximize the use of data assembled by the LPRSA Restoration Project for OU 2, but does not identify data sources for OU 3 (e.g., Newark Bay, the Hackensack River, the Kill Van Kull, and the Arthur Kill). LPRSA data will almost exclusively be collected within the lower 17 miles of the Lower Passaic River and will be of little use in determining and quantifying injuries in OU 3. The Federal Trustees must present a comprehensive plan for collecting necessary data on actual conditions in and contributing sources to OU 3.

- Page 47 and following: The Draft Plan does not provide sufficient detail to allow the public and potentially responsible parties to determine whether the technical approach being outlined by the Federal Trustees will result in adequate data meaningful to the damage assessment process. It appears that significant planning is still required by the Federal Trustees before a full plan can be presented to the public for review and comment.

- Page 49 and following: Regarding the multiple statements on "advisories" on fish in the Passaic River (see also pages 8 and 29), the Draft Plan does not properly present the correct dates and corresponding advisory types/basis. The advisory type/basis and dates should be confirmed and more clearly defined in the Draft Plan.

- Page 62: The Draft Plan presents data from a report by Parsons (2003) on cormorants, including data on chemical concentrations in plasma, feathers and eggs. However, under the discussion of developmental studies, the authors do not cite the results of the observations made by Parsons (2003) on egg production, hatching success, and fledgling survival. These portions of the report should also be included in the discussion of potential injuries to birds from consuming prey within the Study Area. While parties can differ on interpretation of environmental data, the Trustees need to present and discuss all relevant data and findings.

- Page 67: The Draft Plan states that "The specific studies that the Federal Trustees have in progress to determine injuries to surface water resources of the Site are described below and shown in Exhibit 4-11." Furthermore, page 48 of the Draft Plan states that "The Trustees expect that all plans for injury studies will be peer

reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used." Where is the plan and report on the associated peer review that was to be released to the public associated with the "studies" shown in Exhibit 4-11?

- Page 74: The Draft Plan discusses in general terms how pathways between a hazardous substance and a resource will be addressed, but does not discuss the technical approach the Federal Trustees intend to use to establish the necessary link between a specific release of a hazardous substance and a resource injury. Establishing such a link is a key requirement in the injury determination phase of the assessment. While the Draft Plan presents a discussion on how relatively small scale pathways will be evaluated (e.g., use of food web model, sources within the Study Area, etc.), the Draft Plan fails to describe how sources and pathways will be evaluated in the larger context of the Study Area. For example, how have external sources of hazardous substances to the Study Area affected resources within the Study Area (e.g., hazardous substances entering the Study Area from above Dundee Dam, or upstream of the tidally influenced portion of the Hackensack River, or from storm drains and CSOs, or from New York Harbor, or Raritan Bay). The DOI Regulations require that a clear causation link be established between a specific release of a hazardous substance and an injured resource. Quantifying the influence of these external sources will be critical in accounting for injuries not associated with releases within the Study Area.

- Page 76 and following: The Draft Plan does not explain how baseline conditions will be established or accounted for during injury quantification, even though accounting for such conditions is one of the principal elements in correctly quantifying injuries. Section 11.72(a) of the DOI Regulations states that "[t]he authorized official *shall determine* the physical, chemical, and biological baseline conditions and associated baseline services for injured resources at the assessment area. . . ." (emphasis added). Furthermore, § 11.72(b)(3) provides that "[b]aseline data should be as accurate, precise, complete, and representative of the resource as the data used or obtained in § 11.71 of this part" (Section 11.71 covers the Injury Quantification Phase – service reduction quantification). Given the complex history and nature of the Site, especially in relation to impacts to natural resources associated with activities (e.g., dredging, upland and in-water habitat losses, shoreline construction, CSO and storm water discharges, commercial navigation activities, intense urban development and required services to support development, ambient noise and artificial lighting) that would be considered baseline conditions, the Draft Plan must provide a clear plan on how baseline conditions will be defined and incorporated into the injury quantification phase, and a description of the data required to define baseline conditions.

- Page 78: Under what authority is a claim for navigation losses being made?

- Appendix: Quality Assurance Management – The QA Plan(s) that will be prepared by the Federal Trustees (as described in this Appendix) do not reflect

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that they will be prepared in accordance with the most recent EPA standard, the Uniform Federal Policy for Implementing Quality Systems (UFP-QS) EPA-505-F-03-001 March 2005. This Appendix should be revised to comply with this standard or the Federal Trustees should explain why they are not using the UFP QAPP format?

V. SPECIFIC ISSUES NOT ADDRESSED BY THE DRAFT PLAN

As stated above, the Draft Plan lacks essential details regarding how the NRDA will be conducted. To correct that deficiency, information responsive to the following questions should be provided in a revised assessment plan:

Fish and Shellfish

- Page 48: Since determining risk is based on the evaluation of a future probability and evaluation of injury is a demonstration of *past* adverse effects of hazardous substances, what specific scientific studies will be conducted to identify any injuries to fish and shellfish? How will baseline and causation be taken into account and what, if any, RI data will be used?

- Page 49: How will assessment of alleged losses to recreational and potential subsistence angling be conducted? Since many of the fish found in the Study Area have regional foraging areas, please describe how only the alleged losses of recreational and potential subsistence angling in the LPRSA will be evaluated.

- Page 50: Why are risk-based numbers being utilized to determine injury? As noted in the first bullet in this section, risk does not equate to injury. Injury is a demonstrated past adverse effect. It is not clear from the text how the Federal Trustees plan on demonstrating this.

- Page 50: Comparison to literature values is not an appropriate or reliable measure of injury, as such values are merely correlative, and not indicative of causation. The use of these methods clearly does not meet the requirements of §11.15(d). Please see previous specific comments in this section on determining injury.

- Page 57: How will appropriate reference areas be identified and will the Federal Trustees be coordinating with the RI/FS team, who are also identifying appropriate reference areas? If so, how will that coordination be accomplished?

Birds

- Page 58: What specific scientific studies will be conducted by the Federal Trustees to determine injury to birds? How will baseline and causation be taken into account and what, if any, RI data will be used?

- Pages 59-61 (Text and Exhibits 4-8): Swinburne Island is well outside of the Study Area, and the presentation of study results for birds on the Island serves to further confuse the possible relationship (if any) between possible observed

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conditions and environmental releases that are purported to be the basis for the NRDA.

- Page 62: Screening values are for use in identifying chemicals that might present a risk, not for determining injury. The Draft Plan should describe how injury will be determined.

- Page 62: Variations in avian populations are due to many factors, including predation, habitat loss, and changes in prey availability. How will the Federal Trustees establish that hazardous substances, as opposed to other factors, are responsible for variations in bird populations?

- Page 63: How will population-level effects be determined for birds? As noted above, populations and even individual bird fecundity is highly variable, with many contributing factors. How will the Federal Trustees establish and take into account baseline conditions?

- Page 64: What are the boundaries of the Study Area? This is important to understand since data needs will be based on the boundaries of the Study Area. For example, there is a plethora of data in the LPRSA as compared to the other OUs identified in the Draft Plan. How and when will an adequate database of information be acquired for the other OUs such that the different OUs can be assessed with regard to potential contributions?

- How are the boundaries of the Study Area determined? For example, why are floodplain soils within the Study Area? Will the Federal Trustees assert that the mere presence of hazardous substances in flood plain soils constitutes an injury? If so, how will the Federal Trustees determine causation?

Surface Water

- Page 69: There are many inputs to surface water and temporal changes in surface water conditions. Will the Federal Trustees assert that the mere presence of hazardous substances in surface water constitutes an injury? If so, how will the Federal Trustees determine causation?

Sediment Evaluation

- Page 71: Sediment quality values are used to estimate *potential* effects (please see earlier comments on the difference between risk and injury). How will actual injury, if any, be determined?

Ground Water

- Page 72: Exceedance of a threshold value does not constitute an injury. How will injuries to ground water be determined?

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- Page 72: As noted above, the Draft Plan does not explain how the Study Area boundaries are to be delineated. This is particularly relevant to ground water.

Geologic

- Page 73: How will injuries be determined?
- Page 73: Why are floodplain soils being evaluated (please see earlier comments on Study Area boundary)?

Air

- Page 74: How will injuries be determined?

Pathway Determination

- Page 74: There is insufficient detail to determine *how* the pathway determination will be conducted. The Draft Plan should provide this information.

Damage Determination

- Page 76: There are a number of tools listed, yet no details are provided as to how these tools will be used in the damage assessment. The Draft Plan should provide that detail.

Restoration

- Page 79: The CPG agrees that restoration planning is critical. How will implementation of early restoration projects be assessed? How will the Federal Trustees select early restoration projects?

Summary of Comments

The Draft Plan presented by the Federal Trustees fails to meet many of the requirements for Type B assessments, 43 CFR Part 11, Subpart C. The deficiencies in the Draft Plan are so significant that the Draft Plan should be withdrawn and a revised plan should be issued. The revised document should also provide a detailed description of any study plans being considered by the Federal Trustees, as well as a discussion of the critically important question of how baseline conditions in OU 2 and OU 3 will be established and incorporated during the injury quantification phase and how the Federal Trustees will establish causation.

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January 15, 2008

Tim Kubiak
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street
Pleasantville, New Jersey 08232

Re: Diamond Alkali Superfund Site, Draft "Natural Resource Damage Assessment Plan," dated November, 2007

Dear Mr. Kubiak:

This letter provides ISP Environmental Services, Inc's ("ISP") comments in response to the Public Review Draft of the "Natural Resource Damage Assessment Plan," dated November, 2007 (Draft NRDA Plan), issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (FWS). Under separate cover, S.S. Papadopulos & Associates (SSPA) is submitting further comments on behalf of ISP related to sediment flux and contaminant transport issues.

I. The Draft NRDA Plan Does Not Adequately Address Baseline Issues

The Draft NRDA Plan fails to discuss the methods that will be used to determine baseline. In an NRD matter, baseline is the starting point for calculating damages. For example, the Department of Interior's ("DOI") regulations state that baseline is required to "quantify for each resource determined to be injured . . . the effect of the discharge or release in terms of the reduction from the baseline condition in the quantity and quality of services . . . ." *43 CFR 11.70(a).* Similarly, the National Oceanic and Atmospheric Administration's ("NOAA") regulations require the trustees to "quantify the degree, and spatial and temporal extent of such injuries relative to baseline." 15 CFR § 990.52.

The baseline evaluation is not an empty exercise but rather a critical consideration of any natural resource damages assessment. As stated by DOI, the baseline assessment must be robust: "[b]aseline data should be as accurate, precise, complete, and representative of the resource as data used" in quantifying the injury. *43 CFR 11.72(b)(3).* Similarly, NOAA's regulations provide that "[b]aseline data may be estimated using historical data, reference data, control data, or data of incremental changes…alone or in combination. *15 CFR 990.30.* Indeed, the concept of baseline, among other things, is necessary to effectuate the important statutory principle that Trustees are only entitled to recover natural resource damages "resulting from" a liable defendants' release of a hazardous substance or oil. *See, e.g., 42 USC 9607(4)(C).*

Establishing baseline conditions is especially critical here because portions of the areas of concern have been inhabited for approximately 360 years and records of environmental degradation predate the industrial revolution.

For example, consider the following:

- The dumping of manure into the Hackensack River was outlawed in the 1600's because of the adverse effects the practice had on local oyster beds. Nevertheless, permitted and un-permitted waste disposal is still one of the major sources of environmental degradation and loss of services in the areas of concern. This is the result of land development and population growth of the region, not contamination from industrial sources.

- The natural depth of Newark Bay was historically about 18 feet, but soil erosion due to land development led to the need for dredging navigation channels in the 1800's. Navigation channels are now repeatedly dredged to a depth 40-50 feet to allow the entry of larger ships. It is very likely that such dredging results in the re-suspension of previously buried contaminants and that prop-wash from large ships is an important factor in the re-distribution of the sediment particulates. Since 50-foot channels and large mechanized ship traffic were not present 360 years ago, baseline conditions have clearly been altered by factors other than contaminants.

- As early as 1894 the New York Times commented that "Few cities in the world, if any, have viler drinking water than the cites in New Jersey which depend upon the Passaic River for their water supply" and oyster colonies reportedly became extinct in Newark Bay during the period of petrochemical industry expansion around 1880. Historically, wetlands provided breeding grounds for fish and wildlife in the area of concern, but much of this wetland area was filled long ago. Much of the natural shoreline has been replaced with bulkheads that prevent foraging by wildlife. The remaining natural wetlands have, more recently, been invaded by *Phragmites*, with a consequential reduction in biological diversity. Therefore, it will be important for the trustees to distinguish between effects due to the release of hazardous chemicals and effects due to the *de facto* allocation of natural resources to accommodate human population growth.

- Baseline conditions are not constant and levels of most contaminants are decreasing in the areas of concern. For example, Ludwig and Iannuzzi (2005) found no adverse effects on polychaete worms due to sediments from the Passaic River. Therefore, when compared to conditions existing in the 19th century, baseline conditions have likely improved.

- The presence of disease vectors must be evaluated as part of baseline. Disease vectors due to combined storm water and sewage line overflows have historically been the major cause of restrictions on human fish and shellfish consumption. With regard to bird populations, other factors to be considered

include the prevalence of disease vectors (i.e., botulism due to anaerobic sediments, Salmonellosis, cholera, Eustrogylid parasites, Lyme disease, and avian influenza viruses), habitat disturbances (i.e., land development, bulkheads, recreational boating and commercial shipping), and ecological factors (i.e., intra- and inter-specific competition, foraging habitat, dietary resources, and predation) must be given substantial weight of evidence.

- The Draft NRDA Plan does not address the selection, or availability, of reference areas. In urban settings, baseline conditions are usually evaluated by comparison to physically similar reference areas where contaminant levels are low. This is likely to be problematic in the areas of concern because the entire area has been developed and industrialized for 200-400 years and any effects due to chemicals will not be easily delineated from those due to factors such as substrate physical characteristics, elevated ammonia and sulfide levels, and/or low oxygen levels. Within the areas of concern such delineation will probably require the use of multiple, less than optimal, reference areas. As discussed below in greater detail, because of the very low concentrations of sediment quality guideline values, it is likely that at least some chemical contaminants will be determined to be "elevated" in many of these reference areas. Thus, selection of appropriate reference locations may require "best professional judgment" and compromise rather than comparison to questionable screening benchmarks.

II. The Draft NRDA Plan Improperly Relies on Sediment Quality Guidelines

The Draft NRDA Plan used sediment quality guideline values (SQGs) to determine that mercury is the primary metal of concern [page 33; Exhibit 2-1]. Although SQGs may be used to eliminate contaminants of concern by identifying concentrations below which no risk is expected, they should not be used to identify or rank metals of concern because the method of calculating SQGs is scientifically flawed. SQGs are based on bioassays conducted with naturally-occurring sediments that contain many different chemicals, not with sediments that only contain mercury. If toxicity is observed in these sediments, it is assumed that mercury is the sole cause. Since mercury is found at low levels in the environment, the resulting SQG is also low, regardless of the many co-occurring chemicals that could have actually caused the toxicity, their inherent toxicity, or their concentrations. In fact, the Chief Scientist for the NOAA Status and Trends Program, the compiler of SQG data, has repeatedly pointed out the unreliability of SQGs (O'Connor et al. 1998; O'Connor 2000; O'Connor 2004).

SQGs are scientifically flawed because they are not derived from tests with mercury alone, and do not account for bioavailability or regional conditions. In particular, the SQG for mercury does not account for the very high binding affinity that mercury has for the sulfide that is characteristic of regional sediments. For instance, Weis et al. (2004) reported that the only metal associated with effects on benthic invertebrate populations in Berry's Creek, one of the most mercury-contaminated waterways in the United States, was copper, not mercury. This would not have been predicted based on the

SQGs for either copper or mercury. The data presented in Exhibits 4-5 to 4-7of the Plan also show that despite substantially different distances from the putative major known mercury sources in the region, the total mercury in crab, fish[1] and bird tissues is relatively constant. The similarity of these concentrations also suggests, as was shown in the Berry's Creek by Cardona-Marek et al. (2007), that the methylmercury concentration is not linked to the total mercury concentration. This again shows that SQGs should not be used to rank metals of concern and that bioavailability should be a critical consideration in the process of identifying contaminants for further risk evaluation.

Therefore, ISP recommends that contaminants for further evaluation should be selected only after on a careful review of the primary peer-reviewed literature and regional studies available to the trustees from other sites. For instance Exhibit 2-1 shows that the SQG for mercury is 0.71 mg Hg/kg, but regional studies have shown no effects on sand worms, hard clams or grass shrimp exposed to 34.9 mg Hg/kg sediment from New York Harbor (Rubenstein et al. 1988) or on benthic populations at between 14.5 and 67.8 mg Hg/kg sediment from Berry's Creek (Weis et al. 2004). Other mercury-only bioassays showed no effects on marine amphipods at 15.2 mg Hg/kg (Swartz et al. 1988). Similar discrepancies between SQGs and chemical-specific bioassays have been shown for PCBs (Fuchsman et al. 2006) and dioxins/furans (Barber et al. 1998). Careful consideration of the results of these studies can only enhance the scientific validity on any injury assessments for sediments while reliance on SQG's alone will create misleading and controversial conclusions.

III. The Injury Determination Must Look Beyond Contaminant Levels

The Draft NRDA Plan proposes to use comparison "to known criteria, standards, guidance values or other threshold values" as the basis for determining whether further studies should be pursued. However, as discussed above, such comparisons ignore the most important abiotic modifier of toxicity, which is bioavailability. Therefore, ISP recommends the pursuit of more thorough injury determination studies. These studies must be designed to answer focused questions and the interpretation of the results should be disclosed in the NRDA Plan. For instance, sublethal (i.e., growth) results should not be given the same weight as lethal results in laboratory bioassays and bioassays should not be given the same weight as benthic population surveys. Endpoints, such as brain asymmetry, that are not linked to population stability should not be given weight equal to endpoints such as nesting success that are directly linked to population stability. Because such interpretive issues always arise at the beginning of the injury quantification phase, these and similar issues should be discussed in the injury determination phase. Since laboratory bioassays disturb and re-mix sediments, and benthic populations vary seasonally and yearly, ISP recommends multi-year benthic surveys as the best integrator of environmental conditions. Similarly, because risk assessments based on laboratory studies are rarely substantiated by field studies, ISP recommends avian and mammalian population stability field studies.

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[1] There appears to be an error in units for total mercury. Assuming most total mercury is methylated, and the data presented for methylmercury is correct, the total mercury data should be ppm, not ppb.

The mere presence of "elevated" levels of chemicals in animal tissues should not be construed to mean that a biological injury has occurred, but the Draft NRDA Plan proposes to evaluate the potential for injury by comparison to critical body residues (CBRs). The theory of using of CBRs for screening purposes is well founded for non-polar organic contaminants (DiToro et al. 1991) but not for contaminants that act through interaction with specific biological ligands (DiToro et. al 2005). CBRs are particularly ill suited for metals because organisms adapt to low-level chronic metal exposures without adverse effects and can have a high mortality rate without measurable increases in body residues by acute high-level exposure (Lauren and McDonald 1987a,b). Different species accumulate different levels of metals and concentrations generally increase with the age of the organism such that what is normal for one species at one age might appear to be "elevated" for different species at a different age. The time scale and concentration that result in CBRs are critical factors in the interpretation of this type of data. When exposed to sublethal concentrations of metals, organisms adapt by physiological mechanisms such as producing metal-binding proteins (i.e., metallothionein) which sequester metals away from subcellular ligands where they might cause adverse effects. Other adaptive physiological responses include changes in permeability and genetic selection of more resistant populations. Within the areas of concern, Weis et al. (1981) and Kraus et al. (1998) have demonstrated increased resistance to mercury in populations of killifish and grass shrimp, respectively.

CBR has already been used to present misleading evidence of risk in the area of concern. In the Risk Assessment for the Focused Feasibility Study, Battelle (Malcolm Pirnie 2007) used CBR to estimate the risk from mercury to invertebrates and fish but also erroneously assumed that all mercury in fish and invertebrates was present as methylmercury. If CBR is to be used at all, the trustees must be careful to thoroughly evaluate all of the available data and not to select only studies that support one possible outcome or the lowest CBR. It will be important for the trustees to compile the available data and evaluate with full knowledge of the concentration in the environment, the time frame for effects or adaptation, appropriate laboratory exposure conditions, and adaptive abilities of animals in the environment., However, as discussed above, ISP recommends that the results of population and community studies will provide a less circuitous and more scientifically-defensible route to the estimation of injuries than CBR.

IV. Conclusion

ISP provides the above preliminary comments in response to the Draft NRDA Plan. In sum, the draft NRDA Plan contains a number of important deficiencies, including the misuse of sediment quality guidelines, the implied correlation between contaminant concentrations and injury, and the failure to systematically evaluate baseline.

ISP would be pleased to discuss any of these issues with you in more detail. Finally, ISP hereby requests an opportunity to review and comment on any future drafts of the NRDA Plan or any of the associated studies.

Very truly yours,

J. David McNichol
Sr. Manager, Environmental

Electronic Mail

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S.S. PAPADOPULOS & ASSOCIATES, INC.
ENVIRONMENTAL & WATER-RESOURCE CONSULTANTS

January 15, 2008

Mr. Tim Kubiak
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street
Pleasantville, New Jersey 08232

Subject: **Diamond Alkali Superfund Site, Draft "Natural Resource Damage Assessment Plan," dated November, 2007**

Dear Mr. Kubiak:

This letter provides our comments on behalf of ISP Environmental Services, Inc. ("ISP") in response to the Public Review Draft of the "Natural Resource Damage Assessment Plan," dated November, 2007 ("Draft NRDA Plan"), issued by the U.S. Department of Commerce ("DOC"), National Oceanic and Atmospheric Administration ("NOAA") and the U.S. Department of the Interior ("DOI"), U.S. Fish and Wildlife Service ("FWS").

The Draft NRDA Plan discusses future investigations of alleged natural resource injuries in the Lower Passaic River, the Newark Bay and portions of the Arthur Kill and Kill Van Kull. When evaluating the Newark Bay and its relationship to the surrounding river systems it is critical to understand the complex hydraulic relationships between these various water bodies. Unfortunately, many of the studies of these relationships that have been conducted to date contain serious uncertainties or problems. In order to achieve a scientifically-valid and rigorous NRD assessment, the Trustees should address these issues.

Consider, for example, the following:

- In 2006, as part of the Lower Passaic Restoration Project, the U.S. EPA and the Army Corps of Engineers completed its *Draft Geochemical Evaluation (Step 2)* (Malcolm Pirnie 2006). The sediment mass balance calculations relied upon in this 2006 evaluation, however, are highly uncertain and fundamentally flawed. These calculations rely on work by Lowe et al., 2005 ("Lowe"). This work contains numerous unsupported assumptions and errors that render the sediment load estimates unusable to quantify potential contributions from the various water bodies. For example:

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- Lowe compared bathymetric surveys for 1934 and 1993/94 to calculate the changes in the bottom elevation of Newark Bay. The 1934 survey and the data collected in 1994 might not be directly comparable, as the morphology of the bay, measurement methodologies, and data locations and densities were different between the two studies.

- Lowe calculated landside sediment loads for the Passaic River and the Hackensack River and their tributaries based on a very limited set of suspended sediment and flow data. Lowe recognized that there were no supporting data for either flow or suspended sediment for the Lower Passaic River and Lower Hackensack River. Lowe then calculated landside contributions from combined sewer overflows, storm water, wastewater treatment plants, and atmospheric deposition. These calculations relied on estimates and model results since there were little available data for quantification.

- Lowe calculated dredged volumes based on information on dredging activities between 1924 and 1985. This information contains maintenance and improvement and other types of data that were collected by different contractors at various locations over a long time period. Calculations based on this type of data carry a large level of uncertainty.

Based on the above, Lowe assumed that the total sediment deposited in Newark Bay is equal to the dredged quantities. Lowe then subtracted the estimated contribution from the landside sources and concluded that the remainder of the calculation represents the sediment load that was contributed to Newark Bay from Arthur Kill and Kill Van Kull. No actual calculation of sediment deposition from the two Kills was done. Lowe did not address the overall uncertainty of the approach nor the weaknesses of the difference-based mass balance calculations. Analysis of the actual data that is available for the Arthur Kill and the Kill Van Kull demonstrates that the assumptions and calculations made by Lowe regarding the two Kills are unlikely to represent reality.

- Indeed, the total suspended sediment concentrations in Arthur Kill that would be required to fulfill the Lowe assumption of 32,030 cubic meters per year of sediment flux from the Arthur Kill to Newark Bay would have to be almost 5,000 mg/L in order to explain the sediment load to the Bay that Lowe attributes to the Arthur Kill. This amount of suspended sediment is not supported by the data which indicates that 20 mg/L is representative of the suspended sediment concentrations in the Arthur Kill. The suspended

sediment data contradicts Lowe's own assumption that the sediment load budget can be calculated by direct flow comparison between the Kills.

- Lowe also incorrectly assumed that the flood tide flow in the Arthur Kill is larger than the ebb tide, thus concluding that there would be net sediment transport northward to Newark Bay from Arthur Kill. This is clearly incorrect. Net flow and sediment flux in Arthur Kill is southward to Raritan Bay. Numerous studies, including the *Lower Passaic River Restoration Project – Draft Hydrodynamic Modeling Report, April 2006,* have concluded that flow in the Arthur Kill is predominately from Newark Bay to Raritan Bay in a counterclockwise direction around Staten Island. *See also* Blumberg et al. 1999; Chant 2002 and 2006; Kalvarachchi et al., 2003. Since sediment concentrations in the Arthur Kill do not vary significantly from flood tide to ebb tide, the net sediment flux in Arthur Kill is also southward towards Raritan Bay.

- Furthermore, the water and sediment fluxes from the Kill Van Kull are larger and the flow is faster than in the Arthur Kill (Pence et al., 2006). This conclusion was used to allocate the marine side sediment and contaminant loads between the Kills in the *Draft Geochemical Evaluation*, for example. Bathymetry on the navigation channels in and around Newark Bay also shows that the flow from Kill Van Kull is channeled toward the mouth of Arthur Kill. The smaller and slower flow in Arthur Kill can therefore be expected to be backed up at the mouth of the Arthur Kill preventing sediment transport from Arthur Kill to Newark Bay.

- Another issue of significant uncertainty that the Trustees should consider relates to assumptions of annual sediment accumulation in Newark Bay. For example, Lowe states that the uncertainty in bathymetry is approximately plus or minus 0.3 meters. Applying this uncertainty over the area of the Bay (about 16.8 square kilometers) produces an uncertainty in sediment volume of plus or minus 5 million cubic meters. This uncertainty is almost the same magnitude as the estimated total sediment accumulation of 5,335,439 cubic yards that Lowe uses in his sediment mass balance calculation. If plus 0.3 meters is used in the calculation of total sediment loading to Newark Bay, the magnitude of sediment deposited in Newark Bay per year is zero, with the amount entering the Bay, equaling the amount leaving. This total sediment accumulation estimate is Lowe's basis for the calculation of the Kills contribution since a simple subtraction was used to determine the mass balance; the level of uncertainty in the estimate is so wide as to render any conclusion based upon it unsupportable.

- Determinations regarding the date of the mass of sediment transported by the Passaic River to Newark Bay are also highly uncertain. Two major sources of uncertainty that afflict the calculations are: a) the Passaic River sediment flux contribution, and b) the average concentrations of contaminants in the contributing sediment sources within Newark Bay itself.

  - For example, the sediment flux from the Passaic River has been estimated to range from 12,400 to 79,100 cubic meters per year. *See* Lowe et al. 2005; *Draft Geochemical Evaluation*. In the Draft Geochemical Evaluation, Passaic River flux estimates vary by a factor of three depending on how the sediment flux is calculated. *See Draft Geochemical Evaluation*. Even using the highest sediment flux value of 79,100 cubic meters per year from the Passaic River, the sediment mass balance from this evaluation would require almost three times as much sediment to be transported to Newark Bay via the Kills. This is not supported by the available data. The available flow and suspended sediment data indicate that the Kills are unlikely to contribute this large an amount of sediment to Newark Bay. This implies that the contribution from other sources –including from the Passaic River– must be larger than the range considered by EPA and/or that the total amount of sediment deposited into Newark Bay is much lower than estimated.

  - Further, chemical concentrations and calculated average values that are used for mass balance calculation in the *Draft Geochemical Evaluation* are impaired by a large uncertainty that originates in sampling, analysis, and data manipulations. This uncertainty is generally recognized in the evaluation. *See Draft Geochemical Evaluation* at page 2-15 noting a duplicate precision of 30% for analytical results in core samples. However, this large uncertainty is not considered to test the robustness of the conclusions presented. The uncertainty surrounding the conclusions presented in the *Draft Geochemical Evaluation* is so great that the mass balance calculations cannot and should not be used to support any quantitative conclusions on sediment and contaminant transport.

  - The sediment load from the Passaic River was calculated based on a chemical mass balance on 2,3,7,8-TCDD and Total TCDD. Based on this approach, the sediment load was determined to be 35,600 cubic meters per year. The sediment load from the Passaic River could also have been calculated based on any other parameter other than TCDDs. To determine the accuracy of this methodology one can simply apply

the same methodology to the other contaminant data and observe if the results are similar. For example, using mercury as a parameter, the mass of sediment contributed by the Passaic River would be on the order of 150,000 cubic meters per year to satisfy the sediment mass balance; this value is not out of range for sediment contribution considering the uncertainty on the chemical and sediment data. This further illustrates the lack of robustness of the conclusions presented in the *Draft Geochemical Evaluation*.

- In the *Draft Geochemical Evaluation*, the conclusion that the largest mercury source contributing to Newark Bay is "missing" is based on the sediment load contributed from the Passaic River that was determined from a chemical mass balance based on TCDDs. If the sediment load had been determined on the basis of mercury, the conclusion would be that a sink for TCDDs is missing in Newark Bay sediments, and/or that average TCDD concentrations in sediment in the Passaic River were lower than those calculated and used in the analysis. Again, considering the uncertainty on chemical and sediment data this conclusion is not out of range. These are large inconsistencies which require further evaluation.

*****

In summary, the attribution of the residual of the sediment mass to Kill Van Kull and the Arthur Kill by simple addition to 100 percent of the estimated sediment load produces a result that is highly uncertain and that contradicts the available data for Arthur Kill. In the *Draft Geochemical Evaluation*, the difference between the estimated annual sediment loading to Newark Bay and the total annual sediment loads from upland sources is assumed to equal the marine sediment loading via the Kill Van Kull and the Arthur Kill. This procedure basically accumulates all of the uncertainty from each estimate into the uncertainty of difference. The uncertainty in the annual sediment accumulation in Newark Bay, together with the uncertainty in the estimates of sediment loads from upland sources – including the Passaic River – and the Hackensack River and sewer overflows, are simply too large to use this methodology to estimate a meaningful sediment mass balance.

The ultimate result of the calculation (inferred marine sediment loading) could range from virtually nothing to a significantly higher amount. Were the mass balance approach used conversely – i.e., by taking the total sediment deposited in Newark Bay assumed by Lowe, minus the amount contributed by the Kills estimated by sediment concentration and flow, transferring all of the uncertainly to the upper rivers – the sediment contribution of the upper rivers would be much greater than is assumed in the *Draft Geochemical Evaluation*. Clearly, the quantifying of sediment fate and transport and the origin of contamination in Newark Bay calls for a more exacting approach. This approach should: a) be anchored in the data; b) consider

uncertainties; and c) be based on sediment deposition rates and sediment transport modeling. Analyzing the sediment transport potential of each individual river is more scientifically sound for estimating realistic potential sediment contributions.

In order to fully understand the contribution of sediments and contaminants to the Newark Bay and the cause of any natural resource injuries, it is important that the Trustees undertake rigorous studies of sediment flow and contaminant transport. We are continuing to evaluate the specific studies that would be recommended and will submit further proposals as they are developed. In the meantime, we would appreciate and are look forward to discussing our concerns with you.

Sincerely,

S.S. PAPADOPULOS & ASSOCIATES, INC.

Steven P. Larson
Executive Vice President

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March 6, 2008

Jane C. Luxton, General Counsel
National Oceanic and Atmospheric Administration
United States Department of Commerce
NOAA Office of the General Counsel
Herbert C. Hoover Building
14th and Constitution Ave. NW
Washington, DC. 20230

Re: Diamond Alkali Superfund Site
Natural Resource Damage Assessment
Notice of Intent to Perform a Natural Resource Damage Assessment

Response by Tierra Solutions, Inc. and Maxus Energy Corporation to the Office of General Counsel's Letter dated January 25, 2008

Dear Ms. Luxton:

On February 4, 2008, Maxus Energy Corporation ("Maxus") and its affiliate, Tierra Solutions, Inc. ("Tierra"), each received a copy of the attached letter from your office, dated January 25, 2008 ("January Letter"). The January Letter enclosed a copy of Captain Ken Barton's letter of August 2, 2007 ("August Letter"), which provided notice that the National Oceanic and Atmospheric Administration and the U.S. Department of the Interior ("Federal Trustees") had made a determination to perform a natural resource damage assessment for the Diamond Alkali Superfund Site. Maxus and Tierra have previously responded to the August Letter as part of collective responses made by the Lower Passaic River Study Area Cooperating Parties Group ("CPG"), through the CPG's Coordinating Counsel, William Hyatt. In addition, on January 15, 2008, Tierra, Maxus and Occidental Chemical Corporation submitted comments to the November 2007 Public Review Draft of the Federal Trustees' Natural Resource Damage Assessment Plan for the Diamond Alkali Superfund Site.

