Record of Decision Summary
LCP Bridge Street Site
Site # 7-34-049

Site History:

In 1953, Allied Chemical (now Honeywell International) constructed a chlor-alkali facility at the site. The chlor-alkali facility produced caustic soda (sodium hydroxide) and liquid chlorine using the mercury cell process. Beginning in 1968, both the mercury cell and diaphragm cell processes were used to produce these chemicals. In 1979, the plant site was sold to Linden Chemical and Plastics (LCP, the predecessor of LCP Chemicals - NY). LCP operated the chlor-alkali plant until 1988, when manufacturing at the facility ceased. In 1992, LCP Chemicals declared bankruptcy. In 1994, the site was named as a "sub-site" of the Onondaga Lake NPL site. Currently, all of the buildings are vacant and no operations exist at the facility.

The Proposed Plan was issued on July 6, 2000. A Public Meeting for the Proposed Plan was conducted on July 19, 2000. The Public Comment Period concluded on September 18, 2000.

Remedial History:

In 1990, PCB-contaminated soils were excavated and removed from the Eastern Rectiformer Area by LCP Chemicals under the Toxic Substances Control Act (TSCA) regulations. In March 1995, approximately 200,000 pounds of PCB-contaminated electrical equipment and 21,000 gallons PCB-contaminated oil were disposed of off-site by Honeywell per TSCA regulations.

In October 1995, the State of New York and Honeywell entered into a Stipulation and Order, under the 1992 Onondaga Lake Consent Decree, to conduct a RI/FS at the Site. Field work for the RI commenced in October 1995, and was completed in April 1998. In November 1998, the State of New York issued a revised RI which was modified by the State in May 1999. In June 1999, the NYSDEC received a revised FS from Honeywell.

In March 1999, an Interim Remedial Measure (IRM), which involved the drumming and off-site disposal of hazardous laboratory chemicals, was conducted by Honeywell. In July 1999, Honeywell removed hazardous wastewaters and sludges from on-site tanks and disposed of the waste off-site as IRMs.

In December 1999, an IRM commenced which involves the removal of portions of the on-site sewers, some of which are known to be releasing mercury-contaminated water into the West Flume, a tributary of Onondaga Lake. The down-gradient ends of these sewers have been plugged and the excavations have been backfilled with a soil and bentonite slurry.

An IRM entailing the decontamination and demolition of most of the on-site structures commenced in May 2000. A Diaphragm and Mercury Cell Building decontamination and demolition IRM is scheduled to be conducted prior to the implementation of the final remedy at the Site. The Cell Building IRM will, in part, consist of removing and recycling elemental mercury from cells inside the Mercury Cell Building, followed by the decontamination and demolition of the buildings.

Summary of the Selected Remedy:

The selected remedy for the site has an estimated cost of $14.23 million. The components of the remedy are as follows:

- Excavation of West Flume Contaminated Sediments and Disposal on the Facility;
- Excavation of Contaminated Wetland Sediments with On-Site Disposal and Wetlands Restoration;
- Cleaning Catch Basins and Manholes and Filling Site Sewers with a flowable grout;
- Excavation of Brine Muds and On-Site Disposal;
- Excavation and On-Site Treatment of Mercury-Contaminated Principal Threat Shallow Soil along with the Excavation and Off-Site Disposal of PCB-Contaminated Soil;
- Installation of a Low-Permeability Cap over the site, including the excavated, consolidated and treated material, and demolition debris;
- Hydraulic Containment of Shallow and Deep Aquifers with a Subsurface Barrier Wall and Groundwater Collection; and
- Deed Restriction.

Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
LCP Bridge Street Site
Sub-Site to the Onondaga Lake NPL Site
Village of Solvay, Onondaga County
Site Number 7-34-049

September 2000

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

RECORD OF DECISION

LCP Bridge Street Site
Sub-Site of the Onondaga Lake Superfund Site
Village of Solvay, Town of Geddes, Onondaga County, New York

New York State Department of Environmental Conservation
Albany, New York

September 2000

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

LCP Bridge Street Site, Sub-Site of the Onondaga Lake Superfund Site
Village of Solvay, Town of Geddes, Onondaga County, New York

Superfund Site Identification Number: NYD095586376
EPA Operable Unit 5

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the New York State Department of Environmental Conservation's selection of a remedy for the LCP Bridge Street Sub-Site (the "Site"), which is chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §9601 *et seq.*, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300; and the New York State Environmental Conservation Law (ECL) and 6 NYCRR Part 375. This decision document explains the factual and legal basis for selecting the remedy for the Site. The attached index (see Appendix III) identifies the items that comprise the Administrative Record upon which the selection of the remedy is based.

The United States Environmental Protection Agency (USEPA) and the New York State Department of Health (NYSDOH) were consulted on the planned remedy, and concur with the selected remedy (see Appendix IV).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedy include the following:

- Excavation of approximately 54,300 cubic yards of sediment exceeding upstream mercury concentrations. Backfilling of the excavated areas with clean fill and revegetating such areas, as appropriate. All excavated material will be dewatered, characterized and placed on-Site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap. Restoration of any wetlands impacted by remedial activities. The restored wetlands will require routine inspection for several years to ensure adequate survival of the planted vegetation;

- Cleaning sewer catch basins and manhole structures and filling Site sewer systems with grout;

- Excavation of approximately 3,200 cubic yards of brine muds and placement of the brine muds on-Site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;

- Excavation and on-Site treatment of approximately 4,500 cubic yards of mercury-contaminated principal threat waste[1] shallow soils at the facility with on-Site placement of the treated soils under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;

- Excavation and off-Site disposal of soils which contain PCB contamination above NYSDEC Division of Environmental Remediation Technical and Administrative Guidance Memorandum levels. All excavated material will be characterized and transported for treatment/disposal at an off-Site Resource Conservation and Recovery Act- and/or Toxic Substances Control Act-compliant facility, as appropriate;

- Installation of a New York State 6 NYCRR Part 360 equivalent low permeability cap over the facility to contain Site soils, excavated sediments and brine muds, and demolition debris;

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[1] Six distinctive locations on-Site contain "principal threat waste" because the soil contaminants in these areas are highly mobile or toxic and will be a continuing source of groundwater contamination.

- Hydraulic containment of both the shallow and deep aquifers with a subsurface barrier wall and a groundwater collection and treatment system to maintain proper hydraulic gradients;
- Implementation of institutional controls (*i.e.*, deed restrictions) to prohibit the use of groundwater at the Site and the disturbance of the Site cap and slurry wall;
- Long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA Section 121, 42 U.S.C. §9621, in that it: 1) is protective of human health and the environment; 2) meets a level or standard of control of the hazardous substances, pollutants and contaminants, which at least attains the legally applicable or relevant and appropriate requirements under federal and state laws or justifies grounds for their waiver; 3) is cost-effective; and 4) utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. In keeping with the statutory preference for treatment that reduces toxicity, mobility, or volume of contaminated media, as a principal element of the remedy, the contaminated groundwater will be collected and treated. In addition, the excavated principal threat waste soil will be treated on-Site prior to disposal.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

ROD DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the Administrative Record file for this Site.

- Chemicals of concern and their respective concentrations (see ROD, pages 5-10);

- Baseline risk presented by the chemicals of concern (see ROD, pages 11-16);
- Cleanup levels established for chemicals of concern and the basis for these levels (see ROD, pages 5-10);
- How source materials constituting principal threats are addressed (see ROD, page 10);
- Current and reasonably-anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (see ROD, page 11);
- Potential land and groundwater use that will be available at the Site as a result of the selected remedy (see ROD, pages 49-50);
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (see ROD, page 48); and
- 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 decision) (see ROD, pages 44-57).

AUTHORIZING SIGNATURE

Michael J O'Toole J

Michael J. O'Toole Jr.
Division Director

9/29/00
Date

RECORD OF DECISION FACT SHEET

New York State Department of Environmental Conservation

Site

Site name: LCP Bridge Street Site

Site location: Village of Solvay, Town of Geddes, Onondaga County, New York

Listed on the NPL: December 16, 1994

Record of Decision

Date signed: September 29, 2000

Selected remedy: Excavation of contaminated soils and sediments, followed by on-Site treatment/disposal, construction of a cap and slurry wall and extraction and treatment to address the contaminated groundwater.

Capital cost: $12,430,000

Monitoring cost: $157,200, annually

Present-worth cost: $14.23 Million (7% discount rate for 30 years)

Lead NYSDEC

Primary Contact: Richard Mustico, Remedial Project Manager, (518) 457-1641

Secondary Contact: Donald Hesler, Acting Section Chief, (518) 457-1641

Main PRPs Honeywell International, Inc. and LCP Chemicals - NY

Waste

Waste type: Mercury, lead, PCBs, volatile organic compounds and semi-volatile organic compounds

Waste origin: Past industrial practices from the operation of a chlor-alkali plant

Contaminated media: Groundwater, soil, surface water and sediments

DECISION SUMMARY

LCP Bridge Street Site, Sub-Site of the Onondaga Lake Superfund Site
Village of Solvay, Town of Geddes, Onondaga County, New York

New York State Department of Environmental Conservation
Albany, New York

September 2000

TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS continued

ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

In 1994, Onondaga Lake, its tributaries and the upland hazardous substance sites which are releasing or threatening to release contamination to the Lake and its tributaries were added to the EPA's Superfund National Priorities List (NPL). The LCP Bridge Street Site[1] (the "Site") is contributing contamination to Onondaga Lake, and therefore, is considered a "Sub-Site" of the Onondaga Lake NPL site.

The Site is located approximately two miles west of Syracuse in the Village of Solvay and Town of Geddes, Onondaga County, New York (see Figure 1). The 20-acre facility is fenced and contains various vacant industrial, storage, and office buildings, as well as empty storage tanks and railroad tracks. The facility is situated to the south of the New York State Fairgrounds complex and a Conrail right-of-way, and to the north of Belle Isle Road and an intact portion of the Erie Canal. Matlow Company, a scrap yard, and NAKOH, a chemical company, are located to the northeast of the facility. The Kamine Syracuse Cogeneration facility is located to the immediate west. The property and surrounding areas are presently zoned industrial, and the reasonably anticipated future land use is not expected to change.

The Site also includes a man-made drainage channel known as the West Flume, a man-made wetland known as the Ponded Area, the East and West Ditches, and other on-Site drainage ditches. The West Flume is a New York State Class C[2] water body, pursuant to 6 NYCRR Part 895.2(k), as it is shown on the classification maps and is a direct tributary to a Class C water body, Geddes Brook. The West Flume originates on the Honeywell International, Inc. (Honeywell, a successor corporation of the former AlliedSignal, Inc.) Main Plant property east of the Site and traverses under Bridge Street and through the northern portion of the facility from the southeast to the northwest. The West Flume typically ranges in width from 5 to 10 feet and is lined with thick reeds (*i.e., Phragmites*). The West Flume ultimately discharges under Interstate 695 to Geddes Brook, approximately 3,100 feet west of the facility (see Figure 2). Geddes Brook discharges into Nine Mile Creek, which in turn is a tributary of Onondaga Lake.

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[1] Superfund Site Identification Number: NYD095586376.

[2] As defined in 6 NYCRR Part 701.8, the best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

The Ponded Area is located adjacent to and west of the facility. It consists of 7.3 acres of wetland and is both a federal wetland and part of a New York State-regulated wetland. The Ponded Area consists of the 0.9-acre Wetland A and the 6.4-acre Wetland B. Both wetland areas are dominated by *Phragmites*. Surface water from the Ponded Area discharges to the West Flume from Wetland B *via* an underground culvert, approximately 1,400 feet west of the facility.

The West Ditch, located immediately west of the facility, and the on-Site ditches, located in the western portion of the facility, intermittently discharge surface runoff from the facility into the Ponded Area. The East Ditch, located immediately east of the facility, intermittently discharges surface runoff to the West Flume.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

From the mid-to-late 1800's, the Site was occupied by several companies which produced salt from the brine springs that were located in the area. Between 1908 and the late 1940's, the Atmospheric Nitrogen Company operated a manufacturing plant to produce ammonia at the Site. By 1920, control of this company had been acquired by the Allied Chemical Company (predecessor to Honeywell International, Inc.). This facility was demolished in the early 1950's, and in 1953, Honeywell constructed a chlor-alkali facility. The chlor-alkali facility produced caustic soda (sodium hydroxide) and liquid chlorine using the mercury cell process, and beginning in 1968, both the mercury cell and diaphragm cell processes were used. Between 1955 and 1969, hydrogen gas, generated as a by-product at the facility, was used to manufacture hydrogen peroxide.

In 1979, the plant site was sold to Linden Chemical and Plastics (LCP Chemicals, the predecessor of LCP Chemicals - NY, a Division of the Hanlin Group, Inc.). In 1980 and 1981, LCP installed a hydrochloric acid production process and a sodium hypochlorite bleach production process, respectively. LCP operated the chlor-alkali plant until 1988, when manufacturing at the facility ceased. In 1990, PCB-contaminated soils were excavated and removed from the Eastern Rectiformer Area by LCP Chemicals pursuant to the Toxic Substances Control Act (TSCA). In 1992, LCP Chemicals declared bankruptcy.

In March 1995, approximately 21,000 gallons of PCB-contaminated oil were drained from transformers and rectifiers in the Western Rectiformer

Area. Approximately 200,000 pounds of PCB-contaminated electrical equipment and the PCB-contaminated oil were disposed of off-Site by Honeywell under TSCA requirements.

The eastern portion of the facility, leased by HoltraChem Manufacturing Company (HMC) from the mid-1990's until 1998, was used as a product transfer station by HMC for the distribution of caustic soda and discontinued acids. Currently, all of the buildings are vacant and no operations exist at the facility.

In October 1995, the State of New York and Honeywell entered into a Stipulation and Order, under the 1992 Onondaga Lake RI/FS Interim Consent Decree, to conduct an RI/FS at the Site. Field work for the RI commenced in October 1995 and was completed in April 1998. In November 1998, the State of New York issued an RI report which was modified by the State in May 1999. In June 1999, NYSDEC received a revised FS report from Honeywell.

In March 1999, an Interim Remedial Measure (IRM), which involved the drumming and off-Site disposal of hazardous laboratory chemicals, was conducted by Honeywell. In July 1999, a hazardous wastewater and sludge IRM was completed. Under this action, Honeywell removed hazardous wastewaters and sludges from on-Site tanks and disposed of the waste off-Site.

In March 2000, an IRM was completed which removed portions of on-Site sewers which were known to, or which may have been, releasing mercury-contaminated water into the West Flume and East Ditch. The downgradient ends of these sewers were then plugged. An IRM entailing the demolition of most of the on-Site structures commenced in May 2000. A Diaphragm and Mercury Cell Building demolition IRM commenced in July 2000. This IRM will, in part, consist of removing and recycling elemental mercury from cells inside the Mercury Cell Building, followed by the decontamination and demolition of the buildings.

In October 1999, NYSDEC obtained groundwater samples from north of the West Flume on an adjacent property in the vicinity of the Peroxide Building (see Figure 3). The laboratory analysis characterized the groundwater as having high concentrations of xylene. Xylene was used by Honeywell in the hydrogen peroxide process mentioned above. In November 1999, NYSDEC added an operable unit to address this contamination which will be investigated under a future RI/FS.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI report, FS report, and Proposed Plan for the Site were made available to the public in both the Administrative Record and information repositories maintained at NYSDEC Albany and Syracuse offices, the information repository at the Onondaga County Public Library, Syracuse Branch at the Galleries, 447 South Salina Street, Syracuse New York, and the information repository at the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York. A notice of availability of the above-referenced documents was published in the *Post Standard* on July 6, 2000. The public comment period was held from July 6, 2000 to August 4, 2000. However, in response to a request for an extension, the public comment period was extended until September 18, 2000.

On July 19, 2000, NYSDEC conducted a public meeting at the Geddes Town Hall to present the findings of the RI/FS and answer questions from the public about the Site and the remedial alternatives under consideration.

In response to an inquiry by NYSDEC regarding the Site's reasonably-anticipated future land use, Mr. William Perez, the Zoning Board Chairman for the Village of Solvay indicated in a March 7, 2000 telephone conversation with Mr. Richard Mustico of NYSDEC, that the Village of Solvay had no plans to modify the current industrial zoning of the property. In addition, Mr. Perez confirmed that the public water supply used by the Village of Solvay was provided by Onondaga County, and that the Village had no plans to use the groundwater at the facility for a drinking water source.

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

SCOPE AND ROLE OF OPERABLE UNIT

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.5, defines an operable unit as a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the Site. Operable units may address geographical portions of a site, specific site problems, or initial phase of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site.

NYSDEC and EPA have currently organized the work for the Onondaga Lake NPL Site into eight sub-sites. These sub-sites are also considered to be operable units of the NPL Site by EPA.

NYSDEC has already selected a remedy for the Ley Creek Dredgings Sub-Site in a ROD concurred on by EPA on February 9, 1998. Construction of the remedy for the Ley Creek Dredgings Sub-Site is presently underway and is expected to be completed in late 2000.

RI/FSs are currently underway at the following Onondaga Lake NPL Sub-Sites: Willis Avenue; Semet Residue Ponds; Maestri 2; GM Former Inland Fisher Guide; Town of Salina Landfill; and the Onondaga Lake Bottoms, which includes the Geddes Brook and Ninemile Creek RI/FS. These RI/FSs are expected to be complete within three to four years. In addition, Interim Remedial Measure (IRMs) have been, or are being, conducted at the Willis Avenue, Semet Residue Ponds and GM Former Inland Fisher Guide Sub-Sites.

The primary objectives of this action are to control the sources of contamination at the LCP Bridge Street Sub-Site, to minimize the migration of contaminants, and to minimize any potential future health and environmental impacts.

The contamination of the groundwater from the hydrogen peroxide production process at the Site will be addressed under another operable unit to the LCP Bridge Street Site.

SUMMARY OF SITE CHARACTERISTICS

The purpose of the RI, conducted from 1995 to 1998, was to determine the nature and extent of the contamination at and emanating from the Site. The results of the RI are summarized below.

Groundwater

There are two groundwater flow systems which have been identified at the Site *(i.e.*, an upper aquifer and a lower aquifer). These aquifers are separated by a clay and silt aquitard (a layer of low permeability), which is absent in the northern portion of the Site at the West Flume. The upper aquifer consists of fill, and groundwater was encountered between 0.6 and 8.7 feet below the ground surface. The lower aquifer includes a silty sand unit above a competent glacial till. Mercury, which is the primary contaminant of concern in the groundwater, was detected at concentrations exceeding NYSDEC's groundwater standard of 0.7 micrograms per liter (µg/L) in a number of wells at the Site. The standard was most frequently exceeded in groundwater samples collected from the upper aquifer. The mercury contamination in the upper aquifer exists from the Mercury Cell Building Area to the area in the vicinity of monitoring well couplet MW-14 and north to the West Flume (see Figure 3), where groundwater from the upper aquifer discharges contaminating the surface water and sediment in the West Flume and ultimately Onondaga Lake. The highest concentration of mercury in groundwater was detected in monitoring well MW-27S at 867 µg/L. Several other metals were detected in groundwater from this well, however, this was attributed to the high concentration of suspended solids in the groundwater sample. The second round of sampling from this well yielded a sample with a lower suspended solids level and a mercury concentration of 33.2 µg/L. Concentrations of mercury within the groundwater contaminant plume in the upper aquifer, which is approximately 1,200 feet wide and 500 feet long, typically range between approximately 7 and 190 µg/L.

Mercury was detected at levels exceeding the water quality standard in samples collected from three deep monitoring wells just north of, and hydraulically downgradient of, the Mercury Cell Building. The mercury concentrations in groundwater samples collected from these three wells, MW-16D, MW-17D and MW-33D, were 2.5, 216 and 260 µg/L, respectively, with the two highest sample concentrations being collected from wells which are screened within soil containing elemental mercury dense non-aqueous phase liquid (DNAPL). Deep monitoring wells downgradient of these three wells yielded groundwater samples in which mercury was either not detected or present at concentrations below NYSDEC groundwater quality standard for mercury. Groundwater in the lower aquifer in the areas north and south of the West Flume appears to converge at depth beneath the flume. This groundwater may eventually discharge to the West Flume or Geddes Brook at a location west of, and downstream of, the facility.

Other than mercury, and with the exception of monitoring well MW-27S, the only other metals detected in on-Site groundwater above NYSDEC groundwater standards were antimony and lead. Concentrations of antimony in groundwater above NYSDEC standard of 3 µg/L occurred in two wells and ranged from 3.0 to 5.2 µg/L. Concentrations of lead in groundwater above NYSDEC standard of 25 µg/L occurred in one well and was 90.4 µg/L. These contraventions of the groundwater standards are co-located with contraventions of the groundwater standard for mercury.

Volatile organic compounds (VOCs) were detected in groundwater in the western portion of the facility. VOCs detected include vinyl chloride, chloroethane, 1,1-dichloroethane, and 1,2-dichloroethene. The VOCs are within a contaminant plume emanating from upgradient of the Site. Concentrations of VOCs in groundwater dissipate to non-detectable levels on-Site. VOCs in groundwater at other portions of the Site were detected sporadically and are co-located with contraventions of the groundwater standard for mercury. These VOCs include chloroform, which was detected in three wells on-Site above NYSDEC's groundwater standard of 7 µg/L at concentrations between 10 and 200 µg/L, and benzene, which was detected in one monitoring well on-Site above NYSDEC's groundwater standard of 0.7 µg/L, at a concentration of 2 µg/L.

Semivolatile organic compounds (SVOCs), including hexachlorobenzene (HCB), benzo(a)anthracene, chrysene, 4-methylphenol and napthalene were detected sporadically above NYSDEC groundwater standards. All of the above exceedances are co-located with contraventions of the groundwater standard for mercury. Total SVOC concentrations in groundwater averaged 40 µg/L, with a maximum total SVOC concentration of 123 µg/L in the Mercury Cell Building Area. In the eastern portion of the facility, total SVOC concentrations in groundwater averaged 102 µg/L with a maximum total concentration also of 123 µg/L.

PCBs were detected in one monitoring well above NYSDEC groundwater standard of 0.09 µg/L. PCBs in this monitoring well ranged from 0.14 to 0.55 µg/L. (See Table 1.)

Surface Water

Mercury is the primary constituent of concern in surface water. However, lead, chromium, and seven organic compounds, including PCBs, are also present. Of the seven organic compounds, only PCBs, at a maximum concentration of 0.09 μg/L, were detected above the NYSDEC surface water standard (0.00012 μg/L). In addition, lead, at a maximum concentration of 524 μg/L, was detected above the NYSDEC surface water standard (16 μg/L) which is based upon Site-specific surface water hardness. All exceedances of NYSDEC surface water standards are co-located with exceedances of the surface water standard for mercury. The NYSDEC surface water standard for mercury is 0.0026 μg/L in the dissolved form, which was derived for the protection of wildlife. Mercury concentrations in the surface water of the West Flume increase from the upstream station (0.0197 μg/L total and nondetect at 0.0010 μg/L dissolved) to the station adjacent to the facility (9.050 μg/L total and 2.252 μg/L dissolved). Concentrations of mercury in surface water were shown to be lower at the downstream station (between approximately 3.0 and 5.6 μg/L total and 0.318 μg/L dissolved), which is at the mouth of the West Flume, prior to its discharge into Geddes Brook, roughly 3,100 feet from the facility. The highest concentrations of mercury detected in surface water were typically in the wetland areas with maximum concentrations of 146.7 μg/L total mercury and 3.214 μg/L dissolved mercury in the wetland. Site surface water discharges to Onondaga Lake *via* the West Flume to Geddes Brook and Ninemile Creek. (See Table 2.)

Sediments

Mercury is the primary constituent of concern in on-Site sediments. However, nine VOCs, SVOCs (including HCB), other metals besides mercury (including lead), and PCB Aroclor 1254 were also detected at concentrations above screening levels or above those which were detected at the upgradient sediment sampling location. NYSDEC sediment criteria for mercury are 0.15 mg/kg (lowest effect level) and 1.3 mg/kg (severe effect level). Mercury was detected in the sediment of the West Flume upstream of the Site at a concentration of 0.2 mg/kg. Concentrations of mercury in sediments in the West Flume adjacent to the facility are as high as 131 mg/kg, and concentrations of approximately 30 mg/kg were detected downstream of the facility at the mouth of the West Flume. Mercury contamination in the Ponded Area also exists at concentrations up to 131 mg/kg. Concentrations of mercury in sediments generally decrease with depth in both the West Flume and Ponded Area. (See Tables 3-10.)

Surface and Subsurface Soil

Mercury was detected in soils throughout the Site, PCBs were detected in soils in the Western Rectiformer Area, and lead was detected in solids from the Diaphragm Cell Building.

The average concentration of mercury in surface soils is 633 mg/kg, with a maximum concentration of 19,200 mg/kg obtained from one sample in the area of the former mercury still. Visible elemental mercury DNAPL was observed in a shallow soil boring obtained from within the Mercury Cell Building. Elemental mercury DNAPL was also observed in deep soil collected from approximately 18 to 50 feet below the ground surface in the area just north of the Mercury Cell Building. Approximately 4,500 cubic yards of the mercury-contaminated shallow soils present a principal threat (high concentrations of mercury, including elemental mercury DNAPL).

PCBs were detected in soils in the Western Rectiformer Area at an average concentration of 12.2 mg/kg and at a maximum concentration of 79 mg/kg. Lead was detected in solids in the Diaphragm Cell Building at an average of 325.4 mg/kg and at a maximum concentration of 1340 mg/kg. (See Tables 11-23.)

Air Quality

Air monitoring conducted at three locations along the perimeter of the Site did not show the presence of contamination. Air monitoring yielded concentrations of mercury above the Occupational Safety and Health Administration limit of 0.05 milligrams per cubic meter inside the Mercury Cell Building; mercury was not detected in the air outside of the Mercury Cell Building.

Site Sewers

Prior to the recently completed IRM, various on-Site sewers discharged mercury-contaminated groundwater and/or surface water runoff to the West Flume. Concentrations of mercury in water emanating from these plugged, but leaking, sewers ranged from approximately 21 to 114 µg/L. Several other sewers traversed or ended at the West Flume and East

Ditch. While these other sewers did not appear to be discharging to the West Flume or East Ditch, the potential for discharge existed.

Brine Mud Disposal Area

The Brine Mud Disposal Area contains approximately 3,200 cubic yards of uncapped brine muds in an area north of the West Flume. The brine muds are non-hazardous precipitated calcium carbonate and magnesium carbonate that were generated during brine purification as part of the caustic soda production process which took place at the facility. Relatively low levels of mercury were detected in the Brine Mud Disposal Area during the RI. Mercury concentrations ranged from 0.46 to 6.8 mg/kg, with an average of 4 mg/kg, in the shallow muds, and 0.24 to 0.92 mg/kg, with an average of 0.57 mg/kg, in the deeper muds. (See Table 24.)

Biological Tissues

Biota samples were collected at various locations from the West Flume and Ponded Area. Mercury, PCBs, and HCB were detected in all fish samples that were examined. The maximum concentrations of PCBs (0.24 mg/kg) and HCB (0.35 mg/kg) in fish were higher than the ecological screening thresholds of 0.11 mg/kg and 0.2 mg/kg, respectively, for these compounds. The maximum concentration of mercury in fish (2.23 mg/kg) was higher than the Food and Drug Administration threshold of 1 mg/kg. However, the small size of the fish make them unusable for human consumption. The highest concentration of mercury in biota (3.70 mg/kg) was detected in a hellgrammite, a predatory insect. The highest concentration of total PCBs in biota (0.80 mg/kg) was detected in a crayfish.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using the remedy selection criteria which are described below. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

While widespread soil contamination is present throughout the LCP Bridge Street Facility, six distinctive locations on the facility contain "principal threat waste" since the mercury in these areas is highly mobile or toxic, and will be a continuing source of groundwater contamination because some of the contamination is located below the water table. The locations that contain principal threat waste are in the vicinity of the former Mercury Cell Building and in an area located in the vicinity of the East Ditch (see Figure 7, extent of mercury-contaminated soil to be excavated and treated).

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The property is presently zoned industrial. The current land use in the immediate vicinity of the Site is industrial. Based on a number of factors, including the reported history of land use in the area of the Site since the early 1900's, the existing zoning for the Site property, and subsequent communications between NYSDEC and the Zoning Board Chairman for the Village of Solvay, NYSDEC determined that the reasonably-anticipated future use for the Site is industrial.

Currently, the on-Site aquifers are not used for drinking water. Residents located in the vicinity of the Site use the public water supply provided by Onondaga County. Groundwater near the Site will not be used as a source of potable water under future-use scenarios.

SUMMARY OF SITE RISKS

Based upon the results of the RI, human health and ecological baseline risk assessments were conducted to estimate the risks associated with current and future site conditions. The baseline risk assessments estimate the human health and ecological risk which could result from the contamination at the Site, if no remedial action were taken. As was noted above, the local zoning for the Site and land adjacent to the Site is industrial. Thus, it appears that the reasonably anticipated future use for the Site is industrial. Although it is anticipated that the future use of Site groundwater will not be a drinking water source, federal Maximum Contaminant Levels (MCLs) and state groundwater standards are still cleanup goals for Site groundwater, since the groundwater is classified as "Class GA" fresh groundwater. In accordance with NYSDEC Water Quality Regulations (6 NYCRR Part 701.15), the best usage of "Class GA" waters is as a source of potable water supply.

Human Health Risk Assessment

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of a heath problem occurring if no clean up actions were taken at a site. To estimate this baseline risk at a Superfund site, a four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: The hazard identification step identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence and concentration.

Exposure Assessment: Under this step, the different ways that people might be exposed to the contaminants identified in the previous step, the concentrations that people might be exposed to, and the potential frequency and duration of exposure are considered. Using this information, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur is calculated.

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

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. The potential risks from the individual contaminants and exposure pathways are added up and a total site risk is calculated. Two types of risk--cancer risk and non-cancer risk are considered. The likelihood of any kind of cancer resulting from a site is expressed as an upper bound probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk." In other words, the odds that a person *may* develop cancer as a result of exposure to Site contaminants are 1 in 10,000. This risk is in addition to what cancers a person would normally be expected to develop from all other causes. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept here is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects are no longer predicted.

Human health risks were evaluated for current and reasonably foreseeable future potential exposure scenarios. Potential exposures to nearby residents were not evaluated for air and groundwater because contaminants are not migrating off-Site *via* air or groundwater. However, contaminated groundwater does discharge to surface water (the West Flume) which eventually discharges into Onondaga Lake. Groundwater in the vicinity of the Site is classified as "Class GA" fresh groundwater. In accordance with NYSDEC Water Quality Regulations (6NYCRR Part 701.15), the best usage of "Class GA" waters is as a source of potable water supply. However, the groundwater pathway at the Site is incomplete since no one is currently using groundwater as a drinking source due to a readily available public water supply, nor is it expected that groundwater from this Site will be used as a drinking source in the foreseeable future. The risk assessment did not address exposure to mercury from the Site in Onondaga Lake, including fish consumption, although this Site has been documented to be a major source of mercury to the Lake and the New York State Department of Health has issued a fish advisory on the consumption of fish from Onondaga Lake due to mercury contamination in those fish. Risk exposures within the Lake are being examined in the Onondaga Lake Bottom RI/FS.

All contaminants detected in Site-related media were considered in the risk assessment. For each contaminant of concern, an exposure point concentration, representing an upper bound estimate of the mean contaminant concentration at the point of human exposure, was calculated. (See Table 25.)

While a chain-linked fence surrounds the facility, potential exposure scenarios were evaluated for both inside and outside the fenced area since contamination was detected both inside and outside the fenced area. The following receptors were evaluated: a worker who patrols the Site, a worker who works at the rail car terminal, adolescents trespassing within the facility's fence line, adolescents trespassing outside of the facility's fence line, adults trespassing on their way to the State Fairgrounds, a generic future on-Site worker, and a future on-Site construction worker.

Depending on the potential exposure scenarios, chemical intakes (doses) were estimated. Various exposure pathways were identified, including ingestion of sediment, dermal contact with sediment, ingestion of surface soil, dermal contact with soil, ingestion of surface water, dermal contact with surface water, and dermal contact with groundwater.

Calculated carcinogenic risks for current and future exposure scenarios are within the acceptable risk range for Superfund sites (10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million, for incremental cancer risks)[3]. However, the calculated Hazard Index (HI) values for adolescents trespassing outside the facility's fence line, the future on-Site worker, and the future construction worker exceed 1.0, ranging from approximately 2 to 13 for these scenarios. Therefore, it is possible that adverse non-cancer health effects could occur due to trespassing and future work at the Site. The primary contributors to the potential adverse non-cancer health effects were mercury and PCBs. (See Tables 26-34)

These risk estimates are based on current and future reasonable maximum exposure scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure, as well as the toxicity of the contaminant of concern.

Ecological Risk Assessment

The baseline ecological risk assessment for the Site focused on aquatic life and wildlife resources with potential exposure to COCs in the aquatic and terrestrial systems at the Site. The vegetated portion of the Site and the immediately surrounding area support a variety of plants and wildlife, and the aquatic system supports benthic invertebrates, fish and amphibians. The aquatic system at the Site consists of the East Ditch, West Ditch, Ponded Area (*i.e.*, Wetlands A and B) and the West Flume. The wetland investigation conducted in April 1998 as part of the RI determined that approximately 7.3 acres of Federal jurisdictional wetlands (*i.e.*, Wetlands A and B) and approximately 3.9 acres of ditches, including the West Flume and portions of the East Ditch and West Ditch, are located in the study area.

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[3] Cancer risks of 10^{-6} or less are usually considered insignificant and are not a public health concern. However, cancer risks greater than 10^{-4} will typically trigger actions to lower exposures. When cancer risks are between 10^{-6} and 10^{-4}, a risk management decision is made on a case by case basis whether to pursue risk reduction measures.

The ecological risk assessment consisted of three steps: *Problem Formulation* (including pathway analysis); *Screening Risk Assessment* (criteria-specific analysis); and *"Definitive" Risk Assessment* (toxic-effect analysis). The screening risk assessment consisted of a comparison of maximum concentrations of potential COCs in surface sediment, surface water, and prey of wildlife to various toxicological criteria. The screening assessment documented the presence of 22 COCs at the Site, including mercury, HCB and PCBs that could potentially cause adverse ecological effects. The toxic-effect analysis for aquatic life addressed benthic and water-column organisms by a combination of laboratory-based and field-based studies.

Effects on Sediment-Dwelling (Benthic) Organisms:

Laboratory-based toxicity studies on the survival and growth of amphipods and/or midges exposed to sediment from the Site documented potential hazards to the sediment organisms in all of the aquatic habitats, except the West Flume. Statistical analyses of number and types of sediment-dwelling species in aquatic habitats on the Site resulted in similar conclusions regarding relative impacts. However, by this method, all macrobenthic communities, including that in the West Flume, were judged to be at least moderately stressed.

Effects on Water-Column Organisms:

Survival, growth and reproduction impacts to organisms living in the water column, tested by exposing waterfleas *(Ceriodaphnia dubia)* and fathead minnows to water collected from the Site, indicated significant hazard only in the West Ditch, which discharges to the Wetland A. In contrast, organisms exposed to water from the West Flume upstream and downstream of the ditch showed no significant negative effects.

Food Chain Toxicity of Bioaccumulative Contaminants:

The toxic-effect analysis for wildlife consisted of food-web modeling leading to the development of hazard quotients[4] (HQs) for a piscivorous bird, the belted kingfisher; a piscivorous mammal, the mink; and an insectivorous mammal, the short-tailed shrew. These three wildlife

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[4] Hazard Quotients (HQs) are values obtained from dividing an estimated environmental exposure value by a toxicity reference value (such as a concentration known to cause no adverse effects). HQ values equal to or greater than 1.0 indicate potential ecological risk.

species were used for the indigenous wildlife community because they represent relatively high trophic levels (*i.e.*, they are animals relatively high on the food chain) with a propensity to biomagnify COCs. Maximum HQs (*i.e.*, using maximum concentrations of contaminants) developed for the belted kingfisher were 57.69 for mercury (methyl mercury), 1.00 for total PCBs, and 5.83 for the DDT family. Maximum HQs for the mink were 25.69 for mercury (methyl mercury) and 3.65 for total PCBs. Maximum HQs for the short-tailed shrew were 87.51 for total PCBs. Many of the HQs calculated are equal to or greater than 1.0, thereby indicating the presence of Site-related toxicological risk to wildlife. The results of the mean HQs (*i.e.*, using mean concentrations) are less than the results of the maximum HQs. However, many of the mean HQ values are also equal to or greater than 1.0, again indicating the presence of Site-related toxicological risk to wildlife.

Summary of Human Health and Ecological Risks

Based upon the human health and ecological risk assessments, NYSDEC and EPA have determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the selected remedy or one of the other active measures considered, present a current or potential threat to public health or the environment.

Specifically, it has been concluded that: (1) carcinogenic risks to humans for current and future exposure scenarios are within the acceptable risk range for Superfund sites (10^{-4} to 10^{-6} for incremental cancer risks); (2) non-cancer health effects to humans could occur due to trespassing and future work at the Site, and the primary contributors to these potential adverse non-cancer health effects are mercury and PCBs; and (3) the primary concern for fish and wildlife resources is mainly due to mercury (methyl mercury) and PCBs.

The risk assessments for this Site do not address the exposure of mercury to humans, fish and wildlife from the Site in Onondaga Lake, including the consumption of fish. The Site has been documented to be a major source of mercury to the Lake, and the New York State Department of Health has issued a fish advisory on the consumption of fish from Onondaga Lake due to mercury contamination in those fish. Risk exposures to humans, fish and wildlife within the Lake, however, are being examined as part of the Onondaga Lake Bottom RI/FS.

Basis for Action

Based upon the human health and ecological risk assessments, NYSDEC has determined that the response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances from the Site into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following remedial action objectives have been established:

- eliminate, to the extent practicable, contaminant migration from the Site to the Onondaga Lake environs and environmental media (e.g., groundwater, surface waters, soil, air and sediment);
- restore, to the extent practicable, groundwater quality to levels which meet state and federal drinking water standards;
- mitigate, to the extent practicable, the migration and potential migration of contaminated waters through Site sewers;
- eliminate, to the extent practicable, the direct contact threat associated with contaminated soil, surface water and groundwater; and
- reduce, to the extent practicable, the level of contaminants in surface water and sediments to attain surface water ARARs and sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend.

SUMMARY OF ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. §9621(b)(1) and 6 NYCRR Part 375, mandates that a remedial action must 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 alternatives to the maximum extent practicable. CERCLA Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA Section 121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the Site can be found in the FS report. The FS report presents numerous remedial alternatives categorized by the media (contaminated sediments, groundwater, soil, and Site sewers) they address. To facilitate the presentation and evaluation of these alternatives, the FS report's alternatives have been consolidated into the remedial alternatives discussed below.

While deep soil excavation alternatives were considered in the FS report, these alternatives were screened out due to concerns associated with the feasibility and/or potential risks associated with implementing these alternatives. Concerns associated with the feasibility of deep soil excavation include the likelihood that it would be difficult to locate and excavate all of the elemental mercury due to the excavation depth. In addition, costs for excavating the deep soil above the glacial till would be approximately $72,000,000. Also, liquid elemental mercury in the deep soil is limited in extent, appears to be stable (*i.e.,* not likely to be mobile), and is not contributing significantly, in terms of areal extent, to dissolved mercury concentrations in the lower aquifer. Geotechnical borings taken as part of the facility development in the 1950s are believed to have penetrated the silt and clay layer, which acts as an aquitard between the upper and lower aquifers, and may have facilitated the downward migration of elemental mercury at the Site. However, the hydraulic measurements and aquifer chemistry (*e.g.*, pH and chlorides) between the upper and lower aquifers suggest that the silt and clay layer is acting as an aquitard in portions of the Site. This is supported by the fact that dissolved mercury concentrations are significantly higher in the upper aquifer than in the lower aquifer. Deep soil alternatives would require excavation of the silt and clay layer, which in general separates the upper and lower aquifers. The removal of the silt and clay layer would likely result in greater mixing between the groundwater in the upper and lower aquifers. Given the potential influence of Site geochemical conditions on the solubility of mercury, this could result in an increase in the mobility of mercury in the lower aquifer. Based on the risks posed by the alternatives and the technical infeasibility of removing all of the deep elemental mercury from the subsurface, the deep soil excavation alternatives were screened out.

As was discussed above, in March 2000 an IRM was completed which removed portions of the on-Site sewers which were, or which may have been, releasing mercury-contaminated water into the West Flume and East Ditch. The downgradient ends of these sewers were then plugged and the excavations were filled with a soil/bentonite mixture to prevent preferential pathways from developing. An IRM entailing the demolition of most of the on-Site structures commenced in May 2000. A Diaphragm and Mercury Cell Building demolition IRM commenced in July 2000. This IRM will, in part, consist of removing and recycling elemental mercury from cells inside the Mercury Cell Building, followed by the decontamination and demolition of the buildings. For purposes of identifying and evaluating remedial alternatives for the Site, these IRMs will be considered completed.

The present-worth costs for the alternatives discussed below are calculated using a discount rate of 7 percent and a 30-year time interval. The time to implement reflects only the time required to construct and implement the remedy and does not include the time required to design the remedy, insure the performance of the remedy by Honeywell, or procure contracts for design and construction.

Components Common to all Action Alternatives:

Each combination of action alternatives assumes that a deed restriction would be placed on the facility to restrict unacceptable future use at the facility. The deed restriction would restrict the use of less than 20 acres of land at the main portion of the facility. The capital cost and present-worth cost for implementing a deed restriction would be approximately $20,000.

Sediment, Sewer, Brine Mud and Soil Alternatives:

Alternative SSBMS-1: No Further Action with Long-Term Monitoring

Capital Cost:	$0
Annual Monitoring Costs:	$9,400
Total Present-Worth Cost:	$117,000
Construction Time:	1 month

The Superfund program requires that the "no action" alternative be considered (for this Site the no further action alternative must be considered, as opposed to the no action alternative, because various Site IRMs have either been conducted at the Site or are currently in the construction phase) as a baseline for comparison with the other alternatives. The "no further action remedial alternative" does not include any further physical response measures that address the contaminated sediments, soil, surface water or wastes. This alternative would, however, include annual, long-term monitoring of contaminant levels in the surface water, sediments, and biota.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Alternative SSBMS-2: Excavation and On-Site Disposal of Contaminated Sediments; Cleaning Catch Basins and Manholes and Filling Sewers; Excavation and On-Site Disposal of Brine Muds; Excavation and On-Site Treatment of Principal Threat Mercury-Contaminated Shallow Soil followed by On-Site Disposal of Treated Soil; Excavation and Off-Site Disposal of PCB-Contaminated Soil; and Construction of a Low-Permeability Cap

Capital Costs:	$9,410,000
Annual Operation & Maintenance Costs:	$29,200
Total Present-Worth Cost:	$9,624,000
Construction Time:	2 years

This alternative includes excavating approximately 19,000 cubic yards of sediments which exceed the background level of 0.2 mg/kg of mercury along an approximately 4,800-foot length of the West Flume. It was assumed that all sediment in the West Flume would require excavation in order to achieve the cleanup goal of 0.2 mg/kg of mercury. Excavation would occur in short segments, and the West Flume's flow would be bypassed around the working segments to avoid contaminated sediment resuspension and transport.

The wetlands portion of the alternative includes excavating an estimated 35,300 cubic yards of sediments which exceed the background level of 0.2 mg/kg of mercury from Wetland A, which includes the West Ditch (an on-Site drainage ditch), and Wetland B. Based upon the data obtained as part of the RI, it was assumed that all sediments to a depth of 3 feet would require excavation in order to achieve the cleanup goal of 0.2 mg/kg of mercury. However, due to the limited sampling results available in Wetland B, additional sediment sampling would be required during the design phase in order to further delineate the extent of mercury contamination in that wetland. Prior to excavation, standing water would be removed (pumped out) from the wetlands and treated as discussed below.

Excavation from the West Flume and the wetlands would occur with conventional earthmoving equipment. Following excavation, sediments from both the West Flume and the wetlands would be gravity dewatered and placed on-Site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap (see cap discussion below). Sediments would have to pass Toxic Characteristic Leaching Procedure (TCLP) testing prior to placement on-Site.

Implementation of the sediment portions of this alternative would require clearing and grubbing activities and implementation of soil erosion and sediment controls. The West Flume would undergo restoration with clean soil and revegetation. The wetlands would be restored through a wetlands assessment and restoration plan which would be developed as part of the remedial design. New wetlands would be created at an off-Site location if on-Site restoration was impracticable or not feasible. Post-excavation monitoring of West Flume and wetland surface water, sediments, and biota would be conducted on an annual basis for at least 5 years to assess the effectiveness of the remedy.

This alternative would also consist of cleaning the estimated 25 sewer catch basins and manhole structures downgradient of the Mercury and

Diaphragm Cell Buildings. As these basins and structures are low points in the sewer system, elemental mercury and mercury-contaminated solids would likely accumulate at these locations. Cleaning of these structures would include temporarily plugging the inlet and outlet pipes, and removing all of the water and solids from the structures using a vacuum truck and high-pressure sprayer. While it was assumed that the solids removed from the sewer structures, approximately 15 cubic yards, would be disposed of off-Site at a hazardous waste treatment (retort) facility, on-Site treatment of these solids (with the principal threat waste soils discussed below) would be evaluated during the design phase. Following cleaning, all pipes in the subject area would be filled with a flowable grout and all access points would then be sealed using concrete.

This portion of the alternative includes excavating an estimated 3,200 cubic yards of brine muds and placing the material on-Site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap (see cap discussion below). It is envisioned that no stabilization of the brine muds would be required prior to their placement under the cap. Since the brine muds are currently in piles, no backfilling would be required. However, following the excavation, the area would be covered with six inches of top soil, seeded and allowed to vegetate.

Approximately 4,500 cubic yards of mercury-contaminated principal threat shallow soil areas[5] would be excavated and treated on-Site *via* physical separation, chemical leaching, soil washing and/or solidification/stabilization. These principal threat waste areas would be soil containing high concentrations of mercury including elemental mercury DNAPL which exists in Site soils. For evaluating this alternative, physical separation was used as the representative technology. However, pilot testing may be required to determine the best approach for treatment of soils. Excavation would be completed with conventional earthmoving equipment, and soils excavated from below the water table would require dewatering prior to treatment. Free product or "pools" of elemental mercury, if any exist, would be collected and handled separately, when feasible, from the soils to be treated. Treated soils would be replaced in the excavated areas after treatment goals had been achieved and placed under a New York State 6 NYCRR Part 360 equivalent low-permeability cap (see cap discussion below). TCLP testing would be required during remedial design in order to determine

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[5] For costing purposes in the FS report, 260 mg/kg of mercury (a value used in land disposal restrictions) in soil was assumed to fail TCLP testing.

the treatment goal as soils not passing TCLP would not be allowed to be placed back into the excavation area.

Soil in the Western Rectiformer Area, and other small areas with PCB contamination would be excavated and disposed of off-Site in accordance with TSCA and New York State requirements[6]. Confirmatory sampling of soils remaining after excavation would be required in order to assure alternative goals are attained.

Finally, this alternative would include an 18.5-acre New York State 6 NYCRR Part 360 equivalent low-permeability cap to be placed over the facility to contain Site soils as well as sediments from the on-Site ditches and the East Ditch[7].

Two areas at the facility outside of the proposed footprint of the cap, totaling approximately 2.2 acres in size, would require excavation to a depth of approximately 3 feet and consolidation under the cap. The excavated areas would then be backfilled with approximately 2 feet of clean fill and 1 foot of top soil and then seeded.

For costing purposes, excavated sediments from the West Flume and wetland areas, excavated soils from other on-Site areas, building demolition debris, and excavated brine muds were assumed to provide the required fill necessary for cap slopes. Proper sloping of the cap is required to allow runoff and prevent infiltration of rain water. If desired, a cap design incorporating a surface asphalt layer would provide the additional benefit of allowing future use of the area for vehicle parking.

While the remedial costs for this alternative assume that the wastewater from the dewatering activities discussed above would be treated at an off-Site wastewater treatment facility, the use of an existing wastewater treatment facility would be evaluated during the design phase. Any on-Site treatment facility would be required to meet water and/or air discharge requirements.

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[6] As per NYSDEC TAGM 4046, PCB-contaminated soil would be excavated to 1 and 10 mg/kg for surface and subsurface soil, respectively. Soil contained under a New York State 6 NYCRR Part 360 equivalent cap would require excavation to 10 mg/kg of PCB.

[7] The cap would be placed over shallow soil with mercury concentrations exceeding 0.1 mg/kg, a concentration of mercury in soil which would be protective of human health and the environment for any foreseeable future activity at this Site.

Because this alternative (Alternative SSBMS-2) would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Alternative SSBMS-3: Excavation and Off-Site Disposal of Contaminated Sediments; Cleaning, Excavation and Off-Site Disposal of Sewers; Excavation and Off-Site Disposal of Brine Muds; Excavation and Off-Site Treatment/Disposal of Mercury- and PCB-Contaminated Soils; and In-Situ Stabilization/Solidification of Deep Soils

Capital Costs:	$65,040,000
Annual Operation & Maintenance Costs:	$28,000
Total Present-Worth Costs:	$65,387,000
Construction Time:	7 years

As with Alternative SSBMS-2, this alternative includes excavating sediments which exceed 0.2 mg/kg of mercury along the West Flume and from Wetland A and Wetland B, excavating brine muds, and excavating soils in the Western Rectiformer Area and other areas exceeding NYSDEC's TAGM objectives for PCBs. This alternative also includes excavating approximately 163,000 cubic yards of shallow soil (*i.e.*, soil above the clay and silt aquitard) with mercury concentrations greater than the TAGM objective of 0.1 mg/kg. This volume of soil includes the 4,500 cubic yards of mercury-contaminated soils that presents a principal threat. Under this alternative, the excavated sediments, brine muds, and soils would be transported for treatment/disposal at an off-Site RCRA- and/or TSCA-approved facility, as appropriate.

Under this alternative, post-excavation monitoring of the wetlands and West Flume surface water, sediments, and biota would be conducted on an annual basis for at least five years to assess the effectiveness of the remedy.

This alternative would also include cleaning 25 sewer catch basins and manhole structures located downgradient of the Mercury and Diaphragm Cell Buildings. This would be accomplished by temporarily plugging the inlet and outlet pipes and removing all of the water and solids from the structures using a vacuum truck and high-pressure sprayer. Following cleaning, the sewers would be excavated and disposed of at an off-Site location.

In addition, approximately 130,000 cubic yards of soil containing elemental mercury would be stabilized and solidified in place. In this area, stabilization/solidification would occur in soils from the ground surface to the depth at which elemental mercury has migrated, approximately 50 feet below the ground surface. Building slabs, footing and subsurface utilities would be removed, as necessary, and characterized for proper disposal prior to stabilization/solidification.

The stabilization/solidification process would use reagents or binders, such as cement, coal combustion fly ash, clay or other materials to chemically fixate the contaminated soil. A treatability study would be required to determine which reagents and/or binders would be most effective for stabilizing and solidifying the soils contaminated with elemental mercury. Pretreatment with sulfide compounds would be conducted prior to adding a binder in order to yield mercury(II) sulfide, a compound with a very low solubility. A multiple auger deep soil mixing rig would be used to mix the treatment chemicals and contaminated soils *in-situ*. As the augers advance into the ground, the chemicals would be added through the center of the auger which would mix them with the contaminated soil. An increase in soil volume of approximately 30% would occur after the *in-situ* stabilization/solidification process was completed. This excess soil would be disposed of on-Site in the area where shallow soils are excavated.

Implementation of this alternative would require clearing and grubbing activities and implementation of soil erosion and sediment controls. The West Flume would undergo restoration with clean soil and wetlands would be restored as discussed in Alternative SSBMS-2. Since the brine muds are currently in piles, no backfilling would be required. However, following excavation of the brine muds, the area would be covered with six inches of top soil, seeded and allowed to vegetate.

As with Alternative SSBMS-2, while the remedial costs for this alternative assume that the wastewater from the activities requiring dewatering would be treated at an off-Site wastewater treatment facility, the use of an existing wastewater treatment facility would be evaluated during the design phase.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, further remedial actions may be implemented in the future to remove or treat the waste.

Groundwater Remedial Alternatives:

Alternative GW-1: No Action and Long-Term Monitoring

Capital Costs:	$10,000
Annual Operation and Maintenance Costs:	$9,400
Total Present-Worth Cost:	$127,000
Construction Time:	2 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative does not include any physical remedial measures that address the problem of groundwater contamination at the Site.

This alternative would, however, include the development of a long-term groundwater monitoring program and the installation of 10 additional groundwater monitoring wells. Under the monitoring program, groundwater samples would be collected and analyzed annually.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented in the future to remove or treat the wastes.

