RECORD OF DECISION

LCP Chemicals Inc, Superfund Site,

Linden, Union County, New Jersey

United States Environmental Protection Agency

Region 2

February 2014

241403

DECLARATION STATEMENT

RECORD OF DECISION

SITE NAME AND LOCATION

LCP Chemicals, Inc., Superfund Site (EPA ID# NJD079303020)
Linden, Union County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy to address contamination in groundwater, soil, sediments and building material at the LCP Chemicals, Inc., Superfund Site (Site), in Linden, Union County, New Jersey. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record established for this Site.

The State of New Jersey New Jersey Department of Environmental Protection (NJDEP) concurs with the components of the selected remedy. However, NJDEP does not concur with the contingency remedies for treating elemental mercury as discussed further below. NJDEP believes the contingency remedy should be excavation and off-site removal of the principal threat waste (PTW). In addition, NJDEP believes that the existing data on contamination in Arthur Kill sediments is insufficient to determine cleanup levels for the Northern Off-Site Ditch and South Branch Creek sediments.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect public health or the environment from actual or threatened releases of hazardous substances from the Site into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy described in this document represents the first and only planned remedial phase, or operable unit, for the LCP Chemicals, Inc., Superfund Site.

The major components of the selected remedy include:

- Installation of a capping system to prevent direct contact

with soils and exposure to mercury vapor;

- Treatment of the soil containing visible elemental mercury by mixing with it sulfur to convert the mercury to mercuric sulfide;

- Excavation and on-site disposal of sediments and marsh soils from the Northern Off-Site Ditch and the downstream portion of the South Branch Creek;

- Restoration of the excavated areas;

- Controlled demolition of the Site's buildings, recycling of non-porous material and placement of porous material under the cap;

- Containment and collection of the overburden groundwater layer by a barrier wall and collection/disposal system;

- Groundwater monitoring; and

- Implementation of institutional controls, in the form of a deed notice and Classification Exception Area (CEA).

EPA recognizes that the selected remedy includes a treatment approach for addressing visible elemental mercury that is innovative; therefore EPA is also identifying two contingency remedies in the event that the selected remedy does not meet performance criteria. Further information regarding these contingency remedies can be found in the Decision Summary.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1: Statutory Requirements

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

Conversion of visible mercury in soils to mercuric sulfide satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Part 3: Five-Year Review Requirements

Because the remedy will result in hazardous substances, pollutants, or contaminants remaining above levels that allow for unlimited use and unrestricted exposure, a five-year review will be required.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the administrative record file for the Site.

- Chemicals of concern and their respective concentrations may be found in the Site Characteristics section.
- Baseline risk represented by the chemicals of concern may be found in the Summary of Site Risks section.
- A discussion of cleanup levels may be found in the Remedial Action Objectives section.
- A discussion of materials constituting principal threats may be found in the Principal Threat Waste section.
- Current and reasonably-anticipated future land use assumptions are discussed in the Current and Potential Future Site and Resource Uses section.
- A discussion of potential uses of the Site as a result of the selected remedy is discussed in the Remedial Action Objectives section.
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs are discussed in the Description of Alternatives section.

- Key factors that led to selecting the remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decisions) may be found in the Comparative Analysis of Alternatives and Statutory Determinations sections.

Walter E. Mugdan, Director
Emergency and Remedial Response Division
EPA - Region 2

FEB. 25, 2014
Date

DECISION SUMMARY

LCP Chemicals, Inc. Superfund Site

Linden, Union County, New Jersey

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SITE NAME, LOCATION AND BRIEF DESCRIPTION

The LCP Chemicals, Inc., Superfund Site (Site) is located in an industrial area on the Tremley Point peninsula in Linden, Union County, New Jersey. The twenty-six acre Site is bordered by the Arthur Kill to the east; the former GAF Corporation site to the north; and Northville Industries, BP Corporation, and Mobil to the northeast, south, and west, respectively. South Branch Creek, a man-made drainage ditch that empties into the Arthur Kill, flows through a portion of the Site (Figures 1a and 1b).

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Beginning in the 1880s and into the 1950s, Tremley Point's tidal wetlands were filled to allow for industrial development. Most of the industrial production facilities in the region are no longer operating. The primary current use of the area is bulk storage and transport of petroleum products and aggregates.

In 1955, the General Aniline & Film Corporation (GAF) constructed and began operating a chlor-alkali plant on the Site. By 1956, the core buildings required for chlorine production were present, including Buildings 220 and 230 (Figure 1a). The twenty-six acre property and the chlor-alkali operation were purchased in 1972 by Linden Chlorine Products, Inc. At some point, the company became known as the LCP Chemicals, Inc., a division of the Hanlin Group, Inc. An additional mercury cell building (Building 240) and other buildings were added by the company in the early 1970s.

Portions of the LCP property were leased to other companies for the operation of related manufacturing operations. In 1957 a western portion of the property was leased to Union Carbide Corporation (UCC) to house a hydrogen plant operation that used by-products of the chlorine production. That facility, known as the Linde Division hydrogen plant, operated until 1990. In addition, Kuehne Chemicals, Inc., leased an area on the northern portion of the property to manufacture sodium hypochlorite.

The chlor-alkali manufacturing operations ceased by 1985 and the facility was then used as a terminal for products produced at other locations. In 1991, Hanlin Group, Inc., filed a petition under Chapter 11 of the bankruptcy code, and liquidated its assets by 1994. As part of the bankruptcy, Hanlin Group abandoned the LCP property; ownership reverted to the bankruptcy estate.

In August 1994, EPA conducted a Site visit and confirmed that the chlorine process buildings were decommissioned, the facility was no longer functional and that the property was vacated by LCP employees. The Site was placed on the National Priorities List in 1998. In 1999, a potentially responsible party (PRP), ISP-ESI and EPA entered into an Administrative Order to perform a remedial investigation and feasibility study (RI/FS).

Under the oversight of EPA, the PRP's consultants sampled and analyzed soil, sediments, groundwater, surface water and biota. The results of the sampling events, which can be found in the RI report, formed the basis for the FS. The RI and FS reports, which are summarized in this Record of Decision (ROD), can be found in the administrative record for the Site or online at: http://epa.gov/region02/superfund/npl/lcpchemicals/

The LCP property has been abandoned since the last tenant, Active Water Jet, Inc., (a pipe cleaning facility) vacated in 2000. Currently the Site is fenced and secured. The buildings, in particular the mercury cell buildings, are in an advanced state of disrepair.

On October 21, 2013, EPA was informed that James Mathis, the last acting chief executive officer of the Hanlin Group, Inc., signed a quit claim deed on September 19, 2013. The quit claim deed purports to transfer ownership of the LCP property to Cherokee LCP Land, LLC.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

On August 21, 2013, EPA released the RI/FS, a Proposed Plan for Site remediation, and supporting documentation for comment. These documents were made available to the public in the administrative record repositories maintained at the EPA Region 2 office (290 Broadway, New York, New York 10007) and the Linden Public Library, (31 East Henry Street, Linden, New Jersey). The documents were also made available online. EPA published a notice of availability involving the above-referenced documents in the Home News Tribune on August 21, 2013. The public comment period was scheduled from August 21, 2013 to September 20, 2013. On September 17, 2013, the public comment period was extended to October 21, 2013, based on a request from an environmental group.

On August 28, 2013, EPA held a public meeting at the Tremley Point Recreation Building, to inform local officials and

interested citizens about the Superfund process, to discuss the findings of the RI/FS, to present the remedial alternatives for the Site, and to respond to questions and comments from area residents and other attendees.

Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary section of this ROD (see Appendix V).

SCOPE AND ROLE OF OPERABLE UNIT

This action, referred to as operable unit one (OU1) will be the only action for the Site. It addresses contaminated soils, sediments, building material and groundwater.

The selected remedy will treat soil that contains visible elemental mercury. The remedy will also capture, contain and monitor contaminated groundwater, excavate and contain contaminated sediments, and cap areas of contaminated soil.

SUMMARY OF SITE CHARACTERISTICS

The RI field investigation was performed at the Site in two major phases between July 2001 and May 2008. The Phase I field investigation was conducted between July 2001 and April 2002. It included the collection and analysis of samples from soil, groundwater, surface water and sediments at locations throughout the Site. Data were also collected to provide a geologic, hydrologic and hydrogeologic interpretation of the Site.

The Phase II field investigation was performed at the Site from August 2006 to June 2007. Additional samples were collected in May 2008. The Phase II investigation included samples from soil, soil vapor, groundwater, surface water, sediment and biota. Other work included hydrogeologic testing, habitat assessment and a wetlands assessment.

Soil:

The entire upland area of the Site is covered with about 300,000 cubic yards of anthropogenic fill, which ranges in thickness from approximately 0.7 feet to as much as 17 feet, with an average thickness of roughly nine feet. The fill consists of a heterogeneous mix of soil, ash, wood, brick and glass. Below the fill is a layer of tidal marsh deposits ranging in thickness from five to ten feet. Peat (i.e., loose, soft fibrous material) comprises the upper portion of the tidal marsh deposits and

grades to organic silt and clay. Underlying the tidal marsh deposits is a layer of fine-grained glacial till comprised primarily of silts and clays. The glacial till ranges in thickness from 18.5 feet to 20.5 feet. Finally, below the glacial till is bedrock of the Passaic Formation. The upper portion of the bedrock is highly weathered residual soil composed of fine-grained silts and clays with shale fragments, similar to the overlying glacial till. The layer transitions to competent bedrock with depth.

Two hundred and seventy two surficial and 153 subsurface soil samples were collected during the RI. In addition, horizontal drilling was used to collect 27 soil samples from beneath the dilapidated buildings.

The Site soils are contaminated with constituents including mercury, arsenic and other metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated naphthalenes (PCNs), as well as volatile organic chemicals (VOCs) at levels above the New Jersey non-residential soil remediation standards. The RI found that mercury, at unacceptable concentrations, was dispersed across this entire twenty-six acre Site (Figures 2a-2d). EPA considers mercury to be the primary contaminant of concern (COC), due to its persistence, toxicity and overall mass at the Site. Mercury is typically in the elemental or mercuric sulfide form and at the highest levels (>7,000 milligrams/kilogram (mg/kg)) in the anthropogenic fill. In areas near the chlor-alkali cell buildings, free elemental mercury is present down to a depth of about 17 feet. EPA considers the soil with visible mercury (about 24,000 cubic yards) to be the Site's principal threat waste (PTW) as described later in this document.

South Branch Creek/Northern Off-Site Ditch:

South Branch Creek is a man-made drainage ditch placed in its current location in the early 1970s. It originates in the central portion of the Site and flows east for about 1,200 feet before emptying into the Arthur Kill. The Arthur Kill is a ten-mile long tidal strait, with multiple industrial contaminant sources, that connects Raritan Bay with Newark Bay (Figure 1b). The upstream portion of the South Branch Creek is about 15 feet wide, expanding to about 30 feet wide where it enters the Arthur Kill. It has roughly a five foot tidal range, and becomes dry over most of its course during low tides. The South Branch Creek banks contain a relatively narrow strip of low marsh soils

classified by the New Jersey Department of Environmental Protection (NJDEP) as "intermediate value" wetlands.

Twenty-five surface water samples were collected from the Creek, which showed exceedances of state surface water standards for a number of substances including mercury and arsenic. Mercury was not detected in filtered samples; however, the concentrations in unfiltered samples ranged from 3 parts per billion (ppb) to almost 30 ppb, with the highest concentrations detected during low tides. This seems to indicate that Site-related mercury, attached to suspended sediments, enters the South Branch Creek water column due to tidal stream velocities (Figure 3). Low marsh soils adjacent to the South Branch Creek contained high levels of mercury (maximum concentration of 3,000 mg/kg). Mercury was also detected in the tissue from the six fish (mummichog) and twelve fiddler crabs analyzed, with a mean total mercury concentration of 2.6 mg/kg and 70 mg/kg in fish and fiddler crabs tissue, respectively (Figure 4).

Fifty-eight sediment samples were collected from seven transects across the South Branch Creek and adjacent to the Creek's mouth in the Arthur Kill. Mercury, arsenic, barium and total PCBs were the most frequently detected COCs in the South Branch Creek sediments. Mean concentration of mercury in the sediments was 196 mg/kg, with a high concentration of 901 mg/kg (Figure 5a-5d). Similar to the findings in soils, mercury speciation showed the most common type of mercury was elemental and mercuric sulfide.

The Northern Off-Site Ditch is a man-made ditch located south of the LCP property that empties into the South Branch Creek. Three transects of sediment samples were collected from the Northern Off-Site Ditch. The mercury results indicate that the Ditch was impacted by overland flow from the LCP Site (Figure 6).

Groundwater:

Groundwater at the Site is found in two layers separated by an aquitard consisting of silt and clay. The shallower layer (overburden zone) is within the fill and the peat subunit of the tidal marsh deposits. The deeper layer (bedrock zone) is within the upper portion of the bedrock.

Samples of the overburden groundwater were collected from twenty-one wells and showed exceedances of the applicable state groundwater standards for several constituents, including

mercury, arsenic and some VOCs (Figure 7a-7d). Dissolved mercury concentrations ranged from non-detect (ND) to 164 ppb. Concentrations of other constituents, such as chlorobenzene (from ND to 16,200 ppb), benzene (ND to 848 ppb) and arsenic (up to 275 ppb), showed high levels of exceedances. The overburden groundwater is classified as Class II-A, meaning existing New Jersey Groundwater Quality Standards (NJGWQS) are applicable. However, due to the shallow depth and low production potential of the zone, it could not be used as a source of potable water in New Jersey.

Due to naturally occurring levels of total dissolved solids and chloride, the bedrock zone has been reclassified by the State of New Jersey to Class III-B groundwater, meaning it cannot be used as a source of potable water. Due to the high levels of TDS (i.e., greater than 10,000 parts per million), EPA would also consider this aquifer non-potable. According to NJ regulations (N.J.A.C. 7:9C-1.7(f)), Class III-B groundwater requires the development of site-specific criteria. The criteria shall be more stringent than necessary to ensure that there will be no: impairment of existing uses of groundwater; resulting violation of surface water quality standards; release of pollutants to the ground surface, structures or air in concentrations that pose a threat to human health; or violation of constituent standards for downgradient classification areas to which there is a significant potential for migration of groundwater pollutants.

Those site specific criteria have not yet been developed, so currently the bedrock zone has no applicable standards. In order to protect downgradient surface water, while site specific groundwater criteria are being developed, the NJDEP has suggested using state surface water standards as the bedrock zone's interim criteria.

Sample results from 10 bedrock wells show that mercury and other constituents exceed surface water standards in the bedrock zone. The highest concentrations of mercury, benzene and chlorobenzene were 11 ppb, 383 ppb and 14 ppb, respectively. Potentiometric studies indicate that the groundwater in the bedrock zone underlying the Site is currently being controlled by a pump and treat remedy at the adjacent GAF Corporation site (Figure 8).

Building Debris:

Over ten buildings and structures remain on the LCP property. The buildings are in a state of disrepair and in the case of the

former mercury cell buildings, unsafe to enter. Anecdotal evidence suggests that the buildings' porous material contains free elemental mercury. The amount of building material on Site is roughly 32,000 cubic yards (61,000 tons).

Soil Vapor:

Fourteen soil vapor samples were collected throughout the Site as part of the RI field investigation. Samples from 10 probes were tested for VOCs and samples from 4 probes were tested for mercury vapors.

Mercury vapors were detected in each of the 4 samples that were tested. The concentrations ranged from 0.2 to 2.5 micrograms per cubic meter ($\mu g/m^3$).

The VOCs detected in the soil vapor are similar to those that were detected in the soil. The VOCs in soil vapor include chlorobenzene; benzene, toluene, ethylbenzene and xylenes (BTEX) compounds; hexachlorobutadiene; chloroform and TCE.

Conceptual Site Model

A conceptual site model was developed to integrate all the different types of information collected during the RI.

Contaminants associated with the Site media fall into three general categories:

1) Contaminants associated with Site operations either directly from the chlor-alkali process or from spilled or discharged contaminants related to general facility operations
2) Contaminants that are incidental to anthropogenic fill
3) Contaminants from other sources, such as storm-water runoff or sediment transport from the Arthur Kill

Site-related contamination originated in the upland manufacturing facility area. During the period of chlor-alkali operation, mercury was discharged to the environment atmospherically or to the ground through spills or waste disposal. While the concentrations vary, mercury is a pervasive contaminant dispersed continuously across the Site. High concentrations of mercury remain in soils, including visual evidence of elemental mercury. Vertical migration of mercury in soils beneath the fill appears to have been relatively limited.

The deeper fill contains substantially lower total mercury concentrations than the shallow fill, with only half as many exceedances of the applicable soil standard (New Jersey nonresidential direct contact soil remediation standard, 65 mg/kg). Seventy-five percent of the native material underlying the fill (tidal marsh deposits and the glacial till) contained mercury below that standard.

Six of the twenty unfiltered samples from the overburden groundwater exceeded the New Jersey Groundwater Quality Standard (GWQS) for mercury (2 ppb) (Figure 7a) while only two of the filtered samples exceeded 2 ppb (Figure 9. In addition, dissolved (i.e., filtered samples) levels of mercury were undetected in most of the samples located between the production area and South Branch Creek.

This pattern of mercury groundwater detections appears to indicate that there is a general absence of lateral migration of mercury in overburden groundwater.

Only three of the unfiltered bedrock groundwater samples contained detectable mercury (Figure 10) and those are likely related to an off-site source (i.e., the GAF site). These bedrock mercury detections were limited to the western portion of the LCP Site. Based on the potentiometric surface contours, it appears that pumping from the adjacent GAF Site is effectively capturing the bedrock groundwater under the LCP Site (Figure 8).

These soil and groundwater observations are consistent with the presence of mercury in an insoluble form. The results of the sequential extraction analyses performed on soils confirm that the majority of mercury exists in Site soils as insoluble species (mercuric sulfide and elemental mercury). For this reason, migration in groundwater has been limited and minimal further migration is anticipated.

The mercury detected at high concentrations in South Branch Creek and the Northern Off-Site Ditch (both sediments and the low marsh soils adjacent to the creeks, which reflect sediment deposition during tidal surges or storm events) is likely due to soil-bound mercury moving via advective flow into the nearest surface water body.

The presence of elevated mercury in soils along the alignment of the historic South Branch Creek channel and the southern

boundary of the LCP Site is consistent with the overland release migration mechanism. Both uncontrolled stormwater run-off and piped discharges are likely to have contributed to transport. Mercury that was atmospherically deposited to near-facility surface soils could also have been transported via run-off. Subsequent tidal mixing and continuous suspension/redeposition may explain why clearer gradients with sediment depth are not uniformly observed.

Changes in Site drainage patterns after 1976 and the cessation of chlor-alkali manufacturing activities in 1985 would have dramatically decreased the quantity of overland releases to South Branch Creek after that time. Furthermore, the flat gradient at the Site and lack of drainage structures provide for minimal ongoing stormwater discharge to South Branch Creek.

There is a tendency for elemental mercury to appear at the ground surface during rain events; however, elemental mercury is highly insoluble and should experience negligible entrainment given the minimal run-off overall from the Site to South Branch Creek. Since groundwater is a negligible source of mercury to surface water, the transport of mercury to South Branch Creek can be considered largely historic.

Mercury in South Branch Creek sediments (Figures 5a through 5d) and adjacent low marsh soils is present at the highest concentrations in the areas closest to the former manufacturing facility (Transect A) and the possible drainage inputs from the large concrete pipe that drains at Transect C. The correlation of the existing pattern of mercury presence with historical inputs known to have ceased decades ago strongly indicates that outward mercury migration from the channel is now limited. The attenuation of mercury concentrations in sediments as South Branch Creek reaches the Arthur Kill provides further support for limited sediment transport, since extensive mixing over time would have reduced or eliminated the clear concentration gradient.

Stormwater drainage from the southern portion of the LCP Site, adjacent to the Northern Off-Site Ditch appears to have remained consistent throughout the operational history at the LCP plant. The spatial distribution of mercury found in the Northern Off-Site Ditch sediments is consistent with an overland migration of contaminants in stormwater runoff from the former hydrogen plant area.

The migration of low levels of mercury that suspend in surface water may be environmentally significant because mercury can be of concern in the environment at low concentrations. However, this pathway is unlikely to serve as a mechanism for moving or altering the bulk mass of mercury present in sediments.

There may be some solubilization, chemical transformation, and volatilization of the small amount of mercury that resides in the water column. Again, these processes affect a vanishingly small proportion of the mercury load in sediments and are not significant from a bulk transport perspective. However the small amount (approximately 0.1 to 0.2 percent) of mercury in surface water that has become methylated will have a high bioconcentration factor, meaning it could impact biota even at relatively low concentrations. Sediments are also likely contributing to biological accumulation, as evidenced by the elevated concentrations of mercury in the fiddler crab.

Both fish and crab serve as prey species that can contribute to mercury biomagnifications up the food chain. Therefore, while the significance of this pathway from a bulk transport perspective is unknown, movement from sediment into biota is an environmentally significant migration pathway.

PCBs, PCNs, hexachlorobenzene (HCB), and polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDDs/PCDFs) originating in soils adjacent to the former facility, would be expected to behave in a similar manner as mercury, traveling primarily via run-off adsorbed onto solids. PCBs were generally low in South Branch Creek sediments (undetected or at part-per-billion levels), but demonstrated a similar pattern to mercury, with the highest concentrations at Transects A and C (Figure 11). PCBs were not detected in Arthur Kill sediments, indicating attenuation with distance from the Site. HCB movement appears to have been minimal, as this compound was undetected in South Branch Creek samples except for one occurrence of 1.5 mg/kg in the 0.5-1.0-foot sediments at Transect C and two detections under 0.2 mg/kg in low marsh soils at Transect. HCB was also not detected in the Northern Off-Site Ditch.

Lower-chlorinated chlorobenzenes appear to have migrated to South Branch Creek and the Northern Off-Site Ditch via the same mechanism of adsorption/run-off. These constituents, which have higher solubility than the other COCs, have also partitioned into groundwater, as has benzene. A portion of what is observed in South Branch Creek and the Northern Off-Site Ditch may be

attributable to the localized discharge of chlorobenzenes in shallow groundwater. However, this mechanism is unlikely to account for more than a small proportion of what is observed in sediments. These more soluble COCs have relatively short residence times in surface water due to volatilization and their higher aqueous solubility results in less partitioning to sediment. Thus, relatively little benzene and chlorobenzene is observed in sediment compared with the higher-chlorinated compounds, which are more likely to have migrated adsorbed to solids.

The presence of contaminants in soils not associated with Site operations is attributable to anthropogenic fill, regional contamination, or other historic sources to South Branch Creek.

The markedly elevated arsenic noted in sediments (concentrations greater than the maximums detected in any of the soil units) appears to be related to a local source likely other than the LCP Site. South Branch Creek received inputs from other nearby facilities, including the GAF site.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES:

Groundwater Uses: As described previously, the groundwater at the Site is found in two layers separated by a silt/clay aquitard. The shallower overburden layer is considered by New Jersey to be Class II-A, a source of potable water; however, the water cannot be used as a potable resource. The bedrock zone has been reclassified by New Jersey to be Class III-B groundwater, which means it is unsuitable for potable use.

LCP Property uses: The LCP Site, which includes the LCP property and the Off-Site Ditch area, is currently unused, but is zoned for commercial and industrial uses. EPA has consulted with local municipal authorities and the Site is being considered as part of an area-wide industrial/commercial redevelopment plan. The redevelopment plan would not change the zoning.

SUMMARY OF SITE RISKS

As part of the RI, a baseline risk assessment was conducted to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases,

under current and future land and groundwater uses.

Human Health Risk Assessment

A Baseline Human Health Risk Assessment (BHHRA) was conducted to estimate current and future effects of contaminants on human health. A BHHRA is an analysis of the potential adverse human health effects caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future Site uses. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for this Site. Tables 1 through 6 provide a summary of relevant information from the BHHRA (i.e. exposure pathways and chemicals found to pose unacceptable risk to human health).

The risk assessment document for this Site, entitled *Final Human Health Risk Assessment,* dated May 2011 is available in the administrative record file and Site repository.

A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios, as follows.

Hazard Identification - uses the analytical data collected to identify the contaminants of potential concern (COPCs) at the Site for each medium, with consideration of a number of factors explained below.

Exposure Assessment - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (*e.g.*, ingesting contaminated soil) by which humans are potentially exposed.

Toxicity Assessment- determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of effect (response).

Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site-related risks. The risk characterization also identifies contamination with concentrations that exceed acceptable levels, defined by

the NCP as an excess lifetime cancer risk greater than 1 x 10^{-6} - 1 x 10^{-4} or a Hazard Index greater than 1.0; contaminants at these concentrations are considered COCs and are typically those that will require remediation at the Site. Also included in this section is a discussion of the uncertainties associated with these risks.

Hazard Identification
In this step, analytical data collected during the RI was used to identify contaminants of potential concern (COPCs) in the soil, sediment, surface water and groundwater at the Site based on factors such as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants as well as their mobility and persistence.

Surface (less than two feet deep) and subsurface (greater than two feet deep) soil, overburden groundwater, South Branch Creek sediment/bank soil and soil vapor samples were collected between July 2001 and May 2008 as part of the remedial investigation. A comprehensive list of all Site COCs can be found in the Table 2 series of the May 2011 Final Human Health Risk Assessment report.

Exposure Assessment
In this step, the different exposure scenarios and pathways through which people might be exposed to the contaminants identified in the previous step were evaluated.

Consistent with Superfund policy and guidance, the BHHRA is a baseline human health risk assessment and therefore assumes no remediation or institutional controls to mitigate or remove hazardous substance releases. Cancer risks and noncancer hazard indices were calculated based on an estimate of the reasonable maximum exposure (RME) expected to occur under current and future conditions at the Site. The RME is defined as the highest exposure that is reasonably expected to occur at a Site.

The exposure assessment identified potential human receptors based on a review of current and reasonably foreseeable future land use at the Site. The Site is located on Tremley Point in Linden, a heavily industrialized peninsula in Union County, New Jersey. Land use surrounding the Site is primarily industrial. The Site is currently zoned heavy industrial. In February of 2009, bedrock groundwater was reclassified to Class III-B non-potable groundwater. Based on the Class III-B reclassification, drinking water wells cannot be drilled and narrative groundwater

criteria would apply to bedrock groundwater in the affected area. NJDEP classified overburden groundwater below the Site as Class II-A groundwater; therefore, future potable use of groundwater was evaluated. Groundwater is not currently used for drinking water at the Site. Future potable use of bedrock groundwater is prohibited and in the overburden is highly unlikely.

Based on information gathered during the RI, such as zoning and demographic information, several exposure scenarios for the Site were selected. For current land use scenario, the following exposure scenario was evaluated:

- adolescent trespassers contacting/ingesting surface water/sediment in South Branch Creek.

For potential future land uses, the following exposure scenarios were evaluated:

- commercial/industrial workers contacting/ingesting surface soil, or inhaling vapors from surface soil;
- site-specific workers contacting/ingesting/inhaling surface soil;
- construction/utility workers contacting/ingesting/inhaling surface/subsurface soil;
- commercial/industrial workers ingesting overburden groundwater;
- construction/utility workers contacting/ingesting/inhaling vapors from shallow groundwater;
- adolescent trespassers contacting/ingesting/inhaling surface soil;
- adolescent trespassers contacting/ingesting surface water/sediment in South Branch Creek; and
- indoor workers inhaling vapors migrating from the subsurface into indoor air.

Table 2 presents all exposure pathways considered in the BHHRA, and the rationale for the selection or exclusion of each pathway. Since the South Branch Creek is generally unsuitable for fish species that are used for human consumption, and considering the industrial setting and substantial barriers to fishing access (i.e., small boat via the Arthur Kill and only during high tide), the fish/shellfish consumption pathway for

South Branch Creek is considered incomplete and was not evaluated in the HHRA.

Toxicity Assessment

In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects were determined. Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and noncancer health effects.

Under current EPA guidelines, the likelihood of carcinogenic risks and noncancer hazards due to exposure to Site chemicals are considered separately. Consistent with current EPA policy, it was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, cancer and noncancer risks associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Toxicity data for the human health risk assessment were provided by the Integrated Risk Information System (IRIS) database, the Provisional Peer Reviewed Toxicity Database (PPRTV), or another source that is identified as an appropriate reference for toxicity values consistent with EPA's directive on toxicity values. Toxicity values can be found in Tables 3 and 4. Additional toxicity information for all COPCs is presented in the Table 5 and 6 series of the May 2011 Final HHRA.

Risk Characterization

This step summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site risks. Exposures were evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated

from the following equation, while the equation for inhalation exposures uses the IUR, rather than the SF:

Risk = LADD x SF

Where: Risk = a unit-less probability (1×10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

The likelihood of an individual developing cancer is expressed as a probability that is usually expressed in scientific notation (such as 1×10^{-4}). For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to Site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure.

For noncancer health effects, a hazard index (HI) is calculated. The HI is determined based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels for humans (including sensitive individuals) which are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in environmental media (*e.g.*, the amount of a chemical ingested from contaminated drinking water) is compared to the RfD or the RfC to derive the hazard quotient (HQ) for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds within a particular medium that impacts a particular receptor population.

The HQ for oral and dermal exposures is calculated as below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

HQ = Intake/RfD

Where: HQ = hazard quotient
Intake = estimated intake for a chemical (mg/kg-day)

RfD = reference dose (mg/kg-day)

The intake and the RfD will represent the same exposure period (*i.e.*, chronic, subchronic, or acute).

The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which noncancer health effects are not expected to occur.

The HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific population. An HI greater than 1.0 indicates that the potential exists for non-carcinogenic health effects to occur as a result of Site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific population exceeds 1.0, separate HI values are then calculated for those chemicals which are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1.0 to evaluate the potential for noncancer health effects on a specific target organ or system. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The highest noncancer (HI=190) risk was calculated be a future industrial or commercial worker on the unremediated Site. Specific cancer and noncancer risks are summarized in Tables 5 and 6. Exposure to mercury (elemental and inorganic), vanadium and furan in soil and arsenic, cobalt, iron, manganese, mercury, methyl mercury, vanadium, furan, p-chloroaniline, benzene, chlorobenzene and dioxin in shallow groundwater posed an unacceptable human health risk.

EPA anticipates that the remedy will reduce exposure to mercury and other Site COCs in soil, sediment, groundwater and building material, resulting in the interruption of unacceptable risks to trespassers, commercial/industrial workers, site-specific workers, and construction/utility workers.

Ecological Risk Assessment

A part of the RI, ecological risk was evaluated to determine the likelihood that adverse ecological effects are occurring or may potentially occur as a result of the Site-related contamination.

The risk assessment was performed in accordance with EPA's

Ecological Risk Assessment Guidance for Superfund eight step approach. As part of that approach, a Screening Level Ecological Risk Assessment (SLERA) was conducted to identify potential environmental risks associated with the Site. The SLERA indicated there was a potential for adverse ecological effects. Therefore a more thorough study, called a Baseline Ecological Risk Assessment (BERA), was performed.

The BERA evaluated the following potentially complete receptor exposure pathways (and representative receptors):

- Exposure of benthic macroinvertebrates to contaminated sediment/bank soil in South Branch Creek;

- Exposure of estuarine fish to contaminated sediment and surface water in South Branch Creek;

- Exposure of omnivorous mammals (raccoon; *Procyon lotor*) to contaminated sediment/bank soil, surface water, and prey items in South Branch Creek;

- Exposure of piscivorous mammals (mink; *Mustela vison*) to contaminated sediment/bank soil, surface water, and prey items in South Branch Creek;

- Exposure of sediment-probing birds (spotted sandpiper; *Actitis macularia*) to contaminated sediment/bank soil, surface water, and prey items in South Branch Creek;

- Exposure of piscivorous birds (great blue heron; *Ardea herodias*) to contaminated sediment/bank soil, surface water, and prey items in South Branch Creek;

- Exposure of invertivorous mammals (short-tailed shrew; *Blarina brevicauda*) to contaminated soil and prey items in the upland area of the Site;

- Exposure of carnivorous mammals (red fox; *Vulpes vulpes*) to contaminated soil and prey items in the upland area of the Site;

- Exposure of invertivorous birds (American woodcock; *Scolopax minor*) to contaminated soil and prey items in the upland area of the Site; and

- Exposure of carnivorous birds (red-tailed hawk; *Buteo jamaicensis*) to contaminated soil and prey items in the upland area of the Site.

Potential risks to benthic macroinvertebrate communities were primarily evaluated by comparing sediment COC concentrations in South Branch Creek to sediment benchmarks; additionally, bulk sediment toxicity testing was performed for lethality and growth (acute toxicity tests). Potential risks to estuarine fish communities in South Branch Creek were evaluated by comparing fish tissue COC concentrations to tissue toxicity reference values (TRVs). Potential risks to populations of upper trophic level (wildlife) receptors at the Site were evaluated using food chain models to calculate dietary doses, which were compared to dietary TRVs to yield a quantitative estimate of risk.

Two exposure levels were considered for evaluating potential ecological risks. The RME scenario considered exposure to upper-bound exposure point concentration (EPC) estimates (95 percent upper confidence levels or maximum concentrations) and the central tendency exposure (CTE) scenario considered mean concentrations.
Note that EPCs did not account for visible elemental mercury as it was not possible to analyze these samples using conventional methods; however, it is assumed that areas with visible elemental mercury pose unacceptable risks to potential ecological receptors. If available, multiple effects levels were also considered. A range of screening levels and tissue toxicity reference values (TRVs) that correspond to various effects were considered for benthic macroinvertebrates and estuarine fish, respectively. For wildlife receptors, both 'no observable adverse effect level' (NOAEL) and 'lowest observed adverse effect level' (LOAEL) TRVs were considered.

The results of the BERA support the following conclusions:

- Several COCs in South Branch Creek sediment have the potential to result in adverse ecological effects to benthic macroinvertebrates as determined by comparison to marine sediment screening levels. Arsenic, barium, mercury, and methyl mercury are expected to be the primary risk drivers. South Branch Creek sediment acute toxicity testing results also indicated a potential for reduced benthic invertebrate survival.

- Fish tissue concentrations measured in South Branch Creek were within the range of tissue TRVs identified in the primary literature, indicating that South Branch Creek COCs are not bioaccumulating to a level likely to adversely affect populations of estuarine fish.

- Ecological risks for omnivorous mammals (raccoons), piscivorous mammals (mink), and piscivorous birds (great blue herons) exposed to COCs in South Branch Creek were below established risk levels. However, there is a potential for ecological risk to sediment-probing birds (spotted sandpiper) exposed to COCs in South Branch Creek. Primary risk drivers are arsenic, barium, and mercury.

Areas of visible elemental mercury contamination in the upland area of the Site could not be quantitatively evaluated. For the purposes of the BERA, areas with visible elemental mercury were assumed to present unacceptable risk for potential ecological receptors.

- No unacceptable risks were identified for carnivorous mammals (red foxes) exposed to COCs in the upland area of the Site. There is a potential for ecological risk to insectivorous mammals (short tailed shrews), invertivorous birds (American woodcocks), and carnivorous birds (red-tailed hawks). Although the Site may serve as a wildlife corridor for terrestrial species, significant ecological exposure to soil is not expected to occur given the highly disturbed habitat, lack of prey species and vegetation, limited exposure potential due to buildings, pavement and gravel on Site, and anticipated future land use. Based on calculated risk estimates, primary risk drivers in the upland area are mercury and hexachlorobenzene.