I write merely to clarify that Maxus's and Tierra's responses to the Federal Trustees (individually or as part of the CPG), as well as any participation by them in the NRD Assessment process, should not be construed as conceding that Maxus or Tierra qualify as potentially responsible parties ("PRPs") for natural resource damages. Rather, Maxus has responded in compliance with private, contractual indemnity obligations that Maxus owes to another party, and Tierra is responding because it separately contracted

with Maxus to perform those indemnity obligations. It is in those capacities (i.e., on behalf of the indemnified party) that Maxus and Tierra have been participating in the CPG and will to continue to be as responsive as possible to the Federal Trustees' assessment process.

Very truly yours,

Sara Galley
Counsel, Maxus Energy Corporation

Vinson&Elkins

Carol E. Dinkins cdinkins@velaw.com
Tel 713.758.2528 **Fax** 713.615.5311

January 15, 2008

Mr. Mark Barash
U.S. Department of Interior
Suite 612
One Gateway Center
Newton, Massachusetts 02458-2802

Re: Diamond Alkali Superfund Site
Natural Resource Damage Assessment Plan; Public Review Draft (November 2007)
Prepared By The Federal Natural Resource Trustees

Dear Mr. Barash:

Tierra Solutions, Inc. ("Tierra"), for itself and on behalf of Maxus Energy Corporation and Occidental Chemical Corporation ("OCC," as successor to Diamond Shamrock Chemicals Company [f/k/a Diamond Alkali Company]), presents the attached comments on the Federal Natural Resource Trustees' Natural Resource Damage Assessment (NRDA) Plan for the Diamond Alkali Superfund Site; Public Review Draft (November 2007) (the "Plan"). While this document provides numerous detailed comments, the following list provides a general overview:

Trustee Participation: The absence of the New Jersey Department of Environmental Protection as a participant in its role as the State's natural resource trustee presents a significant risk that unnecessary costs will be incurred through duplicative and uncoordinated efforts.

Cost Effectiveness: The Plan lacks sufficient detail to allow an evaluation of whether or not the proposed assessment would be cost-effective.

Coordination With Other Investigations: The Plan lacks sufficient detail to determine the degree to which the damage assessment process will be coordinated with the ongoing interagency Passaic River Restoration Project and the related Remedial Investigation/Feasibility Study (RI/FS) activities both in the Lower Passaic River and Newark Bay Complex.

Secondary Data analysis: The Plan does not incorporate analysis/findings set forth in the large body of available, relevant reports and recognized in peer-reviewed

publications dealing with natural resources and natural resource services in the Newark Bay Complex (Site). In the Uniform Federal Policy on Quality Assurance Project Plans, the importance of the review and analysis of Secondary Data is clearly established.

Baseline: The Plan does not specify a method for determining baseline conditions, which is an essential element of an NRD assessment, particularly in the context of an area in which the habitat and natural resources have been significantly degraded beginning in the 1800s.

Multi-Chemical Influence: The Plan provides for assessment of only a small number of chemical contaminants, ignoring many chemicals present in the Site at elevated levels that may present a risk to, or have damaged, the natural resources.

Multi-Party Responsibility: the Plan contains a section entitled "Sources of Contamination" but includes a description of only one source—the Diamond Alkali Plant—despite acknowledging that there are at least 120 contaminant point sources in the lower Passaic River portion of the Site alone. This focus on a single source is both technically and legally insupportable.

Cause of Injury: The Plan must meaningfully discuss how the Trustees intend to evaluate the causal connection between particular releases and particular injuries—a necessary element of NRDA under relevant regulations—in the context of a Site involving large numbers of environmental stressors, extensive historic impairment of habitat, and the many different chemical substances present at the Site.

Inadequate detail on methods: The Plan provides insufficient detail regarding injury and damage assessment methods.

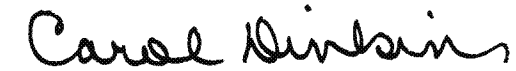
In addition to these overarching comments, this document offers additional observations and suggestions related to specific items contained in the Plan.

Most importantly, we believe that given the many areas in which the Plan is inadequate on legal and technical grounds, an assessment conducted pursuant to this plan would not qualify for the rebuttable presumption under section 107(f)(2)(C) of CERCLA. Moreover, and perhaps more importantly, unless the Trustees address the Plan's failure to specify a method for addressing the critical issues of baseline and causation, and its arbitrary decision to focus on particular substances and limited areas of the Site while excluding assessment of others, the assessment, from its inception, is incapable of accurately assessing

natural resource damages, if any, at the Site, which will in turn make it impossible to accurately identify the particular entities that may have been responsible for such damages. Therefore, we strongly recommend that the assessment not move forward until these technical and legal issues in the Plan are corrected, and the corrected Plan re-issued for further comments.

Tierra notes that it strongly supports the Trustees' intent for parties to participate in cooperative assessment activities, hopes that a cooperative process will assist in correcting these and other problems with the Plan before any assessment activities begin, and is committed to work cooperatively with the Trustees to accomplish these goals.

Very truly yours,



Carol E. Dinkins

Attachment

Comments on November 2007 Public Review Draft, Diamond Alkali Superfund Site Natural Resource Damage Assessment Plan prepared by the Federal Natural Resource Trustees: National Oceanic and Atmospheric Administration, U.S. Department of Commerce; and Fish and Wildlife Service, U.S. Department of the Interior

OVERVIEW

As required by the Comprehensive Environmental Response Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9601 et seq., the Federal Natural Resource Trustees' Draft Natural Resource Damage Assessment (NRDA) Plan for the Diamond Alkali Superfund Site (the "Plan") invites cooperative assessment participation by potentially responsible parties ("PRPs") (see page 43) and also requests involvement of the public, especially regarding restoration planning. Furthermore, the Plan specifically declares the Trustees' intent to maintain a focus on restoration throughout the assessment process and indicates that this emphasis may provide an opportunity to develop and implement early/interim restoration projects within the Site if desired or appropriate. Tierra agrees that the Plan should focus on cooperation and restoration-based solutions. While these are laudable goals, this Plan as it is currently written cannot achieve them unless the legal and technical deficiencies are addressed and a revised Plan reissued for public review and comment before assessment activities begin. Tierra strongly supports the Trustees' intent for parties to participate in cooperative assessment activities, hopes that a cooperative process will assist in correcting these and other problems with the Plan before any assessment activities begin, and is willing to work cooperatively with the Trustees to accomplish these goals.

GENERAL COMMENTS

1. The lack of participation by New Jersey State Trustees is inappropriate.

The lack of formal participation by the State of New Jersey's Natural Resource Trustee, the New Jersey Department of Environmental Protection ("NJDEP"), is a troubling and complicating circumstance. The Plan references the State's "complementary authority" with regard to NRDA, but does not explain how the relationship between the Federal and State Trustees will function going forward, or how the Trustees will ensure coordination of activities and avoid duplication of assessment costs.[1]

[1] CERCLA prohibits double recovery of NRDA costs: "There shall be no double recovery under this chapter for natural resource damages, including the costs of damage assessment or restoration, rehabilitation, or acquisition for the same release and natural resource" 42 U.S.C. 9607(f)(1) (emphasis added). Furthermore, the NRDA regulations specifically prohibit double recovery of NRDA costs. "There shall be no double recovery under this rule for damages or for assessment costs, that is, damages or assessment costs may be recovered only once, for the same discharge or release and natural resource, as set forth in section 107(f)(1) of CERCLA" 43 CFR § 11.15(d).

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The Plan's failure to account for the non-participation of the State Trustee is inconsistent with the NRD regulations (see 43 C.F.R. § 11.32(a)), which mandate cooperation, or at least coordination, between the State and Federal Trustees in NRD assessment activities. These regulations set forth a number of requirements that the Trustees must "fulfill . . . before developing an Assessment Plan." One of these is "Coordination."[2] Although the regulations provide some authority allowing various Natural Resource Trustees to act independently, that authority is limited to cases where there is "a reasonable basis for dividing the assessment," which is a prerequisite for a Natural Resource Trustee to "act independently and pursue separate assessments, actions, or claims." Even then (1) the claims shall "not overlap," and (2) "the Natural Resource Trustees shall coordinate their efforts, particularly those concerning the sharing of data and the development of the Assessment Plans" (see 43 CFR § 11.32(a)(1)(iii)). The Plan does not articulate a reasonable basis for dividing the assessment, nor does it describe how the Federal Trustees will avoid duplicative efforts or share data. Because the coordination requirement is expressly made a precondition to development of the Assessment Plan, failure to adhere to this requirement will disqualify any assessment performed under that plan from the rebuttable presumption contained in section 107(f)(2)(C) of CERCLA.

Whatever the reason for the State's lack of participation, the Plan clearly identifies and proposes to analyze specific resources (e.g., groundwater and submerged tidelands)[3] that are under the sole or co-trusteeship of the State. Yet, the plan is silent on how the Federal Trustees plan to coordinate their efforts with those of the State Trustee. As such, the proposed Plan is flawed by failing to address how the assessment process can be reasonable, cost-effective and avoid duplication when, from all appearances, injury and damage analyses are being conducted independently and redundantly by both the Federal and State Trustees. Overall, it is unclear how a cooperative assessment can proceed for the Site without the full and integrated cooperation of all Trustees.[4]

This problem is particularly important to Tierra, which currently is a named defendant in a lawsuit in which the State—while explicitly disavowing any claim to recover natural

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2 "Authorized officials from different agencies or Indian tribes are encouraged to cooperate and to coordinate any assessments that involve coexisting or contiguous natural resources or concurrent jurisdiction. They may arrange to divide responsibility for implementing assessment in any manner that is agreed to by all the affected natural resource trustees…" 43 CFR § 11.32(a)(ii).

3 Other State resource status issues (i.e., waterbody beneficial use impairments under the Clean Water Act) also appear to be inadequately addressed in this Plan and this may be at least partially due to the lack of State presence in this Plan process.

4 The absence of the State Trustee, which shares a primary role as sole or co-trustee to many natural resources at the Site, places PRPs in a situation that is ripe for litigation and renders the process replete with duplication, contrary to 40 C.F.R. § 11.16(d). Furthermore, the absence of an essential Trustee potentially deprives all interested parties of information concerning the natural resources under State control or co-trusteeship and any damages to them. Such deprivation undoubtedly and unnecessarily will escalate costs and the time it will take to perform the assessment, which is in direct contravention of the reasonableness requirements in 43 C.F.R. § 11.13(c) and § 11.30.

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resource damages—is attempting to recover NRD assessment costs for the same Site.[5] Nor is the potential for impermissible duplication limited to assessment costs alone. The lack of coordination—and the concomitant potential for double recovery—is equally apparent with respect to alleged damages, including (without limitation) those regarding navigation, dredging and dredge disposal costs. On the one hand, the State treats the alleged "impact" of hazardous substances on "navigation, dredging, and disposal" as "economic injuries to the State and the Newark Bay Complex," for which the State seeks monetary compensation, and which the State believes are distinct from any injuries to "the ecosystem and natural resources of the Newark Bay Complex."[6] The Federal Trustees obviously take a different view of the matter. The Plan announces that the Federal Trustees regard "lost navigational services"—including any "reduced ability to maintain authorized federal shipping channels" and "increased dredging costs associated with problems with disposal"—as "compensable damages under NRDA laws and regulations," which the Federal Trustees clearly intend to pursue under the NRD rubric (see pages 78-79 of the Plan).

The Plan does not explain how the two positions can be harmonized. The Plan provides no support for the proposition that "lost navigational services" are "compensable damages under NRD laws and regulations." Nor does it clarify how the Federal Trustees propose to assess, as natural resource damages, alleged injuries or losses that the State of New Jersey, a purported co-trustee, apparently believes are purely economic and altogether outside the scope of NRD.[7]

The proposed Plan also contains no mention of the 2003 Memorandum of Agreement among the State of New Jersey, Department of Environmental Protection, Office of Natural Resource Restoration, National Oceanic and Atmospheric Administration, and the United States Fish and Wildlife Service. That Agreement was enacted to "ensure the coordination and cooperation of the Trustees in addressing their respective natural resource damage and restoration concerns and responsibilities arising from the release of hazardous substances at and from the Diamond Alkali Superfund Site and Environs." A copy of the Memorandum of Agreement is attached hereto and incorporated herein as

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[5] *See* First Amended Complaint *NJDEP, et al. v. Occidental Chemical Corp.*, et al., Civ. No. ESX-L-9868-05 (N.J. Super. Ct.), (Exhibit 1 hereto), ¶ 6 (in which the State disavows any "claim for natural resource damages, including the loss of use of the State's natural resources"); *but see State's Brief in Support of Motion for Leave to File Second Amended Complaint* (August 6, 2007) (Exhibit 2) at 4 (in which the State clarifies that, while it is "not asserting claims for NRD at this time, and seeks to reserve those claims for a later date in subsequent litigation," the State **is** seeking to recover in the lawsuit "the cost of **assessing** the . . . injuries to the natural resources of New Jersey . . . .") (emphasis added).

[6] First Amended Complaint (Exhibit 1), ¶ 4.

[7] Tierra notes further that any determination of the baseline condition of the "navigational services provided by the Site" must acknowledge the historical fact that significant channel-maintenance dredging of virtually the entire length of the Passaic River halted as early as the 1940s—long before discovery of contamination at levels that might impact dredging or disposal costs, and for economic reasons that had nothing to do with the presence of any contamination.

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Exhibit 3. To our knowledge, this agreement is still in effect. However, it is unclear, based on the statements set forth in the Plan, whether it is being observed by the signatories thereto. The dual track assessment activities contravene the expressed intent of this Memorandum of Agreement.

2. The Plan fails to establish reasonableness and likely cost-effectiveness of assessment.

Federal regulations require that natural resource damage assessment ("NRDA") plans

> *"be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost." 43 C.F.R. § 11.31(a)(2).*

Under the relevant regulations, the Assessment Plan must be sufficiently detailed to allow an evaluation of whether the costs of the assessment are likely to exceed the natural resource damages being studied—an important point given the apparent breadth of the Plan—and to allow comparison among various assessment activities that might obtain the same information or data at lower cost (see 43 C.F.R. § 11.14 regarding definitions of "cost-effective" and "reasonable cost"). This detail must be added to the Plan to comply with the NRD regulations.

The Plan presented by the Federal Trustees, which proposes the subject *Type B* assessment for the Diamond Alkali Superfund Site, fails to meet this pivotal, threshold requirement. Although limited portions of the Plan contain detail sufficient to provide relevant analytical and technical comment, overall the Plan lacks the specificity needed for meaningful evaluation of whether the Plan is reasonable and cost effective.

3. The Plan fails to contain sufficient information to demonstrate that it will be coordinated to the extent possible with the ongoing interagency Lower Passaic River Restoration Project and the related RI/FS in the Lower Passaic River and Newark Bay Complex.

The federal NRD regulations, specifically 43 CFR § 11.31(a)(3), provide that

> *"The Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation, feasibility study or other investigation performed pursuant to the NCP" [i.e., CERCLA activities].*

The Plan must provide detailed discussion of how this coordination will be accomplished to comply with this mandatory requirement for NRD Assessment Plans. As is, the Plan merely notes in passing the existence of ongoing CERCLA actions at the Site (see pages 42-43 of the Plan). For example, the Plan states that restoration options are "being coordinated with USEPA remedial actions" and further provides that the "Federal Trustees *may use* information obtained through remedial and WRDA restoration studies

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where suitable to assess injuries to natural resources within the Site." The Plan should articulate with specificity how such coordination will occur, where in the ongoing remedial investigation the Trustees will insert themselves, and how the Trustees plan to utilize information obtained to plan and consider future restoration activities. This is necessary for the Plan to be "sufficient" to "demonstrate" the necessary coordination, particularly at a Site as complex as this one. The Trustees should take steps to assure the required coordination, and should revise the Plan to address and describe such coordination as required; failure to do so will disqualify any assessment performed under the current version of the Plan from the rebuttable presumption under CERCLA and may render assessment costs unrecoverable.

4. The Plan fails to acknowledge and incorporate relevant peer reviewed assessments and related data and information.

Among the specifications for properly prepared damage assessment plans is a requirement under 43 CFR § 11.31(a)(3) that

> *"The Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation, feasibility study or other investigation performed pursuant to the NCP."*

Investigation activities in the lower Passaic River, other areas of the watershed and the Newark Bay Estuary have been conducted intensively for years, resulting in many reports and peer-reviewed publications. These existing reports and publications provide a wealth of detail regarding natural resources and natural resource services, baseline conditions, effects of chemical releases, and scope and opportunities for environmental restoration. Information contained in those reports and publications has been presented to the Natural Resource Trustees and USEPA in briefing and discussion forums in New Jersey over several years. Much of that accumulated body of knowledge regarding the Site has been ignored in the Plan. The Plan must address and incorporate this vast body of knowledge as mandated by 43 C.F.R. § 11.15(a)(3), which provides that "the natural resource trustee who has performed an assessment in accordance with this rule may recover…the reasonable and necessary costs of the assessment." Under the current circumstances, the application of that rule should be expected to preclude recovery by the Trustees of costs associated with duplicative studies that are unnecessary in this instance.[8]

The Plan identifies and references many site-specific chemistry data sources, including some documents/databases compiled by Tierra, and utilizes a number of toxicological and ecological references that are either unrelated to, or only marginally related to the Site. However, the Plan neither identifies, nor makes use of, many of the substantial number of relevant (and readily available) peer-reviewed toxicological, ecological,

[8] *See also* 43 C.F.R. § 11.63(a)(3), "To the extent the information needed to make this determination [injury pathway determination] *is not available*, tests shall be conducted and necessary data collected to meet the requirements of this section" (emphasis added).

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human health and related assessment publications that exist in the scientific literature and are specifically related to the Site. A select list of these references is provided as Attachment 1 to these comments. Additional publications, reports and studies for the Site were cataloged in Volume 1 of the *Newark Bay Study Area Remedial Investigation Work Plan, Sediment Sampling and Source Identification Program, Newark Bay, New Jersey* entitled *Inventory and Overview Report of Historical Data* that was prepared by Tierra and approved by USEPA in 2004. Collectively, these peer-reviewed publications and other reports/datasets contain the majority of the data and information that have been collected to date on the environmental conditions that exist in this system and must, under the regulations, be considered.[9]

The Plan identifies the Urban Rivers Restoration Initiative ("URRI"; see page 37 of the Plan) and even commits to "maximize the use of Lower Passaic River Restoration Project ("LPRRP") data and information" (page 47 of Plan) but no detail is provided on how this will be accomplished. Given the Plan's lack of inclusion of the key published studies that have been conducted at the Site to date, it is not at all clear that, without more of a focus on this critical issue in the Plan, the assessment process will maximize the use of pre-existing site-specific data and information. At the very least, the Plan should acknowledge that such studies are relevant to the injury analyses it proposes. Furthermore, the Plan should commit to reducing unnecessary costs and avoid duplication of efforts by using available data in every possible instance.

5. The Plan does not contain a baseline conditions assessment.

The Plan must explain how baseline conditions will be established; this is an essential component of an NRD assessment under the law that currently is not fulfilled in the Plan. The NRD regulations, at 43 C.F.R. § 11.72, detail the requirements for conducting a baseline services determination, none of which are discussed in any detail or specificity in the Plan, especially regarding the use of historical data (43 C.F.R. § 11.72(c)) establishment of control areas, if applicable (43 C.F.R. § 11.72(d)) and determining baseline services generally (43 C.F.R. § 11.72(e)-(k)). Absent the Plan addressing this critical issue, it is demonstrably inadequate under the regulations, as it is impossible to evaluate the "reasonable cost" of the proposed assessment—a regulatory requirement for an Assessment Plan (*see* 43 C.F.R. § 11.31(a)(2))—without some meaningful consideration of the baseline issue. Baseline is a key element of the Quantification phase of the assessment, which must be considered in assessing "reasonable cost" (43 C.F.R. § 11.14(*et seq.*)). Any NRDA that fails to set forth complete baseline conditions will be fundamentally flawed and rendered incapable of supporting the rebuttable presumption.

The Site has a well-documented long history of environmental damage and resource degradation which makes establishing the correct baseline one of the most important tasks in this assessment process. More than two centuries of habitat destruction through draining, filling, and bulkheading must be evaluated, as natural resources were destroyed

[9] 43 C.F.R. § 11.13(c) provides that "The purpose of the Assessment Plan is to ensure the assessment is performed in a planned and systematic manner…and…at a reasonable cost." Failing to use peer-reviewed publications in completing this assessment will undoubtedly result in increased costs and inefficiencies.

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by such activities well before much of the chemical input to the Site. Although the Plan makes isolated historical references to the compromised environmental conditions of the Site, there is no explicit statement regarding the importance of such information in establishing "baseline" conditions, nor is there any description regarding the Trustees' use of such information in the damage assessment process. This is a fundamental flaw in the Plan as proposed, notwithstanding extensive contamination of the Site dating back to the 1700s and early 1800s.

The book entitled *A Common Tragedy: History of an Urban River* by Iannuzzi et al. (2002) is not cited anywhere in this Plan, despite the fact that it systematically identifies, characterizes and thoroughly documents (including with myriad contemporaneous materials) historical environmental baseline conditions for the Site. Indeed, broadly-published sources have long acknowledged the deplorable baseline environmental condition of the Site. As early as September 24, 1895, the New York Times reported that, "from Paterson down to the point of discharge in Newark Bay, the [Passaic] [R]iver is little better than a large open sewer. Passaic, Rutherford, Belleville, Kearny, East Newark, or Harrison; Newark, and the Oranges, one and all discharge their sewage direct into the river, which nowhere is much more than a quarter mile in width."[10] The NRDA for this Site must emphasize the quantification of baseline conditions as part of the assessment process;[11] only then can incremental injuries and damages be properly quantified.

Indeed, in Chapter 4, page 57, second full paragraph, the Plan refers to possible studies "...to assess community composition, species abundance, distribution patterns, or other community metrics. As part of such studies, the Trustees would identify and characterize appropriate reference areas to understand the likely baseline condition." This is a necessary and required assessment under 43 CFR Part 11 (for example, at 43 CFR § 11.71 which specifies evaluation relative to baseline). Yet, the Plan only specifies this kind of assessment for fish and shellfish. For other important natural resources—birds and mammals—the Plan provides only for evaluation of chemical exposure thresholds, and does not propose community structure analyses or assessment of baseline impairments. Given that such analyses have been conducted, reported, and published in the peer-reviewed scientific literature, and that those reports and publications are readily available to the author(s) of this Plan, the Plan's failure to cite those reports and publications, and to build the planned assessment activities on that existing and readily available information base, is insupportable and must be corrected.

Furthermore, the Trustees have not adequately identified certain critical considerations with regard to the status of water quality and biological conditions in the Passaic River/Newark Bay system. Specifically, the Trustees have not acknowledged the relevance and importance of water quality standards and waterbody impairment status

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[10] *The Foul Passaic River*, N.Y. Times (9/24/1895).

[11] This is also required by the NRD Regulations: "Baseline data should be as accurate, precise, complete, and representative of the resources as the data used or obtained in 11.71 of this part"[Quantification phase – service reduction quantification] 43 CFR § 11.72(a)(3).

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under the Clean Water Act. The State of New Jersey (and USEPA) includes the lower Passaic River on its 303(d) list for multiple contaminants, contaminant categories (e.g., "petroleum hydrocarbons") and biological impairment ranging from moderate to severe. While some of the parameters identified by the Trustees in the Plan are responsible for some portion of these impairment listings, additional parameters should be addressed for baseline considerations as well as specific injury determinations within the Plan. The Trustees include a specific reference in the Plan to "designated waterbody uses" (pages 68-69 of the Plan) but fail to clarify their anticipated use of this information in informing baseline decision-making or for identifying parameters of interest.

6. The Plan contains an inadequate and incomplete assessment of chemical contaminants.

It is clearly recognized in the Plan (see page 10 of the Plan) that a large number of hazardous substances exist in the Site, including "in addition to dioxins and PCBs…semivolatile organic compounds, herbicides, insecticides, polycyclic aromatic hydrocarbons (PAHs), and metals." The existence of these contaminants throughout the Site has been well documented by a number of entities in both CERCLA- and non-CERCLA-related studies. Despite this recognition, this Plan identifies (as listed in Exhibit 2-10 on page 34) only a limited group of contaminants as the focus of the NRDA. No basis is provided in the Plan for the small number of contaminants being investigated, which is inconsistent with NRD regulations at 43 CFR Part 11.[12] The NRDA should evaluate the incremental injuries and damages from all known chemical contaminants that exist in the system at elevated levels. At a minimum, this would include a substantially larger list of metals/inorganics, PAHs, petroleum hydrocarbons and various volatile and semivolatile compounds. There is a significant body of existing information, much of it available through USEPA Region II, demonstrating that a substantially greater list of contaminants should be included for evaluations.

In addition, the entire Plan places inordinate focus on dioxins and dioxin-like toxic effects, relative to other contaminants. Even the limited number of other chemicals that are addressed in this Plan are not given the same level of attention as are dioxins in terms of presenting source information, site-specific data summaries, toxicity data, etc. Given that this Site is contaminated with a wide range of substances that have originated from a large number of sources for more than 200 years, both within and outside of the Site, the focus of this Plan should be redirected to presenting consistent levels of data and information on all known contaminants/contaminant classes, for the various natural resources that are being investigated under the proposed NRDA.

[12] Specifically, this omission violates 43 CFR § 11.31(a)(3) which states: "The Assessment Plan shall contain information sufficient to demonstrate that the damage assessment has been coordinated to the extent possible with any remedial investigation/feasibility study or other investigation performed pursuant to the NCP."

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7. The Plan contains an incomplete characterization and assessment of the myriad sources of chemical contaminants to the Site

While it is recognized in the Plan (see page 34) that "hazardous substances in the Site likely originate from numerous sources, both direct (point sources) and non-direct (non-point sources)", this Plan does not contain even a cursory characterization of these myriad sources, nor a program for conducting a systematic injury assessment for the many chemical contaminants that originated from these sources. In fact, pages 34 and 35 of the Plan which contain the section entitled "Sources of Contamination" include a description of only one source—the Diamond Alkali Plant—despite acknowledging that there are at least 120 contaminant point sources in the lower Passaic River portion of the Site alone. This focus on a single source is both technically and legally insupportable.

The absence of even a cursory inventory of the types and numbers of contaminant sources from the other waterways of the Site (besides the Passaic River) is puzzling and insupportable. Limitation of the of the acknowledged sources of contamination (page 34 of the Plan) to a limited group of possible PRP sources in the "Lower Passaic River watershed" (see page 35 of the Plan) displays a fundamentally flawed perception of the historic reality, and indeed with the stated geographical scope of the assessment envisioned by the Plan. Over the course of time—dating virtually to the founding of the country and evolution of the Site as the veritable cradle of the Industrial Revolution—there have been literally thousands of contaminant sources located along or proximate to the Newark Bay Complex, including its other direct tributaries (the Hackensack River, Passaic River, Arthur Kill and Kill Van Kull) and the tributaries of those tributaries.

Furthermore, even though the Plan tacitly acknowledges discharges from "public utilities" (page 34), not a single public utility or municipality is included as a noticed party to this Plan. Since their earliest settlement, through at least the early 1900s, the municipalities and industries along and proximate to the Site discharged their untreated wastewater directly into the surface waters of the Site. Many municipalities within the Site continued to discharge untreated wastewater into the Site through at least the 1950s. Furthermore, to this day, untreated wastewater continues to discharge into the Site from municipal and regional sewer systems as a result of systemic design flaws and improper maintenance.

Tierra understands that not every recipient of a general notice letter ("GNL") from USEPA has been included as a noticed party to this Plan. In addition, there exist many other PRPs, to which the USEPA is considering issuing GNLs, not to mention scores (if not hundreds) more public and private entities that are known to have discharged hazardous substances into the Site but have so far escaped regulatory focus. All these other parties should be included in the "cooperative approach" and the Plan re-noticed accordingly. Failure to include these public and private entities represents a data gap and unreasonably omits significant PRPs from the NRDA process in direct contravention of 43 C.F.R. § 11.32(a)(2).[13]

[13] 43 C.F.R. § 11.32(a)(2)(i) provides that the Trustees should make "reasonable efforts to identify potentially responsible parties." § 11.32(a)(2)(ii) provides that "In the event the number of potentially

8. The Plan does not discuss how the assessment intends to establish causation.

The NRD regulations make it clear that one of the principal tasks that must be performed in an NRD assessment is determining whether releases of particular hazardous substances were, in fact, the cause of the injuries being assessed. For example, the Type B procedures should be applied only to "injuries resulting from the . . . release of a hazardous substance" 43 C.F.R. § 11.61(b) (emphasis added). The Plan contains no discussion of how the Trustees intend to pursue such an assessment, and much in the Plan suggests that the proposed assessment will be inadequate to do so. For example, it would be necessary, at a minimum, for the assessment to comprehensively examine the hazardous substances that have been released into the Site, not just a limited subset of those substances as the Plan proposes, to determine whether particular injuries were caused by release(s) of any particular hazardous substance(s). Without such an analysis, the assessment would be inadequate to establish the existence of any compensable natural resource damages.

9. The assessment/presentation of dioxin/furan toxicology and Toxic Equivalency Factors ("TEFs") contains inaccuracies.

The Plan contains broad statements regarding adverse health effects reported for TCDD without discussing the uncertainties or controversies associated with the toxicity of this class of compounds to humans, but it does not support such statements with any references. Similarly, discussions and statements made regarding the ecological effects of TCDD on various receptor groups (invertebrates, fish, shellfish and birds) are based on a limited set of publications addressing studies primarily of freshwater sites, the application of which are highly uncertain in the context of this estuarine Site.

The Plan briefly discusses the toxic equivalency factor (TEF) approach to quantifying mixtures of dioxins and dioxin-like compounds and includes an entire page (page 26 of the Plan) consisting of a summary TEF table listing the consensus-based avian, fish and mammalian World Health Organization (WHO) TEFs for 29 dioxin, furan and dioxin-like PCB congeners. However, there is no discussion of TEF applications to the levels of dioxins and dioxin-like compounds that have been measured in sediment samples from the Site. Further, the Plan does not contain any discussion of the various well-known uncertainties and shortcomings associated with specific TEFs, or the TEF approach in general.

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responsible parties is large or if some of the potentially responsible parties cannot be located, the authorized official may proceed against any one or more of the parties identified. The authorized official should use reasonable efforts to proceed against most known potentially responsible parties or at least against all those potentially responsible parties responsible for significant portions of the potential injury."

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10. The Plan lacks sufficient detail with respect to injury and damage assessment methods.

The NRDA regulations specifically address the level of technical detail to be included in an NRDA Plan. The regulations state that

> *"The Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost... The Assessment Plan shall include descriptions of the natural resources and geographical areas involved...In addition, for Type B assessments, the Assessment Plan shall include the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies" 43 CFR § 11.31(a)(2).*

The specification at 43 CFR § 11.31(a)(2) requiring the Assessment Plan to provide sufficient detail to support evaluation of the likely cost-effectiveness of the assessment is a key component. Trustees are entitled to recover on behalf of the public, the amount of damages to natural resources so long as the cost of the assessment process does not exceed the amount of damages to the resources. To make this judgment, it is imperative that the Assessment Plan provide sufficient detail to demonstrate the likelihood that damages attributable to the specific hazardous substances at issue in the assessment can be discerned, quantified, and recovered relative to baseline.

While, as our comments elsewhere demonstrate, the Plan is insufficient in that it mentions baseline only as a general issue for shellfish and fish injury assessment, it also is notably insufficient by failing even to recognize baseline conditions for other resources. In order to comply with the requirements identified in 43 CFR § 11.31(a)(2), the Plan should be revised to provide explicit details regarding assessment and quantification of baseline impairments relative to impairments associated with site-specific releases. Absent that level of detail, given the massive and pervasive baseline degradation in this intensely urbanized ecosystem (see comments elsewhere regarding detailed investigations of baseline and other impairments available in reports, publications, and in presentations given to natural resource trustees), the assessment cannot be performed cost-effectively nor can it be legally supportable.

The Plan does not provide any detail regarding "...sampling locations...sample and survey design, numbers and types of samples...analyses to be performed..." and other specifications of 43 CFR § 11.31(a)(2). Ideally, the Plan would provide this required information to allow reasoned judgments to be made regarding the proposed investigations. However, if it is decided to forego that information in the Plan, the Plan should at least specify in detail when in the process such information will be made available, what technical bases will support decisions regarding sample types, numbers, locations and analyses, and what document(s) will provide such information. In

particular, the Plan should explain that later documents providing sampling and analytical details will be made available for stakeholder and public comment.

The list of "specific [NRDA] investigations that are proposed" as bulleted on page 11 of the Executive Summary and described in Chapter 4 of this Plan is actually a simple restatement of the possible kinds of investigations listed at 43 CFR §§ 11.61, 11.62, and elsewhere. Given that detailed assessments of natural resources (invertebrate, shellfish, finfish, birds, and wildlife) have been conducted, reported, and published for CERCLA-related and other studies for this Site and region, and that those reports and publications are readily available, it is impermissible for the Plan to revert to a generic listing lifted from the regulations at 43 CFR Part 11. The information base for the Site is well advanced regarding the presence, community structure, baseline impairments, and chemical impairments of natural resources. This Plan must meet the requirements of 43 CFR § 11.31 and other regulations by coordinating with other investigations and must incorporate existing and available information so that the revised plan will be Site-specific, useful, effective, and otherwise comply with the regulations.