Alternative GW-2: Hydraulic Containment of Shallow Aquifer with a Groundwater Extraction Trench

Capital Costs:	$1,100,000
Annual Operation & Maintenance Costs:	$288,000
Total Present-Worth Cost:	$4,675,000
Construction Time:	8 months

This alternative would involve constructing a groundwater extraction trench along the West Flume to prevent contaminated shallow groundwater from discharging into the West Flume. The collection trench would consist of a horizontal pipe within a collection trench which would be backfilled with a high permeability material. Hydraulic containment would be maintained by using a series of sumps to extract groundwater and obtain drawdown within the trench. Preliminary modeling indicates that the base of the groundwater extraction trench would require installation at 3 to 5 feet below the water table, and that the groundwater extraction rate would be approximately 15 gallons per minute.

Soil excavated in the installation of the collection trench would be backfilled into the trench and/or disposed of on-Site. Installation of the trench would also require dewatering which, for purposes of this alternative, would be treated at an off-Site wastewater treatment facility.

For this alternative, it was assumed that the groundwater would be pumped to a new water treatment system which would be constructed on-Site. Long-term operation and maintenance of the treatment system would be required, as would the long-term disposal of precipitated solids from the treatment system. During the remedial design process, it would be determined whether treated groundwater would be discharged to the West Flume, reinjected into the groundwater system, or disposed of off-Site; and if the existing on-Site water treatment system could be modified to meet discharge requirements.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Alternative GW-3: Hydraulic Containment of Shallow and Deep Aquifers with a Subsurface Barrier Wall

Capital Costs:	$3,000,000
Annual Operation & Maintenance Costs:	$128,000
Total Present-Worth Cost:	$4,587,000
Construction Time:	8 months

Under this alternative, a subsurface barrier wall would be installed around the contaminated shallow and deep soil[8], and contaminated groundwater at the facility. The barrier wall would be installed to a depth of approximately 55 feet and would be keyed into the low-permeability, competent, glacial till, which occurs at a depth of approximately 50 feet below the ground surface. A series of soil borings would be conducted prior to designing the subsurface barrier wall to verify the depth to the glacial till in the proposed location of the barrier wall and to ensure that all of the elemental mercury is contained within the subsurface barrier wall.

For the purpose of evaluating this alternative, a bentonite slurry wall was selected as the representative barrier wall[9]. The slurry wall would be constructed by excavating a vertically-walled trench using a hydraulic backhoe and crane-mounted clamshell. The slurry wall installation would advance in a progressive manner by excavating the trench and then filling the trench with a bentonite clay and water slurry, to maintain trench stability, at one end, while backfilling the trench at the other end with a bentonite clay and soil mixture. Excess excavated soil from trenching not used as part of the bentonite clay and soil mixture would be disposed of on-Site.

In order to achieve an inward and upward hydraulic gradient, extraction wells would be installed to remove groundwater. The exact number of wells, the locations of wells, and the pumping rates required to achieve

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[8] This alternative assumes that a New York State 6 NYCRR Part 360 equivalent cap would also be constructed as part of the remedy. Costing of the cap is not considered in this alternative.

[9] Under this alternative, compatibility testing of potential barrier wall materials would be required during the remedial design to ensure that the constructed barrier would be effective in containing Site contamination.

the desired hydraulic gradient would be determined during remedial design and construction.

Long-term operation and maintenance would be required for the subsurface barrier wall, the groundwater extraction system, and the groundwater treatment system. As part of the O&M, groundwater and surface water monitoring would be required to ensure the slurry wall and groundwater extraction system were working properly.

While this alternative assumes that a new water treatment system would be constructed on-Site to treat extracted groundwater prior to discharge to the West Flume, during the design process, reinjection of treated water to the groundwater system, off-Site disposal of groundwater, and modification of the existing on-Site water treatment system would be evaluated.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Alternative GW-4: Restoration of Shallow and Deep Aquifers with Groundwater Extraction and Treatment

Capital Costs:	$3,000,000
Annual Operation & Maintenance Costs:	$288,000
Total Present-Worth Cost:	$6,574,000
Construction Time:	8 months

Under this alternative, groundwater collection trenches and extraction wells would be used to extract groundwater from the shallow and deep aquifers, respectively. Groundwater would be pumped at rates which would maintain an inward and upward hydraulic gradient[10].

Groundwater in the upper aquifer exceeds groundwater quality standards over a large portion of the Site, and groundwater quality in the lower

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[10] This alternative assumes that a New York State 6 NYCRR Part 360 equivalent cap would also be constructed as part of the remedy. Costing of the cap is not considered in this alternative.

aquifer is only impacted by the elemental mercury DNAPL in soils in a localized area. Therefore, while the shallow groundwater would be extracted from a number of locations across the Site, the deep groundwater would only be extracted from a localized area. Subsurface utilities encountered during trenching activities would require excavation, characterization and proper disposal.

Long-term operation and maintenance would be required for the groundwater extraction system and the groundwater treatment system.

While this alternative assumed that a new water treatment system would be constructed on-Site to treat extracted groundwater prior to discharge to the West Flume, during the design process, reinjection of treated water to the groundwater system, off-Site disposal of groundwater, and modification of the existing on-Site water treatment system would be evaluated.

Because this alternative would result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, NYSDEC considered the factors set out in CERCLA Section 121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01 (*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA: Interim Final*, October 1988). The detailed analysis consisted of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The following "threshold" criteria are the most important and must be satisfied by any alternative in order to be eligible for selection:

1. *Overall protection of human health and the environment* addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated,

reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with ARARs* addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver. Other Federal or State advisories, criteria or guidance are To-Be-Considered (TBCs). TBCs are not required by the NCP, but may be very useful in determining what is protective at a Site or how to carry out certain actions or requirements.

The following "primary balancing" criteria are used to make comparisons and to identify the major tradeoffs between alternatives:

3. *Long-term effectiveness and permanence* refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

5. *Short-term effectiveness* addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. *Implementability* is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. *Cost* includes estimated capital and O&M costs, and net present-worth costs.

The following "modifying" criteria are used in the final evaluation of the remedial alternatives after the formal comment period, and may prompt modification of the preferred remedy that was discussed in the Proposed Plan:

8. *EPA acceptance* indicates whether, based on its review of the RI/FS reports and Proposed Plan, the EPA concurs with, opposes, or has no comments on the selected remedy.

9. *Community acceptance* refers to the public's general response to the alternatives described in the RI/FS reports and Proposed Plan.

A comparative analysis of these alternatives based upon the evaluation criteria noted above, follows.

Overall Protection of Human Health and the Environment

Alternative SSBMS-1, no further action with long-term monitoring, would not be protective of human health and the environment since it would not address the potential human health and ecological risks posed by the contaminated sediments, sewers, brine muds, and soils.

Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) would, by contrast, be significantly more protective than Alternative SSBMS-1, in that the risk of incidental contact with contaminated substances by humans and ecological receptors would be significantly reduced. In addition, the removal of the brine muds and contaminated sediments would eliminate the potential for further surface water contamination. The cleaning of the catch basins and manholes, and the filling of the sewer system with grout would eliminate any impacts to surface water, and potentially to shallow groundwater. The excavation and treatment of the principal threat mercury-contaminated shallow soils and the capping of the facility would significantly reduce the migration of contaminants to the groundwater.

Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) would be the most protective alternative once construction was completed, since the risk of incidental contact with waste by humans and ecological receptors would be completely eliminated. Under this alternative, the contaminants would either be completely removed from the Site or treated in-situ. However, implementing the removal of excavated soils, sediments and brine muds under Alternative SSBMS-3 would present some adverse impacts to the community as a result of increased vehicular emissions, fugitive dusts, noise, and risk of traffic accidents which could result in the release of hazardous substances.

Alternative GW-1, no further action with long-term monitoring, would not be protective of human health and the environment since it would not address the potential human health and ecological risks posed by the contaminated groundwater discharge to surface water.

Shallow groundwater discharges to the West Flume and is contributing to the contravention of surface water standards which have been developed to be protective of human health and the environment. Alternative GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench) would result in the capture and treatment of the shallow impacted groundwater before it discharged to the West Flume. Therefore, Alternative GW-2 would be more protective of surface water than Alternative GW-1. However, under Alternative GW-2, groundwater modeling indicates that Wetland A would be dewatered by as much as 0.5 feet. It is believed that the dewatering of the wetland would have an adverse impact on wetland habitat and wildlife. Under Alternative GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall), contaminated deep soils would be effectively isolated (in combination with Alternative SSBMS-2) and all contaminated groundwater at the facility would be effectively contained. Since the contaminated groundwater would no longer discharge to surface waters, all potential exposure pathways would be eliminated. Groundwater modeling indicates that the water elevations of Wetland A would not be impacted as a result of implementing Alternative GW-3. This alternative would be significantly more protective of groundwater than Alternatives GW-1 and GW-2, but not as protective as Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment), which would eventually restore the groundwater to standards. However, restoration of groundwater *via* Alternative GW-4 would require the implementation of Alternative SSBMS-3, which would address all mercury-contaminated soil acting as a source of groundwater contamination. In addition, under Alternative GW-4, groundwater modeling indicates that Wetland A would be dewatered by approximately 1 to 2 feet. It is believed that this dewatering would result in the loss of the wetland.

Compliance with ARARs

There are currently no promulgated standards for contaminant levels in soils and sediments, only "To-Be-Considered" cleanup objectives: NYSDEC's TAGM limits for soils and NYSDEC's sediment cleanup objectives specified in its Division of Fish and Wildlife, Division of Marine Resources, *Technical Guidance for Screening Contaminated Sediments*, January 1999.

The contaminated sediments, sewers, brine muds, and soils would not be addressed under Alternative SSBMS-1 (no further action with long-term monitoring). Since the soils, sewers and sediments contribute to the exceedances of groundwater and/or surface water ARARs, this alternative would not comply with ARARs.

Both Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) and Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) would comply with NYSDEC's TAGM objectives for soils and NYSDEC's sediment cleanup objectives.

To comply with RCRA land disposal restrictions, under Alternative SSBMS-2, only those sediments, and soils which pass RCRA hazardous waste characteristic testing (*i.e.*, TCLP) could be disposed of on-Site without treatment.

Since Alternatives SSBMS-2 and SSBMS-3 would involve the excavation of PCB-contaminated soils, their disposition would be governed by the requirements of TSCA and RCRA. The disposal of the non-PCB-containing materials under these alternatives would be governed by RCRA.

A State 6 NYCRR Part 360 equivalent low-permeability cap is an action-specific ARAR for closure. Therefore, Alternative SSBMS-2 would satisfy this action-specific ARAR.

EPA and NYSDEC have promulgated health-protective MCLs and groundwater standards, respectively, which are enforceable standards for various drinking water contaminants. Although groundwater is not used as a drinking water source at the Site, achievement of federal MCLs and state groundwater standards is a remedial action objective.

Alternative GW-1 (no action with long-term monitoring) does not provide for any direct remediation of groundwater and would, therefore, not achieve chemical-specific ARARs.

Under groundwater Alternative GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench), an extraction trench would hydraulically contain and collect all of the shallow groundwater exceeding ARARs. The extraction trench would also eliminate the discharge of shallow contaminated groundwater to the West Flume, which in turn, would eliminate the contravention of surface water standards due to the groundwater discharge. Although chemical-specific surface water ARARs would be met, for Alternative GW-2, chemical-specific groundwater ARARs would not be met for this alternative. Also, groundwater modeling results indicate that implementing Alternative GW-2 would dewater Wetland A by approximately 0.5 feet. It is believed that this would adversely impact the habitat and wildlife in the wetland.

Under Alternative GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall), all groundwater exceeding ARARs would be effectively contained within the subsurface barrier wall, but would not be restored to groundwater quality standards. All potential impacts to surface water from groundwater discharge would also be eliminated under this alternative. Although chemical-specific surface water ARARs would be met for Alternative GW-3, chemical-specific groundwater ARARs would not be met for this alternative within the subsurface barrier wall as the contaminated groundwater would be contained. However, chemical-specific groundwater ARARs would be met for this alternative outside of the subsurface barrier wall, because the barrier wall would contain all of the contaminated groundwater.

Under Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment), all groundwater exceeding standards would be extracted and treated. In addition, potential impacts to surface water from shallow groundwater discharge would be eliminated under this alternative. However, groundwater modeling results indicate that implementing Alternative GW-4 would dewater Wetland A by approximately 1 to 2 feet and would likely result in the loss of the wetland.

Long-Term Effectiveness and Permanence

Alternative SSBMS-1, no further action with long-term monitoring, would not provide reliable protection of human health and the environment over time.

Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) would reduce the residual risk of untreated waste on the Site by excavating and treating the principal threat waste, taking the PCB-contaminated soil off-Site for disposal/treatment and isolating the remaining contaminants from contact with human and environmental receptors.

The 6 NYCRR Part 360 equivalent low-permeability cap under this alternative would provide a high level of effectiveness in isolating unsaturated shallow soils from potential human and environmental exposure routes. These types of caps are a well-proven method for physically isolating contaminated media and significantly reducing surface water infiltration, leachate generation, and waste mobility. The EPA handbook "Remedial Action at Waste Disposal Sites" states that the design life of a multilayer cap constructed using a flexible membrane liner along with a low-permeability clay liner is in excess of 100 years. The cap would require routine inspection and maintenance (asphalt patching or mowing, fertilizing, reseeding and repairing any potential erosion or burrowing rodent damage) to ensure its long-term effectiveness and permanence.

The majority of the area that would be capped under Alternative SSBMS-2 is industrialized and is not vegetated. The ecological risk assessment concluded that this part of the Site is not a valuable habitat for wildlife. The primary vegetated area which would be capped is the East Ditch. The East Ditch is a small (about three to 5 feet wide), intermittently flowing drainage ditch that originates upgradient of the Site. It is partially contained in a series of pipes. The East Ditch, because of its small size and intermittent flow, is not capable of supporting resident fish populations. Therefore, capping of shallow soils, including the East Ditch and the on-Site ditches would not result in the destruction of significant wildlife habitat. The increased runoff associated with a cap would be channeled to the West Flume, consistent with state and local regulations.

Under Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) all of the contaminated media would either be removed off-Site for treatment/disposal or would be treated (or immobilized) on-Site. Therefore, this alternative would provide the most reliable and permanent means of preventing exposure to contaminants on-Site and eliminating the potential for contaminants migrating off-Site.

Alternative GW-1 (no further action with long-term monitoring) would have no long-term effectiveness in the restoration of groundwater quality since elemental mercury and highly contaminated soil would continue to act as a source of contamination to the groundwater.

Alternative GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench) would result in the capture and treatment of the shallow impacted groundwater before it discharged to the West Flume. Therefore, Alternative GW-2 would be a significantly more reliable and effective means of protecting human health and the environment than Alternative GW-1. Under Alternative GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall), all contaminated groundwater at the facility would be permanently and effectively contained. Since the contaminated groundwater would no longer discharge to surface waters, all potential exposure pathways would be eliminated. This alternative would be significantly more protective than Alternatives GW-1 and GW-2, but not as protective as Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment), which would eventually restore the groundwater to standards. However, restoration of groundwater *via* Alternative GW-4 would require the implementation of Alternative SSBMS-3, which would address all mercury-contaminated soil acting as a source of groundwater contamination. In addition, under Alternative GW-4, groundwater modeling indicates that Wetland A would be dewatered by approximately 1 to 2 feet. It is believed that this dewatering would result in the loss of the wetland.

Also, Alternatives GW-2, GW-3, and GW-4 would require operation and maintenance activities to maintain their effectiveness and they would generate treatment residues which would have to be appropriately handled; Alternative GW-1 would not require operation and maintenance and would not generate any residues.

Reduction in Toxicity, Mobility, or Volume Through Treatment

Alternative SSBMS-1, no further action with long-term monitoring, would not reduce the toxicity, mobility, or volume of contaminated media.

Under Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap), the on-Site treatment of the principal threat mercury-contaminated shallow soil and the off-Site treatment/disposal of the PCB-contaminated soil would reduce the contaminants' mobility, toxicity, and volume. The cleaning of the catch basins and manholes and filling the sewers would reduce the mobility of the contaminants present. The installation of a 6 NYCRR Part 360 equivalent low-permeability cap would reduce the mobility of mercury in the unsaturated soil by isolating it from transport mechanisms such as leaching to groundwater and surface water runoff. Disposal of the excavated, untreated soils, sediments and brine muds under a low-permeability cap would also reduce contaminant mobility. The toxicity and volume of all of these materials, however, would remain unchanged.

Under Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils), the off-Site treatment of the excavated material would reduce their toxicity, mobility, and volume. Those wastes that are simply disposed of off-Site would only have their mobility reduced. The *in-situ* stabilization/solidification of the mercury-contaminated soils would reduce their toxicity and mobility. It is estimated that the addition of stabilization/solidification agents would increase the volume of soils by 30%.

Alternative GW-1 (no action with long-term monitoring) would not actively reduce the toxicity, mobility, or volume of contaminants through treatment. Groundwater Alternatives GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench), GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall) and GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment) would reduce the mobility of contaminants (primarily mercury) by preventing shallow groundwater from discharging to the West Flume and being transported off-Site to Geddes Brook, Nine Mile Creek and Onondaga Lake. The toxicity of the collected or extracted groundwater would be permanently reduced through treatment. While all of the groundwater alternatives would gradually reduce the volume of contaminated groundwater over an extended length of time through extraction and treatment, Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment) would do so in a more aggressive manner. While Alternative GW-4 would be the most aggressive means of addressing the contaminated groundwater, using preliminary modeling results, EPA estimates that it would require in excess of 30,000 years to attain groundwater quality standards at the facility under this alternative.

Short-Term Effectiveness

Alternative SSBMS-1 (no further action with long-term monitoring) does not include any physical construction measures in any areas of contamination and, therefore, would not present a risk to the community as a result of its implementation.

Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) would require the delivery of cap construction materials and off-Site transport of contaminated waste materials. Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) would require the off-Site transport of a greater amount of contaminated waste material and would require the delivery of solidification treatment system components. Although trucks entering and leaving the Site would use the heavily-traveled roadways in the area, both alternatives, Alternative SSBMS-3 much more so than Alternative SSBMS-2, would increase vehicle traffic and could subject nearby residents to increased noise levels and may pose the potential for traffic accidents which could result in releases of hazardous substances. In addition, Alternative SSBMS-3 could subject the residents to increased noise levels during the operation of the on-Site stabilization/solidification treatment system.

Also, under both action alternatives, disturbance of the land during excavation and/or construction activities could affect the surface water hydrology of the Site. There is a potential for increased stormwater runoff and erosion during excavation and construction activities that would have to be properly managed to prevent excessive stormwater and sediment loadings to surface waters. For both action alternatives, appropriate measures would be taken during excavation activities to prevent transport of fugitive dust and exposure of workers and downgradient receptors to mercury-contaminated soils. In addition, under Alternative SSBMS-2, measures would need to be taken to protect workers and downgradient receptors from emissions from the on-Site soil treatment system.

The excavation of contaminated sediments would result in the temporary disruption of the West Flume and wetland environments.

All of the groundwater alternatives might present some limited risk to on-Site workers through dermal contact and inhalation related to groundwater sampling activities. Under Alternative GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench), short-term risks to remedial workers, area workers and residents, and the environment would be minimal because excavation of the trench would be conducted in areas with relatively low levels of contamination. Under groundwater Alternative GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall), short-term risks to remedial workers, area workers and residents, and the environment would be minimal because minimal disturbance of contaminated soil would be anticipated and the barrier wall would be constructed in areas with relatively low mercury concentrations. Under groundwater Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment), the excavation of the groundwater extraction and infiltration trenches through potentially contaminated soils could present potential short-term direct exposure risks to remedial workers, including mercury volatilization and fugitive dust generation during soil excavation and handling. These risks could, however, be minimized by utilizing proper protective equipment.

Air monitoring would need to be conducted during implementation of all action alternatives, as necessary.

It is estimated that Alternative SSBMS-1 would require one month to implement, since developing a long-term monitoring program would be the only activity that is required. It is estimated that Alternative SSBMS-2 would require 2 years to implement and Alternative SSBMS-3 would require 7 years to implement.

It is estimated that Alternative GW-1 would require two months to implement, since developing a long-term groundwater monitoring program and installing additional monitoring wells would be the only activities that would be required. It is estimated that Alternative GW-2, Alternative GW-3, and Alternative GW-4 would each require 8 months to implement.

Using preliminary modeling results, EPA estimates that it would require in excess of 30,000 years to attain groundwater quality standards at the facility under Alternative GW-4.

Implementability

Alternative SSBMS-1, no further action with long-term monitoring, would be easily implementable, as the only activity would be to develop a monitoring plan.

Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) would use reliable earthmoving equipment and proven techniques, and established administrative procedures, and sufficient facilities are available for on-Site treatment of the excavated mercury-contaminated soils and the off-Site disposal of the excavated PCB-contaminated soils. Therefore, this alternative can be readily implemented.

Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) would use reliable earthmoving equipment and proven techniques, and established administrative procedures, and sufficient facilities are available for the off-Site treatment/disposal of the excavated sediments, sewers, brine muds, and soils. While the off-Site transport of the excavated sediments, sewers, brine muds, and soils is technically feasible, the large volume of truck traffic that would result from implementation of this alternative (over 15,600 trucks to transport the waste materials out and approximately the same number of trucks to bring clean fill in), might impede its implementation. The volume of traffic on local roads may present load limit, traffic, road maintenance, and community acceptance issues that would be difficult to address. While *in-situ* solidification/stabilization would be implementable, its application at this Site would be hampered by the presence of subsurface utilities and building foundations. The process would also require the transport of potentially large volumes of bulk reagents and additives to the Site.

Alternative GW-1, no further action with long-term monitoring, would be easily implementable, as the only activities to be conducted would be the development of a long-term monitoring plan and the installation of 10 additional groundwater monitoring wells and long-term monitoring.

Alternatives GW-2 (hydraulic containment of shallow aquifer with a groundwater extraction trench) and GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall) would be easily implementable. Readily available conventional earthmoving equipment would be utilized for excavation and installation of the trench under Alternative GW-2. Subsurface barrier wall design and construction methods are well established for Alternative GW-3. Some specialized equipment and experienced contractors would, however, be required for constructing a slurry wall to a depth of 55 feet. The groundwater treatment technology required for Alternatives GW-2 or GW-3 is well proven and readily available. Administrative difficulties associated with these alternatives should be minimal. Under Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment), the restoration of groundwater to standards would be technically achievable only if accompanied by Alternative SSBMS-3, as discussed above.

Cost

The present-worth costs are calculated using a discount rate of seven percent and a 30-year time interval. The estimated capital, operation and maintenance (O&M), and present-worth costs for each of the alternatives are presented below.

Soil/Sediment Alternatives	Capital Cost	Annual OM&M Cost	Present-Worth Cost
SSBMS-1	$0	$9,400	$117,000
SSBMS-2	$9,410,000	$29,200	$9,624,000
SSBMS-3	$65,040,000	$28,000	$65,387,000

Groundwater Alternatives	Capital Cost	Annual OM&M Cost	Present-Worth Cost
GW-1	$10,000	$9,400	$127,000
GW-2	$1,100,000	$228,000	$4,675,000
GW-3	$3,000,000	$128,000	$4,587,000
GW-4	$3,000,000	$288,000	$6,574,000

As can be seen by the cost estimates, Alternative SSBMS-1 (no further action with long-term monitoring) is the least costly soil, sediment, sewer, and brine mud alternative. Alternative SSBMS-3 (excavation and off-Site disposal of contaminated sediments; cleaning, excavation and off-Site disposal of sewers; excavation and off-Site disposal of brine muds; excavation and off-Site treatment/disposal of mercury- and PCB-contaminated soils; and *in-situ* stabilization/solidification of deep soils) is the most costly soil alternative at $65,387,000. The least costly groundwater remedy is no action with long-term monitoring at $127,000. Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment) is the most costly groundwater alternative at $6,574,000.

Support Agency Acceptance

Both EPA and NYSDOH concur with the selected remedy. Letters of concurrence are attached (see Appendix IV).

Community Acceptance

Comments received during the public comment period are summarized and addressed in the Responsiveness Summary, which is attached as Appendix V to this document.

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, NYSDEC and EPA have determined that Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap), to address the contaminated sediment, sewers, brine muds, and soils, and Alternative GW-3, hydraulic containment of the shallow and deep aquifers with a subsurface barrier wall and groundwater extraction wells to achieve an inward and upward hydraulic gradient, and treatment of the extracted groundwater, to address the groundwater contamination, are the appropriate remedies, best satisfy the requirements of CERCLA Section 121, 42 U.S.C. §9621 and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9).

Alternative SSBMS-1 (no further action) would not be protective of human health and the environment, since it would not actively address the potential human health and ecological risks posed by the contaminated media.

Under Alternative SSBMS-3, the source of groundwater contamination would be removed by excavating and removing shallow soil containing mercury, and by implementing *in-situ* soil solidification/stabilization of mercury-contaminated soil and DNAPL located below the Mercury and Diaphragm Cell Buildings. However, removing 163,000 cy of contaminated soil from the Site under this alternative would require approximately 15,600 truck loads. Since approximately the same number of returning trucks would be required to import clean fill, it is anticipated that this volume of traffic on local roads would present load limit, traffic, road maintenance, and community acceptance issues that would be difficult to address. Local roads may need to be upgraded before the project was initiated and/or repaired following project completion. In addition, the increased traffic would result in increased levels of air pollution from vehicular emissions and fugitive dusts, and would present an increased risk of traffic accidents which could result in releases of hazardous substances. The excavation and off-Site disposal of contaminated soil, sediments, and brine muds under Alternative SSBMS-3 would also require an increased capital expenditure of $35.6 million as compared to the cost of excavating and treating the mercury-contaminated principal threat waste soils, excavating and placing the sediments and brine muds on-Site, and installing a low-permeability cap on the property (Alternative SSBMS-2). Implementing *in-situ* solidification/stabilization, which is also proposed under Alternative SSBMS-3, would add an additional $20 million to the capital cost of the remedy. If Alternative GW-4 (restoration of shallow and deep aquifers with groundwater extraction and treatment) was implemented, groundwater modeling results indicate that groundwater elevations in Wetland A area would be lowered by approximately 1 to 2 feet. It is anticipated that this dewatering would likely result in the loss of the wetland. Also, using preliminary modeling results, EPA estimates that it would require in excess of 30,000 years to attain groundwater quality standards at the facility under Alternative GW-4, thus making it technically impracticable to implement. Consequently, NYSDEC and EPA believe that implementing Alternative SSBMS-3 or Alternative GW-4 would result in a greater risk to health and the environment than the selected remedy, Alternative SSBMS-2 in combination with Alternative GW-3, and that implementing Alternative GW-4 would be technically impracticable.

Description of the Selected Remedy

The selected remedy involves:

- The excavation of sediments from the West Flume that exceed the background mercury concentration of 0.2 mg/kg (approximately 19,000 cubic yards) and placement of these sediments on-Site under a low-permeability cap (see below for cap discussion). The estimated average excavation depth is approximately four feet. Following sediment removal, the banks and bottom of the West Flume will be graded and filled with clean fill as necessary to maintain an appropriate hydraulic gradient. Excavation of sediments and disposal on-Site under the low-permeability cap will remove sediments exceeding background concentrations, prevent human, fish, and wildlife exposure to impacted sediments that result in unacceptable risks and prevent sediments from impacting surface water quality (see Figure 4);

- The excavation of sediments from Wetlands A and B that exceed the background mercury concentration of 0.2 mg/kg (approximately

31,000 cubic yards) and on-Site placement of these sediments under a low-permeability cap (see below for cap discussion). The estimated average excavation depth is approximately three feet. Following sediment removal, the wetlands will be restored through a wetlands assessment and restoration plan which will be developed as part of the remedial design. New wetlands will be created at an off-Site location if on-Site restoration is not feasible. Excavation of sediments and on-Site placement of these sediments under the low-permeability cap will remove sediments exceeding background concentrations, prevent human, fish, and wildlife exposure to impacted sediments that result in unacceptable risks and prevent sediments from impacting surface water quality (see Figure 4);

- The sewer system located downgradient of the Mercury Cell and Diaphragm Cell Buildings will be cleaned and filled. The cleaning of catch basins and manhole structures will include temporarily plugging the inlet and outlet pipes, and removing all of the water and solids from the structures using a vacuum truck and high-pressure sprayer. Following cleaning, all pipes in the subject area will be filled with a flowable grout and all access points will be filled with concrete. Cleaning of catch basins and manhole structures and filling the sewer system down gradient of the Diaphragm and Mercury Cell Buildings with flowable grout will mitigate potential exposure and impacts to shallow groundwater from potential leaking sewers and from the potentially leaching of mercury from the sewer structures (see Figure 5);

- The excavation of approximately 3,200 cubic yards of brine mud from the Brine Mud Disposal Area and on-Site placement of the brine muds under a low-permeability cap (see cap discussion below). After removal, the area will be covered with six inches of topsoil and seeded. Removal and disposal under the low-permeability cap will prevent human and ecological exposure to the brine mud, and will prevent the release of low concentrations of mercury and high suspended solids present in the brine mud to groundwater *via* leaching, and to surface water and sediments *via* surface water runoff (see Figure 6);

- Approximately 4,500 cubic yards of shallow soil mercury-contaminated principal threat waste from the vicinity of the Mercury Cell Building, Retort, and Still areas, and the MW-14 area will be excavated, treated, and placed back on-Site under a low-permeability cap (see cap discussion below). The soil will be treated on-Site using a technology such as physical separation, chemical leaching, soil washing, and/or solidification/stabilization. Pilot testing will be required to determine the best treatment approach. Approximately 900 cubic yards of soil, primarily from the Western Rectiformer Area, containing PCB concentrations greater than 1 and 10 mg/kg for surface and subsurface soil, respectively, will be excavated and disposed of off-Site. The excavation of shallow soil mercury-contaminated principal threat waste will significantly reduce the total mercury in shallow soil and significantly reduce sources of contamination to shallow groundwater and to surface water, *via* groundwater discharge and surface runoff (see Figure 7);

- A 6 NYCRR Part 360 equivalent low-permeability cap covering approximately 18.5 acres will be placed over the LCP Bridge Street facility to cover and contain shallow facility soils, excavated brine muds, building demolition debris, and excavated sediments from the West Flume and wetlands that exceed the soil cleanup goals, sediment background levels, and/or which present unacceptable risks. The low-permeability cap will effectively contain all shallow soils exceeding 0.1 mg/kg of mercury and 1 mg/kg of PCBs (PCB contaminated soil exceeding 10 mg/kg will be properly disposed of off-Site). The cap will therefore prevent human and ecological exposure to shallow Site-impacted soils that result in unacceptable risks (primarily due to mercury and PCBs), prevent the release of Site-related contaminants from shallow soils to surface water and sediments *via* surface water runoff, and reduce the further release of Site-related contaminants in unsaturated soils to groundwater *via* infiltration and leaching. Cap design will take into account future land use of the area (see Figure 6);

- A subsurface barrier wall will be installed around the facility to contain Site-impacted shallow and deep groundwater. The barrier wall will be installed to a depth of approximately 55 feet and keyed into the low-permeability glacial till. A series of soil borings will be conducted prior to designing the subsurface barrier wall to verify the depth to the glacial till in the proposed location of the barrier wall and to ensure that all of the elemental mercury is contained within the subsurface barrier wall. The barrier wall will also be tied into the low-permeability cap discussed above. To ensure total containment is achieved, groundwater extraction wells will be installed and pumped at a rate sufficient to maintain an inward and upward hydraulic gradient. Groundwater will be treated in an on-

Site groundwater treatment system, and subsequently discharged to the West Flume, injected into a groundwater aquifer, or disposed of off-Site. The subsurface barrier wall will reduce the potential for further migration of the elemental mercury and deep groundwater, and prevent the release of Site-related contaminants in shallow groundwater to the West Flume and other surface water bodies (see Figure 6);

- Long-term monitoring will be conducted of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy. Additional groundwater monitoring wells will be installed to confirm the extent of mercury-contaminated groundwater; and
- A deed restriction will be placed on the facility to restrict unacceptable future use at the facility, and to protect the cap and slurry wall. The deed restriction will restrict the use of less than 20 acres of land on the main portion of the facility.

If monitoring results from deep borings in the vicinity of the mercury cell building area and groundwater monitoring wells indicate that elemental mercury is mobile and that it would not be effectively contained by the cap and barrier wall system, mercury DNAPL recovery wells or other treatment methods will be considered.

A Stage IA cultural resources survey will be performed during the remedial design phase to evaluate the sensitivity of the Site for cultural resources. The results of the Stage IA survey will be used to assist in determining if additional cultural resources survey work will be required.

Under separate agreements and work plans, NYSDEC and Honeywell are presently decontaminating and demolishing a number of on-Site facility structures as IRMs.

Summary of the Estimated Remedy Costs

The estimated capital costs for the selected remedy total approximately $12.43 million dollars, and the estimated annual O&M costs total approximately $157,000. The total present-worth cost of the selected alternatives is approximately $14.23 million dollars. The total present worth is the sum of capital costs and the present-worth cost of operation and maintenance, which is based on a project life for operation and maintenance of 30 years and a 7% discount rate.

These engineering cost estimates are expected to be within +50 to -30 percent of the actual project cost, and are based upon the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedy.

Expected Outcomes of the Selected Remedy

Based upon the human health and ecological risk assessments, NYSDEC and EPA have determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the selected alternative or one of the other active measures considered, present a current or potential threat to public health or the environment.

Specifically, it has been concluded that: (1) carcinogenic risks to humans for current and future exposure scenarios are within the acceptable risk range for Superfund Sites (10^{-4} to 10^{-6} for incremental cancer risks); (2) non-cancer health effects to humans could occur due to trespassing and future work at the Site, and the primary contributors to these potential adverse non-cancer health effects are mercury and PCBs; and (3) the primary concern for fish and wildlife resources is mainly due to mercury (methyl mercury) and PCBs.

The selected alternative will contain contaminated groundwater and soil within a slurry wall and cap, preventing exposure to humans and the environment. The selected remedy will preclude the migration of contamination to the Onondaga Lake system from the Site; it will provide a reduction in the toxicity, mobility, or volume of mercury; it will satisfy the ARARs and RAOs (with the exception of groundwater ARARs and RAOs at the facility); and it will provide long-term effectiveness. Other alternatives intended to achieve groundwater ARARs within this area would cause greater risk to both human health and the environment. In addition, groundwater ARARs and RAOs outside of the containment area will be obtained. The selected remedy will be implemented in a reasonable time frame with minimal significant short-term impacts to human health or the environment. The selected remedy will be cost-effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected remedy will also meet the statutory preference for the use of treatment as a principal element. Finally, the selected remedy will provide overall protection of human health and the environment due to contaminants at the Site. These actions will restore the Site such that it can be utilized in the future in accordance with the reasonably-anticipated future land use. Under the selected remedy, it is anticipated that it will require approximately two years to implement the source control portion of the remedy. With regard to groundwater, it will take approximately eight months to construct the subsurface barrier wall. Since the groundwater portion of the remedy is hydraulic containment of the shallow and deep aquifers with a subsurface barrier wall and groundwater extraction wells, groundwater cleanup standards will not be achieved. The property and surrounding areas are presently zoned industrial, and the reasonably anticipated future land use is not expected to change. It is also anticipated that the future use of the Site groundwater will not be a drinking water source.

STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are 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.

For the reasons discussed below, NYSDEC has determined that the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment through containment with a cap and slurry wall, thereby eliminating the threat of exposure *via* direct contact with or ingestion of the contaminated media. The selected remedy will also be protective of the environment in that the excavation and containment of contaminated soil and sediments will eliminate contaminant-related concerns related to ecological receptors. The remedy will also preclude the migration of contamination to the Onondaga Lake System from the Site. While carcinogenic risks to humans for current and future exposure scenarios are already within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} at the Site, the selected remedy will reduce exposure levels to below the HI of 1 for non-carcinogens. The implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts. The selected remedy will also provide overall protection by reducing the toxicity, mobility, and volume of contamination through the on-Site treatment and/or containment of the contaminated soils and sediments, and the extraction and treatment of the contaminated groundwater.

Compliance with Applicable or Relevant and Appropriate Requirements of Environmental Laws

While there are no federal or New York State soil and sediment ARARs, remedial action goals discussed above include, in part, eliminating, to the extent practicable, contaminant migration from the Site to the Onondaga Lake environs and environmental media (e.g., soil and sediment); eliminating, to the extent practicable, the direct contact threat associated with contaminated soil; and reducing, to the extent practicable, the level of contaminants in sediments to attain sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend. The selected remedy will comply with all ARARs or justify grounds for their waiver (*i.e.*, justify grounds for not attaining ARARs). The selected remedy will not achieve groundwater ARARs within the containment area (*i.e.*, within the area contained by the cap and slurry wall), and would thus require an ARAR waiver. However, this is appropriate because compliance with this ARAR would result in a greater risk to human health and the environment than the selected alternative [See 42 U.S.C. § 9621 (d) (4) (B)]. A summary of action-specific, chemical-specific, and location-specific ARARs which will be complied with during implementation of the selected remedy is presented below.

Action-specific ARARs:

- Clean Air Act (CAA) National Emissions Standards for Hazardous Air Pollutants (NESHAPs), 40 CFR Parts 61 and 63

- CAA, New Source Review (NSR) and Prevention of Significant Deterioration Requirements, 40 CFR Part 52

- CAA, New Source Performance Standards (NSPS), 40 CFR Part 6

- Resource Conservation and Recovery Act (RCRA), Standards for Hazardous Waste Generators; Manifesting; Pre-transportation; Reporting Requirements, 40 CFR Par 262 Subparts B, C, D

- RCRA Subtitle C - Hazardous Waste Management, Identification and Listing of Hazardous Wastes, 40 CFR Part 261
- Standards for Hazardous Waste Generators, Hazardous Waste Determinations, 40 CFR Part 262.11
- Standards for Hazardous Waste Generators, 90-Day Accumulation Rule, 40 CFR Part 262.34
- Standards for Owners/Operators of Hazardous Waste Treatment, Storage and Disposal (TSD) Facilities Parts 264 and 265, Subparts B, F, G, J, S, and X
- RCRA, Standards of Capping: Surface Impoundments, Waste Piles, Landfills, Subtitle C, 40 CFR Parts 264 and 265, Subparts K, L and N
- RCRA Subtitle C, Land Disposal Restrictions (LDRs), 40 CFR Part 268
- RCRA Subtitle C, Phase IV Supplemental Proposal on Land Disposal of Mineral Processing Wastes, 62 FR 25997
- RCRA Subtitle D, Criteria for Classification of Waste Disposal Facilities, 40 CFR Part 257
- Toxic Substance Control Act (TSCA), 40 CFR Part 761
- U.S. Department of Transportation Rules for Hazardous Materials Transport, 49 CFR Part 107 *et. seq*.
- Occupational Health and Safety Act, Worker Health and Safety, 29 CFR 1910.120 and 29 CFR 1926
- NYSDEC Identification and Listing of Hazardous Wastes, 6 NYCRR Part 371
- New York State Hazardous Waste Management Facility Regulations, 6 NYCRR Parts 370, 372 and 373
- NYSDEC Corrective Action for Solid Waste Management Units, 6 NYCRR Part 373-2.19

- New York State Solid Waste Management Facility Regulations, 6 NYCRR Parts 360 and 364
- NYSDEC LDRs, 6 NYCRR Part 376
- New York State Classifications of Surface Waters and Groundwaters, 6 NYCRR Part 701
- New York State Regulations on the State Pollution Discharge Elimination System (SPDES), 6 NYCRR Parts 750-758
- New York State Air Pollution Control Regulations, 6 NYCRR Parts 120, 200-203, 207, 211, 212 and 219
- New York State Air Quality Standards, 6 NYCRR Part 257
- Local County or Municipality Pretreatment Requirements, Local regulations

Chemical-specific ARARs:

- Safe Drinking Water Act (SDWA) MCLs and MCLGs (40 CFR Part 141)
- New York State Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards, 6 NYCRR Part 703

Location-specific ARARs:

- Clean Water Act (CWA), Wastewater Discharge Permits; Effluent Guidelines, Best Available Technology (BAT) and BMPPT, 40 CFR Parts 122, 125 and 401
- CWA, Discharge to Publicly-Owned Treatment Works, 40 CFR Part 403.5
- CWA, Underground Injection Control Program, 40 CFR Parts 144-147
- CWA Section 404, Dredge and Fill in Wetlands, 33 CFR Parts 320-330 and 40 CFR Part 230

- CWA Section 404, Discharge of Dredge or Fill Material into Waters of the United States, 33 CFR Parts 320-330 and 40 CFR Part 230

- Floodplain Management 40 CFR 6, Subpart A; 40 CFR 6.302

- Protection of Wetlands, 40 CFR Part 6, Subpart A

- Fish and Wildlife Coordination Act, 16 U.S.C. 661, Modification to Waterways that Affects Fish of Wildlife, 40 CFR 6.302

- National Historic Preservation Act, 16 U.S.C. 470

- New York State Freshwater Wetlands Law ECL, Article 24, 71 in Title 23

- New York State Freshwater Wetlands Implementation Program, 6 NYCRR 662 and 665

- New York State Protection of Waters Program, 6 NYCRR Part 608

- CWA Section 401, State Water Quality Certification (WQC) Program, 33 U.S.C. 1341

Other Criteria, Advisories, or Guidance To Be Considered:

- Requirements for Management of Hazardous Contaminated Media (Hazardous Waste Identification Rule (HWIR) - Media), 61 FR 18879, 40 CFR Part 260, *et. al.*

- CAA, National Ambient Air Quality Standards, 40 CFR Part 50

- Executive Order 11990 (Protection of Wetlands)

- Executive Order 11988 (Floodplain Management)

- Land Use in the CERCLA Remedy Selection Process, OSWER Directive No. 9355.7-04

- EPA Statement of Policy on Floodplains and Wetlands Assessments for CERCLA Actions

- New York Guidelines for Soil Erosion and Sediment Control

- New York State Air Cleanup Criteria, January 1990
- SDWA Proposed MCLs
- NYSDEC, Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1, October 1998
- New York State Groundwater Effluent Limitations, TOGS 1.1.2
- NYSDEC Division of Water, Guidance on Groundwater Contamination Strategy, TOGS 2.1.1
- New York State Ambient Air Quality Guidelines, Air Guide-1
- NYSDEC Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites, October 1994
- EPA Ambient Water Quality Criteria (Federal Register, Volume 57, No. 246, December 22, 1992)
- Technical Guidance for Screening Contaminated Sediments (January 1999), NYSDEC, Division of Fish and Wildlife, Division of Marine Resources
- NYSDEC Interim Guidance on Freshwater Navigational Dredging
- NYSDEC Soil Cleanup Objectives, Technical Administrative Guidance Memorandum No. 94-HWR-4046

Cost-Effectiveness

For the foregoing reasons, it has been determined that the selected remedy provides for overall effectiveness in proportion to its cost.

The estimated capital costs for the selected remedy total approximately $12.43 million dollars, and the estimated annual O&M costs total approximately $157,000. The total present-worth cost of the selected alternatives is approximately $14.23 million dollars.

Although Alternatives SSBMS-1 and GW-1 (no further action) are less costly than the selected remedy, no further action at the Site would not achieve the overall protection of human health and the environment, and contamination from the Site would continue to migrate into the Onondaga Lake System.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in NCP §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this Site.

The selected remedy will provide a permanent solution for the contaminated soils and sediments by removing them from the environment, treating principal threat waste mercury-contaminated soil, and containing the contaminated soils, sediments and groundwater on-Site via the construction and maintenance of a cap, slurry wall and groundwater extraction and treatment system. PCB-contaminated waste above NYSDEC TAGM limits will be excavated and sent to an off-Site disposal system.

With regard to the groundwater, the selected remedy will provide a permanent remedy and will employ extraction and treatment technologies to reduce the toxicity, mobility, and volume of the contaminants in the groundwater.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied under the selected remedy in that principal threat waste contaminated soils will be excavated for on-Site treatment, and treatment will be used to reduce the volume and toxicity of contamination in the groundwater.

Five-Year Review Requirements

Since the selected alternative will result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan, released for public comment in July 2000, identified Alternative SSBMS-2 (excavation and on-Site disposal of contaminated sediments; cleaning catch basins and manholes and filling sewers; excavation and on-Site disposal of brine muds; excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil; excavation and off-Site disposal of PCB-contaminated soil; and construction of a low-permeability cap) and Alternative GW-3 (hydraulic containment of shallow and deep aquifers with a subsurface barrier wall and groundwater extraction wells) as the selected remedy. Based upon its review of the written and verbal comments submitted during the public comment period, NYSDEC and EPA determined that it would be appropriate to install additional groundwater monitoring wells to confirm the extent of mercury-contaminated groundwater, and to consider the use of mercury DNAPL recovery wells or other treatment methods, if future monitoring results from deep soil borings and groundwater monitoring wells indicate that elemental mercury is mobile and that it would not be effectively contained by the cap and barrier wall system. No other significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

APPENDIX I

FIGURES

SOURCE: U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP; SYRACUSE WEST, NY (1978).

SCALE

0 2000 4000FT.

QUADRANGLE LOCATION

LATITUDE; 43° 4' 00"
LONGITUDE: 76° 13' 00"

PARSONS ENGINEERING SCIENCE, INC.

Gradient Corporation

LCP Bridge Street FS
Solvay, New York

FIGURE 1

SITE LOCATION MAP

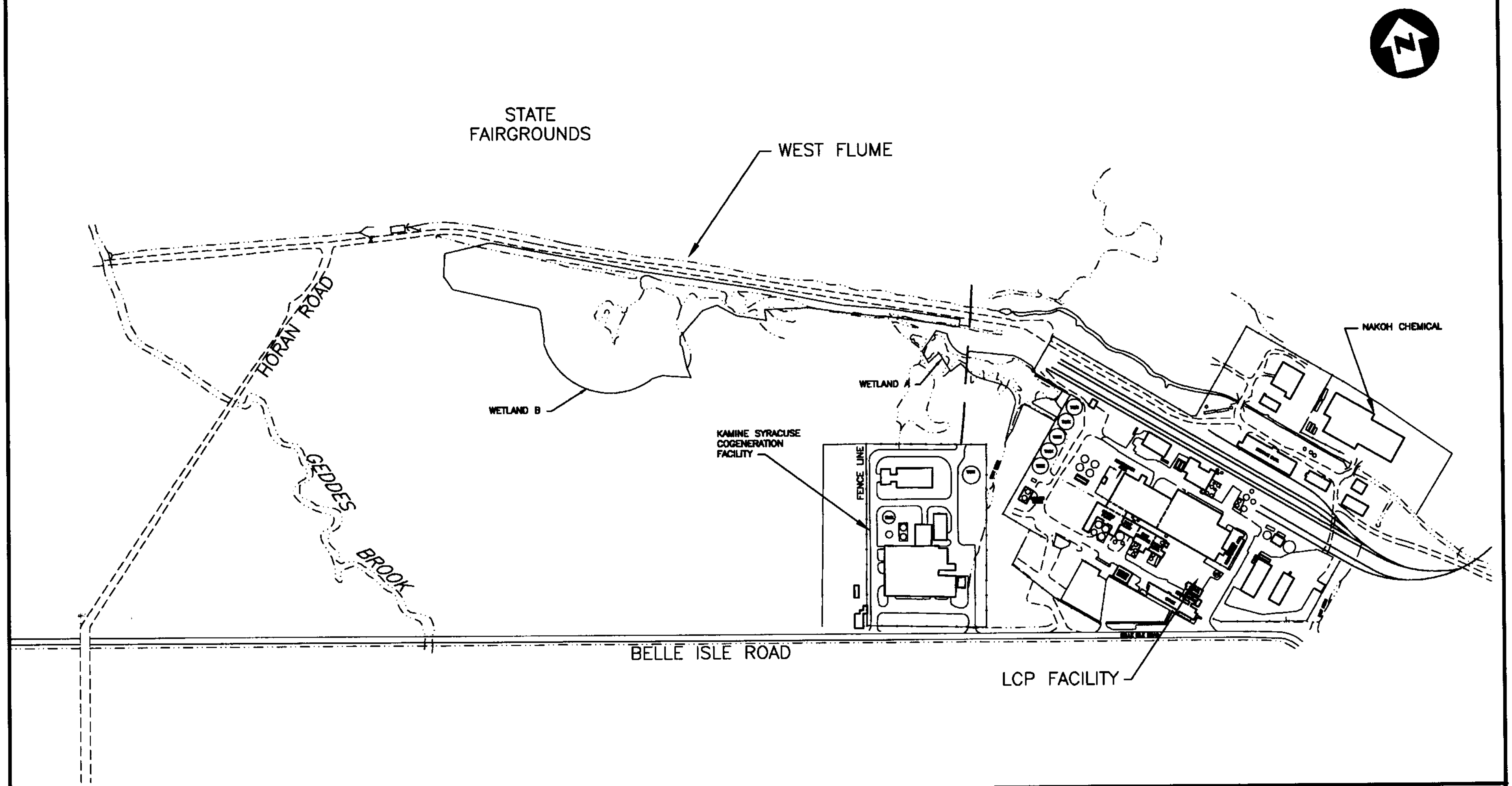

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FIGURE 2

LCP Bridge Street FS
Solvay, New York

SITE VICINITY MAP

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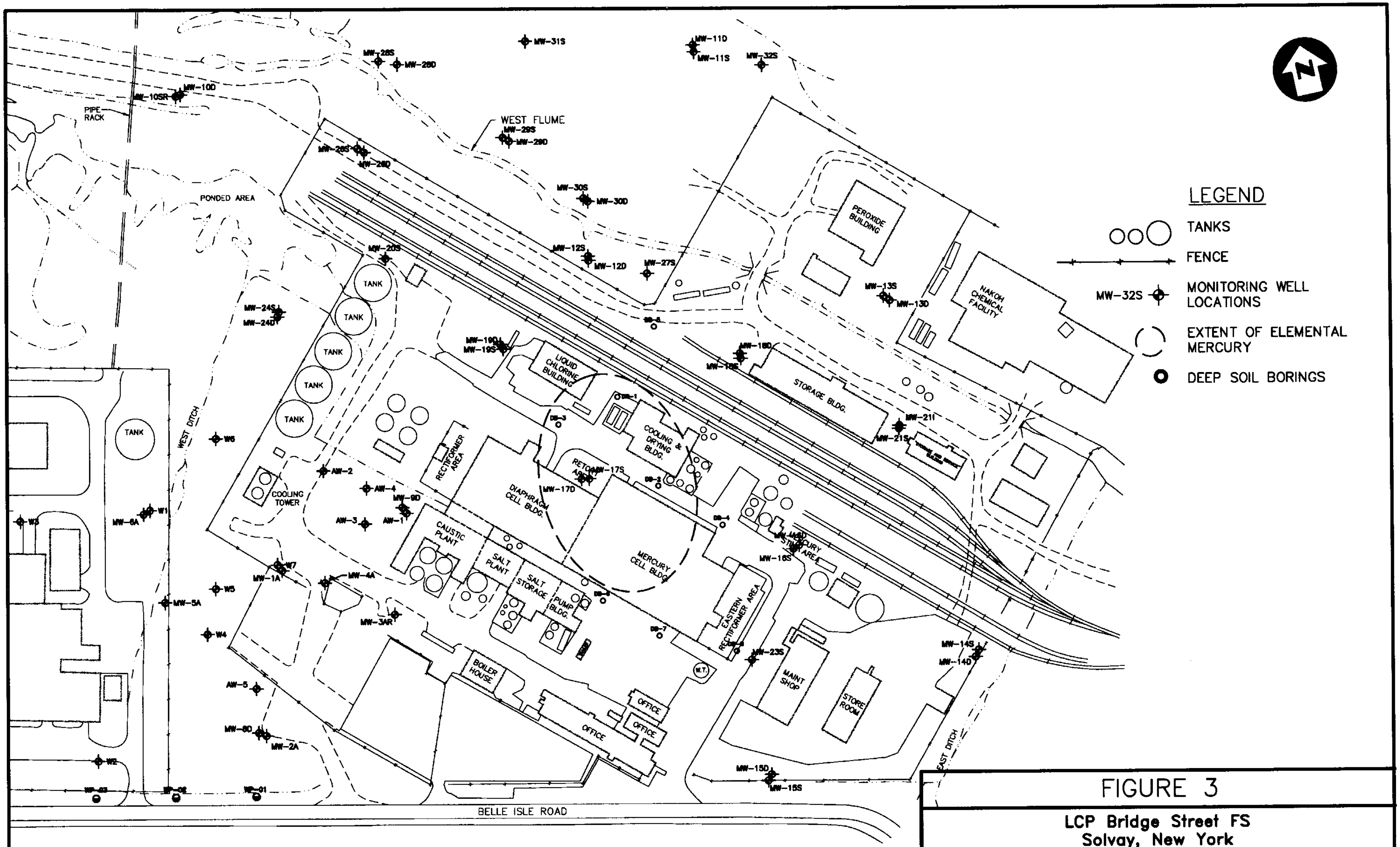

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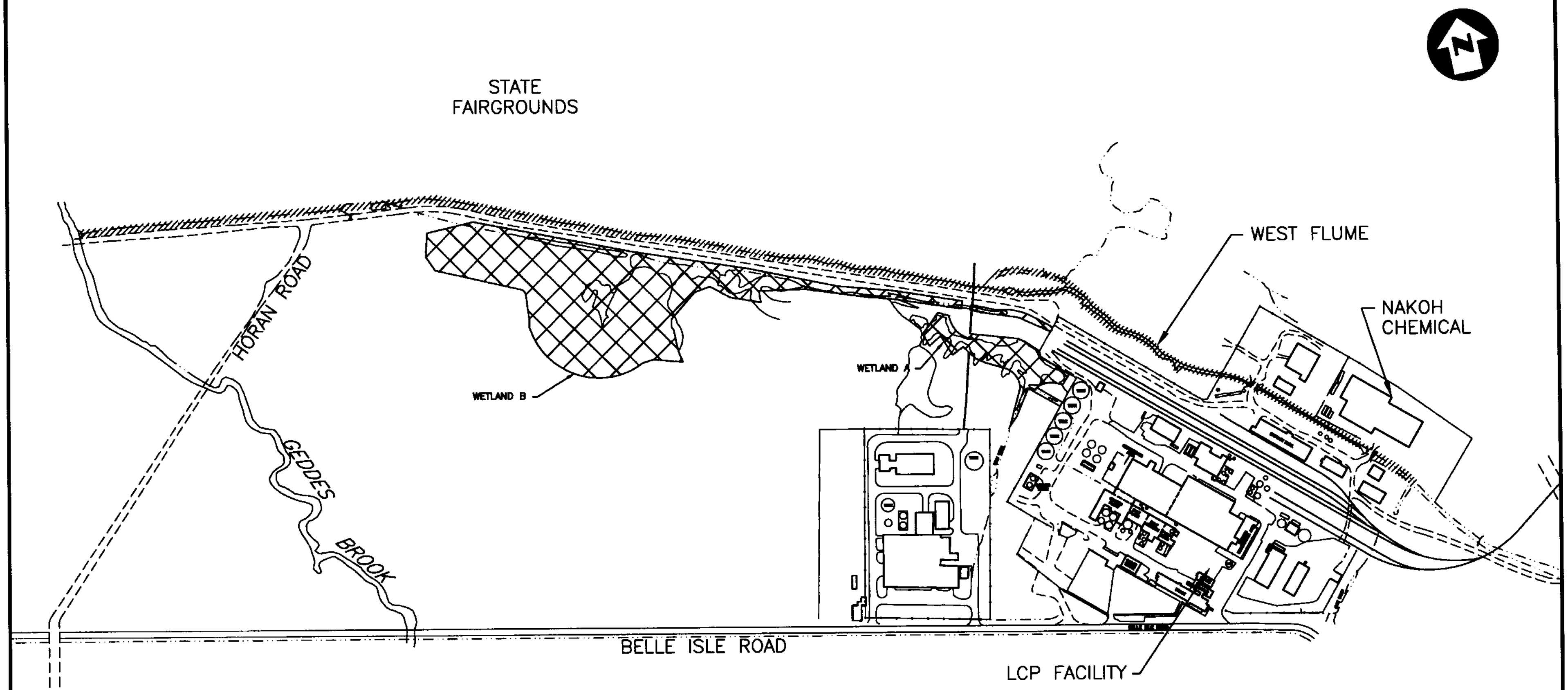
FIGURE 3

LCP Bridge Street FS
Solvay, New York

LCP FACILITY MAP

PARSONS ENGINEERING SCIENCE, INC.