In summary, elevated HQ risks were estimated in the BERA for benthic invertebrates and sediment probing birds for exposure to several COCs in South Branch Creek. These risks are consistent with the reduced survival in the acute toxicity sediment testing results. These data support the premise that Site contaminants in sediment are sufficient to cause adverse alterations to the functioning of benthic invertebrate communities. Elevated concentrations of the COCs are generally higher in samples closer to the former facility. Arsenic, barium, and mercury are the primary risk drivers in South Branch Creek.

Elevated HQ risks were estimated in this BERA for terrestrial mammals (invertivores) and birds (invertivores and, to a lesser extent, carnivores). Primary risk drivers are mercury (including visible elemental mercury) and hexachlorobenzene. Concentrations tend to be focused in areas near the former operational areas of the Site.

Uncertainties

The procedures and inputs used to assess risks in these evaluations, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is uncertainty as to the actual levels present. Environmental chemistry analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health and environmental risks, including a quantitative evaluation of the

degree of risk associated with various exposure pathways, is presented in the HHRA and BERA reports, which can be found in the administrative record for this Site. The response action selected in this ROD is necessary to protect public health and the environment from actual or threatened releases of hazardous substances to the environment.

REMEDIAL ACTION OBJECTIVES:

Remedial Action Objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as Applicable and Relevant or Appropriate Requirements (ARARs) and risk-based levels established in the risk assessment.

The Site is a former industrial property in the midst of other industrial properties that have been subject to separate remedial actions. Thus EPA considered remedies that manage waste in place (a "waste management area") consistent with remedies at neighboring properties.

The RAOs are:

- Reduce or eliminate potential current and future unacceptable risks to human and ecological receptors resulting from ingestion and dermal contact with soils and groundwater.

- Reduce or eliminate potential current and future unacceptable risks to human receptors resulting from inhalation of mercury vapors emanating from soils and marsh deposits

- Reduce or eliminate migration of soil contamination to groundwater or surface water.

- Prevent or minimize migration of contaminated groundwater, and, to the extent practicable, remediate to applicable standards outside the waste management area.

- Reduce or eliminate unacceptable risks to human and ecological health as a result of ingestion or dermal contact with Site sediments.

- Reduce or eliminate human exposure to contaminated building materials and physical hazards that may result in potentially unacceptable risk.

The cleanup levels for the Site's soil (Table 7) including for mercury (65 mg/kg) and other COCs (other than naphthalene), are based on the New Jersey Soil Remediation Standard for direct contact to non-residential soils. For naphthalene, a risk-based cleanup goal has been developed.

EPA has concluded that soil containing visually observable elemental mercury is considered principal threat waste (PTW). The Arthur Kill has numerous sources of mercury contamination; the mercury contamination in the Arthur Kill near the LCP Site does not appear to be distinguishable from the levels found throughout the Arthur Kill/Newark Bay complex. Since any areas of remediated Site sediments in the South Branch Creek and Northern Off-Site Ditch are likely to be impacted by contaminated sediments in the Arthur Kill, the cleanup levels for the sediments will be set at levels consistent with those found in the Arthur Kill.

For groundwater, the cleanup goal for the overburden zone is the New Jersey Groundwater Quality Standard for Class IIA groundwater. The bedrock zone has been classified Class III-B, which requires the development of state approved site specific criteria. The cleanup levels for the COCs in the bedrock aquifer will be the New Jersey Surface Water Standards for saline waters. Should the State proceed with developing criteria for this Class III-B aquifer, EPA will assess the remedy at that time to ensure protectiveness.

DESCRIPTION OF ALTERNATIVES:

Section 121 (b)(1) of CERCLA (42 U.S.C. 9621(b)(1))requires that each remedial alternative be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility or volume of hazardous substances.

Potential applicable technologies were identified and screened using effectiveness, implementability and cost as the criteria, with the most emphasis on the effectiveness of the remedial action. Those technologies that passed the initial screening were then assembled into five remedial alternatives.

Except for the No Action alternative (Alterative 1), each remedial alternative would be coupled with institutional controls to limit the potential exposure of the public to the Site contaminants. Institutional controls are typically restrictions placed to minimize human exposure, while allowing continued monitoring. Institutional controls are generally used in conjunction with remedial technologies. Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on institutional controls to achieve protectiveness.

The time frames below for construction do not include the time for designing the remedy or the time to procure necessary contracts. Because all the alternatives result in contamination remaining on the Site above levels that would allow for unlimited use and unlimited exposure, a review will be conducted every five years (five-year reviews).

Alternative 1 - No Action

Total Capital Cost	$0
Operation and Maintenance	$0
Total Present Net Worth	$0
Timeframe	0 years

The No Action alternative was retained for comparison purposes as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the regulation under which EPA implements the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). No remedial actions would be implemented as part of the No Action alternative. This alternative does not include institutional controls.

Alternative 2 - Partial Containment (Treatment Cap)

Total Capital Cost	$19.9 million
Operation and Maintenance	$ 1.1 million[1]
Total Present Net Worth	$21.0
Timeframe	2 Years

1 Operation and maintenance costs for the remedial alternatives are presented as the 30-year present worth of this work.

An impermeable cap would be installed over virtually the entire Site to both prevent direct contact with contaminated soils, prevent overland transport of contamination and to interrupt the potential for inhalation exposure to mercury vapor. The area under the cap, including the overburden layer of groundwater, would be considered the waste management area. The cap would incorporate a soil layer, and a three-inch thick treatment layer of sulfur placed under an impermeable geosynthetic membrane. The geosynthetic membrane (and the sulfur layer for mercury) would serve to prevent vaporization of mercury (and other contaminants) as well as prevent rainwater infiltration into the underlying groundwater.

Since the sediments would likely be recontaminated by sediments from the Arthur Kill, source reduction would be the focus of the sediment remedy. The cleanup level for the South Branch Creek and Northern Off-Site Ditch sediments would be set at levels consistent with Site COC concentrations found in the Arthur Kill sediments. Sediments with unacceptable levels of contaminants in the downstream portion of the South Branch Creek as well as in the Northern Off-Site Ditch would be excavated and placed in the upstream portion of the South Branch Creek. The upstream portion would then be placed under the cap. The downstream portion and the Northern Off-Site Ditch would be restored with clean sediment, and the adjacent wetlands reconstructed. In addition, wetlands mitigation would be implemented at another location for the area that has been lost under the cap.

The buildings on Site would be demolished in a controlled manner. Steel and other non-porous material would be segregated, decontaminated and recycled. Porous material that has visible signs of contamination would be treated with sulfur. The debris would be processed to reduce its size before being placed under the cap.

Alternative 2 would also include collection of groundwater from the overburden aquifer layer. A shallow system would be installed along the limits of the cap. The collected groundwater would be either piped to the adjacent GAF site for treatment, or sent to the local publicly owned treatment works for appropriate treatment and disposal. Groundwater monitoring would be performed in the overburden aquifer to confirm that there is an inward gradient to the Site and in the bedrock aquifer to confirm that the deeper groundwater is not being impacted by the LCP Site, and continues to be captured by the GAF wells.

This remedy would require air monitoring during building demolition and work where the soil or sediments are disturbed. In addition, this remedy would include institutional controls (e.g., a CEA and a deed notice) to prevent exposure to contaminated groundwater and to restrict the property to industrial or commercial use. A long-term monitoring program would be developed to ensure the continued protectiveness of the remedy and also to assess potential migration and natural degradation of the contaminated groundwater.

Alternative 3 Full Containment (Treatment Cap and Barrier Wall)

Total Capital Cost	$23.8 million
Operation and Maintenance	$ 1.1 million
Total Present Net Worth	$24.9 million
Timeframe	3 years

The Alternative 3 remedy for soils is the same as Alternative 2, except it includes a barrier wall, such as sheet piling, to further limit the potential for lateral migration of contaminants off-Site. The low permeability barrier wall would be installed along the limits of the soil cap and tied into the top of the glacial till layer (approximately 15 feet below ground surface (bgs)).

Like Alternative 2, Alternative 3 would include collection of groundwater from the overburden aquifer layer. However, for Alternative 3, the shallow collection system would be installed along the interior limits of the barrier wall. The system would likely consist of a collection pipe with pump stations as needed. Groundwater monitoring would be performed as described in Alternative 2.

Alternative 3 includes the same remedial components for sediments and building materials as Alternative 2, including institutional controls and long-term monitoring.

Alternative 4a and 4b - Full Containment and Partial/Full Depth PTW Stabilization

Alternative 4a

Total Capital Cost	$33.2 million
Operation and Maintenance	$ 1.1 million
Total Present Net Worth	$34.3 million
Timeframe	4 years

Alternative 4b

Total Capital Cost	$35.2 million
Operation and Maintenance	$ 1.1 million
Total Present Net Worth	$36.3 million
Timeframe	4 years

Alternative 4a and 4b contains all the components of Alternative 3. Alternatives 4a and 4b also include treatment of the PTW soils through stabilization. Stabilization would be accomplished by in-situ mixing of sulfur with PTW soil through the use of specialized mixing equipment (e.g., augers). The amount of sulfur per volume of soil will be determined during the pre-design studies. Also, specific measures of success will be developed during the design phase. The measures of success would be used to determine if the full scale stabilization remedy was effective at converting the elemental mercury to mercuric sulfide.

The primary goal of stabilization would be to convert the elemental mercury to mercuric sulfide. Mercuric sulfide (i.e., cinnabar) is insoluble, does not generate vapors and is a solid at ambient temperatures. Two approaches were analyzed for this alternative, Alternative 4b is treatment to the full depth of the PTW area (up to 17 feet bgs) and Alternative 4a includes treatment of only the shallower soils (up to 6 feet bgs). The shallower soils contain the majority (more than 80 percent) of the elemental mercury.

Alternative 5 - Full Containment and Partial/Full Depth PTW Excavation and Off-Site Disposal

Alternative 5a

Total Capital Cost	$84.2 million
Operation and Maintenance	$ 1.1 million
Total Present Net Worth	$85.3 million
Timeframe	3 years

Alternative 5b

Total Capital Cost	$96.2 million
Operation and Maintenance	$ 1.1 million
Total Present Net Worth	$97.3 million
Timeframe	3 years

Alternative 5 (i.e., 5a and 5b) contains all the components of Alternative 3. Alternative 5 also includes removal and off-site

disposal of the PTW, and some of the contaminated building debris. Post excavation sampling would be performed. Similar to Alternative 4, two approaches were considered, removal to the full depth of the PTW area (up to 17 feet bgs (5b)) and removal of only the shallower (up to 6 feet bgs (5a)) soils.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in CERCLA §121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial response measures pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consisted of an assessment of the individual response measure against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each response measure against the criteria.

Threshold Criteria *- The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

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1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Alternative 1 would not provide protection of human health or the environment, since uncontained contamination would persist in the soils, sediments, groundwater and building material. Potential and existing routes of exposure to humans and animals would be unrestricted. Also, there would be no mechanism to monitor the migration of the contamination.

Alternatives 2 through 5 would provide protection of human health and the environment by preventing exposure to contaminated media through installation of an impermeable cap. Alternatives 2 through 5 would also provide protection of human health through implementation of institutional controls to interrupt potential future exposure. The barrier wall included

in Alternatives 3 through 5 would further limit the potential for lateral migration of groundwater contamination.

2. Compliance with applicable or relevant and appropriate requirements (ARARs)

Section 121(d) of CERCLA and NCP '300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy would meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

Concentrations of contaminants exist at levels above the applicable groundwater and soil standards (e.g., the New Jersey Groundwater Quality Standards and the New Jersey Soil Remediation Standards). Except for Alternative 1, all alternatives would address the contaminated soil through containment and address the overburden groundwater through capture, containment and treatment. All alternatives except

Alternative 1 would comply with location and action-specific ARARs.

A list of ARARs can be found in Table 8.

Primary Balancing Criteria *- The next five criteria, criteria 3 through 7, are known as Aprimary balancing criteria@. These criteria are factors with which tradeoffs between response measures are assessed so that the best option will be chosen, given site-specific data and conditions.*

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3. Long-term effectiveness and permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Alternative 1 would not be effective or permanent, since the contaminants would not be monitored and there would be no mechanism to prevent future exposure. In general, the relative degrees of effectiveness and permanence associated with Alternatives 2, 3, 4a and 4b, and 5a and 5b are comparable; however, Alternatives 4a and 4b would provide an additional component of protection by further reducing the potential mercury vapor pathway through the conversion of the PTW elemental mercury to mercuric sulfide. EPA expects that conversion will be permanent. Similarly, Alternatives 5a and 5b would provide additional protection over Alternatives 2 and 3 by removing the area of PTW.

4. Reduction of toxicity, mobility, or volume

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 1 would not reduce the toxicity, mobility and volume (TMV) through treatment as no active treatment occurs. All the action alternatives would reduce the mobility of the contamination through containment, as well as potentially reducing some of the toxicity and mobility through conversion of

elemental mercury at the cap's "treatment layer." Alternatives 3, 4a and 4b and 5a and 5b afford additional reduction of mobility through the use of a barrier wall.

Alternatives 4a and 4b would best meet this criterion by reducing the toxicity and mobility of the mercury through treatment of the visible mercury to convert it to mercuric sulfide. Mercuric sulfide is less toxic, less soluble and less volatile than elemental mercury.

Alternatives 5a and 5b would reduce the mobility, but not toxicity and volume of elemental mercury at the Site through removal and disposal rather than treatment.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

For Alternative 1, protection of the community and workers during remedial activities would not be applicable as no remedial action is occurring.

Alternatives 2, 3 and 5a and 5b would have approximately the same construction period of about two to three years. Alternative 4a and 4b would have the longest construction period (three to four years) due to the time required to perform in-situ mixing, as well as to perform the necessary pilot studies.

All the action alternatives would result in a temporary increase in short-term mercury vapor emissions over baseline conditions. Alternative 5a and 5b would have the largest increase in emissions during the implementation (estimated at between 101 and 197 pounds). In addition, Alternative 5a and 5b would require between 1,000 and 2,000 trucks to first remove the PTW soil and debris, and then to bring in substrate to backfill the excavated areas. Thus, Alternative 5a and 5b is the only option that would significantly increase the truck traffic through the local community.

During the remedial work, Alternative 4a and 4b would have the smallest increase in mercury vapor emissions (0.5 to 0.8 pounds released) because of the widespread use of a sulfur compound.

Vapor emissions could impact on-site construction workers and the local community. Alternatives 2 and 3 would have an increase of an estimated 7.7 pounds.

Health and Safety Plans, which would include air monitoring, engineering controls and appropriate worker personal protective equipment (PPE), would be used to protect the community and workers for Alternatives 2 through 5.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

All the action alternatives are implementable with conventional materials and equipment. Alternatives 2 and 3 would be the easiest to implement.

Alternative 4a and 4b would require specialized equipment to mix the soil, as well as methods to address subsurface obstructions. Alternative 4b would be more difficult to implement due to the greater depth and the associated subsurface obstacles.

Alternative 5a and 5b would require disposal of elemental mercury wastes. Currently a single facility, located in Canada, has been identified that can accept this waste stream. Some uncertainty still exists on whether the facility can handle the mass from this Site.

In addition, the Mercury Export Ban Act (MEBA) may place further constraints on how this waste stream can be handled. Signed into law in 2008, MEBA is intended to prevent elemental mercury originating in the United States from reaching foreign markets. In this case, MEBA would also ban elemental mercury recovered from Site soils or sediments from being reused or sold even domestically.

7. Cost

Includes estimated capital and O&M costs, and net present worth value of capital and O&M costs.

Each action alternative includes long-term operation and

maintenance. Therefore, a seven percent discount rate was used to derive each alternative's present net worth cost.

Alternative 1 incurs no cost but provides no protection to human health. Except for Alternative 1, Alternative 2 is the least expensive of the alternatives. Alternatives 5a and 5b are the most expensive alternatives. Alternative 4a and 4b are relatively close in price to Alternatives 2 and 3. The level of operation and maintenance required was similar for each active remedial alternative, so this long-term management cost was not an important factor for comparing casts at the Site.

Modifying Criteria - The final two evaluation criteria, criteria 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.

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8. State acceptance

Indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

The NJDEP concurs with the components of the selected remedy. However, NJDEP does not concur with the contingency remedies for treating elemental mercury as discussed further below. NJDEP believes the contingency remedy should be excavation and off-site removal of the PTW. In addition, NJDEP believes that the existing data on contamination in Arthur Kill sediments is insufficient to determine cleanup levels for the Northern Off-Site Ditch and South Branch Creek sediments.

9. Community acceptance

Summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

EPA solicited input from the community on the remedial response measures proposed for the Site. Verbal comments were recorded

from attendees of the public meeting. Several written comments were received.

Generally, the comments received during the public meeting did not express any particular concerns regarding the preferred alternative. A number of commenters were concerned that if a large storm surge were to occur during the remedial action, their homes could be exposed to Site contaminants entrained within the tidal waters. Some of the written comments expressed preference for removal and disposal of the PTW soils (Alternative 5a or 5b).

In Appendix V, the Responsiveness Summary addresses all comments received; it also includes copies of the written comments and a transcript from the public meeting.

PRINCIPAL THREAT WASTE

Principal threat wastes are considered source materials, i.e., materials that include or contain hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. The Superfund Law requires that treatment of PTW be considered wherever practicable.

At the LCP Site, soil containing visible mercury is a PTW and will be treated through the implementation of the selected remedy.

SELECTED REMEDY

Based upon consideration of the results of the investigations, the requirements of CERCLA, the detailed analysis of the remedial alternatives and public comments, EPA has determined that Alternative 4b is the appropriate remedy for the Site. This remedy best satisfies the requirements of CERCLA Section 121 and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9).

The major components of the selected remedy include:

- Installation of a capping system to prevent direct contact with soils and exposure to mercury vapor;

- Treatment of the soil containing visible elemental mercury by mixing it with sulfur to convert the mercury to mercuric

sulfide;

- Excavation and on-Site disposal of sediments and marsh soils from the Northern Off-Site Ditch and the downstream portion of the South Branch Creek;

- Restoration of the excavated areas;

- Controlled demolition of the Site's buildings, recycling of non-porous material and placement of porous material under the cap;

- Containment and collection of the overburden groundwater layer by a barrier wall and collection collection/disposal system;

- Groundwater monitoring; and

- Implementation of institutional controls in the form of a deed notice and a CEA.

A capping system will be installed to both prevent direct contact with soils on a Site-wide basis and to interrupt the potential for inhalation exposure to mercury vapor (Figure 12). The cap will incorporate a soil layer, and a three-inch thick treatment layer of sulfur placed under an impermeable geosynthetic membrane. The treatment layer will be placed over areas of mercury-contaminated soil that are not otherwise treated.

The geosynthetic membrane will serve to prevent vaporization of mercury (and other contaminants) as well to prevent rainwater infiltration into the underlying groundwater. A low permeability barrier wall will be installed along the limits of the soil cap and tied into the top of the glacial till layer (about 15 feet deep). Areas with PTW will be treated by mixing the contaminated soil with sulfur to convert the elemental mercury to mercuric sulfide to a depth of approximately 15 feet. A pilot study, with clearly defined treatment goals, will be performed prior to full implementation of the remedy.

Sediments with unacceptable levels of contamination in the Northern Off-Site Ditch and in the downstream portion of the South Branch Creek will be excavated and placed under the cap. The excavated sediment areas and the adjacent wetlands would be

reconstructed. In addition, wetlands mitigation will be implemented at another location for the area that has been lost under the cap. During the design phase, EPA will determine cleanup levels for the sediments that are consistent with existing levels in the Arthur Kill.

The buildings on Site will be demolished in a controlled manner. Steel and other non-porous material will be segregated, decontaminated and recycled. Porous material that has visible signs of mercury contamination will be treated with sulfur. The debris will be processed to reduce its size then placed under the cap. Air monitoring will be required during building demolitions, and also during other activities where the soil or sediments are disturbed.

Aside from the containment afforded by the barrier wall, the selected remedy will include collection of groundwater from the overburden layer. A shallow system would be installed along the interior limits of the barrier wall. The system would likely consist of a shallow collection pipe with pump stations as needed. The collected groundwater will be either piped to an adjacent site for treatment, or sent to the local POTW. Groundwater monitoring of the overburden aquifer will be performed to ensure that there is an inward gradient to the Site. After the cap is installed, EPA expects the overburden area under the cap to dewater in less than 10 years. Groundwater monitoring in the overburden aquifer and in the bedrock aquifer will be performed to confirm that the contamination is being contained in the waste management unit. In addition, monitoring will determine whether the neighboring GAF site remedy continues to capture the bedrock groundwater underlying the LCP Site.

While the financial costs of the selected alternative are relatively high, the costs are due to the many components and complex nature of this single operable unit. The cost of this remedy is significantly lower than the excavation/off-site removal alternative, so it is the more cost effective of the two alternatives that specifically address the PTW.

The selected remedy will prevent human and ecological exposure to Site contaminants in the soil, sediments, groundwater and building material. In addition, the selected remedy's cap will allow for future commercial use of the property. As contamination above acceptable risk levels will remain on the Site, five-year reviews will be performed.

The remedy was selected over other alternatives principally because it is expected to achieve substantial and long-term risk reduction through treatment of the PTW, as well as containment.

Based on information currently available, EPA believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. EPA expects the selected remedy will satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to implementation of the selected remedy.

EPA recognizes that the selected remedy includes a treatment approach for PTW that is innovative; therefore, EPA is also identifying two contingency remedies in case the selected remedy does not meet the measures of success, which will be developed during the pre-design studies.

CONTINGENCY REMEDIES

If, after reviewing the pilot study results, EPA determines that treating the PTW to full depth is not technically practicable, EPA will use the first contingency remedy. The first contingency would be Alternative 4a, treatment of the PTW to mid-depth. If EPA determines that the treatment of the PTW waste is not meeting pre-set goals at any depth, then EPA will use the second contingency remedy, Alternative 3. Alternative 3 is the same as the preferred alternative, except without treatment of the PTW.

If EPA chooses to implement one of the contingency remedies, EPA will issue a decision document to record this change in the remedial approach.

Green Remediation Considerations

Green remediation practices can be incorporated into the selected remedy's planning and implementation of pre-design investigation and remediation as follows:

- Minimize number of field mobilizations
- Use local labor to reduce fuel consumption associated with driving to the Site
- Use ultra-low sulfur diesel or fuel-grade biodiesel as fuel for construction vehicles
- Schedule shipments of sulfur and clean fill to minimize the uses of fuel
- Dispose of steel at recycling facility if possible
- Use non-phosphate detergents for decontamination
- Use direct push technology, if feasible, for soil sampling to minimize waste production (drill cuttings) and the uses of fuel
- Schedule sampling to minimize shipping

STATUTORY DETERMINATIONS

As was previously noted, CERCLA §121(b)(1) mandates that a remedial action must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances, pollutants, or contaminants at a site. CERCLA §121(d) further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4).

Protection of Human Health and the Environment

The selected remedy, Alternative 4b, will be protective of human health and the environment through the containment of certain Site contamination. The planned capping system will prevent direct contact with contaminated soils thereby eliminating the risk posed by dermal contact and ingestion. The cap will also significantly reduce the potential for inhalation exposure to mercury vapor.

An impermeable geosynthetic membrane will be incorporated in the cap and will further prevent vaporization of mercury (and other contaminants) as well preventing rainwater infiltration into the underlying groundwater. A barrier wall will further enhance the containment afforded by the impermeable cap.

Sediments with unacceptable levels of contamination in the Northern Off-Site Ditch and in the downstream portion of the South Branch Creek will be excavated and placed under the cap thereby further reducing ecologic risk.

The selected remedy also will be protective of human health and the environment through the treatment of principal threat waste and overburden groundwater.

Areas with principal threat waste will be treated by mixing the contaminated soil with sulfur to convert the elemental mercury to mercuric sulfide to a depth of approximately 15 feet.

Long-term monitoring of the containment remedy and enforcement of institutional controls will ensure that remaining wastes will not impact human health and the environment through direct contact or impact to groundwater.

The selected remedy will provide adequate long-term control of risks to human health and the environment through treatment, capping, institutional controls and long-term monitoring. The selected remedy presents the fewest short-term risks of all action alternatives.

Compliance with ARARs

The selected remedy will comply with ARARs.

A list of ARARs can be found in Appendix Table 8 of this document.

Cost Effectiveness

EPA has determined that the selected remedy is cost-effective and represents a reasonable value. In making this determination, the following definition was used: A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" (40 C.F.R. §300.430(f)(1)(ii)(D)).

EPA evaluated the "overall effectiveness" of those alternatives that satisfied the threshold criteria (*i.e.*, were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness).

Overall effectiveness was then compared to costs to determine cost-effectiveness.

The cost of implementing the selected remedy, Alternative 4b, is approximately $11.4 million more than the cost of implementing Alternative 3. The increased cost of Alternative 4b is related largely to the in-situ stabilization of the elemental mercury. This aspect of the selected remedy greatly increases the long-term effectiveness and permanence of the remedy in that the sulfur treatment ensures the reduction of the risk of exposure to the most dangerous levels of mercury even in the event of a failure of the containment system. The overall effectiveness secured by the additional cost of the selected remedy, over remedies that achieve protectiveness through containment only, was determined by EPA to be proportional to costs and hence the selected remedy represents a reasonable value for the money to be spent.

EPA evaluated Alternative 4b against Alternatives 5a and 5b for cost effectiveness. Alternatives 5a and 5b exceed the cost of the selected remedy by $49 million and $61 million, respectively. While excavation and off-site disposal of the PTW provides for long-term effectiveness and permanence in addressing Site risks, these remedies fall short of the goal of reducing toxicity, mobility and volume through treatment attained by Alternative 4b. Furthermore, the short-term negative impact of the excavation and off-site disposal is considerably greater than the negative impact which will be attributed to the treatment phase of the selected remedy.

EPA found that the additional benefits derived from the off-site disposal remedies do not justify the significant increased costs over the selected remedy and, therefore, EPA determined that the selected remedy is cost effective as it has been determined to provide the greatest overall protectiveness for its present worth costs.

Utilization of Permanent Solutions and Alternative Treatment Technologies

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs to the extent practicable, EPA has determined that the selected remedy provides the best balance

of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and State and community acceptance.

The selected remedy will provide adequate long-term control of risks to human health and the environment through containment of Site-related containments, treatment of the principal threat wastes, long-term monitoring and institutional controls. The selected remedy has the least short-term risks of the action alternatives. The selected remedy employs an innovative technology that could be applied at other sites having soils impacted with high levels of elemental mercury.

Preference for Treatment as a Principal Element

Through the use of sulfur to convert elemental mercury to mercuric sulfide, the selected remedy meets the statutory preference for the use of remedies that employ treatment that reduces toxicity, mobility or volume as a principal element to address the principal threats at the Site.

Five-Year Review Requirements

The selected remedy will result in contamination remaining above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years of construction completion for the Site to ensure that the remedy is, or will be, protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the LCP Site was released for public comment on August 21, 2013. An extension was requested by interested parties. On September 17, 2013, EPA granted an extension of the comment period. The comment period closed on October 21, 2013.

The Proposed Plan identified Alternative 4b (full containment and full depth PTW stabilization) as EPA's preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. The comments received are documented in the Responsiveness Summary. EPA made no significant changes to the remedy as originally identified in the Proposed Plan.

APPENDIX 1

FIGURES

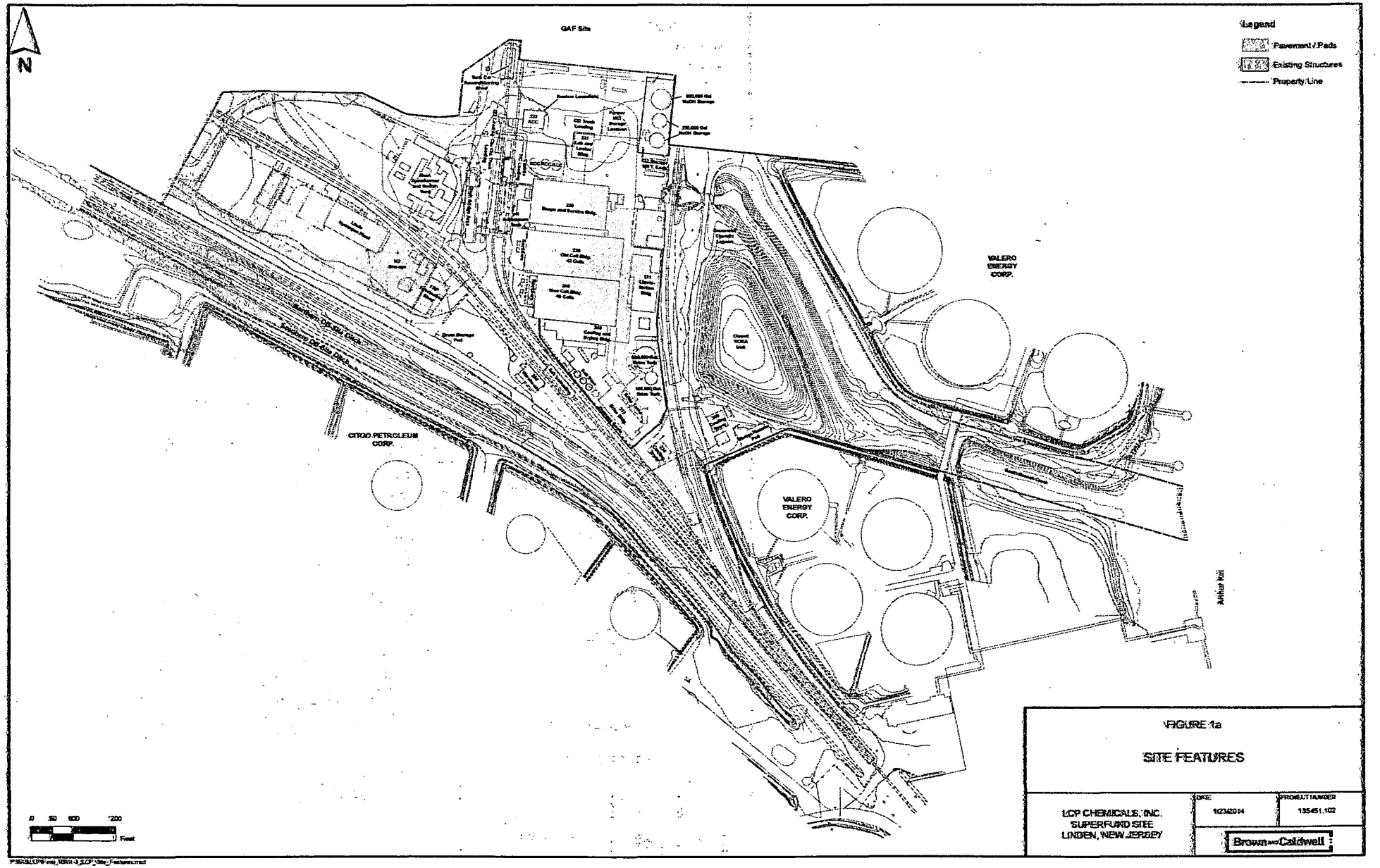


FIGURE 1a

SITE FEATURES

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE 10/24/2014

PROJECT NUMBER 135451.102

Brown AND Caldwell

P:\GIS\LCP\Final_RDR\4-3_LCP_Site_Features.mxd

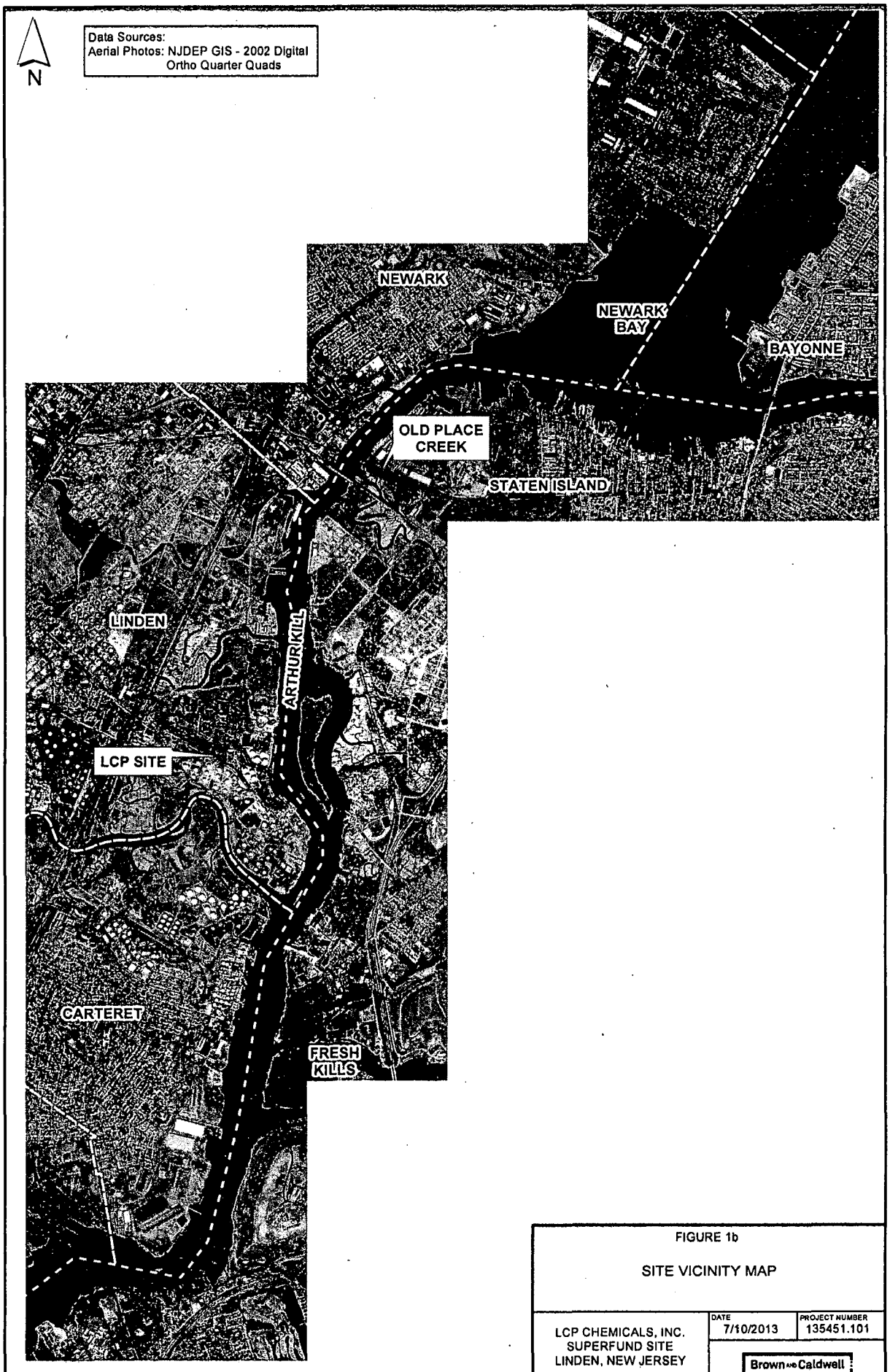
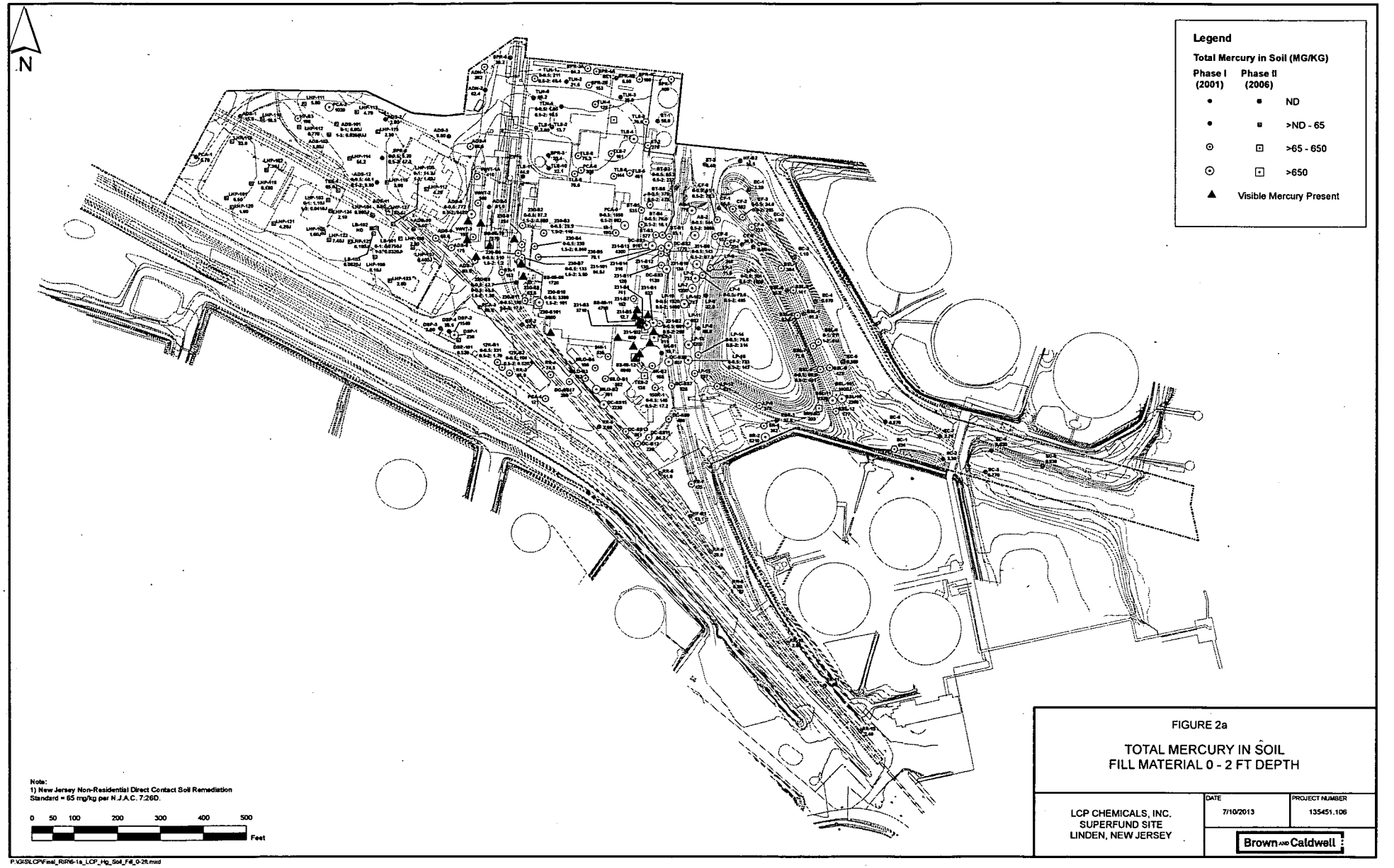


FIGURE 1b

SITE VICINITY MAP

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 7/10/2013	PROJECT NUMBER 135451.101
	Brown AND Caldwell	

P:\GIS\LCP\Final_RIR\1-2_LCP_Site_Vicinity.mxd



Note:
1) New Jersey Non-Residential Direct Contact Soil Remediation Standard = 65 mg/kg per N.J.A.C. 7:26D.