Furthermore, throughout its provisions concerning injury determination and quantification, the Plan frequently states that the Trustees "may" or "might" undertake a particular study, investigation, survey, or series thereof.[14] The Plan's frequent lack of specificity, and its heavy reliance on a "plan as we go" approach, is inconsistent with the requirement that the "Assessment Plan *shall* be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective." 43 C.F.R. § 11.31(a)(2). Tierra appreciates that the assessment process will be iterative, to some extent, but a plan so replete with hedges about what the assessment "may" or "might" "potentially" entail thwarts the ability to conduct the requisite, up-front evaluation regarding whether the assessment process will be both systematic and cost-effective.

11. The Site boundaries and geographic focus of the Plan are unclear.

The boundary of the Site is defined in Chapter 1 of this Plan as the lower Passaic River and the Newark Bay Study Area. However, throughout the Plan, much of the focus is on small portions of the Site (as defined), primarily the lower Passaic River, and it is unclear how the various proposed studies apply to the Site as a whole. We suggest that a clear and definitive definition of the Site be included, and that the discussions, particularly in

[14] For example (without limitation), *see* Plan at page 10, "*Potential* investigations for the damage determination phase of the NRDA for the site include the following: Recreational fishing lost use study. Avian lost use study. Habitat equivalency analysis. Lost navigational services study."; Plan at page 49, "The studies *under consideration* by Federal Trustees to evaluate injuries to fish within the Site...."; Plan at 50, "The Trustees *may* also develop additional CBRs based on available ecotoxicological literature."; Plan at 57, "...the Trustees *may* evaluate fish and shellfish health.... The Trustees *may* also evaluate the overall status of the fish and shellfish communities....; The Trustees *may* supplement these assessments of the impact of Site contaminants on fish and shellfish community health with a literature review. ... the Trustees *may* conduct studies on the effects...; Plan at 59, "The studies the Federal Trustees *are considering* to determine potential injuries to birds...the Federal Trustees *may* evaluate concentrations of hazardous substances in tissues of waterfowl..."

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Chapter 4 (Assessment and Restoration), describe how they will be conducted on a Site-wide basis. Moreover, the current Lower Passaic River-centric approach in the Plan is likely to result in a biased assessment that disproportionately attributes natural resource damages to releases into the Lower Passaic River instead of objectively evaluating all of the releases of hazardous substances into other portions of the Site.

12. The Plan's statements regarding the fish consumption advisories are contradictory and inaccurate.

The multiple statements in the Plan regarding fish consumption advisories and bans are contradictory and, in many instances, inaccurate. From the Executive Summary onward, multiple statements suggest that fish and seafood consumption advisories by the State of New Jersey were triggered by the detection of PCBs and dioxin. *See* page 8 (the detection of dioxin and PCBs adjacent to the Diamond Alkali Company plant "led to the institution of fish and seafood consumption advisories by the State of New Jersey . . . "); page 29 ("high concentrations of dioxins and PCBs within the Site led" to a fish consumption ban in 1983); page 49 ("[a] 'do not eat' prohibition for all fish and shellfish species has been in place for the lower Passaic River since 1982 due to dioxin and PCB contamination."). In fact, the first fish consumption advisory was issued by the State of New Jersey in 1982 as a result of the detection of PCBs, before dioxin was even detected at the Site.

In December 1982, the NJDEP banned the sale of American eels and striped bass taken from, among other places, Newark Bay, the Lower Passaic River, the Lower Hackensack River, the Arthur Kill and the Kill Van Kull as a result of PCB contamination. At the same time, the NJDEP issued a fish-consumption advisory for other types of fish taken from these waters due to PCB contamination. The 1982 fishing bans and advisories remain in effect today. NJAC 7:25-18A. NJDEP did not issue a fish advisory related to dioxin until 1983. NJDEP Administrative Order No. EO-40-17, dated 10/19/83. At page 77, the Plan correctly recognizes that the first fish consumption advisory in 1982 "was based on the presence of PCB contamination in fish" and that an advisory relating to dioxin did not issue until 1983. Finally, in concluding that the NJDEP has "identified use impairments including aquatic life support and fish consumption for the lower Passaic River and Newark Bay," the Plan inappropriately relies on *allegations* made by the NJDEP in a pending lawsuit. *See* page 68, *citing, NJDEP and the Administrator of the New Jersey Spill Compensation Fund v. Occidental Chemical Corporation, et al.* The NJDEP's allegations in that lawsuit already have been amended once, are currently subject to multiple motions to dismiss, and remain unproven.

SPECIFIC COMMENTS

Chapter 1. The Ecological, Cultural, and Economic Significance of the Site

Page 15, first paragraph:

The discussion regarding the surroundings of the Site omits landfills and other CERCLA sites.

Page 15, paragraph headed "The Natural Environment of the Site":

The effects of many sources of baseline degradation (habitat quality declines, habitat loss, impacts of physical and nonpoint-source chemical releases, sewage and combined sewer overflow [CSO] inputs and others) has been documented in many reports and publications to have enormous consequences for natural resources and natural resource services, constraining such services to very low levels. An important component of those constraints is related to loss and degradation of wetland habitats. Given all the data and information that are available, this section does not accurately represent the full extent and nature of impairments to the environment of the Site. Indeed, by citing the figure "45 acres" and acknowledging that those acres are functionally impaired (by, for example, presence of invasive clones of common reed), this introductory section of the Plan appears to acknowledge those baseline impacts. However, this section must be substantially expanded to give an accurate accounting of the myriad non-chemical service losses that have occurred for more than 200 years at this Site.

In addition, the Plan states without support that "(t)hese habitats support a variety of benthic invertebrates and aquatic, semi-aquatic, and terrestrial vertebrates including clams, mussels, turtles, fish, birds, and mammals." For example, we have seen no documentation to date of clams or mussels existing at the Site. This statement should be revised to set forth the types of organisms that have been documented to exist at the Site and provide supporting references.

Page 16, Exhibit 1-2:

The purpose of this table is unclear and given the citation to the table on page 15—"...the Site supports an array of ecological resources that interact in myriad ways (Exhibit 1-2)"—it is inaccurate. A number of the animal species listed in this table have little or no viable support habitat remaining at the Site and, thus, it clearly is inaccurate for the Plan to claim that these are resources "of" or "supported by" the Site. It also is unclear why no vegetation species are listed as "Select Natural Resources of the Site," given the critically important roles that plants play in functional ecosystems. For many of these species, a more accurate characterization relative to the Site conditions is that they are constrained by the degraded baseline conditions. The Plan should be revised to reflect this condition. This is a critically important point from the damage assessment perspective for two reasons. First,

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organisms that are not present because of baseline constraints cannot be injured by Site-related releases, and so cannot be included in estimated damages. Second, species impaired by baseline conditions may well be important as focal points for restoration. The overall scope for restoration planning encompasses natural resources regardless of the fundamental reasons for their impairment. The Plan should be revised to identify species whose populations are excluded or impaired by baseline conditions, and incorporate those species as appropriate in planning for and scaling of restoration actions.

Chapter 2. Hazardous Substances in the Site

Page 21, first paragraph, "Types and Effects of Contamination":

The last sentence discusses the "primary contaminants of concern." However, nowhere does the Plan explain the derivation of this limited list of contaminants, nor how these contaminants relate to the baseline, both temporally and in terms of environmental impacts. A substantially larger number of contaminants must be addressed under this NRDA, as discussed in General Comment 7 above. Arbitrarily limiting the list of contaminants to be addressed under the NRDA is inconsistent with guidance and scientifically lacking.

In addition, this chapter of the Plan (beginning on page 21) places a great deal of focus on dioxins and dioxin-like toxic effects. Even the limited numbers of other chemicals addressed in the current version of the Plan are not given the same level of attention as dioxins in terms of presenting toxicity data and study results/summaries from the literature, summarizing the Site-specific data on the contaminants in biota, etc. Given that this Site is known to be contaminated with a wide range of substances that originated from a large number of sources, both within and outside of the Site, the focus of the Plan should be re-directed to presenting a concise summary of all known information on the various contaminants, as well as descriptions and tabulated summaries of the toxicological effects of the various contaminants on the biological trust resources that are being investigated under this NRDA.

Page 21, second paragraph:

A statement is made that

> *"The term 'dioxin' typically refers to one of the most toxic compounds known to humans, 2,3,7,8-tetrachlorodibenzo-para-dioxin (2,3,7,8-TCDD or simply TCDD)."*

This statement of the Plan inaccurately characterizes the scientific data concerning the toxicity of this class of compounds, and it lacks supporting references. While 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) has been one of the most extensively researched environmental chemicals over the last three decades, no available human toxicological data support this statement. Recent studies of human exposure to

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TCDD have shown that even at high blood serum levels, the symptoms and effects have been limited to few clinical and biochemical effects, primarily chloracne (see Young and Regens, 2005). These findings are inconsistent with the concept set forth in the Plan that TCDD is one of the "most toxic compounds known to humans."

TCDD has been shown to induce a broad spectrum of toxicological effects in laboratory animals, though most of the effects occur at levels well above those typically encountered as a result of environmental exposures. In addition, extrapolating from data in laboratory animals to predict potential adverse health effects in humans poses many difficulties and, as a result, toxicity estimates based on such laboratory data have substantial uncertainty associated with them. In the Toxicological Profile for TCDD, the ATSDR (1998) outlined several of the critical challenges associated with using animal data to quantify dioxin health risks in people. Examples of some of the issues raised by the ATSDR (1998) include uses of dose levels that result in body burdens that are at least 10 to more than 1,000 times higher than background body burdens in humans; significant differences in species sensitivity; and shortcomings in experimental study design such as exposures to only a single dioxin-like compound when, in reality, people are exposed to mixtures of these compounds. While animal data routinely are used to predict responses in humans, it is important to recognize the uncertainties inherent in such interspecies extrapolations.

Since the mid-1980s, the USEPA has spearheaded an enormous effort to assemble a comprehensive risk assessment of dioxin and dioxin-like compounds. The fact that this assessment has undergone multiple draft revisions over the last twenty years is a clear indication of the vast amount of literature pertaining to these compounds, as well as the uncertainty, and oftentimes conflicting studies, associated with them. The most current draft of this assessment, known as the 2003 Dioxin Reassessment, recently was commented upon by a committee of the National Academy of Sciences (NAS). One of the more telling critiques made by the NAS committee regarding the 2003 report is the following statement:

> *"...the EPA Reassessment continues to rely on the approach that diverse human data collected across disparate studies of different types and inherent strengths can be interpreted with confidence without applying the more formalized tools of evidence-based medicine. Thus, the EPA Reassessment (as well as Institute of Medicine [IOM] committee report) relies largely on committee-based, consensus evaluation of the available data rather than on specifically commissioned, rigorous analyses constructed according to established criteria that both formally evaluate the strengths of the available evidence and integrate, by quantitative systematic review, the data across available studies."(NAS 2006)*

Especially relevant to the NRDA are the extreme differences in animal sensitivity that have been observed over the last four decades of dioxin research. Male Hartley guinea pigs were found to be sensitive to TCDD, with Schwetz et al. (1973) reporting 50% lethality at an acute dose (LD_{50}) of 0.0006 mg/kg. On the other end of the

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animal sensitivity spectrum, Henck et al. (1981) demonstrated that male Syrian Golden Hamsters were significantly less sensitive to the effects of TCDD, reporting an acute LD_{50} for TCDD of over 5 mg/kg, or more than 8000 fold higher than was reported for the guinea pigs. There also is significant variability among different strains of the same species of animal. Pohjanvirta et al. (1999) reported a more than 1000 fold difference in acute LD_{50} between the Han/Wistar Kuopio strain and Long Evans *Turku* AB strain of rats. And it should be noted that, although wasting syndrome is a characteristic sign common to most animals in toxicology studies of TCDD, the symptoms of toxicity can vary among animals, with atrophy of the thymus and lymphatic tissue apparently the most sensitive toxicity marker in guinea pigs, and the liver being the primary organ affected in rodents and rabbits (USEPA, 2003a). Overall, these examples highlight the considerable variability associated with TCDD exposure and biological effects in animals, as well as the uncertainties associated with human health and wildlife risk assessment. Tierra recommends that the Trustees incorporate language into the Plan that reflect these uncertainties, as well as include supporting references. Additionally, the Plan should describe how they plan to address species differences in the toxicity associated with PCDD/Fs.

Page 21, second paragraph:

A statement is made that

> *"However, dioxins exist in a variety of forms, or isomers, which along with other 'dioxin-like' compounds share many or all of the toxic characteristics of TCDD via a common receptor-mediated mechanism of action."*

This statement regarding the basic chemical and toxicological concepts of dioxins and dioxin-like compounds is not accurate for several reasons. It implies that, relative to TCDD, all forms of dioxin elicit some degree of toxicity, which is refuted by the World Health Organization Toxic Equivalency Factors (TEF) scheme. Also, it contradicts later statements on page 24, paragraph 1 (e.g., "Some congeners are extremely toxic, while others are believed to be relatively innocuous."). Of the 75 polychlorinated dibenzo-*p*-dioxin (PCDD) congeners that comprise this group of chemicals, the current state-of-the-science suggests that only six of these congeners are capable of producing some degree of adverse biological effects relative to TCDD. Likewise, a small fraction of polychlorinated dibenzofuran (PCDF) congeners (10 of the 135) are considered to interact with biological systems in a manner similar to, but to varying degrees as, TCDD. There are a number of reasons not all dioxin and furan congeners are considered toxic, including congener structural instability and a lack of affinity for the aryl hydrocarbon receptor (AhR). The Plan further confuses the issue by using the word 'isomer' to describe the various forms of dioxins. Chemical isomers are defined as compounds that have the same chemical formula but different atomic arrangements to their structures. Since not all 8 groups of PCDD isomers are represented in the TEF scheme, it is inaccurate to suggest that all PCDD isomers "share many or all of the toxic characteristics of TCDD." Finally, the Plan fails to provide references from the peer-reviewed literature to support this statement. Tierra

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recommends the Trustees clarify this statement to reflect what is generally accepted by the scientific community, as well as include references.

Page 22, Exhibit 2-1:

Exhibit 2-1: Occurrence And Distribution Of Selected Chemicals Of Potential Concern In Sediments Of The Lower Passaic River, Compared To Screening Criteria (Page 22).

Chemical (units in dry weight)	Average Conc.	Maximum Conc.	Reach of Maximum Concentration	Detection Frequency	Criterion Value	Exceedance Frequency	Average HQ
TCDD (ppt)	546	13,500	Harrison Reach	234 / 239	NA	NA	NA
Total PCBs* (ppb)	1,746	17,506	Kearny Reach	252 / 255	180	252 / 255	9.7
PAHs (ppb)							
HMW PAHs (ppb)	29,886	1,400,000	Newark Reach	302 / 306	9,600	261 / 306	3.1
LMW PAHs (ppb)	9,796	1,410,000	Newark Reach	275 / 306	3,160	144 / 306	3.1
DDT, DDE, DDD (total DDT) (ppb)	236	5980	Point No Point Reach	197 / 206	46.1	177 / 206	5.1
Mercury (ppb)	2,697	10,700	Harrison Reach	229 / 252	710	217 / 252	3.8

We have several comments on this exhibit:

- The text on page 21 references Exhibit 2-1 after explaining that earlier studies of sediment from the lower Passaic River demonstrated "elevated and potentially injurious concentrations" of PCDDs and PCDFs, among other chemicals. This exhibit displays sparse information to support this statement. In fact, Exhibit 2-1 presents only an average and a maximum concentration for TCDD in sampled sediment. The Plan does not include analogous sampling data for any of the other PCDDs, nor does it provide any information on levels of PCDFs found in these sediment samples. The table should be amended to provide information about other PCDD/Fs and a summary of TEQ values.

- We object to the use of the term "criteria" in this exhibit and the associated text. The NOAA ER-M values are published sediment benchmarks. The authors of the study from which they were derived (Long et al. 1995—this is incorrectly cited as Long and Morgan, 1995 in Exhibit 2-1) clearly state that these are not promulgated sediment criteria to be used as clean-up standards. They are simply benchmarks for screening for potential risks to benthic invertebrates.

- The simple listing of an average concentration of a contaminant along with the maximum concentration recorded for the area does not appropriately convey the variability and uncertainty associated with the measurements from the many samples that have been collected under various programs/studies. At a minimum, a measure of variability (the standard deviation of the mean) should be included along with the average, as was done later in this chapter in Exhibit 2-12. Additionally, the Trustees should include a description of how the statistics were calculated (was the distribution of the data set considered, etc.).

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- A comparison of the TCDD concentration average listed in Exhibit 2-1 and those listed for the various regional samples in Exhibit 2-12 (page 36) indicates inconsistencies in the calculations of the TCDD average concentrations between the two tables. Apparent similarities between the data represented in the two exhibits (e.g., TCDD maximum concentrations are the same) would suggest that some or most of the same data were used to generate these exhibits. The Trustees should address these inconsistencies.

Page 22, first paragraph:

This paragraph initiates a section discussing dioxin-like compounds and begins with "Dioxin-like compounds include the various isomers of dioxin, furans, and certain PCBs." However, the discussion of all known, and emerging, dioxin-like compounds is incomplete. The Trustees should develop a discussion of compounds such as polybrominated compounds, chlorinated PAHs and any other compounds with potential dioxin-like toxicity.

Pages 22 through 33, summary profiles of contaminant classes:

The summary profiles for the various contaminant classes are generic and lack appropriate references. In addition, some level of information should be provided regarding the toxicology of these contaminants to estuarine receptors that are found at the Site.

Page 23, Exhibit 2-2:

This exhibit portrays only a small portion of the Site and does not seem to support any key point in this chapter of the Plan. In fact, it confuses the issue regarding the actual geographical boundaries and focus of the Site, as described in General Comment 11 above. As such, we suggest that it be removed from the Plan.

Page 24, first paragraph:

A statement is made that

> *"Toxic effects of dioxin include weight loss, abnormalities of the liver and other organs, impaired growth, edema, gastric ulcers, tumor production and carcinogenesis, immunosuppression, impaired endocrine function, embryo mortality, birth and developmental defects, and death."*

This statement is misleading, given that there is no context regarding the animal species, or the type of exposure, that have been documented to exhibit the adverse biological effects listed. And, once again, there are no references provided to support this statement. Have these effects been confirmed in all manner of species? Do these effects manifest themselves in humans exposed to dioxin? What about ecological receptors that would be expected at the Site? And what level of exposure would

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produce such effects in the sensitive species? These are all questions that must be addressed in order to qualify such a broad and controversial assertion. In commenting on the USEPA's 2003 Dioxin Reassessment Draft, the NAS acknowledged the controversy surrounding these questions and addressed the weight of evidence regarding many of these issues as they pertain to the literature on human exposure and animal experiments. It is very clear that, for each of the adverse biological effects listed in this statement, there is a varying degree of certainty that surrounds scientific knowledge of the susceptibility of various wildlife and humans to each effect. Therefore, the statement as it is structured is inaccurate. Tierra recommends that this statement be removed from the revised Plan.

Page 25, first paragraph:

A statement is made that

> *"Effects of non-dioxin like PCBs include neurotoxicity, endocrine disruption, and immunosuppression (EPA 2003)."*

There is no reference to these non-dioxin PCB effects in the reference cited: *USEPA (2003b). Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans and Biphenyls in Ecological Risk Assessment. External Review Draft. Risk Assessment Forum. 630/P-03/002A. Washington, D.C. June.* We request that the Trustees replace this reference with one that supports this statement.

Page 25, third paragraph:

A statement is made that

> *"The total dioxin-like activity is therefore typically described using 'toxic equivalency factors,' or TEFs (van den Berg et al. 1998; van den Berg et al. 2006). The TEF approach uses the potency of individual PCDD, PCDF, and PCB congeners, relative to TCDD, along with measured concentrations of these chemicals to calculate a toxic equivalent (TEQ) for each compound. The individual TEQs are then summed to derive a total TEQ, which gives an estimate of the total TCDD-like activity to which an organism is exposed."*

In summarizing the TEF approach, the Plan should recognize the uncertainty and variability inexorably linked to the TEF concept and derivation process. In developing TEFs for dioxin and dioxin-like compounds, the WHO constructed databases in which relative potencies (REPs) were derived and compiled for each congener based on relevant studies in the literature (van den Berg et al., 1998; van den Berg et al., 2006; Haws et al., 2006a). The current TEF methodology has been identified as "interim," and, as such, is subject to periodic review as new information becomes available. The dynamic and iterative nature of TEF derivation was demonstrated most recently with the release of updated TEF values (van den Berg et

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al., 2006), which were derived following review of a refined REP database [e.g., addition of more recent studies and a refined set of criteria for data inclusion (Haws et al., 2006)].

When the current WHO TEFs were established, the expert panel relied upon a series of decision criteria to assess the relative importance of the underlying REPs in assigning a consensus-based TEF for each congener. However, because this was a qualitative process, it is not possible to characterize the variability and uncertainty inherent in the risk estimates that are based on the WHO TEFs. As such, the current mammalian TEFs established by the WHO represent single assigned point values, despite the fact that they are derived from distributions of individual REP values. Although the WHO relied upon only the most relevant literature in deriving the REPs, these studies represented a cornucopia of methodologies, biological endpoints and dose regimens, the culmination of which resulted in a largely heterogeneous data set. As demonstrated in the figure below, the distributions of REP values for some congeners range over several orders of magnitude.

It therefore has been proposed that TEFs (and subsequent estimates of risk for dioxin-like compounds) be based on the distribution of REP values for each congener. This approach would allow for better characterization of the uncertainty and variability inherent in estimates that are based on TEFs. These distributions potentially could be used to establish point estimate TEFs based on a common point in the underlying distribution, thereby ensuring a more uniform degree of conservatism in the TEF values. Notably, during their most recent re-evaluation of the TEF methodology in June 2005, the WHO expressed interest in discussing a probabilistic approach (which utilize REP distributions) for derivation of TEFs for dioxin-like compounds (Scott et al., 2006).

The application of such quantitative weighting schemes to REP distributions allows for greater emphasis to be placed on those REP values believed to be better suited for the purposes of human-health risk assessment, while concomitantly yielding a transparent and consistent method for deriving TEFs. Furthermore, those involved in risk management have the flexibility to tailor the desired level of protection to the specific situation under consideration, thus facilitating the establishment of a consistent level of protection for all congeners (Scott et al., 2006; Haws et al., 2006b). Therefore, Tierra suggests that the Trustees utilize a weight-based distribution system prior to applying the TEFs in their future studies to ensure that they characterize the uncertainty in their results.

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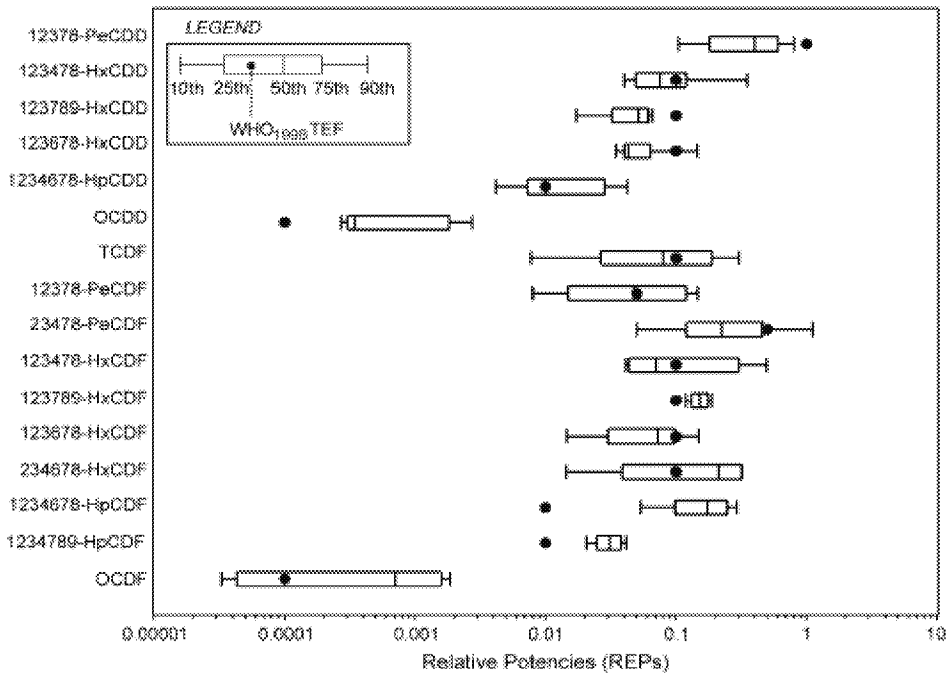
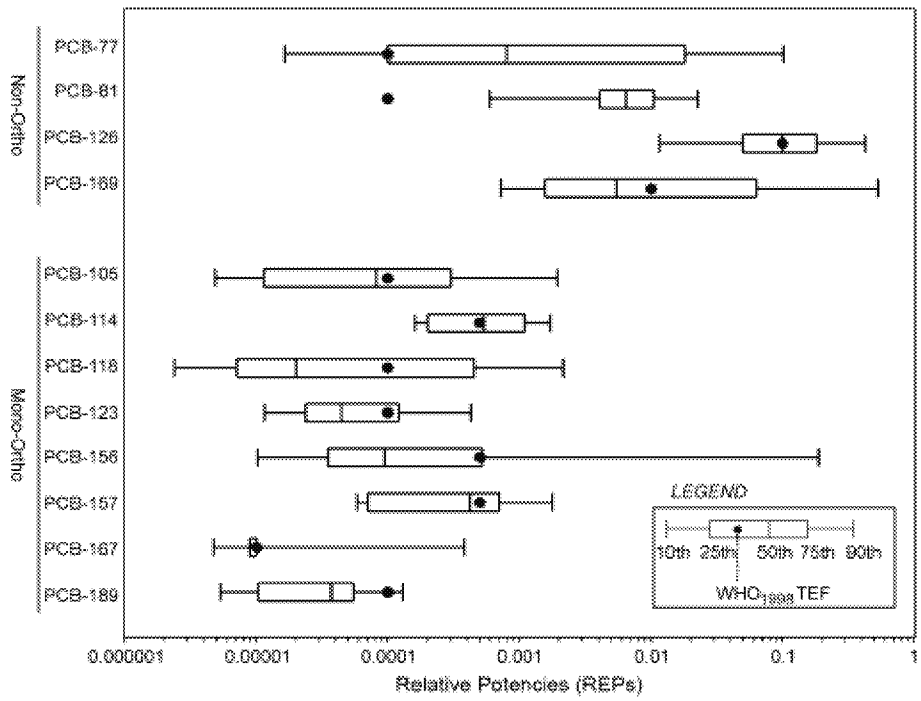
Distributions of REP values in the REP2004 database (in vivo + in vitro combined) (Haws et al., 2006a).





Page 25, third paragraph:

A statement is made that

> *"The World Health Organization (WHO) has used numerous toxicity studies of dioxins, furans, and PCBs to develop consensus-based TEFs for a variety of compounds for birds, fish, and mammals including humans (van den Berg et al. 1998; van den Berg et al. 2006) (Exhibit 2-5)."*

The mammalian TEFs developed by the WHO-TEF committee are based on a large volume of literature. In contrast, the fish and avian TEFs are based on a small number of literature sources (van den Berg et al., 1998). Additionally, since the publication of the fish and avian TEFs, a variety of errors have been identified with some of the congener REPs as derived from their source studies, thus calling into question the accuracy of these two groups of TEFs. The Trustees should acknowledge these errors in their discussion/text.

The fish WHO TEFs are based on an REP database that was comprised of only nine fish studies. As listed in this database, 38 individual REPs were derived from these studies. However, discrepancies exist in the fish REP database. For example, there are 12 REPs listed in the database that represent 10 compounds as evaluated by Walker and Peterson (1991). Two of these compounds, PCB 77 and PCB 126, listed duplicate REPs in the database. Additionally, the REP listed for 1,2,3,7,8,9-hexachlorodibenzo-*p*-dioxin as derived by Helder and Seinen (1986) was mislabeled in the database as 1,2,3,7,8,9-hexachlorodibenzofuran.

The avian TEFs were derived from data published in a total of 16 studies, many of them only focusing on a few of the dioxin and dioxin-like congeners. There are 84 REPs in the avian REP database based on these 16 studies. Among these 84 REPs, a number of significant discrepancies have been identified. For example, the database lists a total of 16 REPs for the 13 compounds assessed by Bosveld et al. (1992). PCBs 77, 126, and 169 are each assigned two REPs in the database, which turn out to be duplicates in the cases of PCB 77 (0.02) and 169 (<0.001). PCB 126 is assigned two different REPs (0.1 and 0.06); however, one of them (0.06) has no basis in the literature, so its origins are uncertain. Another example includes the REPs derived from Brunstrom & Andersson (1988). In the avian database there is a REP for PCB 153 that appears to be based on a single dose. Also, the PCB 169 REP (0.017) was mislabeled PCB 153 in the database, a congener that is not even listed in any of the TEFs published by the WHO. A third example of the errors present in the avian REP database is evident after inspecting the REPs based on the investigations of Machala et al. (1996). In their paper, Machala et al. present dose response curves based on ethoxyresorufin-O-deethylase (EROD) activity, but do not calculate EC50 values for any of the compounds tested. However, it can be visually determined from inspecting Figure 1A of this paper that PCB 77 has an EROD EC50 that is ≥ 2 orders of magnitude greater than TCDD. Therefore, PCB 77 should have a REP of roughly $\leq$ 0.01. Yet in this case the TEF database has the PCB 77 REP listed as 0.05.

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Further examples of inconsistencies between the avian REP database and the literature cited as supporting such can be found by examining those REPs derived from Powell et al. (1996a, b). As listed in the database, the PCB 77 REP of 0.01 derived from the Powell studies is not correct. Using the lethality value (LD_{50}) of PCB 77 (8.8 ug/kg egg) (Powell et al., 1996a) and the TCDD LD_{50} (0.15 ug/kg egg) (Powell et al., 1996b) results in a REP of 0.017. Another problem is that the avian REP database indicates that one of the PCB 105 REPs is based on chicken embryonic abnormality data from Powell et al. (1996a). However, it is clearly stated by the investigators that only the highest of the five PCB 105 doses produced any significant frequency of observed abnormalities in the chicken embryo population studied. As such, it was not possible for the authors to extrapolate an ED50 that could be used to derive a plausible REP for PCB 105 from this study. Thus, the PCB 105 REP of 0.001 listed in the avian database as being derived from the Powell et al. (1996a) study is not valid. Based on these and other inconsistencies with the fish and avian TEF scheme, Tierra recommends that the Trustees, at a minimum, note these discrepancies as a part of their discussion of the WHO TEFs and the TEF approach in general.

Pages 27 and 28, Exhibits 2-6 and 2-7:

The Trustees have gathered, analyzed and summarized in the Plan a select group of publications from the literature regarding potential dioxin toxicity to fish, yet did not include such data/analyses for other receptor groups and chemical contaminants. This insupportable selective reliance on scientific information fails to comply with the requirements of 43 CFR § 11.31(a)(3) and 43 C.F.R. § 11.62(f) (concerning defining injuries to biological resources), 43 C.F.R. § 11.63(f) (concerning defining exposure pathways to biological resources), 43 C.F.R. § 11.64(f) (concerning testing and sampling methods for biological resources), and 43 C.F.R. § 11.70(l) (concerning quantification of service reduction to biological resources). The Trustees should either generate and include this same level of data/information for the other receptors and contaminants of interest at the Site, or remove these two exhibits from the Plan. In addition, if retained in the Plan, some discussion should be provided regarding the substantial uncertainties that exist both in the application of the datasets from the literature that were used to generate these exhibits, and the extrapolation techniques that were used to convert the data to hypothetical effects levels for fish.

Page 29, first paragraph:

A statement is made that

> *"In fact, the NJDEP stated that the calculated magnitude of cancer risk from consuming blue crabs from the Site was 'one of the highest encountered by the NJDEP in any context' (NJDEP 2002a)."*

The purported cancer risks calculated in the NJDEP report cited in the Plan were based on a number of unrealistic and erroneous default assumptions, and therefore the conclusion arrived at in the report, which the Trustees have reiterated in this statement, is not scientifically supported. For example, the crab consumption data used in the risk assessment (NJDEP 1995; Pflugh et al., 1999) are not relevant to the lower six-mile stretch of the Passaic River. The crab consumption data were obtained from interviews conducted at 26 locations throughout the "Newark Bay Complex," according to NJDEP (2002) and Pflugh et al. (1999). Moreover, a review of the raw data from this study reveals that the six-mile stretch of the lower Passaic River was not surveyed at all by Pflugh. The Plan should reference region-specific data, which is readily available in the peer-review literature (Ray et al., 2007). In the face of such Site-specific data, it is arbitrary and capricious to assume that consumption rates measured over such a vast region will be representative of any particular setting within that region.