Gradient Corporation



LEGEND

▨ EXTENT OF WEST FLUME SEDIMENTS TO BE EXCAVATED WITH Hg > 0.2 mg/kg

— DELINEATED WETLAND

▩ EXTENT OF SEDIMENTS TO BE EXCAVATED WITH Hg > 0.2 mg/kg AND EXTENT OF WETLAND TO BE RESTORED

500 250 0 500 1000

SCALE: 1"=500'

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XREF'S: NONE

FIGURE 4

LCP Bridge Street FS
Solvay, New York

WEST FLUME AND WETLAND SEDIMENT EXCAVATION

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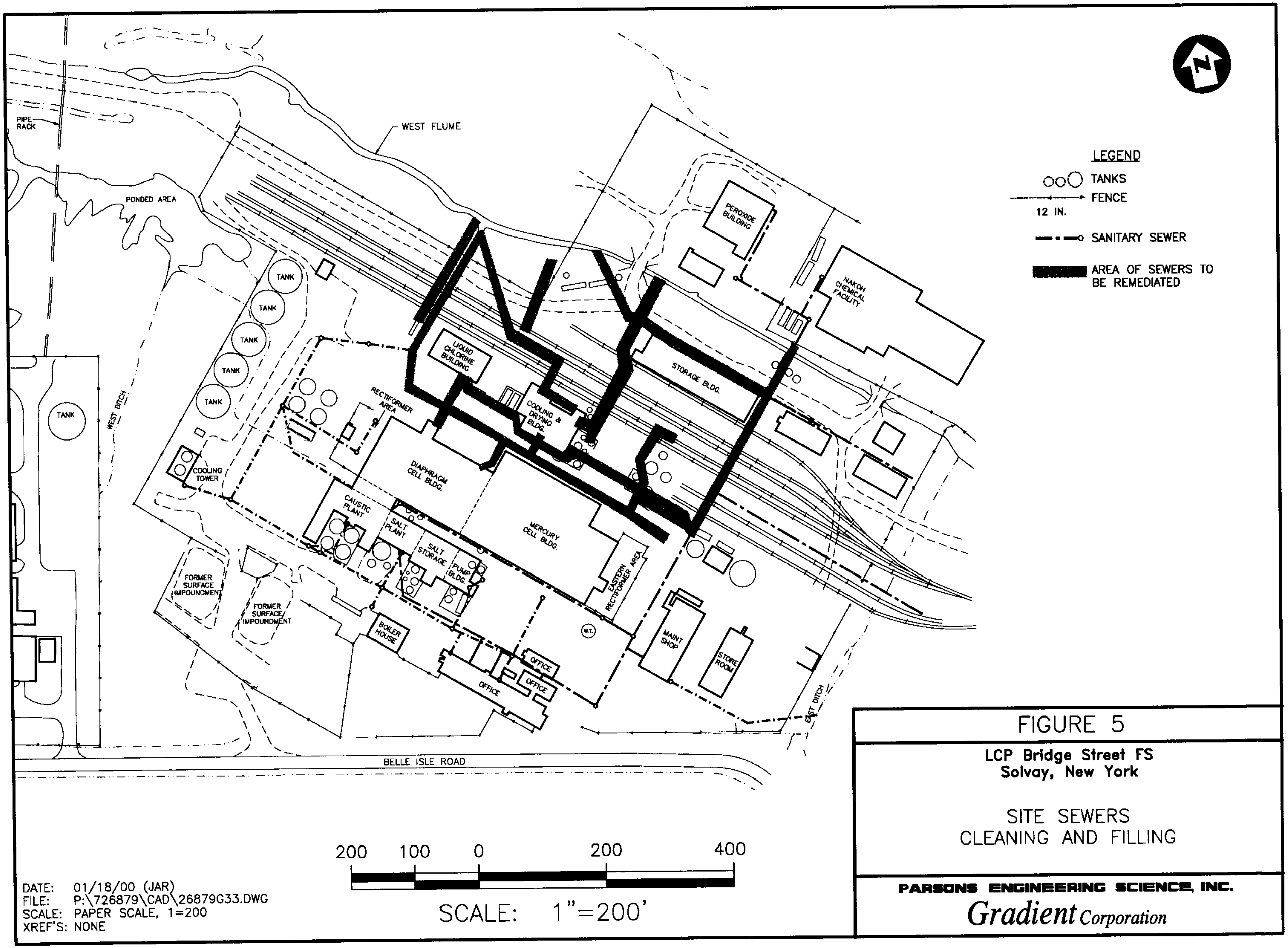

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XREF'S: NONE

FIGURE 5

LCP Bridge Street FS
Solvay, New York

SITE SEWERS
CLEANING AND FILLING

PARSONS ENGINEERING SCIENCE, INC.
Gradient Corporation

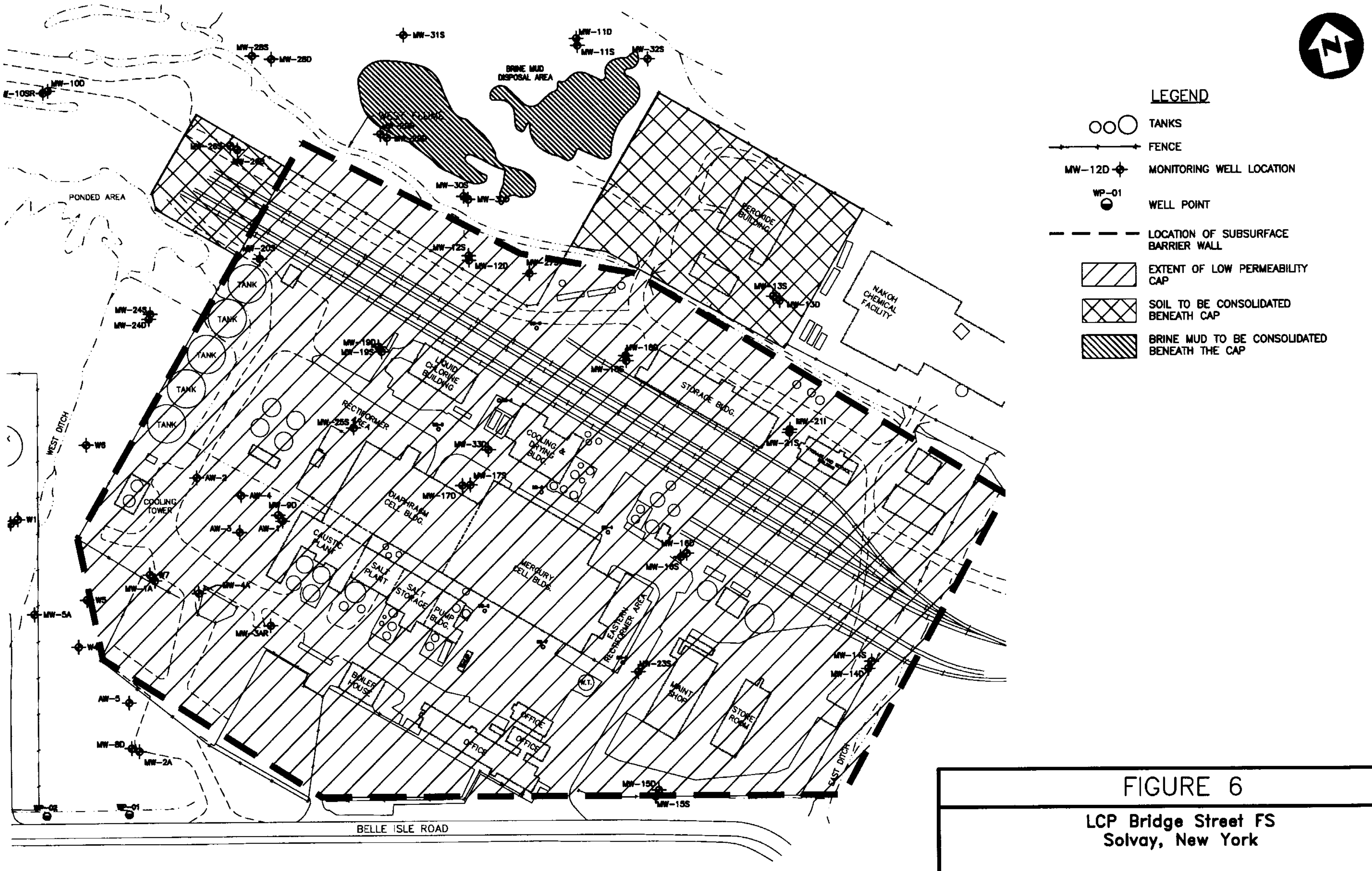

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FIGURE 6

LCP Bridge Street FS
Solvay, New York

BRINE MUD EXCAVATION, LOW PERMEABILITY CAP AND SUBSURFACE BARRIER WALL

PARSONS ENGINEERING SCIENCE, INC.
Gradient Corporation

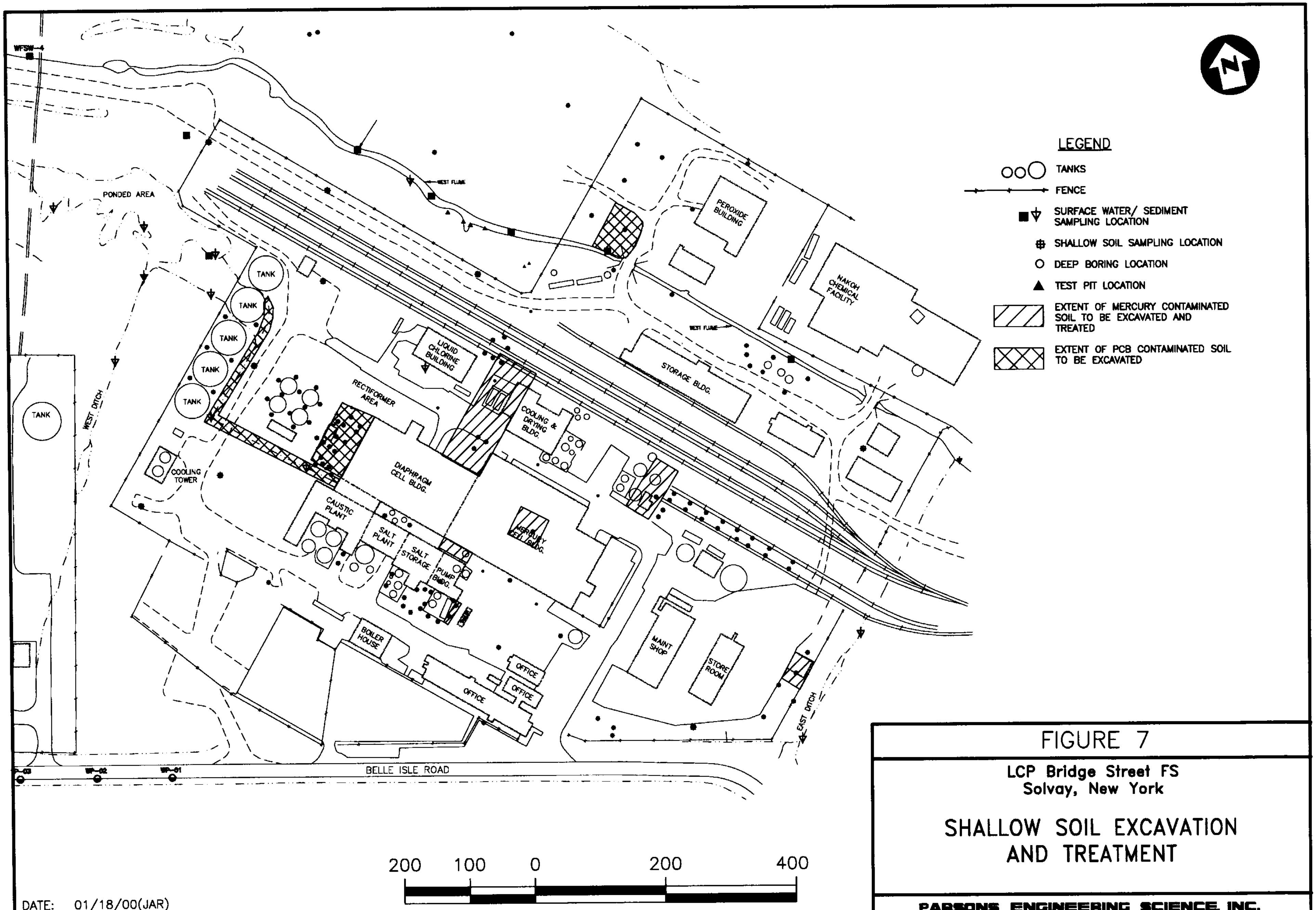

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FIGURE 7

LCP Bridge Street FS
Solvay, New York

SHALLOW SOIL EXCAVATION AND TREATMENT

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APPENDIX II

TABLES

APPENDIX II

TABLES (continued)

Table 1
Comparison of Groundwater Concentrations from All (except W1, W3, W4, and W6) Wells to MCLs, Standards and Background
LCP Bridge Street RI/FS
Solvay, New York

Sample ID Date Sampled	Units	Background (GWMW-15S) Oct-95	USEPA MCLs	NYSDEC Standards/ Guidelines	Number of Dectections	Number of Exceedances of Background	Total Number of Samples	Maximum Concentration Detected	Groundwater Monitoring Wells Exceeded Background
Volatile Organics									
1,2-Dichloroethene (total)	ug/L	10 U	170	5	3	3	9	5	MW-14S, MW-16S, MW-21S
Benzene	ug/L	10 U	5	0.7	1	1	13	2	MW-21S
Chloroform	ug/L	10 U	100	7	4	4	9	200	MW-16S, MW-21S, MW-27S[1]
Tetrachloroethene	ug/L	10 U	5	5	2	2	9	3	MW-21S, MW-30S
Xylene (total)	ug/L	10 U	10,000	5	1	1	13	1	MW-27S
Semivolatile Organics									
1,2-Dichlorobenzene	ug/L	10 U	600	4.7	1	1	11	0.8	MW-30S
1,4-Dichlorobenzene	ug/L	10 U	75	4.7	1	1	11	0.4	MW-30S
2,4,6-Trichlorophenol	ug/L	10 U	NA	5	1	1	11	0.8	MW-21I
2,4-Dimethylphenol	ug/L	10 U	NA	5	2	2	11	3	MW-21S,MW-21I
2-Methylnaphthalene	ug/L	10 U	NA	NA	3	3	11	7	MW-21S, MW-21I, MW-27S
2-Methylphenol	ug/L	10 U	NA	5	2	2	11	2	MW-21S, MW-21I
4-Methylphenol	ug/L	10 U	NA	5	3	3	11	8	AW-01, MW-21S, MW-21I
Acenaphthene	ug/L	10 U	NA	20	2	2	11	8	MW-21S, MW-27S
Anthracene	ug/L	10 U	NA	50	3	3	11	2	MW-21S, MW-21I, MW-27S
Benzo(a)anthracene	ug/L	10 U	NA	0.002	1	1	11	0.2	MW-19S
Carbazole	ug/L	10 U	NA	NA	3	3	11	17	MW-21S, MW-21I, MW-27S
Chrysene	ug/L	10 U	NA	0.002	1	1	11	0.2	MW-19S
Dibenzofuran	ug/L	10 U	NA	NA	3	3	11	5	MW-21S,MW-21I, MW-27S
Fluoranthene	ug/L	0.3 J	NA	50	4	4	11	1	MW-19S, MW-21S, MW-21I, MW-27S
Fluorene	ug/L	10 U	NA	50	3	3	11	6	MW-21S, MW-21I, MW-27S
Hexachlorobenzene	ug/L	10 U	1	0.35	2	2	11	7	MW-27S[1]
bis(2-Ethylhexyl)phthalate	ug/L	10 U	NA	50	1	1	11	26	MW-12D
Naphthalene	ug/L	10 U	NA	10	4	4	11	43	AW-01, MW-21S, MW-21I, MW-27S
Pentachlorophenol	ug/L	25 U	1	1	1	1	11	2	MW-21I
Phenanthrene	ug/L	0.3 J	NA	50	5	4	11	10	MW-19S, MW-21S, MW-21I, MW-27S
Phenol	ug/L	10 U	NA	1	2	2	11	48	MW-21S, MW-21I
Pyrene	ug/L	0.2 J	NA	50	4	4	11	0.8	MW-19S, MW-21S, MW-21I, MW-27S

Table 1
Comparison of Groundwater Concentrations from All (except W1, W3, W4, and W6) Wells to MCLs, Standards and Background
LCP Bridge Street RI/FS
Solvay, New York

Sample ID Date Sampled	Units	Background (GWMW-15S) Oct-95	USEPA MCLs	NYSDEC Standards/ Guidelines	Number of Dectections	Number of Exceedances of Background	Total Number of Samples	Maximum Concentration Detected	Groundwater Monitoring Wells Exceeded Background
PCBs									
Aroclor-1242	ug/L	1.1 U	NA	NA	1	1	11	0.2	MW-30S
Aroclor-1248	ug/L	1.1 U	NA	NA	1	1	11	0.55	MW-30S
PCBs (total)	ug/L		0.5	0.1					
Inorganics									
Mercury, total	ug/L	0.18 U	2	0.7	26	26	56	867	AW-01, MW-12S, MW-14S, MW-15D, MW-16S, MW-16D, MW-17S, MW-17D, MW-18S, MW-18D, MW-19S, MW-19D, MW-119D, MW-21S, MW-21I, MW-23S, MW 24D, MW-25S, MW-26S, MW-27S, MW-30S, MW-33D[1]
Mercury, dissolved	ug/L	0.2 U	NA	NA	21	21	56	194	AW-01, MW-12S, MW-13S, MW-16S, MW-16D, MW-17S, MW-17D, MW-18S, MW-19S, MW-21S, MW-21I, MW-25S, MW-26S, MW-27S, MW-29D, MW-30S, MW-32S, MW-33D[1]
Aluminum, total	ug/L	91300 J	50-200	NA	3	0	3	42400	
Aluminum, dissolved	ug/L	271 J	NA	NA	3	2	3	430	MW-27S, MW-30S
Antimony, total	ug/L	3 U	6	3	2	2	3	5.2	MW-27S, MW-30S
Antimony, dissolved	ug/L	4 J	NA	NA	3	2	3	7.7	MW-27S, MW-30S
Arsenic, total	ug/L	158	50	25	3	0	3	93.9	
Arsenic, dissolved	ug/L	44 J	NA	NA	2	0	3	24.9	
Barium, total	ug/L	835 J	2000	1000	3	1	3	1340	MW-27S
Barium, dissolved	ug/L	219 J	NA	NA	3	0	3	92	
Beryllium, total	ug/L	4.2 J	4	3	2	1	3	4.7	MW-27S
Cadmium, total	ug/L	3.2 J	5	5	2	1	14	10.6	MW-27S
Cadmium, dissolved	ug/L	1 U	NA	NA	1	1	14	2.2	MW-27S
Calcium, total	ug/L	479000 J	NA	NA	3	1	3	1710000	MW-27S
Calcium, dissolved	ug/L	97200 J	NA	NA	2	0	3	80700	
Chromium, total	ug/L	116	100	50	9	0	14	82.4	
Chromium, dissolved	ug/L	1 U	NA	NA	2	2	14	5.6	MW-27S, MW-30S
Cobalt, total	ug/L	67	NA	NA	3	0	3	37.4	
Copper, total	ug/L	186	1000	200	3	1	3	968	MW-27S
Copper, dissolved	ug/L	1 U	NA	NA	3	3	3	36.1	MW-27S, MW-29S, MW-30S

Table 1
Comparison of Groundwater Concentrations from All (except W1, W3, W4, and W6) Wells to MCLs, Standards and Background
LCP Bridge Street RI/FS
Solvay, New York

Sample ID Date Sampled	Units	Background (GWMW-15S) Oct-95	USEPA MCLs	NYSDEC Standards/ Guidelines	Number of Dectections	Number of Exceedances of Background	Total Number of Samples	Maximum Concentration Detected	Groundwater Monitoring Wells Exceeded Background
Cyanide	ug/L	13	200	100	1	1	3	208	MW-27S
Iron, total	ug/L	149000 J	300	300	3	0	3	67100	
Iron, dissolved	ug/L	1570 J	NA	NA	3	0	3	838	
Lead, total	ug/L	101 J	15	25	10	2	11	538	MW-27S, MW-28D
Lead, dissolved	ug/L	46.4 J	NA	NA	4	0	7	25.1	
Magnesium, total	ug/L	159000 J	NA	35,000	3	0	3	68000	
Magnesium, dissolved	ug/L	16700 J	NA	NA	2	0	3	13200	
Manganese, total	ug/L	3680 J	NA	NA	3	0	3	2100	
Manganese, dissolved	ug/L	448 J	NA	NA	3	0	3	40.9	
Nickel, total	ug/L	156	NA	NA	3	1	3	375	MW-27S
Nickel, dissolved	ug/L	3.1 J	NA	NA	3	3	3	20.7	MW-27S, MW-29S, MW-30S
Potassium, total	ug/L	37900 J	NA	NA	1	1	3	46800	MW-27S
Potassium, dissolved	ug/L	8200 U	NA	NA	1	1	3	27800	MW-27S
Selenium, total	ug/L	7.4 J	50	10	2	0	3	5.8	
Selenium, dissolved	ug/L	2.1 J	NA	NA	2	2	3	5	MW-29S, MW-30S
Sodium, total	ug/L	296000 J	NA	20,000	3	0	3	269000	
Sodium, dissolved	ug/L	290000 J	NA	NA	3	0	3	272000	
Vanadium, total	ug/L	141	NA	NA	3	0	3	85.1	
Vanadium, dissolved	ug/L	1.1 J	NA	NA	2	2	3	22.2	MW-27S, MW-30S
Zinc, total	ug/L	433	500	300	3	1	3	664	MW-27S
Miscellaneous									
Chloride	mg/L	1870	250,000	250,000	33	16	37	42700	AW-01, MW-9D, MW-11D, MW-12D, MW-13D, MW-16D, MW-17D, MW-18D, MW-19D, MW-24S, MW-24D, MW-26D, MW-28D, MW-29D, MW-30D, MW-31S
Phenols	mg/L	0.023 U	NA	1	2	2	37	0.151	MW-21I, MW-28D
Sulfate	mg/L	10 U	250,000	250,000	37	37	37	2280	All Monitoring Wells.
Total Organic Carbon	mg/L	3.77 U	NA	NA	13	13	36	231	AW-91, MW-11S, MW-13S, MW-14S, MW-16S, MW-19S, MW-21S, MW-21I, MW-25S, MW-28S, MW-31S, MW-32S, MW-33D

Note:

1. An exceedance of background was noted at the same monitoring well in both phase 1 and phase 2 sampling. Consequently, the wells listed in column do not add up to the number of background exceedances noted.

2) Every sample was considered unique, i.e., results from two different phases were not averaged.

3) If the background was non-detect, then any detectable result was considered to exceed background.

4) U-Not detected; J-estimated value; UJ-estimated detection limit

Table 2
Comparison of West Flume, East Ditch, West Ditch, and Ponded Area Surface Water Data to Background and Standards[7]
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SW-13 (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	Federal AWQC (Acute)	Number of Exceedences of Acute AWQC	Federal AWQC (Chronic)	Number of Exceedences of Chronic AWQC	NYSDEC Standard/ Guidelines[7]	Number of Exceedences of NYSDEC Guidelines	Locations Where One or More Standards/Guidelines Were Exceeded
Volatile Organics												
1,2-Dichloroethene (total)	µg/L	10U	2	11	12	11600^{6}	0	NA^{2}		NA^{2}		
1,1-Dichloroethane	µg/L	10U	1	11	1	NA^{2}		NA^{2}		NA^{2}		
Chloroform	µg/L	10U	2	11	17	28900^{6}	0	1240^{6}	0	NA^{2}		
Tetrachloroethene	µg/L	10U	1	11	1	5280^{6}	0	840^{6}	0	NA^{2}		
Trichloroethene	µg/L	10U	1	11	0.9	45000^{6}	0	21900^{6}	0	NA^{2}		
Semi-Volatile Organics												
1,2-Dichlorobenzene	µg/L	10U	1	5	2	NA^{2}		NA^{2}		5 A	0	
Pesticides/PCBs												
Aroclor-1254	µg/L	1U	1	5	0.09	2	0	0.014	1	0.001 A	1	SW-15
Mercury												
Mercury, total	ng/L	19.7	13	13	146702	NA^{2}		NA^{2}		NA^{2}		
Mercury, dissolved	ng/L	1UJ	12	13	7023	2400	3	12	10	NA^{2}		All except SW-05, SW-06, and SW-18
Methylmercury, total	ng/L	0.059	13	13	420	NA^{2}		NA^{2}		NA^{2}		
Other Inorganics/Metals												
Aluminum, total	µg/L	93.8	3	3	1210	NA^{2}		NA^{2}		100 A	3	SW-10, SW-11, SW-12
Antimony	µg/L	5.9	2	3	7.8	88^{3}	0	30^{3}	0	NA^{2}		
Arsenic	µg/L	2.4U	3	3	15.1	360	0	190	0	190 A	0	
Barium	µg/L	66.6	1	3	113	NA^{2}		NA^{2}		NA^{2}		
Cadmium	µg/L	1U	1	11	2.3	17^{4}	0	3.1^{4}	0	3.1^{4} A	0	
Calcium	µg/L	236000	0	3	0	NA^{2}		NA^{2}		NA^{2}		
Chromium	µg/L	1.2	11	11	119	16^{5}	2	11^{5}	3	588^{4} A	0	SW-03, SW-07, SW-08
Copper, total	µg/L	4.6	3	3	16.4	59^{4}	0	35^{4}	0	35^{4} A	0	
Iron	µg/L	462	3	3	1730	1000	1	NA^{2}		300 A	3	SW-10, SW-11, SW-12
Lead, total	µg/L	4.1UJ	7	11	524	NA^{2}		NA^{2}		16^{4} A	7	SW-03, 04, 06, 07, 08, 10, and 15
Lead, dissolved	µg/L	R		5	287	415^{4}	0	16^{4}	3	16^{4} A	3	SW-03, SW-09, SW-15
Magnesium, total	µg/L	37100	0	3	0	NA^{2}		NA^{2}		NA^{2}		
Manganese, total	µg/L	24	3	3	103	NA^{2}		NA^{2}		NA^{2}		
Nickel, total	µg/L	11.8	0	3	0	4172^{4}	0	464^{4}	0	252^{4} A	0	

Table 2
Comparison of West Flume, East Ditch, West Ditch, and Ponded Area Surface Water Data to Background and Standards[7]
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SW-13 (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	Federal AWQC (Acute)	Number of Exceedences of Acute AWQC	Federal AWQC (Chronic)	Number of Exceedences of Chronic AWQC	NYSDEC Standard/ Guidelines[7]	Number of Exceedences of NYSDEC Guidelines	Locations Where One or More Standards/Guidelines Were Exceeded
Potassium, total	µg/L	11500	2	3	33700	NA[2]		NA[2]		NA[2]		
Selenium, total	µg/L	2U	1	3	2.6	20	0	5	0	1 A	1	SW-11
Sodium, total	µg/L	179000	3	3	230000	NA[2]		NA[2]		NA[2]		
Vanadium, total	µg/L	1UJ	3	3	5.6	NA[2]		NA[2]		14 A	0	
Chloride	mg/L	607	6	11	1280	860	5	230	9	NA[2]		All except SW-05 and SW-06
Phenols	mg/L	0.012	7	12	0.035	NA[2]		NA[2]		NA[2]		
Sulfate	mg/L	553	0	12	0	NA[2]		NA[2]		NA[2]		
Total Organic Carbon	mg/L	2.08	12	12	26.4	NA[2]		NA[2]		NA[2]		
Total Suspended Solids	mg/L	5	12	12	5400	NA[2]		NA[2]		NA[2]		

Notes:

Target Analyte(s)/fraction included – VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. *U-Not Detected; J-estimated value; UJ-estimated detection limit.*
2. *NA indicates that a standard was not available for the analyte.*
3. *Proposed value.*
4. *Hardness (as $CaCO_3$) was calculated with the formula Hardness=2.497*(Ca mg/L)+4.118*(Mg mg/L) using calcium and magnesium data from SW-10, SW-11, SW-111, and SW-12.*

   Hardness values ranged from 358 mg/L to 479 mg/L. The hardness value of 358 mg/L (SW-10, Ponded Area) was used to calculate the hardness-dependent water quality criteria, since this value yields the lowest and most conservative water quality criteria.
5. *The water quality criteria for hexavalent chromium was used in order to be conservative.*
6. *Lowest Observable Effect Level.*
7. *The fish propagation or wildlife consumption of fish (A) based standard/guidance was used whenever one was available (NYSDEC, 1993). A comparison of site-related concentrations to human health based standards, for compounds with no aquatic life or wildlife consumption of aquatic life standards, is presented in Appendix D.*

A - Indicates that the standard is intended to protect aquatic life or animal consumers of aquatic life.

Table 3
Comparison of Shallow Sediment Data in West Flume to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	2	--^{5}	NA^2		
1,1-Dichloroethane	µg/kg	12 U	0	2	--^{5}	NA^2		
1,2-Dichloroethene (total)	µg/kg	12 U	0	2	--^{5}	NA^2		
Acetone	µg/kg	12 UJ	0	2	--^{5}	NA^2		
Chlorobenzene	µg/kg	12 U	0	2	--^{5}	42 (BAL-C)		
Chloroform	µg/kg	12 U	0	2	--^{5}	NA^2		
Ethylbenzene	µg/kg	12 U	0	2	--^{5}	NA^2		
Methylene Chloride	µg/kg	12 U	0	2	--^{5}	NA^2		
Tetrachloroethene	µg/kg	12 U	0	2	--^{5}	NA^2		
Toluene	µg/kg	12 U	0	2	--^{5}	NA^2		
Xylene (total)	µg/kg	12 U	0	2	--^{5}	NA^2		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	780 U	1	2	61	142 (BAL-C)^4	0	
1,4-Dichlorobenzene	µg/kg	780 U	1	2	53	142 (BAL-C)^4	0	
2-Methylnaphthalene	µg/kg	44 J	0	2	--^{5}	NA^2		
Acenaphthene	µg/kg	110 J	0	2	--^{5}	1662 (BAL-C)		
Acenaphthylene	µg/kg	170 J	1	2	180	NA^2		
Anthracene	µg/kg	370 J	1	2	380	NA^2		
Benzo(a)anthracene	µg/kg	1800	1	2	2000	NA^2		
Benzo(a)pyrene	µg/kg	2600 J	1	2	2700	NA^2		
Benzo(b)fluoranthene	µg/kg	3300 J	1	2	4700	NA^2		
Benzo(g,h,i)perylene	µg/kg	780 UJ	0	2	--^{5}	NA^2		
Benzo(k)fluoranthene	µg/kg	2800 J	1	2	3800	NA^2		
bis(2-Ethylhexyl)phthalate	µg/kg	780 UJ	1	2	1900	2368 (BAL-C)	0	
Butylbenzylphthalate	µg/kg	780 UJ	0	2	--^{5}	NA^2		
Carbazole	µg/kg	430 J	1	2	440	NA^2		
Chrysene	µg/kg	2100	1	2	2700	NA^2		
Di-n-octylphthalate	µg/kg	780 UJ	1	2	350	NA^2		
Dibenz(a,h)anthracene	µg/kg	100 J	0	2	--^{5}	NA^2		
Dibenzofuran	µg/kg	83 J	1	2	89	NA^2		
Diethylphthalate	µg/kg	780 U	1	2	23	NA^2		
Dimethylphthalate	µg/kg	780 U	0	2	--^{5}	NA^2		
Fluoranthene	µg/kg	4600	1	2	5600	12109 (BAL-C)	0	
Fluorene	µg/kg	140 J	0	2	--^{5}	NA^2		
Hexachlorobenzene	µg/kg	780 U	1	2	97	142 WB	0	
Hexachlorobutadiene	µg/kg	780 U	0	2	--^{5}	47 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	480 J	0	2	--^{5}	NA^2		
Naphthalene	µg/kg	110 J	0	2	--^{5}	NA^2		
Nitrobenzene	µg/kg	780 UJ	0	2	--^{5}	NA^2		
Pentachlorophenol	µg/kg	1900	0	2	--^{5}	NA^2		
Phenanthrene	µg/kg	1600	0	2	--^{5}	1425 (BAL-C)		
Pyrene	µg/kg	3900	1	2	4700	NA^2		
Pesticides/PCBs								
Aroclor-1254	µg/kg	16 J	2	2	29	17 WB	2	SD-11A, SD-12A
Endosulfan I	µg/kg	2 U	0	2	--^{5}	0.36 (BAL-C)		
gamma-Chlordane	µg/kg	2 U	0	2	--^{5}	NA^2		
Mercury								
Mercury	mg/kg	0.55	3	3	28.6	0.15 LEL	3	SD-11A, SD-111A, SD-12A

Table 3
Comparison of Shallow Sediment Data in West Flume to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Methylmercury, total	ng/g	1.18 J	5	5	68.9	NA^2		
Other Inorganics/Metals								
Aluminum	mg/kg	2210	2	2	5050	NA^2		
Antimony	mg/kg	1.8 J	2	2	2.5	2 LEL	2	SD-11A, SD-12A
Arsenic	mg/kg	9.8	1	2	10.7	6 LEL	1	SD-12A
Barium	mg/kg	29.7	2	2	110	NA^2		
Beryllium	mg/kg	R	0	2	--^{5}	NA^2		
Cadmium	mg/kg	R	0	2	--^{5}	0.6 LEL		
Calcium	mg/kg	167000 J	2	2	224000	NA^2		
Chromium	mg/kg	26.1	0	2	--^{5}	26 LEL		
Cobalt	mg/kg	4.3	1	2	5.1	NA^2		
Copper	mg/kg	66.9 J	0	2	--^{5}	16 LEL		
Iron	mg/kg	15200	0	2	--^{5}	20000 LEL		
Lead	mg/kg	84.8	0	5	--^{5}	31 LEL		
Magnesium	mg/kg	14400	1	2	14900	NA^2		
Manganese	mg/kg	264 J	2	2	395	460 LEL	0	
Nickel	mg/kg	19.3	1	2	22.6	16 LEL	1	SD-12A
Selenium	mg/kg	1.1 J	2	2	2	NA^2		
Silver	mg/kg	0.23 U	0	2	--^{5}	1 LEL		
Sodium	mg/kg	433 J	2	2	2280	NA^2		
Vanadium	mg/kg	9	2	2	15.5	NA^2		
Zinc	mg/kg	122 J	1	2	178	120 LEL	1	SD-12A
Chloride^7	mg/kg	4.1 UJ	0	2	--^{5}	NA^2		
pH	mg/kg	8.03	0	2	--^{5}	NA^2		
Phenols	mg/kg	0.823 J	2	2	5.39	0.01 (BAL-C)	2	SD-11A, SD-12A
Sulfate	mg/kg	401 J	2	2	5580	NA^2		
Total Organic Carbon	mg/kg	6740 J	2	2	18300	NA^2		

Notes:

Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

Concentrations for all compounds were reported on a dry weight basis.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (11,872 mg/kg) measured in both shallow and deep sediment samples collected in
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 4
Comparison of Shallow Sediment Data in East Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	3	--[5]	NA[2]		
1,1-Dichloroethane	µg/kg	12 U	1	3	11	NA[2]		
1,2-Dichloroethene (total)	µg/kg	12 U	1	3	22	NA[2]		
Acetone	µg/kg	12 UJ	1	3	69[6]	NA[2]		
Chlorobenzene	µg/kg	12 U	1	3	20	289 (BAL-C)	0	
Chloroform	µg/kg	12 U	0	3	--[5]	NA[2]		
Ethylbenzene	µg/kg	12 U	0	3	--[5]	NA[2]		
Methylene Chloride	µg/kg	12 U	0	3	--[5]	NA[2]		
Tetrachloroethene	µg/kg	12 U	0	3	--[5]	NA[2]		
Toluene	µg/kg	12 U	1	3	4	NA[2]		
Xylene (total)	µg/kg	12 U	0	3	--[5]	NA[2]		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	780 U		0		991 (BAL-C)[4]		
1,4-Dichlorobenzene	µg/kg	780 U		0		991 (BAL-C)[4]		
2-Methylnaphthalene	µg/kg	44 J		0		NA[2]		
Acenaphthene	µg/kg	110 J		0		11557 (BAL-C)		
Acenaphthylene	µg/kg	170 J		0		NA[2]		
Anthracene	µg/kg	370 J		0		NA[2]		
Benzo(a)anthracene	µg/kg	1800		0		NA[2]		
Benzo(a)pyrene	µg/kg	2600 J		0		NA[2]		
Benzo(b)fluoranthene	µg/kg	3300 J		0		NA[2]		
Benzo(g,h,i)perylene	µg/kg	780 UJ		0		NA[2]		
Benzo(k)fluoranthene	µg/kg	2800 J		0		NA[2]		
bis(2-Ethylhexyl)phthalate	µg/kg	780 UJ		0		16469 (BAL-C)		
Butylbenzylphthalate	ug/kg	780 UJ		0		NA[2]		
Carbazole	µg/kg	430 J		0		NA[2]		
Chrysene	µg/kg	2100		0		NA[2]		
Di-n-octylphthalate	µg/kg	780 UJ		0		NA[2]		
Dibenz(a,h)anthracene	µg/kg	100 J		0		NA[2]		
Dibenzofuran	µg/kg	83 J		0		NA[2]		
Diethylphthalate	µg/kg	780 U		0		NA[2]		
Dimethylphthalate	µg/kg	780 U		0		NA[2]		
Fluoranthene	µg/kg	4600		0		84201 (BAL-C)		
Fluorene	µg/kg	140 J		0		NA[2]		
Hexachlorobenzene	µg/kg	780 U		0		991 WB		
Hexachlorobutadiene	µg/kg	780 U		0		330 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	480 J		0		NA[2]		
Naphthalene	µg/kg	110 J		0		NA[2]		
Nitrobenzene	µg/kg	780 UJ		0		NA[2]		
Pentachlorophenol	ug/kg	1900 U		0		NA[2]		
Phenanthrene	µg/kg	1600		0		9906 (BAL-C)		
Pyrene	µg/kg	3900		0		NA[2]		
Pesticides/PCBs								
Aroclor-1254	µg/kg	16 J		0		116 WB		
Endosulfan I	µg/kg	2 U		0		2.5 (BAL-C)		
gamma-Chlordane	µg/kg	2 U		0		NA[2]		
Mercury								
Mercury	mg/kg	0.55	3	3	24.2	0.15 LEL	3	SD-04A, SD-05A, SD-06A
Methylmercury, total	ng/g	1.18 J	3	3	15.9	NA[2]		

Table 4
Comparison of Shallow Sediment Data in East Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Other Inorganics/Metals								
Aluminum	mg/kg	2210	0	0	--^{5}	NA^2		
Antimony	mg/kg	1.8 J	0	0	--^{5}	2 LEL		
Arsenic	mg/kg	9.8	0	0	--^{5}	6 LEL		
Barium	mg/kg	29.7	0	0	--^{5}	NA^2		
Beryllium	mg/kg	R	0	0	--^{5}	NA^2		
Cadmium	mg/kg	R	3	3	0.98	0.6 LEL	1	SD-05A
Calcium	mg/kg	167000 J	0	0	--^{5}	NA^2		
Chromium	mg/kg	26.1	0	3	--^{5}	26 LEL		
Cobalt	mg/kg	4.3	0	0	--^{5}	NA^2		
Copper	mg/kg	66.9 J	0	0	--^{5}	16 LEL		
Iron	mg/kg	15200	0	0	--^{5}	20000 LEL		
Lead	mg/kg	84.8	1	3	144	31 LEL	1	SD-05A
Magnesium	mg/kg	14400	0	0	--^{5}	NA^2		
Manganese	mg/kg	264 J	0	0	--^{5}	460 LEL		
Nickel	mg/kg	19.3	0	0	--^{5}	16 LEL		
Selenium	mg/kg	1.1 J	0	0	--^{5}	NA^2		
Silver	mg/kg	0.23 U	0	0	--^{5}	1 LEL		
Sodium	mg/kg	433 J	0	0	--^{5}	NA^2		
Vanadium	mg/kg	9	0	0	--^{5}	NA^2		
Zinc	mg/kg	122 J	0	0	--^{5}	120 LEL		
Chloride^7	mg/kg	4.1 UJ	0	3	--^{5}	NA^2		
pH	mg/kg	8.03	0	3	--^{5}	NA^2		
Phenols	mg/kg	0.823 J	3	3	3.34	0.04 (BAL-C)	3	SD-04A, SD-05A, SD-06A
Sulfate	mg/kg	401 J	3	3	2290	NA^2		
Total Organic Carbon	mg/kg	6740 J	3	3	137000	NA^2		

Notes:
Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.
Concentrations for all compounds were reported on a dry weight basis.
If the background concentration was non-detect, then any detectable result was considered to exceed background.
1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (82,550 mg/kg) measured in both shallow and deep sediment samples collected in this area
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 5
Comparison of Shallow Sediment Data in West Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	2	--[5]	NA[2]		
1,1-Dichloroethane	µg/kg	12 U	0	2	--[5]	NA[2]		
1,2-Dichloroethene (total)	µg/kg	12 U	0	2	--[5]	NA[2]		
Acetone	µg/kg	12 UJ	0	2	--[5]	NA[2]		
Chlorobenzene	µg/kg	12 U	0	2	--[5]	177 (BAL-C)		
Chloroform	µg/kg	12 U	0	2	--[5]	NA[2]		
Ethylbenzene	µg/kg	12 U	0	2	--[5]	NA[2]		
Methylene Chloride	µg/kg	12 U	0	2	--[5]	NA[2]		
Tetrachloroethene	µg/kg	12 U	0	2	--[5]	NA[2]		
Toluene	µg/kg	12 U	1	2	22	NA[2]		
Xylene (total)	µg/kg	12 U	0	2	--[5]	NA[2]		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	780 U		0		605 (BAL-C)[4]		
1,4-Dichlorobenzene	µg/kg	780 U		0		605 (BAL-C)[4]		
2-Methylnaphthalene	µg/kg	44 J		0		NA[2]		
Acenaphthene	µg/kg	110 J		0		7063 (BAL-C)		
Acenaphthylene	µg/kg	170 J		0		NA[2]		
Anthracene	µg/kg	370 J		0		NA[2]		
Benzo(a)anthracene	µg/kg	1800		0		NA[2]		
Benzo(a)pyrene	µg/kg	2600 J		0		NA[2]		
Benzo(b)fluoranthene	µg/kg	3300 J		0		NA[2]		
Benzo(g,h,i)perylene	µg/kg	780 UJ		0		NA[2]		
Benzo(k)fluoranthene	µg/kg	2800 J		0		NA[2]		
bis(2-Ethylhexyl)phthalate	µg/kg	780 UJ		0		10065 (BAL-C)		
Butylbenzylphthalate	ug/kg	780 UJ		0		NA[2]		
Carbazole	µg/kg	430 J		0		NA[2]		
Chrysene	µg/kg	2100		0		NA[2]		
Di-n-octylphthalate	µg/kg	780 UJ		0		NA[2]		
Dibenz(a,h)anthracene	µg/kg	100 J		0		NA[2]		
Dibenzofuran	µg/kg	83 J		0		NA[2]		
Diethylphthalate	µg/kg	780 U		0		NA[2]		
Dimethylphthalate	µg/kg	780 U		0		NA[2]		
Fluoranthene	µg/kg	4600		0		51459 (BAL-C)		
Fluorene	µg/kg	140 J		0		NA[2]		
Hexachlorobenzene	µg/kg	780 U		0		605 WB		
Hexachlorobutadiene	µg/kg	780 U		0		202 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	480 J		0		NA[2]		
Naphthalene	µg/kg	110 J		0		NA[2]		
Nitrobenzene	µg/kg	780 UJ		0		NA[2]		
Pentachlorophenol	ug/kg	1900 U		0		NA[2]		
Phenanthrene	µg/kg	1600		0		6054 (BAL-C)		
Pyrene	µg/kg	3900		0		NA[2]		
Pesticides/PCBs								
Aroclor-1254	µg/kg	16 J		0		71 WB		
Endosulfan I	µg/kg	2 U		0		1.5 (BAL-C)		
gamma-Chlordane	µg/kg	2 U		0		NA[2]		
Mercury								
Mercury	mg/kg	0.55	2	2	35.8	0.15 LEL	2	SD-02A, SD-03A
Methylmercury, total	ng/g	1.18 J	2	2	15.8	NA[2]		

Table 5
Comparison of Shallow Sediment Data in West Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Other Inorganics/Metals								
Aluminum	mg/kg	2210	0	0	--[5]	NA[2]		
Antimony	mg/kg	1.8 J	0	0	--[5]	2 LEL		
Arsenic	mg/kg	9.8	0	0	--[5]	6 LEL		
Barium	mg/kg	29.7	0	0	--[5]	NA[2]		
Beryllium	mg/kg	R	0	0	--[5]	NA[2]		
Cadmium	mg/kg	R	0	2	--[5]	0.6 LEL		
Calcium	mg/kg	167000 J	0	0	--[5]	NA[2]		
Chromium	mg/kg	26.1	1	2	27.8	26 LEL	1	SD-03A
Cobalt	mg/kg	4.3	0	0	--[5]	NA[2]		
Copper	mg/kg	66.9 J	0	0	--[5]	16 LEL		
Iron	mg/kg	15200	0	0	--[5]	20000 LEL		
Lead	mg/kg	84.8	0	2	--[5]	31 LEL		
Magnesium	mg/kg	14400	0	0	--[5]	NA[2]		
Manganese	mg/kg	264 J	0	0	--[5]	460 LEL		
Nickel	mg/kg	19.3	0	0	--[5]	16 LEL		
Selenium	mg/kg	1.1 J	0	0	--[5]	NA[2]		
Silver	mg/kg	0.23 U	0	0	--[5]	1 LEL		
Sodium	mg/kg	433 J	0	0	--[5]	NA[2]		
Vanadium	mg/kg	9	0	0	--[5]	NA[2]		
Zinc	mg/kg	122 J	0	0	--[5]	120 LEL		
Chloride[7]	mg/kg	4.1 UJ	0	2	--[5]	NA[2]		
pH	mg/kg	8.03	2	2	10.3	NA[2]		
Phenols	mg/kg	0.823 J	1	2	1.01	0.03 (BAL-C)	1	SD-03A
Sulfate	mg/kg	401 J	2	2	716	NA[2]		
Total Organic Carbon	mg/kg	6740 J	2	2	59600	NA[2]		

Notes:

Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

Concentrations for all compounds were reported on a dry weight basis.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (50,450 mg/kg) measured in both shallow and deep sediment samples collected in this area
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 6
Comparison of Shallow Sediment Data from On-Site and Ponded Area to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)^{1}	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^{3}	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	4	–^{5}	NA^{2}		
1,1-Dichloroethane	µg/kg	12 U	0	4	–^{5}	NA^{2}		
1,2-Dichloroethene (total)	µg/kg	12 U	0	4	–^{5}	NA^{2}		
Acetone	µg/kg	12 UJ	1	4	43^{6}	NA^{2}		
Chlorobenzene	µg/kg	12 U	0	4	–^{5}	203 (BAL-C)		
Chloroform	µg/kg	12 U	1	4	4	NA^{2}		
Ethylbenzene	µg/kg	12 U	0	4	–^{5}	NA^{2}		
Methylene Chloride	µg/kg	12 U	1	4	5	NA^{2}		
Tetrachloroethene	µg/kg	12 U	0	4	–^{5}	NA^{2}		
Toluene	µg/kg	12 U	2	4	14	NA^{2}		
Xylene (total)	µg/kg	12 U	1	4	3	NA^{2}		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	780 U	3	7	130	695 (BAL-C)^{4}		
1,4-Dichlorobenzene	µg/kg	780 U	0	7	–^{5}	695 (BAL-C)^{4}		
2-Methylnaphthalene	µg/kg	44 J	0	7	–^{5}	NA^{2}		
Acenaphthene	µg/kg	110 J	0	7	–^{5}	8111 (BAL-C)		
Acenaphthylene	µg/kg	170 J	0	7	–^{5}	NA^{2}		
Anthracene	µg/kg	370 J	0	7	–^{5}	NA^{2}		
Benzo(a)anthracene	µg/kg	1800	0	7	–^{5}	NA^{2}		
Benzo(a)pyrene	µg/kg	2600 J	0	7	–^{5}	NA^{2}		
Benzo(b)fluoranthene	µg/kg	3300 J	0	7	–^{5}	NA^{2}		
Benzo(g,h,i)perylene	µg/kg	780 UJ	1	7	160	NA^{2}		
Benzo(k)fluoranthene	µg/kg	2800 J	1	7	3100	NA^{2}		
bis(2-Ethylhexyl)phthalate	µg/kg	780 UJ	1	7	2200	11558 (BAL-C)		
Butylbenzylphthalate	µg/kg	780 UJ	0	7	–^{5}	NA^{2}		
Carbazole	µg/kg	430 J	0	7	–^{5}	NA^{2}		
Chrysene	µg/kg	2100	0	7	–^{5}	NA^{2}		
Di-n-octylphthalate	µg/kg	780 UJ	0	7	–^{5}	NA^{2}		
Dibenz(a,h)anthracene	µg/kg	100 J	0	7	–^{5}	NA^{2}		
Dibenzofuran	µg/kg	83 J	0	7	–^{5}	NA^{2}		
Diethylphthalate	µg/kg	780 U	2	7	14	NA^{2}		
Dimethylphthalate	µg/kg	780 U	1	7	510	NA^{2}		
Fluoranthene	µg/kg	4600	0	7	–^{5}	59095 (BAL-C)		
Fluorene	µg/kg	140 J	0	7	–^{5}	NA^{2}		
Hexachlorobenzene	µg/kg	780 U	2	7	360	695 WB		
Hexachlorobutadiene	µg/kg	780 U	1	7	64	232 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	480 J	1	7	800	NA^{2}		
Naphthalene	µg/kg	110 J	0	7	–^{5}	NA^{2}		
Nitrobenzene	µg/kg	780 UJ	1	7	28	NA^{2}		
Pentachlorophenol	µg/kg	1900 U	0	7	–^{5}	NA^{2}		
Phenanthrene	µg/kg	1600	0	7	–^{5}	6952 (BAL-C)		
Pyrene	µg/kg	3900	0	7	–^{5}	NA^{2}		
Pesticides/PCBs								
Aroclor-1254	µg/kg	16 J	6	7	4900	81 WB	5	SD-07A, SD-08A, SD-14A, SD-15A, SD-16A
Endosulfan I	µg/kg	2 U	1	4	8.8	1.7 (BAL-C)	1	SD-09A
gamma-Chlordane	µg/kg	2 U	0	4	–^{5}	NA^{2}		