0 50 100 200 300 400 500 Feet

FIGURE 2a

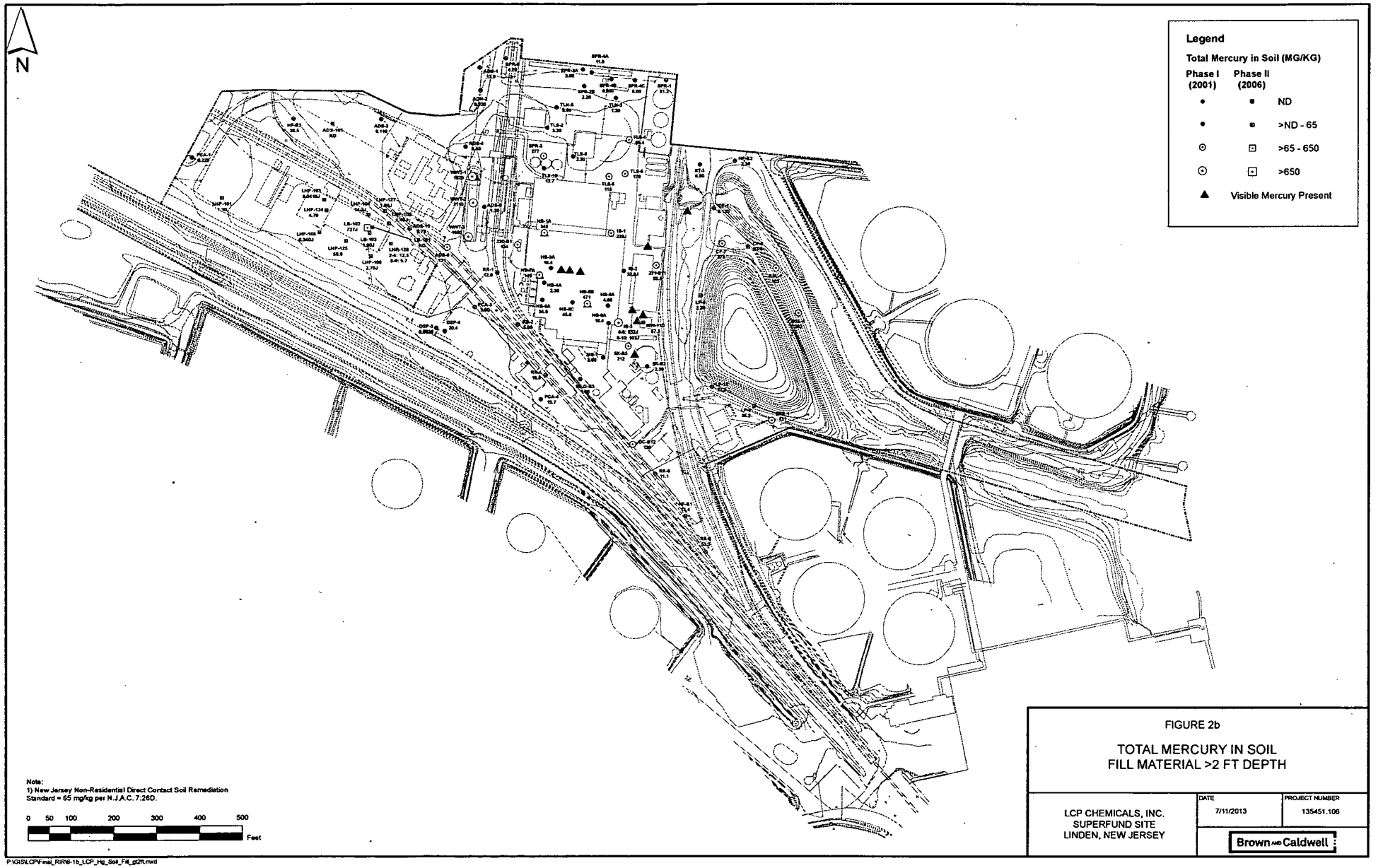
TOTAL MERCURY IN SOIL
FILL MATERIAL 0 - 2 FT DEPTH

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/10/2013	135451.106

Brown AND Caldwell

P:\GIS\LCP\Final_RIR\6-1a_LCP_Hg_Soil_Fill_0-2ft.mxd



Note:
1) New Jersey Non-Residential Direct Contact Soil Remediation Standard = 65 mg/kg per N.J.A.C. 7:26D.

0 50 100 200 300 400 500 Feet

FIGURE 2b

TOTAL MERCURY IN SOIL
FILL MATERIAL >2 FT DEPTH

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/11/2013	135451.106

Brown AND Caldwell

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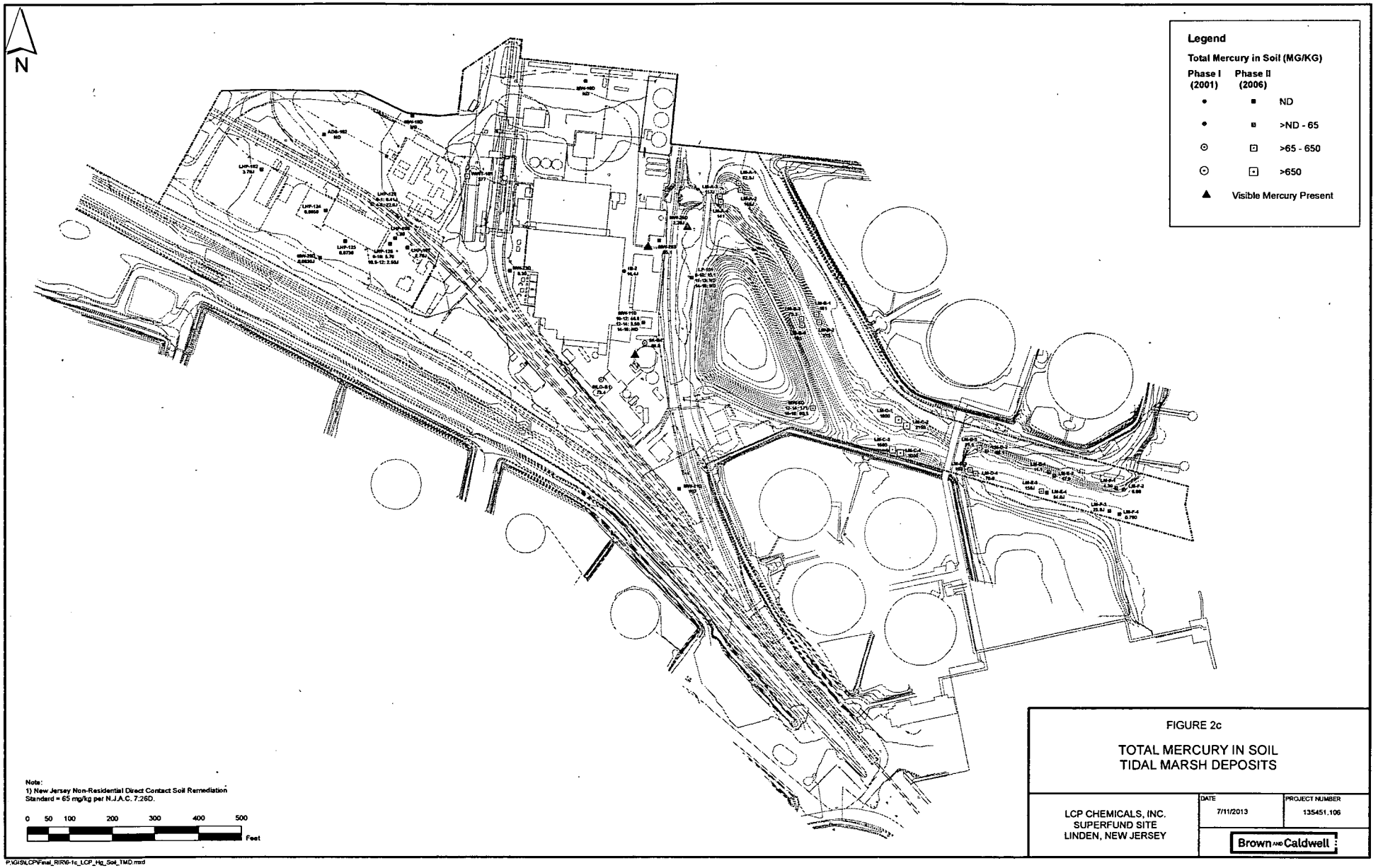

FIGURE 2c

TOTAL MERCURY IN SOIL
TIDAL MARSH DEPOSITS

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 7/11/2013	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

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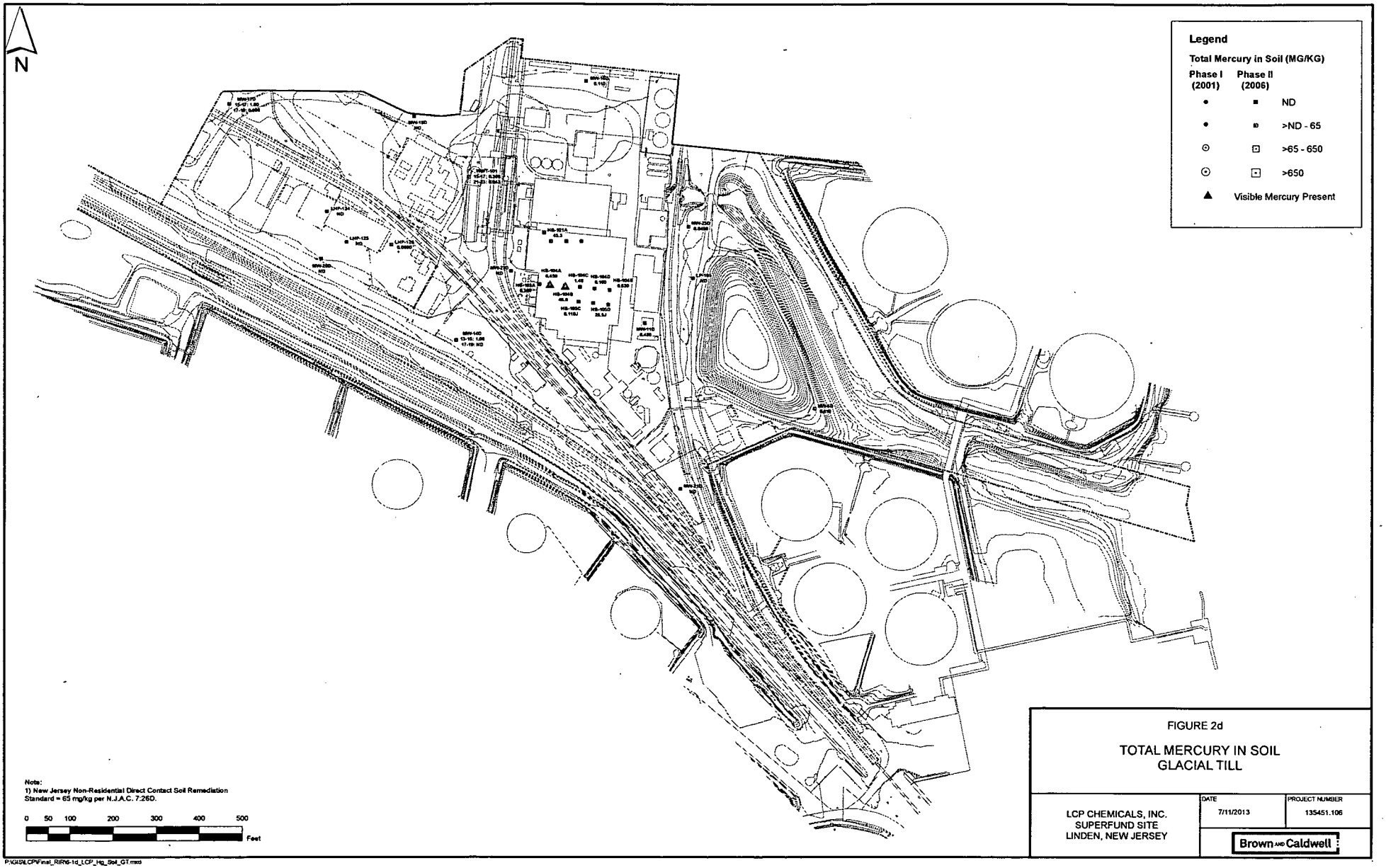

FIGURE 2d

TOTAL MERCURY IN SOIL
GLACIAL TILL

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/11/2013	135451.106

Brown AND Caldwell

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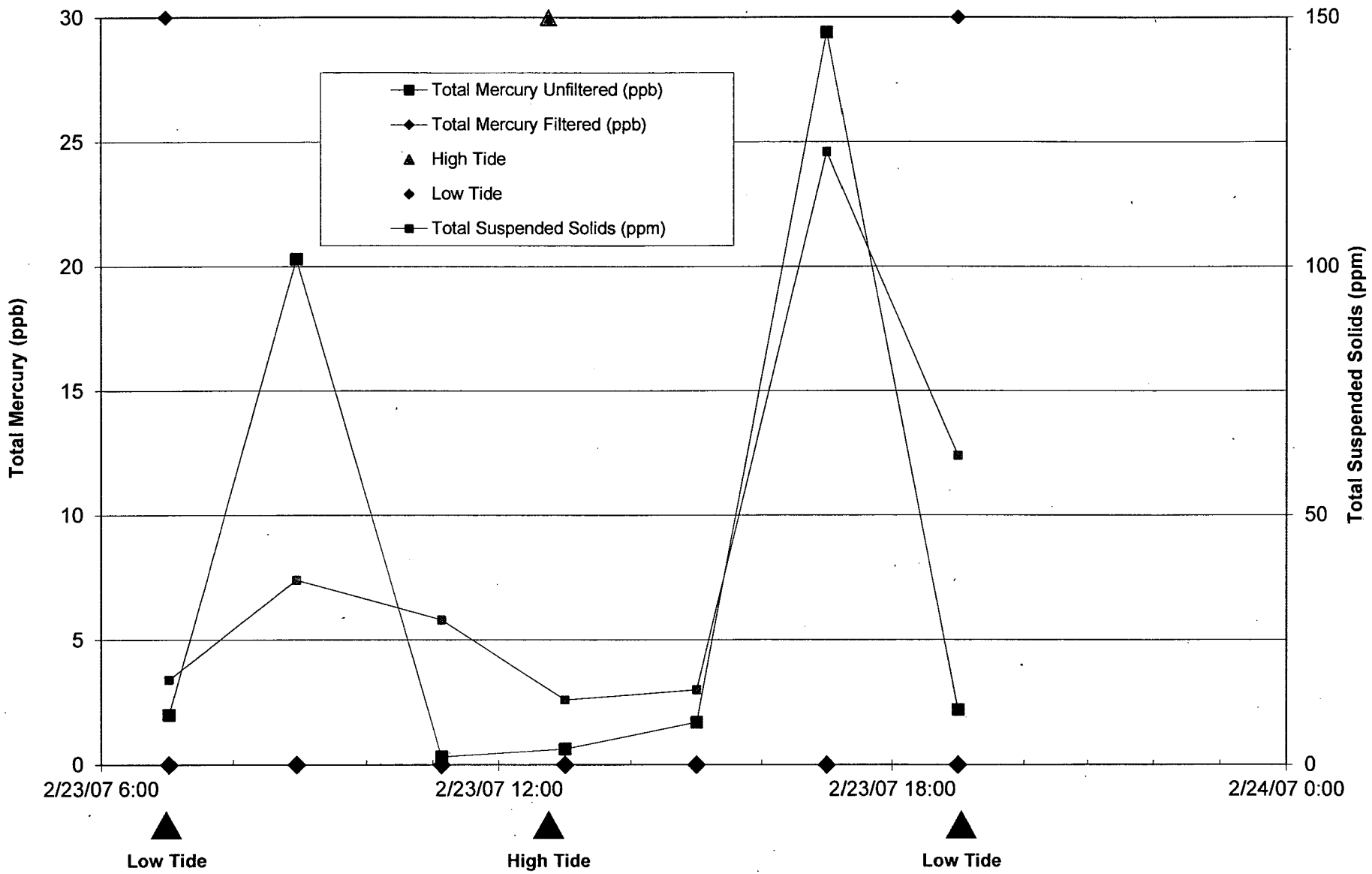
FIGURE 3
Relationship Between Tide and Mercury Concentration in Surface Water
LCP Chemicals Inc., Linden, New Jersey



Brown AND Caldwell

P:\LCP\137005(Final_RI_Report)\Final_RIR_Document\Figures\Section_6\Source_Files\3_SW_Hg_Tide.xlsx\Chart - Lab Data
8/16/2013

FIGURE 4a

TOTAL MERCURY IN FISH TISSUE

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

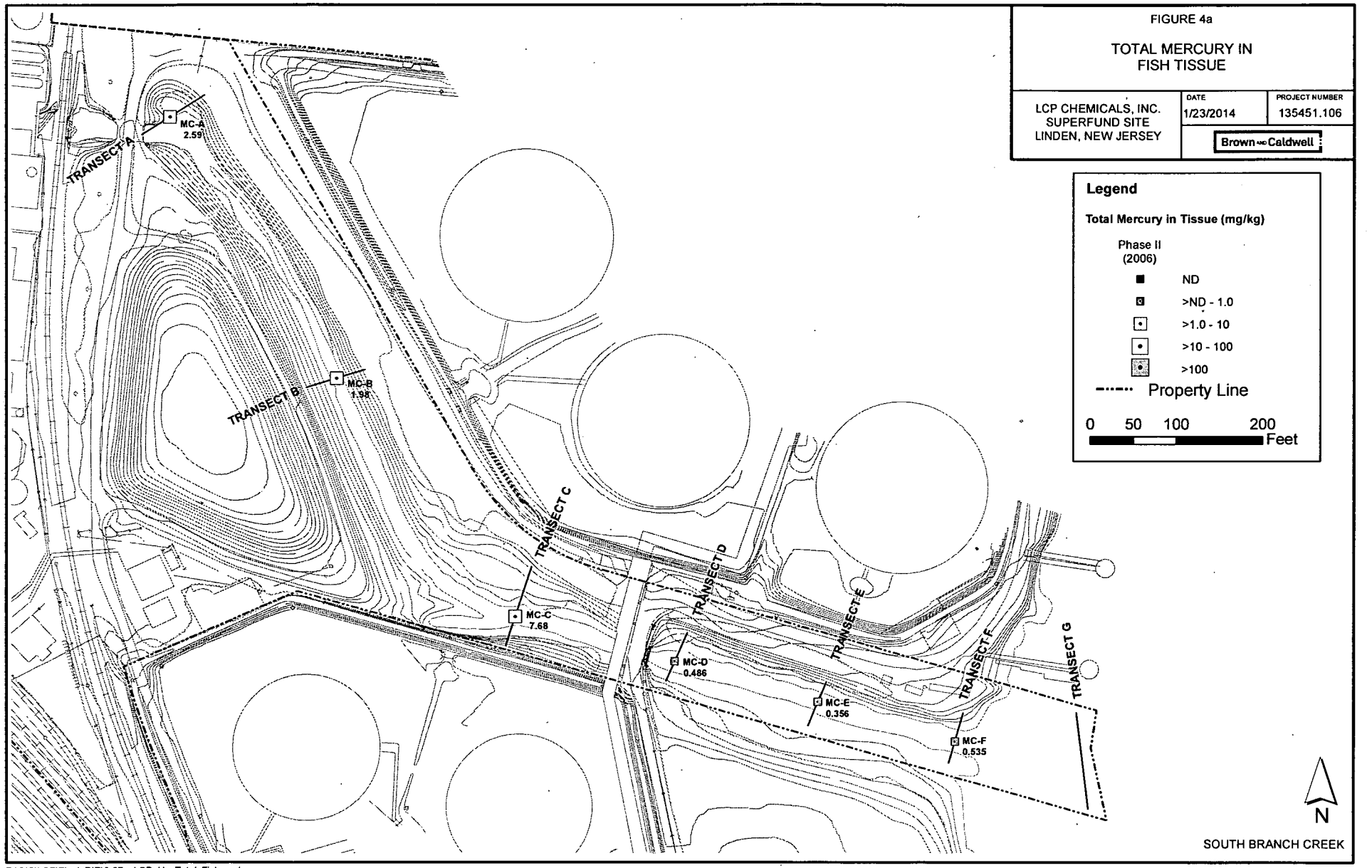


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FIGURE 4b

TOTAL MERCURY IN FIDDLER CRAB TISSUE

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
1/23/2014	135451.106

Brown AND Caldwell

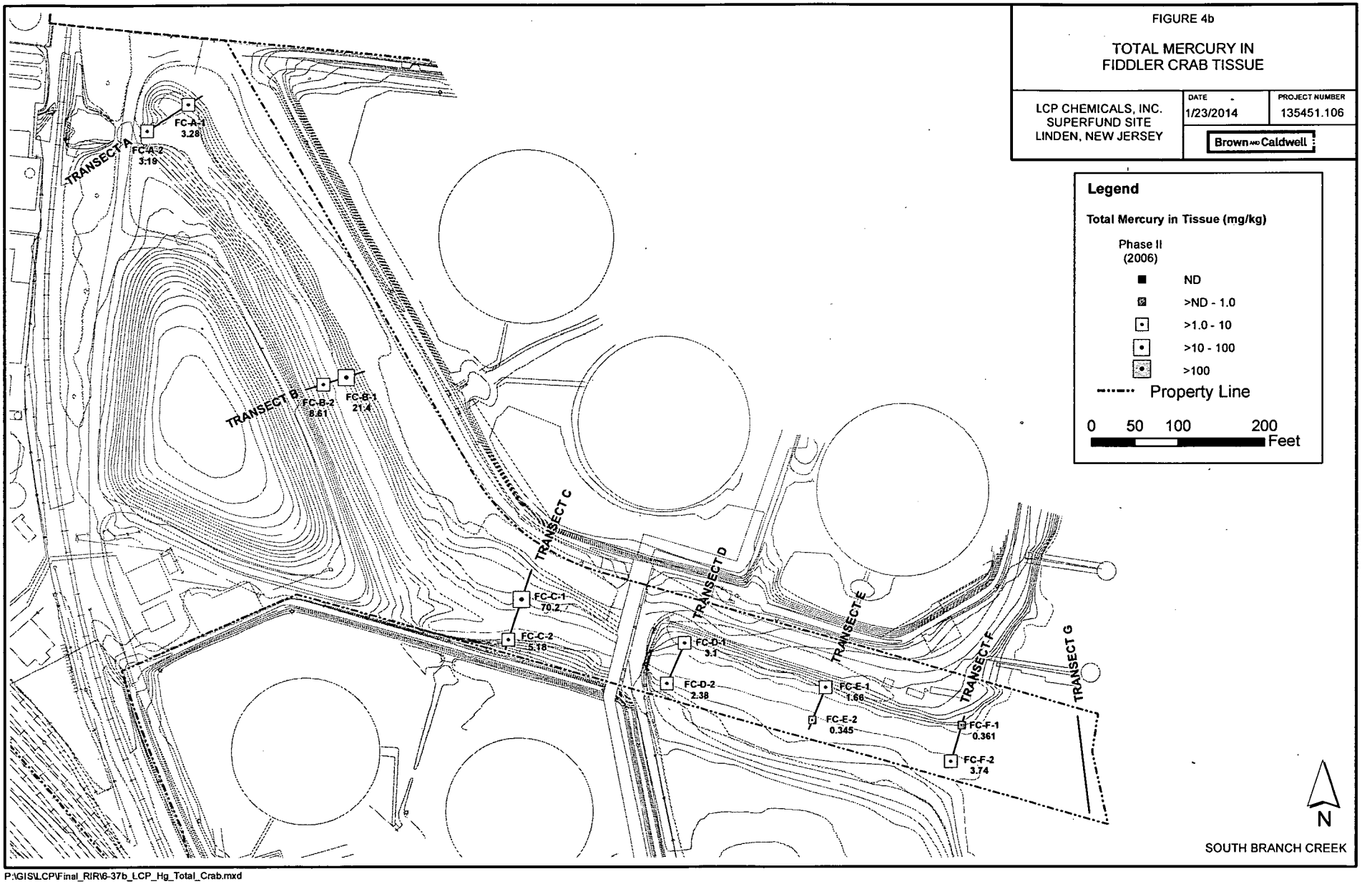

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FIGURE 5a

TOTAL MERCURY IN SEDIMENTS
0 - 0.5 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

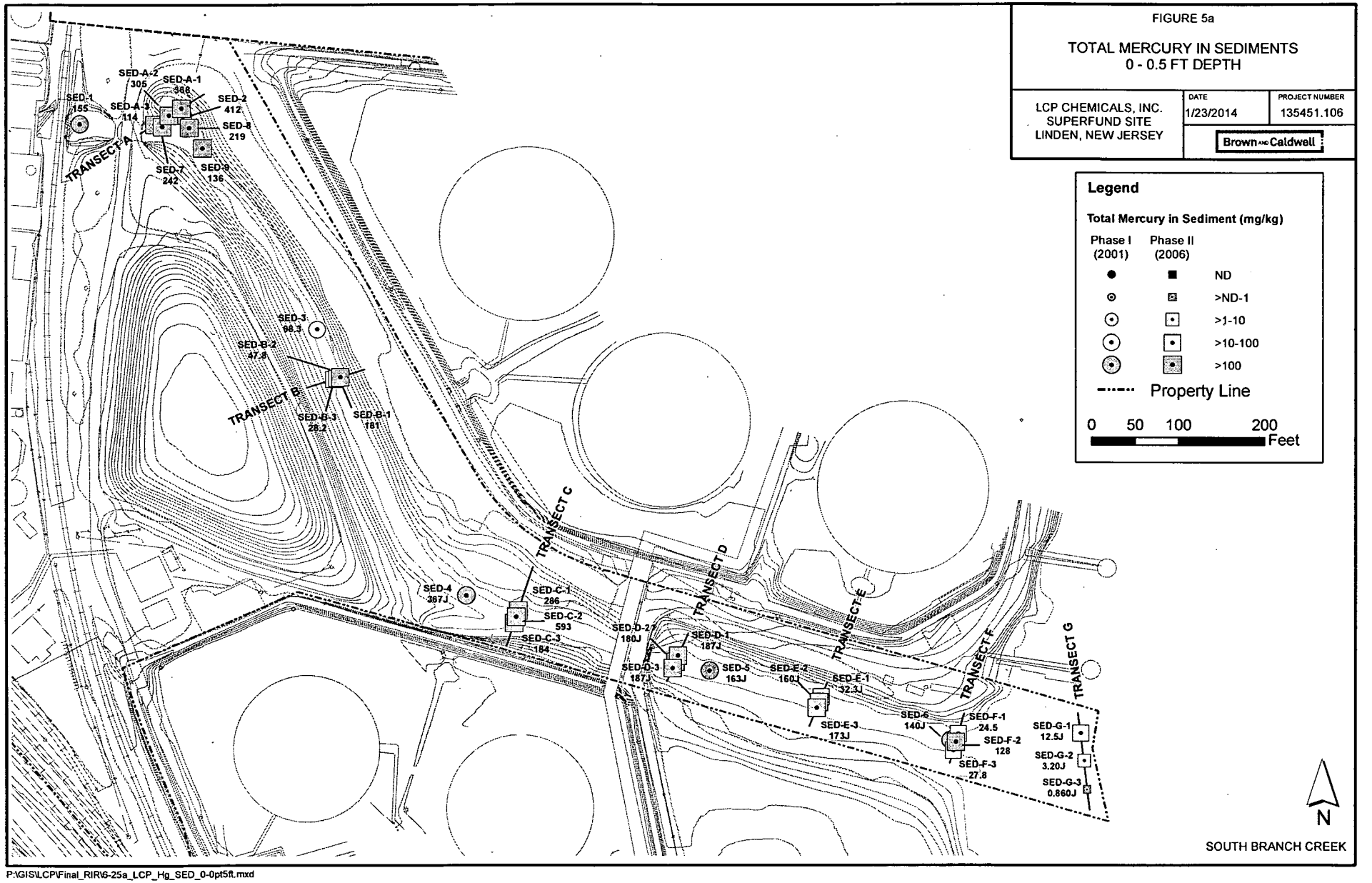

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FIGURE 5b

TOTAL MERCURY IN SEDIMENTS
0.5 - 1.0 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

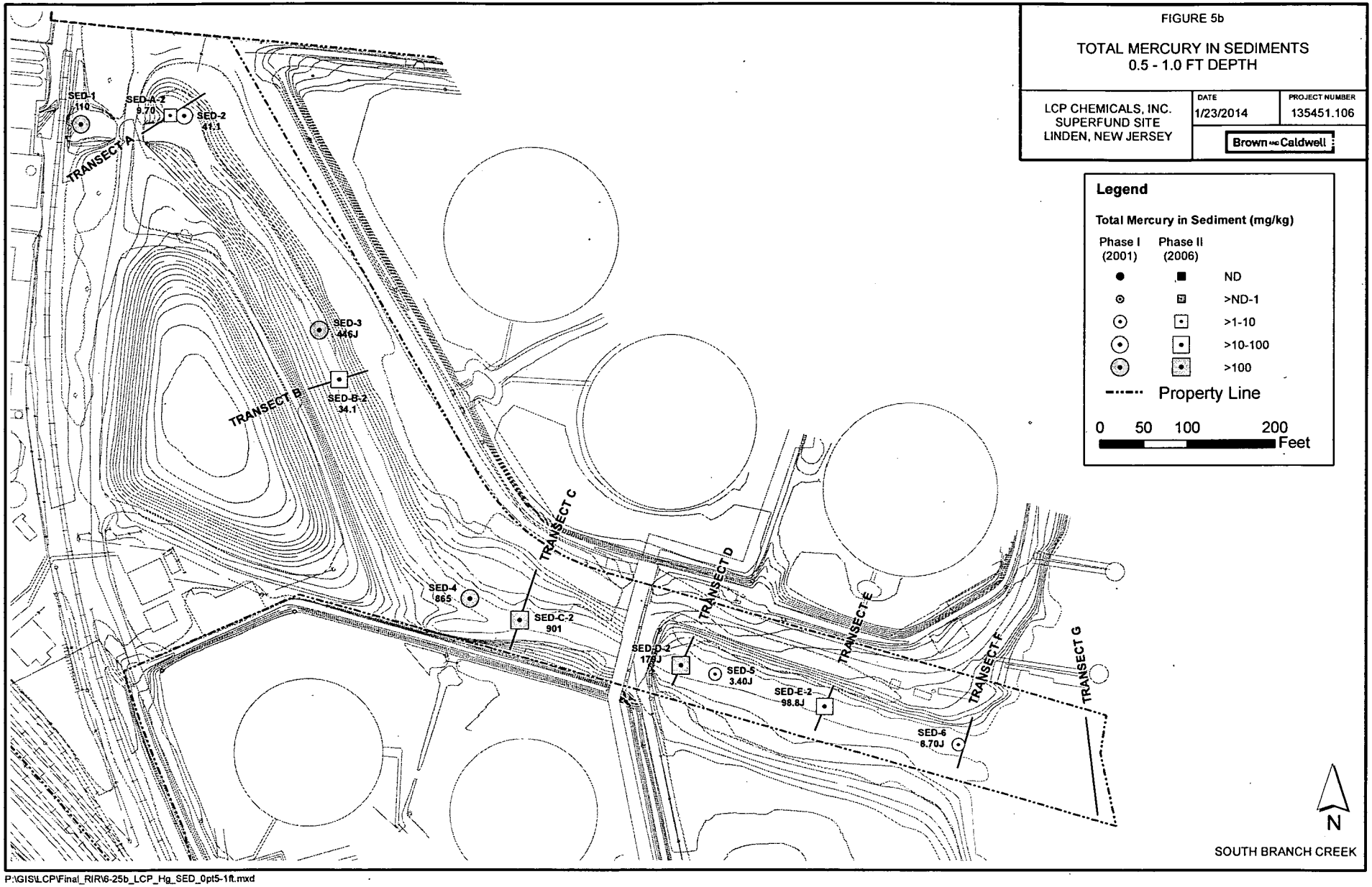

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FIGURE 5c

TOTAL MERCURY IN SEDIMENTS
1.0 - 1.5 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