Also, there are several instances in which the crab consumption data collected by Pflugh and colleagues (NJDEP 1995; Pflugh et al., 1999) were not interpreted in a reasonable or valid manner. In virtually every instance, these flawed, or otherwise unfounded, assumptions served to artificially inflate the risk estimates. These are summarized as follows:

- First, unlike the recent Creel Angler Survey of the lower Passaic River that spanned the period of a year (Ray et al., 2007), the NJDEP's survey of the Newark Bay Complex took place over a period of only 39 days. Therefore, it is certain to have suffered from avidity bias (i.e., they likely surveyed a disproportionate number of the most avid crabbers). The effect of deriving consumption rates without adjusting for the number of avid anglers/crabbers results in over-estimating the consumption rates (Price et al., 1994). Correcting for, or at least discussing, avidity bias is a fundamental part of any responsible and scientifically defensible risk assessment that relies on angler interview data (USEPA 1992). The NJDEP did not attempt to address this bias, nor was it even mentioned.

- Second, the NJDEP assumed in its risk assessment that the consumption-rate information from its 39-day survey was representative of year-round crab consumption rates (NJDEP 2002). However, as noted in an earlier survey by May and Burger (1996) that covered Arthur Kill, Raritan Bay, and the "NJ Shore," crabbers are only active during the warmest months of the year. Because the NJDEP's risk assessment ignored the well-known seasonal changes in crab consumption rates, the assumed year-round crab consumption rates and the risk estimates were considerably over-estimated and, therefore, inaccurate.

- Third, the Department assumed that all of the crabbers will eat the whole hepatopancreas of the crab all of the time (NJDEP 2002). This assumption conflicts with the fact that the NJDEP survey found that only 15% of crabbers stated that they might eat the hepatopancreas; i.e., 85% stated they would not

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consume the hepatopancreas (NJDEP 2002, 1995). An earlier survey by May and Burger (1996) also noted that "most crabbers only ate cleaned crabs (discarding the hepatopancreas), with fewer than 3% eating whole crabs." The NJDEP attempted to justify their assumption by stating that PCDD/Fs in the hepatopancreas may be dispersed "in the cooking liquid" during preparation of the crab. However, no scientific support was offered for this assertion. The NJDEP's unfounded and erroneous assumptions were not trivial oversights; the hepatopancreas contains higher levels of lipophilic compounds (such as PCDD/Fs, PCBs, etc.) than the muscle tissue. Again, the NJDEP chose to ignore factual evidence and instead made assumptions that artificially inflate the risk estimates.

- Fourth, the NJDEP (2002) relied on unrealistic and scientifically indefensible consumption rates. One of the scenarios considered by NJDEP actually assumed that a person would consume 15 crabs per day for 70 years. A person eating 15 crabs per day would be consuming approximately 1,125 grams (2.4 pounds) of crab per day. This value is 1) several-fold higher than even the highest (90th percentile) estimate of fish consumption by recreational anglers provided by USEPA's Exposure Factors Handbook (190 grams/day) (USEPA 1997), and 2) more than 30 times greater than the 99th percentile of shellfish consumption found in a national survey (Rupp et al., 1980). It obviously is unrealistic to assume continuous consumption of self-caught crabs from the Newark Bay Complex each and every day over an entire 70-year lifetime. While a small fraction of the crabbers reported eating crab for more than 50 years (7%), they clearly did not suggest or indicate that all of the caught and consumed crabs came from the Newark Bay Complex (NJDEP, 2002). These data may simply reflect the number of years these respondents ate crab from all sources. Again, the NJDEP relied on unrealistic and unfounded assumptions which resulted in significantly elevated and indefensible risk estimates.

The fish and crab tissue chemistry data (available at http://www.ourpassaic.org), and the results of a recent comprehensive creel angler survey (CAS) specific to the lower Passaic River (Finley et al., 2003; Ray et al., 2007), lead to and support an entirely different conclusion than the 2002 NJDEP report. Statistical evaluation of the crab tissue data indicates that the average concentration of dioxin TEQ from crab muscle in Passaic River samples collected between 1995 and 2000 was 18.1 ppt (see Table 1 below). Results of the site-specific CAS, which was conducted to determine scientifically defensible ingestion rates for fish and shellfish from this segment of the river (Finley et al., 2003; Ray et al., 2007), indicated that no crabs from this region are consumed (Ray et al., 2007). As such, the consumption rate and corresponding intake from Passaic River crabs is assumed to be zero. However, as a conservative measure of analysis, we also determined daily dioxin intake from Passaic River crab muscle using the USEPA's consumption rate for crab (USEPA, 1997). Combining the dioxin concentration data observed in lower Passaic River crab muscle with the USEPA's crab meat consumption rate for a 70 kg person (0.28 g/day) indicates that such an individual would ingest 0.007 pg TEQ/kg/day from fish (Table 1). The

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results of this CAS have been previously provided to the NJDEP and USEPA. Additionally, this CAS was subject to peer review by an expert panel as reported in Finley et al. 2003, to ensure the scientific rigor and defensibility of the results.

The daily TEQ intake associated with ingesting Passaic River fish and crabs can be put into perspective by comparing the intakes to other known dietary intakes. The daily contributions of beef, pork, poultry, eggs, dairy products (excluding milk but including table fats), milk, freshwater fish and shellfish, and marine fish and shellfish were considered. The total daily estimated intake of dioxin from these foods by the general U.S. population is estimated to be 0.58 pg TEQ/kg/day (Table 1). Thus, the estimated average daily dioxin intake from the Passaic River crab is below the daily dioxin levels that humans in the general population routinely ingest on a daily basis (see Table 1 below).

Furthermore, the hypothetical daily intake from Passaic River crab is below the typical dose received by a nursing infant as a result of ingesting breast milk that is contaminated with background levels of dioxin. In developing the Dioxin Reassessment (USEPA, 2003a), USEPA scientists estimated that an infant receives 242 pg TEQ/kg/day at birth and 87 pg TEQ/kg/day during the first year of life as a result of breastfeeding.

Since higher daily intakes result from both breastfeeding and ingesting a normal diet (than those from Site-specific intake from crab ingestion), it is clear that the NJDEP report cited in the Plan relies on assumptions and arrives at conclusions that are flawed. Table 2 presents acceptable daily intakes of TEQ established by domestic and international health agencies. Comparison of these acceptable daily intakes to the estimated average daily intake by humans of TEQ arising from Passaic River crab indicates that this dose is well below the criteria established by these reputable public health agencies. Based on a comparison to acceptable daily intakes for TEQ developed by reputable public health agencies and to the TEQ that humans normally ingest, it is not reasonable to conclude that the crab from this river is unsafe for consumption or that TCDD poses an imminent and substantial danger. Tierra recommends that the Trustees either remove this statement from the Plan, or put it into the appropriate context by following it with the information discussed above.

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Table 1. Estimated Daily Intake of TCDD TEQ for Passaic River Fish/Crabs and Typical US Foods					
Food Sample	**Mean TCDD TEQ (pg/g)**	**Consumption Rate (g/kg-day)**	**Daily intake (pg/kg/day)**	**Dioxin Reference**	**Consumption Reference**
Passaic River Biota					
Fish (filet)	51.9	0.006	0.31	Public database	Ray et al., 2007
Blue Crab (muscle)	18.1	0.000	0.00	Public database	Ray et al., 2007
Blue Crab (muscle)	18.1	0.004	0.07	Public database	USEPA, 1997
US Food Groups					
Beef	0.18	0.825	0.15	Winters et al., 1996	USEPA, 1997
Pork	0.28	0.261	0.07	Lorber et al., 1997	USEPA, 1997
Poultry	0.068	0.598	0.04	Ferrario et al., 1997	USEPA, 1997
Eggs	0.081	0.317	0.03	Hayward and Bolger, 2000	USEPA, 1997
Dairy Products	0.12	0.871	0.10	Lorber et al., 1998	USDA, 1995
Milk	0.018	2.500	0.05	Lorber et al., 1998	USDA, 1995
Freshwater Fish and Shellfish	1	0.086	0.09	Feidler et al., 1997a&b; Jensen and Bolger, 2001; Jensen et al., 2000	USEPA, 1997
Marine Fish and Shellfish	0.26	0.201	0.05	Feidler et al., 1997a&b; Jensen et al., 2000	USEPA, 1997
US Food Total			**0.58**		

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Table 2. Acceptable Intake of TCDD TEQ Developed by Various Domestic and International Agencies		
Agency/Group	**Acceptable Intake Rate**	**Reference**
World Health Organization	1-4 pg/kg/day, TDI	WHO, 2000
European Commission	2 pg/kg/day, TDI	ECSCF, 2001
United Kingdom	2 pg/kg/day, TDI	CoT, 2001
World Health Organization, JECFA	2.3 pg/kg/day, TDI	JECFA, 2001
ATSDR 1998	1 pg/kg/day, MRL	DeRosa et al., 1999

Page 29, last paragraph:

A statement is made that

> *"...projected dioxin levels in fish eggs, calculated based on the relationship between measured lipid concentrations in mummichog (Bailey et al. 1973), exceeded no observable adverse effects levels (NOAELs)..."*

This statement goes on to compare these calculated levels of dioxin in eggs to a variety of egg-based thresholds that have been published in the literature for trout and other freshwater species. There are two critical problems with this assessment.

- First, the calculation/estimation of dioxin or any other chemical concentrations in the eggs of fish (in this case mummichog) based on parameters taken from a single 35 year old study (i.e., Bailey et al., 1973 as cited in the Plan) that was not even conducted in the Newark Bay system is a highly unreliable means for assessing potential injury to fish. Without actual Site-specific or even region-specific egg data being available, this assessment is scientifically indefensible. As such, it should be removed from this Plan.

- Second, the use of egg thresholds (critical body residues or CBRs) from studies of freshwater fish species, many of which are known by scientists to be the most sensitive species to dioxin-like toxicological effects, is inappropriate for an injury assessment of an estuarine species such as the mummichog. Even recognizing that only a limited amount of dioxin toxicity data are available in the scientific literature for fish, and that this type of assessment in the Plan is a screening-level evaluation, the Plan does not adequately portray the substantial level of uncertainties that exist in the conclusions that are drawn from this assessment.

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These uncertainties should be characterized clearly in the Plan or this presentation of the freshwater fish data should be removed.

Page 30, Exhibit 2-8:

As with Exhibits 2-6 and 2-7, this exhibit includes a selective assessment of the available data from the literature to establish benchmarks—in this case "critical body residues" (CBRs) for dioxin effects on fish and wildlife. Again, it is misleading and highly biased that the same analysis was not performed for any of the other contaminants of concern in this Plan.[15] In addition, the data that were used to develop these CBRs is only a portion of that which is available in the literature, and the application/extrapolations used to generate the CBRs are highly uncertain. No discussion is provided in the text regarding these uncertainties. Accordingly, this exhibit should be removed from the Plan. Alternately, a more thorough assessment of the literature on dioxin ecotoxicology should be conducted and an appropriate uncertainties assessment provided. The same level of assessment is conducted and presented for all other contaminants at the Site.

Page 31, first paragraph:

The extrapolation of dioxin concentrations in fish to concentrations in bird eggs is technically unsupportable. This extrapolation is based on a single limited study using herring gulls in the Great Lakes (Hoffman et al., 1996 as cited in the Plan). The idea that this one study on a single species of fish and bird somehow suggests that a simple biomagnification factor (BMF) exists to extrapolate from fish tissue data through adult birds (of differing species) and then into their eggs is fraught with uncertainties to the point where it is unusable for a site-specific injury assessment. This text and concept should be removed from the Plan.

Page 31, second paragraph:

There has been no documentation of mink occurrence at this Site. Therefore, the pre-selection of mink as a mammal of concern is inappropriate and unsupportable. This text should be removed from this Plan.

Page 34, Exhibit 2-10:

This exhibit (along with the contaminant profiles in Chapter 2) should be expanded to include additional contaminants that occur at the Site as previously discussed.

Pages 34 and 35, "Sources of Contamination":

The focus on one source and two chemicals is woefully inadequate and fails to characterize the hundreds of sources of chemical contaminants to the Site. This

[15] Fair consideration of all contaminants of concern is required by the NRD Regulations including, but not limited to, 43 CFR § 11.31(a)(3).

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section must be expanded to include a characterization of the multiple sources of various chemicals to the Site, including those that have historically existed, or currently exist, both within and outside of (but that contribute to) the Site.

Page 35, "Identification of PRPs":

The Plan states that the

> *"Diamond Alkali Plant is just one of approximately 120 New Jersey point source discharges into the Lower Passaic River watershed; more than 50% of these are from industrial facilities (e.g., asphalt plants; plastic, metal, stone, clay, and glass manufacturers; sawmills; communications equipment; and various public utilities). In addition, non-point source discharges (e.g., landfill leachate; leaking storage tanks, chemical drums, container boxes; and stormwater runoff), along with illegal dumping, have contributed substantially to contamination along the river."*

Limitation of the scope of this description to "hundreds" of possible PRP sources, and to the "Lower Passaic River watershed," displays a fundamentally flawed perception of the historic reality, and indeed with the stated geographical scope of the assessment envisioned by the Plan. Over the course of time—dating virtually to the founding of the country and evolution of the Site as the veritable cradle of the Industrial Revolution—there have been literally thousands of contaminant sources located along or proximate to the Passaic River. Realistically, however, the number of sources is even more vastly understated, given that the Plan does not purport to undertake an assessment of the "Lower Passaic River watershed," but rather the entire Newark Bay Complex, including its other direct tributaries (the Hackensack River, Arthur Kill and Kill Van Kull) and the tributaries of those tributaries.

Furthermore, even though the Plan tacitly acknowledges discharges from "public utilities," not a single public utility or municipality is included as a noticed party to this Plan. Since their earliest settlement, through at least the early 1900s, the municipalities and industries along and proximate to the Site discharged their untreated wastewater directly into the surface waters of the Site. Since at least the mid-1800s, the continuous and systematic discharge of untreated, or only partially treated, wastewater into the surface waters of the Site from regional and local sewer systems has significantly polluted the waters and sediments of the Site with pathogenic organisms, hazardous substances, including heavy metals, and other compounds. Many municipalities within the Site continued to discharge untreated wastewater into the Site through at least the 1950s. Even when wastewater treatment plants were constructed, many of the treatment facilities provided only rudimentary primary treatment to remove gross solids and floatables or were otherwise grossly incapable of providing adequate treatment of wastewater discharged from the municipalities. Furthermore, to this day, untreated wastewater continues to discharge into the Site from municipal and regional sewer systems as a result of systemic design flaws and improper maintenance. Untreated wastewater is also continuously and

systematically discharged into the surface waters of the Site from combined sewer systems, which are designed to overflow and discharge untreated wastewaters directly into the Site from one or more outfalls when wet-weather runoff entering the system exceeds the capacity of the combined sewer system. Each municipality, regional sewer system, public utility, and the like should be included in the "cooperative approach" and the Plan re-noticed accordingly.[16]

Failure to include these public and private entities represents a data gap and unreasonably omits significant PRPs from the NRDA process in direct contravention of 43 C.F.R. § 11.32(a)(2).[17]

Finally, Tierra understands that not every recipient of a GNL from USEPA has been included as a noticed party to this Plan. In addition, there exist many other PRPs, to which the USEPA is considering issuing GNLs, not to mention scores (if not hundreds) more public and private entities that are known to have discharged hazardous substances into the Site but have so far escaped regulatory focus. All these additional parties should be included in the "cooperative approach" and the Plan re-noticed accordingly.

Page 36, Exhibits 2-11 and 2-12:

These exhibits are improperly and indefensibly focused on only one of the many sources and a single contaminant of concern at this Site. They should be removed from the Plan and replaced with a more relevant figure(s) that depict(s) the many sources of contaminants that exist throughout the Site.

Chapter 3. The Role of the Trustees

Page 38, paragraph 2:

This section identifies the Trustees for the Site as the State of New Jersey, U.S. Department of Commerce and U.S. Department of the Interior. As explained in more detail in General Comment 1 above, the roles of each Trustee should be more clearly defined and the specific Trust Resources for which each Trustee is responsible should be laid out clearly in this section.

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[16] 43 C.F.R. § 11.32(a)(2)(iii)(B) provides that the Trustees "shall allows at least 30 calendar days, with reasonable extensions granted as appropriate, for the potentially responsible party or parties notified to respond to the Notice before proceeding with the development of the Assessment Plan or any other assessment actions."

[17] 43 C.F.R. § 11.32(a)(2)(i) provides that the Trustees should make "reasonable efforts to identify potentially responsible parties." § 11.32(a)(2)(ii) provides that "In the event the number of potentially responsible parties is large or if some of the potentially responsible parties cannot be located, the authorized official may proceed against any one or more of the parties identified. The authorized official should use reasonable efforts to proceed against most known potentially responsible parties or at least against all those potentially responsible parties responsible for significant portions of the potential injury."

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An uncoordinated approach to the process will result in additional and unnecessary costs, delay and confusion. Concern for costs is evident throughout the NRD regulations and the NRDA Plan. For example, 43 CFR § 11.30(c)(2) states: "Activities undertaken as part of the Assessment Plan phase shall be taken in a manner that is cost-effective, as that phrase is used in this part." In addition, 43 CFR § 11.31(a)(2) states that "the Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damages is likely to be cost-effective and meets the definition of a reasonable costs, as those terms are used in this part." The NRDA regulations state: "The purpose of the NRDA Plan is to ensure that NRDA is done in a systematic manner and at a reasonable cost."[18] Too fulfill this purpose, this Plan must incorporate existing data related to the Site, not rely on an unspecified series of studies to investigate an undefined geographical area. Otherwise, the Plan ensures that the costs associated with the NRDA will be far from reasonable.

Chapter 4. The Diamond Alkali Superfund Site NRDA: Assessment and Restoration

Page 46, second paragraph:

This paragraph is remiss in not citing the multiple chemicals throughout the Site as a reason for the complexity of the NRDA.

Page 47 through 76 "Injury Determination and Quantification":

From page 47 to page 76, the Plan offers superficial description of generic categories of injury assessment and quantification methodologies, including simple box-chart graphics. These pages repeat some of the language and concepts found at 43 CFR § 11.61 through 11.64. However, a careful evaluation of the Plan's content reveals fundamental misunderstandings regarding the scientific specifications for injury determination and quantification at 43 CFR, and a fundamental lack of familiarity with the extensive body of data and information available as a result of investigations conducted under the direction of USEPA for CERCLA activities. For example,

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[18] The NRD Regulations define "Reasonable Cost" as follows:

> *Reasonable cost means the amount that may be recovered for the cost of performing a damage assessment. Costs are reasonable when: the Injury Determination, Quantification, and Damage Determination phases have a well-defined relationship to one another and are coordinated; the anticipated increment of extra benefits in terms of the precision or accuracy of estimates obtained by using a more costly injury, quantification, or damage determination methodology are greater than the anticipated increment of extra costs of the methodology; and the anticipated cost of the assessment is expected to be less than the anticipated damage amount determined in the Injury, Quantification, and Damage Determination (43CFR § 11.14 et seq.).*

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Exhibit 4-2 shows a hierarchy of studies "under consideration." Subsequent exhibits show simple boxes and tables that apparently are intended to guide the reader to understand how the Trustees will determine and quantify injury. However, the need for baseline analysis and baseline quantification as a fundamental assessment parameter is not mentioned in any of these figures or in the text discussing assessment methods, despite the emphasis and detail given for baseline at 43 CFR § 11.70 et seq. This problem is pervasive throughout the Plan.

In addition, the Plan (throughout this chapter) identifies a number of "selected potential ecological effects" for the various biological resources including survival, growth and reproduction effect endpoints, which is appropriate; but it also identifies several biomarker and related more subtle effect endpoints (e.g., behavioral abnormalities, impaired endocrine function, etc.) that are not supportable for evaluating potential damages to populations of organisms.

Pages 48 through 58, "Fish and Shellfish":

This section discusses fish and shellfish as food resources for "amphibians, reptiles, birds, and mammals," and is followed by Exhibit 4-3, which lists generic study categories, some repeated from 43 CFR § 11. The discussion cites Exhibit 1-2 as a basis for concluding that "(t)he Site provides habitat to shellfish and resident and migratory fish, including several species of special concern..." and goes on to state that the site "historically supported a vibrant catch." This is, as a general statement, true. However, a number of detailed quantitative reports and publications based on studies conducted for CERCLA activities document in detail, both qualitative and quantitative, that baseline impairments including habitat loss, habitat degradation, physical stressors such as storm-flow, and point and non-point chemical releases unrelated to the specific releases at issue for the Diamond Alkali site play an important role in constraining biological resources and resource services. In keeping with the specifications at 43 CFR § 11.70, the Plan should be revised to reflect the ubiquity of baseline impairments, and the study methods needed to characterize and quantify injuries relative to baseline conditions (as specified at 43 CFR § 11.71)

Page 50, second paragraph:

This paragraph indicates that the Trustees are currently engaged in an analysis of fish consumption advisories. However, on page 48, the Plan states that

> *"The Trustees expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used."*

The plan and report on the associated peer review that was to be released to the public related to the Trustee fish consumption advisory assessment should be formally issued by the Trustees for comment.

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Pages 58 through 65, "Birds":

> The generic study categories presented here and in Exhibit 4-7 (page 59) for biological bird injuries include "breeding survey," "developmental studies," and "floodplain food webs." Given the widely understood relationship between bird community structure and the area of available, high-quality wetland, the authors' determination that 45 acres of emergent wetland are extant should have triggered the authors to include and describe baseline characterization and quantification. The first paragraph on page 64 lists "avian species occurring in the Site that frequently feed in floodplains." The list includes eastern meadowlark, northern oriole, thrushes, rose-breasted grosbeak, scarlet tanager (which is a species requiring extensive tracts of canopied forest habitat), yellow-throated vireo, and Kentucky warbler. Among the shortcomings of this section is that no description of the "floodplain" on which these species might feed is provided. Reference to available reports and peer-reviewed publications prepared for CERCLA activities document the important role played by habitat constraints on the floodplain (e.g., Iannuzzi et al. 2002). Where a floodplain is present at all adjacent to the lower Passaic River, it is narrow and baseline habitat quality is very low. Under these conditions, the Plan's exclusive focus on injuries that might be attributable to a very few chemicals originating via very few releases indicates a misunderstanding on the part of the author(s) regarding the need for baseline assessment as a regulatory requirement (43 CFR 11.70 et seq.) and as a basis for scientifically sound estimation of damages attributable to the specific releases associated with any given source or contaminant.

Page 67, fourth paragraph:

The first sentence in this section on Surface Water explains:

> *"The specific studies that the Federal Trustees have in progress to determine injuries to surface water resources of the Site are described below and shown in Exhibit 4-11."* However, on page 48, the Plan states that: *"The Trustees expect that all plans for injury studies will be peer reviewed and released to the public for review and comment. Upon completion of the studies, the results will also be peer reviewed and released, as will a final study report that will include a description of the methods used."*

The Plan and report on the associated peer review that was to be released to the public should be formally issued by the Trustees for comment.

Page 63, Exhibit 4-9:

> The dramatic reduction in recent years of bird numbers on Shooter's Island, as depicted on this graph, is both troubling and unexplained. This information should be carefully analyzed with specific regard to the conduct of the censuses and potentially relevant conditions at the census site(s).

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ATTACHMENT 1

Publications Summarizing the Results of Studies in the Newark Bay Estuary Sponsored by Tierra Solutions, Inc: 1990–2007

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EXHIBIT 1

First Amended Complaint New Jersey Department of Environmental Protection et al. vs. Occidental Chemical Corporation et al. Civ. No. ESX-L-9868-05 (N.J. Superior Court)

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ESSEX

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs,	:	SUPERIOR COURT OF NEW JERSEY LAW DIVISION - ESSEX COUNTY DOCKET NO. ESX-L-9868-05
v.	:	CIVIL ACTION
OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	:	FIRST AMENDED COMPLAINT AND DEMAND FOR TRIAL BY JURY

Plaintiffs, New Jersey Department of Environmental Protection ("DEP") and Administrator of the New Jersey Spill Compensation Fund ("Administrator") (collectively, "Plaintiffs"), by way of this Complaint against the above-named defendants, Occidental

Chemical Corporation ("OCC"), Tierra Solutions, Inc. ("Tierra"), Maxus Energy Corporation ("Maxus"), Repsol YPF, S.A. ("Repsol"), YPF, S.A. ("YPF"), YPF Holdings, Inc. ("YPFH"), and CLH Holdings, Inc. ("CLHH") (collectively, "Defendants"), say:

STATEMENT OF THE CASE

1. For roughly twenty years, OCC and its predecessors-in-interest deliberately polluted the Passaic River with 2,3,7,8-Tetrachlorodibenzo-p-dioxin ("TCDD"), a particularly potent form of dioxin, DDT and various other pesticides and chemicals. For an essentially equivalent period of time, OCC, Tierra, Maxus, Repsol, YPF, YPFH, and CLHH have orchestrated and implemented a strategy to delay and impede the clean-up and restoration of the Passaic River. As a direct result of OCC's intentional releases and discharges into the Passaic River, and Defendants' feat of delaying any real solution for another 20-plus years, TCDD has migrated throughout the lower 17 miles of the Passaic River, Newark Bay, the lower reaches of the Hackensack River, the Arthur Kill, the Kill Van Kull, and into adjacent waters and sediments (collectively, the "Newark Bay Complex"). The sediments in the Newark Bay Complex are saturated with TCDD, yet not one teaspoon of TCDD-impacted sediment has been removed as part of a clean-up or restoration effort.

2. Similarly, Repsol, YPF, YPFH, CLHH, Maxus and Tierra have orchestrated and implemented a strategy to strand environmental liabilities associated with the Newark Bay Complex in Tierra, which has no independent ability to satisfy such obligations.

3. The consequences of Defendants' actions are far-reaching and significant. The Newark Bay Complex has become one of the world's worst sites for TCDD contamination. TCDD concentrations recorded in blue crabs in the Newark Bay Complex may be the highest ever discovered in aquatic animals. Because of this contamination, DEP has issued a complete

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ban on all fish and shellfish consumption from the Newark Bay Complex, though studies performed by Defendants themselves show that consumption continues. It is clear that the TCDD concentrations throughout the Newark Bay Complex present a real threat to human health and to the environment.

4. Similarly, Defendants have caused myriad and substantial economic injuries to the State and the Newark Bay Complex. Defendants' TCDD has impacted commerce, industry, navigation, dredging, and disposal for decades. Likewise, the ecosystem and natural resources of the Newark Bay Complex have been significantly injured.

5. Accordingly, Plaintiffs now bring this action to recover past and future damages caused by Defendants' intentional and egregious conduct. This civil action is brought pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11a to -23.11z (the "Spill Act"), the Water Pollution Control Act, N.J.S.A. 58:10A-1 to -37.23 (the "WPCA"), and New Jersey common law. In this action, Plaintiffs seek reimbursement of any and all cleanup and removal costs the State of New Jersey has incurred, and all such costs that the State of New Jersey will incur, alone and working in conjunction with federal agencies, as a result of Defendants' discharge of TCDD into the Newark Bay Complex. Plaintiffs also seek compensatory damages, punitive damages, declaratory relief, and equitable relief as set forth herein.

6. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages, including the loss of use of the State's natural resources. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive

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regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

THE PARTIES

7. Plaintiff DEP is a principal department within the Executive Branch of the State government vested with the authority to conserve natural resources, protect the environment, prevent pollution, and protect the public health and safety. See N.J.S.A. 13:1D-9; see also Executive Order 40. Plaintiff DEP's principal office is located at 401 East State Street, Trenton, Mercer County, New Jersey.

8. In addition, the State of New Jersey is the trustee of all natural resources within its jurisdiction for the benefit of its citizens and is vested with the authority to protect this public trust. See N.J.S.A. 58:10-23.11a.

9. Plaintiff Administrator is the chief executive officer of the New Jersey Spill Compensation Fund (the "Spill Fund"). See N.J.S.A. 58:10-23.11j. As chief executive officer of the Spill Fund, Plaintiff Administrator is authorized to approve and pay cleanup and removal costs Plaintiff DEP incurs, see N.J.S.A. 58:10-23.11f.c. and d., and to certify the amount of any claim to be paid from the Spill Fund, see N.J.S.A. 58:10-23.11j.d. Plaintiff Administrator's principal office is located at New Jersey Department of Environmental Protection, Environmental Claims Administration, 401 East State Street, P.O. Box 028, Trenton, New Jersey 08625-0028.

10. Defendant Occidental Chemical Company ("OCC") is a corporation organized under the laws of the State of New York, with a principal place of business located at 5005 LBJ Freeway, Dallas, Texas 75380. OCC has been served and has appeared in this matter.

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11. Maxus Energy Corporation (f/k/a Diamond Shamrock Corporation, f/k/a New Diamond Corporation) ("Maxus") is a corporation organized under the laws of the State of Delaware with a principal place of business located at 1330 Lake Robbins Drive, Suite 400, The Woodlands, Texas 77380. Maxus has been served and has appeared in this matter.

12. Tierra Solutions, Inc. (f/k/a Diamond Shamrock Chemical Land Holdings, f/k/a Chemical Land Holdings, Inc.) ("Tierra") is a corporation organized under the laws of the State of Delaware with a principal place of business located at 2 Tower Center Boulevard, Floor 10, East Brunswick, New Jersey 08816. Tierra has been served and has appeared in this matter.

13. Repsol YPF, S.A. ("Repsol") is, upon information and belief, a Spanish business entity with a principal place of business located at Paseo de la Castellana, 278-280, 28046 Madrid Spain. Repsol has been served in this matter.

14. YPF, S.A. ("YPF") is, upon information and belief, an Argentinean business entity with a principal place of business located at Avenida Presidente Roque Saenz Pena, 777, C.P. 1364 Buenos Aires Argentina. YPF has been served and has appeared in this matter.

15. YPF Holdings, Inc. ("YPFH") is, upon information and belief, a Delaware corporation with a principal place of business located at 1330 Lake Robbins Drive, The Woodlands, Texas 77380. YPFH has been served and has appeared in this matter.

16. CLH Holdings ("CLHH") is, upon information and belief, a Delaware corporation with a principal place of business located at 1330 Lake Robbins Drive, Suite 400, The Woodlands, Texas 77380. CLHH has been served and has appeared in this matter.

OWNERSHIP HISTORY OF LISTER SITE

17. In 1940, Kolker Chemical Works, Inc. ("Kolker") acquired an approximate 3.4 acre tract of land located at 80 Lister Avenue, in the Ironbound section of Newark, Essex

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County, New Jersey, for the production of DDT and phenoxy herbicides. 80 Lister Avenue, together with the adjacent property at 120 Lister Avenue, is referred to herein as the "Lister Site." The Lister Site is located on the banks of the Passaic River.

18. In March 1951, Kolker was acquired by Diamond Alkali Company. Diamond Alkali Company owned and operated that portion of the Lister Site located at 80 Lister Avenue from 1951 until 1967. In 1967, Diamond Alkali Company merged with Shamrock Oil & Gas Company, and the company's name was changed to Diamond Shamrock Corporation ("DSC-1"). DSC-1 continued to operate that portion of the Lister Site located at 80 Lister Avenue until August 1969 and sold it in March 1971.

19. In 1983, New Diamond Corporation was incorporated to be the holding company and parent of DSC-1. After the creation of New Diamond Corporation, DSC-1 changed its name to Diamond Chemicals Company on or about September 1, 1983. A few days later, New Diamond changed its name to Diamond Shamrock Corporation ("DSC-2"). On or about October 26, 1983, Diamond Chemicals Company changed its name to Diamond Shamrock Chemicals Company.

20. On September 4, 1986, DSC-2 sold all of the stock of Diamond Shamrock Chemicals Company to an affiliate of Occidental Chemical Company, Oxy-Diamond Alkali Corporation. Diamond Shamrock Chemicals Company then merged with Oxy-Diamond Alkali Corporation and was renamed Occidental Electrochemicals Corporation on or about September 29, 1986. Occidental Electrochemicals Company was then merged into its parent, Occidental Chemical Corporation, effective on or about November 30, 1987.

21. Through both the November 30, 1987 merger agreement and the operation of law, Occidental Chemical Corporation assumed and succeeded to the Diamond Alkali/DSC-1

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liabilities now at issue in this case.[1] OCC knowingly accepted the benefits and liabilities of this transaction and is responsible for the prior acts of DSC-1. OCC is a "discharger" and a person "in any way responsible" under the Spill Act.

22. On April 30, 1987, shortly after its sale of the chemicals division to OCC, DSC-2 changed its name to Maxus Energy Corporation. As part of the September 4, 1986 transaction whereby Maxus sold Diamond Shamrock Chemicals Company to OCC, Maxus agreed to manage the environmental liabilities at DSC-1's historical sites and to indemnify OCC from certain liabilities associated therewith. On information and belief, at various times Maxus had the authority to control and, in fact, controlled the environmental response at the Lister Site and in the Newark Bay Complex. During the time of Maxus' control, discharges of TCDD continued to occur from the Lister Site into the Newark Bay Complex. Maxus is now an indirect subsidiary of Spanish oil giant Repsol, through YPFH and YPF. Maxus is a "discharger" and a person "in any way responsible" under the Spill Act.

23. After TCDD contamination was discovered at the Lister Site, DSC-1 acquired ownership of 120 Lister Avenue in 1984 and reacquired 80 Lister Avenue in 1986. DSC-1 then transferred title to both 80 and 120 Lister Avenue to Tierra, which continues to own the entire Lister Site today. During the time of Tierra's ownership and control, discharges of TCDD continued to occur from the Lister Site into the Newark Bay Complex. Tierra is a "discharger" and a person "in any way responsible" under the Spill Act.