Table 6
Comparison of Shallow Sediment Data from On-Site and Ponded Area to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvey, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Mercury								
Mercury	mg/kg	0.55	21	21	193	0.15 LEL	21	All
Methylmercury, total	ng/g	1.18 J	18	18	175	NA[2]		
Other Inorganics/Metals								
Aluminum	mg/kg	2210	4	4	13000	NA[2]		
Antimony	mg/kg	1.8 J	0	4	--[5]	2 LEL		
Arsenic	mg/kg	9.8	1	4	10.2	6 LEL	1	SD-10A
Barium	mg/kg	29.7	4	4	118	NA[2]		
Beryllium	mg/kg	R	2	4	0.98	NA[2]		
Cadmium	mg/kg	R	3	7	3.9	0.6 LEL	2	SD-09A, SD-16A
Calcium	mg/kg	167000 J	1	4	178000	NA[2]		
Chromium	mg/kg	26.1	3	7	42.4	26 LEL	3	SD-09A, SD-15A, SD-16A
Cobalt	mg/kg	4.3	3	4	9.6	NA[2]		
Copper	mg/kg	66.9 J	0	4	--[5]	16 LEL		
Iron	mg/kg	15200	1	4	20100	20000 LEL	1	SD-09A
Lead	mg/kg	84.8	14	18	716	31 LEL	14	SD-07A, SD-09-10A, SD-14-22A
Magnesium	mg/kg	14400	2	4	16600	NA[2]		
Manganese	mg/kg	264 J	3	4	470	460 LEL	1	SD-08A
Nickel	mg/kg	19.3	3	4	110	16 LEL	3	SD-07A, SD-08A, SD-09A
Selenium	mg/kg	1.1 J	1	4	1.9	NA[2]		
Silver	mg/kg	0.23 U	2	4	9.2	1 LEL	2	SD-07A, SD-09A
Sodium	mg/kg	433 J	4	4	6050	NA[2]		
Vanadium	mg/kg	9	3	4	23.4	NA[2]		
Zinc	mg/kg	122 J	1	4	147	120 LEL	1	SD-08A
Chloride[7]	mg/kg	4.1 UJ	1	7	128	NA[2]		
pH	mg/kg	8.03	6	7	11.4	NA[2]		
Phenols	mg/kg	0.823 J	6	7	8.06	0.03 (BAL-C)	6	SD-07A,SD-08A,SD-09A,SD-10A,SD-15A,SD-16A
Sulfate	mg/kg	401 J	6	7	4040	NA[2]		
Total Organic Carbon	mg/kg	6740 J	7	7	87300	NA[2]		

Notes:

Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

Concentrations for all compounds were reported on a dry weight basis.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (57,936 mg/kg) measured in both shallow and deep sediment samples collected in this area (SD-7,8,9,10,1
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 7
Comparison of Deep Sediment Data in West Flume to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	2	--^{5}	NA^2		
1,1-Dichloroethane	µg/kg	12 U	0	2	--^{5}	NA^2		
1,2-Dichloroethene (total)	µg/kg	12 U	0	2	--^{5}	NA^2		
Acetone	µg/kg	12 UJ	0	2	--^{5}	NA^2		
Chlorobenzene	µg/kg	12 U	0	2	--^{5}	42 (BAL-C)		
Chloroform	µg/kg	12 U	0	2	--^{5}	NA^2		
Ethylbenzene	µg/kg	12 U	0	2	--^{5}	NA^2		
Methylene Chloride	µg/kg	12 U	0	2	--^{5}	NA^2		
Tetrachloroethene	µg/kg	12 U	0	2	--^{5}	NA^2		
Toluene	µg/kg	12 U	0	2	--^{5}	NA^2		
Xylene (total)	µg/kg	12 U	0	2	--^{5}	NA^2		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	390 U	0	2	--^{5}	142 (BAL-C)^4		
1,4-Dichlorobenzene	µg/kg	390 U	0	2	--^{5}	142 (BAL-C)^4		
2-Methylnaphthalene	µg/kg	390 U	1	2	61	NA^2		
Acenaphthene	µg/kg	42 J	1	2	280	1662 (BAL-C)	0	
Acenaphthylene	µg/kg	88 J	1	2	100	NA^2		
Anthracene	µg/kg	220 J	1	2	530	NA^2		
Benzo(a)anthracene	µg/kg	900	1	2	1400	NA^2		
Benzo(a)pyrene	µg/kg	1100 J	1	2	1600	NA^2		
Benzo(b)fluoranthene	µg/kg	1600 J	1	2	2600	NA^2		
Benzo(g,h,i)perylene	µg/kg	41 J	1	2	90	NA^2		
Benzo(k)fluoranthene	µg/kg	1400 J	1	2	1800	NA^2		
bis(2-Ethylhexyl)phthalate	µg/kg	460	0	2	--^{5}	2368 (BAL-C)		
Butylbenzylphthalate	ug/kg	390 UJ	0	2	--^{5}	NA^2		
Carbazole	µg/kg	170 J	1	2	620	NA^2		
Chrysene	µg/kg	940	1	2	1700	NA^2		
Di-n-octylphthalate	µg/kg	55 J	0	2	--^{5}	NA^2		
Dibenz(a,h)anthracene	µg/kg	390 UJ	0	2	--^{5}	NA^2		
Dibenzofuran	µg/kg	37 J	1	2	150	NA^2		
Diethylphthalate	µg/kg	390 U	1	2	10	NA^2		
Dimethylphthalate	µg/kg	390 U	0	2	--^{5}	NA^2		
Fluoranthene	µg/kg	2400	1	2	3800	12109 (BAL-C)	0	
Fluorene	µg/kg	81 J	1	2	240	NA^2		
Hexachlorobenzene	µg/kg	390 U	2	2	820	142 WB	2	SD-12B, SD-11B
Hexachlorobutadiene	µg/kg	390 U	0	2	--^{5}	47 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	390 UJ	2	2	310	NA^2		
Naphthalene	µg/kg	16 J	1	2	110	NA^2		
Nitrobenzene	µg/kg	390 U	0	2	--^{5}	NA^2		
Pentachlorophenol	ug/kg	950 UJ	0	2	--^{5}	NA^2		
Phenanthrene	µg/kg	780	1	2	2200	1425 (BAL-C)	1	SD-12B
Pyrene	µg/kg	2000	1	2	3000	NA^2		
Pesticides/PCBs								
Aroclor-1254	µg/kg	42 J	2	2	320	17 WB	2	SD-11B, SD-12B
Endosulfan I	µg/kg	2 U	0	2	--^{5}	0.36 (BAL-C)		
gamma-Chlordane	µg/kg	2 U	0	2	--^{5}	NA^2		
Mercury								
Mercury	mg/kg	0.59	3	3	48	0.15 LEL	3	SD-11B, SD-111B, SD-12B

Table 7
Comparison of Deep Sediment Data in West Flume to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Methylmercury, total	ng/g		0	0	–^{5}	NA^2		
Other Inorganics/Metals								
Aluminum	mg/kg	2480	1	2	3480	NA^2		
Antimony	mg/kg	1.8 J	0	2	–^{5}	2 LEL		
Arsenic	mg/kg	13.6	0	2	–^{5}	6 LEL		
Barium	mg/kg	27.1	2	2	87.2	NA^2		
Beryllium	mg/kg	R	1	2	0.38	NA^2		
Cadmium	mg/kg	R	1	2	0.61	0.6 LEL	1	SD-11B
Calcium	mg/kg	160000 J	2	2	209000	NA^2		
Chromium	mg/kg	19.9	0	2	–^{5}	26 LEL		
Cobalt	mg/kg	2.7	2	2	6.1	NA^2		
Copper	mg/kg	66.3 J	1	2	219	16 LEL	1	SD-12B
Iron	mg/kg	12700	1	2	16000	20000 LEL	0	
Lead	mg/kg	64.1	1	5	70.8	31 LEL	1	SD-12B
Magnesium	mg/kg	8370	2	2	11200	NA^2		
Manganese	mg/kg	235 J	2	2	319	460 LEL	0	
Nickel	mg/kg	20.6	1	2	89.5	16 LEL	1	SD-12B
Selenium	mg/kg	0.95 J	0	2	–^{5}	NA^2		
Silver	mg/kg	0.25 U	0	2	–^{5}	1 LEL		
Sodium	mg/kg	582 J	2	2	1820	NA^2		
Vanadium	mg/kg	8.7	1	2	8.9	NA^2		
Zinc	mg/kg	137 J	0	2	–^{5}	120 LEL		
Chloride^7	mg/kg	4.5 UJ	0	2	–^{5}	NA^2		
pH	mg/kg	8.01	2	2	8.2	NA^2		
Phenols	mg/kg	1.18 J	1	2	1.55	0.01 (BAL-C)	1	SD-12B
Sulfate	mg/kg	713 J	2	2	952	NA^2		
Total Organic Carbon	mg/kg	11300 J	1	2	13800	NA^2		

Notes:

Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

Concentrations for all compounds were reported on a dry weight basis.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (11.872 mg/kg) measured in both shallow and deep sediment samples collected in this The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used. Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 8
Comparison of Deep Sediment Data in East Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^{1}	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^{3}	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	1	3	8	NA^{2}		
1,1-Dichloroethane	µg/kg	12 U	0	3	--^{5}	NA^{2}		
1,2-Dichloroethene (total)	µg/kg	12 U	1	3	29	NA^{2}		
Acetone	µg/kg	12 UJ	1	3	110^{6}	NA^{2}		
Chlorobenzene	µg/kg	12 U	0	3	--^{5}	289 (BAL-C)		
Chloroform	µg/kg	12 U	0	3	--^{5}	NA^{2}		
Ethylbenzene	µg/kg	12 U	0	3	--^{5}	NA^{2}		
Methylene Chloride	µg/kg	12 U	1	3	3	NA^{2}		
Tetrachloroethene	µg/kg	12 U	0	3	--^{5}	NA^{2}		
Toluene	µg/kg	12 U	1	3	2	NA^{2}		
Xylene (total)	µg/kg	12 U	0	3	--^{5}	NA^{2}		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	390 U	0	0	--^{5}	991 (BAL-C)^{4}		
1,4-Dichlorobenzene	µg/kg	390 U	0	0	--^{5}	991 (BAL-C)^{4}		
2-Methylnaphthalene	µg/kg	390 U	0	0	--^{5}	NA^{2}		
Acenaphthene	µg/kg	42 J	0	0	--^{5}	11557 (BAL-C)		
Acenaphthylene	µg/kg	88 J	0	0	--^{5}	NA^{2}		
Anthracene	µg/kg	220 J	0	0	--^{5}	NA^{2}		
Benzo(a)anthracene	µg/kg	900	0	0	--^{5}	NA^{2}		
Benzo(a)pyrene	µg/kg	1100 J	0	0	--^{5}	NA^{2}		
Benzo(b)fluoranthene	µg/kg	1600 J	0	0	--^{5}	NA^{2}		
Benzo(g,h,i)perylene	µg/kg	41 J	0	0	--^{5}	NA^{2}		
Benzo(k)fluoranthene	µg/kg	1400 J	0	0	--^{5}	NA^{2}		
bis(2-Ethylhexyl)phthalate	µg/kg	460	0	0	--^{5}	16469 (BAL-C)		
Butylbenzylphthalate	ug/kg	390 UJ	0	0	--^{5}	NA^{2}		
Carbazole	µg/kg	170 J	0	0	--^{5}	NA^{2}		
Chrysene	µg/kg	940	0	0	--^{5}	NA^{2}		
Di-n-octylphthalate	µg/kg	55 J	0	0	--^{5}	NA^{2}		
Dibenz(a,h)anthracene	µg/kg	390 UJ	0	0	--^{5}	NA^{2}		
Dibenzofuran	µg/kg	37 J	0	0	--^{5}	NA^{2}		
Diethylphthalate	µg/kg	390 U	0	0	--^{5}	NA^{2}		
Dimethylphthalate	µg/kg	390 U	0	0	--^{5}	NA^{2}		
Fluoranthene	µg/kg	2400	0	0	--^{5}	84201 (BAL-C)		
Fluorene	µg/kg	81 J	0	0	--^{5}	NA^{2}		
Hexachlorobenzene	µg/kg	390 U	0	0	--^{5}	991 WB		
Hexachlorobutadiene	µg/kg	390 U	0	0	--^{5}	330 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	390 UJ	0	0	--^{5}	NA^{2}		
Naphthalene	µg/kg	16 J	0	0	--^{5}	NA^{2}		
Nitrobenzene	µg/kg	390 U	0	0	--^{5}	NA^{2}		
Pentachlorophenol	ug/kg	950 UJ	0	0	--^{5}	NA^{2}		
Phenanthrene	µg/kg	780	0	0	--^{5}	9906 (BAL-C)		
Pyrene	µg/kg	2000	0	0	--^{5}	NA^{2}		
Pesticides								
Aroclor-1254	µg/kg	42 J	0	0	--^{5}	116 WB		
Endosulfan I	µg/kg	2 U	0	0	--^{5}	2.5 (BAL-C)		
gamma-Chlordane	µg/kg	2 U	0	0	--^{5}	NA^{2}		
Mercury								
Mercury	mg/kg	0.59	2	3	23.2	0.15 LEL	3	SD-04B, SD-05B, SD-06B

Table 8
Comparison of Deep Sediment Data in East Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Methylmercury, total	ng/g		0	0	--^{5}	NA^2		
Other Inorganics/Metals								
Aluminum	mg/kg	2480	0	0	--^{5}	NA^2		
Antimony	mg/kg	1.8 J	0	0	--^{5}	2 LEL		
Arsenic	mg/kg	13.6	0	0	--^{5}	6 LEL		
Barium	mg/kg	27.1	0	0	--^{5}	NA^2		
Beryllium	mg/kg	R	0	0	--^{5}	NA^2		
Cadmium	mg/kg	R	2	3	0.66	0.6 LEL	1	SD-06B
Calcium	mg/kg	160000 J	0	0	--^{5}	NA^2		
Chromium	mg/kg	19.9	0	3	--^{5}	26 LEL		
Cobalt	mg/kg	2.7	0	0	--^{5}	NA^2		
Copper	mg/kg	66.3 J	0	0	--^{5}	16 LEL		
Iron	mg/kg	12700	0	0	--^{5}	20000 LEL		
Lead	mg/kg	64.1	2	3	107	31 LEL	2	SD-05B, SD-06B
Magnesium	mg/kg	8370	0	0	--^{5}	NA^2		
Manganese	mg/kg	235 J	0	0	--^{5}	460 LEL		
Nickel	mg/kg	20.6	0	0	--^{5}	16 LEL		
Selenium	mg/kg	0.95 J	0	0	--^{5}	NA^2		
Silver	mg/kg	0.25 U	0	0	--^{5}	1 LEL		
Sodium	mg/kg	582 J	0	0	--^{5}	NA^2		
Vanadium	mg/kg	8.7	0	0	--^{5}	NA^2		
Zinc	mg/kg	137 J	0	0	--^{5}	120 LEL		
Chloride[7]	mg/kg	4.5 UJ	0	3	--^{5}	NA^2		
pH	mg/kg	8.01	3	3	9.86	NA^2		
Phenols	mg/kg	1.18 J	3	3	5.45	0.04 (BAL-C)	3	SD-04B, SD-05B, SD-06B
Sulfate	mg/kg	713 J	0	3	--^{5}	NA^2		
Total Organic Carbon	mg/kg	11300 J	3	3	155000	NA^2		

Notes:

Target Analyte(s)/fraction included – VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.

Concentrations for all compounds were reported on a dry weight basis.

If the background concentration was non-detect, then any detectable result was considered to exceed background.

1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the aNAlyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (82,550 mg/kg) measured in both shallow and deep sediment samples collected in this are
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 9
Comparison of Deep Sediment Data in West Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	2	–[5]	NA[2]		
1,1-Dichloroethane	µg/kg	12 U	0	2	–[5]	NA[2]		
1,2-Dichloroethene (total)	µg/kg	12 U	0	2	–[5]	NA[2]		
Acetone	µg/kg	12 UJ	0	2	–[5]	NA[2]		
Chlorobenzene	µg/kg	12 U	0	2	–[5]	177 (BAL-C)		
Chloroform	µg/kg	12 U	0	2	–[5]	NA[2]		
Ethylbenzene	µg/kg	12 U	0	2	–[5]	NA[2]		
Methylene Chloride	µg/kg	12 U	0	2	–[5]	NA[2]		
Tetrachloroethene	µg/kg	12 U	1	2	8	NA[2]		
Toluene	µg/kg	12 U	0	2	–[5]	NA[2]		
Xylene (total)	µg/kg	12 U	0	2	–[5]	NA[2]		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	390 U		0		605 (BAL-C)[4]		
1,4-Dichlorobenzene	µg/kg	390 U		0		605 (BAL-C)[4]		
2-Methylnaphthalene	µg/kg	390 U		0		NA[2]		
Acenaphthene	µg/kg	42 J		0		7063 (BAL-C)		
Acenaphthylene	µg/kg	88 J		0		NA[2]		
Anthracene	µg/kg	220 J		0		NA[2]		
Benzo(a)anthracene	µg/kg	900		0		NA[2]		
Benzo(a)pyrene	µg/kg	1100 J		0		NA[2]		
Benzo(b)fluoranthene	µg/kg	1600 J		0		NA[2]		
Benzo(g,h,i)perylene	µg/kg	41 J		0		NA[2]		
Benzo(k)fluoranthene	µg/kg	1400 J		0		NA[2]		
bis(2-Ethylhexyl)phthalate	µg/kg	460		0		10065 (BAL-C)		
Butylbenzylphthalate	µg/kg	390 UJ		0		NA[2]		
Carbazole	µg/kg	170 J		0		NA[2]		
Chrysene	µg/kg	940		0		NA[2]		
Di-n-octylphthalate	µg/kg	55 J		0		NA[2]		
Dibenz(a,h)anthracene	µg/kg	390 UJ		0		NA[2]		
Dibenzofuran	µg/kg	37 J		0		NA[2]		
Diethylphthalate	µg/kg	390 U		0		NA[2]		
Dimethylphthalate	µg/kg	390 U		0		NA[2]		
Fluoranthene	µg/kg	2400		0		51459 (BAL-C)		
Fluorene	µg/kg	81 J		0		NA[2]		
Hexachlorobenzene	µg/kg	390 U		0		605 WB		
Hexachlorobutadiene	µg/kg	390 U		0		202 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	390 UJ		0		NA[2]		
Naphthalene	µg/kg	16 J		0		NA[2]		
Nitrobenzene	µg/kg	390 U		0		NA[2]		
Pentachlorophenol	µg/kg	950 UJ		0		NA[2]		
Phenanthrene	µg/kg	780		0		6054 (BAL-C)		
Pyrene	µg/kg	2000		0		NA[2]		
Pesticides/PCBs								
Aroclor-1254	µg/kg	42 J		0		71 WB		
Endosulfan I	µg/kg	2 U		0		1.5 (BAL-C)		
gamma-Chlordane	µg/kg	2 U		0		NA[2]		
Mercury								
Mercury	mg/kg	0.59	1	2	0.28	0.15 LEL	2	SD-02B, SD-03B

Table 9
Comparison of Deep Sediment Data in West Ditch to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)[1]	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines[3]	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Methylmercury, total	ng/g					NA[2]		
Other Inorganics/Metals								
Aluminum	mg/kg	2480		0		NA[2]		
Antimony	mg/kg	1.8 J		0		2 LEL		
Arsenic	mg/kg	13.6		0		6 LEL		
Barium	mg/kg	27.1		0		NA[2]		
Beryllium	mg/kg	R		0		NA[2]		
Cadmium	mg/kg	R	0	2	--[5]	0.6 LEL		
Calcium	mg/kg	160000 J		0		NA[2]		
Chromium	mg/kg	19.9	0	2	--[5]	26 LEL		
Cobalt	mg/kg	2.7		0		NA[2]		
Copper	mg/kg	66.3 J		0		16 LEL		
Iron	mg/kg	12700		0		20000 LEL		
Lead	mg/kg	64.1	2	2	93.2	31 LEL	2	SD-03B, SD-02B
Magnesium	mg/kg	8370		0		NA[2]		
Manganese	mg/kg	235 J		0		460 LEL		
Nickel	mg/kg	20.6		0		16 LEL		
Selenium	mg/kg	0.95 J		0		NA[2]		
Silver	mg/kg	0.25 U		0		1 LEL		
Sodium	mg/kg	582 J		0		NA[2]		
Vanadium	mg/kg	8.7		0		NA[2]		
Zinc	mg/kg	137 J		0		120 LEL		
Chloride[7]	mg/kg	4.5 UJ	1	2	70.8	NA[2]		
pH	mg/kg	8.01	2	2	11.4	NA[2]		
Phenols	mg/kg	1.18 J	0	2	--[5]	0.02 (BAL-C)	0	
Sulfate	mg/kg	713 J	1	2	1490	NA[2]		
Total Organic Carbon	mg/kg	11300 J	2	2	45200	NA[2]		

Notes:
Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.
Concentrations for all compounds were reported on a dry weight basis.
If the background concentration was non-detect, then any detectable result was considered to exceed background.
1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (50,450 mg/kg) measured in both shallow and deep sediment samples collected
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 10
Comparison of Deep Sediment Data from On-Site and Ponded Area to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^1	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^3	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Volatile Organics								
1,1,1-Trichloroethane	µg/kg	12 U	0	4	–^{5}	NA^2		
1,1-Dichloroethane	µg/kg	12 U	0	4	–^{5}	NA^2		
1,2-Dichloroethene (total)	µg/kg	12 U	0	4	–^{5}	NA^2		
Acetone	µg/kg	12 UJ	2	4	130^6	NA^2		
Chlorobenzene	µg/kg	12 U	0	4	–^{5}	203 (BAL-C)		
Chloroform	µg/kg	12 U	0	4	–^{5}	NA^2		
Ethylbenzene	µg/kg	12 U	1	4	8	NA^2		
Methylene Chloride	µg/kg	12 U	0	4	–^{5}	NA^2		
Tetrachloroethene	µg/kg	12 U	1	4	7	NA^2		
Toluene	µg/kg	12 U	1	4	1	NA^2		
Xylene (total)	µg/kg	12 U	1	4	64	NA^2		
Semi-Volatile Organics								
1,2-Dichlorobenzene	µg/kg	390 U	1	5	80	695 (BAL-C)^4	0	
1,4-Dichlorobenzene	µg/kg	390 U	3	5	170	695 (BAL-C)^4	0	
2-Methylnaphthalene	µg/kg	390 U	1	5	58	NA^2		
Acenaphthene	µg/kg	42 J	1	5	180	8111 (BAL-C)	0	
Acenaphthylene	µg/kg	88 J	1	5	93	NA^2		
Anthracene	µg/kg	220 J	2	5	400	NA^2		
Benzo(a)anthracene	µg/kg	900	2	5	3600	NA^2		
Benzo(a)pyrene	µg/kg	1100 J	1	5	4300	NA^2		
Benzo(b)fluoranthene	µg/kg	1600 J	1	5	5800	NA^2		
Benzo(g,h,i)perylene	µg/kg	41 J	0	5	–^{5}	NA^2		
Benzo(k)fluoranthene	µg/kg	1400 J	1	5	5200	NA^2		
bis(2-Ethylhexyl)phthalate	µg/kg	460	1	5	3000	11558 (BAL-C)	0	
Butylbenzylphthalate	µg/kg	390 UJ	0	5	–^{5}	NA^2		
Carbazole	µg/kg	170 J	1	5	690	NA^2		
Chrysene	µg/kg	940	2	5	4000	NA^2		
Di-n-octylphthalate	µg/kg	55 J	0	5	–^{5}	NA^2		
Dibenz(a,h)anthracene	µg/kg	390 UJ	1	5	170	NA^2		
Dibenzofuran	µg/kg	37 J	1	5	100	NA^2		
Diethylphthalate	µg/kg	390 U	2	5	16	NA^2		
Dimethylphthalate	µg/kg	390 U	0	5	–^{5}	NA^2		
Fluoranthene	µg/kg	2400	1	5	7100	59095 (BAL-C)	0	
Fluorene	µg/kg	81 J	1	5	150	NA^2		
Hexachlorobenzene	µg/kg	390 U	2	5	350	695 WB	0	
Hexachlorobutadiene	µg/kg	390 U	0	5	–^{5}	232 WB		
Indeno(1,2,3-cd)pyrene	µg/kg	390 UJ	2	5	1900	NA^2		
Naphthalene	µg/kg	16 J	1	5	94	NA^2		
Nitrobenzene	µg/kg	390 U	0	5	–^{5}	NA^2		
Pentachlorophenol	µg/kg	950 UJ	0	5	–^{5}	NA^2		
Phenanthrene	µg/kg	780	2	5	1700	6952 (BAL-C)	0	
Pyrene	µg/kg	2000	1	5	4800	NA^2		
Pesticides/PCBs								
Aroclor-1254	µg/kg	42 J	4	5	1600	81 WB	4	SD-14B, SD-15B, SD-16B, SD-08B-D
Endosulfan I	µg/kg	2 U	0	2	–^{5}	1.7 (BAL-C)		
gamma-Chlordane	µg/kg	2 U	1	2	5.3	NA^2		
Mercury								
Mercury	mg/kg	0.59	7	22	62.1	0.15 LEL	16	All except SD-08B-D, SD-18B, SD-20B, SD-23B, SD-24B, SD-25B

Table 10
Comparison of Deep Sediment Data from On-Site and Ponded Area to Background and NYSDEC Guidelines
LCP Bridge Street RI/FS
Solvay, New York

Sample ID	Units	SD 13A (Background)^{1}	Number of Exceedences of Background	Number of Samples	Maximum Detection Above Background	NYSDEC Sediment Guidelines^{3}	Number of Exceedences of NYSDEC Sediment Guidelines	Locations Where NYSDEC Guidelines Were Exceeded
Methylmercury, total	ng/g		0	3	–^{5}	NA^{2}		
Other Inorganics/Metals								
Aluminum	mg/kg	2480	2	2	5750	NA^{2}		
Antimony	mg/kg	1.8 J	0	2	–^{5}	2 LEL		
Arsenic	mg/kg	13.6	0	2	–^{5}	6 LEL		
Barium	mg/kg	27.1	2	2	72.2	NA^{2}		
Beryllium	mg/kg	R	1	2	0.73	NA^{2}		
Cadmium	mg/kg	R	0	7	–^{5}	0.6 LEL		
Calcium	mg/kg	160000 J	1	2	247000	NA^{2}		
Chromium	mg/kg	19.9	3	7	25.8	26 LEL	0	
Cobalt	mg/kg	2.7	1	2	2.9	NA^{2}		
Copper	mg/kg	66.3 J	0	2	–^{5}	16 LEL		
Iron	mg/kg	12700	0	2	–^{5}	20000 LEL		
Lead	mg/kg	64.1	4	18	1050	31 LEL	4	SD-14B, SD-15B, SD-16B, SD-08B-D
Magnesium	mg/kg	8370	1	2	17600	NA^{2}		
Manganese	mg/kg	235 J	1	2	277	460 LEL	0	
Nickel	mg/kg	20.6	0	2	–^{5}	16 LEL		
Selenium	mg/kg	0.95 J	1	2	0.99	NA^{2}		
Silver	mg/kg	0.25 U	0	2	–^{5}	1 LEL		
Sodium	mg/kg	582 J	2	2	9640	NA^{2}		
Vanadium	mg/kg	8.7	0	2	–^{5}	NA^{2}		
Zinc	mg/kg	137 J	1	2	143	120 LEL	1	SD-08B-D
Chloride^{7}	mg/kg	4.5 UJ	2	7	87	NA^{2}		
pH	mg/kg	8.01	6	7	11.7	NA^{2}		
Phenols	mg/kg	1.18 J	2	7	2.82	0.03 (BAL-C)	2	SD-08B-D, SD-09B
Sulfate	mg/kg	713 J	4	7	4130	NA^{2}		
Total Organic Carbon	mg/kg	11300 J	7	7	104000	NA^{2}		

Notes:
Target Analyte(s)/fraction included -- VOCs, SVOCs, Pesticides, PCBs, Mercury, Other Inorganics/Metals, and pH, unless blank.
Concentrations for all compounds were reported on a dry weight basis.
If the background concentration was non-detect, then any detectable result was considered to exceed background.
1. U-Not Detected; J-estimated value; UJ-estimated detection limit.
2. NA indicates that a NYSDEC guideline was not available for the analyte.
3. NYSDEC guidelines for organic chemicals were calculated using the average organic carbon content (57,936 mg/kg) measured in both shallow and deep sediment samples collected in this ar
The wildlife bioaccumulation based standard was used whenever available, otherwise, the benthic aquatic life health bioaccumulation standard was used.
Human health based standards are shown in Appendix D.
4. NYSDEC guideline is for dichlorobenzenes.
5. The background sediment concentration was not exceeded in any downstream sample; hence, no comparison against criteria was performed for this analyte.
6. Believed to be a laboratory artifact, hence no screening against criteria was performed.
7. Reported as a soil leachate, therefore, the units were mg/L.

BAL-C - Chronic toxicity of benthic aquatic life.
WB - Wildlife bioaccumulation.
LEL - Lowest effects level.

Table 11
Compounds Detected in Special Area 1 (Process Equipment "Graveyard") Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 0101A**	**SL 0102A**	**SL 0102H**	**SL 0103A**	**SL 0103H**	**SL 0104A**	**SL 0104D**	**SL 0105A**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**	**3.5-4**	**0-0.5**	**3.5-4**	**0-0.5**	**1.5-2**	**0-0.5**
	Units									
Volatile Organics										
Ethylbenzene	ug/kg	5500							86 J	
Xylene (total)	ug/kg	1200							6700	
Semivolatile Organics										
2-Methylnaphthalene	ug/kg	36400			900 J					
Acenaphthene	ug/kg	50000 **			3400 J					
Anthracene	ug/kg	50000 **			6500 J					
Benzo(a)anthracene	ug/kg	224 or MDL			8700					
Benzo(a)pyrene	ug/kg	61 or MDL			7700					
Benzo(b)fluoranthene	ug/kg	1100			8300 J					
Benzo(g,h,i)perylene	ug/kg	50000 **			790 J					
Benzo(k)fluoranthene	ug/kg	1100			7000 J					
Carbazole	ug/kg				7600 J					
Chrysene	ug/kg	400			8800					
Dibenzofuran	ug/kg	6200			2000 J					
Fluoranthene	ug/kg	50000 **			26000					
Fluorene	ug/kg	50000 **			3200 J					
Indeno(1,2,3-cd)pyrene	ug/kg	3200			4600 J					
Naphthalene	ug/kg	13000			2200 J					
Phenanthrene	ug/kg	50000 **			23000					
Pyrene	ug/kg	50000 **			14000					
PCBs										
Aroclor-1254	ug/kg	1000 ***	15 J	480 J	44 J	210 J	8.5 J	640 J	79	320 J
Aroclor-1260	ug/kg	1000 ***	20 J	130 J	120	180 U	6.3 J	190 J	45	270 J

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 11
Compounds Detected in Special Area 1 (Process Equipment "Graveyard") Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0101A	SL 0102A	SL 0102H	SL 0103A	SL 0103H	SL 0104A	SL 0104D	SL 0105A
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5	3.5-4	0-0.5	3.5-4	0-0.5	1.5-2	0-0.5
	Units									
Inorganics										
Mercury	mg/Kg	0.1	0.7 J	23.3 J	6.2 J	6.1 J	1.1 J	15.9 J	0.34 J	52.8 J
Copper	mg/Kg	25 or SB	55.1 J	132 J	233 J	50.6 J	23.7 J	32.8 J	44.9 J	42.9 J
Lead	mg/Kg	SB****	25.8	70.3	118	29.8	12.1	48.7 J	14.3	153
Miscellaneous										
Chloride^2	mg/L		3 U	3.4 J	3.6 J	4 J	3 U	3 U	3 J	3 U
pH	pH units		8.37 J	8.21 J	7.57 J	7.96 J	8.14 J	8.48 J	8.26 J	8.04 J

Notes:

1. Only compounds detected in at least one sample within this area are listed in this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- MDL is Method Detection Limit
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** As per TAGM #4046, Total VOCs < 10 ppm, Total Semi-VOCs < 500 ppm, and Individual Semi-VOCs < 50 ppm

*** Recommended surface concentration of total PCBs

**** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 11
Compounds Detected in Special Area 1 (Process Equipment "Graveyard") Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0106A	SL 01106A
Date Sampled		TAGM	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5
	Units			
Volatile Organics				
Ethylbenzene	ug/kg	5500		
Xylene (total)	ug/kg	1200		
Semivolatile Organics				
2-Methylnaphthalene	ug/kg	36400		
Acenaphthene	ug/kg	50000 **		
Anthracene	ug/kg	50000 **		
Benzo(a)anthracene	ug/kg	224 or MDL		
Benzo(a)pyrene	ug/kg	61 or MDL		
Benzo(b)fluoranthene	ug/kg	1100		
Benzo(g,h,i)perylene	ug/kg	50000 **		
Benzo(k)fluoranthene	ug/kg	1100		
Carbazole	ug/kg			
Chrysene	ug/kg	400		
Dibenzofuran	ug/kg	6200		
Fluoranthene	ug/kg	50000 **		
Fluorene	ug/kg	50000 **		
Indeno(1,2,3-cd)pyrene	ug/kg	3200		
Naphthalene	ug/kg	13000		
Phenanthrene	ug/kg	50000 **		
Pyrene	ug/kg	50000 **		
PCBs				
Aroclor-1254	ug/kg	1000 ***	1800 U	1800 U
Aroclor-1260	ug/kg	1000 ***	12000	16000

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 11
Compounds Detected in Special Area 1 (Process Equipment "Graveyard") Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 0106A**	**SL 01106A**
Date Sampled		TAGM	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**
	Units			
Inorganics				
Mercury	mg/Kg	0.1	108 J	59.3 J
Copper	mg/Kg	25 or SB	270 J	72 J
Lead	mg/Kg	SB****	124	81.6 J
Miscellaneous				
Chloride^2	mg/L		3 U	3 U
pH	pH units		8.22 J	8.18 J

Notes:

1. Only compounds detected in at least one sample within this area are listed in this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- MDL is Method Detection Limit
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** As per TAGM #4046, Total VOCs < 10 ppm, Total Semi-VOCs < 500 ppm, and Individual Semi-VOCs < 50 ppm

*** Recommended surface concentration of total PCBs

**** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 12
Compounds Detected in Special Areas 2, 6, and 7 (Tank Areas)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC**	**SL 0201A**	**SL 0201D**	**SL 0202A**	**SL 0202D**	**SL 0203A**	**SL 0204A**	**SL 0205A**	**SL 0205D**
Date Sampled		**TAGM**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		**RSCO***	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**	**0-0.5**	**0-0.5**	**0-0.5**	**1.5-2**
	Units									
Inorganics										
Mercury	mg/Kg	0.1	2.8	13.7	28.8	3.4	13.7	3.6	27.9	1.8
Copper	mg/Kg	25 or SB	51.4	43.7	247	44	1070	73.3	127	R
Lead	mg/Kg	SB**	74.7	58	267	56.2	787	310	123	15.3
Miscellaneous										
Chloride^2	mg/L		3 UJ	42.2 J	3 UJ	6.4 J	3 UJ	3 UJ	4.9 J	3 UJ
pH	pH units		9.38	10.1	8.88	11.4	8.23	8.62	8.29	9.34

Notes:

1. Only compounds detected in at least one sample in these areas are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 12
Compounds Detected in Special Areas 2, 6, and 7 (Tank Areas)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC TAGM RSCO***	**SL 0206A**	**SL 0206D**	**SL 0601A**	**SL 0602A**	**SL 0602D**	**SL 0603A**	**SL 0603D**	**SL 0604A**	**SL 0605A**	**SL 0606A**
Date Sampled			**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)			**0-0.5**	**1.5-2**	**0-0.5**	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**	**0-0.5**	**0-0.5**	**0-0.5**
	Units											
Inorganics												
Mercury	mg/Kg	0.1	4.4	4.3								
Copper	mg/Kg	25 or SB	29.9	47.5	19.8 J	6.7 J	14.1 J	5.3 J	4.3 J	49.1 J	5.6 J	51.6 J
Lead	mg/Kg	SB**	35.4	20.6	37.1 J	14.9 J	11.1 J	326 J	117 J	563 J	11.2 J	54.9
Miscellaneous												
Chloride^2	mg/L		3 UJ	27.8 J	10.9 J	3 UJ	3 UJ	3 UJ	3 UJ	4.07 J	3 UJ	3 UJ
pH	pH units		9.1	11.4	9.23 J	8.56	8.81	8.43	8.93	9.37	8.63	8.55

Notes:

1. Only compounds detected in at least one sample in these areas are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 12
Compounds Detected in Special Areas 2, 6, and 7 (Tank Areas)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 06106A	SL 0701A	SL 0702A	SL 0702E	SL 0703A	SL 0704A	SL 0704D	SL 0705A	SL 0706A	SL 07106A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	0-0.5	2-2.5	0-0.5	0-0.5	1.5-2	0-0.5	0-0.5	0-0.5
	Units											
Inorganics												
Mercury	mg/Kg	0.1		4.7	4	0.88	10.2	1.7	3.2	4.7	29.4	37.9
Copper	mg/Kg	25 or SB	210 J	113	49	54.5	27.9	32.8	31.2	76.8	41.3	48.5
Lead	mg/Kg	SB**	77.3 J	93.8	90	75.1	53.5	17.6	34.3	68.3	87.1	99.2
Miscellaneous												
Chloride[2]	mg/L		3 UJ	3 UJ	3 UJ	47.9 J	3 UJ	3 UJ	5.6 J	3 UJ	3 UJ	3 UJ
pH	pH units		8.46	8.76	8.6	9.27	8.56	9.59	12.6 J	9.35	8.68	8.37

Notes:

1. Only compounds detected in at least one sample in these areas are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 13
Compounds Detected in Special Area 3 (Waste-Solid Collection Tank Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	**SL 0301A**	**SL 03101A (Dup)**	**SL 0301A 111(Dup)**	**SL 0301C**	**SL 0302A**	**SL 0302B**
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	0-0.5	1-1.5	0-0.5	0.5-1
	Units							
Semi-Volatile Organics								
Hexachlorobenzene	ug/Kg	410	68 J	46 J	64 J	360 U	79 J	460 U
Inorganics								
Mercury	mg/Kg	0.1	283	235	75.3	108	166	44.1
Copper	mg/Kg	25 or SB			82.8 J	205 J	396 J	126 J
Lead	mg/Kg	SB**			33.9 J	117 J	106 J	20.7 J
Miscellaneous								
Chloride^2	mg/L				3 UJ	3 UJ	90.6	32.5
pH	pH units				8.21	8.93	8.29	9.22

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 14
Compounds Detected in Special Area 5 (Western Rectiformer Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 0501A	SL 0501B	SL 0502A	SL 05102A	SL 0502B	SL 0503A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0.5-1	0-0.5	0-0.5	0.5-1	0-0.5
	Units							
PCBs								
Aroclor-1254	ug/kg	1000 **	380 U	360 U	2000 J	2300	2500 J	2600
Aroclor-1260	ug/kg	1000 **	19000 J	4600	750 J	690	3400 J	1800 J

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Target analytes were Aroclors 1016, 1221, 1232, 1242, 1248 1254, and 1260.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Recommended surface concentration of total PCBs

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 14
Compounds Detected in Special Area 5 (Western Rectiformer Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0503B	ENSYS-4A	ENSYS-4B	ENSYS-7A	ENSYS-7B	ENSYS-8A	ENSYS-8B
Date Sampled		TAGM	Oct-95	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0.5-1	0.5-1	1-2	0.5-1	1-2	0.5-1	1-2
	Units								
PCBs									
Aroclor-1254	ug/kg	1000 **	3100	21000 U	21000 U	3700 U	3600 U	3600 U	9700 U
Aroclor-1260	ug/kg	1000 **	2000 J	61000	76000	6500	5800	12000	15000

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Target analytes were Aroclors 1016, 1221, 1232, 1242, 1248 1254, and 1260.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Recommended surface concentration of total PCBs

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 14
Compounds Detected in Special Area 5 (Western Rectiformer Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SB-04A**	**SB-04B**	**SB-104A**
Date Sampled		TAGM	**Oct-96**	**Oct-96**	**Oct-96**
Sample depth (ft. below grade)		RSCO*	**0-1**	**1-2**	**0-1**
	Units				
PCBs					
Aroclor-1254	ug/kg	1000 **	690 U	610 J	700 U
Aroclor-1260	ug/kg	1000 **	▨ **1300**	350 U	1000

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Target analytes were Aroclors 1016, 1221, 1232, 1242, 1248 1254, and 1260.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)
** Recommended surface concentration of total PCBs

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 15
Compounds Detected in Special Areas 8 and 11 (Mercury-Cell Retort and Still Area and Mercury-Cell Building Area)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0801A	SL 0801B	SL 0802A	SL 0802B	SL 0803A	SL 0803B	SL 0804A	SL-0804B
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1
	Units									
Inorganics										
Mercury	mg/Kg	0.1	19100	19200	3660	2850	5120	1700	75.6	15.3
Copper	mg/Kg	25 or SB								
Lead	mg/Kg	SB**								
Miscellaneous										
Chloride^2	mg/L									
pH	pH units									

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 15
Compounds Detected in Special Areas 8 and 11 (Mercury-Cell Retort and Still Area and Mercury-Cell Building Area)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0805A	SL-0805B	SL 0806A	SL 08106A	SL-0806B	SO-10A	SO-10B	SO-11A	SO-11B
Date Sampled		TAGM	Oct-95	Oct-96	Oct-95	Oct-95	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	0.5-1	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1
	Units										
Inorganics											
Mercury	mg/Kg	0.1	125	15.8	254	217	35.1	5700	450	120	76
Copper	mg/Kg	25 or SB									
Lead	mg/Kg	SB**									
Miscellaneous											
Chloride^2	mg/L										
pH	pH units										

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 15
Compounds Detected in Special Areas 8 and 11 (Mercury-Cell Retort and Still Area and Mercury-Cell Building Area)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1101D	SL 1101H	SL 1101L	SL 1101P	SL 11101P	SD-29A	DB-1B	DB-1I	DB-1Z
Date Sampled		TAGM	Nov-95	Nov-95	Nov-95	Nov-95	Nov-95	Oct-96	Sept-95	Sept-95	Sept-95
Sample depth (ft. below grade)		RSCO*	1.5-2	3.5-4	5.5-6	7.5-8	7.5-8	0-0.5	2-4	16-18	50-52
	Units										
Inorganics											
Mercury	mg/Kg	0.1	217 J	129 J	14.3 J	30.7 J	28.8 J		433	0.16 U	3.3
Copper	mg/Kg	25 or SB	21.4	56.8	75.8	59.9	50.1				
Lead	mg/Kg	SB**	70.3 J	121 J	59.1 J	48.3 J	25.1 J	1340			
Miscellaneous											
Chloride^2	mg/L		12.8 J	54.1 J	148 J	115 J	24.1 J				
pH	pH units		11.4	10.8	11.3	11.4	11.6				

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 15
Compounds Detected in Special Areas 8 and 11 (Mercury-Cell Retort and Still Area and Mercury-Cell Building Area)
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC**	**DB-2A**	**DB-2G**	**DB-2X**	**DB-3B**	**DB-3I**	**DB-3Z**	**DB-4A**	**DB-4G**	**DB-4V**	**DB-5A**	**DB-5G**	**DB-5T**
Date Sampled		**TAGM**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**	**Sept-95**
Sample depth (ft. below grade)		**RSCO***	**0-2**	**12-14**	**46-48**	**2-4**	**16-18**	**50-52**	**0-2**	**12-14**	**42-44**	**0-2**	**12-14**	**38-40**
	Units													
Inorganics														
Mercury	mg/Kg	0.1	26.5	3.3	14.6	49	58.3 J	0.67 J	16 J	0.1 UJ	0.24	3.6 J	0.16 U	0.12 U
Copper	mg/Kg	25 or SB												
Lead	mg/Kg	SB**												
Miscellaneous														
Chloride^2	mg/L													
pH	pH units													

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0901A	SL 09101A	SL 0902A	SL 0903A	SL 0903D	SL 0904A	SL 0904D	SL 0905A	SL 0905D
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5	0-0.5	0-0.5	1.5-2	0-0.5	1.5-2	0-0.5	1.5-2
	Units										
Volatile Organics											
Acetone	ug/kg	200	6 J	18 J		10 J	10 UJ				
Methylene Chloride	ug/kg	100	12 UJ	5 J		11 UJ	10 UJ				
Ethylbenzene	ug/kg	5500	12 U	12 U		11 U	10 U				
Xylene	ug/kg	1200	12 U	12 U		11 U	10 U				
Semi-Volatile Organics											
1,2,4-Trichlorobenzene	ug/kg	3400	400 UJ	30 J		370 UJ	350 UJ				
2,4,6-Trichlorophenol	ug/kg	**	400 UJ	420 UJ		370 UJ	350 UJ				
1,2-Dichlorobenzene	ug/kg	7900	400 UJ	16 J		370 UJ	350 UJ				
1,3-Dichlorobenzene	ug/kg	1600	400 UJ	5 J		370 UJ	350 UJ				
1,4-Dichlorobenzene	ug/kg	8500	400 UJ	20 J		370 UJ	350 UJ				
2-Methylnaphthalene	ug/kg	36400	12 J	17 J		370 UJ	350 UJ				
Acenaphthene	ug/kg	50000 ***	33 J	21 J		370 UJ	350 UJ				
Acenaphthylene	ug/kg	41000	400 UJ	7 J		370 UJ	350 UJ				
Anthracene	ug/kg	50000 ***	34 J	36 J		14 J	15 J				
Benzo(a)anthracene	ug/kg	224 or MDL	180 J	220 J		69 J	87 J				
Benzo(a)pyrene	ug/kg	61 or MDL	160 J	180 J		78 J	74 J				
Benzo(b)fluoranthene	ug/kg	1100	340 J	380 J		130 J	140 J				
Benzo(g,h,i)perylene	ug/kg	50000 ***	28 J	12 J		R	16 J				

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 0901A**	**SL 09101A**	**SL 0902A**	**SL 0903A**	**SL 0903D**	**SL 0904A**	**SL 0904D**	**SL 0905A**	**SL 0905D**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**
	Units										
Benzo(k)fluoranthene	ug/kg	1100	270 J	260 J		83 J	90 J				
Butylbenzylphthalate	ug/kg	50000 ***	400 UJ	420 UJ		9 J	350 UJ				
Carbazole	ug/kg		33 J	32 J		9 J	15 J				
Chrysene	ug/kg	400	260 J	310 J		100 J	120 J				
Di-n-butylphthalate	ug/kg	8100	21 J	420 U		27 J	11 J				
Dibenz(a,h)anthracene	ug/kg	14 or MDL	26 J	16 J		11 J	13 J				
Dibenzofuran	ug/kg	6200	17 J	19 J		370 UJ	350 UJ				
Diethylphthalate	ug/kg	7100	22 J	420 UJ		89 J	130 J				
Dimethylphthalate	ug/kg	2000	13 J	29 J		95 J	350 UJ				
Fluoranthene	ug/kg	50000 ***	480 J	500		160 J	220 J				
Fluorene	ug/kg	50000 ***	26 J	18 J		370 UJ	9 J				
Hexachlorobenzene	ug/kg	410	510 J	1000 J		33 J	26 J				
Hexachloroethane	ug/kg		660 J	550 J		370 UJ	350 UJ				
Indeno(1,2,3-cd)pyrene	ug/kg	3200	110 J	61 J		44 J	76 J				
Naphthalene	ug/kg	13000	14 J	28 J		6 J	350 UJ				
Pentachlorophenol	ug/kg	1000 or MDL	93 J	41 J		890 UJ	840 UJ				
Phenanthrene	ug/kg	50000 ***	320 J	310 J		84 J	120 J				
Phenol	ug/kg	30 or MDL	30 J	420 UJ		370 UJ	350 UJ				
Pyrene	ug/kg	50000 ***	390 J	480 J		130 J	170 J				
Pesticides/PCBs											
4,4'-DDE	ug/kg	2100	210 U	420 U		18 U	8.9 J				
Aroclor-1254	ug/kg	1000 ****	4300 J	8100 J		490 J	170 U				
Aroclor-1260	ug/kg	1000 ****	2100 U	4200 U		180 U	170 U				
Dieldrin	ug/kg	44	210 U	420 U		8.4 JN	17 U				
Endrin	ug/kg	100	210 U	420 U		14 JN	7 JN				

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 0901A**	**SL 09101A**	**SL 0902A**	**SL 0903A**	**SL 0903D**	**SL 0904A**	**SL 0904D**	**SL 0905A**	**SL 0905D**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**	**0-0.5**	**1.5-2**
	Units										
Inorganics											
Mercury	mg/Kg	0.1	1690 J	1800 J	1350 J	246 J	4.8 J	1290 J	0.83 J	23.8 J	0.33 J
Aluminum	mg/Kg	SB	6290	3540		2710	4760				
Arsenic	mg/Kg	7.5 or SB	7.2 J	4.6 J		4.4 J	3.5 J				
Barium	mg/Kg	300 or SB	159	90.7		101	15.4				
Beryllium	mg/Kg	0.16 or SB	0.83 J	0.79 J		0.67 J	0.68 J				
Cadmium	mg/Kg	1 or SB	0.25 UJ	0.42 J		0.26 J	0.21 UJ				
Calcium	mg/Kg	SB	109000 J	179000 J		137000 J	98700 J				
Chromium	mg/Kg	10 or SB	56.5 J	44.8 J		13.5 J	9.4 J				
Cobalt	mg/Kg	30 or SB	7.7 J	4.5 J		4.6 J	4.5 J				
Copper	mg/Kg	25 or SB	169 J	112 J		44.3 J	R				
Cyanide	mg/Kg	*****	1.2 U	0.6 U		1.1 U	1 U				
Iron	mg/Kg	2000 or SB	104000 J	33500 J		9970	11200				
Lead	mg/Kg	SB******	166 J	150 J	174 J	28.4 J	7.1 J	26.8 J	11.8 J	8 J	12.9 J
Magnesium	mg/Kg	SB	15400	8840		27300	68300				
Manganese	mg/Kg	SB	690	397		245	345				
Nickel	mg/Kg	13 or SB	317 J	195 J		38.8 J	10.5 J				
Potassium	mg/Kg	SB	1030 J	784 J		818 J	779 J				
Selenium	mg/Kg	2 or SB	3.9	1.2 J		0.45 UJ	0.68 J				
Silver	mg/Kg	SB	2.1 J	0.41 J		0.22 UJ	0.21 UJ				
Sodium	mg/Kg	SB	4600 J	3390 J		407 J	468 J				
Zinc	mg/Kg	20 or SB	254 J	178 J		54.6 J	19.4 J				
Miscellaneous											
Chloride^2	mg/L		34.8 J	36.8 J	18.1 J	3 UJ	4.2 J	4 J	4.8 J	3 UJ	12.4 J

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 0906A	SL 0906D	SL 0907A	SL 0908A	SO-03A	SO-04A
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	1.5-2	0-0.5	0-0.5	0-0.5	0-0.5
	Units							
Volatile Organics								
Acetone	ug/kg	200	10 UJ	12 J		55 UJ		
Methylene Chloride	ug/kg	100	10 UJ	11 UJ		13 UJ		
Ethylbenzene	ug/kg	5500	10 U	11 U		11 U		
Xylene	ug/kg	1200	10 U	11 U		11 U		
Semi-Volatile Organics								
1,2,4-Trichlorobenzene	ug/kg	3400	350 UJ	380 UJ		7300 UJ		
2,4,6-Trichlorophenol	ug/kg	**	350 UJ	380 UJ		7300 UJ		
1,2-Dichlorobenzene	ug/kg	7900	350 UJ	380 UJ		7300 UJ		
1,3-Dichlorobenzene	ug/kg	1600	350 UJ	380 UJ		7300 UJ		
1,4-Dichlorobenzene	ug/kg	8500	350 UJ	380 UJ		7300 UJ		
2-Methylnaphthalene	ug/kg	36400	350 UJ	14 J		7300 UJ		
Acenaphthene	ug/kg	50000 ***	12 J	10 J		7300 UJ		
Acenaphthylene	ug/kg	41000	6 J	12 J		7300 UJ		
Anthracene	ug/kg	50000 ***	23 J	20 J		7300 UJ		
Benzo(a)anthracene	ug/kg	224 or MDL	170 J	130 J		260 J		
Benzo(a)pyrene	ug/kg	61 or MDL	190 J	120 J		330 J		
Benzo(b)fluoranthene	ug/kg	1100	300 J	210 J		560 J		
Benzo(g,h,i)perylene	ug/kg	50000 ***	34 J	R		R		