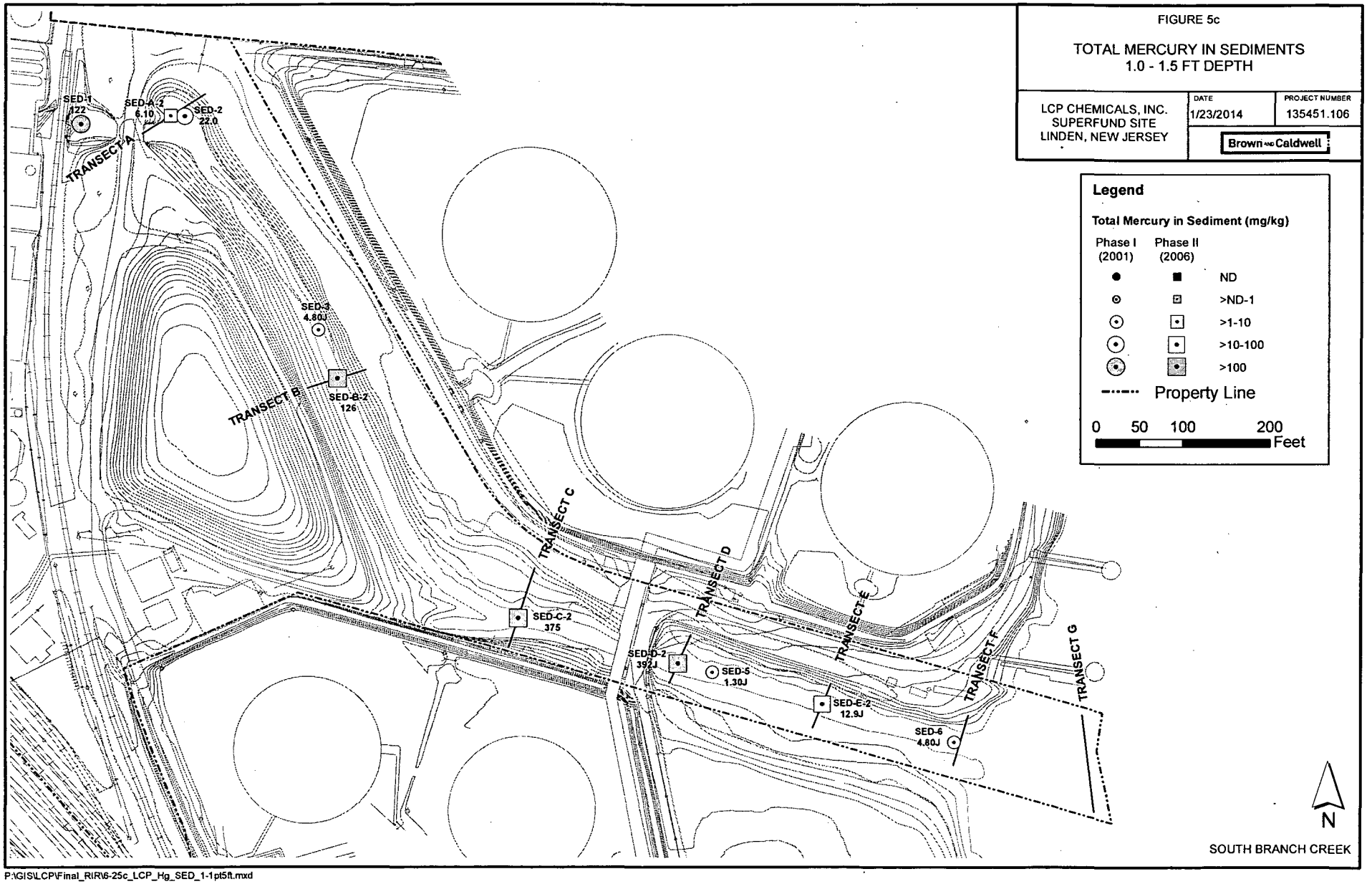

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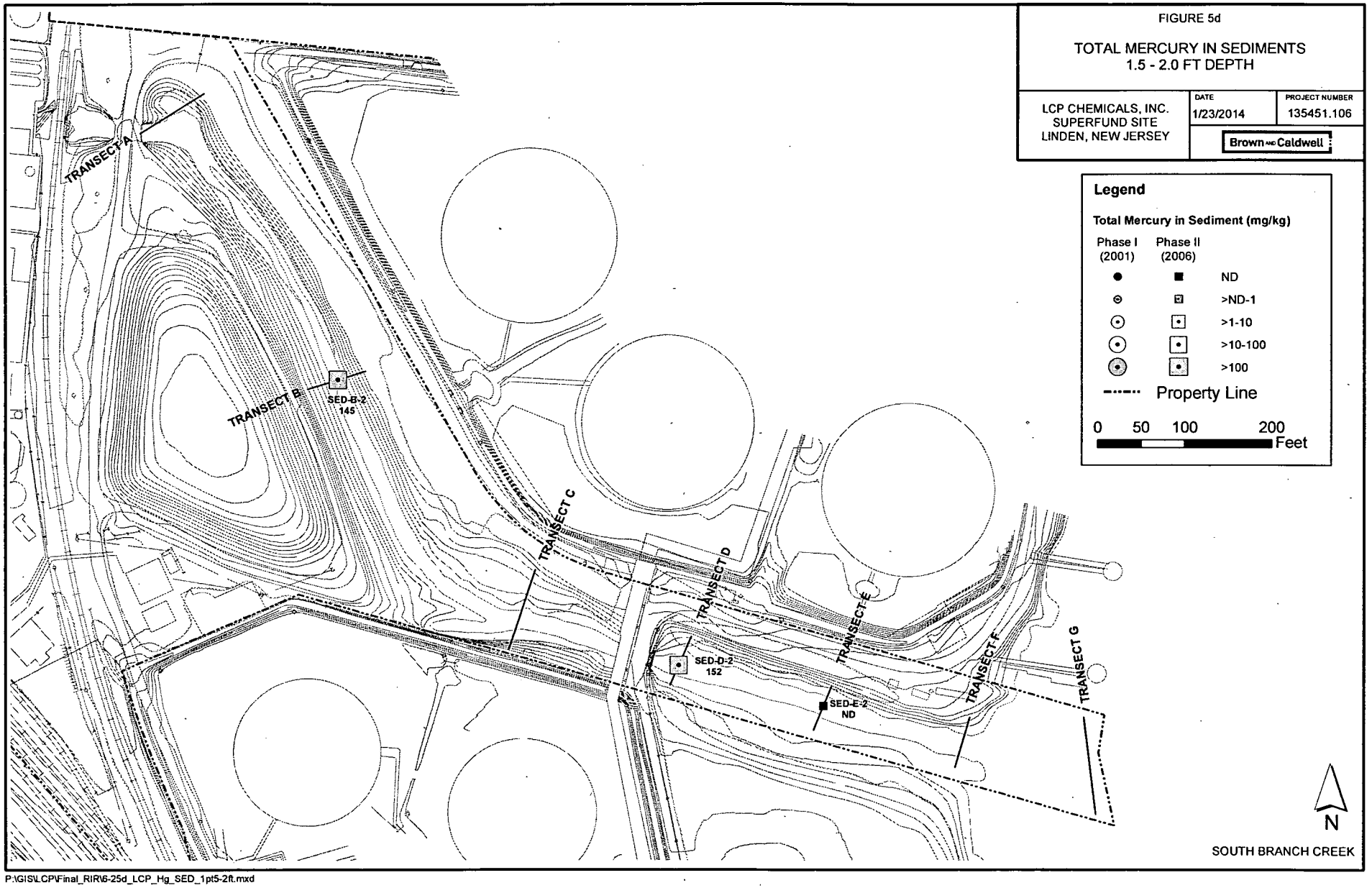
FIGURE 5d

TOTAL MERCURY IN SEDIMENTS
1.5 - 2.0 FT DEPTH

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
1/23/2014	135451.106

Brown AND Caldwell



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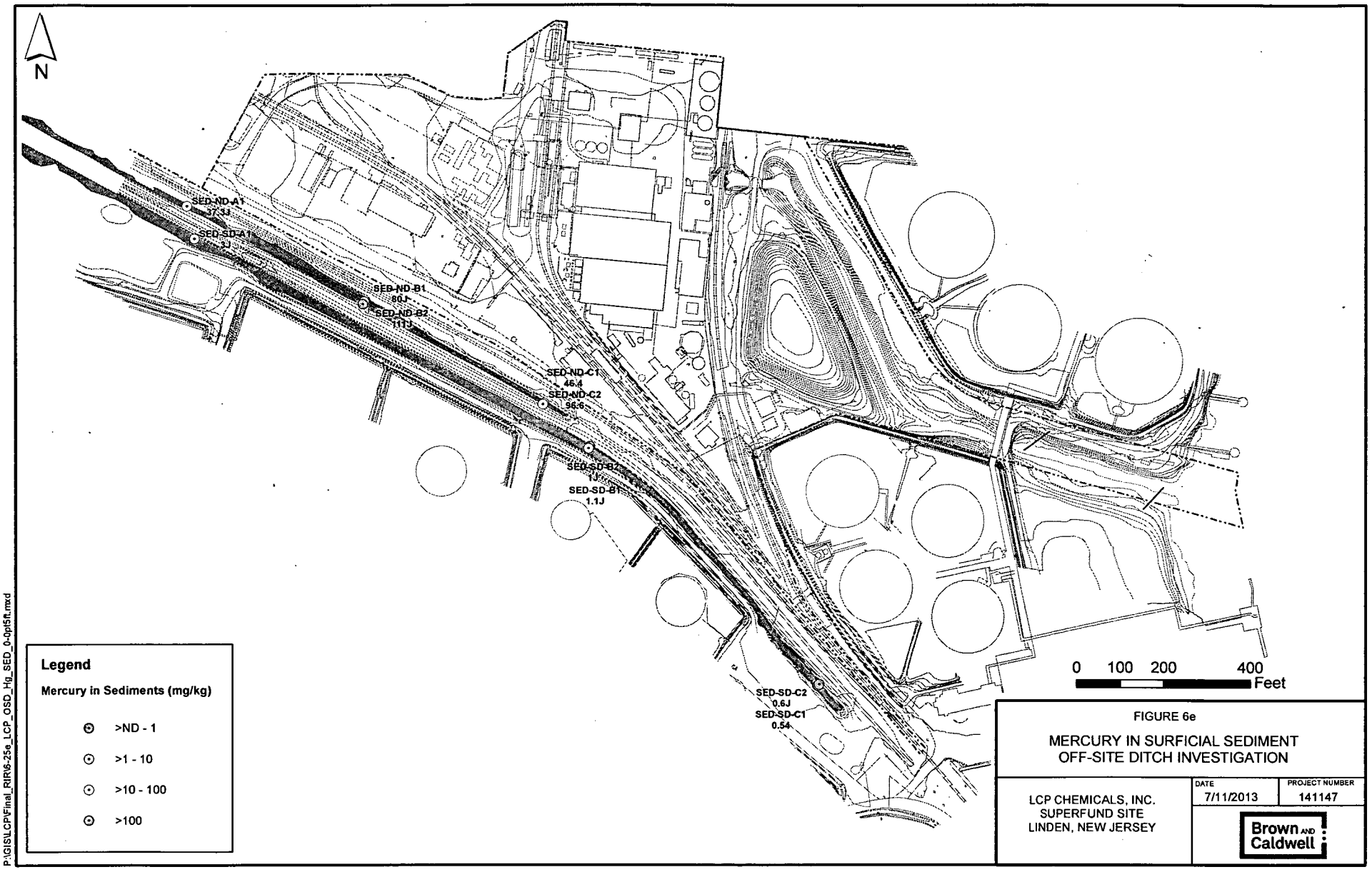

FIGURE 6e

MERCURY IN SURFICIAL SEDIMENT
OFF-SITE DITCH INVESTIGATION

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/11/2013	141147

Brown AND Caldwell

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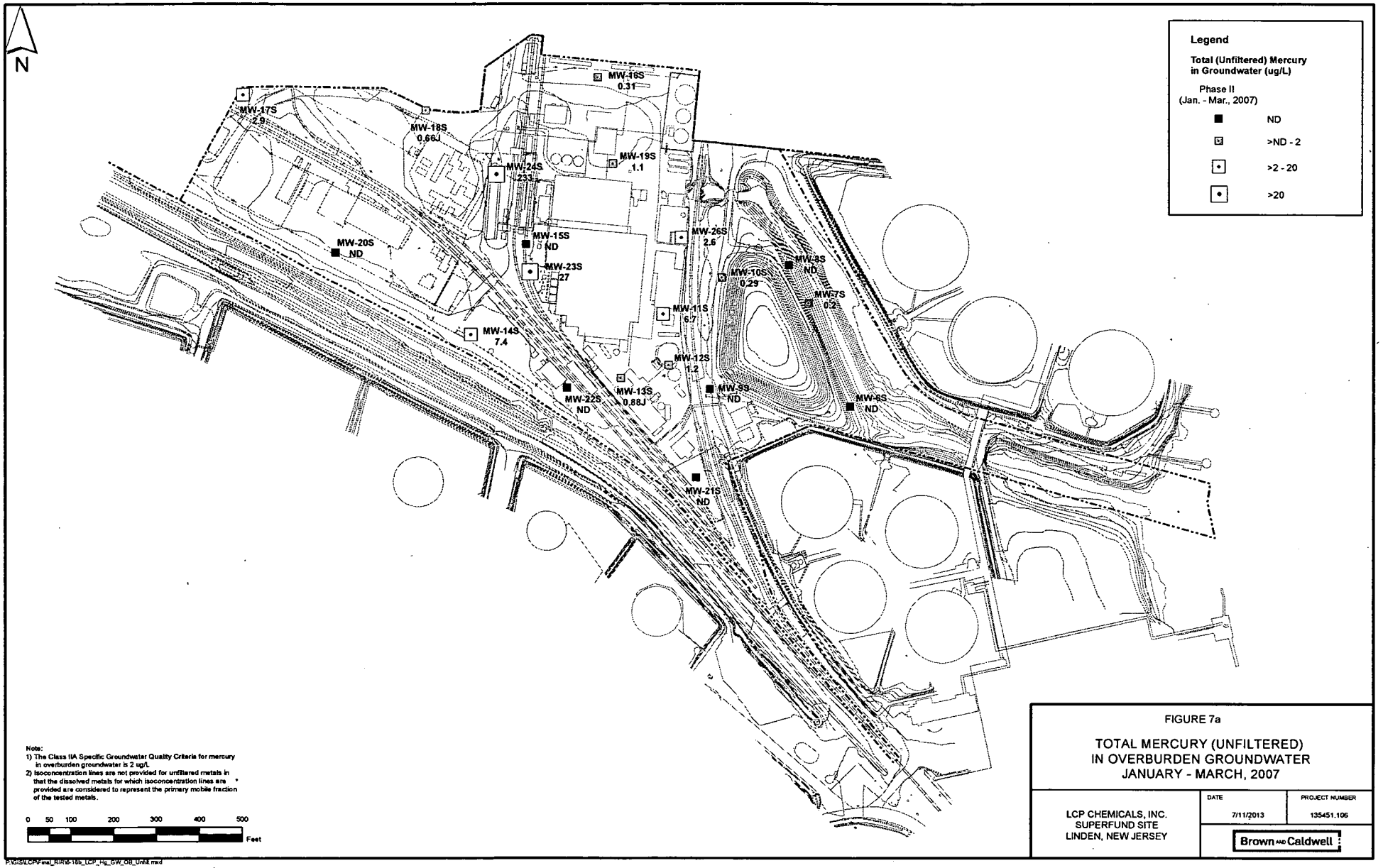


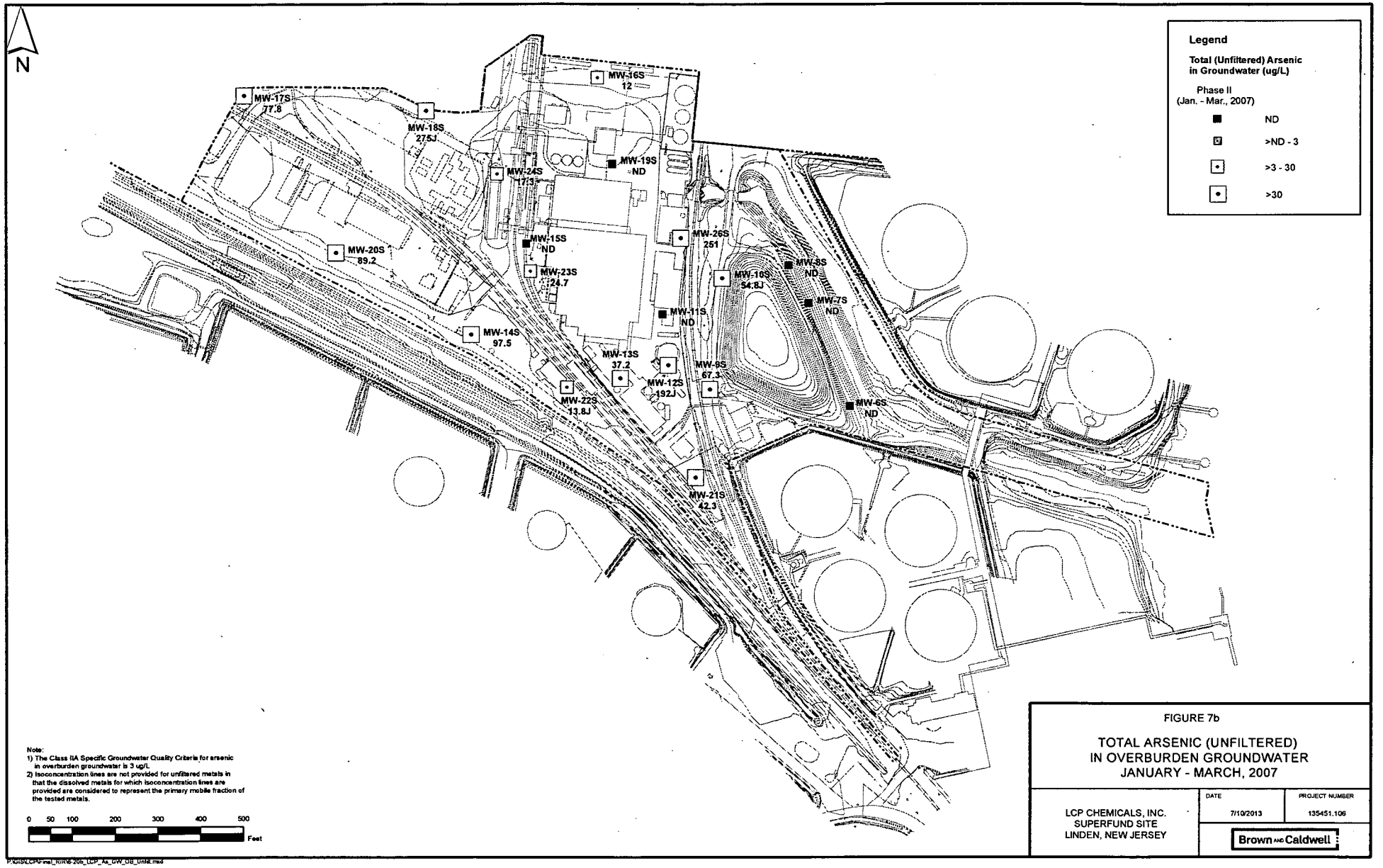
Note:
1) The Class IIA Specific Groundwater Quality Criteria for mercury in overburden groundwater is 2 ug/L
2) Isoconcentration lines are not provided for unfiltered metals in that the dissolved metals for which isoconcentration lines are provided are considered to represent the primary mobile fraction of the tested metals.

FIGURE 7a

TOTAL MERCURY (UNFILTERED) IN OVERBURDEN GROUNDWATER JANUARY - MARCH, 2007

	DATE	PROJECT NUMBER
LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	7/11/2013	135451.106
	Brown AND Caldwell	

P:\GIS\LCP\Final_RI\RI6-18b_LCP_Hg_GW_OB_Unfil.mxd



Note:
1) The Class IIA Specific Groundwater Quality Criteria for arsenic in overburden groundwater is 3 ug/L
2) Isoconcentration lines are not provided for unfiltered metals in that the dissolved metals for which isoconcentration lines are provided are considered to represent the primary mobile fraction of the tested metals.

0 50 100 200 300 400 500 Feet

FIGURE 7b

TOTAL ARSENIC (UNFILTERED) IN OVERBURDEN GROUNDWATER JANUARY - MARCH, 2007

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/10/2013	135451.106

Brown AND Caldwell

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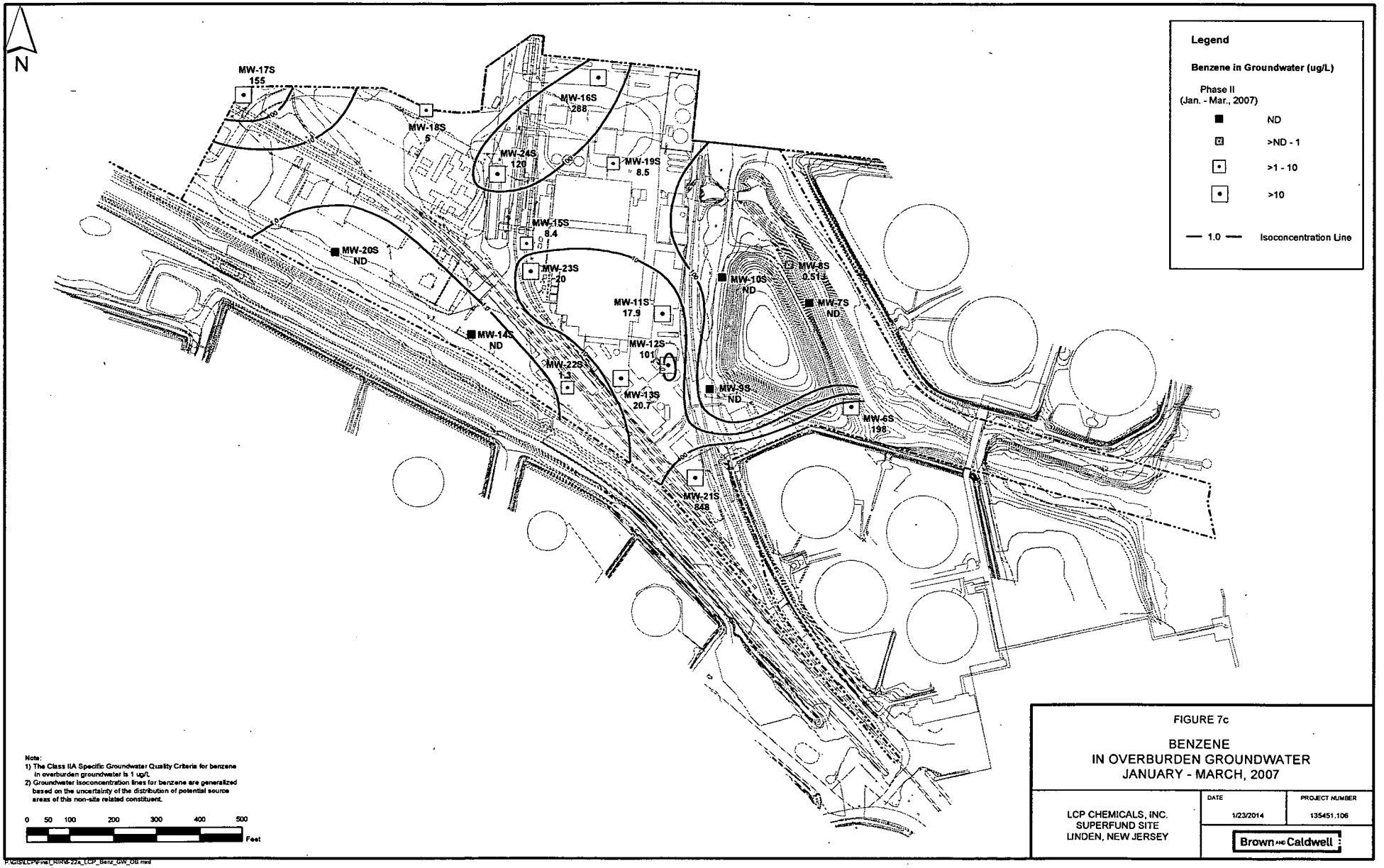

Note:
1) The Class IIA Specific Groundwater Quality Criteria for benzene in overburden groundwater is 1 ug/L.
2) Groundwater Isoconcentration lines for benzene are generalized based on the uncertainty of the distribution of potential source areas of this non-site related constituent.

FIGURE 7c

BENZENE
IN OVERBURDEN GROUNDWATER
JANUARY - MARCH, 2007

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

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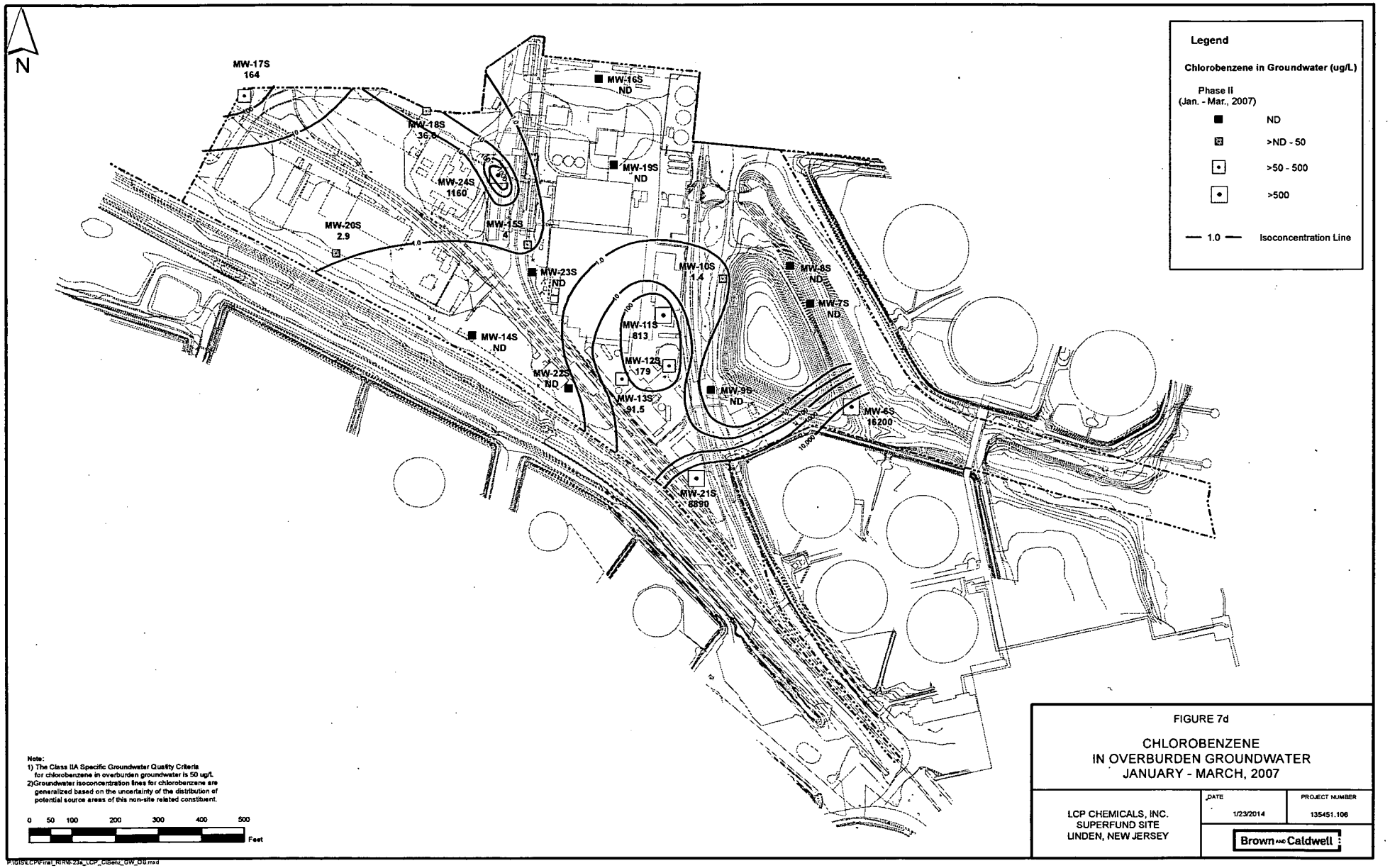

Note:
1) The Class IIA Specific Groundwater Quality Criteria for chlorobenzene in overburden groundwater is 50 ug/L
2)Groundwater isoconcentration lines for chlorobenzene are generalized based on the uncertainty of the distribution of potential source areas of this non-site related constituent.

0 50 100 200 300 400 500 Feet

FIGURE 7d

CHLOROBENZENE
IN OVERBURDEN GROUNDWATER
JANUARY - MARCH, 2007

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	

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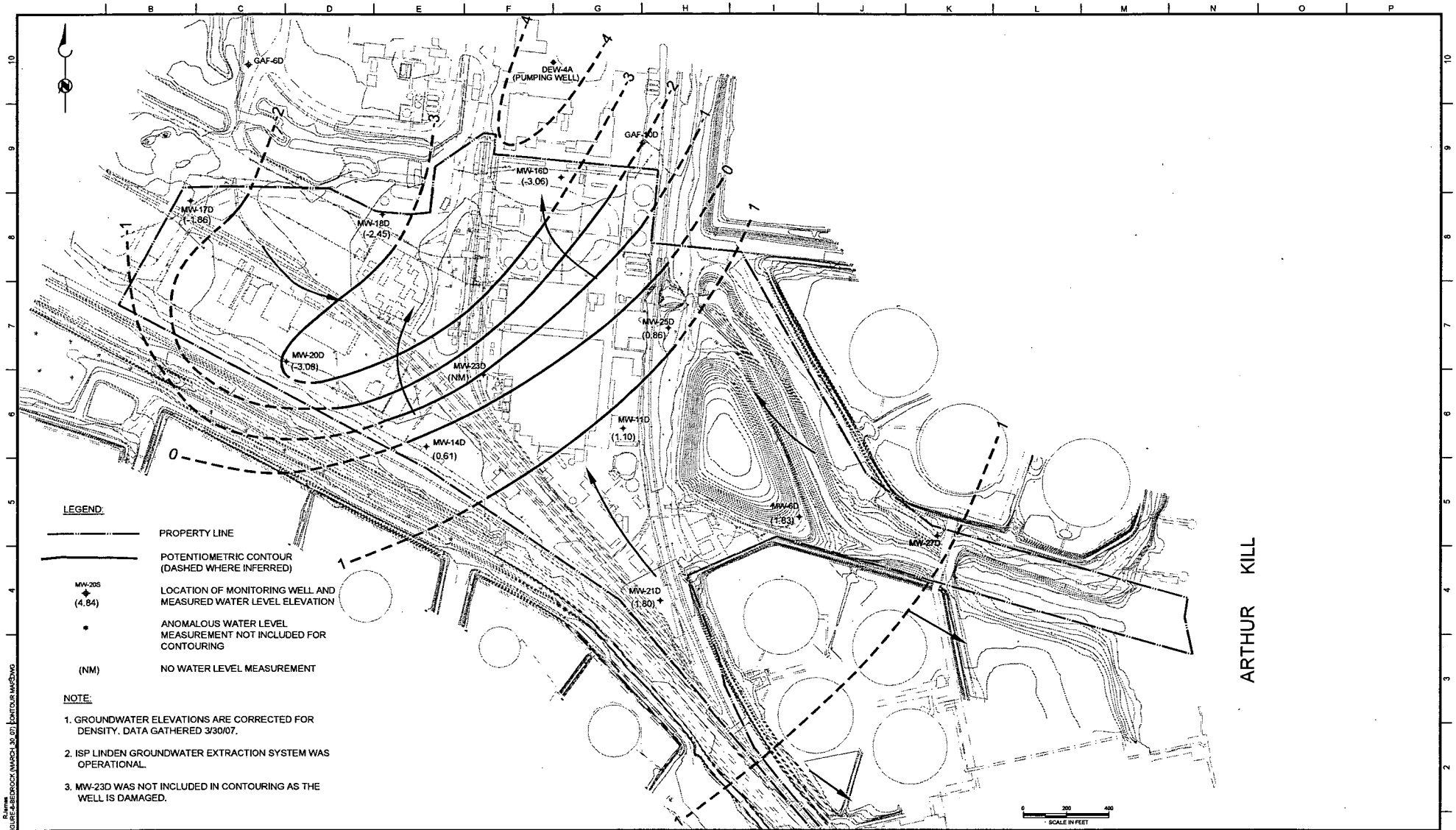


LEGEND:

PROPERTY LINE

POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)

MW-20S (4.84) — LOCATION OF MONITORING WELL AND MEASURED WATER LEVEL ELEVATION

* — ANOMALOUS WATER LEVEL MEASUREMENT NOT INCLUDED FOR CONTOURING

(NM) — NO WATER LEVEL MEASUREMENT

NOTE:

1. GROUNDWATER ELEVATIONS ARE CORRECTED FOR DENSITY. DATA GATHERED 3/30/07.
2. ISP LINDEN GROUNDWATER EXTRACTION SYSTEM WAS OPERATIONAL.
3. MW-23D WAS NOT INCLUDED IN CONTOURING AS THE WELL IS DAMAGED.