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[1] As used herein, "OCC" includes Kolker Chemical Works, Inc., Diamond Alkali Company, Diamond Alkali Organic Chemicals Division, Inc., DSC-1, Diamond Chemicals Company, Diamond Shamrock Chemicals Company and Occidental Electrochemicals Company, in addition to their successor Occidental Chemical Corporation.

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ALTER-EGO/COMMON ECONOMIC UNIT

24. Through a series of related transactions, Repsol, YPF, YPFH, CLHH, Maxus, and Tierra (the "Repsol Group") have worked to strand the environmental liabilities associated with the Newark Bay Complex in Maxus and Tierra, while systematically stripping Maxus's and Tierra's assets and ability to satisfy these obligations. The members of the Repsol Group are acting jointly, as a common economic unit, and as alter egos of each other.

25. For many years following its September 4, 1986 sale of the Diamond Shamrock Chemicals Company to OCC, Maxus managed the environmental liabilities flowing from the Lister Site, while Tierra actually owned the Lister Site. Maxus' role changed, however, following its 1995 acquisition by YPF, the former Argentinean state-owned oil and gas conglomerate.

26. After YPF's privatization in 1993, YPF embarked on a strategy to become a global force in the oil and gas industry. One of YPF's primary acquisitions was Maxus, which was acquired in 1995 for almost $2 billion in cash and assumed debt. As part of its effort to integrate and globalize the combined operations of the two companies, YPF undertook a series of transactions to (a) increase its profits from the various oil and gas investments and operations owned by Maxus prior to Maxus's acquisition, and (b) isolate the environmental liabilities associated with the Newark Bay Complex and various other sites in New Jersey and elsewhere.

27. In order to move Maxus's environmental liabilities and certain income-producing assets away from Maxus, YPF created a series of intermediate holding companies in the Netherlands, Cayman Islands, Texas, and elsewhere. As part of this plan, YPF directed the creation of two intermediate parent companies for Maxus and Tierra, specifically, YPFH and

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YPF International Ltd. Additionally, CLHH was created to be the intermediate holding company between Tierra and YPFH.

28. In 1996, immediately following the creation of the various intermediate holding companies, YPF had Tierra – Maxus's sister company – assume all of Maxus' obligations to OCC flowing from the Lister Site as well as other environmental liabilities in New Jersey and elsewhere through an "Assumption Agreement." At the time, Tierra's chief "asset" was the Lister Site itself.

29. The plan also required that YPF, YPFH, CLHH, Maxus, and YPF International, Ltd. fund certain environmental liabilities, including those environmental liabilities associated with the Diamond-era production at the Lister Site, through a "Contribution Agreement." Funding under the Contribution Agreement occurred via direct, cascading capital contributions from YPF to its wholly-owned subsidiary YPF International Ltd., from YPF International Ltd. to its wholly-owned subsidiary YPFH, from YPFH to its wholly-owned subsidiary CLHH, and from CLHH to its wholly-owned subsidiary Tierra.

30. Under the terms of the Contribution Agreement, the funding obligations of YPF and its wholly-owned subsidiaries are capped at approximately $111 million for all obligations assumed pursuant to the Assumption Agreement. The Contribution Agreement also provides that once the cap is met, YPF, YPFH, CLHH, Maxus, and YPF International Ltd. have no further obligation to fund Tierra. On information and belief, that cap has been exceeded, thereby extinguishing the contractual obligations of YPF, YPFH, CLHH, Maxus, and YPF International Ltd. to fund Tierra.

31. Over the course of several years beginning in 1996, YPF also moved essentially all of Maxus' foreign income-producing assets to offshore entities owned by YPF, including

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Maxus Indonesia, while its key domestic operations were sold to third parties. On information and belief, some of Maxus' assets were transferred or sold for less than fair market value.

32. By 2001, Maxus did not have income-producing assets sufficient to fund its own operations and liabilities and was forced to rely upon its cash reserves. By no later than 2005, Maxus had depleted all of its cash reserves and was forced to look to its parent companies, YPF and YPFH, for funding. In fact, in 2002 and again in 2003, YPF submitted financial guarantees in the amount of $20 million to DEP for chromium-contaminated sites in New Jersey because Maxus and its direct parent, YPFH, lacked the financial ability to do so. As a result of YPF's 1996 plan, shareholder equity and retained deficit of YPF's American Unit – YPFH, CLHH, Maxus and Tierra – was approximately negative $150 million and negative $650 million, respectively, by March of 2006, a mere ten years later. Currently, neither Maxus nor Tierra are able to independently meet their financial obligations as they become due.

33. Accordingly, starting in 2005, YPF made other funding arrangements via inter-company credit facilities to permit YPFH and its subsidiaries, CLHH, Maxus and Tierra, to continue as going concerns.[2] In August 2005, YPF extended the first credit facility to YPFH in an amount of $35 million. By May 2006, a mere nine months later, YPF had amended the credit facility with YPFH no less than three times, raising the amount "loaned" to $190 million. Upon information and belief, YPFH distributed the funds for the benefit of Maxus and Tierra. These credit facilities are unsecured, and neither Maxus nor Tierra have any apparent ability to repay the "loans." Moreover, without the credit facilities, YPF's auditor, Deloitte & Touche, refused

[2] YPFH is the top-tiered American subsidiary of YPF. YPFH is merely a holding company, owning the stock of Maxus and CLHH. CLHH is another empty holding company, which only owns the stock of Tierra. For almost a decade, since the inception of the Assumption Agreement and Contribution Agreements, YPF and its American subsidiaries have operated as a common economic unit and as one enterprise.

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to give YPFH and its subsidiaries, including CLHH, Maxus and Tierra, a clean financial bill of health in YPFH's consolidated financial report.

34. YPFH and CLHH do not have any operations or employees. Similarly, YPFH, CLHH and Tierra do not have any independent income. Rather, they continue to exist solely at the whim and control of YPF.

35. The officers and directors of YPF International Ltd., YPFH, CLHH, Tierra, and Maxus significantly overlap, and in some instances have been identical for years. Moreover, the vast majority of officers and directors of YPFH, CLHH, and Tierra came from Maxus, YPF, and/or Repsol.

36. In 1999, Repsol acquired in excess of 95% of YPF's stock, thereby becoming the majority owner. Thereafter, in 2003, Repsol implemented its own plan of reorganization whereby it divided its worldwide operations, including YPF and its wholly-owned subsidiaries, into three divisions: Upstream, Downstream, and the Americas. YPF and its wholly-owned subsidiaries operate in the Americas Division.

37. Repsol and its divisions do not adhere to corporate formalities regarding separateness. While the funding of YPF's American Unit continues to flow through YPF, Repsol directs and controls the environmental practices and operations of Maxus and Tierra. On information and belief, Repsol directs and controls the policies, procedures, funding and actions of YPF, YPFH, CLHH, Maxus, and Tierra.

38. The Repsol Group is acting jointly, as a common economic unit, and its members are alter-egos of the other. As such, each member of the Repsol Group is liable as and for the other members of the group.

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HAZARDOUS SUBSTANCES PRODUCED AT THE LISTER SITE

39. OCC owned the Lister Site from 1940 through 1971. From the mid-1940s through 1969, OCC manufactured agricultural chemicals at a portion of the Lister Site, including dichlorodiphenyltrichloroethane ("DDT") and phenoxy herbicides. DDT production began before the end of World War II and continued through the late-1950s when OCC's DDT operations were consolidated at its Greens Bayou Plant in Houston, Texas. The Greens Bayou Plant was also extensively contaminated with hazardous substances intentionally discharged by OCC.

40. Production of phenoxy herbicides commenced in 1948 and continued through the summer of 1969. Two chemicals manufactured at the Lister Site were 2,4-dichlorophenoxyacetic acid ("2,4-D") and 2,4,5-trichlorophenoxyacetic acid ("2,4,5-T"). TCDD (or 2,3,7,8-tetrachlorodibenzo-p-dioxin) is a particularly toxic form of dioxin that was formed as a by-product of the 2,4,5-T process.

41. Like many other constituents used, produced, and discarded at the Lister Site, DDT, 2,4-D, 2,4,5-T and TCDD all constitute "hazardous substances," as defined in N.J.S.A. 58:10-23.11b.

OCC'S OPERATIONS AND PRACTICES AT THE LISTER SITE

42. As has been previously held by the courts of New Jersey, OCC's operations at the Lister Site offer a glimpse of an exceedingly rare type of corporate citizen: one that both undertook a "deliberate course of pollution [constituting] intentional conduct" and one that had the "subjective knowledge of harm" posed by the TCDD in its discharges and emissions. Diamond Shamrock Chems. Co. v. Aetna Cas. & Sur. Co., 258 N.J. Super. 167, 215-16 (App. Div. 1992).

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43. As laid out by the New Jersey Appellate Division, OCC's production practices at the Lister Site were notorious:

a. Almost from the day production of the phenoxy herbicides commenced in 1948, the workers at the Lister Site experienced chloracne (a disfiguring disease typically involving open and closed comedones, pustules, cysts and blisters on the face, armpits, and groin);

b. By 1955, OCC was aware that its processes were causing the chloracne and was advised to reduce its air contamination and to insist upon personnel and plant cleanliness. These suggestions were either ignored or poorly implemented;

c. In the Autumn of 1959, OCC was advised that a German chemical manufacturer had discovered that TCDD was the causative agent of chloracne and that decreasing OCC's reaction temperature in the 2,4,5-T manufacturing process would substantially reduce the production of TCDD. OCC was offered a two-step process by which TCDD could be eliminated – or at least appreciably reduced – in the 2,4,5-T manufacturing process. OCC instead decided to run the process at a higher temperature than recommended because reducing the autoclave temperature also would reduce production volumes and, therefore, OCC's profits;

d. In 1960, a reaction in the autoclave – whose temperature was "out of control" – caused an explosion that destroyed the larger of the two process buildings on the Lister Site. Following the explosion, OCC rebuilt the destroyed manufacturing process building. OCC had the opportunity to employ improved processes and techniques to lower the TCDD production, but again chose not to do so to avoid incurring capital costs and ensure increased profitability;

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e. Throughout its years of operation, vapors produced by the 2,4,5-T process were vented into the atmosphere on a daily basis. OCC's emissions from the scrubber unit would literally "pit" the paint on the cars in the parking lot – appearing as if acid had been thrown on them. Only in 1967 did OCC construct a carbon tower designed to remove TCDD in its process and finished product at or below a level of one part per million. Even after the carbon tower was installed, there was no decrease in the chloracne among the workers: monitoring reports from 1968 and 1969 showed dioxin levels in OCC's process and finished product at up to 9.6 parts per million and employees recall finished product with up to 80 parts per million.

See Diamond Shamrock Chems. Co., 258 N.J. Super. at 181-87, 212-13.

44. OCC's production processes were not reflective of the industry norm at the time. In fact, records indicate that OCC's products consistently contained more TCDD than their competitors' products.

45. Similarly, OCC's waste management and environmental practices were not reflective of industry standards at the time. In fact, New Jersey's courts have determined that OCC's waste management and environmental practices underscore the intentional nature of its behavior:

a. A number of former plant workers testified that OCC's waste management policy essentially amounted to "dumping everything" into the Passaic River;

b. From the mid-1940s through 1955, all waste products from chemical processes were either directly discharged or ultimately released into the Passaic River;

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c. In 1956, discharges from the Lister Site plant were directed to an industrial sewer line, but the evidence demonstrates that not all of the effluent from the plant was actually directed into the line;

d. In fact, so much DDT waste water was directed into the Passaic River that a mid-river "mountain" of DDT was created. Employees were directed to wade surreptitiously into the Passaic River at low tide and "chop up" the deposits so that they would not be seen by passing boats;

e. In the old – but undamaged – building where OCC manufactured 2,4-D and 2,4,5-T, OCC's "heedless indifference to the environmental damage which resulted from its manufacturing operations" continued after the 1960 explosion. The floors of the old building would accumulate so much 2,4-D and 2,4,5-T that twice-monthly they would be washed down with sulfuric acid, with the waste water flowing into trenches that ran outside the building and into the Passaic River. Routine blockages in the trenches and waste water pits also would cause effluent to back up and migrate into the Passaic River. The concrete floor would be replaced every few years because it was turned to "dust" through the acid-washing process;

f. The "sloppy practices" tolerated by OCC management were also evident from the various leaks in the autoclave room and the pipes that ran between the two manufacturing buildings. Likewise, the pipelines along the 2,4,5-T process units constantly became clogged. Employees were then directed to break and steam clean the clogged lines. The material washed from the pipelines was discharged onto the ground or directly into the Passaic River;

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g. The 10,000 gallon storage tanks on the Lister Site routinely were cleaned of amine, butyl-T, 2,4-D, and 2,4,5-T by shoveling out the residue at the bottoms of the tanks once or twice a month. In this process, both liquid and solid waste fell onto the ground where the waste would be washed away into the Passaic River.

See Diamond Shamrock Chems. Co., 258 N.J. Super. at 181-87.

46. As a result of OCC's practices at the Lister Site, TCDD has been found in the soil at and around the Lister Site, in the groundwater under and around the Lister Site, and in the Newark Bay Complex. Defendants failed to timely notify Plaintiff DEP of the discharges of TCDD and other hazardous substances at and from the Lister Site as required by N.J.S.A. 58:10-23.11e.

47. Based upon the foregoing, the New Jersey courts already have found that the subjective knowledge of OCC was proven, as a matter of fact: OCC knew "the nature of the chemicals it was handling," knew that "they were being continuously discharged into the environment," and knew that "they were doing at least some harm." Diamond Shamrock Chems. Co., 258 N.J. Super. at 210-15 (OCC's "deliberate course of pollution constituted intentional conduct with the corresponding intentional injury inextricably intertwined").

48. OCC clearly "discharged" TCDD and other hazardous substances within the meaning of N.J.S.A. 58:10-23.11b. Defendants have also conducted operations on the Lister Site that involved the generation, storage, and handling of "hazardous substances," as defined in N.J.S.A. 58:10-23.11b.

49. By the judgment of the trial court and the affirming decision of the New Jersey Appellate Division in Diamond Shamrock Chems. Co. v. Aetna Cas. & Sur. Co., 258 N.J. Super.

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167, 215-16 (App. Div. 1992), Defendants are collaterally estopped from relitigating the nature and extent of the intentional discharges into the Passaic River and Newark Bay Complex.

THE REGULATORY HISTORY

50. The Lister Site. In 1982, the United States Environmental Protection Agency ("EPA") initiated a National Dioxin Strategy, targeting facilities that produced 2,4,5-T and its herbicide derivatives for soil sampling and testing for dioxins.

51. After DEP learned of the TCDD contamination at the Lister Site, then-New Jersey Governor Thomas H. Kean issued Executive Order 40, authorizing DEP to engage in emergency measures "necessary to fully and adequately protect the health, safety and welfare of New Jersey citizens." Pursuant to Executive Order 40, DEP issued an administrative order on June 13, 1983, requiring OCC to implement certain stabilization measures at the Lister Site to prevent further TCDD migration off-site. Two subsequent administrative consent orders were entered between DEP and OCC in 1984 to address the Lister Site itself.

52. In 1987, EPA selected an interim remedy for the Lister Site. Under a 1990 Consent Decree with EPA and DEP, OCC and Tierra submitted designs for the interim remedy on the Lister Site. The construction of the interim remedy was just recently completed in 2001. The interim remedy is to be periodically reevaluated.

53. The Newark Bay Complex. Under an Administrative Order on Consent (AOC) executed with EPA on April 20, 1994, Tierra agreed to study a six-mile stretch of the Passaic River and to determine: (1) the spatial distribution and concentrations of TCDD and other contaminants in the Passaic River; (2) the primary human and ecological receptors of the contaminated sediments; and (3) the transport of contaminated sediment within the six-mile stretch.

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54. However, after approximately ten years, this study has not yet been completed. By entering into the 1994 AOC, Tierra and the other Defendants agreed to undertake a proper investigation of the extent and impacts of the TCDD contamination emanating from the Lister Site into the lower six miles of the Passaic River. Defendants instead devoted their resources to various efforts to shift blame away from their activities on the Lister Site and onto other parties and chemicals.

55. Defendants concentrated their resources on manipulating the focus of the investigation away from TCDD and to mislead the regulators. When Defendants initially conducted sampling and reported data to the Government, they did not even include or mention TCDD – the driving force behind the entire study. Likewise, in maps submitted to the regulators as part of the investigation, the Lister Site was inexplicably left off the map and not even identified.

56. Defendants also have attempted to bias the results of the investigation and testing that they controlled. For example, EPA instructed Defendants not to undertake certain studies because EPA was concerned that the results would be misleading and incorrect and would understate the risk to human health and the environment caused by OCC's TCDD. Defendants nonetheless conducted the studies.

57. Defendants' efforts appear geared to justify a predetermined conclusion that there is no increased risk to human health or the environment posed by the TCDD and, therefore, that the TCDD may remain in the Newark Bay Complex.

58. Certain key aspects of the investigation of the lower six miles of the Passaic River were removed from Defendants' control by EPA letter dated January 30, 2001. However, effective June 22, 2004, EPA entered into a new AOC with OCC and about 30 other parties to

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fund $10 million of a $19 million study of the 17-mile stretch of the Passaic River from the Dundee Dam to Newark Bay. Pursuant to a separate agreement, the United States Army Corps of Engineers ("USACE") and New Jersey Department of Transportation ("NJDOT") are to contribute $9 million of the cost of this study, though the USACE's funding has recently come into doubt.

59. Following the filing of a notice of Citizen's Suit for the TCDD impacts in Newark Bay, OCC entered into a separate AOC with EPA on February 13, 2004 to begin another study of the impacts of the Lister Site, this time focusing on Newark Bay and adjacent waters. By entering into the AOC, Defendants deprived courts of jurisdiction to hear the Citizen's Suit. This AOC provides that EPA will maintain oversight control of the Newark Bay investigation.

60. On September 19, 2003, Plaintiff DEP issued a Spill Act directive to OCC, Maxus, Tierra, and others pursuant to N.J.S.A. 58:10-23.11f.a. directing these entities to assess any natural resource that has been, or may be, injured as a result of the discharges of TCDD from the Lister Site.

61. Plaintiff DEP and NJDOT have investigated and are investigating the nature and extent of the contamination in the Newark Bay Complex, dredging options, and disposal techniques.

62. Sampling results from investigations reveal the presence of TCDD at extremely high concentrations.

CONTAMINATION OF THE NEWARK BAY COMPLEX

63. The Newark Bay Complex now constitutes one of the worst TCDD contaminated sites in the world. TCDD is a persistent substance that remains in the environment long after discharge. Further, it bioaccumulates and/or biomagnifies in the food chain and the

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environment. The levels of TCDD in the Newark Bay Complex, and in its fish and shellfish, present an endangerment to human health, the environment, and the well-being of the people of the State of New Jersey.

64. TCDD in the Newark Bay Complex is clearly traceable to the Lister Site. There is a clear TCDD signal in the Passaic River, Newark Bay and beyond, which is unmistakably tied to the Lister Site and the actions of Defendants.

65. Portions of the Passaic River near the Lister Site constitute an ongoing source of TCDD contamination throughout the remainder of the Newark Bay Complex. High levels of TCDD are intermittently released from the Passaic River in storm and other high water events that scour the river bottom. Unacceptable levels of TCDD are persistently discharged from the surface sediments in the Passaic River to the remainder of the Newark Bay Complex.

FIRST COUNT

Spill Act

66. Plaintiffs repeat each allegation of paragraphs 1 through 65 above as though fully set forth in its entirety herein.

67. Each Defendant is a "person" within the meaning of N.J.S.A. 58:10-23.11b.

68. The State of New Jersey has incurred, and will continue to incur, costs as a result of the discharge of TCDD into the Newark Bay Complex. These costs include, but are not limited to, the costs of investigation, cleanup and removal, reasonable costs of preparing and successfully litigating this action, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z.

69. The State of New Jersey has incurred, and will continue to incur, damages as a result of the discharge of TCDD into the Newark Bay Complex. These damages include, but are

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not limited to, damages to and loss of value of real or personal property and the lost income associated therewith.

70. Plaintiff Administrator has certified, and may certify for payment, valid claims made against the Spill Fund concerning the discharges of TCDD to the Newark Bay Complex, and further has approved, and may approve, other appropriations from the Spill Fund to address the discharges of TCDD to the Newark Bay Complex.

71. The costs and damages the State of New Jersey has incurred, and will incur, for the Newark Bay Complex are "cleanup and removal costs," within the meaning of N.J.S.A. 58:10-23.11b, including: all costs associated with (1) the removal or attempted removal of hazardous substances, or (2) taking reasonable measures to prevent or mitigate damage to the public health, safety, or welfare, including but not limited to, public and private property, shorelines, beaches, surface waters, water columns and bottom sediments, soils and other affected property, including wildlife and other natural resources. The cleanup and removal costs include those program costs directly related to the cleanup and removal of the discharge and, with respect to the recovery of past costs, any indirect costs incurred by the State of New Jersey. N.J.S.A. 58:10-23.11b.

72. Defendants are "dischargers" and persons "in any way responsible" for hazardous substances (TCDD) discharged to the Newark Bay Complex, and are strictly liable, jointly and severally, without regard to fault, for all cleanup and removal costs, including, but not limited to, the costs of investigation, cleanup and removal, the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, the reasonable costs of preparing and successfully litigating this action, any other costs incurred pursuant to the Spill Act, and expenditures made by the State of New Jersey.

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73. Defendants' discharges of TCDD into the Newark Bay Complex were the result of Defendants' gross negligence and/or willful misconduct, within the knowledge and privity of the owner, operator, or person in charge. Therefore, the $50,000,000.00 maximum limitation codified at N.J.S.A. 58:10-23.11g.b. is inapplicable to any action against Defendants. Further, Defendants are jointly and severally liable for the full amount of damages.

74. Pursuant to the Spill Act, Plaintiffs may bring an action in the Superior Court for injunctive relief, for unreimbursed costs of investigation, cleanup or removal costs, reasonable direct and indirect costs of preparing and successfully litigating the action, damages to and loss of value of real or personal property and lost income associated therewith, for any unreimbursed costs or damages paid from the Spill Fund, and for any other unreimbursed costs or damages the State of New Jersey incurs under the Spill Act, N.J.S.A. 58:10-23.11u.b.(1), (2), (3) and (5).

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray that this Court:

a. Order Defendants to pay or reimburse Plaintiffs for all unreimbursed costs that the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of the discharges of TCDD, including, but not limited to, all cleanup and removal costs, other costs of investigation, cleanup and removal, the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, any unreimbursed costs or damages paid from the Spill Fund, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z, with applicable interest;

b. Enter declaratory judgment against Defendants for all unreimbursed costs that the State of New Jersey may incur in the future, separately or in conjunction with

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federal agencies, as a result of the discharges of TCDD, including, but not limited to, all cleanup and removal costs, other costs of investigation, cleanup and removal, the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, any unreimbursed costs or damages paid from the Spill Fund, reasonable costs of preparing and successfully litigating this action, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z;

c. Order Defendants to pay and reimburse Plaintiffs for all damages that the State of New Jersey has incurred, and may incur in the future, including, but not limited to, damages to and loss of use of real or personal property and the lost income associated therewith, with applicable interest;

d. Assess civil penalties as provided by N.J.S.A. 58:10-23.11u and its predecessors against Defendants for Defendants' failure to timely notify Plaintiff DEP of the discharges of TCDD and other hazardous substances as required by N.J.S.A. 58:10-23.11e;

e. Award Plaintiffs their reasonable direct and indirect costs and fees for preparing and successfully litigating this action; and

f. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to

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bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

SECOND COUNT

Water Pollution Control Act

75. Plaintiff DEP repeats each allegation of paragraphs 1 through 74 above as though fully set forth in its entirety herein.

76. Each Defendant is a "person" within the meaning of N.J.S.A. 58:10A-3.

77. Defendants discharged pollutants (TCDD) into the Newark Bay Complex within the meaning of N.J.S.A. 58:10A-3 & 58:10A-6.

78. The Commissioner of Environmental Protection or her authorized representative has determined that Defendants violated provisions of the Water Pollution Control Act, N.J.S.A. 58:10A-1 to 37.23 and its predecessors.

79. The State of New Jersey has incurred, and will continue to incur, costs as a result of the discharge of TCDD into the Newark Bay Complex. These costs include, but are not limited to, the cost of any investigation, inspection, or monitoring survey which led to the establishment of the violation, the cost incurred in removing, correcting or terminating the adverse effects upon water quality resulting from the unauthorized discharge of TCDD, and the reasonable direct and indirect costs of preparing and litigating this action.

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80. The State of New Jersey has incurred, and will continue to incur, damages as a result of the discharge of TCDD into the Newark Bay Complex.

81. Pursuant to N.J.S.A. 58:10A-10c., Plaintiff DEP may bring an action in the Superior Court for injunctive relief, N.J.S.A. 58:10A-10c.(1); for the costs of any investigation, inspection, or monitoring survey which led to the establishment of the violation, N.J.S.A. 58:10A-10c.(2); for the reasonable costs of preparing and litigating this case, N.J.S.A. 58:10A-10c.(2); for any reasonable cost incurred by the State of New Jersey in removing, correcting or terminating the adverse effects upon water quality, N.J.S.A. 58:10A-10c.(3); for actual damages caused by the unauthorized discharge, N.J.S.A. 58:10C.(4); and, for the actual amount of any economic benefits accruing to the violator from a violation, N.J.S.A. 58:10A-10c.(5).

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay or reimburse Plaintiff DEP for all unreimbursed costs that the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of Defendants' discharges of TCDD, including, but not limited to, the cost of any investigation, inspection, or monitoring survey which led to the establishment of the violation and the cost incurred in removing, correcting, or terminating the adverse effects upon water quality resulting from the unauthorized discharge of TCDD, with applicable interest;

b. Enter declaratory judgment against Defendants for all unreimbursed costs that the State of New Jersey may incur, separately or in conjunction with federal agencies, as a result of Defendants' discharges of TCDD, including, but not limited to, the cost of any investigation, inspection, or monitoring survey which led to the

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establishment of the violation, and the cost incurred in removing, correcting, or terminating the adverse effects upon water quality resulting from the unauthorized discharge of TCDD;

c. Order Defendants to pay Plaintiff DEP in an amount equal to the actual amount of economic benefit that accrued, and continues to accrue, to Defendants as a result of the violations of the Water Pollution Control Act, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from the violations, the return earned or that may be earned on the amount of avoided costs, and any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of the violations, and any other benefits resulting from the violations.

d. Award Plaintiff DEP the reasonable direct and indirect costs and fees for preparing and litigating this action; and

e. Award Plaintiff DEP such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree

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regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

THIRD COUNT

Public Nuisance

82. Plaintiffs repeat each allegation of paragraphs 1 through 81 above as though fully set forth in its entirety herein.

83. The use, enjoyment, and existence of the Newark Bay Complex and surrounding areas are rights common to the general public.

84. Defendants released and discharged hazardous substances (TCDD) into the Newark Bay Complex and surrounding areas and had an affirmative obligation to remedy the results of such discharges.

85. The TCDD contamination of the Newark Bay Complex and surrounding areas resulting from Defendants' releases and discharges of TCDD constitutes a physical invasion of public and private property and an unreasonable and substantial interference, both actual and potential, with the exercise of the public's common right to the use and enjoyment of the Newark Bay Complex and surrounding areas.

86. Defendants' releases and discharges, and failure to remedy the releases and discharges, of TCDD have caused and continue to cause a significant interference with the public health, public safety, public peace, public good and the public convenience.

87. Defendants' releases and discharges, and failure to remedy the releases and discharges, of TCDD were in violation of New Jersey law at the time of the releases, discharges and inaction.

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88. As long as the Newark Bay Complex and surrounding areas remain contaminated with Defendants' TCDD, the public nuisance continues.

89. Until the Newark Bay Complex and surrounding areas are remediated, Defendants are liable for the creation, and continued maintenance, of a public nuisance in contravention of the public's common rights.

90. Defendants' conduct was willful, wanton, and without regard to the rights of Plaintiffs and the State and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiff DEP for all costs the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges, with applicable interest;

b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur, separately or in conjunction with federal agencies, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges;

c. Order Defendants to pay and/or reimburse Plaintiff DEP for all damages that the State of New Jersey has incurred, and may incur in the future, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges, with applicable interest.

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d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiff DEP in an amount equal to the actual amount of economic benefits that accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, releases and discharges of hazardous substances to the Newark Bay Complex, and the nuisance created thereby, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiff DEP punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiff DEP such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005

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Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

FOURTH COUNT

Trespass

91. Plaintiffs repeat each allegation of paragraphs 1 through 90 above as though fully set forth in its entirety herein.

92. Defendants are liable for trespass, and continued trespass, because Defendants released, discharged, and failed to remedy the releases and discharges of TCDD into the Newark Bay Complex and surrounding areas.

93. As long as the Newark Bay Complex and surrounding areas remain contaminated with Defendants' TCDD, Defendants' trespass continues.

94. Defendants' conduct was willful, wanton, and without regard to the rights of Plaintiffs and the State and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiff DEP for all costs the State of New Jersey has incurred as a result of the trespass to the Newark Bay Complex and surrounding areas, with applicable interest;

b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur as a result of the trespass to the Newark Bay Complex and surrounding areas;

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c. Order Defendants to pay Plaintiff DEP for all damages the State of New Jersey has incurred, and may incur in the future, as a result of the trespass to the Newark Bay Complex and surrounding areas, with applicable interest;

d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiff DEP in an amount equal to the actual amount of economic benefits that accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, releases and discharges of hazardous substances to the Newark Bay Complex and surrounding areas, and the trespass created thereby, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiff DEP punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiff DEP such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark

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Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

FIFTH COUNT

Strict Liability

95. Plaintiffs repeat each allegation of paragraphs 1 through 94 above as though fully set forth in its entirety herein.

96. Toxic wastes are inherently abnormally dangerous and their release, disposal, and/or discharge is an abnormally dangerous activity.

97. Defendants are strictly liable for their abnormally dangerous activity because Defendants released, disposed of, and discharged toxic wastes (TCDD) from and at the Lister Site and into the Newark Bay Complex and surrounding areas.

98. Defendants' conduct was willful, wanton, and without regard to the rights of Plaintiffs and the State.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiff DEP for all costs that the State of New Jersey has incurred as a result of the release, disposal and/or discharge of toxic wastes (TCDD) to the Newark Bay Complex and surrounding areas, with applicable interest;

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b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur in the future as a result of the release, disposal, and/or discharge of toxic wastes to the Newark Bay Complex and surrounding areas;

c. Order Defendants to pay Plaintiff DEP for all damages that the State of New Jersey has incurred, and may incur in the future, as a result of the release, disposal, and/or discharge of toxic wastes to the Newark Bay Complex and surrounding areas, with applicable interest;

d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiff DEP in an amount equal to the actual amount of economic benefits that accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, disposal, releases, and/or discharges of toxic wastes to the Newark Bay Complex and surrounding areas, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiff DEP punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiff DEP such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within

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the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

STUART RABNER
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Attorney for Plaintiffs

By: George F. Schlom /for
John F. Dickinson, Jr.
Deputy Attorney General

Dated: November 29, 2006

Of Counsel:

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DEMAND FOR TRIAL BY JURY

Plaintiff DEP hereby demands a trial by jury on all issues involving the causes of action in the Third Count (Public Nuisance), Fourth Count (Trespass), and Fifth Count (Strict Liability).

DESIGNATION OF TRIAL COUNSEL

Pursuant to R. 4:25-4, the Court is advised that John F. Dickinson, Jr., Deputy Attorney General, is hereby designated as trial counsel for Plaintiffs in this action.

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EXHIBIT 2

New Jersey State's *Brief in Support of Motion for Leave to File Second Amended Complaint* (August 6, 2007). New Jersey Department of Environmental Protection et al. vs. Occidental Chemical Corporation et al. Civ. No. ESX-L-9868-05 (N.J. Superior Court)

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Governor

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August 6, 2007

Office of the Superior Court Clerk
By Deputy Clerk of the Superior Court
AUG - 7 2007
Received and Filed
ESSEX

Deputy Clerk
Superior Court of New Jersey
Essex County Courthouse
50 West Market Street, Room 113
Newark, New Jersey 07102

Re: DEP, et al. V. Occidental, et al
Superior Court of New Jersey, Law Division
Essex County
Docket No. L-9868-05

Dear Deputy Clerk:

This office represents the New Jersey Department of Environmental Protection and the Administrator of the New Jersey Spill Fund ("Plaintiffs") in the above-reference matter. Enclosed please find an original and two copies of Plaintiffs Notice of Motion for Leave to File Second Amended Complaint and Demand For Trial by Jury, supporting brief, proposed form of order, and proof of service.

Please return one copy of each document marked "filed" to Kelly-Ann Pokrywa, Esq. of Gordon and Gordon, Plaintiffs' Special Counsel in this matter, in the self-addressed, stamped envelope provided herewith.

Thank you for your attention to this matter.