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16

Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil

LCP Bridge Street RI/FS

Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 0906A	SL 0906D	SL 0907A	SL 0908A	SO-03A	SO-04A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)			0-0.5	1.5-2	0-0.5	0-0.5	0-0.5	0-0.5
	Units							
Benzo(k)fluoranthene	ug/kg	1100	150 J	170 J		520 J		
Butylbenzylphthalate	ug/kg	50000 ***	350 UJ	380 UJ		7300 UJ		
Carbazole	ug/kg		17 J	23 J		7300 UJ		
Chrysene	ug/kg	400	220 J	150 J		400 J		
Di-n-butylphthalate	ug/kg	8100	24 J	18 J		7300 UJ		
Dibenz(a,h)anthracene	ug/kg	14 or MDL	18 J	380 UJ		7300 UJ		
Dibenzofuran	ug/kg	6200	7 J	10 J		7300 UJ		
Diethylphthalate	ug/kg	7100	100 J	7 J		1100 J		
Dimethylphthalate	ug/kg	2000	140 J	380 UJ		1100 J		
Fluoranthene	ug/kg	50000 ***	350 J	240 J		380 J		
Fluorene	ug/kg	50000 ***	9 J	10 J		7300 UJ		
Hexachlorobenzene	ug/kg	410	65 J	380 UJ		7300 UJ		
Hexachloroethane	ug/kg		350 UJ	380 UJ		7300 UJ		
Indeno(1,2,3-cd)pyrene	ug/kg	3200	79 J	39 J		7300 UJ		
Naphthalene	ug/kg	13000	9 J	12 J		7300 UJ		
Pentachlorophenol	ug/kg	1000 or MDL	850 UJ	910 UJ		18000 UJ		
Phenanthrene	ug/kg	50000 ***	160 J	130 J		7300 UJ		
Phenol	ug/kg	30 or MDL	350 UJ	380 UJ		7300 UJ		
Pyrene	ug/kg	50000 ***	290 J	230 J		600 J		
Pesticides/PCBs								
4,4'-DDE	ug/kg	2100	3.5 U	3.9 UJ		180 U		
Aroclor-1254	ug/kg	1000 ****	180 J	39 UJ		5300 J		
Aroclor-1260	ug/kg	1000 ****	170 J	39 UJ		1800 U		
Dieldrin	ug/kg	44	3.5 U	3.9 UJ		180 U		
Endrin	ug/kg	100	3.5 U	3.9 UJ		180 U		

· blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 0906A**	**SL 0906D**	**SL 0907A**	**SL 0908A**	**SO-03A**	**SO-04A**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-96**	**Oct-96**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**1.5-2**	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**
	Units							
Inorganics								
Mercury	mg/Kg	0.1	134 J	1.4 J	165 J	3860 J	35.7	84.3
Aluminum	mg/Kg	SB	2160	4870		1950		
Arsenic	mg/Kg	7.5 or SB	3.4 J	35.5		3.8 J		
Barium	mg/Kg	300 or SB	70.9	50.6		190		
Beryllium	mg/Kg	0.16 or SB	0.71 J	0.9 J		0.69 J		
Cadmium	mg/Kg	1 or SB	0.22 UJ	0.23 UJ		0.88 J		
Calcium	mg/Kg	SB	151000 J	33500 J		155000 J		
Chromium	mg/Kg	10 or SB	12 J	12.3 J		19.2 J		
Cobalt	mg/Kg	30 or SB	3.5 J	5.9 J		5.8 J		
Copper	mg/Kg	25 or SB	R	36.4 J		101 J		
Cyanide	mg/Kg	*****	1.1 U	4		1.1 U		
Iron	mg/Kg	2000 or SB	6380	45100		12400		
Lead	mg/Kg	SB******	12.9 J	168 J	12.7 J	35.8 J		
Magnesium	mg/Kg	SB	32600	13500		23300		
Manganese	mg/Kg	SB	255	295		241		
Nickel	mg/Kg	13 or SB	22.4 J	17.6 J		372 J		
Potassium	mg/Kg	SB	936 J	554 J		614 J		
Selenium	mg/Kg	2 or SB	0.6 J	5.5		0.55 J		
Silver	mg/Kg	SB	0.22 UJ	0.23 UJ		0.23 UJ		
Sodium	mg/Kg	SB	971 J	1060 J		367 J		
Zinc	mg/Kg	20 or SB	29.8 J	95.5 J		148 J		
Miscellaneous								
Chloride^2	mg/L		6.8 J	45.5 J	3 UJ	3 UJ		

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16

Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SO-05A	SO-105A	SO-06A	SO-07A	SO-08A	SO-09A	SL 1201A
Date Sampled		TAGM	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Units								
Volatile Organics									
Acetone	ug/kg	200							
Methylene Chloride	ug/kg	100							
Ethylbenzene	ug/kg	5500							1 UJ
Xylene	ug/kg	1200							1 UJ
Semi-Volatile Organics									
1,2,4-Trichlorobenzene	ug/kg	3400							2100 U
2,4,6-Trichlorophenol	ug/kg	**							2100 U
1,2-Dichlorobenzene	ug/kg	7900							2100 U
1,3-Dichlorobenzene	ug/kg	1600							2100 U
1,4-Dichlorobenzene	ug/kg	8500							2100 U
2-Methylnaphthalene	ug/kg	36400							210 J
Acenaphthene	ug/kg	50000 ***							290 J
Acenaphthylene	ug/kg	41000							2100 U
Anthracene	ug/kg	50000 ***							180 J
Benzo(a)anthracene	ug/kg	224 or MDL							1600 J
Benzo(a)pyrene	ug/kg	61 or MDL							2300 J
Benzo(b)fluoranthene	ug/kg	1100							3700 J
Benzo(g,h,i)perylene	ug/kg	50000 ***							680 J

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SO-05A	SO-105A	SO-06A	SO-07A	SO-08A	SO-09A	SL 1201A
Date Sampled		TAGM	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96	Oct-96	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
	Units								
Benzo(k)fluoranthene	ug/kg	1100							3000
Butylbenzylphthalate	ug/kg	50000 ***							2100 UJ
Carbazole	ug/kg								1500 J
Chrysene	ug/kg	400							3400
Di-n-butylphthalate	ug/kg	8100							2100 U
Dibenz(a,h)anthracene	ug/kg	14 or MDL							2100 UJ
Dibenzofuran	ug/kg	6200							400 J
Diethylphthalate	ug/kg	7100							260 J
Dimethylphthalate	ug/kg	2000							330 J
Fluoranthene	ug/kg	50000 ***							8400
Fluorene	ug/kg	50000 ***							170 J
Hexachlorobenzene	ug/kg	410							2100 U
Hexachloroethane	ug/kg								2100 U
Indeno(1,2,3-cd)pyrene	ug/kg	3200							1800 J
Naphthalene	ug/kg	13000							620 J
Pentachlorophenol	ug/kg	1000 or MDL							5100 U
Phenanthrene	ug/kg	50000 ***							6100
Phenol	ug/kg	30 or MDL							2100 U
Pyrene	ug/kg	50000 ***							5300
Pesticides/PCBs									
4,4'-DDE	ug/kg	2100							
Aroclor-1254	ug/kg	1000 ****							240 J
Aroclor-1260	ug/kg	1000 ****							210 U
Dieldrin	ug/kg	44							
Endrin	ug/kg	100							

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SO-05A**	**SO-105A**	**SO-06A**	**SO-07A**	**SO-08A**	**SO-09A**	**SL 1201A**
Date Sampled		TAGM	**Oct-96**	**Oct-96**	**Oct-96**	**Oct-96**	**Oct-96**	**Oct-96**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**	**0-0.5**
	Units								
Inorganics									
Mercury	mg/Kg	0.1	66.7	46	47.3	7.3	139	94.5	
Aluminum	mg/Kg	SB							
Arsenic	mg/Kg	7.5 or SB							
Barium	mg/Kg	300 or SB							
Beryllium	mg/Kg	0.16 or SB							
Cadmium	mg/Kg	1 or SB							
Calcium	mg/Kg	SB							
Chromium	mg/Kg	10 or SB							
Cobalt	mg/Kg	30 or SB							
Copper	mg/Kg	25 or SB							
Cyanide	mg/Kg	*****							
Iron	mg/Kg	2000 or SB							
Lead	mg/Kg	SB******							
Magnesium	mg/Kg	SB							
Manganese	mg/Kg	SB							
Nickel	mg/Kg	13 or SB							
Potassium	mg/Kg	SB							
Selenium	mg/Kg	2 or SB							
Silver	mg/Kg	SB							
Sodium	mg/Kg	SB							
Zinc	mg/Kg	20 or SB							
Miscellaneous									
Chloride^2	mg/L								

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 1201A 1011**	**SL 1202A**	**SL 1203D**	**SL 1204D**	**SL 1205A**	**SL 1205B**	**SL 1206A**	**SL 1206B**	**SL 1207A**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**0-0.5**	**0-0.5**	**1.5-2**	**1.5-2**	**0-0.5**	**0.5-1**	**0-0.5**	**0.5-1**	**0-0.5**
	Units										
Volatile Organics											
Acetone	ug/kg	200									
Methylene Chloride	ug/kg	100									
Ethylbenzene	ug/kg	5500	1 U	1 U	1 U	1 U	1 U	1 U	6 U	210	1 U
Xylene	ug/kg	1200	1 U	1 U	2	1 U	1 U	1 U	32	330	1 U
Semi-Volatile Organics											
1,2,4-Trichlorobenzene	ug/kg	3400	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
2,4,6-Trichlorophenol	ug/kg	**	4000 U	200 J	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
1,2-Dichlorobenzene	ug/kg	7900	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
1,3-Dichlorobenzene	ug/kg	1600	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
1,4-Dichlorobenzene	ug/kg	8500	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
2-Methylnaphthalene	ug/kg	36400	590 J	30 J	7100 U	4100 U	350 U	350 U	110 J	2600	700 U
Acenaphthene	ug/kg	50000 ***	870 J	R	7100 U	4100 U	350 U	350 U	460 J	750 U	700 U
Acenaphthylene	ug/kg	41000	67 J	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
Anthracene	ug/kg	50000 ***	12000	27 J	7100 U	4100 U	12 J	350 U	530 J	36 J	19 J
Benzo(a)anthracene	ug/kg	224 or MDL	4500	170 J	7100 U	840 J	48 J	350 U	1100 J	160 J	82 J
Benzo(a)pyrene	ug/kg	61 or MDL	5400	150 J	7100 U	920 J	67 J	82 J	1200 J	180 J	140 J
Benzo(b)fluoranthene	ug/kg	1100	9200 J	350 J	7100 UJ	980 J	85 J	100 J	1300 J	220 J	180 J
Benzo(g,h,i)perylene	ug/kg	50000 ***	750 J	R	7100 UJ	4100 UJ	350 UJ	350 UJ	1800 UJ	750 UJ	700 UJ

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1201A 1011	SL 1202A	SL 1203D	SL 1204D	SL 1205A	SL 1205B	SL 1206A	SL 1206B	SL 1207A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	1.5-2	1.5-2	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5
	Units										
Benzo(k)fluoranthene	ug/kg	1100	6000	330 J	7100 U	940 J	86 J	67 J	1200 J	200 J	180 J
Butylbenzylphthalate	ug/kg	50000 ***	4000 U	110 J	7100 U	4100 U	350 UJ	350 UJ	1800 UJ	750 UJ	700 UJ
Carbazole	ug/kg		1400 J	27 J	7100 U	4100 U	350 U	350 U	490 J	750 UJ	700 UJ
Chrysene	ug/kg	400	7200	300 J	7100 U	810 J	66 J	350 U	1000 J	170 J	120 J
Di-n-butylphthalate	ug/kg	8100	79 J	580 J	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
Dibenz(a,h)anthracene	ug/kg	14 or MDL	680 J	R	7100 U	4100 U	350 UJ	350 UJ	1800 U	750 UJ	700 UJ
Dibenzofuran	ug/kg	6200	1000 J	21 J	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
Diethylphthalate	ug/kg	7100	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	67 J	40 J
Dimethylphthalate	ug/kg	2000	470 J	4600 J	7100 U	4100 U	21 J	350 U	1800 U	750 U	700 U
Fluoranthene	ug/kg	50000 ***	16000	570 J	7100 U	1300 J	100 J	110 J	2900	340 J	170 J
Fluorene	ug/kg	50000 ***	460 J	R	7100 U	4100 U	350 U	350 U	340 J	82 J	700 U
Hexachlorobenzene	ug/kg	410	4000 U	120 J	7100 U	4100 U	46 J	350 U	1800 U	750 U	32 J
Hexachloroethane	ug/kg		4000 U	91 J	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
Indeno(1,2,3-cd)pyrene	ug/kg	3200	3400 J	R	7100 UJ	300 J	24 J	350 UJ	140 J	750 UJ	700 UJ
Naphthalene	ug/kg	13000	1800 J	31 J	7100 U	4100 U	350 U	350 U	240 J	1400	700 U
Pentachlorophenol	ug/kg	1000 or MDL	9600 U	480 J	17000 U	10000 U	860 U	860 U	4500 U	1800 U	1700 U
Phenanthrene	ug/kg	50000 ***	13000	330 J	7100 U	4100 U	62 J	350 U	2000	180 J	90 J
Phenol	ug/kg	30 or MDL	4000 U	R	7100 U	4100 U	350 U	350 U	1800 U	750 U	700 U
Pyrene	ug/kg	50000 ***	12000	480 J	7100 U	1300 J	99 J	150 J	2800	260 J	200 J
Pesticides/PCBs											
4,4'-DDE	ug/kg	2100									
Aroclor-1254	ug/kg	1000 ****	280 JN	620 U							
Aroclor-1260	ug/kg	1000 ****	400 U	620 U							
Dieldrin	ug/kg	44									
Endrin	ug/kg	100									

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1201A 1011	SL 1202A	SL 1203D	SL 1204D	SL 1205A	SL 1205B	SL 1206A	SL 1206B	SL 1207A
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0-0.5	1.5-2	1.5-2	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5
	Units										
Inorganics											
Mercury	mg/Kg	0.1									
Aluminum	mg/Kg	SB									
Arsenic	mg/Kg	7.5 or SB									
Barium	mg/Kg	300 or SB									
Beryllium	mg/Kg	0.16 or SB									
Cadmium	mg/Kg	1 or SB									
Calcium	mg/Kg	SB									
Chromium	mg/Kg	10 or SB									
Cobalt	mg/Kg	30 or SB									
Copper	mg/Kg	25 or SB									
Cyanide	mg/Kg	*****									
Iron	mg/Kg	2000 or SB									
Lead	mg/Kg	SB******									
Magnesium	mg/Kg	SB									
Manganese	mg/Kg	SB									
Nickel	mg/Kg	13 or SB									
Potassium	mg/Kg	SB									
Selenium	mg/Kg	2 or SB									
Silver	mg/Kg	SB									
Sodium	mg/Kg	SB									
Zinc	mg/Kg	20 or SB									
Miscellaneous											
Chloride^2	mg/L										

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1207D	SL 1208	SL 1208A	SL 12102A
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	1.5-2	1.5-2	0-0.5	0-0.5
	Units					
Volatile Organics						
Acetone	ug/kg	200				
Methylene Chloride	ug/kg	100				
Ethylbenzene	ug/kg	5500	1 U	1 U	1 UJ	1 U
Xylene	ug/kg	1200	1 U	1 U	1 UJ	1 U
Semi-Volatile Organics						
1,2,4-Trichlorobenzene	ug/kg	3400	1500 U	360 U	3500 U	1200 U
2,4,6-Trichlorophenol	ug/kg	**	1500 U	360 U	3500 U	200 J
1,2-Dichlorobenzene	ug/kg	7900	1500 U	360 U	3500 U	1200 U
1,3-Dichlorobenzene	ug/kg	1600	1500 U	360 U	3500 U	1200 U
1,4-Dichlorobenzene	ug/kg	8500	1500 U	360 U	3500 U	1200 U
2-Methylnaphthalene	ug/kg	36400	120 J	360 U	3500 U	1200 U
Acenaphthene	ug/kg	50000 ***	620 J	360 U	3500 U	120 J
Acenaphthylene	ug/kg	41000	1500 U	360 U	3500 U	1200 U
Anthracene	ug/kg	50000 ***	770 J	33 J	3500 U	230 J
Benzo(a)anthracene	ug/kg	224 or MDL	2400 J	130 J	3500 U	580 J
Benzo(a)pyrene	ug/kg	61 or MDL	2100 J	190 J	3500 U	630 J
Benzo(b)fluoranthene	ug/kg	1100	3200 J	180 J	220 J	870 J
Benzo(g,h,i)perylene	ug/kg	50000 ***	1500 UJ	360 UJ	3500 UJ	1200 UJ

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16

Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil

LCP Bridge Street RI/FS

Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1207D	SL 1208	SL 1208A	SL 12102A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			1.5-2	1.5-2	0-0.5	0-0.5
	Units					
Benzo(k)fluoranthene	ug/kg	1100	3000	180 J	260 J	980 J
Butylbenzylphthalate	ug/kg	50000 ***	1500 UJ	360 UJ	3500 UJ	1200 UJ
Carbazole	ug/kg		1000 J	32 J	3500 UJ	310 J
Chrysene	ug/kg	400	3100	150 J	190 J	700 J
Di-n-butylphthalate	ug/kg	8100	1500 U	360 U	3500 U	1200 U
Dibenz(a,h)anthracene	ug/kg	14 or MDL	1500 U	360 U	3500 U	1200 UJ
Dibenzofuran	ug/kg	6200	320 J	360 U	3500 U	78 J
Diethylphthalate	ug/kg	7100	1500 U	360 U	3500 U	1200 U
Dimethylphthalate	ug/kg	2000	1500 U	360 U	3500 U	4400
Fluoranthene	ug/kg	50000 ***	7700	310 J	320 J	1800 J
Fluorene	ug/kg	50000 ***	480 J	15 J	3500 U	110 J
Hexachlorobenzene	ug/kg	410	1500 U	360 U	3500 U	200 J
Hexachloroethane	ug/kg		1500 U	360 U	3500 U	1200 U
Indeno(1,2,3-cd)pyrene	ug/kg	3200	370 J	67 J	3500 U	1200 UJ
Naphthalene	ug/kg	13000	230 J	360 U	3500 U	44 J
Pentachlorophenol	ug/kg	1000 or MDL	3600 U	870 U	8400 U	390 J
Phenanthrene	ug/kg	50000 ***	5400	140 J	3500 U	1500 J
Phenol	ug/kg	30 or MDL	1500 U	360	3500	1200 U
Pyrene	ug/kg	50000 ***	5400	220 J	320 J	1400 J
Pesticides/PCBs						
4,4'-DDE	ug/kg	2100				
Aroclor-1254	ug/kg	1000 ****				1200 U
Aroclor-1260	ug/kg	1000 ****				1200 U
Dieldrin	ug/kg	44				
Endrin	ug/kg	100				

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 16
Compounds Detected in Special Areas 9 and 12 (Wastewater Treatment and Equipment Area and Oil-Container Storage Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	**SL 1207D**	**SL 1208**	**SL 1208A**	**SL 12102A**
Date Sampled		TAGM	**Oct-95**	**Oct-95**	**Oct-95**	**Oct-95**
Sample depth (ft. below grade)		RSCO*	**1.5-2**	**1.5-2**	**0-0.5**	**0-0.5**
	Units					
Inorganics						
Mercury	mg/Kg	0.1				
Aluminum	mg/Kg	SB				
Arsenic	mg/Kg	7.5 or SB				
Barium	mg/Kg	300 or SB				
Beryllium	mg/Kg	0.16 or SB				
Cadmium	mg/Kg	1 or SB				
Calcium	mg/Kg	SB				
Chromium	mg/Kg	10 or SB				
Cobalt	mg/Kg	30 or SB				
Copper	mg/Kg	25 or SB				
Cyanide	mg/Kg	*****				
Iron	mg/Kg	2000 or SB				
Lead	mg/Kg	SB******				
Magnesium	mg/Kg	SB				
Manganese	mg/Kg	SB				
Nickel	mg/Kg	13 or SB				
Potassium	mg/Kg	SB				
Selenium	mg/Kg	2 or SB				
Silver	mg/Kg	SB				
Sodium	mg/Kg	SB				
Zinc	mg/Kg	20 or SB				
Miscellaneous						
Chloride^2	mg/L					

blank space indicates not analyzed

J-est. value UJ-est. detection limit U-not detected; value is the detection limit; N-presumptively present; R-rejected

Table 17
Compounds Detected in Special Area 10 (Railroad Loading and Unloading Areas) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC**	**SL 1001C**	**SL 1002C**	**SL 1003C**	**SL 1004C**	**SL 1005C**	**SL 1006B**	**SL 1007C**	**SL 1008C**
Date Sampled		**TAGM**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**
Sample depth (ft. below grade)		**RSCO***	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**0.5-1**	**1-1.25**	**1-1.25**
	Units									
Inorganics										
Mercury	mg/Kg	0.1	1 J	3.3 J	0.97 J	0.32 J	1.4 J	14.8 J	4.1 J	1.5 J
Miscellaneous										
Chloride[2]	mg/L		15.1 J	5.8 J	7.1 J	5.4 J	6.9 J	12.6 J	13 J	5.4 J
pH	pH units		9.09	10.4	10.9	11	10.3	11.4	10.8	9.01

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM #4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 17
Compounds Detected in Special Area 10 (Railroad Loading and Unloading Areas) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC TAGM RSCO***	**SL 1009C**	**SL 1010C**	**SL 10117C**	**SL 1011C**	**SL 1012C**	**SL 1013C**	**SL 1014C**
Date Sampled			**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**
Sample depth (ft. below grade)			**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**
	Units								
Inorganics									
Mercury	mg/Kg	0.1	1.2 J	3.2 J	1.5 J	0.52 J	0.1 J	2	0.57
Miscellaneous									
Chloride^2	mg/L		24 J	3 UJ	3 U	51.9 J	3 UJ	7.7 J	5.8 J
pH	pH units		9.92	10.4	9.57 J	9.07	10.6	9.81 J	11.4 J

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM #4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 17
Compounds Detected in Special Area 10 (Railroad Loading and Unloading Areas) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC TAGM RSCO***	**SL 1015C**	**SL 1016C**	**SL 1017C**	**SL 1018C**	**SL 1019C**	**SL 1020C**	**SL 1021C**	**SL 1022C**
Date Sampled			**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**
Sample depth (ft. below grade)			**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**
	Units									
Inorganics										
Mercury	mg/Kg	0.1	1.6	0.96	0.3 J	4.3	2.8	35.2	40.5	5.6
Miscellaneous										
Chloride^2	mg/L		3 U	17 J	3 U	3 U	3 U	3.2 J	4.1 J	4.3 J
pH	pH units		11.8 J	9.48 J	9.54 J	10.3 J	9.28 J	8.47 J	9.45 J	8.13 J

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM #4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 17
Compounds Detected in Special Area 10 (Railroad Loading and Unloading Areas) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		**NYSDEC**	**SL 1023C**	**SL 1024C**	**SL 1025C**	**SL 1026C**	**SL 1027C**	**SL 1028C**
Date Sampled		**TAGM**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**	**OCT-95**
Sample depth (ft. below grade)		**RSCO***	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**	**1-1.25**
	Units							
Inorganics								
Mercury	mg/Kg	0.1	0.71	4.5 J	2.4	5.5	21.3	2.6
Miscellaneous								
Chloride^2	mg/L		11.6 J	4 J	14.3 J	4.3 J	3.6 J	10.9 J
pH	pH units		9.93 J	8.19	8.21	9.08	8.34 J	9.19

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM #4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 18
Compounds Detected in Special Area 15 (Brine Mud Storage Mud and Wheel Dumpster Area) Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1501A	SL 1501B	SL 1502A	SL 1502D
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0.5-1	0-0.5	1.5-2
	Units					
Inorganics						
Mercury	mg/Kg	0.1	5.4 J	6.8 J	8 J	4.7 J
Miscellaneous						
Chloride^2	mg/L		18.1 J	13.6 J	3 UJ	4.5 J
pH	pH units		9.71	9.38	9.36	9.32

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 19
Compounds Detected in Liquid Chlorine Building Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SO-01A	SO-02A
Date Sampled			Oct-96	Oct-96
Depth			0-0.5	0-0.5
	Units			
PCBs				
Aroclor-1254	ug/kg	1000 **	8400	2900 J
Aroclor-1260	ug/kg	1000 **	3600 U	1800 U

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Target analytes were Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Recommended surface concentration of total PCBs

J-estimated value
U-not detected; value is the detection limit
UJ-estimated detection limit
R-rejected

Table 20
Compounds Detected in MW-14 Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1601A	SL 1602A	SL 1602D	SL 1603A	SL 1603D	SL 1604A	SL 1604D	SL 1605A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	1.5-2	0-0.5	1.5-2	0-0.5	1.5-2	0-0.5
	Units									
Inorganics										
Mercury	mg/Kg	0.1	4.3 J	127 J	15.4 J	3.6 J	0.73 J	480 J	29.5 J	19.2 J
Copper	mg/Kg	25 or SB	19.3 J	36.9 J	37.2 J	16.8 J	19 J	582 J	61.2 J	40.6 J
Lead	mg/Kg	SB **	14.6	85.8	520	29.4 J	14.5 J	337	35.1	51.1
Miscellaneous										
Chloride^2	mg/L		3 U	3 U	19.9 J	3.2 J	3 U	6.8 J	6.4 J	4.5 J
pH	pH units		8.33 J	8.46 J	9.56 J	8.58 J	8.65 J	7.94 J	8.4 J	8.43 J

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 21
Compounds Detected in Sewer Bedding Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	TP 01E	TP 02B	TP 03H	TP 04H	TP 103H
Date Sampled			Nov-95	Nov-95	Nov-95	Nov-95	Nov-95
Sample depth (ft. below grade)			2-2.5	0.5-1	3.5-4	3.5-4	3.5-4
	Units						
Mercury							
Mercury	mg/Kg	0.1	2.9	7.8	5.6	0.86	8.4

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

- Shading indicates exceedance of NYSDEC TAGM RSCOs

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 22
Compounds Detected in Near West Flume Soils
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 2001A	SL 2002A	SL 2003A	SL 20101A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	0-0.5	0-0.5
	Units					
Inorganics						
Mercury	mg/Kg	0.1	11.2 J	12.6 J	4.6 J	13.6 J
Cadmium	mg/Kg	1 or SB	1.3	0.74	0.24 U	0.44
Chromium	mg/Kg	10 or SB	14.7	20.7	18.3	15.5
Copper	mg/Kg	25 or SB	24.4	29.9	1190	34.2
Lead	mg/Kg	SB**	83.7	52.7	44.8	61.1
Miscellaneous						
Chloride^2	mg/L		R	3 UJ	3.2 J	17 J
pH	pH units		10.6	8.1	8.29	10

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 23
Compounds Detected in Soil Samples Collected
From the Inter Area Locations
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1801A	SL 1802A	SL 1802D	SL 1803A	SL 1803D	SL 1804A	SL 1805A	SL 1805D
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0-0.5	0.5-2	0-0.5	0.5-2	0-0.5	0-0.5	0.5-2
	Units									
Inorganics										
Mercury	mg/Kg	0.1	36.7	9.6	2.8	23.8	3.8	1.8	0.11	0.81
Copper	mg/Kg	25 or SB	23.6 J	17.2 J	R	22.2 J	R	20.4 J	26.2 J	27.3 J
Lead	mg/Kg	SB**	R	R	R	R	R	R	R	R
Miscellaneous										
Chloride^2	mg/L		3 UJ	3 UJ	4.8 J	3 UJ	3.9 J	3 UJ	3 UJ	3 J
pH	pH units		7.87	7.9	8.37	8.55	9.04	8.38	8.09	8.08

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 23
Compounds Detected in Soil Samples Collected
From the Inter Area Locations
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1806A	SL 1806D	SL 1807A	SL 1808A	SL 1808D	SL 1809A	SL 1809D	SL 18107A
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0.5-2	0-0.5	0-0.5	0.5-2	0-0.5	0.5-2	0-0.5
	Units									
Inorganics										
Mercury	mg/Kg	0.1	10.2	8.9	4.1	5.8	4.3	3.3	0.42	3.3
Copper	mg/Kg	25 or SB	R	38.6 J	20.1 J	27.6 J	26.3 J	22.3 J	25.5 J	18.4 J
Lead	mg/Kg	SB**	R	R	R	R	R	R	R	R
Miscellaneous										
Chloride^2	mg/L		20.5 J	56.2 J	3 UJ	6.6 J	20.1 J	3.8 J	6.8 J	3 UJ
pH	pH units		9.73	R	7.92	8.95	9.52	9.2	8.98	7.99

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 23
Compounds Detected in Soil Samples Collected From the Inter Area Locations
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	SL 1810A	SL 1810D	SL 18113A	SL 1811A	SL 1811D	SL 1812A	SL 1812A DUP	SL 1812D
Date Sampled			Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)			0-0.5	0.5-2	0-0.5	0-0.5	0.5-2	0-0.5	0-0.5	0.5-2
	Units									
Inorganics										
Mercury	mg/Kg	0.1	53.5	0.39	3.7	15.2	3.1	R	4.9	R
Copper	mg/Kg	25 or SB	32.8 J	17 J	36	32.5 J	108 J	49	70	45.8
Lead	mg/Kg	SB**	R	R	118 J	R	R	179 J	284 J	94.5 J
Miscellaneous										
Chloride^2	mg/L		3 UJ	3 UJ	R	3 UJ	3 UJ	R	R	R
pH	pH units		8.08	8.53	7.8	8.5	8.23	8.17	8.32	8.14

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 23
Compounds Detected in Soil Samples Collected From the Inter Area Locations
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1814A	SL 1814D	SL 1815A
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95
Sample depth (ft. below grade)		RSCO*	0-0.5	0.5-2	0-0.5
	Units				
Inorganics					
Mercury	mg/Kg	0.1	5.8	0.59	7.4
Copper	mg/Kg	25 or SB	23.5	32.8	139
Lead	mg/Kg	SB**	174 J	7.8 J	436 J
Miscellaneous					
Chloride^2	mg/L		R	R	R
pH	pH units		8.12	8.26	7.95

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1701A	SL 1701H	SL 1702A	SL 1702R	SL 1703A	SL 1703J	SB-01B	SB-01E
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	3.5-4	0-0.5	8.5-9	0-0.5	4.5-5	2-4	8-10
	Units									
Volatile Organics										
Acetone	ug/kg	200	14 J	13 UJ			17 J			
Methylene Chloride	ug/kg	100	8 J	6 J			6 J			
Semi-Volatile Organics										
2-Methylnaphthalene	ug/kg	36400	390 UJ	620 J			13 J			
Acenaphthene	ug/kg	50000 **	390 UJ	2100 J			460 UJ			
Acenaphthylene	ug/kg	41000	8 J	40 J			31 J			
Anthracene	ug/kg	50000 **	11 J	3800 J			36 J			
Benzo(a)anthracene	ug/kg	224 or MDL	53 J	5600 J			180 J			
Benzo(a)pyrene	ug/kg	61 or MDL	54 J	5300 J			230 J			
Benzo(b)fluoranthene	ug/kg	1100	43 J	6200 J			220 J			
Benzo(g,h,i)perylene	ug/kg	50000 **	86 J	300 J			58 J			
Benzo(k)fluoranthene	ug/kg	1100	49 J	4100 J			220 J			
Butylbenzylphthalate	ug/kg	50000 **	390 UJ	2100 UJ			10 J			

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1701A	SL 1701H	SL 1702A	SL 1702R	SL 1703A	SL 1703J	SB-01B	SB-01E
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	3.5-4	0-0.5	8.5-9	0-0.5	4.5-5	2-4	8-10
Carbazole	ug/kg		390 UJ	1700 J			13 J			
Chrysene	ug/kg	400	57 J	5200 J			240 J			
Dibenz(a,h)anthracene	ug/kg	14 or MDL	10 J	430 J			34 J			
Dibenzofuran	ug/kg	6200	390 UJ	1200 J			10 J			
Fluoranthene	ug/kg	50000 **	100 J	12000			370 J			
Fluorene	ug/kg	50000 **	390 UJ	2000 J			13 J			
Hexachlorobenzene	ug/kg	410	390 UJ	2100 UJ			22 J			
Indeno(1,2,3-cd)pyrene	ug/kg	3200	39 J	2000 J			160 J			
N-Nitrosodiphenylamine -1	ug/kg		390 U	64 J			460 U			
Naphthalene	ug/kg	13000	390 UJ	1300 J			23 J			
Phenanthrene	ug/kg	50000 **	44 J	12000 J			150 J			
Pyrene	ug/kg	50000 **	94 J	9500 J			340 J			
Pesticides/PCBs										
Aroclor-1254	ug/kg	1000 ***	40 UJ	180 J			40 J		40 U	41 U
Aroclor-1260	ug/kg	1000 ***	40 UJ	87 U			93 UJ		40 U	41 U
Endrin	ug/kg	100	4 UJ	8.7 U			2.3 J			
alpha-Chlordane	ug/kg	540	1.7 J	4.5 U			4.8 UJ			

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1701A	SL 1701H	SL 1702A	SL 1702R	SL 1703A	SL 1703J	SB-01B	SB-01E
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	3.5-4	0-0.5	8.5-9	0-0.5	4.5-5	2-4	8-10
Inorganics										
Mercury	mg/Kg	0.1	0.46 J	0.11 UJ	6.8 J	0.21 J	5 J	0.92 J		
Aluminum	mg/Kg	SB	4820	14000			2090			
Arsenic	mg/Kg	7.5 or SB	3.8 J	19.8			3.5 J			
Barium	mg/Kg	300 or SB	49.4	117			22.1			
Beryllium	mg/Kg	0.16 or SB	0.85 J	1.4 J			0.9 J			
Calcium	mg/Kg	SB	79200 J	12100 J			202000 J			
Chromium	mg/Kg	10 or SB	8.6 J	23 J			8 J			
Cobalt	mg/Kg	30 or SB	4.6 J	13 J			1.8 J			
Copper	mg/Kg	25 or SB	R	77.4 J	27.8 J	R	R	R		
Iron	mg/Kg	2000 or SB	10900	27200			3550			
Lead	mg/Kg	SB****	14.1 J	20.1 J	58.7 J	20.6 J	14.8 J	11.4 J		
Magnesium	mg/Kg	SB	16400	8310			9410			
Manganese	mg/Kg	SB	319	915			84.8			
Nickel	mg/Kg	13 or SB	13.1 J	32.5 J			8.6 J			
Potassium	mg/Kg	SB	841 J	2050 J			622 J			
Selenium	mg/Kg	2 or SB	1.1 J	2 J			0.56 UJ			
Sodium	mg/Kg	SB	1370 J	3490 J			5340 J			
Zinc	mg/Kg	20 or SB	30.4 J	62.8 J			24.6 J			

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SL 1701A	SL 1701H	SL 1702A	SL 1702R	SL 1703A	SL 1703J	SB-01B	SB-01E
Date Sampled		TAGM	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	0-0.5	3.5-4	0-0.5	8.5-9	0-0.5	4.5-5	2-4	8-10
Miscellaneous										
Chloride^2	mg/L				3 UJ	29.4 J		3 UJ		
pH	pH units				8.61	7.49		9.38		

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.
2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- MDL is Method Detection Limit
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** As per TAGM #4046, Total VOCs < 10 ppm, Total Semi-VOCs < 500 ppm, and Individual Semi-VOCs < 50 ppm

*** Recommended surface concentration of total PCBs

**** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SB-02D	SB-02E	SB-03B	SB-03E
Date Sampled		TAGM	Oct-96	Oct-96	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	6-8	8-10	2-4	8-10
	Units					
Volatile Organics						
Acetone	ug/kg	200				
Methylene Chloride	ug/kg	100				
Semi-Volatile Organics						
2-Methylnaphthalene	ug/kg	36400				
Acenaphthene	ug/kg	50000 **				
Acenaphthylene	ug/kg	41000				
Anthracene	ug/kg	50000 **				
Benzo(a)anthracene	ug/kg	224 or MDL				
Benzo(a)pyrene	ug/kg	61 or MDL				
Benzo(b)fluoranthene	ug/kg	1100				
Benzo(g,h,i)perylene	ug/kg	50000 **				
Benzo(k)fluoranthene	ug/kg	1100				
Butylbenzylphthalate	ug/kg	50000 **				

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC		SB-02D	SB-02E	SB-03B	SB-03E
Date Sampled		TAGM		Oct-96	Oct-96	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*		6-8	8-10	2-4	8-10
Carbazole	ug/kg						
Chrysene	ug/kg	400					
Dibenz(a,h)anthracene	ug/kg	14	or MDL				
Dibenzofuran	ug/kg	6200					
Fluoranthene	ug/kg	50000	**				
Fluorene	ug/kg	50000	**				
Hexachlorobenzene	ug/kg	410					
Indeno(1,2,3-cd)pyrene	ug/kg	3200					
N-Nitrosodiphenylamine -1	ug/kg						
Naphthalene	ug/kg	13000					
Phenanthrene	ug/kg	50000	**				
Pyrene	ug/kg	50000	**				
Pesticides/PCBs							
Aroclor-1254	ug/kg	1000	***	40 U	40 U	41 U	40 U
Aroclor-1260	ug/kg	1000	***	2.4 J	40 U	41 U	40 U
Endrin	ug/kg	100					
alpha-Chlordane	ug/kg	540					

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC	SB-02D	SB-02E	SB-03B	SB-03E
Date Sampled		TAGM	Oct-96	Oct-96	Oct-96	Oct-96
Sample depth (ft. below grade)		RSCO*	6-8	8-10	2-4	8-10
Inorganics						
Mercury	mg/Kg	0.1				
Aluminum	mg/Kg	SB				
Arsenic	mg/Kg	7.5 or SB				
Barium	mg/Kg	300 or SB				
Beryllium	mg/Kg	0.16 or SB				
Calcium	mg/Kg	SB				
Chromium	mg/Kg	10 or SB				
Cobalt	mg/Kg	30 or SB				
Copper	mg/Kg	25 or SB				
Iron	mg/Kg	2000 or SB				
Lead	mg/Kg	SB****				
Magnesium	mg/Kg	SB				
Manganese	mg/Kg	SB				
Nickel	mg/Kg	13 or SB				
Potassium	mg/Kg	SB				
Selenium	mg/Kg	2 or SB				
Sodium	mg/Kg	SB				
Zinc	mg/Kg	20 or SB				

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 24
Compounds Detected in Brine Mud Disposal Area Soil
LCP Bridge Street RI/FS
Solvay, New York

Sample ID		NYSDEC TAGM RSCO*	**SB-02D**	**SB-02E**	**SB-03B**	**SB-03E**
Date Sampled			**Oct-96**	**Oct-96**	**Oct-96**	**Oct-96**
Sample depth (ft. below grade)			**6-8**	**8-10**	**2-4**	**8-10**
Miscellaneous						
Chloride^2	mg/L					
pH	pH units					

Notes:

1. Only compounds detected in at least one sample in this area are listed on this table.

2. Chloride concentration of soil leachate.

- Shading indicates exceedance of NYSDEC TAGM RSCOs
- MDL is Method Detection Limit
- SB is Site Background

* NYSDEC TAGM # 4046, Recommended Soil Cleanup Objectives (January 1994)

** As per TAGM #4046, Total VOCs < 10 ppm, Total Semi-VOCs < 500 ppm, and Individual Semi-VOCs < 50 ppm

*** Recommended surface concentration of total PCBs

**** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

blank space indicates not analyzed
J-estimated value UJ-estimated detection limit
U-not detected; value is the detection limit
R-rejected

Table 25
Contaminants of Potential Concern
LCP Bridge Street RI/FS
Solvay, New York

Contaminants of Potential Concern	
Volatile Organics	**Pesticides/PCBs**
1,2-Dichloroethene (total)	Aroclor-1254
4-Methylphenol	Aroclor-1260
Benzene	
Chloroform	**Inorganics/Metals**
Tetrachloroethene	
Trichloroethene	Aluminum
Xylene (total)	Antimony
	Arsenic
Semi-Volatile Organics	Barium
	Beryllium
Anthracene	Cadmium
Benzo(a)anthracene	Chromium
Benzo(a)pyrene	Copper
Benzo(b)fluoranthene	Iron
Benzo(k)fluoranthene	Manganese
bis(2-Ethylhexyl)phthalate	Mercury
Carbazole	Methylmercury, total
Chrysene	Nickel
Dibenz(a,h)anthracene	Vanadium
Dibenzofuran	
Hexachlorobenzene	
Indeno(1,2,3-cd)pyrene	
Naphthalene	

Table 26
Summary of Exposure Factors
LCP Worker #1 - Patrol

On-Site Adult LCP Worker #1 - patrol **Exposure Pathway/Exposure Factor**	**Value**	**Comment**
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.016	Weighted avg adherence, assuming exposure similar to groundskeepers, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	5563	Adult surface area for hands, forearms, lower legs, face, and feet, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	38	Assumes site patroled once/week, and exposure precluded by snow cover 23% of year.
Exposure Duration(yr)	25	USEPA, 1991a.
Body Weight (kg)	70	USEPA, 1991a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/yr)
Averaging Time - Noncancer (d)	9125	25 year occupational exposure duration, 365 days/year.

Table 27
Summary of Exposure Factors
LCP Worker #2 - Terminal

On-Site Adult LCP Worker 2 - Terminal Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.016	Weighted avg adherence, assuming exposure similar to groundskeepers, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	5563	Adult surface area for hands, forearms, lower legs, face, and feet, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	193	Assumes 250 workdays/yr, and exposure precluded by snow cover 23% of year.
Exposure Duration(yr)	25	USEPA, 1991a.
Body Weight (kg)	70	USEPA, 1991a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/yr)
Averaging Time - Noncancer (d)	9125	25 year occupational exposure duration, 365 days/year.

Table 28
Summary of Exposure Factors
Trespasser #1 - Inside Fence

Adolescent Trespasser 1 - Inside Fence Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Sediment		
Sediment Ingestion Rate (mg/d)	50	Assumes sediment ingestion equal to adult daily soil ingestion rate, USEPA, 1996a.
Fraction Sediment from Contaminated Source	1.0	Assumes 50 mg daily adult sediment ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Surface Water		
Surface Water Ingestion Rate (L/hr)	0.005	Assumes ingestion of 5 ml/hr from intentional hand contact with surface water.
Surface Water Ingestion Exposure Time (hr/event)	2	Assumes trespassing event involves contact with surface water for 2 hours.
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.022	Weighted avg adherence, assuming exposure similar to soccer players, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	4443	Surface area for hands, forearms, lower legs, and face, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Sediment		
Soil/Skin Adherence Factor (mg/cm2)	22	Weighted avg adherence, assuming exposure similar to kids-in-mud, USEPA, 1996a.
Surface Area Exposed to Sediment (cm2/event)	5170	Surface area for hands, forearms, lower legs, and feet, USEPA, 1996a.
	0.000001	
Dermal Contact with Surface Water		
Surface Area Exposed to Surface Water (cm2)	3000	Assumes hands, forearms, and feet contact surface water, USEPA, 1996a.
Surface Water Dermal Exposure Time (hr/d)	2	Assumes trespassing event involves contact with surface water for 2 hours.
Conversion Factor (L/cm^3)	0.001	
General Exposure Factors		
Exposure Frequency (d/yr)	1	Conservative estimate; only 1 trespassing event known to have occured within fence.
Exposure Duration(yr)	9	Average length of residence in single home, USEPA, 1989b.
Body Weight (kg)	63	Mean body weight for males, ages 12-21, USEPA, 1996a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/ry)
Averaging Time - Noncancer (d)	3285	Exposure duration (9 yrs) x 365 days/yr.

Table 29
Summary of Exposure Factors
Trespasser #2 - Outside Fence

Adolescent Trespasser 2 - Outside Fence Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Sediment		
Sediment Ingestion Rate (mg/d)	50	Assumes sediment ingestion equal to adult daily soil ingestion rate, USEPA, 1996a.
Fraction Sediment from Contaminated Source	1.0	Assumes 50 mg daily adult sediment ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Surface Water		
Surface Water Ingestion Rate (L/hr)	0.005	Assumes ingestion of 5 ml/hr from intentional hand contact with surface water.
Surface Water Ingestion Exposure Time (hr/ev)	2	Assumes trespassing event involves contact with surface water for 2 hours.
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.022	Weighted avg adherence, assuming exposure similar to soccer players, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	4443	Surface area for hands, forearms, lower legs, and face, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Sediment		
Soil/Skin Adherence Factor (mg/cm2)	22	Weighted avg adherence, assuming exposure similar to kids-in-mud, USEPA, 1996a.
Surface Area Exposed to Sediment (cm2/event)	5170	Surface area for hands, forearms, lower legs, and feet, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Water		
Surface Area Exposed to Surface Water (cm2)	3000	Assumes hands, forearms, and feet contact surface water, USEPA, 1996a.
Surface Water Dermal Exposure Time (hr/d)	2	Assumes trespassing event involves contact with surface water for 2 hours.
Conversion Factor (L/cm^3)	0.001	
General Exposure Factors		
Exposure Frequency (d/yr)	6	Assumes 2 trespassing events per month for 3 summer months.
Exposure Duration(yr)	9	Average length of residence in single home, USEPA, 1989b.
Body Weight (kg)	63	Mean body weight for males, ages 12-21, USEPA, 1996a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yrs x 365 days/yr)
Averaging Time - Noncancer (d)	3285	Exposure duration (9 yrs) x 365 days/yr.

Table 30
Summary of Exposure Factors
Trespasser #3 - Visiting Fair

Adult Trespasser 3 - visiting fair **Exposure Pathway/Exposure Factor**	**Value**	**Comment**
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Sediment		
Sediment Ingestion Rate (mg/d)	50	Assumes sediment ingestion equal to adult daily soil ingestion rate, USEPA, 1996a.
Fraction Sediment from Contaminated Source	1.0	Assumes 50 mg daily adult sediment ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Ingestion of Surface Water		
Surface Water Ingestion Rate (L/hr)	0.001	Assumes ingestion of 1 ml/hr from accidental hand contact with surface water.
Surface Water Ingestion Exposure Time (hr/ev)	0.5	Assumes trespassing event involves accidental contact with surface water for 1/2 hr.
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.022	Weighted avg adherence, assuming exposure similar to soccer players, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	4443	Surface area for hands, forearms, lower legs, and face, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Sediment		
Soil/Skin Adherence Factor (mg/cm2)	0.022	Weighted avg adherence, assuming exposure similar to soccer players, USEPA, 1996a.
Surface Area Exposed to Sediment (cm2/event)	4443	Surface area for hands, forearms, lower legs, and face, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Water		
Surface Area Exposed to Surface Water (cm2)	3000	Assumes hands, forearms, and feet contact surface water, USEPA, 1996a.
Surface Water Dermal Exposure Time (hr/d)	0.5	Assumes trespassing event involves accidental contact with surface water for 1/2 hr.
Conversion Factor (L/cm^3)	0.001	
General Exposure Factors		
Exposure Frequency (d/yr)	2	Assumes 2 trespassing events during fair each year.
Exposure Duration(yr)	9	Average length of residence in single home, USEPA, 1989b.
Body Weight (kg)	70	USEPA, 1991a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/yr)
Averaging Time - Noncancer (d)	3285	Exposure duration (9 yrs) x 365 days/yr.

Table 31
Summary of Exposure Factors
Future On-Site Worker

On-Site Adult Future Worker		
Exposure Pathway/Exposure Factor	**Value**	**Comment**
Ingestion of Surface Soil		
Surface Soil Ingestion Rate (mg/d)	50	Adult daily soil ingestion rate, USEPA, 1996a.
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Surface Soil		
Soil/Skin Adherence Factor (mg/cm2)	0.016	Weighted avg adherence, assuming exposure similar to groundskeepers, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	5563	Adult surface area for hands, forearms, lower legs, face, and feet, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
General Exposure Factors		
Exposure Frequency (d/yr)	193	Assumes 250 workdays/yr, and exposure precluded by snow cover 23% of year.
Exposure Duration(yr)	25	USEPA, 1991a.
Body Weight (kg)	70	USEPA, 1991a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/yr)
Averaging Time - Noncancer (d)	9125	25 year occupational exposure duration, 365 days/year.

Table 32
Summary of Exposure Factors
Future On-Site Construction Worker

On-Site Adult Future Construction Worker Exposure Pathway/Exposure Factor	Value	Comment
Ingestion of Soil (0-10 ft)		
Surface Soil Ingestion Rate (mg/d)	480	Based on landscaper as surrogate for construction worker (EPA, 1997b, from Hawley, 1985)
Fraction Surface Soil from Contaminated Source	1.0	Assumes entire construction work daily adult soil ingestion occurs at site.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Soil (0-10 ft)		
Soil/Skin Adherence Factor (mg/cm2)	0.045	Weighted avg adherence, assuming exposure similar to irrigation installers, USEPA, 1996a.
Surface Area Exposed to Surface Soil (cm2/event)	4443	Adult surface area for hands, forearms, lower legs, and face, USEPA, 1996a.
Conversion Factor (kg/mg)	0.000001	
Dermal Contact with Ground Water		
Surface Area Exposed to Ground Water (cm2)	3000	Assumes hands, forearms, and feet contact surface water, USEPA, 1996a.
Ground Water Dermal Exposure Time (hr/d)	4	Assumes incidental contact with ground water for 4 hr.
Conversion Factor (L/cm^3)	0.001	
General Exposure Factors		
Exposure Frequency (d/yr)	100	Assumes duration of construction project ot be about 5 months (NYSDEC, 1997).
Exposure Duration(yr)	1	NYSDEC, 1997
Body Weight (kg)	70	USEPA, 1991a.
Averaging Time - Cancer (d)	25550	USEPA, 1991a. (70 yr x 365 days/yr)
Averaging Time - Noncancer (d)	365	1 year occupational exposure duration.