Brown AND Caldwell

UPPER SADDLE RIVER, NEW JERSEY
N.J. C.A. 24GA28043100

SUBMITTED: Scott MacMillin, PROJECT MANAGER — DATE: 06/07
APPROVED: BROWN AND CALDWELL — DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)
DESIGNED: MPC
DRAWN: PL
CHECKED: -
CHECKED: SDM
APPROVED: SDM

EXTERNAL REFERENCES: 131369-M1.dwg

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

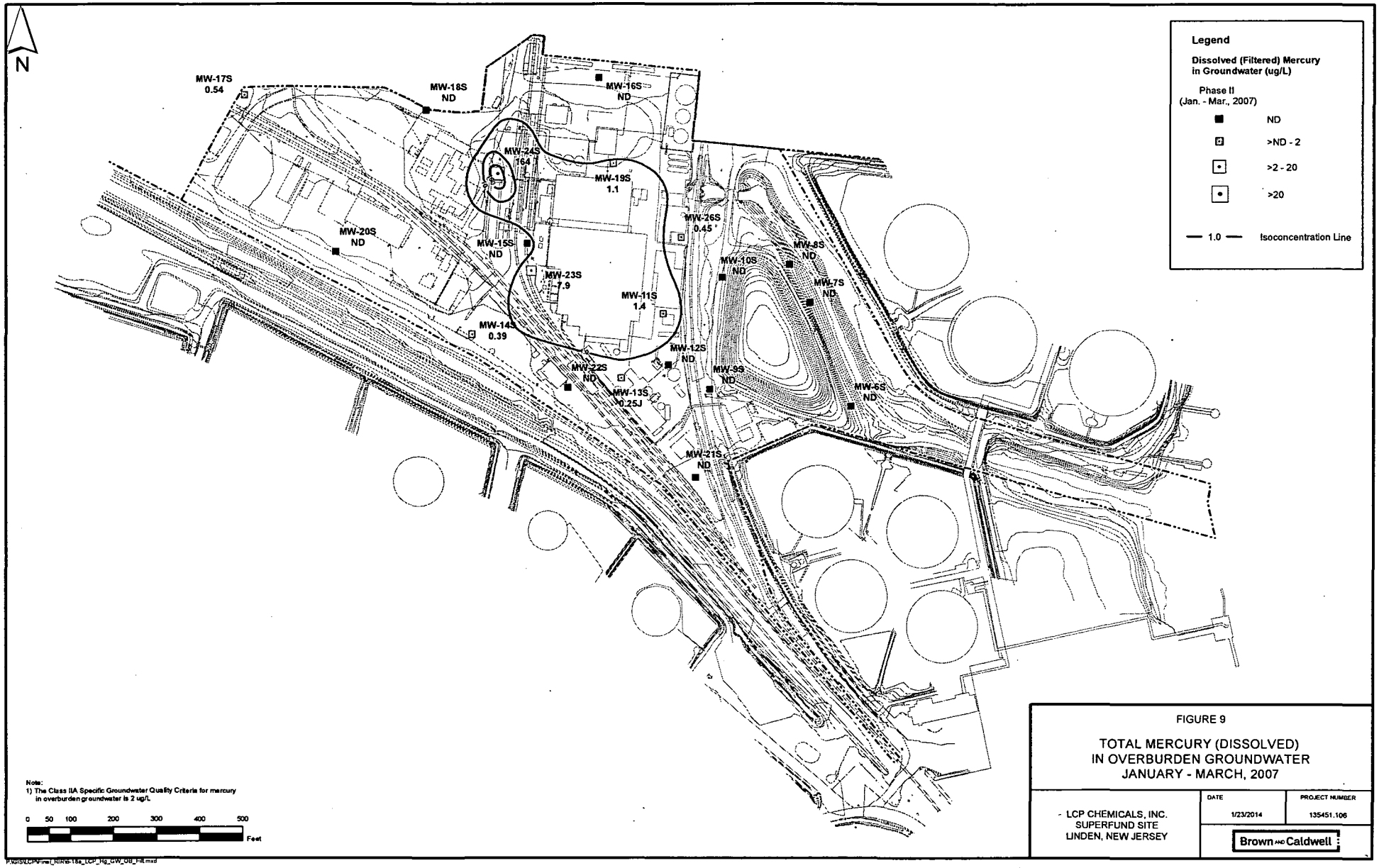
LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

FIGURE 8
CORRECTED[1] POTENTIOMETRIC SURFACE CONTOUR MAP
BEDROCK WATER BEARING ZONE
(MARCH 30, 2007)

LCP REMEDIAL INVESTIGATION

FILENAME: FIGURE 8-13
BC PROJECT NUMBER: 135461.000
CLIENT PROJECT NUMBER: -
DRAWING NUMBER: -
SHEET NUMBER: OF

Jan 23, 2014 - 1:15pm
P:\DRAFTING\LCP\131369\01\FIGURE-8-BEDROCK (MARCH 30 07) CONTOUR MAP.DWG
RJames



Note:
1) The Class IIA Specific Groundwater Quality Criteria for mercury in overburden groundwater is 2 ug/L

0 50 100 200 300 400 500 Feet

FIGURE 9

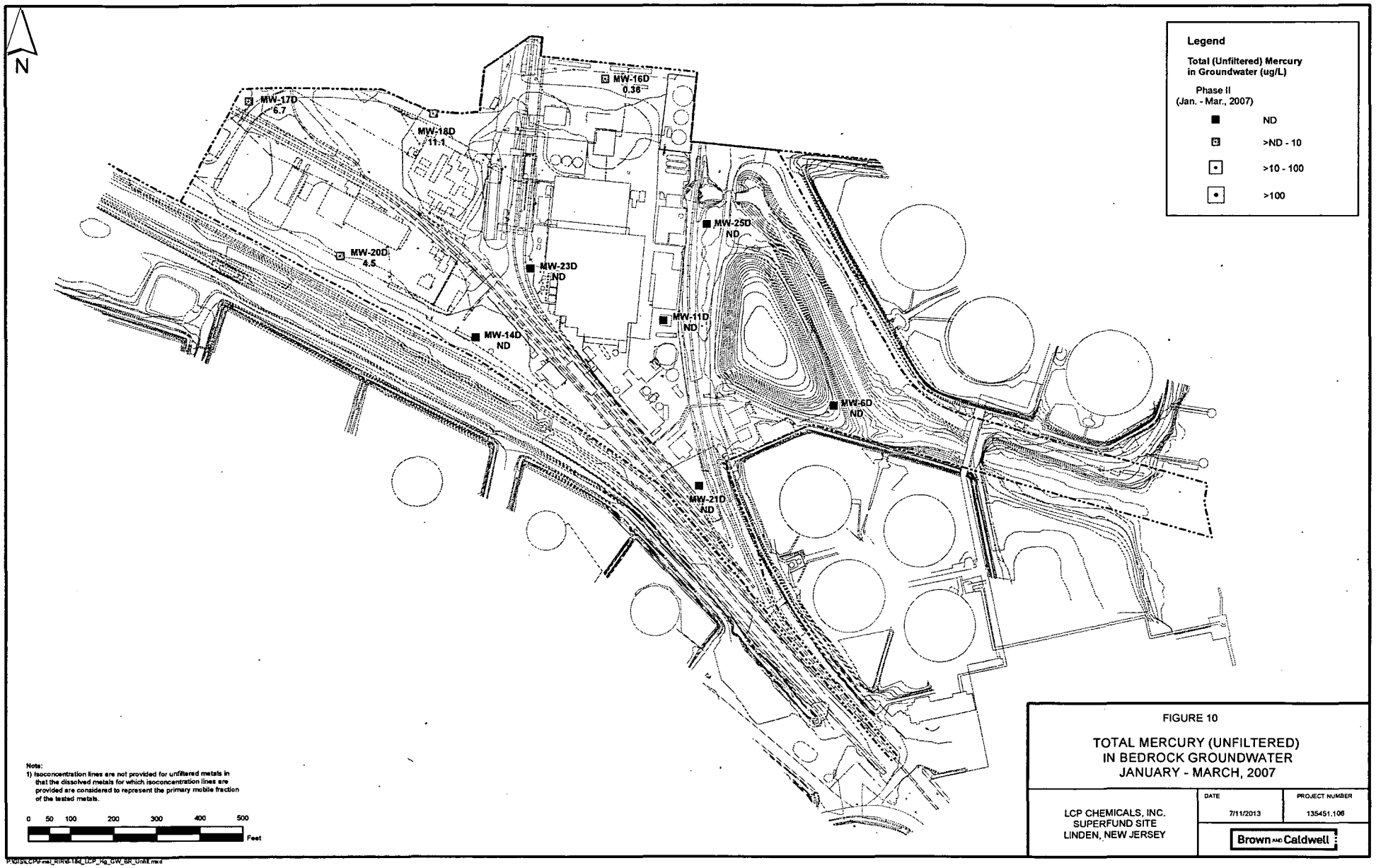
TOTAL MERCURY (DISSOLVED)
IN OVERBURDEN GROUNDWATER
JANUARY - MARCH, 2007

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
1/23/2014	135451.106

Brown AND Caldwell

P:\GIS\LCP\Fine_RIR\G-18a_LCP_Hg_GW_OB_Fill.mxd



Note:
1) Isoconcentration lines are not provided for unfiltered metals in that the dissolved metals for which isoconcentration lines are provided are considered to represent the primary mobile fraction of the tested metals.

0 50 100 200 300 400 500 Feet

FIGURE 10

TOTAL MERCURY (UNFILTERED) IN BEDROCK GROUNDWATER JANUARY - MARCH, 2007

LCP CHEMICALS, INC.
SUPERFUND SITE
LINDEN, NEW JERSEY

DATE	PROJECT NUMBER
7/11/2013	135451.106

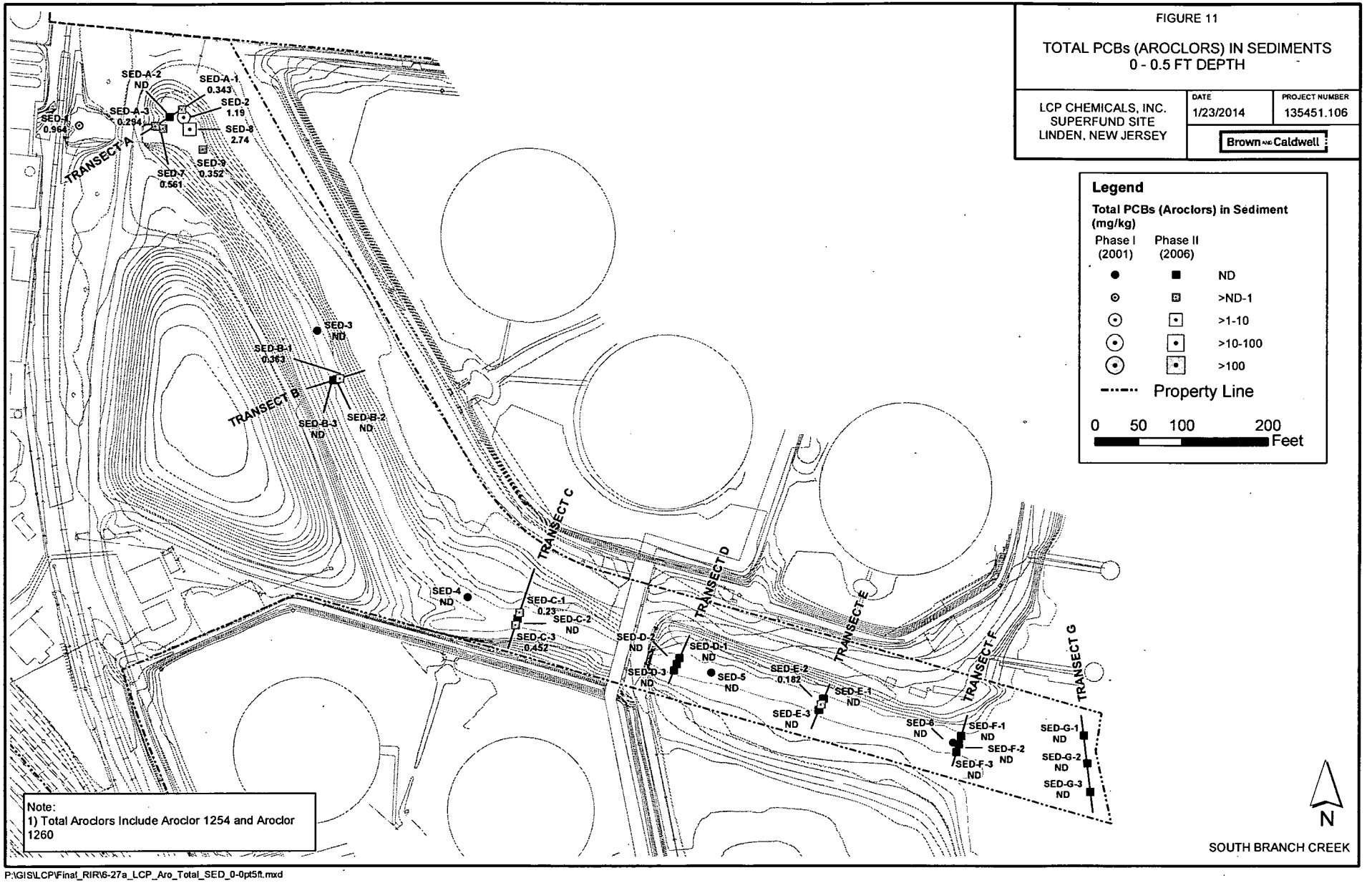
Brown AND Caldwell

P:\GIS\LCP\Final_RIR\8-18d_LCP_Hg_GW_BR_Unfil.mxd

FIGURE 11

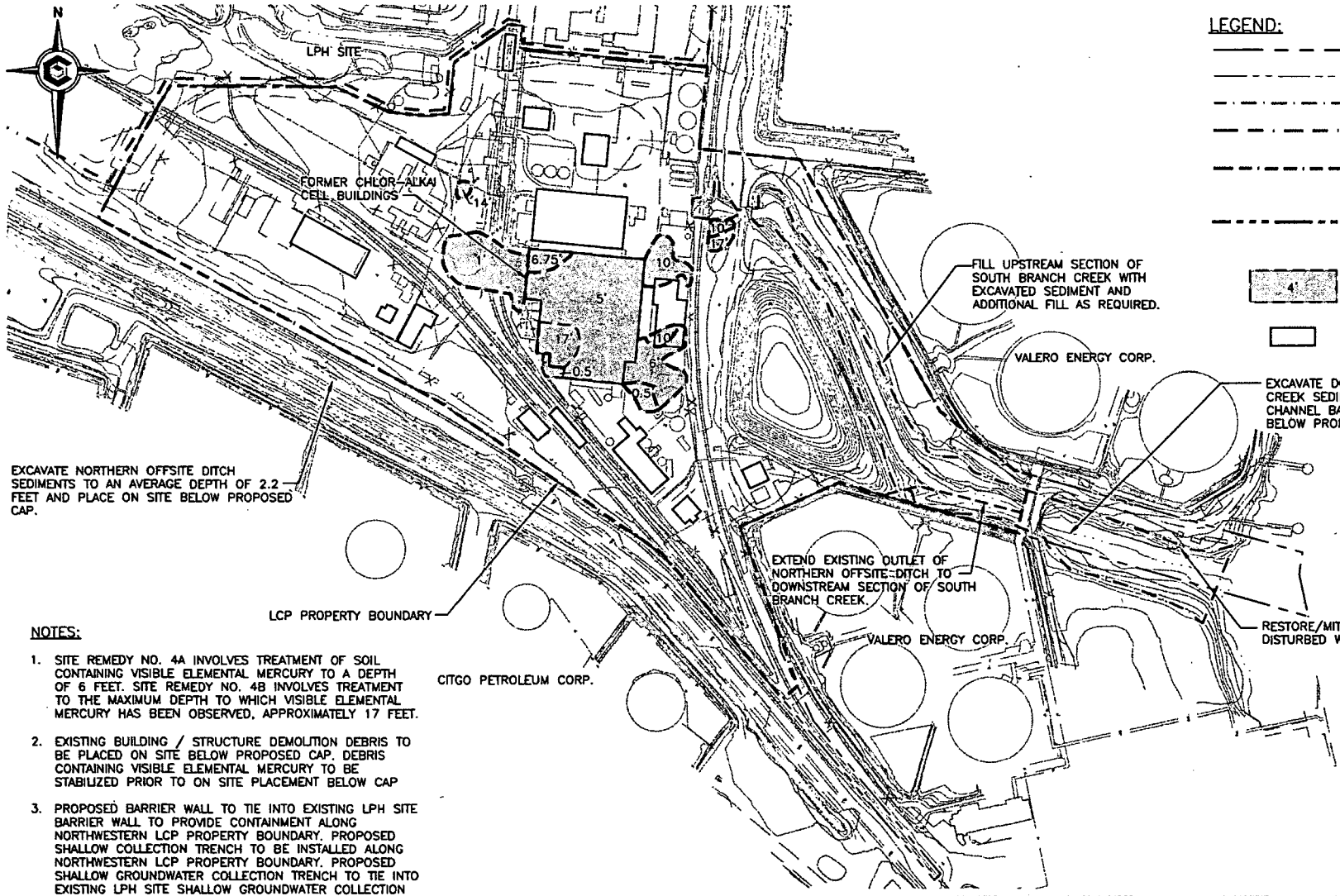
TOTAL PCBs (AROCLORS) IN SEDIMENTS
0 - 0.5 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 1/23/2014	PROJECT NUMBER 135451.106
	Brown AND Caldwell	



Note:
1) Total Aroclors include Aroclor 1254 and Aroclor 1260

P:\GIS\LCP\Final_RIR\6-27a_LCP_Aro_Total_SED_0-0pt5ft.mxd



LEGEND:

- LCP PROPERTY LINE
- LPH PROPERTY LINE
- EXISTING WETLANDS
- EXISTING LPH BARRIER WALL
- LIMIT OF CAP AND BARRIER WALL AND SHALLOW GROUND WATER COLLECTION TRENCH (SEE NOTE 3)
- LIMIT OF CAP AND SHALLOW GROUND WATER COLLECTION TRENCH (SEE NOTE 3)
- 4' — AREA OF SOIL CONTAINING VISIBLE ELEMENTAL MERCURY AND MAXIMUM DEPTH OF OBSERVED VISIBLE ELEMENTAL MERCURY (SEE NOTE 1)
- MAJOR BUILDINGS / STRUCTURES TO BE DEMOLISHED (SEE NOTE 2)

NOTES:

1. SITE REMEDY NO. 4A INVOLVES TREATMENT OF SOIL CONTAINING VISIBLE ELEMENTAL MERCURY TO A DEPTH OF 6 FEET. SITE REMEDY NO. 4B INVOLVES TREATMENT TO THE MAXIMUM DEPTH TO WHICH VISIBLE ELEMENTAL MERCURY HAS BEEN OBSERVED, APPROXIMATELY 17 FEET.
2. EXISTING BUILDING / STRUCTURE DEMOLITION DEBRIS TO BE PLACED ON SITE BELOW PROPOSED CAP. DEBRIS CONTAINING VISIBLE ELEMENTAL MERCURY TO BE STABILIZED PRIOR TO ON SITE PLACEMENT BELOW CAP
3. PROPOSED BARRIER WALL TO TIE INTO EXISTING LPH SITE BARRIER WALL TO PROVIDE CONTAINMENT ALONG NORTHWESTERN LCP PROPERTY BOUNDARY. PROPOSED SHALLOW COLLECTION TRENCH TO BE INSTALLED ALONG NORTHWESTERN LCP PROPERTY BOUNDARY. PROPOSED SHALLOW GROUNDWATER COLLECTION TRENCH TO TIE INTO EXISTING LPH SITE SHALLOW GROUNDWATER COLLECTION SYSTEM, OR PROVIDE PUMP STATION (AS APPROPRIATE).

CORNERSTONE Engineering Group, LLC

FEASIBILITY STUDY – LCP CHEMICALS, INC.
SUPERFUND SITE, LINDEN, NEW JERSEY
SITE REMEDY NOs. 4A & 4B
FULL CONTAINMENT AND
SELECTIVE STABILIZATION

FIGURE NO. 12

PROJECT NO. 090432

File: X:\PROJECTS\SP\090432 - LCP FEASIBILITY STUDY\Project Drawings\Draft FS\MISPSF-01(REV9-6-11).dwg Layout: REMEDY 4A+4B User: joseph.nemesh Nov 07, 2011 - 4:54pm

APPENDIX II

TABLES

Table 1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Future
Medium: Surface Soil (0-2 ft bgs)
Exposure Medium: Surface Soil (0-2 ft bgs)

Exposure Point	Chemical of Concern	Concentration Detected		Concentration Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Surface Soil (0 to 2 ft bgs)	Mercury (elemental)	0.041	787	mg/kg	234 / 237	123	mg/kg	99% KM (Chebyshev) UCL
	Mercury (inorganic)	0.369	7,083	mg/kg	234 / 237	1,103	mg/kg	99% KM (Chebyshev) UCL

Table 1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Mixed Soil (0-10 ft bgs)
Exposure Medium: Mixed Soil (0-10 ft bgs)

Exposure Point	Chemical of Concern	Concentration		Concentration Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration	Statistical Measure
		Min	Max					
Mixed Soil (0 to 10 ft bgs)	Mercury (elemental)	0.063	787	mg/kg	76 / 77	114	mg/kg	99% Chebyshev (Mean, Sd) UCL
	Mercury (inorganic)	0.567	7,083	mg/kg	76 / 77	1,022	mg/kg	99% Chebyshev (Mean, Sd) UCL
	Vanadium	9.7	126	mg/kg	79 / 83	44.8	mg/kg	95% KM (BCA) UCL
	Furan 2,3,7,8-TCDD TEQ	1.41E-06	8.85E-04	mg/kg	5 / 5	7.23E-04	mg/kg	99% Chebyshev (Mean, Sd) UCL

Table 1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration		Concentration Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration	Statistical Measure
		Min	Max					
Overburden Groundwater	Arsenic	12	275	µg/L	14 / 20	275	µg/L	Maximum
	Cobalt	190	190	µg/L	1 / 20	190	µg/L	Maximum
	Iron	103	346,000	µg/L	20 / 20	346,000	µg/L	Maximum
	Manganese	27.6	219,000	µg/L	18 / 20	219,000	µg/L	Maximum
	Mercury	0.2	233	µg/L	13 / 20	233	µg/L	Maximum
	Methyl Mercury	0.000635	168	µg/L	3 / 3	168	µg/L	Maximum
	Vanadium	54.6	136	µg/L	2 / 20	136	µg/L	Maximum
	Dioxin 2,3,7,8-TCDD TEQ	1.90E-05	1.90E-05	µg/L	1 / 1	1.90E-05	µg/L	Maximum
	Furan 2,3,7,8-TCDD TEQ	1.62E-04	1.62E-04	µg/L	1 / 1	1.62E-04	µg/L	Maximum
	Chloroaniline, p-	1.6	4,460	µg/L	9 / 19	4,460	µg/L	Maximum
	Benzene	0.51	848	µg/L	14 / 19	848	µg/L	Maximum
	Chlorobenzene	1.4	16,200	µg/L	11 / 19	16,200	µg/L	Maximum

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil [1]	Surface Soil	Surface Soil	Commercial/ Industrial Worker	Adult	Ingestion	Quant [2]	Commercial/industrial workers may incidentally ingest surface soil.
						Dermal Contact		Commercial/industrial workers may have exposed skin come into contact with surface soil.
		Outdoor Air	Particulates and Vapors (P&V) in Outdoor Air	Commercial/ Industrial Worker	Adult	Inhalation	Quant [2]	Commercial/industrial workers may inhale particulates in fugitive dust generated from surface soil or inhale vapors that migrate from surface soil to air.
	Surface Soil [1]	Surface Soil	Surface Soil	Site-Specific Worker [3]	Adult	Ingestion	Quant [2]	Site-specific workers may incidentally ingest surface soil.
						Dermal Contact		Site-specific workers may have exposed skin come into contact with surface soil.
		Outdoor Air	P&V in Outdoor Air	Site-Specific Worker [3]	Adult	Inhalation	Quant [2]	Site-specific workers may inhale particulates in fugitive dust generated from surface soil or inhale vapors that migrate from surface soil to air.
	Surface Soil [4]	Surface Soil	Surface Soil	Construction/ Utility Worker	Adult	Ingestion	Quant [2]	Construction/utility workers may incidentally ingest surface soil.
						Dermal Contact		Construction/utility workers may have exposed skin come into contact with surface soil.
		Outdoor Air	P&V in Outdoor Air	Construction/ Utility Worker	Adult	Inhalation	Quant [2]	Construction/utility workers may inhale particulates in fugitive dust generated from surface soil or inhale vapors that migrate from surface soil to air.
	Subsurface Soil [4]	Subsurface Soil	Subsurface Soil	Construction/ Utility Worker	Adult	Ingestion	Quant [2]	Construction/utility workers may incidentally ingest subsurface soil.
						Dermal Contact		Construction/utility workers may have exposed skin come into contact with subsurface soil.
		Outdoor Air	P&V in Outdoor Air	Construction/ Utility Worker	Adult	Inhalation	Quant [2]	Construction/utility workers may inhale particulates in fugitive dust generated from subsurface soil or inhale vapors that migrate from subsurface soil to air.

Future	Groundwater	Overburden Groundwater [5]	Overburden Groundwater	Commercial/ Industrial Worker	Adult	Ingestion	Quant	Future commercial/industrial worker ingestion of groundwater was quantitatively evaluated to support remedial decisions-making and risk management processes.
		Shallow Groundwater [6]	Shallow Groundwater	Construction/ Utility Worker	Adult	Ingestion	Qual	Construction/utility worker incidental ingestion of shallow (overburden) groundwater while conducting construction/excavation activities near the water table is likely to be relatively insignificant in comparison to dermal contact with groundwater; therefore, this pathway is qualitatively evaluated as part of the uncertainty analysis.
		Shallow Groundwater [6]	Shallow Groundwater	Construction/ Utility Worker	Adult	Dermal Contact	Quant	Construction/utility workers may have exposed skin come into contact with shallow (overburden) groundwater while conducting construction/excavation activities near the water table.
		Shallow Groundwater [6]	Vapors in Outdoor Air	Construction/ Utility Worker	Adult	Inhalation	Qual	Construction/utility worker inhalation of vapors from shallow (overburden) groundwater while conducting construction/excavation activities near the water table is likely to be relatively insignificant in comparison to dermal contact with groundwater; therefore this pathway is qualitatively evaluated as part of the uncertainty analysis. Areas of the Site containing visible elemental mercury are assumed to present an unacceptable risk.
Future	Surface Soil [1]	Surface Soil	Surface Soil	Adolescent Trespasser	Adult	Ingestion Dermal Contact	Qual	Under future land use conditions, the likelihood for trespassing may increase if current barriers to access (e.g., fencing) are removed. Thus, future trespassers may incidentally ingest, have dermal contact with,
		Outdoor Air	P&V in Outdoor Air	Adolescent Trespasser	Adult	Inhalation	Qual	
Current/Future	Surficial Sediment in/along South Branch Creek	Surficial Sediment in /along SBC	Surficial Sediment in/along SBC	Adolescent Trespasser	Ages 7-16	Ingestion	Quant	Trespassers may incidentally ingest sediment.
						Dermal Contact		Trespassers may have exposed skin come into contact with sediment.

Current/Future	Surface Water in South Branch Creek	Surface Water in SBC	Surface Water in SBC	Adolescent Trespasser	Ages 7-16	Ingestion	Qual	Trespassers may incidentally ingest surface water; however, this pathway is evaluated qualitatively as part of the uncertainty analysis as trespasser exposure to surface water is likely to be insignificant relative to sediment exposure.
						Dermal Contact		Trespassers may have exposed skin come into contact with surface water; however, this pathway is evaluated qualitatively as part of the uncertainty analysis as trespasser exposure to surface water is likely to be insignificant relative to sediment exposure.
Future	Subsurface Soil Vapors (8)	Subsurface Soil Vapors	Vapors in Indoor Air	Indoor Worker	Adult	Inhalation	Quant (2)	Indoor workers may inhale vapors that migrate from the subsurface to indoor air via diffusion, advection, or as a result of heating and ventilation systems.

Notes:

(1) Surface soil includes all soil from the interval 0 to 2 feet below ground surface (ft bgs) not associated with South Branch Creek (SBC).

(2) Areas of visible elemental mercury contamination could not be quantitatively evaluated. For the purposes of this baseline risk assessment, areas with visible elemental mercury were assumed to present an unacceptable risk based on potential direct contact and vapor intrusion pathways. Risks attributed to these areas are based on current (i.e., unremediated) Site conditions.

(3) In addition to the full-time commercial/industrial worker, a reduced-frequency commercial/industrial ("site-specific") worker was also evaluated. Although this scenario is hypothetical, and it is acknowledged that such future land use would require institutional controls, the evaluation of this receptor supports remedial decision–making and risk management process.

(4) Subsurface soil includes all soil from the interval 2 to 10 ft bgs not associated with SBC.

given the salinity and New Jersey regulations. However, the overburden water-bearing zone remains classified as Class II-A (potable). Therefore, future commercial/industrial worker ingestion of overburden groundwater was quantitatively evaluated to provide risk managers with information needed to evaluate the impact of any future changes in groundwater use at the Site.

(6) Future construction/utility workers are assumed to be exposed to shallow groundwater while conducting intrusive activities at the Site. For the purposes of the risk assessment, "shallow" groundwater was assumed to include all overburden groundwater.

(7) Sediment includes all solid media (sediment, bank soil, marsh soil) associated with SBC collected from the interval 0 to 0.5 ft bgs.

(8) Because elemental mercury (which is expected to be the primary risk driver for indoor air) is not soluble, modeling risks from groundwater to indoor air is inappropriate as it would likely result in a gross underestimation of risks from vapor intrusion. Rather, exposure to indoor air was evaluated using soil vapor data and the Johnson and Ettinger (J&E; 1991) vapor intrusion model.

(9) With the exception of subsurface soil vapors, risk associated with environmental media at the Site are presented herein in tabular form in accordance with the standard tables of RAGS Part D. Risks associated with exposure to soil vapors are presented in Attachment E.

Table 3
Non-Cancer Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty	Sources of RfD Target	Dates of RfD
Arsenic	Chronic	3.0E-04	mg/kg-day	0.03	3.0E-04	mg/kg-day	Cardio/Derm	3	I	Nov 2011
Cobalt	Chronic	3.0E-04	mg/kg-day	--	3.0E-04	mg/kg-day	Blood/Resp/Der	--	P	Nov 2011
Iron	Chronic	7.0E-01	mg/kg-day	--	7.0E-01	mg/kg-day	GI	--	P	Nov 2011
Manganese	Chronic	2.4E-02	mg/kg-day	--	9.6E-04	mg/kg-day	CNS	1.0	I	Nov 2011
Mercury (elemental)	Chronic	1.6E-04	mg/kg-day	--	1.6E-04	mg/kg-day	CNS	--	C	Nov 2011
Mercury (inorganic)	Chronic	3.0E-04	mg/kg-day	--	2.1E-05	mg/kg-day	Immuno/Kidney	--	I	Nov 2011
Methyl Mercury	Chronic	1.0E-04	mg/kg-day	--	1.0E-04	mg/kg-day	CNS/Develop	10	I	Nov 2011
Vanadium	Chronic	7.0E-05	mg/kg-day	--	1.8E-06	mg/kg-day	Blood	--	P	Nov 2011
Furan 2,3,7,8-TCDD TEQ	Chronic	1.0E-09	mg/kg-day	0.03	1.0E-09	mg/kg-day	/Develop/Reprod	--	A	Nov 2011
Chloroaniline, p-	Chronic	4.0E-03	mg/kg-day	0.1	4.0E-03	mg/kg-day	Spleen	3,000	I	Nov 2011
Benzene	Chronic	4.0E-03	mg/kg-day	--	4.0E-03	mg/kg-day	Blood/Immuno	300	I	Nov 2011
Chlorobenzene	Chronic	2.0E-02	mg/kg-day	--	2.0E-02	mg/kg-day	Liver	1,000	I	Nov 2011

Pathway: Inhalation

Chemicals	Chronic/	Inhalation	Inhalation	Primary	Combined	Sources	Dates of RfC
Manganese	Chronic	5.0E-05	mg/m^3	CNS	1,000	I	Nov 2011
Mercury (elemental)	Chronic	3.0E-04	mg/m^3	CNS	30	I	Nov 2011
Vanadium	Chronic	1.0E-04	mg/m^3	Blood	--	A	Nov 2011
Dioxin 2,3,7,8-TCDD TEQ	Chronic	4.0E-08	mg/m^3	velop/Rep	--	C	Nov 2011
Furan 2,3,7,8-TCDD TEQ	Chronic	4.0E-08	mg/m^3	velop/Rep	--	C	Nov 2011
Chlorobenzene	Chronic	5.0E-02	mg/m^3	Liver	--	P	Nov 2011

Notes:

RfDo and values obtained from USEPA Regional Screening Level (RSL) Tables for Chemical Contaminants at Superfund Sites (updated November 2010).
The RSL Tables cite the following primary sources:

I = IRIS; USEPA's Integrated Risk Information System available at: http://cfpub.epa.gov/ncea/iris/index.cfm

P = PPRTV; the Provisional Peer Reviewed Toxicity Values derived for the USEPA Superfund program (not publicly available). P(X) indicates a withdrawn value.