Sincerely yours,

ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY

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By Deputy Clerk of the Superior Court
AUG - 6 2007
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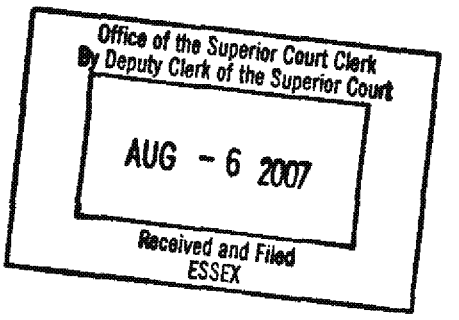

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	:	SUPERIOR COURT OF NEW JERSEY LAW DIVISION - ESSEX COUNTY DOCKET NO. ESX-L-9868-05 CIVIL ACTION **NOTICE OF MOTION FOR LEAVE TO FILE SECOND AMENDED COMPLAINT AND DEMAND FOR TRIAL BY JURY**

PLEASE TAKE NOTICE that on September 7, 2007 at 9:00 a.m., or as soon thereafter as counsel may be heard, Anne Milgram, Attorney General of New Jersey, Connelly, Baker, Wotring, Jackson, L.L.P. and Gordon & Gordon, attorneys for Plaintiffs, New Jersey Department

of Environmental Protection and Administrator of the New Jersey Spill Compensation Fund, shall move before the above-captioned Court located at the Essex County Courts Building, 50 West Market Street, Newark, New Jersey for the entry of an Order for Leave for Plaintiffs, New Jersey Department of Environmental Protection and Administrator of the New Jersey Spill Compensation Fund, to file their Second Amended Complaint and Demand for Jury Trial in the form attached to this Motion as Exhibit "A."

PLEASE TAKE FURTHER NOTICE that in support of this application, the undersigned will rely upon the procedural history of this matter and the Brief submitted herewith.

PLEASE TAKE FURTHER NOTICE that oral argument is requested.

PLEASE TAKE FURTHER NOTICE that Plaintiffs hereby submit a proposed form of Order.

PLEASE TAKE FURTHER NOTICE that a discovery end date has not been assigned.

ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY
Attorney for Plaintiffs

By: _____
John F. Dickinson, Jr.
Deputy Attorney General

Dated: August 6, 2007

Of Counsel:

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	SUPERIOR COURT OF NEW JERSEY LAW DIVISION - ESSEX COUNTY DOCKET NO. ESX-L-9868-05 CIVIL ACTION **BRIEF IN SUPPORT OF MOTION FOR LEAVE TO FILE SECOND AMENDED COMPLAINT AND DEMAND FOR TRIAL BY JURY**

Plaintiffs, the New Jersey Department of Environmental Protection ("DEP") and the Administrator of the New Jersey Spill Compensation Fund ("Administrator") (collectively, the

"State"), file this Brief in Support of its Motion for Leave to File Second Amended Complaint and Demand for Trial by Jury. A copy of the Second Amended Complaint and Demand for Trial by Jury is attached hereto as Exhibit 1.

PROCEDURAL HISTORY

On December 13, 2005 the State filed this case against Occidental Chemical Corporation ("OCC"), Tierra Solutions, Inc. ("Tierra"), Maxus Energy Corporation ("Maxus"), Repsol YPF, S.A. ("Repsol"), YPF, S.A. ("YPF"), YPF Holdings, Inc. ("YPFH"), and CLH Holdings, Inc. ("CLHH") (collectively, "Defendants"). The case was removed to federal court shortly thereafter where it remained until it was remanded to this Court on September 28, 2006.

While the case was in federal court, Repsol, YPF, YPFH, and CLHH filed motions to dismiss for lack of personal jurisdiction. In response, Magistrate Judge Shwartz ordered the State and the Non-Resident Defendants to engage in limited jurisdictional discovery. It was through the beginning phases of this discovery that the State learned additional facts regarding the Non-Resident Defendants' interrelationships between and among themselves, as well as with Maxus and Tierra, and all of their contacts with New Jersey. With the permission of this Court, the State filed its First Amended Complaint on November 29, 2006 to include these additional allegations regarding the Non-Resident Defendants' jurisdictional contacts with New Jersey.

In January 2007, Repsol, YPF, YPFH, and CLHH again filed Motions to Dismiss for Lack of Personal Jurisdiction (the "Jurisdictional Motions"), while their subsidiaries operating in New Jersey, Maxus and Tierra, filed motions to dismiss the First Amended Complaint for failure to state a claim under R. 4:6-2 along with OCC.[1] The Court heard oral argument on these

[1] OCC did not attack the State's claim for cost recovery pursuant to the New Jersey Spill Act, N.J.S.A. 58:10-23.11a-z.

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motions on March 30, 2007. These motions are currently pending before the Court, and as a consequence thereof, none of the Defendant has filed an answer.

The State now seeks to file a Second Amended Complaint to plead additional facts that have come to light since the filing of the First Amended Complaint. Many of these additional facts bear directly on the personal jurisdiction inquiry and are equally relevant to the purported deficiencies in the First Amended Complaint.

ARGUMENTS

A motion for leave to file an amended complaint should be freely granted in the interest of justice without consideration of the ultimate merits of the amendment. Kernan v. One Washington Park, 154 N.J. 437, 456 (1998). Furthermore, a complaint may be amended as a matter of course at any time before an answer or other responsive pleading is filed. R. 4:9-1.

1. No Leave is Required.

To date, none of the Defendants has filed an answer or other responsive pleading in this case.[2] Thus, the State may file an amended complaint as a matter of course without leave of court. R. 4:9-1. Further, because none of the Defendants have filed an answer and the State may amend its complaint as a matter of course, none of the Defendants will be prejudiced by granting the State's motion. However, as a matter of deference to the Court because it currently has before it the pending motions to dismiss for failure to state a claim filed by OCC, Maxus, and Tierra, the State has filed this Motion requesting leave to file its Second Amended Complaint and Demand for Trial by Jury.

[2] Each of the Defendants filed motions to dismiss seeking dismissal of some or all of the claims brought by the State in this case. Motions to dismiss do not constitute responsive pleadings under R. 4:9-1.

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2. Clarification of the Parties and Claims.

The State's First Amended Complaint states, inter alia, a cause of action against each of the Defendants for violating the Water Pollution Control Act ("WPCA"). Pls.' Am. Compl. at ¶¶ 75-81. Pursuant to N.J.S.A. 58:10A-10c, the Commissioner of the Department of Environmental Protection or her authorized representative may file suit in Superior Court for a violation of the WPCA. The State brought this suit through the Department of Environmental Protection and the Administrator of the Spill Fund. In order to avoid any unnecessary procedural disputes on whether the Commissioner is a necessary party to a WPCA claim, the State seeks to add the Commissioner of the Department of Environmental Protection as a named party. Adding the Commissioner does not substantively change the claims brought by the State and will not prejudice any of the Defendants or delay this case.

The State's Second Amended Complaint also seeks to clarify the State's claims regarding natural resource damages ("NRD"). The State's First Amended Complaint makes clear that the State is not asserting claims for NRD at this time and seeks to reserve those claims for a later date in subsequent litigation. However, the State's First Amended Complaint seeks all of the costs the State has or will incur, separately or in conjunction with federal agencies, as a result of the Defendants' conduct and discharges. Although not specified, these costs include the costs of assessing the related injuries to the natural resources of New Jersey under the Spill Act. To avoid any confusion, the State's Second Amended Complaint makes clear that the State is seeking the costs of assessing the injuries to the natural resources of New Jersey.

3. New Allegations Regarding the Repsol Group.

On June 29, 2007, OCC filed a Motion for Leave to File Cross-Claims against Maxus, Tierra, Repsol YPF, YPFH, and CLHH (collectively, the "Repsol Group"). In the attached draft

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Cross-Claim, OCC alleges for the first time that Maxus was the actual successor to certain of Diamond Alkali's environmental liabilities. Diamond Alkali was the owner and operator of the Lister Avenue plant during its operational period when many of the discharges forming the basis of this suit occurred. These allegations are based upon corporate restructurings and transactions that the State has not been permitted to discover pursuant to the limited jurisdictional discovery conducted to date; hence, the State was unaware of these factual allegations until OCC filed its Motion for Leave.

Similarly, even the limited jurisdictional discovery recently obtained demonstrates that Tierra has been operated as the alter-ego of Maxus since at least 1986.[3] The limited evidence developed in the last few months clarifies that Tierra, created merely to hold the environmental liabilities at issue, was without any source of funding other than Maxus and, subsequently, the Non-Resident Defendants. Additionally, Maxus's control over Tierra and the Lister Site since 1983 (directly and through Maxus Corporate Company, which was merged back into Maxus in 1998), gives rise to the State's allegations that Maxus and Tierra have been alter egos since 1986.

Based on these newly obtained facts, the State seeks to amend its Complaint to plead in the alternative that Maxus is directly liable for the discharges of dioxin and other contaminants into the Passaic River. These new allegations will bear directly on Maxus' Motion to Dismiss for Failure to State a Claim currently pending before the Court because Maxus claims that the State has not sufficiently pleaded an actionable connection between Maxus and the Lister Site. Clearly, if Maxus is the direct successor to the liabilities associated with the dioxin contamination of the Passaic River, either through the transactions at issue or through its alter

[3] The current limited jurisdictional discovery should be concluded upon the Court's ruling on the State's Motion to Compel, filed August 1, 2007.

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ego relationship with Tierra, it is abundantly connected to the Lister Site and the State should be permitted to allege those facts.

Moreover, if Maxus is the direct successor to the liabilities associated with the dioxin contamination of the Passaic River or is the alter ego of Tierra, the State has been directly harmed by the Defendants' corporate restructuring and siphoning of assets away from Maxus and Tierra to distant international sister companies. The newly alleged conduct leaves Maxus and Tierra wholly unable to satisfy its obligations to the State for their own direct liabilities in New Jersey.[4] Based upon the foregoing, the Second Amended Complaint contains three new causes of action for fraudulent transfers, aiding and abetting, and civil conspiracy based upon the specific actions of Maxus, Tierra, and the Non-Resident Defendants directed at the State of New Jersey. While much of this information has been developed through the limited jurisdictional discovery conducted since the filing of the First Amended Complaint, it is clear that merits discovery will be necessary to fully develop the scope of this conduct.

4. New Allegations Regarding Personal Jurisdiction.

Because the Non-Resident Defendants were involved in and orchestrated the scheme to siphon all of Maxus's and Tierra's assets away, leaving those entities financially crippled and unable to meet their obligations in and to New Jersey, these newly asserted allegations bear directly upon the issue of personal jurisdiction. Indeed, these new allegations go to various theories of personal jurisdiction, including alter-ego and one cohesive economic unit (both previously pleaded), and conspiracy and effects jurisdiction (both previously un-pleaded).

[4] As opposed to the indemnity obligations Maxus (and Tierra) owe for certain environmental liabilities in New Jersey.

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Accordingly, the State has added these new factual allegations and theories of personal jurisdiction to the Second Amended Complaint.

The allegations contained in the Second Amended Complaint – along with supporting evidence that will be submitted with the State's Response in Opposition to the Non-Resident Defendants' Motions to Dismiss for Lack of Personal Jurisdiction – bear directly upon the personal jurisdiction inquiry and must be considered when the Court takes up the jurisdictional motions. Under the prima facie burden that the Court previously ruled applies to the jurisdictional analysis at this early stage of the proceedings, the Court is simply to consider the allegations contained in the Plaintiffs' Complaint supporting jurisdiction and whether those allegations are factually supported. See Miller Yacht Sales, Inc. v. Smith, 384 F.3d 93, 97 (3d Cir. 2004); Ball v. Metallurgie Hoboken-Overpelt, S.A., 902 F.2d 194, 196 (2d Cir. 1990); Larose v. Sponco Mfg., Inc., 712 F. Supp. 455, 458-59 (D.N.J. 1989).

Because the State has developed evidence relevant to the jurisdictional inquiry after filing its First Amended Complaint, the State must now amend its pleadings in order for the allegations to reflect those newly-discovered facts. The State would be unduly prejudiced by not being allowed to plead the facts that it has obtained through the limited jurisdictional discovery allowed, especially given that no defendant has even filed an answer. Moreover, by filing the Second Amended Complaint before its Response to the jurisdictional motions and the Non-Resident Defendants' Reply, the Non-Resident Defendants are in no way prejudiced and will not be unfairly surprised when the State raises these issues and submits evidence supporting these allegations in its Response in Opposition to the jurisdictional motions. This is particularly true because it is the State that must meet the prima facie burden to demonstrate personal jurisdiction, and any allegations or evidence tendered by the Non-Resident Defendants are not even to be

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considered by the Court at this juncture. Larose, 712 F. Supp. at 458-59 ("[u]ntil either an evidentiary hearing is had or trial is reached, once the plaintiff has met the burden and established a prima facie case of jurisdiction, that suffices, regardless of any controverting presentation by the moving party, to defeat the motion....").

5. Additional Allegations Regarding the Timing of Discharges at the Lister Site.

The State's Second Amended Complaint also contains additional allegations regarding the timing of discharges from the Lister Site to the Passaic River, which OCC, Maxus, and Tierra challenge in their Motions to Dismiss. In their Motions, OCC, Maxus and Tierra argue, in part, that the State's First Amended Complaint fails to adequately plead discharges after 1977, and Maxus' and Tierra's direct responsibility for discharges of dioxin and other hazardous substances during their ownership and/or control of the Lister Site. Although the State believes its First Amended Complaint meets the minimum pleading requirements, the Second Amended Complaint includes additional specific factual allegations about the timing of direct discharges of dioxin and other hazardous substances at the Lister Site in an effort to alleviate this perceived pleading deficiency and move this important litigation forward in a timely manner. These additional factual allegations more than adequately address OCC's, Maxus' and Tierra's challenges to the State's claims based on the timing of discharges from the Lister Site to the Passaic River.

CONCLUSION

The State's Second Amended Complaint remedies certain potential and/or purported deficiencies in the First Amended Complaint. Moreover, it recites newly discovered factual allegations that give rise to additional claims by the State and theories of personal jurisdiction over the Non-Resident Defendants. These allegations go to an alternative theory of liability

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which may ultimately be dispositive in this case and is currently the subject of Defendant OCC's proposed Cross-Claims. Based upon the foregoing, and the fact that leave to amend should be feely given generally and because no answers have been filed, the State respectfully requests that the Court grant the State's Motion for Leave to File Second Amended Complaint and Demand for Jury Trial.

Respectfully submitted,

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ATTORNEY GENERAL OF NEW JERSEY
Attorney for Plaintiffs

By: _____
John F. Dickinson, Jr.
Deputy Attorney General

Dated: August 6, 2007

Of Counsel:

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, THE COMMISSIONER OF THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs,	:	SUPERIOR COURT OF NEW JERSEY LAW DIVISION - ESSEX COUNTY DOCKET NO. ESX-L-9868-05 CIVIL ACTION SECOND AMENDED COMPLAINT AND DEMAND FOR TRIAL BY JURY
v.	:	
OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	:	

Plaintiffs, New Jersey Department of Environmental Protection ("DEP"), the Commissioner of the New Jersey Department of Environmental Protection ("Commissioner"),

and the Administrator of the New Jersey Spill Compensation Fund ("Administrator") (collectively, "Plaintiffs" or the "State"), by way of this Complaint against the above-named defendants, Occidental Chemical Corporation ("OCC"), Tierra Solutions, Inc. ("Tierra"), Maxus Energy Corporation ("Maxus"), Repsol YPF, S.A. ("Repsol"), YPF, S.A. ("YPF"), YPF Holdings, Inc. ("YPFH"), and CLH Holdings, Inc. ("CLHH") (collectively, "Defendants"), say:

STATEMENT OF THE CASE

1. For roughly twenty years of plant operations, Diamond Shamrock Corporation, its predecessors- and successors-in-interest, including OCC and/or Maxus, deliberately polluted the Passaic River with 2,3,7,8-tetrachlorodibenzo-p-dioxin ("TCDD"), a particularly potent form of dioxin, dichlorodiphenyltrichloroethane ("DDT"), and various other pesticides and chemicals. For an essentially equivalent period of time, Tierra, Maxus, Repsol, YPF, YPFH, and CLHH orchestrated and implemented a strategy to delay and impede the clean-up and restoration of the Passaic River and strand the associated liabilities in Maxus and Tierra. Moreover, OCC, Maxus and Tierra knowingly permitted discharges to continue into the Passaic River well into the 1980s from the manufacturing facilities, equipment, and lines they left in place. As a direct result of OCC's, Maxus', and Tierra's intentional releases and discharges into the Passaic River, and Defendants' feat of delaying any real solution for another twenty-plus years, TCDD has migrated throughout the lower 17 miles of the Passaic River, Newark Bay, the lower reaches of the Hackensack River, the Arthur Kill, the Kill Van Kull, and into adjacent waters and sediments (collectively, the "Newark Bay Complex"). The sediments in the Newark Bay Complex are saturated with TCDD, yet not one teaspoon of TCDD-impacted sediment has been removed as part of a clean-up or restoration effort.

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2. Similarly Repsol, YPF, YPFH, CLHH, Maxus, and Tierra orchestrated and implemented a common strategy to transfer all of Maxus' assets to affiliated companies and strand the environmental liabilities associated with the Newark Bay Complex in Tierra and Maxus, thereby leaving them now with no independent ability to satisfy such obligations to the State and others.

3. The consequences of Defendants' actions are far-reaching and significant. The Newark Bay Complex has become one of the world's worst sites for TCDD contamination. TCDD concentrations recorded in blue crabs in the Newark Bay Complex may be the highest ever discovered in aquatic animals. Because of this contamination, DEP has issued a complete ban on all fish and shellfish consumption from the Newark Bay Complex, though studies performed by Defendants themselves show that consumption continues. It is clear that the TCDD concentrations throughout the Newark Bay Complex present a real threat to human health and to the environment.

4. Similarly, Defendants have caused myriad and substantial economic injuries to the State and the Newark Bay Complex. Defendants' TCDD has impacted commerce, industry, navigation, dredging, and disposal for decades. Likewise, the ecosystem and natural resources of the Newark Bay Complex have been significantly injured.

5. Accordingly, the State now brings this action to recover past and future damages caused by Defendants' intentional and egregious conduct. This civil action is brought pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11a to -23.11z (the "Spill Act"), the Water Pollution Control Act, N.J.S.A. 58:10A-1 to -37.23 (the "WPCA"), the New Jersey Uniform Fraudulent Transfer Act, N.J.S.A. 25:2-20 to -34 (the "UFTA"), and New Jersey common law. In this action, the State seeks reimbursement of any and all cleanup and removal

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costs the State of New Jersey has incurred, and all such costs that the State of New Jersey will incur, alone and working in conjunction with federal agencies, as a result of Defendants' discharge of TCDD into the Newark Bay Complex. The State also seeks compensatory damages, punitive damages, declaratory relief, and equitable relief as set forth herein.

6. The State is not seeking, and this Complaint should not be characterized as asserting a claim for natural resource damages, including the loss of use of the State's natural resources, although the State does seek the costs of an assessment of the natural resources damaged or destroyed by Defendants' discharges. The State reserves the right to bring claims for natural resource damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, the State is not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resource damages.

THE PARTIES

7. Plaintiff DEP is a principal department within the Executive Branch of the State government vested with the authority to conserve natural resources, protect the environment, prevent pollution, and protect the public health and safety. See N.J.S.A. 13:1D-9; see also Executive Order 40. Plaintiff DEP's principal office is located at 401 East State Street, Trenton, Mercer County, New Jersey 08625-0028.

8. In addition, the DEP is the trustee of all natural resources within the jurisdiction of the State of New Jersey held for the benefit of its citizens and is vested with the authority to protect this public trust. See N.J.S.A. 58:10-23.11a.

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9. Plaintiff Commissioner is the chief executive officer of the New Jersey Department of Environmental Protection and is authorized to bring a civil action under the New Jersey Water Pollution Control Act. See N.J.S.A. 58:10A-3. Plaintiff Commissioner's principal office is located at New Jersey Department of Environmental Protection, 401 East State Street, P.O. Box 028, Trenton, New Jersey 08625-0028.

10. Plaintiff Administrator is the chief executive officer of the New Jersey Spill Compensation Fund (the "Spill Fund"). See N.J.S.A. 58:10-23.11j. As chief executive officer of the Spill Fund, Plaintiff Administrator is authorized to approve and pay cleanup and removal costs Plaintiff DEP incurs, see N.J.S.A. 58:10-23.11f.c. and d., and to certify the amount of any claim to be paid from the Spill Fund, see N.J.S.A. 58:10-23.11j.d. Plaintiff Administrator's principal office is located at New Jersey Department of Environmental Protection, Environmental Claims Administration, 401 East State Street, P.O. Box 028, Trenton, New Jersey 08625-0028.

11. Defendant OCC is a corporation organized under the laws of the State of New York, with a principal place of business located at 5005 LBJ Freeway, Dallas, Texas 75380. OCC has been served and has appeared in this matter.

12. Defendant Maxus (f/k/a Diamond Shamrock Corporation, f/k/a New Diamond Corporation) is a corporation organized under the laws of the State of Delaware with a principal place of business located at 1330 Lake Robbins Drive, Suite 400, The Woodlands, Texas 77380. Maxus has been served and has appeared in this matter.

13. Defendant Tierra (f/k/a Diamond Shamrock Chemical Land Holdings, f/k/a Chemical Land Holdings, Inc.) is a corporation organized under the laws of the State of

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Delaware with a principal place of business located at 2 Tower Center Boulevard, Floor 10, East Brunswick, New Jersey 08816. Tierra has been served and has appeared in this matter.

14. Defendant Repsol is a Spanish business entity with a principal place of business located at Paseo de la Castellana, 278-280, 28046 Madrid Spain. Repsol has been served and has appeared in this matter. Repsol and its subsidiaries are doing business in New Jersey and are subject to the general jurisdiction of the State.

15. Defendant YPF is an Argentinean business entity with a principal place of business located at Avenida Presidente Roque Saenz Pena, 777, C.P. 1364 Buenos Aires Argentina. YPF has been served and has appeared in this matter. YPF and its subsidiaries are doing business in New Jersey and are subject to the general jurisdiction of the State.

16. Defendant YPFH is a Delaware corporation with a principal place of business located at 1330 Lake Robbins Drive, The Woodlands, Texas 77380. YPFH has been served and has appeared in this matter. YPFH and its subsidiaries are doing business in New Jersey and are subject to the general jurisdiction of the State.

17. Defendant CLHH is a Delaware corporation with a principal place of business located at 1330 Lake Robbins Drive, Suite 400, The Woodlands, Texas 77380. CLHH has been served and has appeared in this matter. CLHH and its subsidiary are doing business in New Jersey and are subject to the general jurisdiction of the State.

OWNERSHIP & OPERATIONAL HISTORY OF LISTER SITE

18. The history of ownership and control of the former Diamond Shamrock Corporation manufacturing site at 80 Lister Avenue, Newark, New Jersey, and its accompanying operations is complex due to the numerous real-estate transactions and byzantine corporate restructurings involved. However, it is clear that OCC and Maxus – and Maxus' alter-ego,

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Tierra – are the parties directly responsible for the liabilities arising from almost forty years of discharges of TCDD, DDT, and other hazardous substances at the site and into the Passaic River.

19. **The Old Diamond Shamrock Years.** Between 1940 and 1951, Kolker Chemical Works, Inc. ("Kolker") acquired, through purchase or lease, an approximate 3.4 acre tract of land located at 80 Lister Avenue, in the Ironbound section of Newark, Essex County, New Jersey, for the production of DDT and phenoxy herbicides. 80 Lister Avenue, together with the adjacent property at 120 Lister Avenue, is referred to herein as the "Lister Site." The Lister Site is located on the banks of the Passaic River.

20. In 1951, Kolker was acquired by Diamond Alkali Company. Diamond Alkali Company owned and operated that portion of the Lister Site located at 80 Lister Avenue from 1951 until 1967. In 1967, Diamond Alkali Company merged with Shamrock Oil & Gas Company, and the company's name was changed to Diamond Shamrock Corporation ("Old Diamond Shamrock"). Old Diamond Shamrock continued to operate that portion of the Lister Site located at 80 Lister Avenue until August 1969, but it did not dismantle or remediate the plant facilities, equipment, or lines that were contaminated with TCDD and other hazardous substances.

21. Instead, in 1971, Old Diamond Shamrock sold and/or leased 80 Lister Avenue to a newly-formed company known as Chemicaland Corporation ("Chemicaland"), which was created by and included former Old Diamond Shamrock managers. Chemicaland leased 80 Lister Avenue to Cloray NJ Corporation ("Cloray"). Cloray was under the same management as Chemicaland (which included former managers of Old Diamond Shamrock). From 1971 until at least 1977, Chemicaland and/or Cloray continued to manufacture organic pesticides at the Lister

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Site for and at the direction of Old Diamond Shamrock. Additionally, during this time period, Chemicaland manufactured herbicides for OCC.

22. Moreover, while considering the acquisition of Chemicaland in 1976 and 1977, Old Diamond Shamrock assumed control of the management and operations at the Chemicaland plant located at the Lister Site. Discharges of TCDD and other hazardous substances from the facilities at the Lister Site continued during Old Diamond Shamrock's control and management of the operations at the Lister Site.

23. Old Diamond Shamrock and its predecessors owned, leased, and/or operated various portions of the Lister Site from 1945 through 1977 and from 1984 through 1986, during which time discharges of TCDD and other hazardous substances occurred from the facilities at the Lister Site. Moreover, the facilities, equipment, and lines left in place by Old Diamond Shamrock continued to discharge hazardous substances at least into the 1980s.

24. **The New Diamond Shamrock Years.** In 1983, high levels of TCDD contamination were discovered at 80 Lister Avenue, in adjacent properties, and in the Passaic River adjacent to the Lister Site. Shortly thereafter, Old Diamond Shamrock created and incorporated New Diamond Shamrock Corporation ("New Diamond Shamrock") as its own parent and as the corporate successor-in-interest to certain operations and liabilities of Old Diamond Shamrock.

25. After the creation of New Diamond Shamrock, Old Diamond Shamrock changed its name to Diamond Chemicals Company on or about September 1, 1983. A few days later, New Diamond Shamrock changed its name to Diamond Shamrock Corporation. On or about October 26, 1983, Diamond Chemicals Company changed its name to Diamond Shamrock Chemicals Company ("DSCC").

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26. **OCC's Liability.** On or about September 4, 1986, New Diamond Shamrock sold all of the stock of DSCC to an affiliate of Occidental Chemical Company, Oxy-Diamond Alkali Corporation. DSCC was subsequently renamed Occidental Electrochemicals Corporation. Oxy-Diamond Alkali Corporation and Occidental Electrochemicals Corporation were then merged into Occidental Chemical Corporation effective on or about November 30, 1987.

27. Through both the November 30, 1987 merger agreement and the operation of law, Occidental Chemical Corporation assumed and succeeded to the Diamond Alkali/Old Diamond Shamrock liabilities now at issue in this case. OCC knowingly accepted the benefits and liabilities of this transaction and is responsible for the prior acts of Old Diamond Shamrock. OCC is a "discharger" and a person "in any way responsible" under the Spill Act.

28. **Maxus' and Tierra's Liability.** On April 30, 1987, shortly after the sale of DSCC to OCC, New Diamond Shamrock changed its name to Maxus Energy Corporation. Through a series of transactions and corporate restructurings that occurred between 1983 and 1986, Maxus assumed and/or retained certain assets and liabilities of Old Diamond Shamrock. Based upon these transactions and restructurings, OCC has stated that Maxus assumed or retained the DSCC liabilities for the contamination of the Passaic River and the Newark Bay Complex. (See Occidental Chemical Corporation's Cross-Claims attached as Ex. A to OCC's Motion for Leave to File Cross-Claims, previously filed with the Court.) While OCC is liable as the direct successor to DSCC, Maxus is also jointly and severally liable with OCC because, through the corporate restructuring from 1983-1986, Maxus assumed and/or retained certain liabilities associated with the operations of Old Diamond Shamrock in connection with the Lister Site and, as such, is directly liable for DSCC's discharges of hazardous substances into the Passaic River beginning in the 1940s and continuing through at least the 1980s.

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29. Moreover, in 1983, Diamond Shamrock created another subsidiary known as "Diamond Shamrock Corporate Company." Diamond Shamrock Corporate Company provided various corporate services to and for Maxus, including the oversight and control of the Lister Site and the environmental impacts flowing from that site. The employees of Diamond Shamrock Corporate Company controlled and/or performed the environmental investigation of the Lister Site and the interactions with DEP. Diamond Shamrock Corporate Company changed its name to "Maxus Corporate Company" in 1988 and was merged into Maxus in 1998. Pursuant to the terms of that merger agreement, Maxus assumed and succeeded to the liabilities of Maxus Corporate Company. Accordingly, "Maxus" includes "Maxus Corporate Company" for all purposes.

30. As part of the September 4, 1986 transaction whereby Maxus sold DSCC to OCC, Maxus agreed to manage the environmental liabilities at Old Diamond Shamrock's historical sites and to indemnify OCC from certain liabilities associated therewith.

31. At various times Maxus (directly and through its alter-egos, Tierra and Maxus Corporate Company) controlled all aspects of the Lister Site, including access to the site, security for the site, maintenance and demolition of the facilities on the site, and the environmental investigation and response at the site. During the time of Maxus' control, discharges of TCDD from the facilities on the Lister Site continued to occur. Maxus is now an indirect subsidiary of Spanish oil giant Repsol, through YPFH and YPF. Maxus is a "discharger" and a person "in any way responsible" under the Spill Act.

32. After TCDD contamination was discovered at the Lister Site, Old Diamond Shamrock acquired ownership of 120 Lister Avenue in 1984 and reacquired 80 Lister Avenue in 1986. Old Diamond Shamrock then transferred title to both 80 and 120 Lister Avenue to Tierra,

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which continues to own the entire Lister Site today. During the time of Tierra's ownership and control, discharges of TCDD continued to occur from the facilities on the Lister Site. Tierra is a "discharger" and a person "in any way responsible" under the Spill Act.

ALTER-EGO/COMMON ECONOMIC UNIT

33. Through a series of related transactions, Defendants Repsol, YPF, YPFH, CLHH, Maxus, and Tierra (the "Repsol Group") and non-party YPF International Ltd. have worked to strand the environmental liabilities associated with the Newark Bay Complex in Maxus and Tierra, while systematically stripping Maxus' and Tierra's assets and ability to satisfy these obligations in New Jersey and elsewhere. The members of the Repsol Group are, and at all material times were, acting jointly, as co-conspirators, as one cohesive economic unit, and as alter-egos of each other.

34. For many years following its September 4, 1986 sale of DSCC to OCC, Maxus managed all of the liabilities and obligations flowing from the Lister Site, while Tierra actually owned the Lister Site. During this era, Maxus was Tierra's parent company, and Maxus controlled all aspects of Tierra's and Maxus Corporate Company's operations. Tierra was created merely to hold the relevant environmental liabilities of Old Diamond Shamrock, including the Lister Site itself. Maxus controlled every aspect of Tierra and Maxus Corporate Company and operated them simply as vehicles to manage those environmental liabilities. However, Tierra was undercapitalized and wholly dependent upon and controlled by Maxus. Maxus, Maxus Corporate Company, and Tierra have operated as alter-egos of one another since 1986 and Maxus and Tierra continue to do so today.

35. While Maxus and Tierra continued to be alter egos of one another, Maxus' role expanded following its 1995 acquisition by YPF, the former Argentinean state-owned oil and gas

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conglomerate. After YPF's privatization in 1993, YPF embarked on a strategy to become a global force in the oil and gas industry. One of YPF's primary acquisitions was Maxus, which was acquired in 1995 for almost $2 billion in cash and assumed debt, and provided YPF with a strong presence in the United States, including New Jersey.

36. In 1996, YPF undertook a series of transactions to: (a) increase its profits from the various oil and gas investments and operations owned by Maxus prior to Maxus' acquisition; and (b) isolate the environmental liabilities associated with the Newark Bay Complex and various other sites in New Jersey and elsewhere. The plan was developed by Maxus and YPF and approved by the Board of YPF in 1996. YPF and Maxus knew that Maxus was liable, both directly and as the indemnitor of OCC, for environmental liabilities associated with the Newark Bay Complex, potentially totaling billions of dollars. The transfers of Maxus' assets were done with the actual intent to hinder, delay, and/or defraud the State of New Jersey and others.

37. In order to move Maxus' environmental liabilities and certain income-producing assets away from Maxus, YPF created a series of intermediate holding companies in the Netherlands, the Cayman Islands, Texas, and elsewhere. As part of this scheme, YPF directed the creation of two intermediate parent companies for Maxus and Tierra, specifically, YPFH and YPF International Ltd. Additionally, CLHH was created to be the intermediate holding company between Tierra and YPFH.

38. In 1996, immediately following the creation of the various intermediate holding companies, YPF had Tierra – then Maxus' sister company as a result of the restructuring – assume all of Maxus' obligations to OCC flowing from the Lister Site as well as other environmental liabilities in New Jersey and elsewhere through an "Assumption Agreement." At the time, Tierra's chief "asset" was the Lister Site itself.

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39. The scheme also dictated that YPF, YPFH, CLHH, Maxus, and YPF International, Ltd. act in concert to fund certain environmental liabilities including those environmental liabilities associated with the Diamond-era production at the Lister Site, and other expenses, such as lobbying in New Jersey and Washington, D.C. regarding the Lister Avenue Site and associated liabilities, through a "Contribution Agreement." Funding under the Contribution Agreement was to occur via direct, cascading capital contributions from YPF to its wholly-owned subsidiary YPF International Ltd., from YPF International Ltd. to its wholly-owned subsidiary YPFH, from YPFH to its wholly-owned subsidiary CLHH, and from CLHH to its wholly-owned subsidiary Tierra.