Table 33
Summary of Total Excess Lifetime Cancer Risk
LCP Bridge Street
Solvay, NY

Receptor/Exposure Pathway	Cancer Risk	Percent Contribution	Chemicals Accounting for >90% of Cancer Risk
On-Site Adult LCP Worker 1 - Patrol			
Ingestion of Surface Soil	3.8E-06	74.51%	Aroclor 1260, Aroclor 1254, BaP
Dermal Contact with Surface Soil	1.3E-06	25.49%	Aroclor 1260, BaP, Be, Aroclor 1254
Total Cancer Risk:	**5E-06**		
On-Site Adult LCP Worker 2 - Terminal			
Ingestion of Surface Soil	2.3E-06	79.58%	Aroclor 1254
Dermal Contact with Surface Soil	5.9E-07	20.42%	Aroclor 1254
Total Cancer Risk:	**3E-06**		
Adolescent Trespasser 1 - In Fence			
Ingestion of Surface Soil	4.1E-08	1.70%	Aroclor 1260, Aroclor 1254, B aP
Ingestion of Sediment	2.0E-09	0.08%	Aroclor 1254, BaP, BbF
Ingestion of Surface Water	6.5E-10	0.03%	Aroclor 1254
Dermal Contact with Surface Soil	1.5E-08	0.62%	Aroclor 1260, BaP, Be, Aroclor 1254
Dermal Contact with Sediment	1.7E-06	70.29%	Aroclor 1254, BaP, BbF
Dermal Contact with Surface Water	6.6E-07	27.29%	Aroclor 1254
Total Cancer Risk:	**2E-06**		
Adolescent Trespasser 2 - Outside Fence			
Ingestion of Surface Soil	1.5E-08	0.03%	Be, As, BaP
Ingestion of Sediment	9.1E-08	0.15%	BaP, As, BbF, Be, BaA
Ingestion of Surface Water	7.7E-09	0.01%	As
Dermal Contact with Surface Soil	1.5E-08	0.03%	Be, BaP
Dermal Contact with Sediment	5.9E-05	99.77%	BaP, Be, BbF, BaA
Dermal Contact with Surface Water	1.0E-08	0.02%	As, PCE, Chloroform
Total Cancer Risk:	**6E-05**		
Adult Trespasser 3 - Visiting Fair			
Ingestion of Surface Soil	4.8E-09	12.63%	Be, As, BaP
Ingestion of Sediment	1.9E-08	49.99%	BaP, As, BbF, Be
Ingestion of Surface Water	1.1E-10	0.29%	As
Dermal Contact with Surface Soil	4.6E-09	12.10%	Be, BaP
Dermal Contact with Sediment	8.7E-09	22.89%	BaP, Be, BbF, *Sb*
Dermal Contact with Surface Water	8.0E-10	2.10%	As, PCE, Chloroform
Total Cancer Risk:	**4E-08**		
On-Site Adult Future Worker			
Ingestion of Surface Soil	2.0E-05	75.76%	Aroclor 1260, Aroclor 1254, BaP
Dermal Contact with Surface Soil	6.4E-06	24.24%	Aroclor 1260, BaP, Be, Aroclor 1254
Total Cancer Risk:	**3E-05**		
On-Site Adult Future Construction Worker			
Ingestion of Soil	6.4E-06	94.12%	Aroclor 1260, BaP, As, Aroclor 1254
Dermal Contact with Soil	1.5E-07	2.21%	Aroclor 1260, BaP, Be, Aroclor 1254, As
Dermal Contact with Ground Water	2.5E-07	3.68%	BaA, PCE, Carbazole, Chloroform
Total Cancer Risk:	**7E-06**		

Table 34
Summary of Total Noncancer Hazard Index*
LCP Bridge Street
Solvay, NY

Receptor/Exposure Pathway	Hazard Index	Percent Contribution	Chemicals Accounting for >90% of Noncancer Risk
On-Site Adult LCP Worker 1 - Patrol			
Ingestion of Surface Soil	4.1E-01	93.39%	Aroclor 1260, Hg, Aroclor 1254
Dermal Contact with Surface Soil	2.9E-02	6.61%	Aroclor 1260, Hg, Aroclor 1254
Total Hazard Index:	**4E-01**		
On-Site Adult LCP Worker 2 - Terminal			
Ingestion of Surface Soil	4.2E-01	85.37%	Hg, Aroclor 1254
Dermal Contact with Surface Soil	7.2E-02	14.63%	Aroclor 1254, Hg
Total Hazard Index:	**5E-01**		
Adolescent Trespasser 1 - In Fence			
Ingestion of Surface Soil	6.1E-03	1.13%	Aroclor 1260, Hg, Aroclor 1254
Ingestion of Sediment	2.3E-03	0.42%	Hg, Aroclor 1254
Ingestion of Surface Water	3.0E-04	0.06%	Hg, Aroclor 1254
Dermal Contact with Surface Soil	2.7E-03	0.50%	Aroclor 1260, Hg, Aroclor 1254
Dermal Contact with Sediment	4.0E-01	73.88%	Hg, Aroclor 1254
Dermal Contact with Surface Water	1.3E-01	24.01%	Aroclor 1254
Total Hazard Index:	**5E-01**		
Adolescent Trespasser 2 - Outside Fence			
Ingestion of Surface Soil	1.4E-03	0.08%	Fe, Hg, Mn, As, Al, Cr
Ingestion of Sediment	2.6E-03	0.15%	Hg, Fe, Aroclor 1254, As, Mn
Ingestion of Surface Water	1.6E-03	0.09%	Hg, As, Cr
Dermal Contact with Surface Soil	2.8E-04	0.02%	Fe, Hg, Mn, Al
Dermal Contact with Sediment	1.7E+00	99.02%	V, Hg, Sb, Fe, Aroclor 1254, Mn
Dermal Contact with Surface Water	1.1E-02	0.64%	Hg, Sb, V, Cr
Total Hazard Index:	**2E+00**		
Adult Trespasser 3 - Visiting Fair			
Ingestion of Surface Soil	4.9E-04	28.03%	Hg, Fe, Mn, As, Al
Ingestion of Sediment	1.9E-04	10.87%	Hg, Fe, As, Mn, Aroclor 1254
Ingestion of Surface Water	1.7E-05	0.97%	Hg, As
Dermal Contact with Surface Soil	9.1E-05	5.21%	Fe, Hg, Mn, Al, Cr
Dermal Contact with Sediment	3.0E-04	17.16%	V, Hg, Sb, Fe, Mn, Aroclor 1254
Dermal Contact with Surface Water	6.6E-04	37.76%	Hg, Sb, V
Total Hazard Index:	**2E-03**		
On-Site Adult Future Worker			
Ingestion of Surface Soil	2.1E+00	83.33%	Aroclor 1260, Hg, Aroclor 1254
Dermal Contact with Surface Soil	4.2E-01	16.67%	Aroclor 1260, Hg, Aroclor 1254
Total Hazard Index:	**3E+00**		
On-Site Adult Future Construction Worker			
Ingestion of Soil	1.2E+01	93.17%	Aroclor 1260, Hg, Aroclor 1254
Dermal Contact with Soil	6.2E-01	4.81%	Aroclor 1260, Hg, Aroclor 1254
Dermal Contact with Ground Water	2.6E-01	2.02%	Hg, Chloroform, Dibenzofuran
Total Hazard Index:	**1E+01**		

**Hazard Quotients are summed, which* may *overstimate total noncancer effects.*

Table 35
LCP Bridge Street Site
SUMMARY OF UNIT COSTS

	Unit Cost	Unit	Source
Excavation and Handling			
25-foot deep sheet piling	SF	$24	Means
Shallow soil (without utilities removal)	CY	$8	Experience
Shallow soil (with utilities removal)	CY	$10	Experience
Deep soil	CY	$10	Experience
Shallow sediment	CY	$10	Experience
Dewatering			
Stockpiling and Dewatering	CY	$3	Experience
Installing wellpoints	EA	$1,000	Experience
Dewatering for trench excavation	LF	$250	Means
Low-permeability Cap	ACRE	$120,000	Experience and vendor
Subsurface Barrier Wall	SF	$8	Experience and vendor
Restoration of Excavated Areas			
Backfilling with clean fill and topsoil	CY	$15	Experience
Seeding and mulching	ACRE	$2,000	Means
Treatment and Disposal			
a) Soil			
Placement	CY	$5	Experience
Onsite thermal treatment to 0.1 ppm Hg	CY	$1,160	Vendor
Onsite thermal treatment to 10 ppm Hg	CY	$580	Vendor
Onsite physical separation to 25 ppm Hg	CY	$190	Vendor
Onsite physical separation to 40.6 ppm Hg	CY	$190	Vendor
Onsite physical separation to 260 ppm Hg	CY	$150	Vendor
In-situ solidification/stabilization	CY	$110	Vendor
Offsite transport and disposal at retort facility	CY	$750	Vendor
Offsite transport and disposal in hazardous waste landfill	CY	$255	Vendor
Offsite transport and disposal in non-hazardous waste landfill	CY	$100	Vendor
b) Water			
Offsite treatment (low to medium levels of Hg)	GAL	$0.25	Vendor
Offsite treatment (high levels of Hg)	GAL	$0.50	Vendor
Sewers			
Sediment removal from catch basins	DAY	$2,500	Experience
Flowable fill/concrete	CY	$300	Vendor
Labor for closing sewers	DAY	$1,800	Means
Material handling	LS	$10,000	Experience
Disposal of sewer pipes (non-haz waste landfill)	TON	$55	Experience

Table 35
LCP Bridge Street Site
SUMMARY OF UNIT COSTS (cont'd)

	Unit Cost	Unit	Source
Groundwater			
Installing wells	EA	$2,000	Experience
1-gpm Groundwater Treatment System	LS	$200,000	Vendor
15-gpm Groundwater Treatment System	LS	$300,000	Vendor
Treatment Building and System Installation	LS	$50,000	Experience
Treatment - labor	HRS	$50	Experience
Treatment - chemicals	1000 GAL	$8	Vendor
Treatment - electrical requirements	KWH	$0.12	Experience
Treatment - sludge disposal	CY		Vendor
Treatment - metals analysis	EA	$100	Vendor
Monitoring - field effort	HRS	$50	Experience
Monitoring - sample analysis	TEST	$50	Experience
Monitoring - data analysis/reporting	HRS	$80	Experience
Underdrain - piping and gravel	LF	$6	Means
Underdrain - sump and pump	EA	$20,000	Engineering Estimate
Underdrain - aboveground pipe with heat tracing	LS	$20,000	Engineering Estimate
Flume			
Clearing of vegetation	ACRE	$1,000	Means
Disposal of vegetation (non-haz waste landfill)	TON	$30	Means
Temporary biodegradable erosion control	SY	$2	Experience
Geocomposite drainage layer	SY	$5	Vendor
Low-permeability liner (Bentomat)	SY	$10	Vendor
Rigid impermeable liner	SY	$10	Vendor
Wetlands			
Removal of standing water - hosing, pump, tank	LS	$30,000	Means
Seeding new wetlands	ACRE	$5,000	Experience
Creation of new wetlands	ACRE	$75,000	Experience
Annual wetland monitoring	LS	$20,000	Experience
Miscellaneous			
Temporary facilities/health and safety	LS	$100,000	Experience
" for brine muds	LS	$20,000	Experience
" for groundwater monitoring	LS	$10,000	Experience
Drainage trench around cap	CY	$10	Experience
Temporary access roads	LF	$30	Vendor

Table 35
LCP Bridge Street Site
WEST FLUME SEDIMENT
Excavate/Onsite Disposal

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Bypass Flume Water				
a. Dam and flexible hose rental for two months	LS	1	$16,000	$16,000
b. Electric pump rental for two months	LS	1	$7,200	$7,200
2. Clear and Dispose of Vegetation				
a. Clear vegetation	ACRE	3.5	$1,000	$3,500
b. Dispose of vegetation	TON	72	$30	$2,160
3. Remove West Flume Sediment				
a. Excavate West Flume sediment (> 0.2 ppm mercury)	CY	19,000	$10	$190,000
b. Stockpile and dewater excavated sediment	CY	19,000	$3	$57,000
c. Dispose of excavated sediment underneath onsite impermeable cap	CY	19,000	$5	$95,000
d. Treat water from sediment dewatering at offsite WWTP	GAL	280,000	$0.25	$70,000
4. Backfill West Flume and Install Erosion Control				
a. Clean fill	CY	19,000	$15	$285,000
b. Temporary biodegradable erosion control	SY	19,000	$2	$38,000
c. Seeding	ACRE	3.8	$5,000	$19,000
5. Temporary Facilities/Health and Safety (field trailer, decon pad, scales, dewatering pad, etc.)	LS	1	$100,000	$100,000
6. Subtotal Capital Costs				$882,860
7. Engineering, Design, and Construction Oversight (20% of subtotal less treatment and disposal costs)				$143,140
8. Contingencies (35%)				$309,001
9. TOTAL CAPITAL COSTS				**$1,300,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. ANNUAL MONITORING				
a. Field Effort (labor, equipment, expenses)	HRS	80	$50	$4,000
b. Sample Analyses	TEST	30	$50	$1,500
c. Data Analysis/Reporting	HRS	30	$80	$2,400
Subtotal				$8,000
4. Present Worth of Monitoring [PW O&M=(P/A, 7%, 30) * Monitoring Annual O&M]				$99,000
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$1,399,000**

Table35
LCP Bridge Street Site
WETLAND SEDIMENT
Excavation/Wetland Restoration/Onsite Disposal

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Temporary Access Roads	LF	800	$30	$24,000
2. Remove Standing Water in Wetlands				
a. Flexible hosing, electric pump, and storage tank rental	LS	1	$40,000	$40,000
b. Treat water offsite	GAL	2,100,000	$0.25	$525,000
3. Excavate and Dewater Sediment				
a. Excavate wetland sediment to 3 feet (sediment > 0.2 ppm Hg)	CY	35,000	$10	$350,000
b. Stockpile and dewater excavated sediment	CY	35,000	$3	$105,000
c. Treat water offsite	GAL	710,000	$0.25	$177,500
4. Dispose of Excavated Sediment Under Onsite Cap	CY	35,000	$5	$175,000
5. Backfill and Seed Wetlands				
a. Topsoil	CY	5,900	$15	$88,500
b. Seeding	ACRE	7.3	$5,000	$36,500
6. Temporary Facilities/Health and Safety (field trailer, decon pad, scales, dewatering pad, etc.)	LS	1	$100,000	$100,000
7. Subtotal Capital Costs				$1,621,500
8. Engineering, Design, and Construction Oversight (20% of subtotal less treatment and disposal costs)				$148,800
9. Contingencies (35%)				$567,525
10. TOTAL CAPITAL COSTS				**$2,300,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Annual Wetland Monitoring	LS	1	$20,000	$20,000
2. Present Worth of Wetland Monitoring [PW O&M=(P/A, 7%, 5) * Wetland Monitoring Annual O&M]				$82,004
TOTAL O&M PRESENT WORTH				**$82,000**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$2,400,000**

Table 35
LCP Bridge Street Site
SEWERS
Clean Catch Basins/Fill

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Water Handling	LS	1	$15,000	$15,000
2. Offsite Water Treatment	GAL	80,000	$0.25	$20,000
3. Removal of Sediment	DAY	7	$2,500	$17,500
4. Disposal of Sediment at Retort Facility	CY	15	$750	$11,250
5. Process Sanitary and Storm Sewer Closure				
a. Flowable Fill / Concrete	CY	300	$50	$15,000
b. Labor	DAY	20	$1,800	$36,000
c. Equipment	LS	1	$5,000	$5,000
6. Temporary Facilities/Health and Safety, Mob/Demob	LS	1	$20,000	$20,000
7. Subtotal Capital Costs				$139,750
8. Engineering, Design, and Construction Oversight (20% of total less treatment and disposal)				$21,700
9. Contingencies (25%)				$34,938
10. TOTAL CAPITAL COSTS				**$200,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
TOTAL O&M PRESENT WORTH				**$0**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$200,000**

Table 35
LCP Bridge Street Site
BRINE MUD DISPOSAL AREA
Excavate/Onsite Disposal

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Excavate and Handle Brine Muds	CY	3,200	$8	$25,600
2. Place Brine Muds in Preparation for Capping	CY	3,200	$5	$16,000
3. Backfill Excavation Areas				
a. Topsoil	CY	650	$15	$9,750
b. Seeding and mulching	ACRE	0.8	$2,000	$1,600
4. Temporary Facilities/Health and Safety	LS	1	$20,000	$20,000
5. Subtotal Capital Costs				$72,950
6. Engineering, Design, and Construction Oversight (20% of subtotal less treatment and disposal costs)				$11,390
7. Contingencies (35%)				$25,533
8. TOTAL CAPITAL COSTS				**$110,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
TOTAL O&M PRESENT WORTH				**$0**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$110,000**

Table 35

LCP Bridge Street Site

Excavate/Onsite Treatment
of Soil with > 260 ppm Hg
(Hot Spot Removal)

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Excavate and Dewater Soil				
a. Excavate soil with > 260 ppm mercury	CY	4,500	$10	$45,000
b. Excavate soil with > 1 ppm PCBs	CY	900	$10	$9,000
c. Stockpile and dewater excavated soil	CY	5,400	$3	$16,200
d. Treat water offsite	GAL	61,000	$0.25	$15,250
2. Treat/Dispose of Excavated Soil				
a. Mercury-contaminated soil - onsite thermal treatment	CY	4,500	$150	$675,000
b. PCB-contaminated soil - offsite hazardous waste landfill	CY	900	$255	$229,500
3. Return Soil Treated for Mercury to Excavation Areas	CY	4,500	$5	$22,500
4. Backfill Areas Excavated for PCBs with Clean Fill	CY	900	$15	$13,500
5. Temporary Facilities/Health and Safety (field trailer, decon pad, scales, dewatering pad, etc.)	LS	1	$100,000	$100,000
6. Subtotal Capital Costs				$1,125,950
7. Engineering, Pre-Design Investigation, Design, and Construction Oversight (20% of subtotal less treatment and disposal costs)				$41,240
8. Contingencies (35%)				$394,083
9. TOTAL CAPITAL COSTS				**$1,600,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
TOTAL O&M PRESENT WORTH				**$0**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$1,600,000**

Table 35
LCP Bridge Street Site
Low-Permeability Cap

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Consolidate Contaminated Soils from North of West Flume				
a. Excavate soil	CY	10,500	$10	$105,000
b. Place in preparation for capping	CY	10,500	$5	$52,500
2. Backfill Areas of Excavation				
a. Clean fill and topsoil	CY	10,500	$15	$157,500
b. Seeding and mulching	ACRE	2.2	$2,000	$4,400
3. Place Low-Permeability Cap Over All Facility Soils South of West Flume	ACRE	18.5	$120,000	$2,220,000
4. Route Surface Water from Cap to West Flume				
a. Excavate drainage trench around perimeter of cap (2 ft. wide, 2 ft. deep)	CY	600	$10	$6,000
5. Temporary Facilities/Health and Safety (field trailer, decon pad, scales, dewatering pad, etc.)	LS	1	$100,000	$100,000
6. Subtotal Capital Costs				$2,645,400
7. Engineering, Pre-Design Investigation, Design, and Construction Oversight (20% of subtotal less disposal costs)				$518,580
8. Contingencies (25%)				$661,350
9. TOTAL CAPITAL COSTS				**$3,800,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Cap Maintenance	HRS	60	$20	$1,200
2. Present Worth of Cap Maintenance [PW O&M=(P/A, 7%, 30) * Cap Maintenance]				$14,900
3. TOTAL O&M PRESENT WORTH				**$15,000**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$3,915,000**

Table 35
LCP Bridge Street Site

Subsurface Barrier Wall

CAPITAL COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Install Barrier Wall				
a. Install a soil-bentonite slurry wall	SF	204,000	$8	$1,632,000
b. Install 4 wells for maintaining hydraulic gradient	EA	4	$2,000	$8,000
c. Install 32 piezometers for verifying containment	EA	32	$2,000	$64,000
2. Construct Onsite Groundwater Treatment System				
a. 2-gpm groundwater extraction and treatment system	LS	1	$200,000	$200,000
b. Treatment building and system installation	LS	1	$50,000	$50,000
3. Temporary Facilities/Health and Safety (field trailer, decon pad, scales, dewatering pad, etc.)	LS	1	$100,000	$100,000
4. Subtotal Capital Costs				$2,054,000
5. Engineering, Pre-Design Investigation, Design, and Construction Oversight (20% of subtotal less treatment and disposal costs)				$410,800
6. Contingencies (25%)				$513,500
7. TOTAL CAPITAL COSTS				**$3,000,000**

ANNUAL OPERATING AND MAINTENANCE COSTS

Item	Unit	Quantity	Unit Cost	Total Cost
1. Groundwater Treatment				
a. Labor	HRS	1,300	$50	$65,000
b. Chemicals	1000 GAL	1,050	$8	$8,400
c. Electrical requirements	KWH	350,000	$0.12	$42,000
d. Sludge disposal	CY	10	$100	$1,000
e. Metals analyses	EA	24	$100	$2,400
Subtotal				$118,800
2. Groundwater Monitoring, Annually for 30 Years				
a. Field Effort (labor, equipment, expenses)	HRS	80	$50	$4,000
b. Sample Analyses	TEST	44	$50	$2,200
c. Data Analysis/Reporting	HRS	40	$80	$3,200
Subtotal				$9,400
2. Present Worth of Groundwater Treatment [PW O&M=(P/A, 7%, 30) * Groundwater Treatment O&M]				$1,470,000
3. Present Worth of Groundwater Monitoring [PW O&M=(P/A, 7%, 30) * Groundwater Monitoring Annual O&M]				$117,000
4. TOTAL O&M PRESENT WORTH				**$1,587,000**
PRESENT WORTH OF ALTERNATIVE [PW=Total Capital + Total O&M Present Worth Costs]				**$4,587,000**

APPENDIX III

ADMINISTRATIVE RECORD INDEX

Administrative Record Index
LCP Chemical - AlliedSignal Bridge Street Site

(New York State Inactive Hazardous Waste Disposal Site #7-34-049)

RI/FS Activities	Document
Pre-Remedial Investigation Information	LCP Facility Environmental Program Phase I Volumes I & II (April 1989) LCP Facility Environmental Program Phase II (February 1990) Public Health Assessment of Onondaga Lake by the New York State Department of Health (July 24, 1995) Public Health Assessment of Onondaga Lake by the US Dept. of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (July 24, 1995) Citizen Participation Plan for the Onondaga Lake National Priority List Site (January 1996)
Remedial Investigation / Feasibility Study Work Plan Approved	Work Plan for the Remedial Investigation and Feasibility Study of the Bridge Street Facility, Solvay, New York (February 1995) Volume I Volume II - Field Sampling Plan Volume III - Quality Assurance Project Plan (revised August 25, 1995) Volume IV - Health and Safety Plan (revised August 25, 1995) Addendum to the Work Plan (June 1995) Addendum II to the Work Plan (revised September 1, 1995)
Remedial Investigation Started	Technical Memorandum No. 1 Summary of Phase I Sampling Results & Proposal for Phase 2 Sampling / Remedial Investigation & Feasibility Study of the Bridge Street Facility Vol. 1 and 2 (May 1996) Addendum (January 3, 1997)
Feasibility Study Started Remedial Investigation Completed	New York State Revision of the Remedial Investigation Report for the LCP Bridge Street Site, Solvay, New York (August 1998) Volume I: Text (revised March 1999) Volume II: Figures and Tables (revised March 1999) Volume III: Appendices A-E Volume IV: Human Health and Ecological Risk Assessments Document 1 - Human Health Risk Assessment Document 2 - Ecological Risk Assessment (revised May 1999) Volume V: Toxicity Profiles (October 9, 1997)

Feasibility Study Completed	Feasibility Study Report for the LCP Bridge Street Facility, Solvay, New York (May 1999) USEPA's Estimated Cleanup Time Calculations for Mercury-Contaminated Groundwater at the LCP Bridge Street Site (Onondaga Lake, NY Subsite) Using the Batch Flush Model Bridging Document for the LCP Bridge Street Sub-Site of the Onondaga Lake Superfund Site (March 2000)
Proposed Plan Released Start of Public Comment Period	USEPA Concurrence on the Proposed Plan (March 13, 2000) Proposed Plan (July 2000) Public Notice of Administrative Record Availability Notices of Public Meetings and Opportunity to Comment
Public Meeting Held	Documentation and Transcripts of Meetings (Attached to the Record of Decision) Written Comments on Selected Remedy Submitted by the Public and the Honeywell International (Attached to the Record of Decision)
Close of Public Comment Period Record of Decision Issued	Record of Decision and Responses to Comments (Responsiveness Summary) - September 2000

Interim Remedial Measures (IRMs)	Hazardous Laboratory Package Report • Removal of Laboratory Chemicals (April 16, 1999) Hazardous Waste Liquid and Sludge Reports • Statement of Qualifications - OP Tech Environmental Services • Work Plan for the Removal of RCRA Hazardous Waste Liquids at the LCP Bridge Street Site, Solvay, New York (December 1998) with Conditional Approval Letter from NYSDEC to AlliedSignal (December 31, 1998) • Work Plan for the Removal of RCRA Hazardous Waste Sludges at the LCP Bridge Street Site, Solvay, New York (March 1999) with Conditional Approval Letter from NYSDEC to AlliedSignal (April 8, 1999) • Completion Report for the Removal of RCRA Hazardous Waste Sludges/Liquids at the LCP Bridge Street Site, Solvay, New York (September 1999, Revised October 1999) General Building Demolition Reports • Demolition Sampling and Analysis Plan (SAP) - (February 1999) with Conditional Approval Letter from NYSDEC to AlliedSignal (May 7, 1999) • Addendum to the SAP - Sampling and Analysis Matrix (July 2, 1999) • Addendum #2: Pre-Demolition Sampling and Analysis Report (September 30, 1999) with Conditional Approval Letter from NYSDEC to AlliedSignal (November 1999) • LCP Bridge Street Facility, Demolition Standard Operating Procedure (SOP) - (May 6, 1999) with Conditional Approval Letter from NYSDEC to AlliedSignal (June 30, 1999) • Bid Specifications: SY9902, Demolition of LCP of New York's Bridge Street Facility (July 1999) with Conditional Approval Letter from NYSDEC to AlliedSignal (July 14, 1999) • Plan of Operations (January 2000) Cell Building Demolition Reports • Project Description for the Demolition and Decontamination of the Mercury and Diaphragm Cell Buildings (December 1999) • Plan of Operations (June 2000) Sewer Reports • Work Plan of the Sewer IRMs, LCP Bridge Street Facility (August 1999) • Sewer Pipe Removal Completion Report (July 2000 - revised)

Enforcement Documents	RI/FS Consent Decree for the Onondaga Lake Sediments (March 16, 1992) RI/FS Stipulation and Order to the Bridge Street Site (October 23, 1995) Section 104(e) Letters to, and responses from, Honeywell International, Inc. Section 104(e) Letters to, and responses from, LCP Chemicals - NY Letter to Mark White, Plant Manager, AlliedSignal, Inc. informing AlliedSignal of LCP Bridge Street Site's NPL status (June 23, 1997) IRM Stipulation for the Removal of Hazardous Waste Liquids and Sludges (January 29, 1999) IRM Stipulation for the Removal of Laboratory Packages (March 7, 1999) IRM Stipulation for the General Building Demolition (August 8, 1999) IRM Stipulation for the Site Sewers (November 22, 1999) IRM Stipulation for the Cell Building Demolition (February 1, 2000)

APPENDIX IV

EPA AND NYSDOH LETTERS OF CONCURRENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

SEP 29 2000

John P. Cahill, Commissioner
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

Dear Commissioner Cahill:

Based upon our evaluation of the various remedial alternatives under consideration and our review of the public's comments and concerns, the Environmental Protection Agency concurs with remedy selected in the Onondaga Lake LCP Bridge Street Sub-Site Record of Decision (ROD).

The selected remedy to address the contaminated sediment, sewers, brine muds, and soils is Alternative SSBMS-2, which calls for excavation and on-site disposal of contaminated sediments, cleaning catch basins and manholes and filling sewers, excavation and on-site disposal of brine muds, excavation and on-site treatment of principal threat mercury-contaminated shallow soil, followed by on-site disposal of the treated soil, excavation and off-site disposal of PCB-contaminated soil, and construction of a low-permeability cap.

To address the contaminated groundwater, the selected remedy is Alternative GW-3, which consists of hydraulic containment of the shallow and deep aquifers with a subsurface barrier wall and groundwater extraction wells, and treatment of the extracted groundwater.

In addition, a deed restriction will be placed on the property to restrict unacceptable future use of the facility and to protect the integrity of the cap and subsurface barrier wall, and long-term monitoring of the groundwater, surface water, sediment, and biota will be performed to ensure the effectiveness of the remedy.

Should your staff have any questions related to our concurrence with the Onondaga Lake LCP Bridge Street Sub-Site ROD, please have them contact Richard Caspe at (212) 637-4390.

Sincerely,

Jeanne M. Fox
Regional Administrator

cc: M. O'Toole, NYSDEC

DOH STATE OF NEW YORK
DEPARTMENT OF HEALTH

Flanigan Square, 547 River Street, Troy, New York 12180-2216

Antonia C. Novello, M.D., M.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

September 27, 2000

Mr. Michael O'Toole, P.E., Director
Division of Environmental Remediation
NYS Dept. of Environmental Conservation
50 Wolf Road, Room 260B
Albany, New York 12233

Re: Proposed Remedial Action Plan
LCP / Allied Bridge Street
Geddes (V), Onondaga County
Site #734049

Dear Mr. O'Toole:

My staff reviewed the September 2000 Record of Decision (ROD) for the LCP/Allied Bridge Street Plant. The site is an inactive chlor-alkali plant, which is contaminated with mercury and PCBs, and is a major source of mercury to Onondaga Lake. The on-site contamination includes mercury dissolved in groundwater, mercury as a dense non-aqueous phase liquid (DNAPL), and PCB contaminated soils. Mercury contaminated groundwater breaks out into a small steam (the West Flume) which is a tributary to Onondaga Lake. Interim remedial measures (IRMs) that have been completed or are in progress, will have the plant completely razed by the end of this year. The ROD includes excavating of off-site sediments and brine muds for on-site disposal, treating the shallow on-site soils that contain mercury DNAPL for on-site disposal, disposal of PCB contaminated soils off-site, encapsulating the site with a slurry wall keyed to the glacial till, constructing a Part 360 cap over the site and groundwater collection inside the slurry wall to maintain inward groundwater gradients. Additionally, the ROD requires a deed restriction to control future site uses.

I believe that these actions will be protective of the public's health, and I concur with this Record of Decision. If you have any questions please contact Dr. Lloyd Wilson of my staff at (518) 402-7870.

Sincerely,

G. Anders Carlson

G. Anders Carlson, Ph.D., Director
Bureau of Environmental Exposure Investigation

cc: N. Kim, Ph.D.
L. Wilson, Ph.D.
Ms. H. Hamel, SFO
Mr. R. Burdick, GFDO
Mr. C. Branagh, DEC Reg. 5
Mr. R. Mustico DEC

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APPENDIX V

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

LCP Bridge Street Site
Sub-Site of the Onondaga Lake Superfund Site

INTRODUCTION

This Responsiveness Summary provides a summary of citizens' comments and concerns received during the public comment period related to the LCP Bridge Street Sub-Site (Site), Remedial Investigation and Feasibility Study (RI/FS) and Proposed Plan, and the responses of the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA) to those comments and concerns. All comments summarized in this document have been considered in NYSDEC and EPA's final decision in the selection of a remedy to address the contamination at the Site.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The July 2000 Proposed Plan, which identified NYSDEC and EPA's preferred remedy and the basis for that preference, and remedial investigation and feasibility study (RI/FS) reports were made available to the public in both Administrative Record and information repositories maintained at the NYSDEC Albany and Syracuse offices; the information repository at the Onondaga County Public Library, Syracuse Branch at the Galleries, 447 South Salina Street, Syracuse New York; and the information repository at the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York. A notice of availability for the above-referenced documents was published in the *Post Standard* on July 6, 2000. The original public comment period was held from July 6, 2000 to August 4, 2000. An extension of the public comment period was granted until September 18, 2000.

On July 19, 2000, NYSDEC conducted a public meeting at the Geddes Town Hall to: present the findings of the RI/FS; answer questions from the public about the Site and the remedial alternatives under consideration; and accept public comments. Approximately 25 people, including local residents and representatives of the media, environmental groups, Honeywell International, Inc. (hereinafter, Honeywell, the potentially responsible party), and federal, state and local governments, attended the public meeting.

OVERVIEW

The Proposed Plan identified the preferred remedy as the excavation of soils contaminated with polychlorinated biphenyls (PCBs) for off-Site disposal, the excavation of soils contaminated with mercury for on-Site treatment and disposal under a cap, the excavation of brine muds and contaminated sediments followed by on-Site disposal under a cap, cleaning and filling Site sewers, the construction of a cap, the hydraulic containment of the shallow and deep aquifers with a slurry wall and groundwater extraction wells (to achieve an inward and upward hydraulic gradient), long-term monitoring, and a deed restriction.

While the selected remedy addresses the majority of the contamination at the Site, additional investigatory work is necessary as another operable unit associated with this Site—xylene contamination in the groundwater located in the vicinity of the Peroxide Building, which is located to the northeast of the Site on the NAKOH Chemical property. This area will be investigated under a future RI/FS at this Sub-Site.

Since not many residents attended the public meeting or provided comments on the Proposed Plan, it was difficult to assess the public's reaction to the selected remedy. However, at the public meeting, the Supervisor of the Town of Geddes expressed support for the preferred remedy. Atlantic States Legal Foundation, Onondaga County, the Atlantic Chapter of the Iroquois Group, and the Onondaga Nation, on the other hand, indicated in their comments that they do not support the containment component of the selected remedy. Onondaga County, however, indicated that it will not oppose proceeding with the implementation of the selected remedy.

Attached to this Responsiveness Summary are Appendices V-a and V-b, which consist of letters submitted during the public comment period and a transcript of the Public Meeting for the Proposed Plan, respectively.

SUMMARY OF COMMENTS AND RESPONSES

The public comments received and corresponding NYSDEC and EPA responses have been organized into the following topics:

- Remedial Investigation Report
- Ecological Risk Assessment
- Feasibility Study
- Public Participation
- Proposed Plan
- Biological Monitoring

A summary of the comments and concerns and NYSDEC and EPA's responses are provided below:

Remedial Investigation Report

Comment #1:	A commenter believes that the draft RI report submitted by Honeywell does not accurately and conservatively assess risk to human health or the biological community and does not provide adequate information for remedy selection and design. The commenter stated further that although the State of New York revised the RI Report, the investigation that was performed at the Site is inadequate and there are deficiencies in the document.
Response #1:	The RI conducted at the Site included a thorough and comprehensive evaluation of the nature and extent of the contamination in the Site's groundwater, surface water, soil, sediment, air, and biota. Since Honeywell's draft RI report had a number of deficiencies, the State of New York revised the document. The revised document conservatively assesses risk to both human health and the environment and provides adequate information for remedy selection and design. The revised document also determined that contamination at the Site poses a potential risk to both human health and the environment; the selected remedy mitigates these threats.
Comment #2:	A commenter questioned the validity of the surface water loading calculations for mercury from the Site to the West Flume[1] and the Onondaga Lake system. The commenter also questioned the RI's findings related to the extent of elemental mercury at the Site.
Response #2:	The RI Report, which provides estimates of the mercury mass loading to the Onondaga Lake System from the Site and determined that the Site is a significant source of mercury to the Onondaga Lake system, is adequate for purposes of contaminant characterization and remedy selection. The remedy selected for the Site will mitigate the mercury contamination currently emanating from the Site. The extent of elemental mercury was sufficiently defined for the purpose of evaluating risks to human health and environmental risk

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[1] The West Flume, a man-made drainage channel, originates on the Honeywell Main Plant property east of the Site and traverses through the northern portion of the facility from the southeast to the northwest. The West Flume typically ranges in width from 5 to 10 feet and is lined with thick reeds. The West Flume ultimately discharges under Interstate 695 to Geddes Brook, approximately 3,100 feet west of the facility. Geddes Brook discharges into Nine Mile Creek, which in turn is a tributary of Onondaga Lake.

and for the purpose of evaluating and selecting a remedy for the Site. During the remedial design, additional soil borings will be collected to ensure that all of the elemental mercury is contained within the slurry wall.

Comment #3: A commenter indicated that it believes that the groundwater flow pattern, and, thus, the mercury migration via groundwater, was inadequately characterized.

Response #3: Site data, including groundwater contaminant concentrations, groundwater chemistry (*e.g.*, pH and chlorides), and water level measurements collected from more than 40 groundwater monitoring wells and surface water stations provided sufficient data to adequately characterize groundwater flow conditions and mercury transport via groundwater at the Site sufficient to support the selection of the remedy (see also Response #2).

Comment #4: A commenter indicated that based upon its reading of NYSDEC's guidance, two phases of sampling for the RI were required. Since a multiple phase RI was not conducted, it is contrary to NYSDEC's guidance.

Response #4: Two phases of RI sampling are not required by NYSDEC regulations, guidance, or policy. The commenter is referring to an NYSDEC guidance for Preliminary Site Assessments (PSAs; TAGM HWR-88-4007) which is not applicable to the performance of RIs. Nevertheless, two sampling phases were conducted at the Site. The first phase of RI sampling was conducted between September 5th and November 8th of 1995 and the second phase of RI sampling was conducted between October 7th and November 8th of 1996. The second phase sampling was based upon the results of the first phase and was conducted to fill data gaps related to the nature and extent of contamination at the Site. In addition to the RI sampling, a third phase of field work was conducted by NYSDEC contractors in April 1998 to determine the presence of a wetland at the Site.

Human Health and Ecological Risk Assessments

Comment #5: A commenter expressed concern that no samples were collected downstream of the West Flume (*i.e.,* Geddes Brook and Ninemile Creek) and that the Site's Human Health and Ecological Risk

Assessments excluded any evaluation of the Site's impacts on downstream receptors, including Onondaga Lake.

Response #5: The investigations of Geddes Brook and Ninemile Creek, as well as Onondaga Lake, are being conducted under separate RI/FSs by Honeywell, with NYSDEC oversight. Sampling of the two tributaries to Onondaga Lake, as well as Onondaga Lake, have occurred as part of these efforts and have detected mercury contamination. Separate Proposed Plans and Records of Decision (ROD) will be developed for the Geddes Brook and Ninemile Creek Site and for the Onondaga Lake Bottoms Site. In addition, the LCP Bridge Street RI states that this Site has been documented to be a major source of mercury to Onondaga Lake, and that the New York State Department of Health has issued a fish consumption advisory for Onondaga Lake because of mercury contamination.

Comment #6: A commenter expressed concern that the "Ponded Area," located adjacent to and west of the facility and consisting of the 0.9-acre Wetland A and the 6.4-acre Wetland B, was not sampled as part of the RI.

Response #6: Wetlands A and B were sampled as part of the RI. The results of the sampling determined that the wetlands are contaminated with, among other contaminants, mercury. The selected remedy includes the excavation of the contaminated sediments and restoration of the wetlands.

Comment #7: A commenter expressed the belief that the number and location of surface water and sediment samples are inadequate to conservatively determine the ecological risk.

Response #7: NYSDEC sediment criteria for mercury are 0.15 mg/kg (lowest effect level) and 1.3 mg/kg (severe effect level). Mercury was detected in the sediment of the West Flume upstream of the Site at a concentration of 0.2 mg/kg. Concentrations of mercury in sediments in a portion of the West Flume located adjacent to the facility are as high as 131 mg/kg, and concentrations of approximately 30 mg/kg were detected downstream of the facility at the mouth of the West Flume. Mercury contamination in the Ponded Area also exists at concentrations up to 131 mg/kg. Because the sediment criterion for mercury is exceeded and the Ecological Risk Assessment concluded that there is a potential ecological risk associated with mercury contaminated sediments, the selected remedy includes the excavation of sediments exceeding the 0.2 mg/kg background concentration in both the West Flume and wetlands. All of the sediments in the West Flume and an approximately three-foot depth of sediments in the wetlands will be excavated and contained on-Site via a slurry wall and cap. Confirmatory sampling will be conducted to ensure that remedial goals are attained. In addition, surface water samples collected as part of the RI determined that concentrations of mercury in surface water exceeded NYSDEC surface water standards, indicating that there is an ecological risk.

Comment #8: A commenter expressed the belief that the exposure pathways to ecological receptors, including insectivorous birds and burrowing animals, presented in the Ecological Risk Assessment, were inadequate to conservatively determine ecological risk from the Site.

Response #8: The Ecological Risk Assessment was conducted consistent with federal and state guidelines, and is, therefore, adequately conservative. The selected remedy will protect the noted receptors by excavating the mercury-contaminated soil at the facility outside of the footprint of the cap and the placement of this soil under the cap. The cap will prevent burrowing animals and birds from being exposed to the contaminated soil contained beneath.

Public Participation

Comment #9: A commenter requested that in compliance with EPA Superfund guidance, no decision regarding Site remedy be made until the public has the opportunity to provide input.

Response #9: NYSDEC and EPA rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS reports and the Proposed Plan were made available to the public for a public comment period which began on July 6, 2000 and concluded on September 18, 2000. NYSDEC and EPA also conducted a public meeting to discuss the results of the RI/FS and the Proposed Plan on July 19, 2000. The final decision regarding the selected remedy was made after NYSDEC and EPA took into consideration all public comments and concerns.

Comment #10: A commenter stated that specific notices concerning this project and other projects in the Onondaga Lake area have not been received.

Response #10: The commenter is on the mailing list that NYSDEC maintains in connection with the community relations program for the Onondaga Lake site, and was sent copies of fact sheets that were distributed regarding the LCP Bridge Street site and the Proposed Plan when it was released. The Department of Interior has also been forwarding this commenter copies of quarterly updates on the Onondaga Lake NPL Site. The quarterly reports include updates on the progress at the LCP Bridge Street Sub-Site.

Proposed Plan

Comment #11: Several commenters expressed the belief that the selected remedy is not permanent and will not be protective of human health and the environment.

Response #11: The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in the National Oil and Hazardous Substances Pollution Contingency Plan, §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this Site.

The selected remedy will provide a permanent solution for the contaminated soils and sediments by removing them from the environment, treating principal threat waste mercury-contaminated soil, and containing the contaminated soils, sediments and groundwater on-Site *via* the construction and maintenance of a cap, slurry wall and groundwater extraction and treatment system. PCB contaminated waste above NYSDEC Technical and Administrative Guidance Memorandum No. 94-HWR-4046 limits will be excavated and sent to an off-Site disposal system.

With regard to the groundwater, the selected remedy will provide a permanent remedy and will employ extraction and treatment technologies to reduce the toxicity, mobility, and volume of the contaminants in the groundwater.

The selected remedy will protect human health and the environment through containment with a cap and slurry wall, thereby eliminating the threat of exposure via direct contact with or ingestion of the contaminated media. The selected remedy will also be protective of the environment in that the excavation and containment of contaminated soil and sediments will eliminate contaminant-related concerns related to ecological receptors. The remedy will also prevent the migration of contamination to the Onondaga Lake System from the Site.

Because the selected remedy will result in contaminants remaining on-Site above health-based levels, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Comment #12: Several commenters stated that they were opposed to the selected remedial alternative because toxics, such as mercury, PCBs and xylene, are being left so close to wetlands and to Onondaga Lake.

Response #12: The selected remedy includes, among other things, the excavation of soils contaminated with PCBs for off-Site disposal, the excavation of soils contaminated with mercury for on-Site treatment and disposal under a cap, the excavation of contaminated wetland sediments followed by on-Site disposal under a cap, the construction of a cap, the hydraulic containment of the shallow and deep aquifers with a slurry wall and groundwater extraction wells, and long-term monitoring. While hazardous compounds will be left on-Site, the containment system will be designed to prevent their migration and to prevent human and ecological exposure.

Xylene was detected at elevated levels in groundwater samples collected from an adjacent property in the vicinity of the Peroxide Building. This area will be investigated as part of a future RI/FS at this Site.

Comment #13: A commenter indicated that once the remedy is implemented, the contained, contaminated material should be managed as a hazardous waste landfill consistent with federal and state regulations.

Response #13: The cap and slurry wall will be constructed and maintained in conformance with all applicable federal and state hazardous waste facility closure requirements.

Comment #14: A commenter stated the belief that the remedy fails to restore the Site for future productive use and eliminates any possibility for unrestricted future use.

Response #14: The property is presently zoned industrial. The current land use in the immediate vicinity of the Site is industrial. Based on a number of factors, including the reported history of land use in the area of the Site since the early 1900's, the existing zoning for the Site property, and subsequent communications between NYSDEC and the Zoning Board Chairman for the Village of Solvay, NYSDEC determined that the reasonably-anticipated future use for the Site is industrial. The selected remedy will enable future, productive uses of the Site, including parking or commercial and light industrial uses.

Comment #15: A commenter stated that since caps may significantly change Site elevations, various engineering controls might need to be added to the cap under the selected remedy to permit Site elevations that will be consistent with the redevelopment of the Site. Therefore, the commenter suggested that the cap be designed to meet all criteria for the cap portion of the remedy, while allowing redevelopment of the Site as a light industrial park, warehouse facility or other useful purpose.

Response #15: Since the reasonably-anticipated future use for the Site is industrial, the selected remedy should enable future, productive uses of the Site, including parking or commercial and light industrial uses. NYSDEC and EPA will evaluate cap designs which are consistent with the future use of the property during the remedial design process.

Comment #16: A commenter expressed concern about the extensive excavation called for in the selected remedy, since there may be archeological sites in the area and excavating such areas may cause extensive damage to ancient Onondaga villages and cultural sites.

Response #16: The excavation of soils and brine muds at the Site are to be conducted only in previously disturbed areas (*i.e.*, areas of fill, not areas of naturally deposited soil). As a result, no culturally-sensitive areas should be disturbed by the actions undertaken in the selected remedy. Nevertheless, the selected remedy will include the completion of a cultural resources survey of the Site prior to conducting the remedial design to indicate the level of sensitivity for cultural resources at the Site.

Comment #17: A commenter stated that the remedy precludes the reclassification or removal of the Site from the State's inventory of Inactive Hazardous Waste Sites.

Response #17: While the selected remedy would not allow the removal of the Site from the State's Registry of Inactive Hazardous Waste Sites, implementation of the remedy would allow for reclassification of the Site on the Registry.

Comment #18: A commenter asked whether the remedy requires on-Site monitoring, operation, and maintenance in perpetuity.

Response #18: To ensure that the remedy remains protective of public health and the environment, on-Site monitoring, operation, and maintenance in perpetuity will be necessary.

Because the selected remedy will result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Comment #19: A commenter inquired as to what contamination the Site is currently contributing to the Onondaga Lake System.

Response #19: The main contaminants emanating from the Site are mercury and PCBs. Other contaminants include volatile organic compounds, semi-volatile organic compounds, and metals.

Comment #20: A commenter inquired as to the current contaminant concentration of mercury leaving the Site.

Response #20: Contamination leaves the Site *via* surface water migration from the West Flume to Geddes Brook. Concentrations of mercury in surface water at the mouth of the West Flume, prior to its discharge into Geddes Brook were between approximately 3.0 and 5.6 micrograms per liter (µg/L) total and 0.318 µg/L dissolved. The NYSDEC surface water standard for mercury is 0.0026 µg/L in the dissolved form, which was derived for the protection of wildlife. Mercury concentrations in the surface water of the West Flume generally increase from the upstream station (0.0197 µg/L total and nondetect at 0.0010 µg/L dissolved) to the station adjacent to the facility (9.050 µg/L total and 2.252 µg/L dissolved). The highest concentrations of mercury detected in surface water were typically in the wetland areas with maximum concentrations of 146.7 µg/L total mercury and 3.214 µg/L dissolved mercury. Surface water from the wetlands discharges to the West Flume west of the facility. Site surface water discharges to Onondaga Lake *via* the West Flume to Geddes Brook and Ninemile Creek.

Comment #21: A commenter inquired as to the volume of contamination that has been released from the Site.

Response #21: Historical volumes of contamination emanating from the Site have not been estimated.

Comment #22: A commenter asked how contamination from the Site is being transported to Onondaga Lake.

Response #22: Contaminated groundwater discharging to the West Flume contaminates its sediment and surface water. Surface water from the West Flume discharges to Geddes Brook which, in turn, discharges to Ninemile Creek. Ninemile Creek discharges to Onondaga Lake.

Comment #23: A commenter asked whether the selected remedy will permanently eliminate all current and potential future contamination of the Lake from the Site.

Response #23: While the selected remedy will eliminate future releases from the Site to the Lake, the selected remedy will not eliminate any of the current contamination in Onondaga Lake, Geddes Brook or Ninemile Creek attributable to the Site. Investigation and remedy selection of Onondaga Lake and the Geddes Brook/Ninemile Creek Sites are being conducted under separate RI/FSs.

Comment #24: Two commenters requested information related to past experience and success in constructing and maintaining a barrier wall at least 55 feet deep and enclosing over 20 acres contaminated with mobile mercury.

Response #24: NYSDEC and EPA have had experience in successfully constructing and maintaining deep slurry wall and cap systems. One of these sites is the Pollution Abatement Services (PAS) Superfund site, located in Oswego, New York, where construction of a cap and slurry wall (to a maximum depth of approximately 36 feet) was completed in 1986. The cap and slurry wall system is still intact at this site and has been operating without any significant problems. While PAS temporarily experienced minor problems with maintaining an inward hydraulic gradient within the barrier wall system, this problem was corrected by increasing the groundwater pumping rate from within the barrier wall. Another site is the Kin-Buc Landfill Superfund site located in Edison Township, New Jersey. A slurry wall system was installed at this site 5 years ago at a depth of up to 50 feet. Still another site is the 102nd Street Superfund site in Niagara Falls, New York where slurry walls were constructed at the perimeter of a 22-acre facility at a depth up to approximately 45 feet. The barrier wall encompasses a variety of hazardous waste types which included mercury at elevated levels. Compatibility testing will need to be performed for the LCP Bridge Street during Remedial Design to ensure that the barrier wall material is compatible with the waste material at the Site.

Comment #25: A commenter expressed concern that the remedy does not include a comprehensive monitoring plan for detecting containment failure or for cleanup contingencies, if containment should fail.

Response #25: The selected remedy calls for long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy. The monitoring will also ensure that the cap and barrier wall are performing as designed. The long-term monitoring plan will be developed during the design phase.

Comment #26: Several commenters asked about the likelihood of failure of the cap or barrier wall over the life of the remedy, if barrier walls or caps have ever failed, and if so, how the failures were addressed.

Response #26: The remedy for the Site includes operation, maintenance, and monitoring to ensure that the containment system continues to perform as designed. Repairs to the cap and/or slurry wall will be performed, if necessary, to ensure that the remedy remains protective of public health and the environment.

Although numerous containment systems have been constructed in the States of New York and New Jersey, the only cap failure that NYSDEC and EPA are aware of is the Asbestos Dump Superfund site in New Jersey, which experienced problems after the construction of two caps on the site. One cap had a gas problem which caused large bubbles to form in the cap. Gas vents had to be installed into the cap to relieve the gas pressure underneath the cap. The other cap had differential settlement which caused low spots and puddles during rain events. The cap had to be regraded with additional top soil. NYSDEC and EPA are not aware of barrier wall system failures in the States of New York or New Jersey.

Comment #27: A commenter inquired as to whether or not EPA or NYSDEC ever elected to remove and dispose of materials originally placed under a cap or kept behind a slurry wall.

Response #27: In a recent EPA determination, eight years after the decision was made to cap contaminants at the Shattuck Superfund Site in Colorado, EPA decided it is now necessary to excavate and haul away the waste underling the cap. This decision was made following the conduct of a five-year review which identified concerns related to the long-term effectiveness of a monolith[2] placed on the site and because of concerns regarding the reliability of institutional controls imposed in the original ROD. In addition to the technical concerns raised by the five-year review, the State, the City and County of Denver, elected officials, and the local community requested that EPA consider other alternatives to the on-site remedy to allow for the unrestricted use of the site.

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[2] The monolith was made up of excavated and treated facility soils along with soils from vicinity properties and from an adjoining railroad right-of-way. The soils were treated using solidification/stabilization. The monolith was capped with low-infiltration barrier materials and a rip-rap armored surface, and is 12-15 feet above the street curb level.

Comment #28: A commenter asked for the expected life of a barrier wall in a Central New York type climate.

Response #28: The climate should have minimal impact on the life of the slurry wall at the Site. The multimedia cap that will be constructed at the Site (which will be designed to withstand winter conditions and a 5-foot frost line) will overlie the slurry wall, thereby protecting it. As stated previously, several cap and slurry wall systems have been constructed at hazardous waste sites and are operating successfully in central and upstate New York.

Comment #29: A commenter asserted that the remedy will not immobilize the waste, treat it, or detoxify it.

Response #29: Under the selected remedy, while a significant amount of contaminated soils will be contained under a cap and within a slurry wall, approximately 4,500 cubic yards of the most heavily-contaminated soils will be excavated and treated (*e.g.*, detoxified and/or immobilized). Treatment will also be used to reduce the volume and toxicity of contamination in the groundwater.

Comment #30: A commenter requested the estimated cost of containing the contaminated groundwater and soil for 30,000 years.

Response #30: The 30,000-year time frame that is cited is the estimated time frame to attain groundwater quality standards at the facility under Alternative GW-4, restoration of shallow and deep aquifers with groundwater extraction and treatment. Alternative GW-4 was not, however, selected to address the contaminated groundwater. Alternative GW-3, hydraulic containment of shallow and deep aquifers with a slurry wall, was selected.

Remedial alternative costs are compared based upon present-worth calculations, which determine the present value of the respective alternatives' capital costs, as well as annual costs, projected over a set time frame at an established interest rate. In other words, present-worth calculations determine how much money would need to be invested now to have sufficient funds to construct the remedy and to perform long-term operation and maintenance (O&M) costs into the future.

It is estimated that the annual O&M cost for the selected remedy is $157,000. Consistent with federal and state guidelines, using a 30-year time frame and a 7% discount rate, the present-worth cost of O&M will be approximately $1.95 million. If the time frame is increased from 30 to 30,000 years, the estimated present-worth cost would be $2.24 million. Therefore, $2.24 million would need to be invested now at a 7% interest rate for 30,000 years to pay for O&M during that time frame.

Consistent with EPA guidance, the above-noted cost estimates are expected to be within +50 to -30 percent of the actual project cost, and are based upon the best available information regarding the anticipated scope of the selected remedy. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedy.

Comment #31: Several commenters assert that excavation and off-Site disposal of contaminated materials is more appropriate than consolidating these materials under a cap. Another commenter questioned the basis for rejecting in-situ solidification/stabilization of the deep soils (Alternative SSBMS-3). Another commenter suggested that supplemental (*i.e.,* in addition to the slurry wall) treatment or containment methods be used or recovery wells be installed to address the mercury dense nonaqueous phase liquid (DNAPL) that would be contained by the slurry wall.

Response #31: NYSDEC and EPA have determined that the selected remedy best satisfies the requirements of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan's nine evaluation criteria for remedial alternatives.

To address the contaminated sediments, sewers, brine muds and soils, Alternative SSBMS-2 calls for the excavation and on-Site disposal of contaminated sediments, cleaning catch basins and manholes and filling sewers, excavation and on-Site disposal of brine muds, excavation and on-Site treatment of principal threat mercury-contaminated shallow soil followed by on-Site disposal of treated soil, excavation and off-Site disposal of PCB-contaminated soil, and construction of a low-permeability cap. Alternative GW-3, hydraulic containment of the shallow and deep aquifers with a slurry wall and groundwater extraction wells to achieve an inward and upward hydraulic gradient, and treatment of the extracted groundwater, addresses the groundwater contamination.