A = ATSDR; the Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLS) available at: http://www.atsdr.cdc.gov/mrls/

C = California EPA toxicity values available at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp

Table 4 Cancer Toxicity Data Summary							
Pathway: Ingestion/ Dermal							
Chemical of Concern	**Oral Cancer Slope Factor**	**Units**	**Adjusted Cancer Slope Factor (for Dermal)**	**Slope Factor Units**	**Weight of Evidence/ Cancer Guideline**	**Source**	**Date**
Arsenic	1.5E+00	1/(mg/kg-day)	1.5E+00	1/(mg/kg-day)	A	I	Nov 2011
Chloroaniline, p-	2.0E-01	1/(mg/kg-day)	2.0E-01	1/(mg/kg-day)	--	P	Nov 2011
Benzene	5.5E-02	1/(mg/kg-day)	5.5E-02	1/(mg/kg-day)	A	I	Nov 2011

Table 5
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Commercial/Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil (0 to 2 ft bgs)	Surface Soil (0 to 2 ft bgs) and P&V in Outdoor Air	Mercury (elemental)	CNS	7.5E-01	--	4.2E+00	5.0E+00
			Mercury (inorganic)	Immuno/Kidney/CNS (inh)	3.6E+00	--	1.2E-02	3.6E+00
							Exposure Medium Total	1.0E+01
Groundwater	Overburden Groundwater	Potable Groundwater	Arsenic	Cardio/Derm	9.0E+00	--	--	9.0E+00
			Cobalt	Blood/Resp/Derm	6.2E+00	--	--	6.2E+00
			Iron	GI	4.8E+00	--	--	4.8E+00
			Manganese	CNS	8.9E+01	--	--	8.9E+01
			Mercury	CNS/Immuno/Kidney	7.6E+00	--	--	7.6E+00
			Methyl Mercury	CNS/Develop	1.6E+01	--	--	1.6E+01
			Vanadium	Blood	1.9E+01	--	--	1.9E+01
			Furan 2,3,7,8-TCDD TEQ	Immuno/Develop/Reprod/Dermal	1.6E+00	--	--	1.6E+00
			Chloroaniline, p-	Spleen	1.1E+01	--	--	1.1E+01
			Benzene	Blood/Immuno	2.1E+00	--	--	2.1E+00
			Chlorobenzene	Liver	7.9E+00	--	--	7.9E+00
							Exposure Medium Total	1.8E+02

Table 5
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Site-Specific Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure
Surface Soil	Surface Soil	Surface Soil	Mercury (elemental)	CNS	3.0E-01	--	1.7E+00	2.0E+00
			Mercury (inorganic)	Immuno/Kidney/CNS (inh)	1.4E+00	--	5.0E-03	1.4E+00
							Exposure Medium Total	4.1E+00

Table 5
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Construction/Utility Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure
Mixed Soil	Mixed Soil	Mixed Soil	Mercury (elemental)	CNS	1.2E+00	--	2.0E+00	3.2E+00
			Mercury (inorganic)	Immuno/Kidney/CNS (inh)	5.7E+00	--	6.0E-03	5.7E+00
			Vanadium	Blood	1.1E+00	--	7.9E-05	1.1E+00
			Furan 2,3,7,8-TCDD TEQ	Immuno/Develop/Reprod/Dermal	1.2E+00	1.1E-01	3.2E-06	1.3E+00
							Exposure Medium Total	1.3E+01
Groundwater	Shallow	Shallow	Manganese	CNS	--	3.1E+01	--	3.1E+01
			Mercury	CNS/Immuno/Kidney	--	1.5E+00	--	1.5E+00
			Vanadium	Blood	--	1.0E+01	--	1.0E+01
			Dioxin 2,3,7,8-TCDD TEQ	Immuno/Develop/Reprod/Dermal	--	2.1E+00	--	2.1E+00
			Furan 2,3,7,8-TCDD TEQ	Immuno/Develop/Reprod/Dermal	--	1.4E+01	--	1.4E+01
			Chlorobenzene	Liver	--	3.1E+00	--	3.1E+00
							Exposure Medium Total	6.4E+01

Table 6
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Commercial/Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Overburden Groundwater	Potable Groundwater	Arsenic	1.4E-03	--	--	1.4E-03
			Chloroaniline, p-	3.1E-03	--	--	3.1E-03
			Benzene	1.6E-04	--	--	1.6E-04
						Exposure Medium Total	4.9E-03

TABLE 7
COC CLEANUP GOALS

COPC	SOIL	OVERBURDEN GROUNDWATER CLASS IIA	SEDIMENT
	NJDEP NON-RESIDENTIAL REM. STD	NJDEP GW STD	PRG[1]
Units	mg/kg	ug/L	mg/kg
Aluminum		2.0E+02	
Antimony	4.5E+02	6.0E+00	
Arsenic	1.9E+01	3.0E+00	8.2
Barium	5.9E+04	6.0E+03	48
Beryllium	1.4E+02		
Cadmium	7.8E+01	4.0E+00	1.2
Chromium		7.0E+01	81
Cobalt	5.9E+02	-	
Copper			34
Iron	-	3.0E+02	-
Lead	8.0E+02	5.0E+00	47
Manganese		5.0E+01	260
Mercury	6.5E+01	2.0E+00	0.15
Nickel		1.0E+02	21
Selenium	5.7E+03		
Silver			1
Vanadium	1.1E+03	6.0E+01	57
Zinc	1.1E+05		150
Acenaphthene			0.016
Acenaphthylene			0.044
alpha-chlordane	1.0E+00		
Aniline		6.0E+00	
Anthracene			0.085
Benz(a)anthracene	2.0E+00	-	0.261
Benzo(a)pyrene TEQ	2.0E-01		0.43
Benzo(b)fluoranthene	2.0E+00		
Benzo(k)fluoranthene	2.3E+01		
Carbazole		-	
Chloroaniline, p-		3.0E+01	
Chrysene			0.384
Dibenz(a,h)anthracene	2.0E-01		0.063
Fluoranthene			0.6
Fluorene			0.019
Dichlorobenzene, 1,2-		6.0E+02	
Dichlorobenzene, 1,4-	1.3E+01	7.5E+01	
Dichlorophenol, 2,4-		2.0E+01	
Dinitrotoluene, 2,4-	3.0E+00		
Dinitrotoluene, 2,6-	3.0E+00		
Hexachlorobenzene	1.0E+00	2.0E-02	
Hexachlorobutadiene	2.5E+01	1.0E+00	
Indeno(1,2,3-c,d) Pyrene	2.0E+00		
Naphthalene	1.7E+01	3.0E+02	0.16
Nitrobenzene		6.0E+00	
Methylnaphthalene, 2-		-	0.07
PCBs	1.0E+00		0.005
PCDDs		1.0E-05	-
PCDFs	-	-	-
Pentachlorophenol		3.0E-01	
Phenanthrene			0.24
Pyrene			0.665
Trichlorobenzene, 1,2,4-	8.2E+02	9.0E+00	
Benzene		1.0E+00	
Chlorobenzene		5.0E+01	
Chloroform	2.0E+00		
Dibromoethane, 1,2-	4.0E-02		
DBCP	2.0E-01		
Ethylbenzene		7.0E+02	
Methylene Chloride	9.7E+01	3.0E+00	
Tetrachloroethylene (PCE)	5.0E+00	1.0E+00	
Trichloroethylene (TCE)	2.0E+01		
Vinyl Chloride		1.0E+00	

Note:
1. Qr to levels consistent with Arthur Kill Sediments

Table 8
Site-Specific ARARs
LCP Chemicals, Inc. Superfund Site
Feasibility Study

Standard, Requirement, or Criterion	Citation or Reference	Type	Description	Status	Comments
FEDERAL					
Air: Clean Air Act	42 USC 7401, Section 112	Action specific	Establishes limits on emissions to atmosphere from industrial and commercial activities.	Applicable	Applicable to alternatives that may emit pollutants to the air.
National Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	Action specific	Establishes emissions limits for primary and secondary NAAQS	Applicable	Applicable to alternatives that may emit pollutants to the air
National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61.01, 61.14	Action specific	Establishes limits on hazardous emissions to the atmosphere	TBC	Applicable to alternative that may emit pollutants to the air. Sets requirements for public exposure to hazardous airborne emissions.
Vapor Intrusion Guidance	OSWER Draft Guidance Document	Chemical specific	Provides soil vapor, indoor air screening levels	TBC	Potentially applicable depending on ultimate redevelopment of the site (i.e., redeveloped with buildings)
Fish and Wildlife: Fish and Wildlife Coordination Act	16 USC 661, 662, 663 40 CFR 6.302(g)	Location specific	Provides protection of fish and wildlife from actions resulting in the control or structural modification of natural streams and water bodies.	Relevant and Appropriate	Potentially applicable to alternatives involving placement of fill in South Branch Creek.
Groundwater: Maximum Contaminant Levels (MCLs)	40 CFR 141.11, 141.31	Chemical specific	Maximum permissible levels of contaminants in water that is delivered to any user of a public water system.	Relevant and Appropriate	Applicable to determining whether groundwater if used from the Site for drinking would require treatment to reduce concentrations to levels below the MCLs. Groundwater at the site is not anticipated to be used.
Identification and Listing of Hazardous Waste	40 CFR Part 261.3, 261.6, 261.10, 261.11, 261.24	Chemical specific	Defines those wastes, which are subject to regulation as hazardous wastes, and lists specific chemical and industry-source wastes.	Applicable	Applicable to determining whether wastes are hazardous, and to brine sludge in closed RCRA unit.
Generators of Hazardous Waste	40 CFR 262 Subparts A,B,C,D,E	Chemical specific	Establishes requirements for generators of hazardous waste (EPA ID numbers and manifests).	Applicable	Applicable to remedial activities that involve the management of a hazardous waste.
Transportation of Hazardous Wastes.	40 CFR 263 Subpart B 49 CFR 107, 171-180	Action specific	Established standards for the transportation of hazardous wastes and/or materials.	Applicable	Applicable to remedial activities that involve the off-site transportation of hazardous waste.

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Standard, Requirement, or Criterion	Citation or Reference	Type	Description	Status	Comments
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR 264 Subparts B, D,E,K	Action, location, and chemical specific	Establishes the minimum standards for the management of hazardous waste and includes regulations for land disposal units.	Applicable	Applicable to remedial activities that include disposal of hazardous wastes, or treatment of hazardous waste at the site.
Land Disposal Restrictions	40 CFR 268	Chemical specific	Identifies hazardous wastes which are restricted from land disposal and identifies treatment requirements prior to disposal	Applicable	Applicable to remedial activities that include disposal of hazardous wastes.
Soil: Mercury Export Ban Act	Public Law 110-414 (122 STAT. 4344 – 4348)	Action and chemical specific	Establishes export and resale ban of elemental mercury containing materials. Remediation wastes may be exported for treatment/disposal but not for sale or reuse of any recovered mercury.	Applicable	Applicable to remedial activities that include international, off-site disposal of elemental mercury.
Surface Water: Clean Water Act (CWA)	33 USC 1342	Action and chemical specific	Sets standards for the restoration and maintenance of chemical, physical and biological characteristics of surface water.	Applicable/ TBC	Applicable for selected remedial technologies (e.g., surface water discharge), and potentially assessment of South Branch Creek.
National Pollutant Discharge Elimination System	40 CFR 122	Action and chemical specific	Requires permits for the discharge of pollutants from any point source into waters of the United States	Applicable	Applicable for selected remedial technologies (e.g., surface water discharge of treated groundwater)
Wetlands and Costal Zone: Section 404 CWA	33 CFR 330	Location and Action Specific	Regulates discharge of dredged or fill material into waters of the United States	Applicable	Applicable to remedial actions that may involve placement of fill in South Branch Creek.
Wetland Permits	40 CFR 230 – 233	Location specific	Provides wetland permitting requirements for actions in and around wetlands and waters of the United States	Applicable	Applicable to remedial actions that may impact wetlands and/or placement of fill in South Branch Creek.
STATE OF NEW JERSEY					

Table 8
Site-Specific ARARs
LCP Chemicals, Inc. Superfund Site
Feasibility Study

Standard, Requirement, or Criterion	Citation or Reference	Type	Description	Status	Comments
Air: Permits and Certificates for Minor Facilities	NJAC 7:27-8	Action specific	Governs permits and certificates for facilities classified as minor air pollution sources.	Applicable	Applicable if the selected remediation system qualifies as a minor air pollution source (e.g., groundwater treatment of VOCs).
Ambient Air Quality Standards	NJAC 7:27-13	Action and chemical specific	Establishes air quality standards for the protection of public health and the preservation of ambient air quality.	Applicable	Applicable to remedial alternatives that result in air emissions (e.g., groundwater treatment of VOCs).
Vapor Intrusion Guidance	NJDEP Guidance Document, March 2013	Chemical specific	Provides soil vapor, indoor air, rapid action, and health department notification screening levels	TBC	Potentially applicable depending on ultimate redevelopment of the site.
Groundwater Quality Standards	NJAC 7:9C	Chemical specific	Lists the maximum permissible levels of contaminants in groundwater.	Applicable	Applicable to groundwater remedial alternatives.
Hazardous and Solid Waste: Identification and Listing of Hazardous Waste	NJAC 7:26G-5	Chemical specific	Describes methods for identifying hazardous wastes and lists known hazardous wastes.	Applicable	Applicable to determining whether wastes are hazardous.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities	NJAC 7:26G-8	Action specific	Establishes permit requirements and construction and operations standards.	Applicable	Applicable if remedial activities include the treatment, storage, and/or disposal of hazardous waste.
Land Disposal Restrictions	NJAC 7:26G-11	Action and chemical specific	Identifies hazardous wastes that are subject to land disposal restrictions	Applicable	Applicable if remedial activities include the disposal of hazardous waste
Transportation of Hazardous Materials	NJAC 16:49	Action specific	Regulates shipping/transport of hazardous materials.	Applicable	Applicable if action includes off-site transport of hazardous materials

Table 8
Site-Specific ARARs
LCP Chemicals, Inc. Superfund Site
Feasibility Study

Standard, Requirement, or Criterion	Citation or Reference	Type	Description	Status	Comments
Solid Waste Regulations And Recycling	NJAC 7:26 Subchapter 1, 2 NJAC 7:26A-1	Action specific	Regulates non-hazardous waste management.	Applicable	Applicable if action includes generation or management of solid wastes.
Sediment Guidance for Sediment Quality Evaluations	NJDEP Ecological Evaluation Technical Guidance August 2012	Chemical specific	Establishes guidance for sediment evaluation to be used in ecological risk assessment process under Site Remediation Program	TBC	Provides basis for determining sediment cleanup criteria for remedial actions
Surface Water: Storm Water Management	NJAC 7:8	Action specific	Establishes requirements for managing and controlling storm water from the site.	Applicable	Applicable if conditions are altered for remedial activities.
Surface Water Standards	NJAC 7:9B	Chemical specific	Sets standards for the restoration and maintenance of chemical, physical and biological characteristics of surface water.	Applicable	Applicable to certain remedial technologies (e.g., surface water discharge), and potentially assessment of South Branch Creek.
Flood Hazard Area Control	NJAC 7:13	Location specific	Controls and limits development in flood plains	Applicable	Applicable to remedial activities in a flood plain.
New Jersey Pollutant Discharge Elimination System Rules	NJAC 7:14A	Action and chemical specific	Establishes standards for surface water discharge for site remediation projects. Takes precedence over National Pollution Discharge Elimination System regulations (40 CFR 122 and 125)	Applicable	Potentially applicable if remedial activities include discharge to surface water.
Treatment Works Approval	NJAC 7:14A-22,23	Action and chemical specific	Regulates the construction and operation of industrial and domestic wastewater collection, conveyance, and treatment facilities.	Relevant and Appropriate	Potentially applicable if remedial activities include a treatment plant or pre-treatment plant with discharge to POTW.
Soil: Soil Erosion and Sediment Control/Mitigation	NJAC 7:13-3.3, 3.4	Action specific	Requires controls for erosion and sediment transport.	Applicable	Applicable to construction activities that disturb soils.

Table 8
Site-Specific ARARs
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Feasibility Study

Standard, Requirement, or Criterion	Citation or Reference	Type	Description	Status	Comments
Remediation Standards	NJAC 7:26D	Chemical specific	Soil site-specific cleanup levels. Includes guidance on development of impact to groundwater soil remediation standards. Regulations also include remediation standards for groundwater and surface water.	Applicable	Provides soil, groundwater, and surface water cleanup objectives.
Wetlands and Costal Zone: Freshwater Wetland Protection Act Rules	NJAC 7:7A	Location specific	Establishes requirements for the protection of freshwater wetlands.	Applicable	Applicable to remedial actions that affect wetland areas, such as adjacent to South Branch Creek.
Coastal Permit Program Rules	NJAC 7:7	Location specific	Establishes requirements for the protection of coastal areas.	Applicable	Applicable to remedial actions that occur within a coastal zone. Coastal zone (CAFRA) is not present adjacent to the site, however, waterfront development requirements would apply.
Other:					
Technical Requirements for Site Remediation	NJAC 7:26E	Action specific	Specifies requirements for remedial activities within New Jersey.	Applicable	State program for implementation of remedial activities and part of Licensed Site Remediation Professional program.
Well Construction and Maintenance, Sealing of Abandoned Wells	NJAC 7:9D	Action specific	Specifies requirements for installation and abandonment of wells.	Applicable	Applicable to remedial action that involve construction or abandonment of wells.

Table 7.7
LCP Chemicals, Inc. Superfund Site, Feasibility Study
Combined Site Remedy No. 4b
Full Containment and Full Depth Stabilization
Detailed Cost Estimate

Capital Costs				Cost Range[1]	
Item	Unit	Unit Price	Quantity	Min	Max
Soil Remedy Components (Alternative 8S-2)					
Mobilization / Demobilization	LS	$105,000	-	$105,000	$105,000
Misc. Site Preparation & Clearing	Ac	$4,600	24.2	$111,000	$111,000
In-situ Stabilization	CY	$80	23,600	$1,888,000	$1,888,000
Stabilization Reagent at 5% S0 Loading	Ton	$500	1,800	$900,000	$9,000,000
Capping	Ac	$250,000	21.9	$6,046,000	$6,046,000
Establish Use Restrictions (Deed Notice)	LS	$50,000	-	$50,000	$50,000
Soil Erosion and Sediment Control/Site Restoration	Ac	$5,000	24.2	$121,000	$121,000
Miscellaneous (HASP, permits, survey)	LS	$50,000	-	$50,000	$50,000
Groundwater Remedy Components (Alternative 2GW)					
Mobilization / Demobilization	LS	$75,000	-	$75,000	$75,000
Misc. Site Preparation & Clearing	Ac	$4,600	24.2	$111,000	$111,000
Barrier Wall	LF	$700	3,900	$2,730,000	$2,730,000
Shallow Groundwater Collection System	LF	$220	5,300	$1,166,000	$1,166,000
Soil Erosion and Sediment Control/Site Restoration	Ac	$5,000	6.1	$30,000	$30,000
Miscellaneous (HASP, permits, survey)	LS	$50,000	-	$50,000	$50,000
Establish Use Restrictions (CEA)	LS	$50,000	-	$50,000	$50,000
Sediment Remedy Components (Alternative 3SD)					
Mobilization / Demobilization	LS	$25,000	-	$25,000	$25,000
Misc. Site Preparation & Clearing	Ac	$4,600	1.3	$6,000	$6,000
Excavate Sediments	CY	$25	4,100	$103,000	$103,000
Stabilization/Solidification*	CY	$150	2,050	$308,000	$308,000
Additional Backfill Upstream Portion of Creek	CY	$28	2,200	$62,000	$62,000
On-Site Disposal	CY	$13	4,100	$53,000	$53,000
Northern Off-Site Ditch Outlet Extension	LS	$50,000	-	$50,000	$50,000
Restore/Mitigate Wetlands	Ac	$150,000	1.3	$200,000	$200,000
Building Remedy Components (Alternative 2B)					
Mobilization / Demobilization	LS	$25,000	-	$25,000	$25,000
Building Demolition	CF	$0.64	5,740,000	$3,674,000	$3,674,000
Debris Processing (crushing, etc.)	CY	$30	32,000	$960,000	$960,000
Stabilization	CY	$150	8,000	$1,200,000	$1,200,000
On-Site Disposal	CY	$13	32,000	$416,000	$416,000
0		$0	-	$0	$0
Subtotal				$20,665,000	$28,665,000
Engineering and Administration	%	10%		$2,067,000	$2,867,000
Subtotal				$22,622,000	$31,532,000
Contingencies	%	30%		$6,787,000	$9,460,000
Total Capital				$29,409,000	$40,992,000
Annual Operation, Maintenance & Monitoring Costs					
Soil Remedy Components (Alternative 8S-2)					
Cap Maintenance	LS	$6,100	-	$6,100	
Maintenance of Institutional Controls (Deed Notice Certification)	LS	$7,500	-	$7,500	
Reporting, 5-year reviews, etc.	LS	$4,300	-	$4,300	
Groundwater Remedy Components (Alternative 2GW)					
Maintenance of Institutional Controls (Deed Notice Certification)	LS	$7,500	-	$7,500	
Reporting, 5-year reviews, etc.	LS	$4,300	-	$4,300	
Quarterly Groundwater Monitoring	LS	$30,000	-	$30,000	
Groundwater Treatment (POTW Discharge)	GAL	$0.0011	315,360	$340	
Sediment Remedy Components (Alternative 3SD)					
Maintenance of Wetlands	LS	$5,200	-	$5,200	
Reporting	LS	$3,000	-	$3,000	
Subtotal				$68,000	
Contingencies	%	30%		$20,000	
Total Annual OM&M				$88,000	
Net Present Worth Annual OM&M (7%, 30 yrs)				$1,092,000	
Total 30 Year Net Present Worth				$30,501,000	$42,084,000

Note:
[1] Range in cost representative of a range of potential sulfur loading in the soil stabilization process between 5% to 50% by weight sulfur per ton of soil

APPENDIX III

ADMNISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX OF DOCUMENTS

DRAFT

08/19/2013 **REGION ID: 02**

Site Name: LCP CHEMICALS INC.
CERCLIS ID: NJD079303020
OUID: 01
SSID: 02HU
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Beginning Bates:	Ending Bates:	Addressee Name:	Addressee Organization:	Author Name:	Author Organization:
689020	08/20/2013	COMPREHENSIVE ADMINISTRATIVE RECORD INDEX FOR OU1 FOR THE LCP CHEMICALS INCORPORATED SITE	7	[INDEX]			[]	[]	[,]	[US ENVIRONMENTAL PROTECTION AGENCY]
101550	1111-01-01 00:00:00.0	LCP CHEMICALS, INC. SITE, ADMINISTRATIVE RECORD FILE, INDEX OF DOCUMENTS.	4	[INDEX]			[]	[]	[NOT AVAILABLE, NOT AVAILABLE]	[EPA, REGION 2]
101551	1111-01-01 00:00:00.0	LCP CHEMICALS, INC. SITE, ADMINISTRATIVE RECORD FILE UPDATE, INDEX OF DOCUMENTS.	2	[INDEX]			[]	[]	[NOT AVAILABLE, NOT AVAILABLE]	[EPA, REGION 2]
113600	11/01/1985	Report: Preliminary Assessment for RCRA Corrective Action Program, GAF Linden, Dupont Rd, Foot of Wood Ave., Linden, Union County, NJ, prepared by the Division of Waste Management, Bureau of Hazardous Waste Planning & Classification, prepared...	114	[REPORT]	101359	101472	[,]	[NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION]	[,]	[Bureau of Hazardous Waste Planning & Classification]
113593	09/09/1994	Memorandum to File, U.S. EPA, Region II, from Mr. Nick Magriples, CHMM, On-Scene Coordinator, Technical Support Section, U.S. EPA, Region II, re: Removal Site Evaluation for LCP Corp. (Linden Chemicals and Plastics), Division of Hanlin Group, Linden...	2	[MEMORANDUM]	100001	100002	[FILE,]	[UNKNOWN]	[MAGRIPLES, NICK]	[EPA]
113596	07/24/1995	Report: Final Draft, Site Inspection, LCP Chemicals, Inc., Linden, Union County, New Jersey, Prepared Under Work Assignment No. 038-2JZZ, Contract No. 68-W9-0051, Volume 1 of 4, submitted by Mr. David S. Kahlenberg, Site...	158	[REPORT]	100026	100183	[]	[]	[KAHLENBERG, DAVID S, MCNULTY, STEVEN T, SPLENDORE, JOHN]	[MALCOLM PIRNIE, INC.]
113597	07/24/1995	Report: LCP Chemical, Linden, Union County, New Jersey, Site Inspection Report, Prepared Under Work Assignment No. 019-2JZZ, Contract No. 68-W9-0051, Volume 2 of 4, submitted by Mr. David S. Kahlenberg, Site Manager, Mr. Steven T. McNulty, Task Leader...	412	[REPORT]	100184	100595	[]	[]	[KAHLENBERG, DAVID S, MCNULTY, STEVEN T, SPLENDORE, JOHN]	[MALCOLM PIRNIE, INC.]

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113598	07/24/1995	Report: LCP Chemical, Linden, Union County, New Jersey, Site Inspection Report, Prepared Under Work Assignment No. 019-2JZZ, Contract No. 68-W9-0051, Volume 3 of 4, submitted by Mr. David S. Kahlenberg, Site Manager, Mr. Steven T. McNulty, Task Leader...	397	[REPORT]	100596	100990	[]	[]	[KAHLENBERG, DAVID S, MCNULTY, STEVEN T, SPLENDORE, JOHN]	[MALCOLM PIRNIE, INC.]
113599	07/24/1995	Report: LCP Chemical, Linden, Union County, New Jersey, Site Inspection Report, Prepared Under Work Assignment No. 019-2JZZ, Contract No. 68-W9-0051, Volume 4 of 4, submitted by Mr. David S. Kahlenberg, Site Manager, Mr. Steven T. McNulty, Task Leader...	368	[REPORT]	100991	101358	[]	[]	[KAHLENBERG, DAVID S, MCNULTY, STEVEN T, SPLENDORE, JOHN]	[MALCOLM PIRNIE, INC.]
113594	08/12/1996	Memorandum to File, U.S. EPA, Region II, from Mr. Nick Magriples, CHMM, On-Scene Coordinator, U.S. EPA, Region II, re: Removal Site Evaluation for LCP Chemicals, Inc., Division of Hanlin Group, Linden, Union County, New Jersey, August 12, 1996...	21	[CHART / TABLE, MAP, MEMORANDUM]	100003	100023	[FILE,]	[UNKNOWN]	[MAGRIPLES, NICK]	[EPA]
113595	10/25/1996	Memorandum to Ms. Kathleen Callahan, Director, Emergency & Remedial Response Division, U.S. EPA, Region II, from Mr. Conrad Simon, Director, Air & Waste Management Division, U.S. EPA, Region II, re: Referral...	2	[MEMORANDUM]	100024	100025	[CALLAHAN, KATHLEEN]	[EPA, REGION 2]	[SIMON, CONRAD]	[EPA]
113601	02/01/1997	Report: Final Hazard Ranking System Evaluation, LCP Chemicals, Inc., Linden Township, Union County, New Jersey, Prepared Under Work Assignment No. 038-2JZZ, Contract No. 68-W9-0051, Volume 1 of 4, submitted by Ms. Lisa Greco, Site Manager, Mr. Steven...	120	[FIGURE, MAP, REPORT]	101473	101592	[]	[]	[GRECO, LISA D, GREENLAW, ALAN , MCNULTY, STEVEN T]	[MALCOLM PIRNIE, INC.]

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113602	02/01/1997	Report: Final Hazard Ranking System Evaluation, LCP Chemicals, Inc., Linden Township, Union County, New Jersey, Prepared Under Work Assignment No. 038-2JZZ, Contract No. 68-W9-0051, Volume 2 of 4, submitted by Ms. Lisa Greco, Site Manager, Mr. Steven...	184	[FIGURE, MAP, REPORT]	101593	101776	[]	[]	[GRECO, LISA D, GREENLAW, ALAN , MCNULTY, STEVEN T]	[MALCOLM PIRNIE, INC.]
113603	02/01/1997	Report: Final Hazard Ranking System Evaluation, LCP Chemicals, Inc., Linden Township, Union County, New Jersey, Prepared Under Work Assignment No. 038-2JZZ, Contract No. 68-W9-0051, Volume 3 of 4, submitted by Ms. Lisa Greco, Site Manager, Mr. Steven...	363	[CHART / TABLE, FIGURE, LETTER, MAP, MEMORANDUM, REPORT]	101777	102138	[]	[]	[GRECO, LISA D, GREENLAW, ALAN , MCNULTY, STEVEN T]	[MALCOLM PIRNIE, INC.]
113604	02/01/1997	Report: Final Hazard Ranking System Evaluation, LCP Chemicals, Inc., Linden Township, Union County, New Jersey, Prepared Under Work Assignment No. 038-2JZZ, Contract No. 68-W9-0051, Volume 4 of 4, submitted by Ms. Lisa Greco, Site Manager, Mr. Steven...	395	[CHART / TABLE, FIGURE, FORM, LETTER, MAP, REPORT]	102139	102533	[]	[]	[GRECO, LISA D, GREENLAW, ALAN , MCNULTY, STEVEN T]	[MALCOLM PIRNIE, INC.]
113608	04/26/1999	Letter to ISP Environmental Services Inc., c/o Dennis Toft, Esq., Wolff & Samson, from Muthu S. Sundram, Esq., Assistant Regional Counsel, New Jersey Superfund Branch, U.S. EPA, Region II, re: LCP Chemicals, Inc., Superfund Site, Linden, Union...	49	[ADMIN. ORDER , LEGAL DOCUMENT, LETTER]	700001	700049	[ISP ENVIRONMENTAL SERVICES, IN, , TOFT, DENNIS M]	[NONE, WOLFF & SAMSON]	[SUNDRAM, MUTHU S]	[EPA, REGION 2]
113607	06/01/1999	Report: Statement of Qualifications, LCP Chemicals, Inc., Superfund Site, Linden, Union County, New Jersey, prepared by URS Greiner Woodward Clyde, prepared for ISP Environmental Services, Inc., June, 1999.	102	[CHART / TABLE, REPORT]	300001	300102	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS GREINER, INC.]
113605	08/14/2000	Plan: Work Plan, Interim Removal Action (IRA) for LCP Chemicals, Inc., Superfund Site, Linden, New Jersey, prepared by URS, prepared for ISP Environmental Services, Inc., August 14, 2000.	36	[CHART / TABLE, REPORT]	200001	200036	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]

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Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Beginning Bates:	Ending Bates:	Addressee Name:	Addressee Organization:	Author Name:	Author Organization:
113606	09/07/2000	Plan: Health and Safety Plan, Interim Removal Action (IRA) for LCP Chemicals, Inc., Superfund Site, Linden, New Jersey, prepared by URS, prepared for ISP Environmental Services, Inc., September 7, 2000.	317	[CHART / TABLE, FIGURE, FORM, REPORT]	200037	200340	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]
113611	10/16/2000	Letter to Ms. Patricia Simmons, Emergency and Remedial Response Division, U.S. EPA, Region II, from Mr. Thomas Pisciotta, Project Manager, URS Corporation, re: Interim Removal Action Addendum, Subcontractor Health and Safety Plan, and Notification	139	[LETTER, REPORT]	300597	300735	[SIMMONS, PATRICIA]	[EPA]	[PISCIOTTA, THOMAS]	[URS CORPORATION]
113612	11/01/2000	Memorandum to Mr. Tarek Khouri, URS Greiner Woodward Clyde, from Mr. Frank Quinton, Health and Safety Manager, Integrated Technical Services, Inc., re: LCP Chemical HASP (Attachment: Material Safety Data Sheet)	23	[MEMORANDUM, REPORT]	300736	300758	[KHOURI, TAREK]	[URS GREINER, INC.]	[QUINTON, FRANK]	[INTEGRATED TECHNICAL SERVICES, INC.]
113609	04/12/2001	Report: Final Sampling and Analysis Plan, Field Operations Plan, Part I, Remedial Investigation and Feasibility Study for the LCP Chemicals, Inc. Superfund Site, Linden, New Jersey, prepared by URS Corporation, prepared for ISP Environmental	193	[REPORT]	300103	300295	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]
113610	04/12/2001	Report: Final Quality Assurance Prelect Plan, Field Operations Plan, Part II, Remedial Investigation and Feasibility Study for the LCP Chemicals, Inc. Superfund Site, Linden, New Jersey, prepared by URS Corporation, prepared for ISP Environmental	301	[REPORT]	300296	300596	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]
113613	04/12/2001	Report: Final Work Plan, Remedial Investigation and Feasibility Study for the LCP Chemicals, Inc. Superfund Site, Linden, New Jersey, prepared by URS Corporation, prepared for ISP Environmental Services Inc.	225	[REPORT]	300759	300983	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]

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08/19/2013

REGION ID: 02

Site Name: LCP CHEMICALS INC.
CERCLIS ID: NJD079303020
OUID: 01
SSID: 02HU
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Beginning Bates:	Ending Bates:	Addressee Name:	Addressee Organization:	Author Name:	Author Organization:
113614	04/16/2001	Report: Final Report, Interim Removal Action (IRA) for LCP Chemicals, Inc. Superfund Site, Linden, New Jersey, prepared by URS, prepared for ISP Environmental Services Inc.	191	[REPORT]	300984	301174	[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]
198983	10/06/2000	FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY WORK PLAN FOR THE LCP CHEMICALS INCORPORATED SITE	210	[PLAN]			[]	[]	[,]	[URS CORPORATION]
198984	02/12/2001	FINAL SAMPLING AND ANALYSIS PLAN - PART 1 OF THE FIELD OPERATIONS PLAN FOR THE LCP CHEMICALS INCORPORATED SITE	183	[PLAN]			[]	[]	[,]	[URS CORPORATION]
198985	04/12/2001	FINAL QUALITY ASSURANCE PROJECT PLAN - PART 2 OF THE FIELD OPERATIONS PLAN FOR THE LCP CHEMICALS INCORPORATED SITE	293	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[URS CORPORATION]
198986	10/12/2001	ADDENDUM NO. 1 TO THE FIELD OPERATIONS PLAN FOR CASED DEEP BORINGS FOR THE LCP CHEMICALS INCORPORATED SITE	4	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198987	11/01/2001	ADDENDUM NO. 2 TO THE FIELD OPERATIONS PLAN FOR SUBSURFACE UTILITY CLEARANCE FOR THE LCP CHEMICALS INCORPORATED SITE	5	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198988	03/01/2002	ADDENDUM NO. 3 TO THE FIELD OPERATIONS PLAN FOR SAMPLING BENEATH BUILDINGS 230 AND 240 FOR THE LCP CHEMICALS INCORPORATED SITE	25	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198990	09/01/2006	HEALTH AND SAFETY PLAN FOR PHASE II REMEDIAL INVESTIGATION FOR THE LCP CHEMICALS INCORPORATED SITE	131	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198989	10/01/2006	REVISED SUPPLEMENTAL WORK PLAN: SEDIMENT TOXICITY TESTING (SOUTH BRANCH CREEK) - PHASE II REMEDIAL INVESTIGATION FOR THE LCP CHEMICALS INCORPORATED SITE	13	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]

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198993	10/01/2006	REVISED ADDENDUM NO. 1 (SOIL AND GROUNDWATER) WORK PLAN FOR PHASE II REMEDIAL INVESTIGATION FOR THE LCP CHEMICALS INCORPORATED SITE	58	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198994	10/01/2006	REVISED ADDENDUM NO. 2 (SOUTH BRANCH CREEK AND ECOLOGICAL ISSUES) WORK PLAN FOR PHASE II REMEDIAL INVESTIGATION FOR THE LCP CHEMICALS INCORPORATED SITE	36	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198995	10/01/2006	REVISED ADDENDUM NO. 4 FIELD OPERATIONS PLAN (BEDROCK MONITORING WELLS, SOIL VAPOR TESTING, AND GROUNDWATER SAMPLING) FOR THE LCP CHEMICALS INCORPORATED SITE	29	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198996	10/01/2006	REVISED ADDENDUM NO. 5 FIELD OPERATIONS PLAN (ECOLOGICAL SAMPLING) FOR THE LCP CHEMICALS INCORPORATED SITE	12	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198991	10/05/2006	QUALITY ASSURANCE PROJECT PLAN ADDENDUM FOR SOIL VAPOR SAMPLING FOR THE LCP CHEMICALS INCORPORATED SITE	58	[PLAN]			[FARANCA, FRANK , GORIN, JONATHON]	[EPA, REGION 2, NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION]	[MACMILLIN, SCOTT D]	[BROWN AND CALDWELL]
198992	10/13/2006	REVISED QUALITY ASSURANCE PROJECT PLAN ADDENDUM FOR SOUTH BRANCH CREEK - AUGUST 23, 2006 FOR THE LCP CHEMICALS INCORPORATED SITE	506	[PLAN]			[FARANCA, FRANK , GORIN, JONATHON]	[EPA, REGION 2, NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION]	[MACMILLIN, SCOTT D, SORELL, TAMARA]	[BROWN AND CALDWELL]
688391	12/17/2008	TECHNICAL MEMORANDUM FOR THE IDENTIFICATION OF CANDIDATE TECHNOLOGIES FOR THE LCP CHEMICALS INCORPORATED SITE	31	[REPORT]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
198981	05/14/2010	REVISED SCOPE OF WORK - CHARACTERIZATION OF OFF-SITE DITCHES FOR THE LCP CHEMICALS INCORPORATED SITE	13	[LETTER]			[GORIN, JON]	[EPA, REGION 2]	[MACMILLIN, SCOTT D, THORN, PAUL J]	[BROWN AND CALDWELL]
198982	11/01/2010	REVISED QUALITY ASSURANCE PROJECT PLAN FOR THE LCP CHEMICALS INCORPORATED SITE	980	[PLAN]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[BROWN AND CALDWELL]
688390	05/27/2011	REMEDIAL INVESTIGATION REPORT - APPENDIX P: FINAL HUMAN HEALTH RISK ASSESSMENT - VOLUME 5 OF 6 FOR THE LCP CHEMICAL COMPANY SITE	373	[REPORT]			[]	[]	[,]	[GEOSYNTEC CONSULTANTS]

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198980	08/01/2013	FINAL FEASIBILITY STUDY REPORT FOR THE LCP CHEMICALS INCORPORATED SITE	359	[REPORT]			[,]	[ISP ENVIRONMENTAL SERVICES, INC.]	[,]	[CORNERSTONE ENGINEERING GROUP LLC]

APPENDIX IV

STATE LETTER OF CONCURRANCE

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITE REMEDIATION
Mail Code 401-06
P. O. Box 420
Trenton, New Jersey 08625-0420
Tel. #: 609-292-1250
Fax. #: 609-777-1914

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

FEB 19 2014

Mr. Walter Mugdan, Director
Emergency and Remedial Response Division
USEPA-Region 2
290 Broadway, Floor 19
New York, NY 10007-1866

Re: LCP Chemicals, Inc. Superfund Site
Record of Decision

Dear Mr. Mugdan:

The New Jersey Department of Environmental Protection (Department) completed its review of the "draft Record of Decision, LCP Chemicals, Inc, Superfund Site, Linden, Union County, New Jersey" prepared by the U.S. Environmental Protection Agency (EPA) Region II in December, 2013. The Department concurs with the proposed concept of in-situ stabilization of the free mercury to a depth of free mercury of 17 feet which includes a multi-layer cap, shallow ground water treatment system, groundwater monitoring and the removal of contaminated sediments in North Off-Site Ditch and the lower part of South Branch Creek. However, the Department cannot concur with the full remedy for the following reasons:

- A treatability study of the in-situ stabilization technology was not performed to determine if the technology would be effective at the LCP site for the selected remedy or the first contingency remedy of treatment to 6 feet. In addition, it has not been determined if there are any obstructions at depth which might hinder in-situ stabilization to 17 feet.