40. Under the terms of the Contribution Agreement, the obligations of YPF and its wholly-owned subsidiaries to fund Tierra are capped at approximately $111 million for all obligations assumed pursuant to the Assumption Agreement. The cap merely reflected the estimated amount of these liabilities booked by Maxus at the time of the transaction. As part of YPF's plan to strand the environmental liabilities associated with the Lister Site and elsewhere, the Contribution Agreement also provides that once the cap is met, YPF, YPFH, CLHH, Maxus, and YPF International Ltd. have no further obligation to fund Tierra. That cap has been exceeded, thereby extinguishing the contractual obligations of YPF, YPFH, CLHH, Maxus, and YPF International Ltd. to fund Tierra.

41. Over the course of the same time period beginning in 1996, YPF also moved essentially all of Maxus' foreign income-producing assets to offshore entities owned by YPF, and directed Maxus to sell key domestic operations to third parties. A substantial portion of Maxus' assets, including its key offshore assets, were transferred or sold for less than fair market value.

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42. For example, Maxus' primary assets at this time were Maxus Southeast Sumatra, LLC and YPF Java Baratlaut, B.V. (collectively, the "Indonesian Assets") which were held in Maxus Indonesia, Inc., a wholly-owned subsidiary of Maxus. In 1995, prior to its acquisition by YPF, Maxus received an offer from a third-party energy company to purchase the Indonesian Assets for $585 Million. Maxus rejected the offer because it was substantially less than Maxus Indonesia, Inc. had been valued internally. Indeed, in mid-1997, third party market analysts' reports and publicly available information indicate that Maxus Indonesia, Inc. had a fair market value in the range of $700 Million to $1.1 Billion based upon the Indonesian Assets. Despite the foregoing, YPF directed that Maxus transfer the Indonesian Assets to an international indirect subsidiary of YPF for $505 Million, which was later adjusted to $568 Million. Maxus transferred the Indonesian Assets at substantially less than fair market value as directed by YPF effective December 31, 1997.

43. Another of Maxus' key assets was YPF Ecuador, Inc., a wholly-owned subsidiary of Maxus (the "Ecuadorian Assets"). Publicly available information indicates that the Ecuadorian Assets had a fair market value of approximately $300 to $400 Million in 1997. Despite the foregoing, YPF directed that Maxus transfer the Ecuadorian Assets to an international indirect subsidiary of YPF for $183 Million. Maxus transferred the Ecuadorian Assets at substantially less than fair market value as directed by YPF effective December 31, 1997.

44. In 1998, many of Maxus' subsidiaries that once held assets but were left empty by these various transactions, including Maxus Indonesia, Inc. and Maxus Corporate Company, were merged back into Maxus in 1998. The merger agreements were executed on behalf of Maxus and each and every of its merged subsidiaries by their common vice-president, David

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Wadsworth, and adopted by their common secretary, H. R. Smith. During this time period, Mr. Wadsworth was also the vice-president of YPFH and CLHH. Similarly, during this time period, Mr. Smith was the secretary of YPFH, CLHH, and Tierra.

45. By 2001, Maxus did not have income-producing assets sufficient to fund its own operations and liabilities and was forced to rely upon its cash reserves. By no later than 2005, and likely some time in 2003 or 2004, Maxus had depleted all of its cash reserves and was forced to look to YPF and its subsidiaries for all of its funding.

46. In fact, in 2001, YPF International Ltd. submitted a "financial guarantee" on behalf of Maxus in the amount of $20 million to DEP for chromium-contaminated sites in New Jersey subject to the Assumption and Contribution Agreements because Maxus and its direct parent, YPFH, lacked the financial ability to do so. YPF took over YPF International Ltd.'s role of being Maxus' financial guarantor to DEP in 2002 and 2003 because YPF International Ltd. no longer had sufficient assets to do so. YPF International Ltd.'s precarious financial situation was due to Repsol's stripping of the former Maxus assets from YPF's (and YPF International Ltd.'s) international subsidiaries and moving them to Repsol's international subsidiaries that were not part of the YPF ownership chain. Repsol moved the assets in an effort to further insulate them from Maxus' and Tierra's environmental liabilities in New Jersey.

47. In similar fashion, Repsol placed Maxus in even further debt by taking Maxus' remaining cash reserves and booking the $325 Million transaction as a "loan," which remains outstanding. As a result of YPF's 1996 plan, as adopted and furthered by Repsol, shareholder equity and retained deficit of the US Group – YPFH, CLHH, Maxus and its subsidiaries, and Tierra – was approximately <u>negative</u> $150 million and <u>negative</u> $650 million, respectively, by March of 2006, a mere ten years later. Currently, neither Maxus nor Tierra are able to

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independently meet their financial obligations as they become due, and they must look to YPF and Repsol for funding. To date, YPF, at the direction and approval of Repsol, has provided this funding to temporarily sustain Maxus and Tierra while they furthered their scheme to remove Maxus' assets and strand liabilities in Tierra. The YPF and Repsol funding is not secured and can stop at any time.

48. Accordingly, starting in 2005, YPF made other funding arrangements via inter-company credit facilities to permit YPFH and its subsidiaries, CLHH, Maxus and its subsidiaries, and Tierra, to continue as going concerns.[1] In August 2005, YPF extended the first credit facility to YPFH in an amount of $35 million. By May 2006, a mere nine months later, YPF had amended the credit facility with YPFH no less than three times, raising the amount "loaned" to $190 million. YPFH distributed the funds for the benefit of Maxus and Tierra. These credit facilities are unsecured, and neither Maxus nor Tierra have any apparent ability to repay the "loans." Moreover, without the credit facilities, YPF's auditor, Deloitte & Touche, refused to give YPFH and its subsidiaries, including CLHH, Maxus, and Tierra, a clean financial bill of health in YPFH's consolidated financial report.

49. YPFH and CLHH do not have any operations or employees. Similarly, YPFH, CLHH, and Tierra do not have any independent income. Rather, they continue to exist solely at the whim and control of YPF and Repsol. Indeed, Maxus and Tierra submit monthly "forecasts" to YPF that estimate their cash needs. YPF thereafter requests approval of the requested amounts from Repsol. Only after Repsol approves the requests for funds does YPF transfer the approved cash allowances into each entity's bank account.

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[1] YPFH is currently the top-tiered American subsidiary of YPF. YPFH is merely a holding company, owning the stock of Maxus and CLHH. CLHH is another empty holding company, which only owns the stock of Tierra. For almost a decade, since the inception of the Assumption Agreement and Contribution Agreements, YPF and its American subsidiaries have operated jointly, as co-conspirators, as one cohesive economic unit and as alter-egos.

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50. The officers and directors of YPF International Ltd., YPFH, CLHH, Tierra, and Maxus significantly overlap, and in some instances have been identical for years. Moreover, the vast majority of officers and directors of YPFH, CLHH, and Tierra came from Maxus, YPF, and/or Repsol.

51. In 1999, Repsol acquired in excess of 95% of YPF's stock, thereby becoming the majority owner. Thereafter, in 2003, Repsol implemented its own plan of reorganization whereby it divided its worldwide operations, including YPF and its wholly-owned subsidiaries, into three divisions: Upstream, Downstream, and "ABB" (Argentina, Bolivia and Brazil). YPF and its wholly-owned subsidiaries – including Maxus and Tierra – are owned under the ABB Division. However, Maxus is controlled by Repsol through its Upstream Group. Likewise, because it is not an operating company but merely designed to hold the liabilities at issue, Tierra directly reports to and is controlled by Repsol in Madrid.

52. Repsol and its divisions do not adhere to corporate formalities regarding separateness. While the funding of the US Group continues to flow through YPF at the direction of Repsol, the environmental practices and operations of Maxus and Tierra are controlled directly by Repsol. Repsol directs and controls the policies, procedures, funding, and actions of YPF, YPFH, CLHH, Maxus, and Tierra.

53. The Repsol Group is, and at all material times was, acting jointly, as co-conspirators, as a one cohesive economic unit, and its members are alter-egos of one and another. As such, each member of the Repsol Group is liable as and for the other members of the group, including all of Tierra's and Maxus' environmental liabilities and obligations for discharges of TCDD at and from the Lister Site.

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HAZARDOUS SUBSTANCES PRODUCED AT THE LISTER SITE

54. Old Diamond Shamrock owned and controlled the Lister Site from 1940 through 1971 and from 1984 through 1986 and also exercised control over, and periodically managed the operations at the Lister Site, between 1971 and 1977. From the mid-1940s through 1969, Old Diamond Shamrock manufactured agricultural chemicals at a portion of the Lister Site, including DDT and phenoxy herbicides. DDT production began before the end of World War II and continued through the late-1950s when Old Diamond Shamrock's DDT operations were consolidated at its Greens Bayou Plant in Houston, Texas. The Greens Bayou Plant was also extensively contaminated with hazardous substances intentionally discharged by Old Diamond Shamrock.

55. Production of phenoxy herbicides commenced in 1948 and continued through the summer of 1969 and thereafter. Two chemicals manufactured at the Lister Site were 2,4-dichlorophenoxyacetic acid ("2,4-D") and 2,4,5-trichlorophenoxyacetic acid ("2,4,5-T"). TCDD (or 2,3,7,8-tetrachlorodibenzo-p-dioxin) is a particularly toxic form of dioxin that was formed as a by-product of the 2,4,5-T process.

56. Like many other constituents used, produced, and discarded at the Lister Site, DDT, 2,4-D, 2,4,5-T, and TCDD all constitute "hazardous substances," as defined in N.J.S.A. 58:10-23.11b.

OPERATIONS AND PRACTICES AT THE LISTER SITE

57. As has been previously held by the courts of New Jersey, Old Diamond Shamrock's operations at the Lister Site offer a glimpse of an exceedingly rare type of corporate citizen: one that both undertook a "deliberate course of pollution [constituting] intentional conduct" and one that had the "subjective knowledge of harm" posed by the TCDD in its

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discharges and emissions. Diamond Shamrock Chems. Co. v. Aetna Cas. & Sur. Co., 258 N.J. Super. 167, 215-16 (App. Div. 1992).

58. As laid out by the New Jersey Appellate Division, Old Diamond Shamrock's production practices at the Lister Site were notorious:

a. Almost from the day production of the phenoxy herbicides commenced in 1948, the workers at the Lister Site experienced chloracne (a disfiguring disease typically involving open and closed comedones, pustules, cysts and blisters on the face, armpits, and groin);

b. By 1955, Old Diamond Shamrock was aware that its processes were causing the chloracne and was advised to reduce its air contamination and to insist upon personnel and plant cleanliness. These suggestions were either ignored or poorly implemented;

c. In the Autumn of 1959, Old Diamond Shamrock was advised that a German chemical manufacturer had discovered that TCDD was the causative agent of chloracne and that decreasing Old Diamond Shamrock's reaction temperature in the 2,4,5-T manufacturing process would substantially reduce the production of TCDD. Old Diamond Shamrock was offered a two-step process by which TCDD could be eliminated – or at least appreciably reduced – in the 2,4,5-T manufacturing process. Old Diamond Shamrock instead decided to run the process at a higher temperature than recommended because reducing the autoclave temperature also would reduce production volumes and, therefore, Old Diamond Shamrock's profits;

d. In 1960, a reaction in the autoclave – whose temperature was "out of control" – caused an explosion that destroyed the larger of the two process buildings on the Lister Site. Following the explosion, Old Diamond Shamrock rebuilt the destroyed

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manufacturing process building. Old Diamond Shamrock had the opportunity to employ improved processes and techniques to lower the TCDD production, but again chose not to do so to avoid incurring capital costs and ensure increased profitability;

e. Throughout its years of operation, vapors produced by the 2,4,5-T process were vented into the atmosphere on a daily basis. Old Diamond Shamrock's emissions from the scrubber unit would literally "pit" the paint on the cars in the parking lot – appearing as if acid had been thrown on them. Only in 1967 did Old Diamond Shamrock construct a carbon tower designed to remove TCDD in its process and finished product at or below a level of one part per million. Even after the carbon tower was installed, there was no decrease in the chloracne among the workers: monitoring reports from 1968 and 1969 showed dioxin levels in Old Diamond Shamrock's process and finished product at up to 9.6 parts per million and employees recall finished product with up to 80 parts per million.

See Diamond Shamrock Chems. Co., 258 N.J. Super. at 181-87, 212-13.

59. Old Diamond Shamrock's production processes were not reflective of the industry norm at the time. In fact, records indicate that Old Diamond Shamrock's products consistently contained more TCDD than their competitors' products.

60. Similarly, Old Diamond Shamrock's waste management and environmental practices were not reflective of industry standards at the time. In fact, New Jersey's courts have determined that Old Diamond Shamrock's waste management and environmental practices underscore the intentional nature of its behavior:

a. A number of former plant workers testified that Old Diamond Shamrock's waste management policy essentially amounted to "dumping everything" into the Passaic River;

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b. From the mid-1940s through 1955, all waste products from chemical processes were either directly discharged or ultimately released into the Passaic River;

c. In 1956, discharges from the Lister Site plant were directed to an industrial sewer line, but the evidence demonstrates that not all of the effluent from the plant was actually directed into the line;

d. In fact, so much DDT waste water was directed into the Passaic River that a mid-river "mountain" of DDT was created. Employees were directed to wade surreptitiously into the Passaic River at low tide and "chop up" the deposits so that they would not be seen by passing boats;

e. In the old – but undamaged – building where Old Diamond Shamrock manufactured 2,4-D and 2,4,5-T, Old Diamond Shamrock's "heedless indifference to the environmental damage which resulted from its manufacturing operations" continued after the 1960 explosion. The floors of the old building would accumulate so much 2,4-D and 2,4,5-T that twice-monthly they would be washed down with sulfuric acid, with the waste water flowing into trenches that ran outside the building and into the Passaic River. Routine blockages in the trenches and waste water pits also would cause effluent to back up and migrate into the Passaic River. The concrete floor would be replaced every few years because it was turned to "dust" through the acid-washing process;

f. The "sloppy practices" tolerated by Old Diamond Shamrock management were also evident from the various leaks in the autoclave room and the pipes that ran between the two manufacturing buildings. Likewise, the pipelines along the 2,4,5-T process units constantly became clogged. Employees were then directed to break and steam clean the

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clogged lines. The material washed from the pipelines was discharged onto the ground or directly into the Passaic River;

g. The 10,000 gallon storage tanks on the Lister Site routinely were cleaned of amine, butyl-T, 2,4-D, and 2,4,5-T by shoveling out the residue at the bottoms of the tanks once or twice a month. In this process, both liquid and solid waste fell onto the ground where the waste would be washed away into the Passaic River.

See Diamond Shamrock Chems. Co., 258 N.J. Super. at 181-87.

61. Although Old Diamond Shamrock first ceased production at the Lister Site in 1969 and later conveyed the property in 1971, discharges of TCDD and other hazardous substances produced by Old Diamond Shamrock's operations continued from the facilities on the Lister Site into the 1980s and beyond. Old Diamond Shamrock did not properly dismantle the process units and other facilities when it ceased operations on the Lister Site. In fact, extremely high levels of TCDD and other hazardous substances remained in and on the process buildings, tanks, sumps, drains, sewers, pipes and other equipment, which were simply left on the Lister Site. The TCDD and other hazardous substances continued to discharge into the environment from the process buildings, tanks, sumps, drains, sewers, pipes and other equipment throughout the 1970s and 1980s.

62. As a result of the Defendants' conduct at the Lister Site, TCDD has been found in the soil at and around the Lister Site, in the groundwater under and around the Lister Site, and in the Newark Bay Complex. Defendants failed to timely notify Plaintiff DEP of the discharges of TCDD and other hazardous substances at and from the Lister Site as required by N.J.S.A. 58:10-23.11e.

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63. Based upon the foregoing, the New Jersey courts already have found that the subjective knowledge of Old Diamond Shamrock was proven, as a matter of fact: Old Diamond Shamrock knew "the nature of the chemicals it was handling," knew that "they were being continuously discharged into the environment," and knew that "they were doing at least some harm." Diamond Shamrock Chems. Co., 258 N.J. Super. at 210-15 (Old Diamond Shamrock's "deliberate course of pollution constituted intentional conduct with the corresponding intentional injury inextricably intertwined"). In that litigation, OCC and Maxus – which had become the successors to Old Diamond Shamrock's liability – acknowledged and judicially admitted that ongoing discharges of TCDD and other hazardous substances continued from and onto the Lister into the 1980s and beyond. OCC and Maxus sought insurance coverage for their extensive environmental harm caused by the discharges at the Lister Site, and offered testimony showing that discharges of TCDD and other hazardous substances continued through the 1980s.

64. Likewise, when Maxus brought suit against the United States government alleging that the government was liable for a portion of the remediation costs associated with its former agent orange and pesticides production, Maxus put forward evidence indicating that hazardous substances continued to be released and/or discharged from the Lister Site into the 1980s. Maxus' suit was dismissed prior to YPF's acquisition of Maxus and their joint efforts to strip Maxus' assets away from the liabilities at issue.

65. OCC and/or Maxus clearly "discharged" TCDD and other hazardous substances within the meaning of N.J.S.A. 58:10-23.11b. Defendants have also conducted operations on the Lister Site that involved the generation, storage, and handling of "hazardous substances," as defined in N.J.S.A. 58:10-23.11b.

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66. By the judgment of the trial court and the affirming decision of the New Jersey Superior Court Appellate Division in Diamond Shamrock Chems. Co. v. Aetna Cas. & Sur. Co., 258 N.J. Super. 167 (App. Div. 1992), Defendants are collaterally estopped from relitigating the nature and extent of the intentional discharges at the Lister Site and into the Passaic River and Newark Bay Complex.

THE REGULATORY HISTORY

67. The Lister Site. In 1982, the United States Environmental Protection Agency ("EPA") initiated a National Dioxin Strategy, targeting facilities that produced 2,4,5-T and its herbicide derivatives for soil sampling and testing for dioxins.

68. After DEP learned of the TCDD contamination at the Lister Site, then-New Jersey Governor Thomas H. Kean issued Executive Order 40, authorizing DEP to engage in emergency measures "necessary to fully and adequately protect the health, safety and welfare of New Jersey citizens." Pursuant to Executive Order 40, DEP issued an administrative order on June 13, 1983, requiring Old Diamond Shamrock to implement certain stabilization measures at the Lister Site to prevent further TCDD migration off-site. Two subsequent administrative consent orders were entered between DEP and DSCC in 1984 to address the Lister Site itself.

69. In 1987, EPA selected an interim remedy for the Lister Site. Under a 1990 Consent Decree with EPA and DEP, OCC and Tierra submitted designs for the interim remedy on the Lister Site. The construction of the interim remedy was just recently completed in 2001. The interim remedy is to be periodically reevaluated.

70. The Newark Bay Complex. Under an Administrative Order on Consent (AOC) executed with EPA on April 20, 1994, Tierra agreed to study a six-mile stretch of the Passaic River and to determine: (1) the spatial distribution and concentrations of TCDD and other

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contaminants in the Passaic River; (2) the primary human and ecological receptors of the contaminated sediments; and (3) the transport of contaminated sediment within the six-mile stretch.

71. However, after approximately thirteen years, this study has not yet been completed. By entering into the 1994 AOC, Tierra and the other Defendants agreed to undertake a proper investigation of the extent and impacts of the TCDD contamination emanating from the Lister Site into the lower six miles of the Passaic River. Defendants instead devoted their resources to various efforts to shift blame away from their activities on the Lister Site and onto other parties and chemicals.

72. Defendants concentrated their resources on manipulating the focus of the investigation away from TCDD and to mislead the regulators. When Defendants initially conducted sampling and reported data to the Government, they did not even include or mention TCDD – the driving force behind the entire study. Likewise, in maps submitted to the regulators as part of the investigation, the Lister Site was inexplicably left off the map and not even identified.

73. Defendants also have attempted to bias the results of the investigation and testing that they controlled. For example, EPA instructed Defendants not to undertake certain studies because EPA was concerned that the results would be misleading and incorrect and would understate the risk to human health and the environment caused by Defendants' TCDD. Defendants nonetheless conducted the studies.

74. Defendants' efforts appear geared to justify a predetermined conclusion that there is no increased risk to human health or the environment posed by the TCDD and, therefore, that the TCDD may remain in the Newark Bay Complex.

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75. Likewise, by stripping Maxus of its assets during this period of delay, the Repsol Group has ensured that Maxus and Tierra do not and will not have the resources to remediate the Newark Bay Complex

76. Certain key aspects of the investigation of the lower six miles of the Passaic River were removed from Defendants' control by EPA letter dated January 30, 2001. However, effective June 22, 2004, EPA entered into a new AOC with OCC and about 30 other parties to fund $10 million of a $19 million study of the 17-mile stretch of the Passaic River from the Dundee Dam to Newark Bay. Pursuant to a separate agreement, the United States Army Corps of Engineers ("USACE") and New Jersey Department of Transportation ("NJDOT") are to contribute $9 million of the cost of this study, though the USACE's funding has recently come into doubt.

77. Following the filing of a notice of Citizen's Suit for the TCDD impacts in Newark Bay, OCC entered into a separate AOC with EPA on February 13, 2004 to begin another study of the impacts of the Lister Site, this time focusing on Newark Bay and adjacent waters. By entering into the AOC, Defendants deprived courts of jurisdiction to hear the Citizen's Suit. This AOC provides that EPA will maintain oversight control of the Newark Bay investigation.

78. On September 19, 2003, Plaintiff DEP issued a Spill Act directive to OCC, Maxus, Tierra, and others pursuant to N.J.S.A. 58:10-23.11f.a. directing these entities to assess any natural resource that has been, or may be, injured as a result of the discharges of TCDD from the Lister Site.

79. Plaintiff DEP and NJDOT, in conjunction with EPA and other federal agencies, have investigated and are investigating the nature and extent of the contamination in the Newark Bay Complex, remediation options, and disposal techniques.

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80. Sampling results from investigations reveal the presence of TCDD at extremely high concentrations.

81. DEP is working to assess the injuries to the State of New Jersey's natural resources and seeks to recover its assessment costs in this action. However, Plaintiffs are not, at this time, seeking natural resources damages for the Newark Bay Complex in this action, and the State reserves the right to bring such claims in the future.

CONTAMINATION OF THE NEWARK BAY COMPLEX

82. The Newark Bay Complex now constitutes one of the worst TCDD contaminated sites in the world. TCDD is a persistent substance that remains in the environment long after discharge. Further, it bioaccumulates and/or biomagnifies in the food chain and the environment. The levels of TCDD in the Newark Bay Complex, and in its fish and shellfish, present an endangerment to human health, the environment, and the well-being of the people of the State of New Jersey.

83. TCDD in the Newark Bay Complex is clearly traceable to the Lister Site. There is a clear TCDD signal in the Passaic River, Newark Bay and beyond, which is unmistakably tied to the Lister Site and the actions of Defendants. However, while it is known that the TCDD in the Newark Bay Complex is from the Lister Site and caused by the actions of Defendants, the TCDD contamination cannot be segregated between the discharges that occurred before or after 1971, 1977 or 1983.

84. Portions of the Passaic River near the Lister Site constitute an ongoing source of TCDD contamination throughout the remainder of the Newark Bay Complex. High levels of TCDD are intermittently released from the Passaic River in storm and other high water events

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that scour the river bottom. Unacceptable levels of TCDD are persistently discharged from the surface sediments in the Passaic River to the remainder of the Newark Bay Complex.

FIRST COUNT

Spill Act

85. Plaintiffs repeat each allegation of paragraphs 1 through 84 above as though fully set forth in its entirety herein.

86. Each Defendant is a "person" within the meaning of N.J.S.A. 58:10-23.11b.

87. The State of New Jersey has incurred, and will continue to incur, costs as a result of the discharge of TCDD into the Newark Bay Complex. These costs include, but are not limited to, the costs of investigation, cleanup and removal, costs of assessing injuries to the natural resources of New Jersey, reasonable costs of preparing and successfully litigating this action, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z.

88. The State of New Jersey has incurred, and will continue to incur, damages as a result of the discharge of TCDD into the Newark Bay Complex. These damages include, but are not limited to, damages to and loss of value of real or personal property and the lost income associated therewith.

89. Plaintiff Administrator has certified, and may certify for payment, valid claims made against the Spill Fund concerning the discharges of TCDD to the Newark Bay Complex, and further has approved, and may approve, other appropriations from the Spill Fund to address the discharges of TCDD to the Newark Bay Complex.

90. The costs and damages the State of New Jersey has incurred, and will incur, for the Newark Bay Complex are "cleanup and removal costs," within the meaning of N.J.S.A. 58:10-23.11b, including: all costs associated with (1) the removal or attempted removal of

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hazardous substances, or (2) taking reasonable measures to prevent or mitigate damage to the public health, safety, or welfare, including but not limited to, public and private property, shorelines, beaches, surface waters, water columns and bottom sediments, soils and other affected property, including wildlife and other natural resources. The cleanup and removal costs include the costs of assessing the injuries to the natural resources of New Jersey, those program costs directly related to the cleanup and removal of the discharge and, with respect to the recovery of past costs, any indirect costs incurred by the State of New Jersey. N.J.S.A. 58:10-23.11b.

91. Defendants are "dischargers" and persons "in any way responsible" for hazardous substances (TCDD) discharged to the Newark Bay Complex, and are strictly liable, jointly and severally, without regard to fault, for all cleanup and removal costs, including, but not limited to, the costs of investigation, cleanup and removal, the costs of assessing the injuries to the natural resources of New Jersey, the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, the reasonable costs of preparing and successfully litigating this action, any other costs incurred pursuant to the Spill Act, and expenditures made by the State of New Jersey.

92. Defendants' discharges of TCDD into the Newark Bay Complex were the result of Defendants' gross negligence and/or willful misconduct, within the knowledge and privity of the owner, operator, or person in charge, and the Lister Site was a major facility as defined by N.J.S.A. 58:10-23.11b. Therefore, the $50,000,000.00 maximum limitation codified at N.J.S.A. 58:10-23.11g.b. is inapplicable to any action against Defendants. Further, Defendants are jointly and severally liable for the full amount of damages.

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93. Pursuant to the Spill Act, Plaintiffs may bring an action in the Superior Court for injunctive relief, for unreimbursed costs of investigation, cleanup or removal costs, including the costs of assessing the injuries to the natural resources of New Jersey, reasonable direct and indirect costs of preparing and successfully litigating the action, damages to and loss of value of real or personal property and lost income associated therewith, for any unreimbursed costs or damages paid from the Spill Fund, and for any other unreimbursed costs or damages the State of New Jersey incurs under the Spill Act, N.J.S.A. 58:10-23.11u.b.(1), (2), (3) and (5).

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray that this Court:

a. Order Defendants to pay or reimburse Plaintiffs for all unreimbursed costs that the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of the discharges of TCDD, including, but not limited to, all cleanup and removal costs, other costs of investigation, cleanup and removal, the costs of assessing the injuries to the natural resources of New Jersey, the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, any unreimbursed costs or damages paid from the Spill Fund, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z, with applicable interest;

b. Enter declaratory judgment against Defendants for all unreimbursed costs that the State of New Jersey may incur in the future, separately or in conjunction with federal agencies, as a result of the discharges of TCDD, including, but not limited to, all cleanup and removal costs, other costs of investigation, cleanup and removal, the costs of assessing the injuries to the natural resources of New Jersey,

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the costs of all reasonable measures taken to mitigate damage to the public health, safety or welfare as a result of the discharges, any unreimbursed costs or damages paid from the Spill Fund, reasonable costs of preparing and successfully litigating this action, and any other costs incurred pursuant to the Spill Act, N.J.S.A. 58:10-23.11a to -23.11z;

c. Order Defendants to pay and reimburse Plaintiffs for all damages that the State of New Jersey has incurred, and may incur in the future, including, but not limited to, damages to and loss of use of real or personal property and the lost income associated therewith, with applicable interest;

d. Assess civil penalties as provided by N.J.S.A. 58:10-23.11u and its predecessors against Defendants for Defendants' failure to timely notify Plaintiff DEP of the discharges of TCDD and other hazardous substances as required by N.J.S.A. 58:10-23.11e;

e. Award Plaintiffs their reasonable direct and indirect costs and fees for preparing and successfully litigating this action; and

f. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not

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seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

SECOND COUNT

Water Pollution Control Act

94. Plaintiffs repeat each allegation of paragraphs 1 through 93 above as though fully set forth in its entirety herein.

95. Each Defendant is a "person" within the meaning of N.J.S.A. 58:10A-3.

96. Defendants discharged pollutants (TCDD) into the Newark Bay Complex within the meaning of N.J.S.A. 58:10A-3 & 58:10A-6.

97. The Commissioner has determined that Defendants violated provisions of the Water Pollution Control Act, N.J.S.A. 58:10A-1 to 37.23 and its predecessors.

98. The State of New Jersey has incurred, and will continue to incur, costs as a result of the discharge of TCDD into the Newark Bay Complex. These costs include, but are not limited to, the cost of any investigation, inspection, or monitoring survey which led to the establishment of the violation, the cost incurred in removing, correcting or terminating the adverse effects upon water quality resulting from the unauthorized discharge of TCDD, and the reasonable direct and indirect costs of preparing and litigating this action.

99. The State of New Jersey has incurred, and will continue to incur, damages as a result of the discharge of TCDD into the Newark Bay Complex.

100. Pursuant to N.J.S.A. 58:10A-10c., Plaintiffs may bring an action in the Superior Court for injunctive relief, N.J.S.A. 58:10A-10c.(1); for the costs of any investigation,

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inspection, or monitoring survey which led to the establishment of the violation, N.J.S.A. 58:10A-10c.(2); for the reasonable costs of preparing and litigating this case, N.J.S.A. 58:10A-10c.(2); for any reasonable cost incurred by the State of New Jersey in removing, correcting or terminating the adverse effects upon water quality, N.J.S.A. 58:10A-10c.(3); for actual damages caused by the unauthorized discharge, N.J.S.A. 58:10C.(4); and, for the actual amount of any economic benefits accruing to the violator from a violation, N.J.S.A. 58:10A-10c.(5).

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray that this Court:

a. Order Defendants to pay or reimburse Plaintiffs for all unreimbursed costs that the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of Defendants' discharges of TCDD, including, but not limited to, the cost of any investigation, inspection, or monitoring survey which led to the establishment of the violation and the cost incurred in removing, correcting, or terminating the adverse effects upon water quality resulting from the unauthorized discharge of TCDD, with applicable interest and the costs of assessing the injuries to the natural resources of New Jersey;

b. Enter declaratory judgment against Defendants for all unreimbursed costs that the State of New Jersey may incur, separately or in conjunction with federal agencies, as a result of Defendants' discharges of TCDD, including, but not limited to, the cost of any investigation, inspection, or monitoring survey which led to the establishment of the violation, and the cost incurred in removing, correcting, or terminating the adverse effects upon water quality resulting from the unauthorized

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discharge of TCDD and the costs of assessing the injuries to the natural resources of New Jersey;

c. Order Defendants to pay Plaintiffs in an amount equal to the actual amount of economic benefit that accrued, and continues to accrue, to Defendants as a result of the violations of the Water Pollution Control Act, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from the violations, the return earned or that may be earned on the amount of avoided costs, and any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of the violations, and any other benefits resulting from the violations.

d. Award Plaintiffs the reasonable direct and indirect costs and fees for preparing and litigating this action; and

e. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. Plaintiffs reserve the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005

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Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

THIRD COUNT

Public Nuisance

101. Plaintiffs repeat each allegation of paragraphs 1 through 100 above as though fully set forth in its entirety herein.

102. The use, enjoyment, and existence of the Newark Bay Complex and surrounding areas are rights common to the general public.

103. Defendants released and discharged hazardous substances (TCDD) into the Newark Bay Complex and surrounding areas and had an affirmative obligation to remedy the results of such discharges.

104. The TCDD contamination of the Newark Bay Complex and surrounding areas resulting from Defendants' releases and discharges of TCDD constitutes a physical invasion of public and private property and an unreasonable and substantial interference, both actual and potential, with the exercise of the public's common right to the use and enjoyment of the Newark Bay Complex and surrounding areas.

105. Defendants' releases and discharges, and failure to remedy the releases and discharges, of TCDD have caused and continue to cause a significant interference with the public health, public safety, public peace, public good and the public convenience.

106. Defendants' releases and discharges, and failure to remedy the releases and discharges, of TCDD were in violation of New Jersey law at the time of the releases, discharges and inaction.

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107. As long as the Newark Bay Complex and surrounding areas remain contaminated with Defendants' TCDD, the public nuisance continues.

108. Until the Newark Bay Complex and surrounding areas are remediated, Defendants are liable for the creation, and continued maintenance, of a public nuisance in contravention of the public's common rights.

109. Defendants' conduct was willful, wanton, and without regard to the rights of the Plaintiffs and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiffs for all costs the State of New Jersey has incurred, separately or in conjunction with federal agencies, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges, with applicable interest;

b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur, separately or in conjunction with federal agencies, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges;

c. Order Defendants to pay and/or reimburse Plaintiffs for all damages that the State of New Jersey has incurred, and may incur in the future, as a result of the public nuisance caused by Defendants' releases and discharges of TCDD and their failure to remedy the releases and discharges, with applicable interest.

d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiffs in an amount equal to the actual amount of economic benefits that

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accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, releases and discharges of hazardous substances to the Newark Bay Complex, and the nuisance created thereby, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiffs punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. The State reserves the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

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FOURTH COUNT

Trespass

110. Plaintiffs repeat each allegation of paragraphs 1 through 109 above as though fully set forth in its entirety herein.