The excavation and off-Site disposal of contaminated soil, sediments, and brine muds under Alternative SSBMS-3 would require an increased capital expenditure of $35.6 million, as compared to the cost of excavating and treating the mercury-contaminated principal threat waste soils, excavating and placing the sediments and brine muds on-Site, and installing a low-permeability cap on the property under the selected remedy. The viability of *in-situ* solidification/stabilization of mercury-contaminated soil has not been proven, which would necessitate the performance of bench and pilot-scale testing. Therefore, implementing *in-situ* solidification/stabilization, which is proposed under Alternative SSBMS-3, would add an additional $20 million to the capital cost of the remedy should it be determined to be a viable technology. Alternative SSBMS-3 would involve removing 163,000 cy of contaminated soil from the Site, which would require approximately 15,600 truck loads. Since approximately the same number of returning trucks would be required to import clean fill, it is anticipated that this volume of traffic on local roads would present load limit, traffic, road maintenance, and community acceptance issues that would be difficult to address. Local roads may need to be upgraded before the project was initiated and/or repaired following project completion. In addition, the increased traffic would result in increased levels of air pollution from vehicular emissions and fugitive dusts, and would present an increased risk of traffic accidents which could result in releases of hazardous substances. Consequently, NYSDEC and EPA believe that implementing Alternative SSBMS-3 would be much more costly and would result in a greater risk to health and the environment than the selected remedy.

Since the selected remedy will not achieve groundwater standards within the containment area (*i.e.*, within the area contained by the cap and slurry wall), it will require a waiver of groundwater standards. However, this is appropriate because compliance with groundwater standards would result in a greater risk to human health and the environment than the selected alternative.

With regard to the suggestion that other treatment or containment methods be used or recovery wells be installed to address the mercury DNAPL that would be contained by the slurry wall, the construction of a slurry wall is considered a permanent remedy for the Site. Nevertheless, the use of mercury DNAPL recovery wells or other containment or treatment methods would be considered, if future monitoring results from deep borings and groundwater monitoring wells indicate that elemental mercury is mobile and that it would not be effectively contained by the cap and barrier wall system.

Comment #32: A commenter stated that shallow mercury contaminated groundwater is migrating below the West Flume and is contaminating groundwater north of the West Flume above the NYSDEC groundwater standard for mercury based on data available from the Site obtained in October 1995 and data obtained from NAKOH Chemical property in December 1998 and October 1999.

Response #32: Results from the October 1995 RI field work determined that all of the monitoring wells north of the West Flume were below the NYSDEC groundwater standard for mercury of 0.7 µg/L (see RI, Volume II, Tables and Figures, Table 4.4-1, dated March 1999 - revised). These include shallow groundwater monitoring wells MW-11S, MW-13S, MW-28S, MW-29S, MW-30S, MW-31S and MW-32S.

Groundwater monitoring results from the NAKOH Chemical property obtained by a consultant for the company showed concentrations of mercury above the NYSDEC groundwater standard for mercury. Because these samples had high levels of suspended solids, and because follow up sampling where steps to minimize turbidity were employed did not show mercury levels above groundwater standards, it was concluded that the mercury was attributable to mercury-contaminated soil particles in the samples.

Comment #33: A commenter stated that hydrogen sent to the Hydrogen Peroxide Building from the chlor-alkali plant was reportedly impregnated with mercury, and that visible elemental mercury has been observed in the Compressor Building, also located north of the West Flume. The commenter asked what steps are being taken to address these sources of contamination.

Response #33: The source of mercury contamination of the hydrogen sent to the Hydrogen Peroxide Building was mercury used in the production of sodium hydroxide and chlorine at the chlor-alkali facility. This mercury-contaminated hydrogen was also the source of mercury contamination in the Compressor Building.

As part of the selected remedy, approximately two acres north of the West Flume in the vicinity of the Hydrogen Peroxide and Compressor Buildings will be excavated to approximately three feet deep to remove mercury-contaminated soil. In addition, a building demolition Interim Remedial Measure (IRM) is currently underway at the facility. This IRM consists of the decontamination, demolition, and proper disposal of most of the Site buildings and structures, including the Hydrogen Peroxide and Compressor Buildings. The excavated soil, as well as the decontaminated demolition debris, will be placed on-Site under the cap.

Comment #34: A commenter noted that the Proposed Plan states that the lower aquifer may discharge at Geddes Brook at a location west of, and downstream of, the facility, and that this is inconsistent with the suggestion that the West Flume acts as a barrier to off-Site groundwater migration.

Response #34: The West Flume acts as a barrier to off-Site groundwater migration in the upper aquifer since groundwater contaminated with mercury discharges to the West Flume. Groundwater in the lower aquifer in the areas north and south of the West Flume appears to converge at depth beneath the flume. This groundwater, in which mercury was either not detected or present at concentrations below NYSDEC groundwater quality standard for mercury downgradient of the area contaminated with elemental mercury, may eventually discharge to the West Flume or Geddes Brook, but at a location west of, and downstream of, the facility.

Comment #35: A commenter asked how future utility and other Site workers would be protected when performing on-Site work.

Response #35: The selected remedy includes excavating and treating approximately 4,500 cubic yards of mercury-contaminated soils and cleaning sewer catch basins and manholes and filling the sewers, catch basins and manholes with a flowable grout and/or concrete. While performing this work, remedial workers will be required to follow appropriate Site health and safety procedures, which include wearing appropriate personal protective equipment and air monitoring. Should air emissions or dust levels reach unacceptable levels, unless the problem can be immediately rectified, remedial activities would be terminated until the problem can be corrected.

The areas where contaminated materials will be excavated will not pose a threat to future utility and other Site workers. The remaining contaminated soils at the facility will be capped. The selected remedy includes the implementation of institutional controls (*i.e.,* deed restrictions) to, among other things, prohibit the disturbance of the Site cap and slurry wall. We do not anticipate any utilities being located beneath the cap or otherwise within the containment system such that utility workers would be at risk.

Comment #36: A commenter asserted that the Proposed Plan fails to address O&M concerns or the proper utilization of institutional controls.

Response #36: The selected remedy includes long-term operation and maintenance related to the cap, slurry wall, groundwater extraction system, and groundwater treatment system.

In addition to the implementation of institutional controls to prohibit the disturbance of the Site cap and slurry wall, as was noted above, the selected remedy includes the implementation of institutional controls to prohibit the use of groundwater at the Site.

Comment #37: A commenter stated that recent evaluations of the Federal Superfund program, including a report by the Environmental Law Institute, have been critical of the use of institutional controls, in particular, the failure to coordinate controls at all necessary levels of government and with interested parties and the public. The commenter asked how such concerns will be addressed and how institutional controls might limit future Site and surrounding Site uses.

Response #37: While enforcing deed restrictions may have been a problem for other abandoned hazardous sites, Honeywell has indicated that it is pursuing the ownership of the Site. Honeywell will be required to assure that the institutional controls selected in the remedy (preventing the use of Site groundwater as a potable source of water and preventing the disturbance of the Site cap and slurry wall) are implemented in accordance with applicable federal, state and local regulations. The property is presently zoned industrial and the current land use in the immediate vicinity of the Site is industrial. The reasonably-anticipated future use for the Site and the surrounding areas is industrial. Even with the above-noted institutional controls in place, the selected remedy will enable future, productive uses of the

Site, including parking or commercial and light industrial uses. It is not anticipated that the areas surrounding the facility will be impacted by the deed restrictions.

Comment #38: A commenter stated that it should be made clear that implementation of the remedy for the Site does not end Honeywell's responsibility for mercury contamination beyond the contained Site and/or for seepage of mercury into Onondaga Lake.

Response #38: Implementation of the selected remedy by Honeywell does not release Honeywell from its liability related to this Site or for any other of the former AlliedSignal sites, such as the Onondaga Lake Bottom and Geddes Brook/Ninemile Creek Sites. In addition, Honeywell is responsible for performing the O&M and monitoring called for in the selected remedy.

Comment #39: A commenter inquired about the final disposition of the contaminated groundwater that will be extracted as part of the hydraulic containment system at the Site.

Response #39: Groundwater collected from the groundwater extraction system (in order to provide an inward and upward hydraulic gradient at the Site) will be either shipped off-Site for treatment and discharge, or treated on-Site to discharge standards and discharged to the West Flume or reinjected into the groundwater.

Comment #40: A commenter suggested that consideration be given to the placement of contaminated sediments removed from Geddes Brook and Ninemile Creek under the LCP Bridge Street site's low-permeability cap.

Response #40: NYSDEC and EPA will consider the suggestion that contaminated sediments removed from Geddes Brook and Ninemile Creek be placed under the LCP Bridge Street Site's cap during a response action or during the remedy selection process for the Geddes Brook and Ninemile Creek Sub-Site. Nevertheless, such plans, if determined to be acceptable, would not be allowed to slow or disrupt the timely closure of the LCP Bridge Street Sub-Site. In addition, the sediments from Geddes Brook and Ninemile Creek would be required to pass EPA toxicity characteristic testing protocol.

Comment #41: A commenter asked how long it would take before remedial work at the Site commences.

Response #41: Following the selection of a remedy for the Site, it should take approximately six months to a year to negotiate the terms of a legal agreement for the performance of its design and construction with Honeywell. It is anticipated that the design will take one to two years to complete. Once the entire design or the design of different components of the remedy has been completed, construction of the remedy at the Site will start. Therefore, it is anticipated that it will take two to three years to start work at the Site.

Comment #42: Several commenters expressed concern that work at the Site might generate contaminated fugitive dust and other on-Site emissions which would pose a threat to those attending the nearby New York State Fair.

Response #42: Appropriate preventive measures, such as spraying the soil with water, will be taken during excavation activities to prevent the transport of fugitive dust from the Site. In addition, air monitoring will be conducted during all excavation activities. Should air emissions or dust levels reach unacceptable levels, unless the problem can be immediately rectified, the excavation activities would be terminated until the problem can be corrected.

The remedy includes the on-Site treatment of mercury-contaminated soils and the on-Site treatment of contaminated groundwater. Both of these systems will be equipped with emission controls. As such, the soil and groundwater treatment processes will not pose a threat to the public and will not adversely impact the air or groundwater.

Comment #43: A commenter asked about the purpose of the cap and barrier wall.

Response #43: The cap will isolate contaminated soils from potential human and environmental exposure routes and significantly reduce surface water infiltration, leachate generation, and waste mobility. The slurry wall, used in conjunction with groundwater extraction wells, will isolate the contaminated groundwater and the contaminated soils located below the water table so as to prevent the migration of contaminated groundwater.

Comment #44: A commenter asked about the basis for using a 0.2 mg/kg mercury cleanup level in the West Flume. Another commenter asked how much sediment exceeds the cleanup level in the West Flume. Another commenter asked whether or not the wetland will be restored after the contaminated sediments are removed.

Response #44: The mercury cleanup level for the sediments in the West Flume is based upon a background (*i.e.*, upstream) concentration of 0.2 mg/kg mercury. Approximately 19,000 cubic yards of sediments exceed the 0.2 mg/kg of mercury cleanup level along an approximately 4,800-foot length of the West Flume. It is assumed that all of the sediment from the West Flume will be removed as part of the excavation. Following the sediment removal for the wetlands portion of the remedy, the wetlands will be restored on-Site if feasible. If it is not feasible to restore the wetlands on-Site, then the wetlands will be created at an off-Site location so that there will be no net loss of wetlands.

Comment #45: A commenter asserted that elemental mercury in the deep soils is not stable, since it has moved downward 50 feet at the Site and it will continue to spread outward along the glacial till's surface.

Response #45: While NYSDEC believes that the extent of elemental mercury in deep soils has been determined, additional deep soil borings are planned as part of the remedial design to verify the extent of contamination in this area as well as the depth to the glacial till along the proposed alignment of the barrier wall. If the borings indicate that the extent of elemental mercury is greater than that reported in the RI, the barrier wall alignment will be modified, if necessary, to ensure that it contains all of the elemental mercury. Furthermore, if during monitoring of the remedy, it is determined that the elemental mercury is migrating, the effectiveness of the cap and barrier wall at containing the elemental mercury will be evaluated. Depending on the results of the evaluation, additional remedial measures (*e.g.*, recovery of elemental mercury, chemical and/or physical fixation) to address the elemental mercury will be considered.

Comment #46: A commenter stated that while the Proposed Plan identifies mercury in surface soils as a principal threat waste, it should have also identified liquid mercury in the deep soils as a principal threat waste. A commenter also asserted that a statement in the FS report that there are no risks associated with elemental mercury in the deep soil because there are no complete exposure pathways is incorrect, since elemental mercury is capable of moving off-Site.

Response #46: Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. While the liquid mercury in the deep soils is toxic, it was not identified as a principal threat waste because it is not believed to be mobile. Groundwater monitoring wells installed during remedial design will be used to determine if the elemental mercury is migrating. If monitoring results indicate that the elemental mercury in the deep soils is mobile, then it will be considered a principal threat waste, and the effectiveness of the cap and barrier wall at containing the elemental mercury will be evaluated. If the results of the evaluation indicate that the system is not effective, additional remedial measures (*e.g.*, recovery of elemental mercury, chemical and/or physical fixation) to address the elemental mercury may be considered.

Since the liquid mercury in the deep soils is not believed to be mobile, the human health and ecological risks assessments concluded that there are no exposure pathways for this soil. Since there are no exposure pathways for this soil, there are no risks.

Comment #47: A commenter stated that the lower concentration of dissolved mercury in the lower aquifer cannot necessarily be attributable to a limited migration of contaminants and/or the cessation of migration of elemental mercury as is suggested in the Proposed Plan, but rather, it may either reflect the "slower hydrological movement of this aquifer" or indicate that elemental mercury did not penetrate to this depth until recently.

Response #47: As stated in the Proposed Plan, it is NYSDEC's position that elemental mercury does not appear to be significantly contributing to dissolved mercury concentrations in the lower aquifer. Groundwater monitoring will be conducted as part of remedial design to monitor any changes in mercury concentrations in the deep aquifer. If the monitoring results indicate that the extent of mercury contamination in groundwater (at levels which exceed the water quality standard) is greater than that reported in the RI, the barrier wall alignment will be modified, if necessary, to ensure that it contains all of the mercury contaminated groundwater. Furthermore, long-term groundwater monitoring will also be performed to monitor the effectiveness of the containment system. See also the response to comment #50, below for an explanation of how the mercury contamination reached the lower aquifer.

Comment #48: A commenter notes that both saline solutions (NaCl) and caustic soda (NaOH) could adversely affect the permeability of a soil-bentonite slurry wall and that there is evidence of both elevated salt concentrations (chloride) and elevated pH in the upper aquifer at the Site.

Response #48: For the purpose of evaluating barrier walls, a soil-bentonite slurry wall was selected as the representative barrier wall in the Proposed Plan. However, compatibility testing of potential barrier wall materials will be performed during remedial design to ensure that the constructed barrier will be effective at containing the Site contamination. Furthermore, Site monitoring results will be used to evaluate the effectiveness of the containment system over the long term. If the results of the evaluation indicate that the system is not effective, additional remedial measures (e.g., recovery of elemental mercury, chemical and/or physical fixation) to address the elemental mercury may be considered.

Comment #49: A commenter stated that the glacial till underlying the Site is assumed to be impervious to penetration by mercury. However, glacial till is a heterogenous mixture of rock, gravel, sand, silt and clay. The Proposed Plan offers no assurance that liquid mercury cannot penetrate this material. There is no scientific or other justification for the statements that the glacial till is impervious.

Response #49: The glacial till consists of compacted, very dense silty clay and gravel. A review of boring logs for the deep borings indicates that elemental mercury is perched on silt lenses or the glacial till, indicating that it is acting as a confining layer. Therefore, it is believed that elemental mercury has not penetrated the till at the Site. However, if borings drilled during remedial design indicate that this is not the case, the effectiveness of the proposed cap and barrier wall at containing the elemental mercury will be evaluated. Depending on the results of the evaluation, the potential modification of the depth of the barrier wall and/or additional remedial measures (e.g., recovery of elemental mercury, chemical and/or physical fixation) to address the elemental mercury may be considered.

Comment #50: A commenter asserted that excavation of the contaminated deep soils to 55 feet is feasible and was inappropriately ruled out in the FS report.

Response #50: While deep soil excavation alternatives were considered in the FS report, these alternatives were screened out due to concerns associated with the feasibility and/or potential risks associated with implementing these alternatives. Concerns associated with the feasibility of deep soil excavation include the likelihood that it would be difficult to locate and excavate all of the elemental mercury due to the excavation depth. In addition, costs for excavating the deep soil above the glacial till (followed by off-Site disposal) would be approximately $72,000,000. Also, liquid elemental mercury in the deep soil is limited in extent, appears to be stable (*i.e.,* not likely to be mobile), and is not contributing significantly, in terms of areal extent, to dissolved mercury concentrations in the lower aquifer. Geotechnical borings taken as part of the facility development in the 1950's are believed to have penetrated the silt and clay layer, which acts as an aquitard between the upper and lower aquifers, and may have facilitated the downward migration of elemental mercury at the Site. However, the hydraulic measurements and aquifer chemistry (*e.g.*, pH and chlorides) between the upper and lower aquifers suggest that the silt and clay layer is acting as an aquitard in portions of the Site. This is supported by the fact that dissolved mercury concentrations are significantly higher in the upper aquifer than in the lower aquifer. Deep soil alternatives would require excavation of the silt and clay layer, which in general separates the upper and lower aquifers. The removal of the silt and clay layer would likely result in greater mixing between the groundwater in the upper and lower aquifers. Given the potential influence of Site geochemical conditions on the solubility of mercury, this could result in an increase in the mobility of mercury in the lower aquifer. Based on the risks posed by the alternatives and the technical infeasibility of removing all of the deep elemental mercury from the subsurface, the deep soil excavation alternatives were screened out.

Comment #51: A commenter indicated that the Proposed Plan's assertion that breaching the silty clay layer separating the upper and lower aquifers could result in geochemical changes in the deep aquifer, which could increase the mobility of the elemental mercury is unlikely. This is because the volume of the lower aquifer is far greater than the upper aquifer and since the depressed redox potential (the electrical potential associated with the oxidation or reduction of a substance) of the upper aquifer may actually decrease the mobility of soluble mercury through the formation of insoluble mercuric sulfide.

A commenter adds that a figure in the FS report shows that there is no silty-clay layer separating the upper and lower aquifers in the vicinity of the West Flume and that the Proposed Plan states that groundwater in the lower aquifer "may eventually discharge to the West Flume or Geddes Brook at a location west of, and downstream of, the facility."

Response #51: While the volume of groundwater in the lower aquifer is greater (about 11 million gallons) than the volume of groundwater in the upper aquifer (about 5 million gallons), the volume of groundwater in the upper aquifer is still significant. With its much higher concentrations of soluble mercury, one would expect to see an increase in mercury concentrations in the lower aquifer if mixing were to take place.

The removal of the silt and clay layer would likely result in greater mixing between the groundwater in the upper and lower aquifers. Given the potential influence of Site geochemical conditions on the solubility of mercury, this could result in an increase in the mobility of mercury in the lower aquifer.

While it is correct that the silty-clay layer is absent in the vicinity of the West Flume area, this area is downgradient of the Mercury Cell building area and would not impact any remediation conducted to address deep soil contamination there.

Comment #52: A commenter indicated that without a complete remediation, it is unlikely that industry would be willing to locate on the property given that property values for unspoiled acreage are so low in central New York.

Response #52: The primary objectives of the selected remedy are to control the sources of contamination, minimize the migration of contaminants, and to minimize any potential future health and environmental impacts. Restoring the Site to enable future, productive uses of the property, while a secondary objective, would allow the property to be used for parking, commercial establishments, or light industry. Based on the location of the property, and based on discussions with Honeywell, it is NYSDEC's understanding that future beneficial use of the property is likely. In addition, Honeywell has indicated that it intends to purchase the property.

Comment #53: A commenter indicated that it believes that the use of the 260 mg/kg limit for excavation and treatment of mercury is questionable, since this is a concentration set under Resource Conservation and Recovery Act regulations for disposal in licensed disposal facilities.

Response #53: For costing purposes in the FS report, 260 mg/kg of mercury (a value used in land disposal restrictions) was simply used to estimate the quantity of soils which would likely fail Toxic Characteristic Leaching Procedure (TCLP) testing. The actual limits of the mercury-contaminated soils to be excavated will be based on TCLP test results conducted as part of the remedial design.

Comment #54: A commenter asserted that a comprehensive monitoring program should have been part of the Proposed Plan so that it would be subject to public review.

Response #54: Long-term monitoring plans are typically developed in conjunction with the remedial design. To ensure that the Site's long-term monitoring plan is adequate, it will be reviewed by NYSDEC and EPA. As a recipient of a Technical Assistance Grant, Atlantic State Legal Foundation's technical advisor will be given the opportunity to review the long-term monitoring plan, as well. Once the document is available, it will be placed in the Site's document repositories, as well.

Comment #55: A commenter indicated that the Proposed Plan lacks a discussion of the slurry wall and glacial till interface and that no provision is made for verifying a "complete" seal at this critical location. A verification system should be required for the slurry wall, cap and all points of interface. The monitoring program should address these points specifically.

Response #55: The slurry wall will be "keyed into" the low-permeability glacial till layer. Procedures to ensure that a complete seal occurs between the slurry wall and the till layer will be specified during the remedial design. The screening of wells to monitor the slurry wall interface with the till, as well as other zones, will be considered in the design of the containment system monitoring program.

Comment #56: A commenter comments that the Proposed Plan contains insufficient characterization data to justify the course of action in approximately 4 acres of the Site in the area of the Mercury Cell Building, the Diaphragm Cell Building, the Caustic Plant, Salt Plant, and other structures since the underlying areas were inaccessible during the RI. Since these buildings are presently being razed, additional monitoring wells should be installed and deep soil samples collected.

Response #56: Additional groundwater monitoring wells and deep soil borings are planned as part of the remedial design to confirm the extent of elemental mercury and mercury contaminated groundwater (which exceeds the water quality standard), and to verify the depth to the glacial till along the proposed alignment of the barrier wall. NYSDEC, however, believes that there is presently sufficient data to support the selection of a remedy for the Site.

Comment #57: A commenter stated that a contingency plan for remedy failure needs to be developed.

Response #57: Since the selected remedy is technically feasible and implementable and will be effective as long as it is properly maintained, a contingent remedy is not necessary. However, it should be noted that the remedy will include a long term monitoring and maintenance program (to be developed during remedial design) to ensure that the remedy continues to be effective at addressing risks to public health and the environment. The program will include provisions for repairing the remedy and for modifying the remedy (which could include the consideration of other remedial technologies) if warranted by the monitoring results.

Because the selected remedy will result in contaminants remaining on-Site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by this assessment, remedial actions may be implemented in the future to remove or treat the waste.

Biological Monitoring

Comment #58: A commenter recommended that a biological monitoring program focused on fish and macroinvertebrate populations in the West Flume, Geddes Brook, and lower Ninemile Creek be made part of the LCP Bridge Street Site remediation process, and that the biological monitoring should continue until such time as mercury and PCB levels in these fish and macroinvertebrate populations reach acceptable ecological background levels.

Response #58: Post-excavation monitoring of West Flume and wetland surface water, sediments, and biota will be conducted on an annual basis to assess the effectiveness of the remedy. The specific details of the long-term monitoring program will be developed during the design phase. Based upon the results of the monitoring, NYSDEC and EPA will determine if further biological monitoring is required. If the biological monitoring shows that contaminant levels in the biota are not diminishing, then further remedial action might be necessary.

While biological monitoring in the West Flume is required as part of the selected remedy for the LCP Bridge Street Site, the Geddes Brook and Ninemile Creek Site is part of a separate RI/FS process. However, the Geddes Brook and Ninemile Creek RI/FS, Proposed Plan, and ROD will take into consideration the remedy selected for the LCP Bridge Street Site.

Comment #59: A commenter recommended that the results of the biological monitoring should be made available to interested citizens and environmental groups until such time as mercury and PCB levels found in the fish and wildlife populations inhabiting the lower Ninemile Creek basin are found to have fallen below acceptable ecological background levels.

Response #59: Biological monitoring data, as well as all other environmental data, resulting from the implementation of the Site remedy are public information and will be available for public inspection at the Site's information repositories.

APPENDIX V-a

LETTERS SUBMITTED DURING THE PUBLIC COMMENT PERIOD

1. Mr. David Coburn, Director, Office of the Environment, Onondaga County (July 31, 2000)
2. Mr. Les Monostory, V.P., The Izaak Walton League of America, Central New York Chapter (July 24, 2000)
3. The Honorable William E. Sanford, Chairman, Onondaga County Legislature (July 28, 2000)
4. Mr. A.J. Labuz, Manager, Remediation & Evaluation Services, Honeywell International, Inc. (July 31, 2000)
5. Mr. Mark P. Hettler, Liverpool, NY (September 5, 2000 - *via* electronic mail)
6. The Honorable Joan K. Christensen, New York State Assemblywoman, 119th District, (September 6, 2000)
7. Mr. Fred Miller, Liverpool, NY (September 7, 2000)
8. Ms. Agnes Lane, Syracuse, NY (September 12, 2000 - *via* electronic mail)
9. Mr. A.J. Labuz, Manager, Remediation & Evaluation Services, Honeywell International, Inc. (September 13, 2000)
10. Mr. Lucas Lorenz, Atlantic States Legal Foundation (September 14, 2000 - comments collected from the 2000 New York State Fair)
11. Ms. Martha H. Loew, Chair, Iroquois Group, Atlantic Chapter (September 15, 2000 - *via* electronic mail)
12. Mr. Joseph J. Heath, Esq., General Counsel for the Onondaga Nation and their Council of Chiefs (September 15, 2000)
13. Mr. Samuel H. Sage, President, Atlantic States Legal Foundation (September 18, 2000)

COUNTY OF ONONDAGA
EXECUTIVE DEPARTMENT
OFFICE OF THE ENVIRONMENT
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NICHOLAS J. PIRRO
County Executive

DAVID COBURN
Director

RECEIVED
AUG - 3 2000
BUREAU OF CENTRAL REMEDIAL ACTION

July 31, 2000

Via Federal Express

Mr. Richard Mustico
Project Manager
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

Re: LCP Bridge Street Proposed Plan (Site # 7-34-049)

Dear Mr. Mustico:

Onondaga County, New York submits these comments, observations and questions in response to the LCP Bridge Street Sub-Site Superfund Proposed Plan issued by the New York State Department of Environmental Conservation in July, 2000.[1]

To reiterate the County's public comment, Onondaga County does not support the Proposed Plan for the following reasons:

- The Remedial Investigation, as noted by NYSDEC itself, was inadequate to sufficiently characterize the nature and extent of contamination at this site or serve as the basis for selecting or designing a remedy. The RI Request was based on an extremely limited data base. The RI (1) failed to investigate and confirm the existence of the relatively impermeable glacial till floor allegedly underlying the site (a critical component of the preferred remedy), (2) failed to conduct time-series monitoring on the front of the liquid mercury pool, and (3) failed to collect appropriately timed or a sufficient number of samples necessary to determine surface water loadings of mercury during high-flow and spring runoff events.

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[1] The County was assisted in the preparation of these comments by: Stearns & Wheler, LLC, One Remington Park Drive, Cazenovia, New York 13035; ALTA Environmental, 100 Amston Road, Colchester, CT 06415; ecology & environment, inc., Buffalo Corporate Center, 368 Pleasant View Drive, Lancaster, NY 14086; Dr. Robert P. Mason, Assistant Professor, Chesapeake Biological Laboratory, P.O. Box 38, One Williams Street, Solomons, MD 20688-0038; and R. Douglas Evans, Ph.D.,Trent University, Environmental and Resource Studies Program, Peterborough, ON Canada K9J 7B8.

- The Proposed Plan is not adequately protective of human health and the environment. It fails to provide a long-term permanent and effective remedy. It fails to restore the site for future productive use. It precludes the re-classification or removal of the site from the State's inventory of Inactive Hazardous Waste Sites. It requires on-site monitoring, maintenance and repairs, and potential additional remedies, in perpetuity.

Contributions to Onondaga Lake and Off-Site Impacts

The Proposed Plan states that "[t]he LCP Bridge Street Site is contributing contamination to Onondaga Lake, and therefore, is considered a "sub-site" of the Onondaga Lake NPL site." Exactly what contamination is the site currently contributing? What is the current volume or concentration of contamination and how was it calculated? What were the historical volumes of contamination and how were the volumes calculated? How is contamination transported from the site to Onondaga Lake? Does the preferred remedy permanently eliminate all current and potential future contamination of the Lake from this Site? If not permanently, for how long?

Both the Human Health Risk Assessment and the Baseline Ecological Risk Assessment excluded any evaluation of the site's impact on downstream receptors including Onondaga Lake. Why were off-site impacts excluded from the analysis of impacts of a known subsite of the Onondaga Lake site?

The Preferred Remedy

The Preferred Remedy is a subsurface wall surrounding and placement of an impermeable cap on top of 20 + acres of mercury contamination that poses a current risk to human health and the environment.

Detail NYSDEC's or Honeywell's experience and success in constructing and maintaining a barrier wall at least 55 feet deep enclosing a perimeter of 20+ acres of otherwise mobil mercury contamination. Has such a structure been successfully installed and operated at any other location? If so, for how long? Have any such remedies (i.e., barrier walls and impermeable caps) failed? How were the failures corrected? Has the State or EPA ever elected to remove and dispose of materials originally placed under a cap or kept behind a slurry wall? If so, why? What is the likelihood of failure of the cap or wall proposed at this site over the life of the remedy?

The RI Report indicates that unexpectedly and without explanation an elemental pool of mercury traveled down and through a reported natural aquitard. How will the barrier wall prevent continued migration?

The floor of the site is reported to be a "relatively impermeable till" but actual site conditions have not been investigated and confirmed. What is the basis for concluding that the "floor" of this site will serve to contain the existing pool of elemental mercury? Should not investigation and confirmation occur prior to selecting a remedy?

The proposed barrier wall and cap system will not immobilize the waste, treat it, or detoxify it. The waste contained by the remedy will therefore remain a continued threat to human health and the environment. The Proposed Plan suggests that the sheer volume and magnitude of contamination mitigates against off-site transportation and disposal of contaminated soils, in that an estimated 31,200 truck trips would be required, and is so extensive that it would take 30,000 years to extract and treat groundwater before it would meet State groundwater quality standards. What is the life expectancy of a barrier wall in a Central New York type climate? What is the cost of containing the water and soil for 30,000 years? What assurances exist that Honeywell will fund and maintain the preferred remedy in perpetuity?

There is no basis in the record for suggesting this site will not have to be maintained and operated well beyond the 30 year Proposed Plan cost estimate. What is the actual cost of implementing, maintaining and operating the preferred remedy?

Alternative Remedies

The Proposed Plan states that *in situ* solidification/stabilization was rejected in large part because it would make the existing groundwater unavailable for use by the community. The logic and rationale behind that decision are faulty at best. First and foremost, Honeywell's use of the site has already made site groundwater unavailable to the community. Second, the same criteria was not applied to and thus, did not serve to eliminate other alternative remedies, including the preferred remedy, which will permanently make groundwater unavailable for use by the community. The State's failure to apply the same criteria to evaluate each proposed remedy is arbitrary and capricious under the law.

Off-Site Migration

The preferred remedy apparently presumes that all contamination will be captured by or removed and placed under the proposed cap. What assurances exist that mercury contamination has not already escaped from the site?

The RI Report presumes, in part, that mercury contaminated groundwater discharges to the West Flume and does not otherwise migrate off-site. That assumption is contrary to the available site data (see prior County comments) and data from the site designated Operable Unit No. 2 and the adjoining NAKOH Chemical property. Mercury contaminated groundwater has been detected at levels that exceed groundwater standards in monitoring wells located northeast and thus beyond the alleged West Flume barrier (Operable Unit # 2: 10/95; NAKOH Chemical: 13/98 and 10/99).

The hydrogen sent to the hydrogen peroxide building from the clor-alkali plant was reportedly impregnated with mercury. In addition, visible elemental mercury contamination has reportedly been observed in the Compress Building located on the Operable Unit #2 site. What steps are being taken to determine and address these sources of contamination?

It is stated in the Proposed Plan that the lower aquifer groundwater may discharge at Geddes Brook at a location west of, and downstream of, the facility. This is inconsistent with the suggestion that the West Flume acts as a barrier to off-site groundwater migration. It is also reported the Geddes Brook and/or Nine Mile Creek are impacted by apparently unidentified sources of mercury. What steps are being taken to investigate and address such sources of mercury?

Future Site Use

The Site is currently classified as a New York State Class 2 Inactive Hazardous Waste Site. Any change in use of a Class 2 Site must be approved by the NYSDEC and the NYSDOH. What type of uses, if any, have been authorized on top of capped hazardous waste landfills? Will a parking lot be approved? Will any other use be approved? Would it be possible to install and manage subsurface utilities at this Site? What protections would be afforded utility and other site workers?

Operation and Maintenance

The Proposed Plan fails to address operation and maintenance concerns or the proper utilization of institutional controls. Does Honeywell own this site?

Recent evaluations of the Federal Superfund program, including a report by the Environmental Law Institute, have been critical of the use of institutional controls, in particular, the failure to coordinate controls at all necessary levels of government and with interested parties and the public. How will such concerns be addressed at this site? What controls are anticipated? How will they limit future and surrounding site uses?

Prior Comments

Onondaga County previously submitted comments regarding the RI/FS process at this site. Those comments dated December 11, 1998, February 12, 1999, March 3, 1999, June 29, 1999 and June 4, 2000 are attached hereto and incorporated herein in response to the July, 2000 Proposed Plan. The State's Responsiveness Summary should address each and every issue raised in the County's earlier comments.

To summarize those comments:

- And in part quote the State, "the Remedial Investigation Report is inadequate because of substantial deficiencies . . . [it] did not accurately and conservatively assess risk to human health, underestimated potential risks to the biological community, and did not provide adequate information for remedy selection and design." State of New York Determination to Disapprove, at 19.

- The RI failed to adequately investigate surface water loadings of mercury due to inadequate frequency and the timing of sampling events.

- The RI inadequately investigated the migration of elemental mercury by failing to place monitoring wells in a presumed downgradient location, failing to locate monitoring wells deep enough to intersect the till, failing to explain the movement of mercury through a reported aquitard, failure to conduct time-series monitoring of the front of the liquid mercury pool (1992 was the date of the last relevant sampling event).

- The RI failed to adequately investigate groundwater flow and pathways and concluded, contrary to the available data, that mercury contaminated groundwater discharges to the West Flume but does not otherwise migrate off-site.

- The Baseline Ecological Risk Assessment failed to address the risks posed by site-related contamination to receptors in valuable habitats located adjacent to and downstream from the site (i.e., Geddes Brook and Nine Mile Creek).

CONCLUSION

In sum, as discussed above and in the County's oral testimony and prior written submissions, the County submits that the Preferred Remedy is not permanent, will eliminate any future site use other than as a mercury waste landfill, and is premised on an incomplete site assessment and site assumptions not yet verified in the field. As a result, Onondaga County does not support the preferred remedy.

Very truly yours,

David Coburn
Director

cc: ✓Timothy J. Larson, P.E., NYS Department of Environmental Conservation
Mr. Joseph J. Mastriano, Onondaga County Department of Drainage & Sanitation
Dr. Russell Nemecek, Onondaga County Health Department
Luis A. Mendez, Esq., Onondaga County Department of Law
Mr. Alfred J. Labuz, Honeywell
Mr. Robert Ford, Honeywell
Gordan Quin, Esq., Honeywell
Manning Gasch, Jr., Esq. - Hunton & Williams
Norman Spiegel, Esq., New York State Department of Law
Philip Bein, Esq., AAG, New York State Department of Law
Mr. John Davis, New York State Department of Law
Mr. Donald J. Hesler, New York State Department of Environmental Conservation
Benjamin A. Conlon, Esq., New York State Department of Environmental Conservation
Mr. Robert Montione, New York State Department of Health
Mr. Ronald Heerkens, New York State Department of Health
Mr. Richard L. Caspe, US EPA
Mr. Robert Nunes, US EPA

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Oral Testimony Presented on Behalf of Onondaga County
Re: the Proposed Remedial Action Plan for the
LCP Bridge Street Sub-Site of the Onondaga Lake Superfund Site
Presented: July 19, 2000

Good evening. My name is David Coburn. I am the Director of the Onondaga County Office of Environment. The brief oral testimony I am presenting this evening on behalf of Onondaga County represents a summary of the more detailed and technical written comments the County will be submitting prior to August 4, 2000.

Let me state at the outset that Onondaga County does not currently support, but will not oppose the State proceeding with the proposed remedy. Not because the County is confident the remedy will stand the test of time, but because addressing the contamination at this site is long overdue. The County does not believe the creation of a permanent mercury waste landfill on the shores of Onondaga Lake is desirable. While it is time for action, the County cautions that it would be foolhardy to assume that the proposed remedy represents a complete, final or lasting solution to the gross contamination at this site.

In 1995 AlliedSignal agreed in a consent order to study this site in order to characterize the sources, types, and extent of contamination. In May of 1997 AlliedSignal submitted a first draft Remedial Investigation (RI) Report. The first draft was rejected by the State. Before the State even completed its review of Allied's revised RI Report, Allied submitted a draft Feasibility Study presenting Allied's proposed cleanup plan for the Site. In 1998, because Allied either could not or would not revise the draft RI in a manner acceptable to the State, the State rejected Allied's Revised RI Report, took matters into its own hands and revised the RI Report.

Since it does not appear in any of the three local Syracuse repositories, let me read just a few sentences of what the State wrote in its determination to disapprove Allied's second Revised Remedial Investigation Report: "The Remedial Investigation Report prepared by AlliedSignal does not properly describe the extent and transport of site contamination, [and]...Among other things, the report understates the amount of mercury contamination originating at the Site and fails to adequately describe the off-site migration of such contamination."

The State also wrote in its determination to disapprove the report: "The Remedial Investigation Report is inadequate because of substantial deficiencies in its description of contamination at and near the Site and substantial deficiencies in its assessment of the risks to human health and the biological community posed by such contamination. The Remedial Investigation Report did not accurately and conservatively assess risks to human health, underestimated potential risks to the biological community, and did not provide adequate information for remedy selection and design."

Of concern to Onondaga County, to our knowledge, no additional data has been collected and the deficiencies in the RI Report that were properly identified by the State remain uncorrected. The LCP Bridge Street Site, like virtually all of the Allied sites the County has been afforded the opportunity to review, is grossly contaminated. As with the other Allied sites the County has reviewed, this site has not been well characterized; investigators do not know where all of the contamination has migrated. But, as with the other Allied sites currently under investigation, it is known that contamination has and continues to migrate off-site and impact Onondaga Lake.

The County agrees with the State's conclusion that the RI Report failed to adequately characterize the LCP Bridge Street Site, largely due to its reliance on too little data. The County agrees with the State's conclusion that the data on which the RI Report is based fails to provide adequate information for selecting or designing a remedy. Unfortunately, in spite of the time that has passed and the effort expended, the County cannot overcome its apprehension that the proposed remedy is not a complete or lasting solution to the contamination problems at this Site. The County is concerned that the capped mercury waste landfill the State and Allied have opted for will be no more than a $14 million carpet under which years of monumental contamination will be swept. The County fears that, in the long run, this remedy will not prevent the migration of contaminants off of the site and ultimately into Onondaga Lake or its tributaries.

Recently, eight years after the decision was made to cap contaminants at the Shattuck Superfund Site in Colorado, the United States Environmental Protection Agency decided it is now necessary to excavate and haul away the waste underlying the cap. This decision was made out of concern that the cap might fail in the future. It is this scenario, and this uncertainty, that the County does not want to see repeated here.

The County is disappointed that, on this the first of a number of Allied site cleanups, AlliedSignal is attempting to set the standard for cleanup so low. The County does not agree with the suggestion that this site, underlain by mercury waste, will ever be capable of being redeveloped to its full potential, and only hopes that this course of action does not set a precedent for the cleanup of the other Allied sites.

Finally, in closing, I am compelled to note for the record what a terrible wrong Allied is attempting to perpetrate against this community. At this very moment Allied continues to prosecute a lawsuit against the County in an effort to force taxpayers to pay the cost of cleaning up the thousands of pounds of mercury contamination Allied knowingly poured into Onondaga Lake and its surrounding environment. The taxpayers are already spending $380 million to upgrade the Metro wastewater treatment plant and collection system to improve water quality in Onondaga Lake. It would be a terrible injustice if the taxpayers had to pay millions of additional dollars to clean up the 100 years of pollution Allied is responsible for.

Devorsetz Stinziano Gilberti Heintz & Smith, P.C.
ATTORNEYS AND COUNSELORS AT LAW

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December 11, 1998

Via Facsimile & U.S. Mail
Mr. Donald J. Hesler
Acting Section Chief
New York State Department of
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Division of Environmental Remediation
50 Wolf Road
Albany, New York 12233

Philip Bein, Esquire
Assistant Attorney General
New York State Department of Law
120 Broadway, 26th Floor
New York, New York 10271

Re: Onondaga Lake System RI/FS
State of New York Determination to Disapprove and Revise the October 9, 1997
LCP Bridge Street Remedial Investigation Report

Gentlemen:

The following comments regarding New York State's decision to disapprove and revise the October 9, 1997 LCP Bridge Street Remedial Investigation Report and the Remedial Investigation Report as revised by New York State are submitted on behalf of Onondaga County.[1]

As explained in more detail below, the County agrees with the State's determination to disapprove and revise the October, 1997 Remedial Investigation Report, but disputes that the revisions made to date are sufficient to correct the overall inadequacy of the LCP Bridge Street RI. At the same time, the County recognizes that it is important that the RI/FS process continue and IRMs be implemented. Thus, the County requests that the data gaps and deficiencies identified

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[1] The County was assisted in the preparation of these comments by: ALTA Environmental Corp., 100 Amston Road (Rt. 85), Colchester, Connecticut 06415 and Stearns & Wheler, One Remington Park Drive, Cazenovia, NY 13035.

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herein[2] be addressed and resolved in a Supplemental RI Report or as an essential component of the continuing FS process.

A. The Decision to Disapprove and Revise

The County fully concurs with the State's determination to disapprove and revise the Remedial Investigation Report, in particular the State's conclusion that:

> The Remedial Investigation Report prepared by AlliedSignal does not properly describe the extent and transport of site contamination, [and]...Among other things, the report understates the amount of mercury contamination originating at the Site and fails to adequately describe the off-site migration of such contamination.
>
> * * *
>
> The Remedial Investigation Report is inadequate because of substantial deficiencies in its description of contamination at and near the Site and substantial deficiencies in its assessment of the risks to human health and the biological community posed by such contamination. The Remedial Investigation Report did not accurately and conservatively assess risks to human health, underestimated potential risks to the biological community, and **did not provide adequate information for remedy selection and design.**

State of New York Determination to Disapprove, at 5 and 19 (emphasis added).

Given the RI Report's failure to conservatively estimate exposure risks and the absence of data necessary to establish a basis for varying from established guidelines, the State had no option but to revise the RI Report.

Equally important, the County agrees that the data on which the RI Report is based fails to "provide adequate information for remedy selection and design," and submits that the Report also failed to adequately characterize the LCP Bridge Street Site due to its reliance on an extremely

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[2] The County has had only minimal time to review the State's Determination to Disapprove and Revise and thus reserves the right to supplement these comments.

limited data base and the repeated adoption and assertion of unsubstantiated and undocumented hypotheses.

Critically, with respect to both the Onondaga Lake System RI/FS process and the LCP Bridge Street RI/FS process, the 1997 RI Report failed, for example, to develop an annual mercury loading budget and failed to provide sufficient data from which a supportable budget could be developed. *New York State Revision of the Remedial Investigation Report, Volume I: Text at 101, f.n. 39.* Among other things, this failure continues to highlight the repeated efforts of AlliedSignal to advocate its preferred interpretation of the Onondaga Lake System mercury budget in an attempt to bias the remedy selection process and/or secure implicit State acceptance and approval of the source of mercury loadings in support, again, of AlliedSignal's preferred theory of mercury source allocation, all of which remains premised on undocumented and unproven hypotheses.

B. New York State's Revision of the RI Report

As noted by the State, the Consent Decree and Stipulation and Order entered into by the State and AlliedSignal authorizes the State's disapproval of reports submitted by AlliedSignal and the issuance of the State's own report which may include "revision of assessments, evaluations and conclusions...as deemed necessary by the State..." *Consent Decree ¶ 32.*

The Revised Report is adequate to confirm the release and threatened release of hazardous substances to the environment, AlliedSignal's obligation to conduct or reimburse the State and/or USEPA for all necessary and appropriate response consistent with the National Contingency Plan, and the Site's detrimental impact on the overall Onondaga Lake System. Given that the above elements have been met, it was not inappropriate for the State to issue a Revised RI Report in an effort to continue to move the Site remediation process forward and initiate IRMs.

The County must, however, dispute the State's contention that the State's revisions have "corrected" the deficiencies in the RI Report, in particular the absence of data sufficient to fully and properly characterize the Site and conclusions not supported by the available data.[3] Simply put, correcting the erroneous conclusions which can be drawn about site risks from the limited available site data does not compensate for the overall inadequate investigation conducted to date.

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[3] The County notes that Consent Decree ¶ 34 provides that the State's approval of an RI Report "does not necessarily approve or adopt the recommendations contained in such report." The Consent Decree is silent, however, regarding the resulting State approval or adoption (even if conditional) of report findings or conclusions (i.e., not recommendations) and the nature of the resulting approval after the State has disapproved and revised any given report.

C. Technical Review and Comments Regarding the Revised RI Report

The County provides the following observations and comments on the Revised RI Report, which are expanded on and further explained in the enclosed draft comments from ALTA Environmental Corp. and Stearns & Wheler.

Surface Water Loadings

- In Section 4.4.5 the issue of mercury mass loading to surface waters is discussed and measurements of surface water flow in the West Flume by PTI (also an AlliedSignal contractor) are dismissed as inaccurate. The data was dismissed based on the stated belief that the flow rate in 1995 was very low and the 1994 flow measurements were recorded a day after a half-inch precipitation event and did not quantify the contribution from leaking pipes. Unfortunately, the flow monitoring data is not included in this Report, and thus cannot be independently evaluated. For this reason, the RI Report must be considered incomplete.

- On page 99 the Report states that "flow rate measurements at successive stations (the August 1995 low flow sampling event) some of which are separated by a short distance, violate flow balance." Without seeing the data, it is impossible to tell what caused this problem. Again, the RI Report must be considered incomplete for failing to include this data. If the groundwater levels were depressed because of a long period of drought (which did in fact occur in the summer of 1995), then the apparently anomalous data may have been the result of the West Flume losing water to the water table in different reaches of the stream. If so, these results are not anomalous, but reflect the seepage of surface water into groundwater.

- The fact that the 1994 flow measurements occurred within a day or two of a half-inch precipitation event does not make the results anomalous. An examination of precipitation patterns for August 1994 (NOAA) indicates that there were four other events during the month that exceeded a half-inch of precipitation. The effects of the half-inch rainfall a day before, during a month when the average total is 3.5 inches, would not have rendered this data anomalous by any reasonable definition. If this data is viewed as normal it confirms a high rate of mercury-contaminated water migrating from the West Flume.

- The Report goes on to describe 1994 as having anomalously high precipitation and 1995 as having anomalously low precipitation. In fact, both years were slightly below average years on an annual basis. Whether the subject years do or do not represent normal conditions should only be concluded by comparison with the historic record of precipitation, or better yet, by measuring the flow over some reasonable period of time.

- If it was felt that the PTI data was inaccurate, the measurements should have been redone, and given the importance of flow in the West Flume, continuous flow measurements should have been taken over the course of a hydrologic year in order to better gauge the difference between storm events, high flow and low flow events. Additionally, measurements should have been taken at more locations. These data are critical to drawing any reasonable conclusions about the contribution of the LCP site on mercury contamination that ultimately finds its way to Onondaga Lake.[4]

Elemental Mercury

- The following observations are made in the RI Report:

  1) Mercury from the mercury cell building has migrated at least 165 feet laterally. (It has also migrated vertically through the aquitard approximately 50 feet to the surface of the glacial till.)

  2) Based on its calculations and assuming the mercury flows along the slope of the till, Gradient contends that the mercury should have migrated over one mile.

  3) Gradient thus concludes that the elemental mercury is not mobile because it has laterally migrated only 165 feet laterally and not 6900+ feet.

  4) Gradient then suggests the retardation of elemental mercury migration is due to capillary forces. These capillary forces were, however, not factored into the previous calculation of lateral migration.

  5) Gradient concludes that "the absence of the elemental mercury near the West Flume and the limited extent of elemental mercury is clear proof that elemental mercury is not migrating along the till layer."

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[4] In fact, NYSDEC TAGM HWR-88-4007 regarding Phase II investigation generic work plans describes just such a requirement. See attached excerpt.

- The logic used is faulty for the following reasons:

  1) It had been established that mercury has migrated at least 165 feet.[5]
  2) The authors of the unrevised RI Report predict the rate of migration on the till assuming a very high gradient, but do not take into consideration the surface tension forces that retard this migration, although they use this mechanism as an explanation for why the mercury might have stopped moving.
  3) Gradient postulates that the mercury has stopped moving because it is trapped in a depression in the till or being held by surface tension. If either of these is true, then:

     a. Where is the documentation of a depression in the till because the Report maps a uniformly steeply dipping till surface?
     b. Why did the surface tension forces allow the mercury to move 165 feet laterally and then stop it?

- It is more reasonable to conclude that:

  1) The predicted slope of the till is <u>not</u> 2.5 degrees; and/or
  2) The rate of migration of mercury is retarded due to surface tension, a factor that was not used in their calculation of rate of migration.

- Of note, the Report also does not discuss how it is that the elemental mercury can migrate vertically downward "through the aquitard" (silty-clay) when the same aquitard is purported to be the basis for the existence of both an upper and lower aquifer underlying the site. Nor does it discuss the till itself and whether it is conductive of groundwater.

Groundwater Flow Patterns

- The Report concludes that the most effective way to gauge the discharge of mercury contaminated groundwater to the west flume is by calculating the groundwater discharge using a "flow net". A true cross-sectional flow net would be valuable

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[5] Importantly the downslope wells and soil borings do not extend to the till and thus, represent another additional data gaps. Therefore, 165 feet should be considered the minimal extent of known lateral migration.

because it would define a flow path for all groundwater originating from source areas. The saturated thicknesses used as the basis of the "flow net" analysis are shown on Table 4.4-7 yet there is no technical justification as to why these values were used. Geologic cross sections and groundwater elevation data were examined to see if there was any explanation for the numbers chosen, but there is no apparent correlation between these numbers and this data.

- A significant concern, in addition to the apparent arbitrary saturated thicknesses used, is the use of an average value for hydraulic conductivity which was calculated using the results of a number of slug tests run on wells identified in Table 4.4-6. It is very difficult to tell whether this data is appropriate for use in this application. Based, however, on a review of cross-sections that indicate the screened intervals for these monitoring wells it is apparent that most of these are <u>not</u> screened across the upper fill zone, which is most likely to conduct groundwater at the highest rate. Given that most of these monitoring wells are apparently screened primarily across intervals that are very likely to be less conductive than the fill zone, this calls into question the validity of the hydraulic conductivity value used to calculate the discharge of contaminated groundwater to the West Flume.

- As described, the groundwater flow patterns are indeed unique and interesting. It is unfortunate that both of the contour maps for the "upper aquifer" and "lower aquifer" are based solely on data from the fall months. As a result, they provide no sense of seasonal variability.

- The similar patterns of groundwater flow suggest a convergence of flow in both the shallow and deeper aquifer under the West Flume. Yet there is a distinct and pronounced head difference between the shallow aquifer and the deeper aquifer of approximately 8 to 10 feet. On page 43 of the Revised Report, it states that "in the vicinity of the West Flume, where the silty aquitard is of limited thickness, or absent, groundwater from a small portion of the lower aquifer discharges into the West Flume." Based on the data provided, this conclusion is not possible, given the large head differences between aquifers.

- It is noted that the data demonstrate that contaminated water from the upper zone is recharging the lower zone and moving somewhere. The only reasonable explanation for converging groundwater flow in the deeper zone would be a high hydraulic conductivity zone in the lower aquifer. Moreover, if it exists, it should be further defined as it probably plays an important role in funneling contaminated groundwater westward towards Geddes Brook.

Additional Comments

- The spacing of wells and the size of screened intervals make it very difficult to answer many of the questions that must be answered to properly characterize this site. In addition, monitoring wells across the site are commonly screened across three separate stratigraphic units but treated as one.
- There is a scarcity of data (monitoring wells and events) in areas downgradient of the major source of mercury contamination (e.g., hundreds of feet between wells in the area downgradient of the diaphragm cell and mercury cell buildings). As a result, potential plumes of contaminated groundwater may remain undetected.
- The overburden overlying the glacial till has been arbitrarily divided into an upper and lower aquifer yet there appears to be no rationale for doing so. Cross section C-C documents the interbedded nature of the "clayey-silt" and the "silty-sand." There is no hydraulic evidence that proves there is any separation between units.
- The glacial till was not characterized and yet it is well known that tills contain large scale fractures and high permeability lenses that can conduct water more rapidly than the till matrix. With an extremely toxic mercury DNAPL moving along the till surface, this is a critical data gap.