- The Department's position is that the contingency remedy should be excavation and off-site disposal of the free mercury (Alternative 5B). While costly, this alternative appears implementable. Containment alone, which is one of the proposed contingencies, does not address the free mercury.

- The draft ROD states that EPA will determine clean-up levels for the sediments that are consistent with existing levels in the Arthur Kill (i.e. background) or the preliminary

remediation goals determined for the site, if they are higher. EPA has indicated that additional data will not be collected to determine the sediment clean–up level. The Department position is that sufficient data has not been collected in the Arthur Kill to determine background. Once background is determined, additional delineation and possibly remediation may be necessary in the Arthur Kill.

In conclusion, for the reasons listed above, the Department does not concur with the selected remedy in the December 2013 draft Record of Decision. If you have any questions, please contact me.

Sincerely,

Mark J. Pedersen
Acting Assistant Commissioner
Site Remediation Program

c: Jon Gorin, USEPA
Anne Pavelka, NJDEP

APPENDIX V

RESPONSIVENESS SUMMARY

APPENDIX V

RESPONSIVENESS SUMMARY
LCP Chemicals, Inc., Superfund Site
Linden, New Jersey

INTRODUCTION

This Responsiveness Summary provides a summary of the public's comments and concerns regarding the Proposed Plan for the LCP Chemicals, Inc., Superfund Site's preferred remedy, and EPA's responses to those comments. All comments summarized in this document have been considered in EPA's final decision for the selection of remedial alternatives for the Site.

This Responsiveness Summary is divided into the following sections:

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS: This section provides the history of community involvement and interests regarding the Site.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS AND RESPONSES: This section contains summaries of oral comments received by EPA at the public meeting, EPA's responses to these comments, as well as responses to written comments received during the public comment period.

The last section of this Responsiveness Summary includes attachments, which document public participation in the remedy selection process for this site. They are as follows:

Attachment A contains the Proposed Plan that was distributed to the public for review and comment;

Attachment B contains the public notices that appeared in the Home News Tribune;

Attachment C contains the transcripts of the public meeting; and

Attachment D contains the written comments received by EPA during the public comment period.

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

On August 21, 2013, EPA released the Proposed Plan and supporting documentation for the proposed remedy to the public for comment. EPA made these documents available to the public in the administrative record repositories maintained at the EPA Region 2 office (290 Broadway, New York, New York) and the Linden Public Library (31 East Henry Street, Linden, New Jersey). EPA published a notice of availability of these documents in the Home News Tribune newspaper on August 21, 2013. EPA opened a public comment period which ran from August, 21 2013, until September 20, 2012. Due to a request

for a public comment period extension, on September 17, 2013, EPA extended the public comment period to October 21, 2013.

On August 21, 2013, EPA held a public meeting at the Tremley Point Recreation Building, in Linden, NJ to inform local officials and interested residents about the Superfund process, to present the preferred remedial alternatives for the Site, solicit oral comment, and respond to any questions.

II. COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, CONCERNS, AND RESPONSES

PART 1: Verbal Comments

This section summarizes comments received from the public during the public comment period along with EPA's responses.

A. SUMMARY OF QUESTIONS AND EPA's RESPONSES FROM THE PUBLIC MEETING CONCERNING THE LCP CHEMICALS INC. SUPERFUND SITE

A public meeting was held August 28, 2013, at 7:00 p.m. in the Tremley Point Recreation Building, in Linden, New Jersey. In addition to a brief presentation of the investigation findings, EPA presented the Proposed Plan and preferred alternative for the Site, received comments from meeting participants, and responded to questions regarding the remedial alternatives under consideration. Attachment C includes the entire transcript of the public meeting.

A summary of comments raised by the public following EPA's presentation is presented below:

Comment #1: *One commenter asked what PTW stood for.*

EPA Response: Principal threat waste, which is the area on Site with visible mercury in soil.

Comment #2: *One commenter asked whether the local sewer authority can handle the overburden groundwater discharge.*

EPA Response: Since it will not be a lot of water, EPA expects that the sewer authority can easily handle the discharge. Also, if they say they cannot accept the water, there are other options such, as treating it at the adjacent GAF site.

Comment #3: *One commenter asked where the mercury, once removed from the water, would be sent.*

EPA Response: The mercury in the groundwater is at a low concentration, so there would not be much mercury removed from the water. Whatever mercury is removed will be disposed of with the sludge by whatever method the selected facility (e.g., sewer authority) uses to dispose of waste.

Comment #4: *Once commenter asked if the plan is to simply bury the contaminated soil.*

EPA Response: No. Some soil (the PTW) will be treated and contained on Site. Other soil, with high levels of mercury but not considered PTW, will also be contained.

Comment #5: *One commenter pointed out that in its presentation EPA referred to a risk number and said it was over a hundred which is high, and should be less than one. What is it a hundred of?*

EPA Response: The number is based on a human health risk calculation for non carcinogens called a "hazard index." One is an acceptable number, anything above one is unacceptable. The hazard index at the site is 190. This is for the quantifiable soil concentrations, not the PTW which is hard to quantify. However, EPA believes that the HI for PTW would be substantially higher than 190. In brief, if someone were working on the Site they would be exposed to an unacceptable level of risk.

Comment #6: *One commenter asked what a geosynthetic membrane is and whether it is impermeable.*

EPA Response: A geosynthetic membrane is essentially a thick piece of plastic. It is commonly used at hazardous waste sites and landfills. In general, the cap will probably consist of a base aggregate, the membrane, some stone, soil and grass or perhaps asphalt. The geosynthetic membrane is basically impermeable and is in compliance with New Jersey regulations.

Comment #7: *Several commenters asked if the remedy, combined with the proposed impermeable cap on a nearby property would increase floodwater problems in the area.*

EPA Response: The EPA staff at the public meeting were not aware of the other cap the commenters were discussing. However, caps are impermeable and issues like rainwater drainage need to be addressed during the design phase. The rainwater running through the stone on top of the cap will not be contaminated, so run-off options could include discharge to the Arthur Kill, for example. The final design would ensure that run-off does not cause additional flooding problems in the area.

Comment #8: *One commenter asked what happens if the responsible parties decide they do not want to pay for the selected remedy and instead they decide to select the less expensive option.*

EPA Response: The responsible parties do not select the remedy. EPA makes that choice and we ask the parties if they want to implement EPA's selected remedy. The parties typically respond positively, because they believe they can do it more effectively and cheaper than EPA. If they refuse, EPA has various enforcement options it can consider.

Comment #9: *One commenter asked about the barrier wall's location, what it's going to be made of and how high will it be.*

EPA Response: EPA can tell where the barrier wall will be, but EPA has yet determined what it will be made of. The wall be installed around the Site, and it will be tied to the glacial till layer. The decision on what it will be made of will be part of the remedial design process, and subject to EPA approval. Typically, barrier walls are made from steel sheeting or bentonite however EPA can accept other options that will hold contaminants on Site. The wall will be below the ground, so it will not be visible from the surface. That will make it easier for the Site to be reused in the future.

Comment #10: *One commenter asked if the sulfur/mercury treatment process has been done elsewhere.*

EPA Response: The process has been recently been tested at other sites, like the Mercury Refining Site in upstate New York. A pilot study is being performed at that site, as we will be performing one at this Site. EPA researchers have confirmed that, chemically, the process should work. The main issue at the

Site is the type of soil we will need to treat. The soil is mainly fill and rubble, where effective mixing will be difficult. That is an engineering issue that will be addressed during the pilot study.

Comment #11: *One commenter asked to see the NRRB comments and the responses.*

EPA Response: The NRRB stands for the National Remedy Review Board. The NRRB reviews proposed Superfund cleanup decisions that meet cost-based review criteria to assure they are consistent with Superfund law, regulations, and guidance. After each review, the board prepares a memo with their findings and recommendations to the region.

The NRRB memo and Region 2's responses can be found at the following:
http://www.epa.gov/superfund/programs/nrrb/pdfs/LCP_Memo.pdf
http://www.epa.gov/region02/superfund/npl/lcpchemicals/pdf/lcp_nrrb_region_2_response_memo.PDF

Comment #12: *One commenter wanted to know if the risk assessment was done prior to Superstorm Sandy, and several commenters wanted to know if the Tremley Point area has been tested after the storm to see if contamination in the Arthur Kill or South Branch Creek affected the area. The commenter wondered whether the residents in the area should be concerned.*

EPA Response: All the investigatory work was done prior to the Storm. EPA is not aware of anyone who has tested the area for effects from the Storm. EPA believes it is unlikely that contamination was spread from the Site, even due to Superstorm Sandy's surge. The reason is that the mercury has stayed in place for over 30 years, including during other storm events, such as Hurricane Gloria and the 1992 Nor'easter. EPA will consider sampling a few adjacent properties to determine if Site contaminants may have migrated.

Comment #13: *One commenter wondered if there was a reason to clean up the Site if it doesn't affect the community.*

EPA Response: Under the Superfund land, EPA has the authority to cleanup sites that pose a current or potential future risk to human health and the environment. There are several reasons to address Site contamination such as to: allow future reuse of the Site for industrial purposes; prevent additional mercury from entering the Arthur Kill; and prevent additional mercury from entering the atmosphere.

Comment #14: *One commenter asked if the people who caused this will be profiting from the cleanup by having their property reused and are the vapors from the mercury putting people are risk.*

EPA Response: The owner has abandoned the Site. The owner is the Hanlin Group. EPA expects someone will take over the Site and redevelop it. EPA has identified an entity that has responsibility for the Site, and they are paying for it. However, they do not own the property.

Data collected on Site, even during hot days when vaporization is highest, do not show an unacceptable risk to the community from atmospheric mercury migrating from the Site.

Comment #15: *One commenter asked the name of the entity paying for the cleanup and whether they own the Site.*

EPA response: Originally it would been LCP, however their liability was passed to ISP and now it is with Ashland Chemical. To date, ISP and Ashland have paid for the remedial work. While Ashland is responsible for the Site cleanup, it does not own the property.

Comment #16: *Several commenters asked how Ashland became responsible.*

EPA Response: Typically what happens is one company buys another company or a piece of another company. As part of that purchase, they have to take over certain liabilities, such as cleaning up a Superfund site.

Comment: *One commenter asked if EPA considered open space or recreation areas for the Site.*

EPA Response: No. The Site is located in an industrial area, surrounded by sites being used or planned to be used for industrial purposes. The Site has limited access. EPA recognizes the remedy will impact a limited area of wetlands near the South Branch Creek. To address this impact, wetland remediation and mitigation will be implemented.

Comment 18: *One commenter asked if the Army Corps or EPA will be remediating the wetlands.*

EPA Response: EPA is not sure at this point who would be doing it, however EPA expects that the responsible party will be paying for the wetlands remediation.

Comment #19: *One commenter asked who is policing the Site, and why the pollution wasn't stopped earlier.*

EPA Response: EPA is the lead regulatory agency in charge of the Site. There are a number of reasons why this Site has taken so long to reach this point. One key issue is the technical complexity of analyzing solutions to address the Site's principal threat waste.

Comment #20: *One commenter asked who has been investigating the adjacent sites, such as the El du Pont property.*

EPA Response: EPA doesn't know who has been investigating those sites. Since they are apparently covered or capped, they are further ahead in the remedial process than LCP.

Comment #21: *One commenter asked how the stabilization will be implemented, and how deep will the remediation go, and will vapors have to be collected.*

EPA Response: The remedy has not been designed yet, but EPA expects the stabilization will incorporate mixing the sulfur and PTW in place. A key question is the amount of sulfur needed per volume of soil. EPA expects to go full depth, as much as 17 feet. However, there is a lot that remains unknown about the depth and the types of debris or pilings that will be encounter. If going to a depth of 17 feet cannot be accomplished, EPA has proposed a contingency to go down to 6 feet. That contingency depth will still address the majority of the visible mercury. A decision on the need for vapor collection will be made during the design.

Comment #22: *One commenter asked about the legal instrument EPA will use to compel the PRPs to perform the remedy especially when the PRP has changed.*

EPA Response: When ISP sold a portion of their company to Ashland, the responsibility to perform the Site investigation and feasibility study – per an Administrative Order on Consent - went with it. After the ROD is signed, EPA will offer Ashland the opportunity to perform the remedy through a Consent Decree. EPA expects they will perform the remedy.

Comment #23: *One commenter asked if the sulfur could convert some chemical in the soils into a chemical that's hazardous.*

EPA Response: EPA does not expect it will happen and EPA will be monitoring the air during the work phases.

Comment #24: *One commenter asked what happens with the mercury in the building, and if there are other chemicals in the building.*

EPA Response: A key to the design and remedial action will be dust and vapor control during demolition as the buildings' porous material is likely heavily contaminated with mercury. The dust/vapor control processes used for buildings demolition are pretty well known and EPA does not expect to find high levels of contaminants aside from mercury.

Comment #25: *One commenter mentioned that he did a demolition project at a site that had used mercury and found the bricks were heavily contaminated with mercury, and vaporization became an issue during hot weather. They stopped work and decided to wait until winter. The commenter also asked where the bricks from the LCP Site would be sent. The commenter was concerned that crushing the brick would release more mercury vapor. Further, the commenter asked if EPA would consider doing the mixing under a bubble or some type of spring form.*

EPA Response: EPA noted the same sort of experience - high levels of mercury in porous brick - during the demolition of a building at a Superfund site in Hoboken, New Jersey. The bricks from LCP's buildings will be treated with sulfur and placed under the cap. EPA recognizes that crushing the brick could release vapor to an unacceptable level, therefore the design will have to account for and prevent that possibility. EPA will consider doing the work inside a temporary structure.

Comment #26: *One commenter asked how long the project will take and if it will be done in all seasons.*

EPA Response: EPA expects the work to go on all year. EPA believes it will take a year and a half for the pilot study, a year for the design, and another year and a half to two years for the construction work to be completed.

Comment #27: *One commenter asked if there was an estimate of the amount of mercury that may have vaporized from the Site over the last thirty years.*

EPA Response: EPA has never made that estimate, but recognizes that vaporization has and continues to occur, which is why EPA would like to implement the remedy as soon as possible.

Comment #28: *One commenter asked how EPA predicted the land use for the risk assessments when there is no land owner.*

EPA Response: For the risk assessments, EPA assumed the land use would be commercial/industrial, which is what the land is currently zoned for. If the Site were to be used for residential purposes, the risk assessment would have found a greater potential risk. Either way, EPA would have decided that the risk posed by the Site needed to be addressed.

Comment #29: *One commenter asked what EPA would have done if this were in a residential area.*

EPA Response: EPA only considered current and potential future uses for the Site, which does not include residences.

Comment #30: *One commenter asked what would happen if during the remedial phase a storm floods the site.*

EPA Response: Based on the nature of mercury, it is unlikely to spread much even during a storm such as Superstorm Sandy. However there will be some contingencies built into the design of the remediation, just in case a hurricane or nor'easter hits while work is underway.

Comment #31: *One commenter asked if, in the future, all water entering the LCP site during rain events, will discharge to the Arthur Kill.*

EPA Response: EPA cannot say that the all the stormwater on Site will eventually discharge to the Arthur Kill. However, the requirements of a New Jersey storm water permit would have to be met by the final design.

Comment #32: *One commenter asked if the South Branch Creek and Northern Offsite Ditch are going to use different cleanup standards due to their proximity to the Arthur Kill. The commenter also expressed concerns that EPA's proposed remedy was inconsistent with EPA's approach to other areas impacting Raritan Bay, where cleanups are performed to prevent further contamination of the Bay. The commenter indicated he was not just concerned about mercury, but also benzene, etc.*

EPA Response: Unlike soil, there are no promulgated standards in New Jersey for sediments. In some cases National Oceanic and Atmospheric Administration screening levels are used for sediments. Those levels are very low. If EPA were to clean up to that level, the sediments would be re-contaminated by the Arthur Kill over a few tide cycles. Therefore, EPA decided to clean the Creek and Ditch to levels consistent with those found in the Arthur Kill. Cleanup of the Creek and Ditch will achieve contaminant levels far below levels currently found in the sediments. This cleanup will interrupt sources of mercury from the Site into the environment. Benzene and the other contaminations in the overburden groundwater will be contained, pumped and treated.

Comment #33: *One commenter asked about a 2002 state bill that required a mercury alert notice throughout the areas, and whether there has been compliance. The commenter indicated that this bill would require signs to be posted in every medical office.*

EPA Response: EPA does not regulate or enforce that state law. EPA's focus is the Site remediation.

Comment #34: *One commenter asked how EPA plans on containing contamination during the remediation that is on worker's feet or on trucks running through the neighborhood.*

EPA Response: That is a concern on nearly every site cleanup, and is addressed through a site-specific health and safety plan. Rules will be in place for people and equipment entering "exclusion zones" and being cleaned of waste before exiting those zones.

Comment #35: *One commenter asked about the mercury ban.*

EPA Response: The mercury ban refers to a restriction in the United States, which prevents movement of elemental mercury across our international borders.

Comment #36: *One commenter asked whether there are birds at the Site eating the contaminated crabs and fish.*

EPA Response: Yes, however, unlike crabs and fish, bird tissue was not sampled. Nevertheless, modeling performed during the risk assessment demonstrated that there is an unacceptable risk to birds, insects and small mammals from the Site contamination.

Comment #37: *One commenter asked about endangered species in the wetlands.*

EPA Response: There is no evidence of any federally endangered species on the Site. However, as part of the remedy, EPA will interrupt exposure to Site contaminants for all species of birds. EPA will be filling in some wetlands on Site but rebuilding them in an area more inviting to wildlife.

Comment #38: *Several commenters asked if there was a government agency that could sample the homes.*

EPA Response: EPA will attempt to find someone who can answer this request, and if found we will put that information up on EPA's website for the Site. EPA notes the concern residents have is not just from the Site, but rather from the water from the Arthur Kill and other local water bodies that may have impacted their homes.

Comment #39: *One commenter asked if the Site might be passed to the NJDEP.*

EPA Response: EPA does not expect that to happen, but if it does EPA and NJDEP will announce it publically.

Comment #40: *One commenter asked whether the 32,000 cubic yard estimate of buildings was their actual space or the amount of total expected debris.*

EPA Response: That is he estimate for the total amount of building material debris expected once the buildings are demolished.

Comment #41: *One commenter asked since the ban went into effect, is EPA doing any kind of work for mercury extraction as a remediation method. Meaning, if something were to come up in 2 or 3 years, could EPA use that instead of the proposed stabilization approach?*

EPA Response: EPA did a thorough search and could not find a practical technology for treatment, aside from the one proposed. However, if something were developed over the next few years, EPA will look at it. EPA can change a remedy if appropriate.

Comment #42: *One commenter asked for a realistic timeframe to begin the remedial action, and whether EPA believes the ROD will be issued in 2013.*

EPA Response: Optimistically, remediation is likely to start approximately four years after the ROD is issued. At the meeting, EPA state an expectation that the ROD would be issued in 2013.

Comment #43: *One commenter asked if EPA considered doing the South Branch Creek remedy while performing the treatability studies.*

EPA Response: Remediating the South Branch Creek as an interim remedy was an idea put forth by the responsible parties during the remedial investigation. After discussions with NOAA and the State, EPA decided to wait until the ROD is issued. However, EPA will consider performing the sediment cleanup while the pilot studies for soils are underway.

Comment #44: *One commenter asked if study results would be accessible during the RD and RA phases.*

EPA Response: The studies will be made available on-line and EPA will have other public meetings or availability sessions to explain results or findings.

Comment #45: *One commenter asked if hard copies could be sent to the library as she had difficulty accessing the information off the discs.*

EPA Response: Libraries generally prefer discs, as the RI/FS documents take up an enormous amount of shelf space. EPA will meet with the Linden librarians to make sure the electronic documents are accessible.

Comment #46: *One commenter asked whether mercury levels will increase by the time the remedy starts.*

EPA Response: No, the Site production is shut down, so there is currently no source adding mercury to the soils or sediments.

Comment #47: *One commenter asked whether the PRPs are responsible for anyone impacted from consuming contaminated fish caught in the Arthur Kill.*

EPA Response: The LCP Site is one of several other sources of mercury to the Arthur Kill, and a limited amount of mercury is still migrating to the Arthur Kill from LCP. Therefore, EPA would prefer to have the remediation completed as soon as possible.

PART 2: Written Comments

Comments from Edison Wetlands Associations et al.:
Comment #1: *Consistency in Superfund Cleanups: LCP Chemicals has been a responsible party at other Superfund sites, and therefore, the selected remedy must be consistent with cleanup remedies. LCP Chemicals had contaminated a similar site in New York adjacent to the Onondaga Lake. The former Linden Chemical and Plastics (LCP) site was a major source of mercury contamination in Geddes Brook,*

Nine Mile Creek and Onondaga Lake. As part of the site remediation, more than eight tons of mercury was removed from the plant property. Additional upland sites, for which there are other responsible parties, are also in various stages of remediation. As of 2010, Records of Decision (ROD) have been signed for cleanup plans at eight Superfund subsites. http://www.dec.ny.gov/chemical/8668.html We strongly recommend that USEPA select Alternative 5a/b (Removal and off---site disposal of the Principal Threat Waste and contaminated building debris). This remedy selection is consistent with other remedy selections like the Geddes brook, Nine Mile Creek and Onondaga Lake cleanup. The current proposed plan contains significant deficiencies in the protectiveness to human health and the environment.

The choosing of Alternative 5a/5b would provide the best of the possible remedies proposed as well as provide consistency with the cleanup of LCP's Superfund Site mercury contamination in Geddes Brook, Nine Mile Creek and Onondaga Lake. As part of the site remediation, more than 8 tons of mercury was removed from the plant property. This important regional resource in the Arthur Kill is no less important than the cleanup of Geddes Brook, Nine Mile Creek and Onondaga Lake.

Alternative 5a/b is the only alternative that offers long---term protection from these hazardous wastes that directly threaten human health and the environment and also provide permanent cleanup of the Principal Threat Waste (PTW) at LCP Chemicals Superfund Site. Cleanup of the PTW is one of the decision making tools used by the USEPA to decide on the Superfund selection remedy process and its ARARs. Only Alternative 5a/b addresses the PTW and provides a permanent cleanup of PTW, mercury, which is a direct threat human health and the environment. Along with the selection of Alternative 5a/b we also want additional mercury cleanup in the sediments that bio-accumulate in wildlife and biota.

EPA Response: The Site to which the commenter refers is the LCP Bridge Street site, located near Syracuse, NY. The remedy at the LCP Bridge Street site called for treatment of the PTW soils through soil washing. As explained in the feasibility study and this ROD, due to the nature of the Site's fill, soil washing would not work at the LCP Linden Site. Also, it should be noted that the eight tons of mercury recovered from soil at Bridge Street. went into the commercial market. As of January 2013, federal agencies are prohibited from selling or distributing elemental mercury under their control or jurisdiction. So even if soil washing were technically feasible at the LCP Linden Site, it would be administratively impracticable to select the treatment approach used at the Bridge Street site.

The LCP Bridge Street site treated a portion of its contaminated soil, specifically the PTW, through soil washing. LCP Linden will treat a portion of its contaminated soils, the PTW, through in-situ stabilization. At both sites, treated soils as well as untreated contaminated soils/sediments are contained on site. Like the LCP Linden Site's selected remedy, the LCP Bridge Street site's containment uses a barrier wall and an impermeable cap. Therefore, fundamentally the LCP Bridge Street site remedy is similar to the remedy selected for LCP Linden, the key difference being the Bridge Street site remedy treated a portion of the soils ex-situ through soil washing, while LCP Linden Site remedy will treat a portion of the soils in-situ through stabilization.

The Geddes Brook and Nine Mile Creek are small water bodies containing mercury contaminated sediments. Those sediments are being excavated and placed under the LCP Bridge Street cap. This is the same approach selected for the Northern Off-Site Ditch and bottom third of the South Branch Creek of the LCP Linden Site. Again, the remedies to which the commenter referred are similar to the remedy selected at LCP Linden.

Alternative 5b is not similar to the remedy at the LCP Bridge Street ste. Rather than treatment,

Alternative 5b called for excavation and off-site disposal of the PTW soils. Alternative 5b was not selected for a number of reasons, such as cost and increased short-term impacts to the community. More importantly, EPA also found that there is a lack of disposal options for soils with visible mercury. Land disposal of soil containing elemental mercury concentrations of over 260 ppm (i.e., all the PTW) is prohibited by the RCRA Land Disposal Restrictions (LDR). Under the LDR, the soils would have to be treated, using high-temperature mercury recovery, before disposal. Once recovered from the waste, elemental mercury has typically been returned to the commercial market as product.

While there are facilities in the United States that can accept and treat soil containing greater than 260 ppm of mercury, none of them could handle the amount of PTW soil requiring treatment at the LCP Site. EPA located only one North American facility (Stablex in Canada) that may be able to handle the quantity of PTW at LCP. However, the facility was not able to say for certain that they could handle the mass.

Comment #2: *NOAA Policy: According to a March 2004 National Oceanic and Atmospheric Administration (NOAA) report, under "Threats and Contaminants Preliminary sampling of soil, surface water, and sediment", it revealed elevated levels of mercury, and other metals. Site contaminants are potentially impacting the Arthur Kill, which is used for recreational boating and fishing. The peregrine falcon, northern harrier, great blue heron, and little blue heron, all state---listed species, are reported to either breed or hunt in the salt marshes near the site. Prall's Island, located approximately 1,000 feet east of the mouth of the South Branch Creek, is a breeding area and rookery for some of these birds. In 1990, the New Jersey Conservation Foundation and the NJ Audubon Society conducted an inventory of the river in which they identified around 200 bird species including nearly 90 species that breed in this area.*

Alternative 4b violates National Estuary Program that was established by Congress in the 1987 amendments to the Clean Water Act. Its purpose is to promote the development and implementation of comprehensive management plans for estuaries of national significance that are threatened by pollution. At the request of the governors of New York and New Jersey, USEPA accepted the New York---New Jersey Harbor & Estuary into the National Estuary Program in 1988. Since that time, it has been an effective partnership for advancing regional efforts to achieve the goals of the Clean Water Act for fishable and swimmable waters throughout the nation.

USEPA's selection of Alternative 4b also violates NOAA's policies on cleaning up and restoring sites in New Jersey. The Office of Response and Restoration's Coastal Protection and Restoration Division (OR&R/CPRD) partners with other agencies and responsible parties to ensure that waste site cleanups not only reduce risk, but also restore natural resources and improve the quality of the environment. NOAA Coastal Resource Coordinators (CRCs) get involved early in site cleanups to:

- *ensure that ecological assessments and the entire cleanup process evaluate and mitigate any risk to sensitive species and habitats;*
- *incorporate environmental restoration into cleanup actions;*

The New Jersey Resource Trustees, which includes the USEPA as a member, states the following in its mission:

> Protecting and Restoring Coastal and Marine Resources: NOAA's Coastal Protection and Restoration Division (CPRD) protects and restores natural resources in marine and coastal environments that are affected by hazardous waste sites. NOAA Coastal Resource Coordinators

(CRCs) work with the U.S. Environmental Protection Agency (EPA), the State of New Jersey, and other trustee agencies to identify risks to natural resources, recommend site cleanups that protect habitat and wildlife, and design projects to restore injured resources and habitats.

USEPA must choose Alternative 5 a/b or they will violate their mandate, through the Congressional National Estuary Program and the Federal Clean Water Act, to protect coastal resources.

EPA Response: A NOAA Regional Resource Coordinator (formally known as a Coastal Resource Coordinator) is represented on EPA Region 2's Biological Technical Assistance Group (BTAG), which reviewed and commented on the Site's investigations, including ecological risk assessments, through a multi-year iterative process. NOAA has not indicated that the selected remedy's containment of contaminated soils and groundwater would fail to comply with any NOAA policies.

The Harbor Estuary Program's (HEP) Comprehensive Conservation and Management Plan and the subsequent 2011-2015 HEP Action Plan seek to reduce toxic contamination to the estuary through a variety of actions, including Superfund site cleanups. Mercury is one of the toxics of concern for HEP. Since the selected remedy will protect human health and the environment in part by reducing mercury contamination to the estuary, it is consistent with the National Estuary Program in general and the HEP specifically.

Comment #3: *Mercury Contamination in the Arthur Kill Estuary: The contamination that has occurred on the LCP Chemicals Superfund Site is of regional importance to New Jersey's waterways and its ecologically sensitive receptors found in the Arthur Kill Estuary and on the receiving end of the Raritan Bay. Due to the proximity of this site to the Arthur Kill and a residential neighborhood, it is of critical importance to properly remediate this site and remove all contamination found on site. The Arthur Kill is currently one of the most heavily contaminated bodies of water found in New Jersey and will continue to be unless action to reduce any further contamination is taken.*

This violation of protecting America's waters has led to the poisoning of biota that is found in the Arthur Kill and has allowed contaminants such as mercury, arsenic, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), volatile organic chemicals (VOCs), chlorobenzene, benzene, and other contaminants to enter the food chain. Fully cleaning up the PTW from LCP Chemicals Superfund site would demonstrate USEPA's mandate to protect human health and the environment is still a core principle of the Superfund Program.

Extensive research has been done on mercury and results were found that in fetuses, infants, and children, the primary health effect of methylmercury is impaired neurological development. Methylmercury exposure in the womb, which can result from a mother's consumption of fish and shellfish that contain methylmercury, can adversely affect a baby's growing brain and nervous system. Impacts on cognitive thinking, memory, attention, language, and fine motor and visual spatial skills have been seen in children exposed to methylmercury in the womb.

The LCP Chemicals Superfund site and its PTW have contributed to the contamination of the Arthur Kill Estuary. This ongoing contamination has become so problematic that the New Jersey Department of Environmental Protection (NJDEP) & the Department of Fish and Wildlife have restricted the consumption of fish and crabs due to the overwhelming contamination of the biota found in the water. This is a clear violation of the Clean Water Act of 1972 and a violation of the Public Trust Doctrine which were passed to ensure the protection of America's waters and access to the water by the public. While in

theory this restriction would provide some protection of public health, the majority of those directly impacted don't speak English and those whose cultural heritage is to fish and crab continue to use the Arthur Kill Estuary as a food source for their families.

EPA Response: EPA agrees and has stated that the contamination at the Site currently puts the local ecology at risk. EPA recognizes that the Site is one of the numerous sites that have impacted the Arthur Kill. EPA also agrees that there would be a risk to human health if people were to work or trespass on the unremedied Site. EPA does not agree that the only way the Site's risks can be interrupted is through removal of the contamination to some other location.

Available data indicate that only a limited mass of mercury is emanating from the Site, mainly through vaporization and possibly sediment transport. The prime driver of risk is direct contact with the soils or sediments on the LCP property. The selected remedy would not only prevent vaporization and sediment transport through treatment and containment, it would also be an excellent and proven way to interrupt direct contact exposure. It should be noted that all the potential alternatives for the Site, including the one with a removal component (Alternative 5a/b), has containment as a principal element.

Comment #4: *Flooding and Severe Weather Storms: USEPA's Proposed Plan will continue to threaten residents who live in this area and who experienced flooding from severe storms and hurricanes just like Hurricanes Irene and Sandy. The contamination from Superfund Sites, like the LCP Chemicals site, have entered the Arthur Kill and then brought back inland after flood waters from the already contaminated Arthur Kill submerged most of this area. With the recent severe weather events in New Jersey, it is important to select remedies for contaminated sites that will not have the potential of creating complications or breaking in the future. Remedy selection 5a/b is the only remedy that provides any protection against future natural disasters.*

These waters have posed a threat to the residents who live in this area and who experience flooding from storms and hurricanes just like Hurricanes Irene and Sandy. The contamination that has come off of sites, such as the LCP Chemicals site, has entered the Arthur Kill and was then brought back inland after flood waters from the already contaminated Arthur Kill submerged most of this area.

EPA Response: EPA recognizes that the Site's remedy will have to be designed and constructed with the understanding that severe flooding will occur on Site sometime in the future. Containment remedies, such as the one at the Scientific Chemical Processing Superfund Site in Carlstadt, New Jersey, have proved to work successfully in flood prone areas, even during the recent storm.

Comment #5: *Incomplete Proposed Alternatives: The USEPA presents several pros to choosing alternative 5a/b yet does not present alternative 5a or 5b as a proposed alternative. In the USEPA's Proposed Plan and evaluation of alternatives, the agency shows that 5a/b meets the criteria for selecting a remedy. Alternative 5a/b meets the following criterion:*

1. *Overall protective of the environment and human health*
2. *Compliance with applicable or relevant appropriate requirements (ARARs)*
3. *Long---term effectiveness and permanence*
4. *Reduction of Toxicity Mobility or Volume Through Treatment*
5. *Short term effectiveness*
6. *Implementability*

7. *Cost*
8. *State/Support Agency Acceptance*
9. *Community Acceptance*

The USEPA states that, "In addition, Alternative 5a and 5b would require between 1,000 and 2,000 trucks to first remove the PTW soil and debris, then to bring in substrate to backfill the excavated areas. Thus Alternative 5a and 5b is the only option that would significantly increase the truck traffic through the local community." However, USEPA has overlooked the possibility of using rail lines to take the contaminated material off site. This area has a plethora of freight rail lines and has the Chemical Coast Sector adjacent to the area. The use of rail lines will highly reduce truck traffic and at the same time reduce the cost of the remediation. This mode of transport has been utilized by USEPA at other Superfund sites such as Horseshoe Road Superfund Site, Atlantic Resources Superfund Site in Sayreville NJ, and Chemical Insecticide Superfund Site in Edison, New Jersey to remove hazardous materials, reduce truck traffic, and drive the remediation cost down as well.