111. Defendants are liable for trespass, and continued trespass, because Defendants released, discharged, and failed to remedy the releases and discharges of TCDD into the Newark Bay Complex and surrounding areas.

112. As long as the Newark Bay Complex and surrounding areas remain contaminated with Defendants' TCDD, Defendants' trespass continues.

113. Defendants' conduct was willful, wanton, and without regard to the rights of the Plaintiffs and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff DEP prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiffs for all costs the State of New Jersey has incurred as a result of the trespass to the Newark Bay Complex and surrounding areas, with applicable interest;

b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur as a result of the trespass to the Newark Bay Complex and surrounding areas;

c. Order Defendants to pay Plaintiffs for all damages the State of New Jersey has incurred, and may incur in the future, as a result of the trespass to the Newark Bay Complex and surrounding areas, with applicable interest;

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d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiffs in an amount equal to the actual amount of economic benefits that accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, releases and discharges of hazardous substances to the Newark Bay Complex and surrounding areas, and the trespass created thereby, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiffs punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. Plaintiffs reserve the right to bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the

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funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

FIFTH COUNT

Strict Liability

114. Plaintiffs repeat each allegation of paragraphs 1 through 113 above as though fully set forth in its entirety herein.

115. Toxic wastes are inherently abnormally dangerous and their release, disposal, and/or discharge is an abnormally dangerous activity.

116. Defendants are strictly liable for their abnormally dangerous activity because Defendants released, disposed of, and discharged toxic wastes (TCDD) from and at the Lister Site and into the Newark Bay Complex and surrounding areas.

117. Defendants' conduct was willful, wanton, and without regard to the rights of the Plaintiffs and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs prays that this Court:

a. Order Defendants to pay and/or reimburse Plaintiffs for all costs that the State of New Jersey has incurred as a result of the release, disposal and/or discharge of toxic wastes (TCDD) to the Newark Bay Complex and surrounding areas, with applicable interest;

b. Enter declaratory judgment against Defendants for all costs that the State of New Jersey may incur in the future as a result of the release, disposal, and/or discharge of toxic wastes to the Newark Bay Complex and surrounding areas;

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c. Order Defendants to pay Plaintiffs for all damages that the State of New Jersey has incurred, and may incur in the future, as a result of the release, disposal, and/or discharge of toxic wastes to the Newark Bay Complex and surrounding areas, with applicable interest;

d. Order Defendants to make restitution for their unjust enrichment and pay Plaintiffs in an amount equal to the actual amount of economic benefits that accrued and continue to accrue to Defendants as a result of Defendants' manufacturing and environmental practices, disposal, releases, and/or discharges of toxic wastes to the Newark Bay Complex and surrounding areas, with applicable interest. Such economic benefits include, but are not limited to, the amount of any savings realized from avoided capital or non-capital costs resulting from Defendants' actions, the return earned or that may be earned on the amount of avoided costs, any benefits accruing to Defendants as a result of a competitive market advantage enjoyed by reason of Defendants' actions, and any other benefits resulting from Defendants' actions;

e. Order Defendants to pay Plaintiffs punitive damages in an amount to be determined by the trier of fact; and

f. Award Plaintiffs such other monetary relief as this Court deems appropriate, except that nothing herein is intended to seek, and should not be interpreted to seek, that Defendants undertake any cleanup, removal, or remedial action within the Newark Bay Complex or on the Lister Site in response to this Complaint. Plaintiffs are not seeking, and this Complaint should not be characterized as asserting a claim for natural resources damages. Plaintiffs reserve the right to

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bring such claim for natural resources damages for the Passaic River and/or other parts of the Newark Bay Complex in the future. Additionally, Plaintiffs are not seeking to enforce or recover any costs covered by the 1990 Consent Decree regarding the Lister Site, nor are they seeking to enforce the December 14, 2005 Directive regarding the funding of a source control dredge plan or the September 19, 2003 Directive regarding assessment of natural resources damages.

SIXTH COUNT

Fraudulent Transfers

118. Plaintiffs repeat each allegation of paragraphs 1 through 117 above as though fully set forth in its entirety herein.

119. Repsol, YPF, YPFH, CLHH and Tierra are affiliates of Maxus as defined in N.J.S.A. 25:2-21.

120. YPF and Maxus engaged in a scheme to enrich YPF, and subsequently Repsol, by transferring substantially all of Maxus' assets to YPF affiliates, and subsequently to Repsol affiliates, for less than fair market value and isolating the environmental liabilities associated with the Lister Site and Newark Bay Complex in companies wholly unable to meet those obligations to the State of New Jersey and others, to wit, Maxus and Tierra. Such transfers include the 1997 transfer of the Ecuadorian Assets and the 1997 transfer of the Indonesian Assets, discussed supra.

121. Subsequently, Repsol furthered the scheme in 2001 and directed that the Ecuadorian Assets and Indonesian Assets be transferred from YPF's international subsidiaries to Repsol's international subsidiaries that are not within YPF's corporate structure. YPF thereafter

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transferred the foregoing former-Maxus assets from YPF's international subsidiaries to Repsol's international subsidiaries that are not within YPF's corporate structure.

122. YPF, Maxus, and Repsol acted with the actual intent to hinder, deny, or defraud the State. Maxus did not receive reasonably equivalent value in the transfers of assets, including but not limited to the Indonesian Assets and the Ecuadorian Assets. Maxus had liabilities beyond its ability to pay and YPF, Maxus, and Repsol knew that Maxus was going to incur further liabilities beyond Maxus' ability to pay.

123. All of the transfers constitute fraudulent transfers as defined in the New Jersey Uniform Fraudulent Transfer Act, N.J.S.A. 25:2-20 to -34. Plaintiffs did not discover these transfers or associated fair market values until after this suit was filed and could not have reasonably discovered them prior to such time. Plaintiffs reserve the right to provide additional evidence and examples as that information is discovered.

124. Defendants' conduct was willful, wanton, and without regard to the rights of Plaintiffs and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray that this Court:

a. Enter a judgment voiding the fraudulent transfers to the extent necessary to satisfy all costs and damages awarded to Plaintiffs;

b. Enter other equitable relief available under N.J.S.A. 25:2-29 to put Plaintiffs in the position they would have been in but for the fraudulent transfers, including awarding Plaintiffs a judgment against YPF, Maxus, and Repsol for the full value of all assets fraudulently transferred from Maxus; and;

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c. Award Plaintiffs reimbursement of attorneys' fees and costs, and such further relief as the Court may deem just and proper.

SEVENTH COUNT

Civil Conspiracy/Aiding and Abetting

125. Plaintiffs repeat each allegation of paragraphs 1 through 124 above as though fully set forth in its entirety herein.

126. YPF International Ltd. and Defendants Maxus, Tierra, CLHH, YPF, YPFH, and Repsol acted together and/or agreed or knowingly participated in a scheme to enrich YPF, and subsequently Repsol, by transferring substantially all of Maxus' assets to YPF affiliates, and subsequently to Repsol affiliates, for less than fair market value and isolating the environmental liabilities associated with the Lister Site and Newark Bay Complex in companies wholly unable to meet those obligations to the State of New Jersey and others, to wit, Maxus and Tierra. Repsol continues to direct YPF, Maxus, and Tierra and their operations and activities concerning the Passaic River and their liabilities in New Jersey. Under the direction of Repsol and/or YPF, each of the Defendants engaged in, inter alia, the following acts in furtherance of the conspiracy:

a. Maxus, at the direction of YPF, created various intermediate holding companies, including YPF International Ltd., YPFH, and CLHH, to isolate Maxus and Tierra far down in the corporate structure;

b. Maxus' contractually transferred its environmental liabilities, including those owed to the State of New Jersey, to Tierra. Such transfer was made for inadequate consideration;

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c. YPF International Ltd., YPF, YPFH, CLHH, and Maxus provided limited funding to Tierra for environmental expenses, including environmental liabilities in New Jersey;

d. YPF International Ltd., YPF, YPFH, CLHH, and Maxus provided limited funding to Tierra for other expenses, including lobbying efforts in and having an effect in New Jersey, as well as other activities in New Jersey;

e. YPF and Maxus agreed, and YPF directed Maxus to transfer substantially all of Maxus' assets to YPF's international subsidiaries for less than fair market value;

f. Maxus transferred substantially all of its assets to YPF affiliates for less than fair market value;

g. YPF International Ltd. and YPF submitted financial guarantee applications and guaranteed certain of Maxus' environmental liabilities in New Jersey which had been contractually assumed by Tierra;

h. Repsol knowingly and willfully joined in YPF's and Maxus' scheme to isolate assets from environmental liabilities, including the environmental liabilities at issue in this lawsuit;

i. In 2001, Repsol substantially assisted YPF's and Maxus' scheme by directing YPF to transfer the previously-transferred Maxus assets from YPF's international subsidiaries to Repsol's international subsidiaries that are not within YPF's corporate structure;

j. YPF transferred the previously-transferred Maxus assets from YPF's international subsidiaries to Repsol's international subsidiaries that are not within YPF's corporate structure, further distancing Maxus' former assets from the

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environmental liabilities parked in Maxus and Tierra, including those owed to the State of New Jersey;

k. In 2003, Repsol stripped substantially all of Maxus' cash reserves leaving Maxus without the ability to meet any of its financial obligations independently.

127. The State of New Jersey was harmed by the conduct of YPF International Ltd. and Defendants Maxus, Tierra, CLHH, YPF, YPFH, and Repsol.

128. Defendants Maxus, Tierra, CLHH, YPF, YPFH, and Repsol are jointly and severally liable as co-conspirators.

129. Defendants Maxus, Tierra, CLHH, YPF, YPFH, and Repsol are liable for aiding and abetting one another.

130. Defendants' conduct was willful, wanton, and without regard to the rights of the Plaintiffs and the citizens of New Jersey.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs prays that this Court:

a. Enter judgment, jointly and severally, against Maxus, Tierra, CLHH, YPF, YPFH, and Repsol;

b. Order Maxus, Tierra, CLHH, YPF, YPFH, and Repsol to pay Plaintiffs for the full value of all assets fraudulently transferred from Maxus in order to put Plaintiffs in the position they would have been in, but for the fraudulent transfers;

c. Order Defendants to pay Plaintiffs for all damages the State of New Jersey has incurred, and may incur in the future, as a result of the conspiracy orchestrated and implemented by Maxus, Tierra, CLHH, YPF, YPFH, and Repsol; and

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d. Order Maxus, Tierra, CLHH, YPF, YPFH, and Repsol to pay Plaintiffs punitive damages in an amount to be determined by the trier of fact.

ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY
Attorney for Plaintiffs

By: _____
John F. Dickinson, Jr.
Deputy Attorney General

Dated: _____, 2007

Of Counsel:

CONNELLY•BAKER• WOTRING•JACKSON LLP
700 Louisiana Street
Suite 1850
Houston, Texas 77002-2778

GORDON & GORDON
505 Morris Avenue
Springfield, NJ 07081

LAMBERT & NELSON, PLC
701 Magazine Street
New Orleans, Louisiana 70130-3629

REICH & BINSTOCK
4265 San Felipe
Suite 1000
Houston, Texas 77027

DEMAND FOR TRIAL BY JURY

Plaintiffs hereby demand a trial by jury on all issues involving the causes of action in the Third Count (Public Nuisance), Fourth Count (Trespass), Fifth Count (Strict Liability), Sixth Count (Fraudulent Transfers), and the Seventh Count (Civil Conspiracy/Aiding and Abetting).

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DESIGNATION OF TRIAL COUNSEL

Pursuant to R. 4:25-4, the Court is advised that William J. Jackson, Special Counsel to the Attorney General, is hereby designated as trial counsel for Plaintiffs in this action.

CERTIFICATION REGARDING OTHER PROCEEDINGS AND PARTIES

Undersigned counsel hereby certifies, in accordance with R. 4:5-1(b)(2), that the matters in controversy in this action are not the subject of any other pending or contemplated action in any court or arbitration proceeding known to Plaintiffs at this time, nor is any non-party known to Plaintiffs at this time who should be joined in this action pursuant to R. 4:28, or who is subject to joinder pursuant to R. 4:29-1. If, however, any such non-party later becomes known to Plaintiffs, an amended certification shall be filed and served on all other parties and with this Court in accordance with R. 4:5-1(b)(2).

ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY
Attorney for Plaintiffs

By: _____
John F. Dickinson, Jr.
Deputy Attorney General

Dated: _____, 2007

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ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY
Richard J. Hughes Justice Complex
25 Market Street
PO Box 093
Trenton, NJ 08625-0093
Attorney for Plaintiffs

By: John F. Dickinson, Jr.
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(609) 984-4654

CONNELLY•BAKER•
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By: Michael Connelly, Special Counsel
(713) 980-1700

GORDON & GORDON
505 Morris Avenue
Springfield, NJ 07081

By: Michael Gordon, Special Counsel
(973) 467-2400

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	:	SUPERIOR COURT OF NEW JERSEY LAW DIVISION - ESSEX COUNTY DOCKET NO. ESX-L-9868-05 CIVIL ACTION **ORDER GRANTING PLAINTIFFS LEAVE TO FILE THEIR SECOND AMENDED COMPLAINT AND DEMAND FOR JURY TRIAL**

THIS MATTER having been brought before the Court on the application of Anne Milgram, Attorney General of New Jersey, Connelly, Baker, Wotring, Jackson, L.L.P. and Gordon & Gordon, attorneys for Plaintiffs, New Jersey Department of Environmental Protection

and Administrator of the New Jersey Spill Compensation Fund, for an Order granting Plaintiffs Leave to File Their Second Amended Complaint and Demand for Trial by Jury and for good cause shown;

IT IS on this _____ day of _____ 2007;

ORDERED that Plaintiffs' motion is hereby GRANTED and Plaintiffs shall be permitted to file their Second Amended Complaint and Demand for Trial by Jury against Defendants.

It is **FURTHER ORDERED** that counsel for Plaintiffs shall serve a copy of this Order on all counsel of record within seven (7) days of the date of entry of this Order.

IT IS SO ORDERED

_____
Hon. Rachel N. Davidson, J.S.C.

[ ] opposed

[ ] unopposed

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ANNE MILGRAM
ATTORNEY GENERAL OF NEW JERSEY
Richard J. Hughes Justice Complex
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Houston, Texas 77002-2778
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REICH & BINSTOCK
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Houston, Texas 77027
Special Counsel to the Attorney General

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION and THE ADMINISTRATOR OF THE NEW JERSEY SPILL COMPENSATION FUND, Plaintiffs, v. OCCIDENTAL CHEMICAL CORPORATION, TIERRA SOLUTIONS, INC., MAXUS ENERGY CORPORATION, REPSOL YPF, S.A., YPF, S.A., YPF HOLDINGS, INC., and CLH HOLDINGS, Defendants.	SUPERIOR COURT OF NEW JERSEY LAW DIVISION ESSEX COUNTY DOCKET NO. L-009868 05 **CIVIL ACTION** **CERTIFICATION**

I, Kelly-Ann Pokrywa, do hereby certify as follows:

1. On August 6, 2007, an original and one copy of the Brief was forwarded for filing via hand delivery to the Clerk, Superior Court, Civil Part, 113 Essex County Courts Building, 50 W. Market Street, Newark, New Jersey 07102.

2. I further certify that on August 6, 2007, an original and copy of the Notice of

Motion and proposed form of Order were forwarded via hand delivery to the Clerk, Superior Court, Civil Part, 113 Essex County Courts Building, 50 W. Market Street, Newark, New Jersey 07102.

3. I further certify that on August 6, 2007, a true copy of the Brief was forwarded via hand delivery to the Honorable Rachel N. Davidson, J.S.C., Historic Courthouse, Chambers 203, 470 Dr. Martin Luther King, Jr. Blvd., Newark, New Jersey 07102.

4. I further certify that on August 6, 2007, a true copy of the Notice of Motion and proposed form of Order were forwarded via hand delivery to the Honorable Rachel N. Davidson, J.S.C., Historic Courthouse, Chambers 203, 470 Dr. Martin Luther King, Jr. Blvd., Newark, New Jersey 07102.

5. I further certify that on August 6, 2007, a true copy of the Brief was forwarded via E-mail to Marc C. Gross, Esq., Greenbaum, Rowe, Smith & Davis, LLP, 75 Livingston Ave., Roseland, New Jersey 07068.

6. I further certify that on August 6, 2007, a true copy of the Notice of Motion and proposed form of Order were forwarded via E-mail to Marc C. Gross, Esq., Greenbaum, Rowe, Smith & Davis, LLP, 75 Livingston Ave., Roseland, New Jersey 07068.

7. I further certify that on August 6, 2007, a true copy of the Brief was forwarded to Ileana M. Blanco, Esq., Bracewell & Giuliani, 711 Louisiana, Suite 2300, Houston, Texas 77002.

8. I further certify that on August 6, 2007, a true copy of the Notice of Motion and proposed form of Order were forwarded via E-mail to Ileana M. Blanco, Esq., Bracewell & Giuliani, 711 Louisiana, Suite 2300, Houston, Texas 77002.

9. I further certify that on August 6, 2007, true copies of the Brief was forwarded via

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E-mail to William L. Warren, Drinker, Biddle & Shanley, LLP, 105 College Road East, Suite 300, P.O. Box 627, Princeton, NJ 08452-0627; to Thomas E. Starnes, Esq., Andrews Kurth, LLP, 1350 I Street, NW, Suite 1100, Washington, D.C. 2005; to Kevin A. Gaynor, Esq., Vinson & Elkins, LLP, The Willard Office Building, 1455 Pennsylvania Avenue, NW, Suite 600, Washington, D.C. 2004-1008.

10. I further certify that on August 6, 2007, true copies of the Notice of Motion and proposed form of Order were forwarded via E-mail to William L. Warren, Drinker, Biddle & Shanley, LLP, 105 College Road East, Suite 300, P.O. Box 627, Princeton, NJ 08452-0627; to Thomas E. Starnes, Esq., Andrews Kurth, LLP, 1350 I Street, NW, Suite 1100, Washington, D.C. 2005; to Kevin A. Gaynor, Esq., Vinson & Elkins, LLP, The Willard Office Building, 1455 Pennsylvania Avenue, NW, Suite 600, Washington, D.C. 2004-1008.

11. I further certify that on August 6, 2007, true copies of the Brief was forwarded via E-mail to Robert T. Lehman, Archer & Greiner, P.C., Once Centennial Square, P.O. Box 3000, Haddonfield, New Jersey 08033 and Oliver S. Howard, Gable & Gotwals, 1100 ONEOK Plaza, 100 West Fifth Street, Tulsa, Oklahoma 74103.

12. I further certify that on August 6, 2007, true copies of the Notice of Motion and proposed form of Order were forwarded via E-mail to Robert T. Lehman, Archer & Greiner, P.C., Once Centennial Square, P.O. Box 3000, Haddonfield, New Jersey 08033 and Oliver S. Howard, Gable & Gotwals, 1100 ONEOK Plaza, 100 West Fifth Street, Tulsa, Oklahoma 74103..

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I hereby certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willingly false, I am subject to punishment.

KELLY-ANN POKRYWA

Dated: August 6, 2007

EXHIBIT 3

2003 Memorandum of Agreement among the State of New Jersey, Department of Environmental Protection, Office of Natural Resource Restoration, National Oceanic and Atmospheric Administration, and the United States Fish and Wildlife Service Regarding Natural Resource Damage Assessment and Restoration for the Diamond Alkali Superfund Site and Environs

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MEMORANDUM OF AGREEMENT

AMONG

the State of New Jersey, Department of Environmental Protection, Office of Natural Resource Restoration,
National Oceanic and Atmospheric Administration,
and the
United States Fish and Wildlife Service

REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT and RESTORATION

FOR THE

Diamond Alkali Superfund Site and Environs

I. INTRODUCTION & PURPOSE

This Memorandum of Agreement (Agreement) by and among the State of New Jersey, Department of Environmental Protection (NJDEP) and its Commissioner, by and through the New Jersey Office of Natural Resource Restoration (NJONRR), the National Oceanic and Atmospheric Administration (NOAA), and the United States Department of the Interior, acting through the United States Fish and Wildlife Service (USFWS), (collectively referred to as the Trustees), is entered into to ensure the coordination and cooperation of the Trustees in addressing their respective natural resource damage and restoration concerns and responsibilities arising from the release of hazardous substances at and from the Diamond Alkali Superfund Site and Environs (Site). The Trustees agree that the scope of their coordination and cooperation may include, to the extent deemed appropriate by the Trustees, any and all hazardous substances (together with their sources) which are considered to impact or influence either Site related injuries to natural resources, or restoration options related to such injuries.

Activities of the Trustees covered under this Agreement include, but are not limited to: (1) the assessment of natural resource damages (hereinafter NRDA) for injury to, destruction of, or loss of natural resources and natural resource services (hereinafter injury or injured natural resources); (2) restoration planning and implementation; and (3) coordination of any activities undertaken pursuant to this Agreement with response, remedial or corrective actions carried out by or under the direction of other federal and state agencies. This Agreement provides a framework for coordination and cooperation among the Trustees, and for the implementation of the activities of the Trustees in furtherance of their mutual goal of restoring

injured natural resources.

It is the express desire of the Trustees to achieve meaningful and appropriate restoration as expeditiously as possible. Towards this end, the Trustees shall work together to explore all avenues and approaches to try to implement restoration as promptly as can be achieved.

II. AUTHORITY

The Trustees enter into this Agreement in accordance with the natural resource damage provisions under Section 107(f) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §9607(f), and other applicable federal and state law and authority (hereinafter other applicable law) including, but not limited to, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended, 40 C.F.R. Part 300, and, to the extent appropriate and elected for use by the Trustees, the Natural Resource Damage Assessment Regulations, as amended, at 43 C.F.R. Part 11; N.J.S.A. 13:1D-9f and 9q; and the New Jersey Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq.

This Agreement is intended to cover, but is not limited to, natural resources as defined under the authorities cited above and other applicable law, belonging to, managed by, controlled by, or appertaining to the Trustees at or related to, or affected by the Site.

III. Trustees

. **Natural Resource Trustees**. The Trustees to this agreement have shared trusteeship over the natural resources of the Site pursuant to Subpart G of the NCP, 40 C.F.R §300.600, as amended, and other applicable law. The following officials or their designated representatives act on behalf of their respective agency for all activities under this Agreement:

- The Commissioner of the New Jersey State Department of Environmental Protection

- The Regional Director of the United States Fish and Wildlife Service, Region 5

- The Director of the Office of Response and Restoration for the National Oceanic and Atmospheric Administration

. **Other Natural Resource Trustees**. Notwithstanding any other provision of this Agreement, any other natural resource trustee, who is not a Trustee signatory to this Agreement and who has an interest with respect to any natural resource impacted or affected by the Site shall

not be precluded from participating in the NRDA activities or any other natural resource trustee activities under this Agreement. Such other Trustees may include, but are not limited to, tribal governments, other federal agencies, or affected trustee agencies from other states, which may be added by addendum to this Agreement, as necessary and appropriate under applicable law.

. **Advisors**. As determined to be appropriate by the Trustees, or as required by applicable law, the Trustees will coordinate with, and seek the advisory participation of appropriate federal and state agencies and departments, and the public.

IV. NATURAL RESOURCE TRUSTEE COUNCIL

. **Composition**. The Trustees recognize the importance of coordinating their efforts in order to effectively and efficiently address their respective natural resource concerns and responsibilities under applicable law. Accordingly, the Trustees hereby agree to create the Diamond Alkali Environs Natural Resource Trustee Council (Trustee Council). Each Trustee, as specified herein shall designate one primary voting representative to the Trustee Council and one alternate representative to act in the absence of the primary voting representative. In addition, the U.S. Department of Justice, the New Jersey Department of Law and Public Safety and in-house counsel for each of the Trustees, may provide one delegate in a legal/consultative role, who shall not be a member of the Trustee Council, but who shall nonetheless be able to attend all meetings of, or organized by, the Trustee Council. Each Trustee may, by written notification to all other Trustees, change the designated delegate and/or alternate.

. **Communications.** To the extent not designated herein. within ten (10) days of the execution of this Agreement each Trustee shall notify all of the Trustees of the name(s), address(es), phone number(s), E-Mail addresses, and facsimile number(s) of the Trustee's primary and alternate delegates to the Trustee Council who shall receive, and shall be responsible for on behalf of that Trustee, all correspondence and communications on behalf of such Trustee.

. **Meetings**. Any Trustee may, upon reasonable notice, call a meeting of the Trustee Council to be conducted either in person or by telephone conference call. Such meetings shall generally be held in conjunction with other set meetings among the Trustees.

. **Decisionmaking**. The three members of the Trustee Council shall have equal authority, and all decisions under this Agreement shall be by unanimous agreement of all Trustee Council voting representatives.

. **Dispute Resolution**. In the event of a dispute involving any decisions under this Agreement, the Trustee Council shall initially attempt to resolve the dispute through good faith discussions directed toward obtaining consensus among the Trustees involved in the dispute and

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consensus by the Trustee Council as a whole. If unanimous consent still cannot be reached after good faith discussions the matter shall be elevated to the next management level within the Trustees for decision or further instructions. If necessary, the Trustees may establish other mechanisms by which disputes may be resolved. The Trustees agree that decisionmaking deliberations will focus upon the Trustees mutual goals of restoration of injured natural resources, rather than upon independent control or trusteeship over the affected natural resources.

. **Duties, Objectives, and Authorities**. In accordance with applicable law, the Trustees hereby authorize the Trustee Council to carry out the following duties:

. To undertake appropriate NRDA and restoration activities at or related to the Site;

. To carry out studies, prepare reports, and collect information that the Trustee Council determines are necessary and relevant to the NRDA;

. To share information with and consult with each other as is determined to be appropriate and consistent with this Agreement;

. To coordinate activities undertaken pursuant to this Agreement with response, remedial or corrective actions carried out by other federal and state agencies, as appropriate;

. To develop, consider and evaluate plans for the restoration of injured natural resources;

. To participate in removal, remedial, corrective or other actions under the authority of EPA or other federal or state agencies in accordance with applicable law;

. To support the Trustees efforts to recover damages for injuries to natural resources from potentially responsible parties (PRPs);

. To plan, arrange for, oversee, or undertake restoration;

. To authorize individual Trustees to contract as deemed necessary to achieve these objectives;

. To coordinate and/or carry out such other actions as may be necessary and appropriate to achieve the purposes and objectives of this Agreement and to address the natural resource damage concerns and responsibilities of the Trustees.

. To encourage public participation and involvement in a manner consistent with applicable law and regulation.

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V. PRP FUNDING

. If PRP funding of NRDA, restoration or response activities becomes available, the Trustee Council may enter into an agreement with the PRP(s) to determine the terms of monetary disbursement and PRP participation in Trustee Council activities. Each Trustee agrees to cooperate in the administration of any funding source or sources that may become available to the Trustees from PRPs. Such funds shall be administered through the Trustee Council established pursuant to this Agreement.

VI. COORDINATION & NOTIFICATION

. The Trustees recognize and agree that their interests in the recovery of claims for natural resource damages associated with the Site are related and have agreed to coordinate negotiation and, if necessary, litigation of their claims and damages that arise out of the Site. Towards that end, the Trustees agree to notify and consult with each other of and concerning all activities, events, or decisions that may affect the NRDA process or the recovery of natural resource damages for injuries to natural resources at, from or related to the Site. The Trustees intend by this Agreement to communicate with each other on, among other things, the following:

- Plans or proposals for NRDA or for restoration;
- Response, removal or remedial actions that any Trustee plans to take with respect to the Site;
- Developments in litigation with the PRPs;
- Any communications any Trustee may have, or anticipates having, with any PRP concerning the settlement or other resolution of any Trustee s claim for natural resource damages at, from or related to the Site.

. The Trustees shall provide information to each other concerning such matters as promptly as practicable, with the goal of enabling the other Trustees to comment on any issues they deem significant. The Trustees further agree to provide copies of any agreements or other documents reflecting settlement or other disposition of claims, including quasi-public claims, involving or related to natural resource injuries arising from or related to the Site. If a Trustee is found to have failed to provide any of the above for any reason, that Trustee shall no longer be a party to this Agreement unless all remaining Trustees request in writing within ten days (10) that such

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Trustee remain a Trustee.

VII. GENERAL PROVISIONS

. **Reservation of Rights and Authority**. Nothing in this Agreement is intended or shall be construed to be an admission by the Trustees in any dispute or action between the Trustees or between the Trustees and a third party. Nothing in this Agreement is intended or shall be construed as a waiver by the Trustees of any claims or defenses in any legal action, or of any other rights or remedies. This Reservation of Rights applies to comments provided by all Trustees to this Agreement on any documents prepared by, or exchanged among, the Trustees in connection with this Agreement.

. Neither execution of this Agreement nor performance of any activities pursuant to this Agreement shall constitute an admission by any Trustee named herein (or any government) of (nor be construed as precedent for) any legal responsibility under federal, state or other applicable law, to protect, restore, or enhance any natural resources associated with the Site over which any other Trustee or non-party asserts trusteeship, standing or jurisdiction. Furthermore, neither execution of this Agreement nor performance of any activities pursuant to this Agreement shall constitute an admission by any Trustee named herein (or any government) of (nor be construed as precedent for) any liability for damage or injury (which may be shown to have occurred by the NRDA activities performed under this Agreement) to any natural resources associated with the Site over which any other Trustee or non-party asserts trusteeship, standing or jurisdiction.

. Nothing in this Agreement is meant to imply, or operate in a manner, that any natural resource trustee with an interest in the Site, whether a Trustee under this Agreement or not, is in any way abrogating or ceding any natural resource trustee responsibility or authority over natural resources of the Site.

. Nothing in this Agreement shall be construed as a waiver of, or foreclosing the exercise of, any rights, powers, remedies or privileges of the individual Trustees now or hereafter existing at law or in equity, by statute or otherwise.

. The parties to this agreement recognize that New Jersey has independent authority under State law to seek or order the restoration of natural resources or payment of natural resource damages, notwithstanding pending federal actions. Nothing in this agreement is meant to imply or operate in a manner that is in any way abrogating or ceding the right of NJDEP to address natural resource injuries and/or damages to the State s natural resources, including but not limited to ground water. Ground water resources located within the boundaries of federal facilities, which support or otherwise are hydrologically connected to joint trustee surface

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resources or which otherwise impact surface water, remain subject to State and federal co-trustee jurisdiction.

. **Limitation of Authority**. No Trustee is authorized to enter into any settlement on behalf of any other Trustee. No Trustee is authorized to represent another Trustee in any litigation that may be commenced by another Trustee or Trustees. Nothing in this Agreement shall be construed as obligating any of the Trustees to expend any funds in excess of appropriations or other amounts authorized by law.

. **Third Parties**. This Memorandum of Agreement is not intended to, nor shall it, vest rights in persons who do not represent the Trustees to this Agreement or who are not Parties to this Agreement.

. **Effective Date, Amendment and Termination**. This Agreement shall be effective when executed by all of the Trustees and may not be amended except by written agreement of all the Trustees. This Agreement can be executed in one or more counterparts, each of which will be considered an original document. This Agreement shall continue in effect until the Trustees determine that the restoration plan or plans implemented under this agreement have been completed, unless terminated before that time or extended beyond that time by written agreement of all the Trustees. However, any Trustee may terminate its participation in the Agreement upon giving thirty (30) days written notice to all other Trustees or as otherwise provided for herein. The withdrawal of any Trustee to this Agreement for whatever reason, shall not affect the subsequent validity of this Agreement among the remaining Trustees. A Trustee that has withdrawn from this agreement shall have no further obligations under this agreement except for the obligations to continue to coordinate activities to the greatest extent practicable, and to expend unobligated funds recovered for natural resource damages solely to restore injured natural resources under their trusteeship, as mandated by Section 107(f) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §9607(f).

IN WITNESS WHEREOF the Trustees have executed this Agreement on the dates attested to below.

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MEMORANDUM OF AGREEMENT
AMONG THE
New Jersey Department of Environmental Protection
National Oceanic and Atmospheric Administration
United States Department of the Interior
REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION
FOR THE
Diamond Alkali Superfund Site and Environs

IN WITNESS WHEREOF the Trustees have executed this Agreement on the dates attested to below.

BY: _____ 11/7/02
Craig R. O'Connor — Date
Deputy General Counsel
National Oceanic and Atmospheric Administration

MEMORANDUM OF AGREEMENT
AMONG THE
New Jersey Department of Environmental Protection
National Oceanic and Atmospheric Administration
United States Department of the Interior
REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION
FOR THE
Diamond Alkali Superfund Site and Environs

IN WITNESS WHEREOF the Trustees have executed this Agreement on the dates attested to below.

BY: _____ 11-20-02
ACTING Dr. Mamie A. Parker — Date
Regional Director
United States Fish and Wildlife Service
For the United States Department of the Interior

MEMORANDUM OF AGREEMENT
AMONG THE
New Jersey Department of Environmental Protection
National Oceanic and Atmospheric Administration
United States Department of the Interior
REGARDING NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION
FOR THE
Diamond Alkali Superfund Site and Environs

IN WITNESS WHEREOF the Trustees have executed this Agreement on the dates attested to below.

BY: _____ 3/20/03
Marc A. Matsil — Date
Assistant Commissioner
New Jersey Department of Environmental Protection