Even if the USEPA must use trucks, this area is well suited to handle the traffic, and the tradeoff of removing the PTW is well worth the use of trucks. This amount of trucks is relatively small in comparison to the removal of this high toxic waste. The area has many major truck routes that already have significant truck traffic.

The volume of trucks is relatively small in comparison to other Superfund site remediations that have been selected in Region 2 where full removal of PTW has been selected. The Ringwood Mines Superfund site in Ringwood, New Jersey is an example where USEPA selected removal of the O'Connor Disposal Area (12,519 truck trips or about 6,260 trucks) for the remedy selection at that site. The remedy selected for the Ringwood Mines Superfund site would generate significantly more trucks on smaller residential roads than Remedy 5 a/b at the LCP Superfund site. USEPA chose the full clean up at that site because of the same exact issues that we are stating for the selection of the remedy at the LCP Chemicals Superfund site.

EPA Response: The criteria "short term-effectiveness" requires considerations of short-term community impacts. Sending several thousand additional trucks through areas of Linden would impact the community through air and noise pollution and the increased risk of accidents. However, that was only one of, and not a key, reason that Alternative 4b was considered preferable to Alternative 5b. Alternative 5b had other short-term community impacts such as increased mercury vaporization. Alternative 5b was also significantly more expensive (criteria 7) and had logistical issues related to implementability (criteria 6) that appeared to be intractable. So even if trains could be used or trucks could somehow bypass the community, it would not have altered EPA's decision.

Comment #6: *Environmental Justice: USEPA states that environmental justice considerations will impact all decision---making the agency does. If this is true, and the USEPA uses environmental justice as a benchmark for their decision---making process, then they must select alternative 5a/b for the remedy at this site. This selected remedy would provide at least a measure of protection for this environmental justice community as it removes the PTW and does not leave it in place for future generations of people and wildlife to suffer its impact. The fact that the public still uses this area for its food source and that these people that live in this community are already suffering from disproportionate amounts of contamination in their air, water, and food makes this environmental justice issue of the highest magnitude. The Tremley Point section of Linden is already a state-recognized Environmental Justice area, one of five cities to get this special assignment.*

As we see with the recent federal government shutdown, assurances that USEPA will be here in perpetuity to maintain a cap that would cover this very toxic waste is not something that can be assured. The federal government shutdown and the funding issues that the United States faces clearly demonstrates that we need to take care of this threatening toxic waste now while we have USEPA to address it. USEPA cannot provide any assurances that they will be funded nor have the mandate in the future to continue to maintain the cap on this operable unit adjacent to the Arthur Kill.
We strongly suggest that USEPA reconsider Alternative 5a/b for a thorough cleanup for the LCP Chemicals Superfund Chemicals Site. Alternative 5a/b is the only alternative that removes the majority of the risk from this site and is protective of human health and the environment. It is also the only alternative that is consistent with other LCP chemical site cleanups throughout the country. USEPA has done the community a disservice if they do not at least remove the main threats of this site and seek to address sediments and other contaminants when funding allows.

We support the vision of the Edison Wetlands Association (EWA), its goal to reduce environmental contamination, reduce the effect that this site on both the Arthur Kill and Raritan Bay, the protection and remediation of public resources, the increase of access to the public, and the long term protection of human health. We would like the full restoration of this area in order to provide a clean and safe habitat for all biota and a fair cleanup for the people marginalized by companies and their pollution. In an area that already experiences flooding and is in close proximity to the Arthur Kill, it is important to provide an avenue which will reduce flooding and provide a vital public service.

We strongly suggest that USEPA select Alternative 5a/b because it is the only alternative that removes the majority of the risk from this site and is protective of human health and the environment. The selection of this remedy ensures the future protection for generations to come and provides a complete and reliable remediation alternative to utilize and implement. Our collective organizations, including our many thousands of members fully support the selection of Alternative 5a/b to remove the mercury and other waste from the LCP Chemicals Superfund site.

EPA Response: EPA understands that in 2005 the Tremley Point Alliance submitted an Environmental Justice Petition for Linden to New Jersey's Environmental Justice Task Force (EJTF). The Petition was conditionally approved contingent on the Alliance submitting an Action Plan. It is unclear whether that action plan was submitted. Nevertheless, the petition highlighted the community's main issues:

- *Performance of a health survey and air quality monitoring in Linden due to the high incidence of asthma and other respiratory illnesses indentified by children and senior citizens.*
- *Protection of wildlife that exists in pockets of habitat and foraging areas in the Seventh Ward by reclassifying the wetland in the area of Linden's Piles Creek and banks of the Rahway River as "exceptional wetlands."*
- *Prior to approval of any projects in the Seventh Ward, i.e., Tremley Point, that have potential to impact human health and/or the environment, an Environmental Impact Study/Statement and meaningful public participation must be required.*

Of all the action alternatives, the selected remedy will have the fewest impacts to local air quality. The selected remedy will not impact wetlands around Piles Creek or the Rahway River. The CERCLA (i.e., Superfund) selection process has meaningful public participation and is considered functionally equivalent to the Environmental Impact Statement process. Therefore, EPA believes the selected

remedy addresses the main concerns of the Environmental Justice Petition.

All of the alternatives considered included a cap requiring long-term operation and maintenance (O&M). The long term O&M of the cap will be performed either by the potentially responsible party (PRP), the future site tenant or the site owner as described by an EPA approved O&M plan and as legally mandated by an institutional control, such as a deed notice. Even if EPA were unfunded in the future, the cap will still be maintained.

Comments from Cherokee LCP Land, LLC
The comment letter (attached) from Cherokee contained summaries of comments provided in more depth by their environmental consultant Impact Environmental. EPA's responses to those can be found under the Comments from Impact Environmental section (directly following this section).

Comments from Impact Environmental, a consultant employed by Cherokee LCP Land, LLC:
Comment #7: *Change Site Name: The site name under Superfund and on the CERCLIS is the "LCP Chemicals, Inc., Superfund Site, Linden, NJ". Comment 1 is a recommendation to change the site name to the "**Ashland** LCP Site, Linden, NJ". This change seems appropriate for framing corporate responsibilities and for general accuracy. There have been many instances in which the name of a Superfund site was changed to reflect changing conditions as a result of public feedback.*

EPA Response: Changing the name of the Site would lead to confusion and is of little value considering the Site has been on the National Priorities List for fifteen years. EPA declines this suggestion.

Comment #8: *At the public hearing and within all of the investigative documents it was established that free, "elemental", mercury was present in the surface soils of the Ashland site. It was indicated that this mercury could be readily observed by visual survey methods. Maps contained within the documents are clear on this matter. Inasmuch as Super-Storm Sandy impacted the site after the mercury in the soil was mapped, and given that no follow-up inspection has been performed, I believe that it is prudent for Ashland to perform this survey again to gauge the impacts of the storm on this surface that is/was laden with elemental mercury. Moreover, as verbalized more than a dozen times at the public hearing, isn't there a responsibility for the PRP to ascertain if mercury concentrations were transported to surrounding residential areas due to the storm-related flooding? At the hearing, an Agency staff member, indicated that similar testing was done by the Agency at and around the areas of the Gowanus Canal in New York, where the staff member lived. My research shows that mercury is much more toxic than any contaminants currently known to exist in the Gowanus Canal.*

Is there a reason why the logic of community-impact testing pertains only to affluent New York City communities and not to the community of Linden - is there an environmental justice issue associated with this site? In recognition of this, I demand the following:

a) *Voluntary testing of Linden residents yard soils by a New Jersey Certified (ELAP) Environmental Testing Laboratory for total mercury. I have performed the necessary re-search and have identified a laboratory that would be willing to test samples, using USEPA test method 6010, at the reduced cost of $35 per sample, inclusive of glassware. While sampling would be performed by the residents, we are prepared to provide a "how-to" website to help ensure a high degree of sampling precision and quality control. The samples could be picked up weekly for a month (on a Friday) at the community recreation center. Screening could also be performed using a hand-held XRF meter that can be rented for several days at a cost that is less than one-thousand dollars.*

b) *The Agency help Impact Environmental coordinate the Edison Wetlands Association and other local community groups interested in the LCP/Ashland site, to provide public notice of the aforementioned volunteer testing program. This can be done in both print and internet media spots.*

c) *The Agency help Impact coordinate local community groups, and offer assistance to-ward obtaining a Technical Assistance Grant (TAG) so that we can interpret and help the community understand technical information about the Ashland site.*

d) *The Agency should demand that a new survey of the Ashland site be performed to understand what, if any, changes occurred to impact the concentration and distribution of elemental mercury as a result of Super-Storm Sandy. As this is somewhat a visual-driven survey, this is a minor expense and inconvenience for the PRP.*

EPA Response: The Gowanus Canal passes through several neighborhoods of variable income levels, including Environmental Justice areas. However, the decision to perform limited sampling of properties adjacent to the Canal was not related to the local demographics.

The Gowanus Canal is 1.8 miles long, 100 feet wide and over 15 feet deep at low tide, with private homes in close proximity to its shoreline. In comparison, LCP's South Branch Creek is an approximately 1000 feet long, six feet wide, one foot deep drainage ditch that lies over a half mile from the nearest home. The flooding of homes/commercial properties along the Gowanus Canal came directly from water in the Gowanus Canal, while the flooding of homes in Linden came from the Arthur Kill and other local waterways, not from the South Branch Creek or Northern Off-Site Ditch.

EPA does not expect that contaminated sediments from the South Branch Creek (or the Northern Off-Site Ditch) could have impacted homes a half mile away in Linden. If Sandy spread LCP contamination off-site, those sediments would be found at one of the adjacent properties. At the public meeting, EPA agreed to sample or oversee sampling of one or more adjacent properties in order to determine if Site related contaminants were spread during the storm. In addition, the LCP Site will be re-surveyed and re-sampled during the remedial design phase.

While EPA has no plans to initiate volunteer sampling at the Site, EPA welcomes and encourages the community to apply for a Technical Assistance Grant. Please contact Wanda Ayala or Natalie Loney to get more information on the EPA's TAG process. Ms Ayala's number is 212 637-3676 and Ms. Loney's number 212 637-3639.

Comment #9: *I believe that both Ashland and ISP have a history of acting as both PRP and cleanup contractor/consultants. My belief stems from the fact that they have staff environmental scientists and chemists, and the name "ISP Environmental Services, Inc". Some current Ashland executives were previously executives at ISP. This appears to represent a conflict of interests, which creates ethical and perception concerns, as the PRP's staff have been integral in guiding investigation and cleanup activities. How can the area residents and Cherokee trust that this process has not been compromised for the purpose of reducing liabilities and on-site remedial costs for ISP to facilitate a sale to Ashland, or by Ashland to mitigate the cleanup and closure costs? In recognition of this, I demand the following:*

a) *Please provide me with information on third-party quality control testing (split samples, sample duplicates, trip blanks, etc.) that the Agency has had performed to insure that design goals were*

executed and reported with the integrity that is paramount to the protection of residents of Linden, Cherokee and the environment.

b) *Please provide information on the number and location of Superfund sites that ISP and Ashland, by extension, are named PRPs. If possible, provide comment on who the contractors of choice were for these projects.*

EPA Response: ISP Environmental Services, Inc., entered into an Administrative Order on Consent with EPA and performed the RI/FS, under EPA oversight, pursuant to and in compliance with that Order. In any of the matters under EPA oversight, if the PRPs have qualified personnel "in house" to perform the studies, that arrangement would be acceptable to EPA. Therefore, the relationship between a PRP and its consultants or contractors is inconsequential.

EPA has not ascertained the number of sites for which Ashland or ISP is a party, nor has EPA contacted the ISP or Ashland requesting names of contractors they use or have used elsewhere.

EPA hired CDM Federal to do field oversight during sampling events performed by ISP's contractors during the Remedial Investigation. CDM collected some split samples during the RI. The split sample results can be found at http://www.epa.gov/region2/superfund/npl/lcpchemicals

Comment #10: *Paramount to the study and the absolute direction of the logic tree used in its remedy selection is that mercury contaminated soil that is hazardous has no off-site legal disposal option. This fact that guides the remedy decision is erroneous. My staff has identified several disposal options for mercury hazardous waste. Many of these options are economical and make excavation of the impacted areas a more economically viable option.*

In recognition of this, I demand the following:

a) *Additional time is necessary to reevaluate this option. Revisions are necessary to the Feasibility Study document, and the logic associated with remedy selection to expand on this excluded information.*

EPA Response: While the commenter did not name the facilities to which he refers, EPA recognizes there are facilities in the United States that can handle high concentration mercury wastes. However there are no existing facilities in the United States that could handle the amount of high mercury waste found at the LCP Site. No additional time is required to reevaluate this option.

Comment #11: *It was identified that the transport of mercury waste could lead to community impacts during transport. If the material was transported in sealed drums this exposure potential could be entirely abated. This procedure has been utilized for decades for the removal of excavated soils in many Superfund Sites. In recognition of this, I demand the following:*

a) *Additional time is necessary to re-evaluate this remedial option. Revisions are necessary to the Feasibility Study document, and the logic associated with remedy selection to expand on this excluded information.*

b) *PRP should be prompted to identify what soils would need to be removed for acute exposure concerns and the removal should be performed immediately as an Interim Remedial Measure. This is particularly necessary as it is clear that the process of identifying and performing*

appropriate remedial measures is going to require additional delay. Failure to act could result in the dispersion of these contaminants from other acts of god or unintended incidents that could lead to dispersion of these toxic contaminants into the surrounding residences.

EPA response: Driving a few thousand trucks through a community has impacts unrelated to the type of freight the trucks are carrying. Those impacts (e.g., traffic, noise, air pollution, etc) are discussed in the feasibility study, specifically under the short-term impacts section. Rather than abating those impacts, the commenter's suggestion would increase truck traffic to allow for the additional volume required to haul waste in approximately 90,000 individual drums.

In addition, if an excavation remedy (Alternative 5 a/b) were selected, it would have other short-term potential risks to the community and workers, such as increased mercury vapor releases caused by excavating and handling the soil on Site. Since filling drums would require more handling of the PTW, it would likely increase, rather than abate, potential short-term vapor risks to workers and the community. No additional time is required to allow consideration of hauling waste soil in drums.

Comment #12: *It was identified that both the USEPA and the PRP contacted Brookhaven National Laboratory (BNL) for remedy selection. I contacted BNL and they have indicated that contact with the BNL staff was not officially engaged to work on the project. Comment provided by BNL indicated that the decision to dismiss Solidification/Stabilization was "flawed". No follow-up was performed by the Agency or the PRP since this "flawed" assessment was rendered by BNL. Moreover, since 2010, nobody performed any follow-up with BNL. BNL has indicated that they have successfully optimized its patented Sulfur Polymer Stabilization/Solidification Process (SPSS) since 2010 (see attached draft white paper prepared by Dr. P. Kalb of BNL). The SPSS process returned excellent results in the Department of Energy Y-12 site Cleanup. The use of this technology for insitu applications needs a serious re-evaluation. In recognition of this, I request the following:*

a) *Additional time is necessary to re-evaluate this remedial option. Revisions are necessary to the Feasibility Study document, and the logic associated with remedy selection to expand on this excluded information.*
b) *BNL needs to be engaged for its true opinion on how this site would be best remedied using its patented techniques. It is my opinion that the Remedial Investigation/Feasibility study is suggesting methods that will infringe upon some of BNL's Patents.*

EPA Response: Researchers at BNL are developing an interesting and promising approach to stabilize and solidify mercury contaminated soils. The process (SBSS) first uses sulfur to convert elemental mercury to mercury sulfide. The mercury sulfide is then solidified through a specific process, which could further reduce dispersion and permeability.

EPA considered this approach; however, after several discussions with BNL and EPA's Office of Research and Development, EPA's project team determined that since the SBSS had not yet been field tested, and protocols for field testing have not yet fully developed, it is too early to consider testing the technology. It is EPA's understanding (confirmed by the commenter's "white paper" submittal) that the process has not been used or even tested at the Y-12 site, rather it has been tested at the bench scale level on Y-12 site's contaminated soils.

In addition, considering the type of substrate at LCP, and the fact that – through the selected remedy -

the PTW will not only be converted to mercury sulfide but contained within a barrier wall/cap, EPA believes any potential decrease in permeability from BNL's process will not significantly increase this remedy's over-all protectiveness.

The commenter does not explain for how he believes the selected remedy may be imposing on BNL patents.

Comment #13: *It seems that the toxicity of mercury is being lost somewhere in the toxicity assessments. While mercury is not carcinogenic, it is an acute toxin. Contact with mercury has immediate and irreversible impacts upon various human organs, in particular the central nervous system. This makes it much more dangerous than other volatile contaminants such as benzene; a mere carcinogen. People are exposed to benzene routinely during fill ups, but several laws exist to eliminate any potential for mercury exposure. The entire body of risk assessment work contained within the Feasibility Study appears to be is flawed due to this failure of simple risk-assessment principle. In recognition of this, I demand the following:*

> *a. The risk assessment needs to be re-written with input from medical professionals who can offer alternate risk exposure assessment information for mercury. This includes staff from the Union County and NJ State Health Departments.*
>
> *b. This site, in its current state, appears to represent a severe health hazard. Greater work needs to be performed to insure that mercury dispersion is not occurring daily due to wind, water, wildlife, trespassers, etc. This site requires a 24 hour guard and temporary covering with an impermeable material (HDPE). If stockpiles of soil from residential tank pulls are required to be temporarily covered by New Jersey DEP, then why wouldn't a highly toxic surface require an impermeable cover? This may represent a health emergency and requires immediate emergency response.*
>
> *c. Public notice must be made to identify the danger this site represents. At the public comment meeting two separate participants from the community indicated that they not only walk the area, but partake in recreation hunting and fishing on the areas adjacent to or adjoining the adjacent properties. Why is this site not being treated for the clear and present danger it represents? Why are signs not posted warning people as they are at other Agency administered cleanup sites?*
>
> *d. The selected remedy does little, if anything to treat groundwater impacted by mercury from entering the Arthur Kill. In 1990, the NJ Conservation Foundation and the NJ Audubon Society conducted an inventory of the river and stream corridor, identifying nearly 200 bird species including about 90 species that breed in the watershed.*

EPA Response: EPA assesses both carcinogenic and non-carcinogenic risks during remedy selection. The commenter's assertion that the toxicity risk from mercury was "lost" in the pertinent documents seem perplexing in light of the fact EPA considers elemental mercury to be the Site's primary risk driver and the key contaminant of concern. Additionally, the principal threat waste at the Site is soil with visible mercury.

The commenter gave no specific reasons why he believes the risk assessment, which was conducted by the responsible party's contractor and reviewed by EPA's risk assessment experts, needs input from

other health professionals, such as those employed at state health agencies. Nevertheless EPA notes that Federal and State health agencies have performed an independent analysis of the Site risks. In 1999, the Agency of Toxic Substances and Disease Registry (ATSDR) and the NJ Department of Health and Senior Services (NJDHSS) released a health assessment for the Site. Their conclusions are consistent with the findings of the risk assessments. The report can be found at: http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=446&pg=1#disc

In brief, ATSDR and NJDHSS concluded:

> *Based on the information reviewed, the ATSDR and NJDHSS have concluded that the Linden Chemicals and Plastics (LCP) site currently poses no apparent public health hazard. This evaluation is the result of an absence of any completed human exposure pathway associated with the site.*
>
> *Fishing advisories/restrictions are currently promulgated by the New Jersey Department of Environmental Protection for the South Branch Creek and the Arthur Kill (as part of the Newark Bay Complex). Site data and information indicate that the LCP site may have contributed to the overall contamination problem of these surface water features.*
>
> *Although the ATSDR and the NJDHSS have not identified completed human exposure pathways associated with the LCP site, on-site soil contamination is present at levels of potential public health concern.*

Since the areas of visible mercury are surrounded by dilapidated buildings, there is no way to currently place an HPDE cover. While preventing release of mercury into the atmosphere is part of the overall goal of the selected remedy, air monitoring on and at the perimeter of the Site have not demonstrated an immediate or even long term risk to local residents.

The Site is surrounded by several layers of fencing and locked gates, and there is signage indicating admittance to the Site is not permitted. EPA will consider adding additional locks and installing more fencing.

EPA strongly disagrees with the assertion that the selected remedy does little if anything about the mercury impacted groundwater. The selected remedy will surround the area of Site contaminated groundwater with a barrier wall, and cover the area with an impermeable cap. The groundwater will then be collected and properly disposed. EPA expects the area to effectively dry out in less than a decade, in the meantime the barrier wall will prevent groundwater from migrating off- Site.

Comment #14: *The Feasibility Study fails to identify the impacts that leaving such a high concentration lode of mercury contaminated soil will have on the redevelopment of the Ashland/LCP site. The current intended land-use for the site is commercial/industrial. Cherokee has identified interest in constructing warehousing with 10% office space. The Feasibility Study needs to address if, and how, the building can be constructed without poisoning the construction workers, and future employees. In recognition of this, I demand the following:*

a) *The study must propose a remedy to prevent impacts of the mercury on building occupants. This should include real-time monitoring instruments to detect the efficacy of the remedy ad-infinitum.*

b) *The study must propose a remedy that will allow construction workers to work on the Ashland site without being exposed to mercury during activities such as excavation for drainage, utility and foundation installation, structural pile installation (down to 90') and surface landscaping/hardscaping.*

c) *The remedy must propose a long term Construction Health and Safety Plan for the Ashland site, and attach the plan to the title as part of the Institutional Controls.*

d) *A fund must be established that insures that monies will be available from the PRP to address any and all escalations in construction costs associated with the toxicity of the Ashland site.*

EPA Response: The primary purpose of an FS is to provide information to allow comparison of several remedial alternatives against each other and against the nine criteria. The purpose of an FS is not to design a remedy or to develop health and safety or monitoring protocols for a future owner or tenant.

Since the buildings the purported owner wishes to construct do not presently exist, it's unclear how the FS could perform real-time air monitoring of those buildings. Regardless, impermeable caps are a commonly used element of a hazardous site remedy. It is not uncommon to construct buildings on top of those caps. How the cap can be designed, in general, to accommodate a future use will be considered during the remedial design. Likewise, future buildings would need to be designed so as not to impact the remedy.

As for comments b and c, if the commenter means health and safety requirements for the remedial work need to be developed prior to implementation of the remedy, EPA agrees and those plans will be part of the overall remedial design. However, if the commenter means that the remedy should allow workers to perform sub-cap construction activities after the remedy is implemented, then EPA needs to point out that once the cap is installed, institutional controls will be put in place to prevent current or future owners or lessees from compromising the containment, such as through excavation or pile installation.

In response to comment d, EPA generally requires that PRPs provide financial assurance - such as through a surety performance bond (or other mechanism) – proving that they can complete the work described in EPA's ROD.

Comment #15: *The Feasibility Study fails to identify the impacts that leaving such a high concentration lode of mercury contaminated soil will have on the redevelopment of the Ashland site. The current intended land-use for the site is commercial industrial. Cherokee has identified interest in constructing a warehouse with a minimum of 10% offices. The Feasibility Study needs to address if, and how, the building can be constructed, and after construction, how it can be sustainably operated. In recognition of this, I demand the following:*

a. *The closure plan must identify how the remedy selection will couple with the intended redevelopment of the Ashland/LCP site by Cherokee. This must include a clear plan for soil stabilization for parking areas. Currently, the plan as proposed will render the site unbuildable due to the heavily disturbed condition that it will leave the soils. Will the soils be able to be compacted enough to support roads and driveways? What about footings, basements, etc.?*

b. *The study must include a clear plan for providing drainage for storm water and roof precipitation runoff. The remedy selection does not allow any means for direction runoff to the water table. Where will the runoff go? Will it be contained for Ashland to have removed on a weekly basis, ad-infinitum? The remedy selection, as it stands currently, will not support any other option.*

c. *The study must propose a long term Operations and Maintenance Plan for the Ashland site, and attach the plan to the title as part of the Institutional Controls.*

d. *A fund must be established that insures that monies will be available from the PRP to effect the necessary secondary or tertiary remediation when other unanticipated impacts are encountered at the LCP/Ashland site.*

EPA Response: The types of plans discussed above, such as an O&M plan or a plan for site run-off are developed either in the design phase or after the remedial action has been implemented. Potential impacts of the remedy on future redevelopment can be considered during the remedial design phase.

Comments from Ashland Inc.:
Comment #16: *Mobilization of mercury from the LCP Site as a result of flooding during Hurricane Sandy; it is unlikely that flooding during the Hurricane Sandy caused remobilization of site contaminants, including mercury, to other off-site, inland locations. The LCP site and other nearby industrial properties have been flooded on multiple occasions by extreme weather events prior to and during the course of the RI, such as Hurricane Floyd (1999). Furthermore, the RI data demonstrate (e.g., off-site ditch sampling) that site contaminants in shallow soils were not distributed any significant distance off site in an inland direction, even after the prior flooding known to have occurred. Conditions during Sandy are not likely to have been sufficiently different than prior flooding events with respect to floodwater velocities such that it is unlikely that Sandy flooding would have caused additional off-site contaminant transport from the site in an inland direction. As such, IES, does not believe that there is a need for off-site sampling associated with the LCP site, as was suggested at the public meeting.*

EPA Response: EPA agrees it is unlikely that Superstorm Sandy spread Site contaminants in any significant amount. However, due to the size of the storm and public concern, EPA believes it is prudent to conduct some limited off-site analyses.

Comment #17: *Contaminant sources in the bedrock groundwater; there is no mention in the proposed plan that the RI demonstrated that most groundwater constituents in bedrock are undetectable except in the northwest area of the site, upgradient of the LCP production area, and that these upgradient impacts are associated with the adjacent GAF (LPH) site. Soluble mercury, benzene and chlorobenzenes are detected within an area in which the GAF groundwater extraction system has been shown to induce bedrock groundwater flow from the neighboring GAF site onto the LCP site. However, bedrock groundwater with in this area is subsequently captured and treated by the adjacent GAF groundwater remediation system. In summary, the soluble mercury and other organic constituents from the adjacent GAF site are the likely source of these constituents in the LCP bedrock wells and this mercury is being captured by the GAF groundwater extraction and treatment system. This is an important distinction relative to the remedy including only groundwater monitoring in the bedrock water bearing zone.*

EPA Response: The ROD describes the findings of the RI with respect to the bedrock groundwater. In addition, EPA discussed the bedrock aquifer and likely causes of its contamination (i.e., the GAF site) during the public meeting.

Comment #18: *Selection of Alternative No. 3 "Full Containment"; while IES understands the preference under SARA for remedies that include treatment, the evaluations performed in the USEPA-approved Feasibility Study support selection of Alternative No. 3, Full Containment, as the preferred remedy. It fully controls the sediment/surface water, groundwater and direct contact pathways. In the case of the LCP Site, available and practicable treatment technology is limited to chemical conversion of elemental mercury to mercuric sulfide. Yet, this technology is unproven and more importantly, alters only the form of mercury; the total mass of mercury remains the same. Therefore, without the benefit of the containment components of the remedy, the Site would still exceed the risk benchmarks (for mercury and other contaminants) for protection of human health and the environment. Therefore, the treatment components of Alternative Nos. 4a and 4b add substantial cost without corresponding, meaningful benefit.*

As also indicated in the Feasibility Study, the off-site disposal options, Alternatives No. 5a and 5b, do no provide any more practicable of an alternative. As researched during preparation of the Feasibility Study, and confirmed by the USEPA during the public meeting on August 28, 2013, a practicable disposal facility for the principal threat waste at the LCP Site has not been identified. And, even if one were, such as the USEcology/Stablex facility in Canada, the ultimate management of the mercury would still be via containment; perhaps outside of the US where less stringent regulations would apply (i.e., the land disposal restrictions do not apply in Canada), and the containment remedy (Alternative No. 3) would still be necessary because of the other contaminants associated with the anthropogenic fill and past site operations.

EPA Response: EPA agrees that Alternative 3 is a protective remedy and would employ tested containment features that have been used at other contaminated sites. EPA, however, disagrees with the commenter that the added cost of the treatment components of Alternative 4a and b are not worth the value added. The stabilization of the elemental mercury greatly increases the long-term effectiveness and permanence of the remedy in that the sulfur treatment ensures the reduction of the risk of exposure to the highest levels of mercury even in the event of a failure of the containment system. The overall effectiveness secured by the additional cost of the selected remedy, over remedies that achieve protectiveness through containment only, was determined by EPA to be warranted and hence the selected remedy represents a reasonable value for the money to be spent.

While there may be uncertainties with the selected remedy's treatment component, the prospect of converting a large volume of elemental mercury to mercury sulfide would not only allow compliance with NCP requirements, it would afford additional protection for direct contact and inhalation risks over containment alone.

Comment #19: *Bedrock water-bearing zone points of compliance; the USEPA's proposed plan, dated August 2013, on Page 2 indicates that surface water standards could be applied to the bedrock aquifer (designated Class IIIB) because numerical Class IIIB groundwater quality standards have not been developed by the NJDEP. Surface water standards should not and could not be an ARAR for groundwater. However, as a practical matter, surface water standards can be a reasonable ARAR for groundwater if applied only at the point of discharge of the groundwater to surface water. This would mean comparing groundwater quality to surface water standards only at the down-gradient perimeter of the site adjacent to the surface water body, not at any portions of the aquifer within the interior of the site.*

EPA Response: NJDEP reclassified the bedrock layer as Class IIIB groundwater, so therefore Class IIA groundwater standards do not apply and new site specific standards need to be developed. Until those standards are developed, NJDEP indicated saline surface water standards were to be used as the applicable criteria. When site specific alternative standards are developed, they will become applicable to the bedrock zone.

Comment #20: *Use of vacuuming and sulfur treatment; the USEPA's "Summary of the preferred alternative" on page 10 of the Proposed Plan, states the "Porous material that has visible signs of mercury contamination will be vacuumed and treated with sulfur." The Feasibility Study does not include vacuuming as a component of Alternative No. 4b on an equivalent basis to the addition of sulfur. Rather the FS, in Section 6.4 describing the building materials alternatives, includes vacuuming "...or other similar technique" for visible elemental mercury, only to the extent practicable.*

The limitations on vacuuming are substantial. The cell buildings, where mercury has been observed, are unsafe to enter and so vacuuming cannot be performed prior to demolition. Following demolition, the resultant porous debris (e.g., masonry units) is likely to be crushed and it would be impracticable to vacuum. As such, while the FS does include vacuuming to the extent practicable, it should only be included as a contingent component. This distinction is important to a practicable implementation approach for the alternative. Conversely, where visible elemental mercury may be present in porous building debris, the intent is to add sulfur and then place the material beneath the cap. The sulfur addition is not contingent component.

EPA Response: EPA agrees. The ROD does not include a requirement to vacuum building debris before treatment with sulfur.

Comments from the New Jersey Department of Environmental Protection:
Comment #21: *The Department concurs with the preferred remedial alternative which includes full containment of the contaminated soils and sediments; full stabilization, to a depth of 17 feet, of principal threat wastes; capture and treatment/disposal of overburden groundwater; partial restoration of South Branch Creek; and demolition of Site buildings. A key element of the remedy will be institutional controls and groundwater monitoring. The remedy is the final remedy for the Site and addresses the following contaminated media: soils, soil vapor, sediments and groundwater (Alternative 4b).*

EPA Response: EPA notes NJDEP's concurrence.

Comment #22: *The Department agrees that there should be a contingency remedy. However, it is the Department's position that the contingency remedy should be removal (Alternative 5b) which while more costly, appears implementable. Containment alone, which is one of the contingencies, does not address the principal threat waste.*

EPA Response: NJDEP is correct that EPA's second contingency remedy, Alternative 3, would not use treatment to address the principal threat waste. The NCP makes clear that when treatment is not practicable, engineering controls, such as containment, should be used. EPA found that excavation/disposal of the PTW has limited implementability. Therefore, the only contingency that would be both reasonably implementable and protective is Alternative 3.

Comment #23: *The Department's position is that a backgrounds study that is reviewed/approved by all partner agencies should be conducted during the design phase in accordance with USEPA 1997, USEPA*

1994 and NJDEP 2012. Background concentrations should be established for all contaminants and media for which site-specific ecological risk-based PRGs have been established (e.g., sediment and fish tissue). Ecological remediation goals should be the higher of the site-specific ecological risk-based PRGs or background. Ecological remediation goals should be used to delineate contamination in the Arthur Kill and determine the extent of the remediation in the Arthur Kill.

EPA Response: The Site is primarily a mercury site and mercury is the prime site contaminant found in the Northern Off-Site Ditch and South Branch Creek. Yet, sampling during the RI seems to indicate that levels of mercury found just outside the South Branch Creek's mouth are consistent with levels found elsewhere in the Arthur Kill and in tributaries of the Arthur Kill. Data also indicate it would not be possible to distinguish LCP's mercury from other mercury sources to the Arthur Kill. In addition, it is important to note that Region 2 is about to begin Phase 3 of the Newark Bay Study, which will likely include portions of the Arthur Kill adjacent to the LCP Site. Decisions related to further sampling or remediation of the Arthur Kill would be premature until the boundaries of Phase 3 are settled.

Comment #24: *More specifically, on page 6 (Remedial Action Objectives) and page 10 (Summary of the Preferred Alternative) of the final proposed plan, the text states that because sediments will be recontaminated by the Arthur Kill, EPA will determine a sediment cleanup level that is consistent with existing levels in the Arthur Kill or nearby tributaries during the design phase.*

a. *The phrase "a sediment cleanup level" implies one numeric goal. For the protection of ecological receptors, site-specific ecological risk-based PRGs should be established for all feeding guild/receptor groups and all contaminants for which elevated risk was indicated in the BERA, including mercury and barium (and possibly additional contaminants). The Departments assumes "existing levels in the Arthur Kill" means "background contaminant concentrations." Background data serve as default remediation goals if PRGs are below background levels and aid in contaminant delineation. The ROD should list the PRGs. The design document should list PRGs and justification for reverting to background levels.*

b. *The Department also requests the phrase "will be recontaminated" be revised in the ROD. While contaminants may enter the remediated zone, they would not be expected to reach pre-remedial levels. Additionally, the Department requests that the word "tributaries" be removed. As per the Department's Ecological Evaluation Technical Guidance (EETG NJDEP 2012), tributaries should be excluded from background investigations if data from the smaller, typically more contaminated water body are not representative of prevailing contaminant levels that may re-enter the remediated sediment site form tidal influences. Specially for the South Branch Creek remedy, use of data from nearby tributaries are not appropriate for background, since the nearest tributary, Piles Creek, contains high-level mercury sediment contamination (and other contaminants) from a LCP-related Responsible Party.*

EPA Response: For clarification, EPA recognizes (as did EPA's National Remedy Review Board) that contamination in the Arthur Kill will likely impact the South Branch Creek/Off-Site Ditch after the sediment remedy is implemented. Therefore, the action will focus on remedying the Creek/Ditch to levels consistent with those found in the Arthur Kill (or PRGs if they are higher). Those levels will be determined during the RD either with existing data or, if necessary, additional data.

EPA agrees, the phrase "a sediment cleanup level" indicates that there is only one numeric goal. That is not correct. The ROD makes that clear and a table of PRGs will be included in the final ROD.

The phrase "will be recontaminated" was not meant to imply recontaminated to existing levels. NJDEP's comment on the tributaries is correct. Reference to using the tributaries for development of sediment cleanup levels was not included in the ROD.

EPA is unaware of any evidence that Piles Creek was impacted by the LCP Chemicals, Inc., Superfund Site.