D. Disputed Revised RI Report Findings

Based on the discussions above and in the attachments hereto, the County disputes the following findings and conclusions found in the New York State Revision of the Remedial Investigation Report LCP Bridge Street Site, Solvay, New York, Volume I: Text:

- Page ES-4: Hydrogeologic conditions
  Based upon geologic data collected during the RI, four overburden stratigraphic units were identified at the facility. The units include (from the ground surface downward): fill, clayey silt, silty sand and relatively impermeable glacial till. Based upon an assessment of geology and hydraulic data collected during the RI, two hydrogeologic systems were identified at the facility: a shallow unconfined groundwater system (upper aquifer) which occurs in the fill, and a deeper groundwater system (lower aquifer) which is bounded above and below by clayey silt

Disputed RI Findings Continued:

and glacial till, respectively. The water table ranges from about 0.5 to 8 ft bgs. Groundwater in both systems flows toward and converges at the West Flume. Groundwater in the upper aquifer discharges to the West Flume and its tributaries.

- Page ES-6:
  The DNAPL in the lower aquifer appears to be stable (i.e., not mobile, and not contributing to dissolved mercury due to the relatively neutral groundwater pH in the lower aquifer)....Groundwater sampling has determined a well characterized groundwater plume of total and dissolved mercury that discharges into the West Flume.

- Page ES-7:
  The extent of mercury in groundwater has been well defined by this RI in both the upper and lower aquifer. Contamination in the upper aquifer extends to the West Flume, where it discharges. Mercury in the deeper aquifer occupies a smaller area, due to relatively neutral pH of the groundwater limiting its solubility....Dry weather mercury mass loading attributable to groundwater (is) calculated to be 0.2 gm/day....Wet weather and post-storm mercury loading to the West Flume appears to be on the order of 2 gm/day, while dry weather loading from sewers appears to be about 0.05 gm/day.

- Page ES-8:
  Total mercury loading to the West Flume from groundwater, sewers, and the ponded area is *on the order of* 1 gm/day in dry weather and 3 gm/day or higher during and for some period after storms (italics added).

  Surface waters and sediments, along with their impact on biota, have been characterized.

- Page ES-10:
  5. Elemental mercury was encountered in one area primarily in the lower aquifer. It is limited in extent and does not appear to be capable of continued migration as NAPL, based on the topography of the till confining layer on which it rests.

Disputed RI Findings Continued:

7. Given all of the available data, the best estimate of mercury loading to the West Flume is *well below* 1 gm/day during dry weather and about 3 gm/day during wet weather and for some period after storms (italics added).

- Page ES-11
  Mercury in groundwater discharges to the West Flume and doesn't migrate beyond *via* groundwater. The loading of mercury from groundwater to the West Flume is estimated to be approximately 0.2 gm/day (italics in original).

- Page 112:
  This DNAPL appears to be stable, *i.e.*, not mobile.

- Page 113:
  Elemental mercury was encountered in one area primarily in the lower aquifer. It is limited in extent and does not appear to be capable of continued DNAPL migration, based on the topography of the till confining layer on which is rests.

- Page 113:
  Mercury in groundwater discharges to the West Flume and doesn't migrate beyond. The loading of mercury from groundwater to the West Flume is estimated to be about 0.2 gm/day.

- Page 113:
  The West Flume also receives mercury loading from on-site sewers and the Ponded Area. The loading from sewers may be highly variable, consisting of both groundwater infiltration and collected surface runoff. The present best estimate of mercury loading to the West Flume from sewers is about 2 gm/day during and after wet weather and about 0.05 gm/day during dry weather.

- Page 113:
  With a total mercury input of about 1 (dry weather) to 3 (wet weather) gm/day.

E. Compliance with the Work Plan and Consent Decree

The County's concerns regarding the adequacy of the RI is magnified when the State Revision of the RI is compared and contrasted with the Bridge Street RI Work Plan, the State's comments regarding the draft RI Report, the Consent Decree, State guidance documents and the National Contingency Plan.

The National Contingency Plan provides as follows:

> The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site.
>
> * * *
>
> Site-specific data needs, the evaluation of alternatives, and the documentation of the selected remedy should reflect the scope and complexity of the site problems being addressed.
>
> * * *
>
> Develop a conceptual understanding of the site based on the evaluation of existing data.
>
> * * *
>
> Conduct[] field investigation to assess the following factors: ... Actual and potential exposure pathways through environmental media;
>
> * * *
>
> Because estimates of actual or potential exposures and associated impacts on human and environmental receptors may be refined throughout the phases of the RI as new information is obtained, site characterization activities should be fully integrated with the development and evaluation of alternatives in the feasibility study.
>
> * * *
>
> Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup.

See 40 C.F.R. § 300.430.

Consistent with the above NCP guidelines, the Bridge Street Work Plan was premised on a site conceptual model which, based on some historical data, suggested:

> Groundwater contamination from on-site sources is limited primarily to the shallow zone which discharges to the West Flume and to surface water west of the LCP Property (west ditch and "ponded area").

Work Plan for the Remedial Investigation and Feasibility Study of the Bridge Street Facility, Solvay, New York, Volume I, at 28.

As a result, the scope and approach of the RI/FS was to:

> Confirm that the deeper zone of groundwater is not significantly affected by on-site sources and limited to the general vicinity of the former cell building. Conversely, if the deeper zone has been affected, define the extent of contamination escaping beneath and beyond the West Flume.
>
> * * *
>
> Employ a two phase investigation process for soil and possibly other media. The nature of the second phase will be defined once data from the first phase becomes available.

Work Plan, Volume I, at 30; Addendum to the Work Plan, at 9.

The investigation to date has debunked the original assumptions about site conditions, namely: the existence of a clayey silt aquitard that results in distinct upper and lower aquifers[6] and the absence of significant impacts to the "lower aquifer." Yet, to date, despite the Work Plan calling

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[6] See Work Plan, p. 29, Figure 2-12 and compare to Revised Remedial Investigation Report, Volume II, Figures 3.4-1, -2 and -3.

Measures or individual operable unit remedies might be appropriate, final remedy selection and the LCP Bridge Street Site's impact on the overall Onondaga Lake System must await a comprehensive site assessment, including an approved investigation and monitoring program which results in a comprehensive site characterization and an evaluation of on-sight and off-site impacts over time and varied environmental conditions.

G. Conclusion

In sum, for the reasons set forth above, Onondaga County submits that, pursuant to Paragraph 34 of the Consent Decree, the conditionally-approved New York State Revision of the Remedial Investigation Report LCP Bridge Street Site, Solvay, New York must be "revised" or "modified", as such terms are used in the Consent Decree, consistent with and in consideration of the comments set forth above.

In an effort to "expedite" the on-going multiple RI/FS process, the County requests that the revisions and modifications proposed herein be implemented now in a supplemental RI Report or as an essential component of the FS Process and not delayed until after the proposed remedial action plan public participation program is conducted.[8] *See Consent Decree, ¶ 38.*

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

Enc. (via U.S. Mail)

cc:
Mr. David Coburn, Onondaga County Office of the Environment
Mr. Joseph J. Mastriano, Onondaga County Department of Drainage & Sanitation
Dr. Russell Nemecek, Onondaga County Health Department
Luis A. Mendez, Esq., Onondaga County Department of Law
Mr. Alfred J. Labuz, AlliedSignal, Inc.
Mr. Robert Ford, AlliedSignal, Inc.
Gordan Quin, Esq., AlliedSignal, Inc.

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[8] Note: The County is cognizant that (1) the State's determination to date is not binding on the County; (2) the State may choose not to address these comments at this time, and (3) regardless of the State's response today, the County will retain its right to provide comments during the public comment period.

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Manning Gasch, Jr., Esq. - Hunton & Williams
Mr. Leonard Sarapas, Dames & Moore
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Mr. John Davis, New York State Department of Law
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Mr. Robert Montione, New York State Department of Health
Mr. Ronald Heerkens, New York State Department of Health
Mr. Mel Hauptman, US EPA NYC

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PRIVILEGED & CONFIDENTIAL

December 10, 1998

Kevin Murphy, Esquire
Devorsetz, Stinziano, Gilberti, Heintz & Smith, P.C.
555 East Genesee Street
Syracuse, NY 13202-2159

Re: Comments for your letter to NYSDEC

Dear Kevin:

We have sub-divided our comments into four categories: three are specific technical categories and the fourth are comments that do not fit into a distinct technical area, but are nevertheless considered important.

1) *Mercury Migration in Groundwater*
As New York State correctly noted on page 5 of your July 18, 1997 letter to Allied referring to their calculation of mercury contaminated groundwater to the west flume, "the calculation likely underestimated the groundwater loading of mercury to the west flume." We could not agree more.

Based on Figure 2.2-2 of Volume II, the largest area of concern related to the LCP facility is defined as the former cell building area combined with the MW-14 area. According to the Remedial Investigation, these are the primary sources of ongoing mercury contamination virtually all of which discharge to the west flume (according to the report) primarily via groundwater flow and leaky sewers. Ultimately, the report concludes that the most effective way to gauge the discharge of mercury contaminated groundwater to the west flume is by calculating the groundwater discharge using a "flow net". They proceed to divide the shallow flow regime into segments divided by flow lines and use average saturated thicknesses for the shallow flow zone. These saturated thicknesses as defined are somewhat confusing since many of the monitoring wells used as the basis for establishing the saturated thicknesses are screened across two or three distinct lithologic units. These units as defined in the report are the surficial urban fill apparently comprised primarily of demolition debris; an underlying clay-silt deposit that underlies the fill material under much of the site, and a silty- sand. It should be noted that under much of the site the clay-silt and silty-sand are inter-fingered indicating that they are not in fact distinct units but rather facies changes in a shallow lacustrine system. A very significant concern, in addition to the apparent arbitrary saturated thicknesses used, is the use of an average hydraulic conductivity using the results of a number of slug tests run on wells as shown on Table 4.4-6 in Volume II. These monitoring wells and piezometers were apparently tested by consultants in a previous investigation. The well completion logs and diagrams from that previous investigation are not included in this report, nor is the primary data used as the basis for calculating the hydraulic conductivities. It is very difficult to tell whether this data is appropriate for use in this application or not. However, based on a review of cross sections that indicate the screened intervals for these monitoring wells, it is apparent that most of these are not screened across the upper fill zone, the zone which is most likely to conduct groundwater at the highest rate in what is described as the upper aquifer. The following is a list of the monitoring wells used for hydraulic conductivity testing and a description of the zone tested.

a) Monitoring Well 10S is not included in Table 2.2-4 and thus could not be adequately defined.
b) Monitoring Well 10SR, which is almost off the property in the northwest corner, is screened entirely across the clay-silt.
c) Monitoring Well 12S, located between the liquid chlorine building and the west flume, is screened across the clay-silt and silty-sand with none of the screen extending into the fill.
d) Monitoring Well 14S, located on the extreme eastern side of the property, is screened primarily across the clay-silt with a very small portion of the screen extending into the fill zone even though the saturated thickness in the fill zone extends approximately 2 ft. above the top of the screen.
e) Monitoring Well 18S does not appear on any cross section and thus nothing can be concluded based on the screened interval, although it is known that it is screened from 3 to 8 feet below grade. If it is comparable to Well 12S, it is most likely to be screened across the clay-silt and silty-sand.
f) Well 21S is partially screened in the fill, but approximately half the screen extends into the clay-silt and silty-sand.
g) Well 12S does not have a log included and is not defined on any of the cross sections, but based on the screened interval, is likely to be screened in the silty-sand.
h) Piezometer 13S similarly does not have a well log, is not in a cross section, but is probably also screened in the silty-sand.

Given the fact that most of these monitoring wells are apparently screened primarily across intervals that are very likely to be less conductive than the fill zone, this calls into question the validity of the hydraulic conductivity value used to calculate the discharge of contaminated groundwater to the west flume.

The fill material is described in Section 3.4.3 of the report as primarily sand and gravel with varying amount of cinders, slag, wood, bricks, asphalt, and in a few select locations – brine purification mud. It seems reasonable to assume that if wells had been screened in the fill zone, hydraulic conductivity testing may have resulted in hydraulic conductivities one to two orders of magnitude higher than the average of 9.7×10^{-4} centimeters per second used in this report. For purposes of comparison, a silty-sand is likely to have a hydraulic conductivity on the order of 10^{-1} or 10^{-2} cm/sec. (Freeze & Cherry, 1979).

Normally, slug test data is not of such a critical nature because it is not used to calculate a discharge of contaminated water that ultimately may be used to make important and costly remedial decisions. However, in this instance, because Gradient has decided that the PTI measurements on the west flume were faulty, the flow net calculations are the only means by which this data is derived. Another important error is assuming that an average hydraulic conductivity can be uniformly applied across the site. The fact is that the fill zone is not a natural and uniform geologic unit such that an average hydraulic conductivity is appropriately used. Even in a uniform geologic environment, a single average value would not be used to characterize such a large area.. There may be sections of fill that have hydraulic conductivities that are on the order of inches per second and there may be other areas where the fill material is finer grained and hydraulic conductivities are lower. It would not be surprising to have a measured hydraulic conductivity of fill material on the order of 10^{-1} or 10^{-2} centimeters per second, which would mean that the mercury loading via groundwater to the west flume would range between 2 and 20 grams per day instead of 0.2 grams per day estimated by Gradient.

One cannot comment on groundwater discharge to the west flume without commenting on groundwater flow patterns. It is unfortunate that both of the contour maps for the "upper aquifer" and "lower aquifer" were done in the fall months because they give no sense of seasonal variability. Both suggest a similar pattern of groundwater flow which appears to indicate a convergence of flow in both the shallow and deeper aquifer under the west flume. There is a distinct and pronounced head difference between the shallow aquifer and the deeper aquifer of approximately 8 to 10 feet. On page 43 of the report, the consultant states that in the vicinity of the west flume, where the silty aquitard is of limited thickness, or absent, groundwater from a small portion of the lower aquifer discharges into the west flume." Based on the data provided, this suggestion is not possible, given the large head differences between the upper and lower aquifer. Moreover, the data demonstrate that contaminated water from the upper zone is recharging the lower zone and moving somewhere. The only reasonable explanation for converging groundwater flow in the deeper zone would be a high hydraulic conductivity zone in the lower aquifer; and if this exists, it should be further defined since it probably plays an important role in funneling contaminated groundwater westward towards Geddes Brook.

2) *Element Mercury/DNAPL Migration*

You noted the important deficiencies with respect to the analysis of elemental mercury migration (as DNAPL) as a migrating ongoing source of contamination. On page 8 of your July 18 letter to Allied, you state "the statement that elemental mercury is not mobile has not been substantiated by actual field data . . . In order to definitely determine whether or not the elemental mercury is mobile at the facility, site specific data, which might involve the installation and sampling of monitoring wells downgradient of the mercury DNAPL, would need to be collected." Once again we concur completely with your statement.

The following are some observations that we made of the mercury/DNAPL analysis:

a) Mercury from the mercury cell building has migrated at least 165 feet laterally. (It has also migrated vertically through the aquitard approximately 50 feet to the surface of the glacial till.)
b) Gradient calculates the slope of the till to be about 2.5 degrees or about 5 percent to the northwest.
c) Based on their calculations, assuming the mercury flows along the slope of the till, they estimate that the mercury should have migrated over one mile.
d) They then conclude that the mercury is not mobile based on the fact that it has migrated 165 feet laterally and not over 6900 feet.
e) They then raise the issue of retardation of elemental mercury migration due to capillary forces. These capillary forces were <u>not</u> factored into the previous calculation of migration distance.
f) They state that "the absence of the elemental mercury near the west flume and the limited extent of elemental mercury is clear proof that elemental mercury is <u>not</u> migrating along the till layer."

The logic that was used is faulty for the following reasons:

a) It is known that the mercury has migrated at least 165 feet.
b) The authors of the RI predict the rate of migration on the till at a very high gradient but do not take into consideration the surface tension forces that retard this migration, although they use this mechanism as an explanation for why the mercury might have stopped moving.
c) They conclude that because the amount of migration predicted from their calculations does not match the extent of observed mercury migration, that the mercury is not moving.
d) They postulate that the mercury has stopped moving because it is trapped in a depression in the till or being held by surface tension. If either of these is true, then:
    1. Where is the documentation of a depression in the till because they map a uniformly steeply dipping till surface?
    2. Why did the surface tension forces allow the mercury to move 165 feet

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laterally and then stop it?

e) Any groundwater scientist in comparing the results of computations (i.e. a prediction) compared to a measured result (in this case the extent of migration of mercury), would reconsider the assumptions used to predict the migration if the prediction was inconsistent with the observations.

f) It is more reasonable to conclude without evidence to the contrary, that:

   1. The predicted slope of the till is not 2.5 degrees; or
   2. The rate of migration of mercury is retarded due to surface tension, a factor that was not used in their calculation of rate of migration.

g) They have not discussed how it is that the elemental mercury can migrate vertically downward "through the aquitard" (silty-clay) nor have they discussed the till itself and whether the till is conductive of groundwater.

There is no evidence that the elemental mercury has stopped moving. Its vertical migration through the aquitard and capillary forces have retarded its rate of migration but the mercury has still fully penetrated the aquitard, migrated to the top of the till, and then moved laterally at least 165 feet. There is no data in this report that demonstrates that it is not still moving. According to the figures in the report showing the contours of the top of till, the cross sections and locations of wells, there are no deep monitoring wells down-flow from the DNAPL that would detect the mercury on top of the till beyond DB-1. Both wells, 19D and 12D, are approximately 10^+ feet above the top of the till.

3) *West Flume Mercury Transport*

As we reviewed the remedial investigation, it became clear how important the west flume may be as a discharge "conduit" for mercury contaminated surface water and groundwater to migrated offsite. Again in your July 18 letter to Allied, you note the importance of the west flume and the gross deficiencies in measuring impacts attributable to the west flume. On page 8 of your letter, you state "the report discusses that low flow mercury loadings to the west flume were overestimated by PTI (1996). However, it also states that storm events resulted in a longer impact on the mercury mass loading to the west flume than was determined by PTI. While the first statement claims that the low flow loading was overestimated, the second statement claims that the high flow loading was underestimated." Once again, we agree with your assessment of the lack of flow data for the west flume.

To elaborate on our concerns, In Section 4.4.5, the issue of mercury mass loading to surface waters is discussed and the measurements of PTI of surface water flow in the west flume are dismissed as inaccurate. Dismissal of the data is based on the stated belief that the flow rate in 1995 was very low, and the 1994 flow measurements did not quantify the contribution from leaking pipes and were recorded a day after a half-inch precipitation event. Unfortunately, the flow monitoring data is not included in this report, and hence cannot be independently evaluated. On page 99, it is stated that "flow rate measurements at successive stations (the August 1995 low flow sampling event) some of which are separated by a short distance, violate flow balance." Without seeing the data, it is impossible to tell what caused this problem, but if the groundwater levels were depressed because of a long period of drought (which did in fact occur in the summer of 1995), then it could be that the apparently anomalous data was the result of the west flume losing water to the water table in different reaches of the stream. These results are then not anomalous but reflect the seepage of surface water into groundwater. The fact that the 1994 flow measurements occurred within a day or two of a half-inch precipitation event, does not make the results anomalous. An examination of precipitation patterns for August 1994 (NOAA) indicate that there were four other events during the month that exceeded a half-inch of precipitation. The effects of the half-inch rainfall a day before, during a month when the total average is 3.5 inches would not have rendered this data anomalous by any reasonable definition. If this data is viewed as normal, then it confirms a high rate of mercury-contaminated water from the west flume.. The report goes on to describe 1994 as being anomalously high precipitation, and '95 being anomalously low precipitation, when in fact both years were slightly below average years on an annual basis. Whether they do or do not represent normal conditions, should only be concluded by comparison with the historic record of precipitation, or better yet, to measure the flow over some reasonable period of time. If it was felt that the PTI data was inaccurate, then the measurements should have been redone, and in fact, given the importance of flow and quality in the west flume continuous flow measurements should have been taken over the course of a hydrologic year in order to better gauge the difference between storm events, high flow and low flow events. These data are critical to drawing any reasonable conclusions about the contribution of the LCP site on mercury contamination that ultimately finds its way to Onondaga Lake.

4) *Other areas of technical concern (no particular order of importance)*

The following are some additional areas of technical concern that arose as we reviewed the revised RI.

a) There is a scarcity of data in areas downgradient of the major source of mercury contamination; i.e. hundreds of feet between wells in the area downgradient of diaphragm cell and mercury cell buildings. There may be plumes of contaminated groundwater that are not detected by any existing wells.

b) The spacing of wells and size of screened intervals makes it very difficult to answer many of the questions that must be answered to characterize this site. Monitoring wells across the site are commonly screened across three separate units and treated as one.

c. Was the protocol for groundwater sampling appropriate given the extremely small concentrations of mercury being analyzed in groundwater, and was the potential volatilization of elemental mercury out of the groundwater sample taken into consideration? Based on the work of Murphy, Beeley, Windum and Smith, 1993, los of volatile elemental mercury from groundwater samples due to inappropriate sampling methodologies can be an important mechanism by which mercury contamination in groundwater is under-reported. In Section 5.2.2 there is some discussion about the transport of elemental mercury via groundwater. From the source of elemental mercury, it is briefly concluded, based on no data analysis, that due to the relatively neutral pH present in the "lower aquifer" the extent of the mercury contamination is very localized. It is stated in the report that the mercury is insoluble at neutral pH. This statement is not factually based. Has an assessment of eH/pH control on mercury solubility and speciation of mercury given the concentrations of chloride and sulfate in groundwater been completed? What would the effect of flushing out of this higher pH water over time be on the mobility of elemental mercury trapped in the ground? A discussion of the chemistry of mercury in this groundwater system is completely lacking, which should be a critical element of this study, particularly in light of the high degree of difficulty likely in removing this contaminant source from the ground.

d) On page 47, Mercury in Surface Water Key Findings

The total mercury concentrations are described as being anomalous because they include suspended sediment. While we realize that dissolved mercury in surface water is the basis for the surface water standard because dissolved mercury is more bio-available, nevertheless, the transport of mercury adsorbed on the sediment particles may be the most important means by which mercury is transported to Geddes Brook, and hence into Onondaga Lake where it may become bio-available.

e) The glacial till itself is not characterized, even though an extremely toxic DNAPL is apparently resting on its surface. It is well known that tills contain large scale fractures and high permeability lenses that can conduct water more rapidly than the till matrix. It is not known with certainty that the DNAPL is not migrating vertically through the till

g) The report references a "flow net" analysis done to calculate groundwater discharge to various receiving water bodies (depicted on Figure 4.4-10). In a very important sense, this is <u>not</u> a flow net and violates some basic rules for flow net analysis (Cedergren, 1967). In addition to the problems with hydraulic conductivity, a flow net must maintain conservation of water mass. There must be no flow boundaries; i.e. flow lines that depict the plan view as well as a flow line defining the "bottom" of the flow zone being depicted. The thickest saturated thickness at the recharge area, the starting point of the flow path, should be used because the volume of water moving in a flow tube (the area between two flow paths) remains the same along the flow tube. If the saturated thickness decreases, the hydraulic gradient increases to make the water move faster. A true cross sectional flow net would be valuable because it would define a flow path for all groundwater originating from source areas. The saturated thickness used as the basis of the "flow net" analysis are shown on Table 4.4-7 with no technical justification as to why these values were used. Geologic cross sections and groundwater elevation data were examined to see if there was any explanation for the numbers chosen but there were no apparent correlation between these numbers and this data. Because there is a large head difference between wells installed in the shallow zone, and wells installed slightly deeper, it indicates that the assumption of uniform horizontal flow cannot be made as the basis for a "flow net" analysis.

Very truly yours,

David W. Stoner, CPG
Executive Vice President
Director, Environmental Sciences

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(860) 537-ALTA [-2582]
FAX 537-8374

MEMORANDUM

DRAFT

11 December 1998
File No. 1138-01

TO: Kevin Murphy, Esq.
Devorsetz, Stinziano, Gilberti, Heintz & Smith, PC

FROM: Dennis Waslenchuk D. Wasl
President

SUBJECT: Review Comments
Remedial Investigation Report – LCP Bridge Street Site
Solvay, New York

I have reviewed the "New York State Revision of the Remedial Investigation Report, LCP Bridge Street Site", as revised by NYDEC and TAMS, August 1998. My comments follow.

1. Characterization of Mercury-Contaminated Groundwater Plumes and DNAPL

The mercury-contaminated groundwater plumes have been only very minimally characterized. A severely-contaminated site like this warrants a more soundly designed monitoring well network (i.e., a network with more monitoring wells delineating the plumes, and with screened intervals that are verified to intersect the contaminant flow paths), and periodic seasonal groundwater monitoring over a period of at least two years.

The report identifies two apparent significant release areas of mercury on the site: (i) the area containing liquid mercury beneath and adjacent to the mercury cell building, as reflected by MW-17/MW-33; and, (ii) the MW-16 area just north of the Eastern Rectiformer. Based on the groundwater elevation contour maps (Figs. 3.6-1 through 3.6-4) it appears that MW-27S is approximately downgradient of MW-17S, and that a point about mid-way between MW-18 and MW-21 would be approximately downgradient of MW-16S.

Shallow groundwater is significantly impacted by mercury at MW-17S, but there is only this single shallow well to monitor the source area, and only a single shallow well (MW-27S) downgradient in the upper aquifer plume that potentially could be on-axis (see Fig. 4.4-3). There is a single deeper well in the source area of the plume (MW-33D), but potentially no deep wells in the downgradient lower aquifer plume. This is a very minimal delineation of a plume (Fig. 4.4-6).

Shallow groundwater is significantly impacted by mercury at MW-16S, but there is only this single shallow well to monitor the source area. There is no downgradient well close to the plume axis; MW-18 and MW-21 may be as much as 125 ft. off-axis.

Although there are monitoring wells at the West Flume about 300 ft. downgradient of the source areas, where contaminated shallow groundwater presumably discharges, there are no intervening monitoring wells between the source area and the discharge point. The lack of intervening monitoring wells prevents us from confirming the interpolated mercury concentration isopleths (see for example Figure 4.4-2), hence we have no means of confirming the attenuation, fate and transport characteristics of mercury in the plumes.

The spacing between downgradient wells along this reach of the West Flume is 180 ft. to 250 ft., which is far too wide to allow an accurate delineation of the plume axes. If the plume axes are not accurately located, then the concentration of mercury in groundwater discharging to the West Flume cannot be determined with confidence.

Moreover, the vertical positions of monitoring well screens in these areas do not seem to be systematic. No rationale or justification for the screened intervals is given; there is no data to verify that the screens intersect the vertical maxima of the mercury-contaminated groundwater plumes, further eroding confidence in our understanding of the concentration of mercury in groundwater discharging to the West Flume. More wells screened in the transmissive fill layer are warranted, since the fill appears to provide a preferential pathway.

The report is misleading with regard to the extent of liquid mercury. The report states that liquid mercury was observed only in deep borings DB-1, DB-2, and DB-3, and not in MW-19D, MW-12D, DB-4, etc. (Vol. 1, Pages 71 & 97). It fails to point out, however, that MW-19D, MW-12D, and DB-4 do not extend down to the till surface upon which the mercury DNAPL would have migrated laterally (Figs. 3.4-1, 3.4-2). Hence, the boundaries showing the extent of liquid mercury (e.g., on Fig. 4.4-2) are not supported by the investigation. As such, soil borings drilled down to the glacial till stratum north of the mercury cell building are needed to define the extent of the liquid mercury, specifically to evaluate whether DNAPL mercury has spread laterally on the till surface beyond the limits shown in the report.

In conclusion, the mercury-contaminated groundwater plumes have not been adequately characterized, either spatially or temporally, given the degree of contamination and the complexity of the site. The extent of DNAPL mercury has not been properly delineated. More site investigation is necessary to provide adequate data for remedy selection.

DRAFT

2. Transport of Elemental Mercury *Via* Groundwater in Dissolved Form

The report states that ". . . due to the relatively neutral pH present in the lower aquifer...the extent of the mercury contamination in the lower aquifer is very localized . . ." (Section 5.2.2.1, Page 91). The notion that liquid mercury ". . . is fairly insoluble . . ." is attributed to Hem, 1970 (Page 60), but the citation for that reference is not provided (References, Page 116). The report itself does not substantiate these statements with a technical discussion of the solubility of mercury under the Eh/pH conditions encountered at the site. Nor does the report discuss the speciation of dissolved inorganic mercury (i.e., elemental, chloride, sulfate), and the implications to dissolved mercury fate and transport.

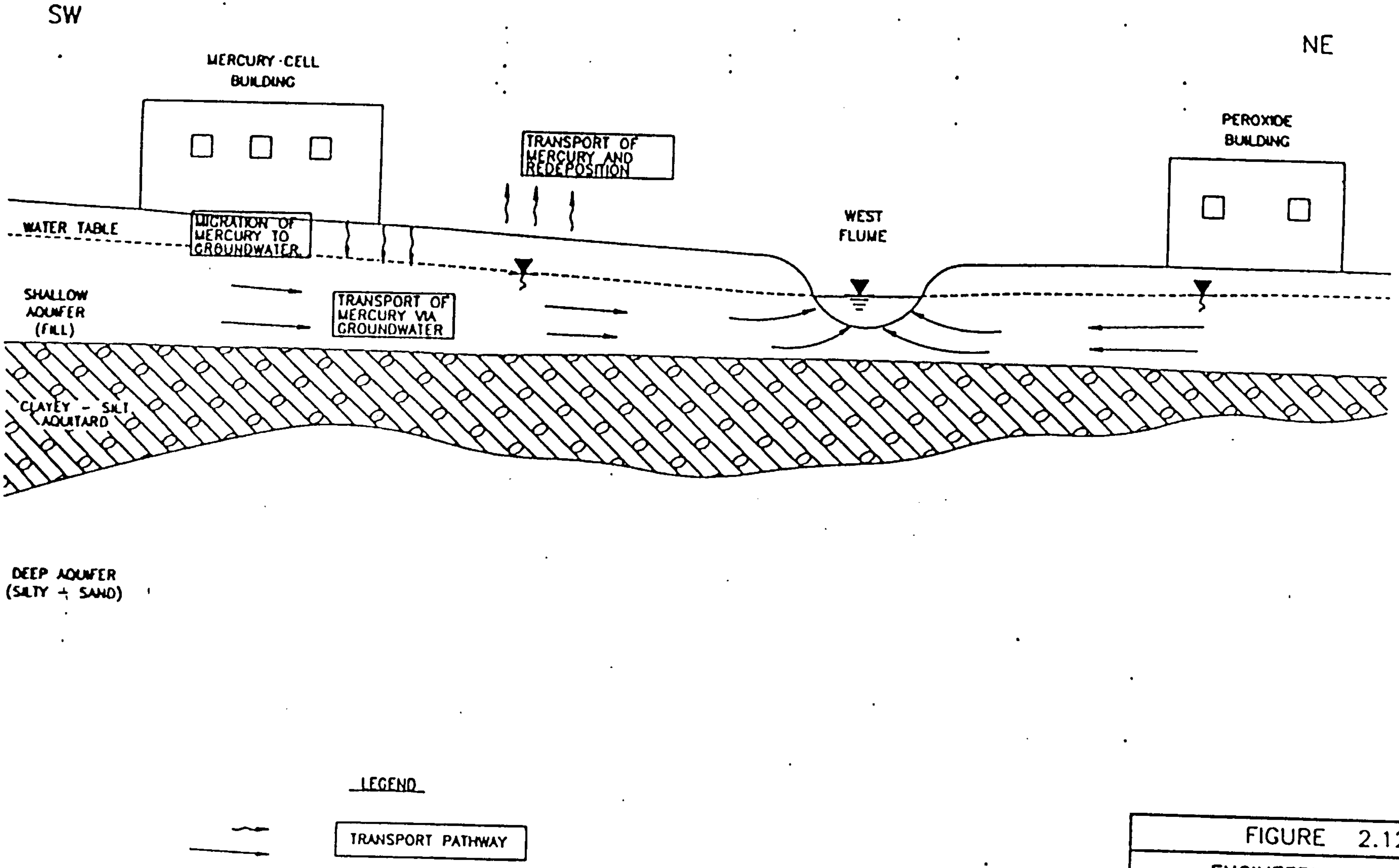
However, the alleged insolubility is used to support the idea that dissolved mercury is very localized, and mercury is very immobile, at the site. To the contrary, as discussed in Item 1, above, the apparent limited extent of dissolved mercury at the site could be an artifact of an inadequate monitoring well network. AlliedSignal should demonstrate the actual extent of dissolved mercury through adequate groundwater monitoring, rather than compensate for a minimal groundwater characterization by putting forth an unsubstantiated geochemical argument.

3. Characterization of Surface Water Quality

The RI report presents data on surface water quality from only one or two sampling events (Section 2.2.2, Page 14, and Section 4.2, Page 45). It makes reference to a West Flume study conducted by PTI, but does not present the data. It appears, however, that surface waters at the site may have been sampled and tested only two or three times; it also appears that water flow rate in the West Flume may have been measured only twice at high and low stages. If so, this is woefully inadequate to develop a representative data base upon which to determine contaminant loading to, and discharge from, the West Flume. Contaminant loadings in the stream undoubtedly vary widely seasonally and with flow rate, to the extent that a much larger population of data would be required to support a statistically valid determination of the rate of discharge of mercury (and other contaminants) to Geddes Brook *via* the West Flume (Section 5.2.4, Page 101).

Although the RI report has confirmed that contaminant sources and migration pathways exist at the site, the extent of contamination and rates of migration have not been adequately characterized to ensure that risks to human health and the environment have been accurately or conservatively determined. The remedial investigation also has not resulted in sufficient information upon which to conduct a feasibility evaluation, or to select a remedy.

AlliedSignal should fill the data gaps of the RI as a necessary initial step in its Feasibility Study process.



NOT TO SCALE

FIGURE 2.12

ENGINEERING-SCIENCE
Cradient Corporation

AlliedSignal, Inc.
Syracuse, New York
RI/FS of LCP
Bridge Street Facility

PRELIMINARY SITE
CONCEPT MODEL
FOR MERCURY

E: 01/23/95
CAD\726879\26879G05.DWG

FIGURE 14

HWR-88-4007
May 9, 1988

MC

New York State Department of Environmental Conservation

MEMORANDUM

TO: Regional Solid and Hazardous Waste Engineers, Bureau Directors and Section Chiefs
FROM: Michael J. O'Toole, Jr., Acting Director, Division of Hazardous Waste Remediation
SUBJECT: DIVISION TECHNICAL/ADMINISTRATIVE GUIDANCE MEMORANDUM: PHASE II INVESTIGATION GENERIC WORK PLAN
DATE: MAY 0 9 1988

Michael J O'Toole Jr.

The objective of a Phase II investigation carried out by consulting firms under contract with the Division of Hazardous Waste Remediation, Bureau of Hazardous Site Control, is to determine if contaminants are leaving an inactive hazardous waste site with a resulting impact on human population and/or the environment.

This document describes the requirements of a Phase II investigation of inactive hazardous waste sites, and should be used in the review of Phase II investigation reports to ensure that all applicable items have been met.

The Bureau of Hazardous Site Control (BHSC) requires that certain aspects be addressed in any investigative work (Phase II) undertaken to determine the hazardous nature of a site. This document describes the applicable work and reporting that must be accomplished by the consultant in performing a Phase II investigation; the requirements by the Division of the consultant in performing a satisfactory Phase II investigation are not limited to the items described herewith, but may include other needs to satisfy unanswered questions on a site-specific basis.

This generic work plan will be divided into nine main areas:

1. Geophysical Survey
2. Well Drilling/Development
3. Recommended Well Sampling and Analyses
4. Environmental Sampling
5. QA/QC Protocols
6. Health and Safety
7. Work Plan Format
8. Phase II Report Format
9. Special Conditions

1. Geophysical Survey

The broad considerations are:

a. Location of buried materials
b. Determination of the presence of contaminant plumes
c. Characterization of subsurface conditions

b. surface water, sampling program should as a minimum include the following considerations:

i. Sampling locations indicated on a site map.

ii. Include an upgradient sampling point for Mitre model scoring.

iii. Depending on the time of year and/or recent precipitation events, the volume of water in surface water bodies will fluctuate. The conditions occurring at the time of sampling can significantly impact the presence and/or concentration of contaminants in the system. If the surface water borders or is in close proximity to the site, it could either be receiving runoff water from the site or outbreaks of groundwater contaminated by the site. Sampling should be effected at these times to obtain best results. The consultant must in the work plan describe presence or absence of seasonal dependence on sampling.

iv. If a stream or other flowing system is the designated target for sampling, the consultant must ascertain to best extent possible, from the site visit, if spring runoff could cause significant diluting effects. Even if this is not an anticipated problem, it must be discussed in the work plan to assure it has been considered.

v. Measurement of the elevation of significant surface water bodies must be recorded whenever the piezometric levels of wells are measured. "Significant surface water body" means any standing or flowing water body which may affect the flow of groundwater in the aquifer or water-bearing zone (or zones) and is tapped by the wells being measured.

Measurements of tidal or other periodic or occasional fluctuations in the surface/groundwater system, which could affect the direction or the rate of flow of leachate plumes must be recorded to the extent necessary. This is to establish as fact, said effect, as necessary for the selection of detection well locations and for the interpretation of data collected from wells.

vi. Vertical and horizontal sampling point will vary depending on nature of surface water body; river, stream, lake, pond, lagoon, etc. Full description and justification must be provided for each sampling location.

vii. Equipment requirements (calibration, cleaning).

viii. Recommended analysis for each sample (containers, preservatives) justification, conforming with section 3.b. (i. & ii.) of this document.

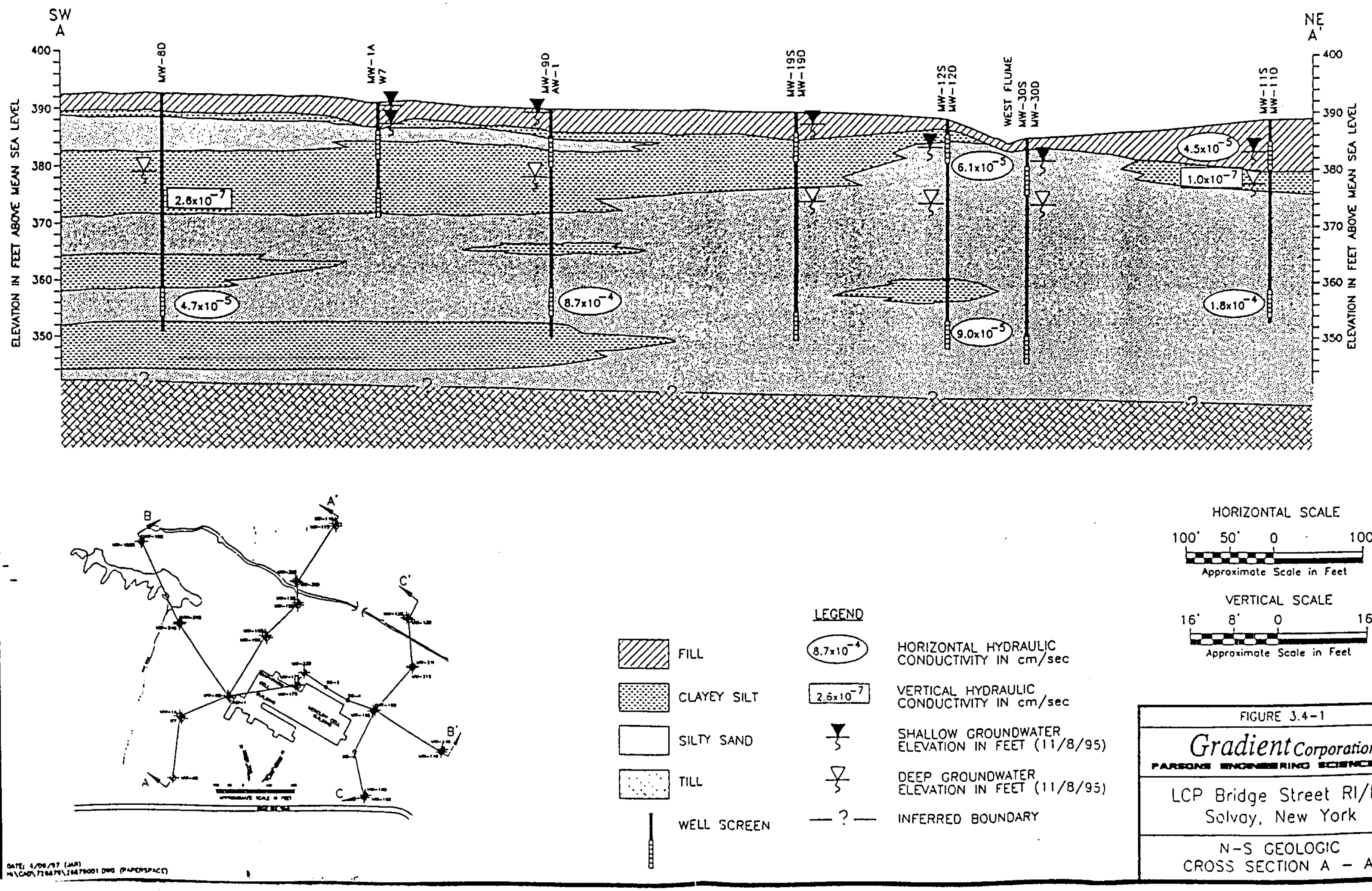


FIGURE 3.4-1

Gradient Corporation
PARSONS ENGINEERING SCIENCE, INC.

LCP Bridge Street RI/FS
Solvay, New York

N-S GEOLOGIC
CROSS SECTION A – A'

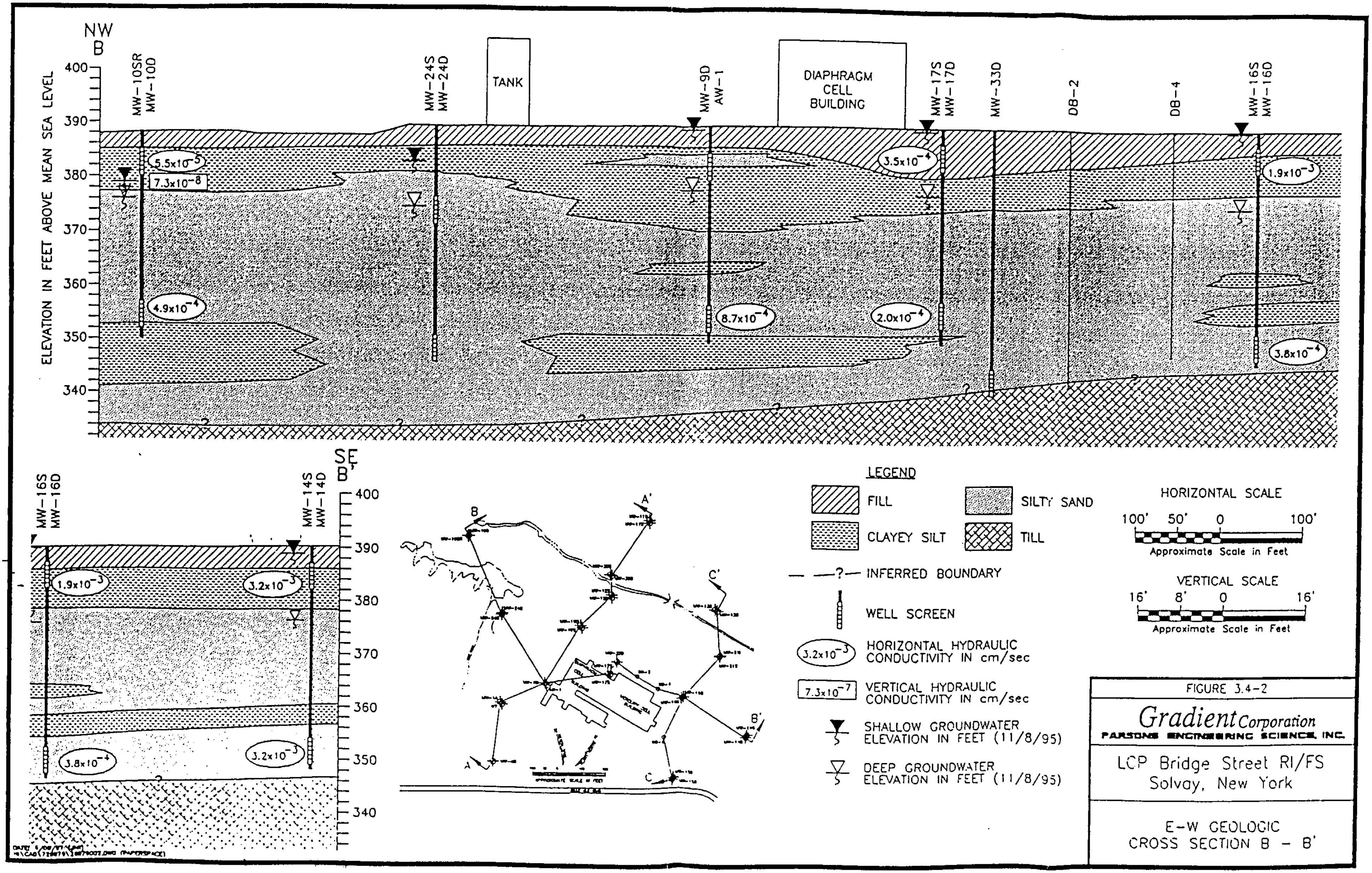


FIGURE 3.4-2

Gradient Corporation
PARSONS ENGINEERING SCIENCE, INC.

LCP Bridge Street RI/FS
Solvay, New York

E-W GEOLOGIC
CROSS SECTION B - B'
]

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Telefax: (315) 442-0106

February 12, 1999

<u>**Via Facsimile & U.S Mail**</u>
Richard A. Mustico, P.E.
Project Manager
Bureau of Central Remedial Action
Room 228
Division of Environmental Remediation
NYS Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Re: February 3, 1999 NYSDEC Correspondence Re: Draft LCP Bridge Street Feasibility Study - January 20, 1999 Meeting

Dear Mr. Mustico:

Onondaga County finds itself limited in its ability to comment on your February 3, 1999 correspondence to Mr. Alfred J. Labuz because it has no knowledge of the context or content of the referenced meeting. Our client's overriding and continuing concern, however, is that the data in the LCP Bridge Street Facility Revised RI Report, particularly related to the mobility of mercury in groundwater, is incomplete for purposes of completing the LCP Bridge Street Facility FS or the related Onondaga Lake System RI/FS. In particular and as previously noted by the County, the conclusions drawn about the direction of groundwater flow, the mobility of mercury in groundwater, the quantity and concentration of contaminated groundwater, and its ultimate fate are not supported by the limited data set which comprises the Revised RI Report.

The County finds itself speculating as to the context of the comments in your letter, but nevertheless, has the following questions and concerns:

Page 1, bullet 3, last point: Allied has apparently agreed to provide the Department with calculations for mercury concentrations in soil which are protective of groundwater. What will be the technical basis for such calculations?

Page 2, bullet 3: This bullet point discusses physical and chemical fixation as well as thermal desorption. We don't recall any such discussions in the draft FS or the comments from the DEC. Please explain.

Page 2, bullet 5: The State is asking for an evaluation of the excavation of mercury-contaminated soils at various apparently arbitrary mercury concentration levels. Is there a regulatory or environmental basis for these concentrations? If not, what is the basis for choosing these concentrations of mercury?

Page 2, bullet 6: This comment appears to imply that the only concern about elemental mercury in deep soil is the potential for future exposure to humans during construction activities. The County remains concerned that elemental mercury left in the ground at depths from 20 to 50 feet is still an ongoing source of contamination to groundwater.

Page 2, bullet 7: Allied Signal is to provide the Department with mercury isopleths for surficial soil and soil in depth. Given the woeful lack of data, what will the basis be for mapping mercury isopleths?

Page 3, bullet 1: The Department has provided Allied (and the County) with limits for allowable concentrations of PCBs, mercury, chlorides, and total dissolved solids for both surface water and groundwater discharge. Please provide the County with the technical or regulatory bases for such limits.

Please also provide the County with a copy of the draft preliminary screening of alternatives sheets distributed on January 20, 1999 as well as any discrete report or data commonly referred to as the "West Flume Mercury Investigation Report" (or has such report been incorporated into the Revised RI itself?).

Lastly, the County again requests the opportunity to be a full participant in the on-going RI/FS process. At many sites in this State all stakeholders regularly meet to review the status and direction of site investigations. The absence now of improved dialogue and communications and full participation by the County will, regrettably, only lead to a further delayed cleanup of the Onondaga Lake System and its many sub-sites.

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

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cc:
Mr. David Coburn, Onondaga County Office of the Environment
Mr. Joseph J. Mastriano, Onondaga County Department of Drainage & Sanitation
Dr. Russell Nemecek, Onondaga County Health Department
Luis A. Mendez, Esq., Onondaga County Department of Law
Mr. Alfred J. Labuz, AlliedSignal, Inc.
Mr. Robert Ford, AlliedSignal, Inc.
Gordan Quin, Esq., AlliedSignal, Inc.
Manning Gasch, Jr., Esq. - Hunton & Williams
Mr. Leonard Sarapas, Dames & Moore
Norman Spiegel, Esq., New York State Department of Law
Mr. John Davis, New York State Department of Law
Mr. Donald J. Hesler, New York State Department of Environmental Conservation
Timothy J. Larson, P.E., New York State Department of Environmental Conservation
Mr. Robert Montione, New York State Department of Health
Mr. Ronald Heerkens, New York State Department of Health
Mr. Mel Hauptman, US EPA NYC
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February 12, 1999

Via Facsimile & U.S. Mail

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Philip Bein, Esquire
Assistant Attorney General
New York State Department of Law
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New York, New York 10271

Re: State's Disapproval of and Comments on the Draft Feasibility Study Report LCP Bridge Street Facility, Solvay, New York dated December, 1997

Gentlemen:

The following comments regarding New York State's decision to disapprove and the State's comments on the December, 1997 LCP Bridge Street Draft Feasibility Study are submitted on behalf of Onondaga County.[1]

---

[1] The County was assisted in the preparation of these comments by: ALTA Environmental Corp., 100 Amston Road (Rt. 85), Colchester, Connecticut 06415 and Stearns & Wheler, One Remington Park Drive, Cazenovia, NY 13035.

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As explained in more detail below, the County agrees with the State's determination to disapprove the December, 1997 Draft Feasibility Study, but disputes that the State's Comments to date are adequate to correct the overall inadequacy of the LCP Bridge Street RI, which did not result in sufficient data upon which to conduct a feasibility evaluation or to select remedies. Thus, the County again requests that the data gaps and deficiencies identified herein and in the County's December 11, 1998 Comments on the State's Decision to Disapprove and Revise the October 11, 1997 LCP Bridge Street Remedial Investigation Report[2] be addressed and resolved in a Supplemental RI Report or as an essential component of the continuing FS process.

The following objection/observations are made to the State's Comments on the Feasibility Study Report, LCP Bridge Street Facility, Solvay, New York:

State Comment No. 6

Page 1-5, last paragraph: The following sentences should be added after the 4th sentence and before the 5th sentence - "However, chlorides, with detection limits ranging between 5.8 and 36.4 parts per million (ppm), were not detected in shallow background monitoring wells north of the West Flume. This would indicate that the shallow aquifer does not have naturally occurring chloride concentrations of an elevated nature, but that the high chloride concentrations in the shallow aquifer are due to on-site activities and upgradient sources which may include industrial and municipal landfills."

The County's Response to State Comment No. 6

While there may be an upgradient component to the elevated concentrations of chloride, the presence of Solvay Waste is a likely significant source of high chloride concentrations. This should be noted.

State Comments No. 8

Page 1-8, 1st paragraph: The 1st full sentence should be modified as follows, "As ~~demonstrated~~ discussed in the RI report, the liquid elemental mercury in the lower aquifer ~~is~~ appears to be stable (i.e., not likely to be mobile, and not contributing significantly to dissolved mercury due to the relatively neutral groundwater pH in

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[2] A copy of the County's December, 1998 comment letter is attached hereto.

the lower aquifer)."

The County's Response to State Comment No 8

The County strongly disagrees with the assertion that "...mercury in the lower aquifer appears to be stable (i.e., not likely to be mobile, and not contributing significantly to dissolved mercury due to the relatively neutral groundwater pH in the lower aquifer)." There simply is no basis for the notions that the pool of liquid mercury is not moving or that the mercury is not dissolving due to the relatively neutral groundwater pH.

a. Flow Direction/Monitoring Well Placement

There has been no time-series monitoring of the "front" of the liquid mercury pool in the deep aquifer. Thus, there are no data to support the assertion that the pool is not moving.

Figure 4.4-6 of the Revised RI Report MW 33-D shows a dissolved mercury concentration of 194 micrograms/liter. There is only one monitoring well in the assumed downgradient direction of flow from MW 33-D that might possibly detect mercury contamination, namely: MW-12D located approximately 240 feet to the north. However, based on the Revised RI Report cross-section 3.4-1 (A-A prime), MW-12D is screened at an elevation above the top of the glacial till. The actual elevation of the till is unknown at this location. Compounding this problem is the fact that the water at depth in the overburden has very high total dissolved solids concentrations. For example, the chloride concentration in MW-12-D is 23,100 ppm. Thus, groundwater at depth is more dense than the shallow groundwater. This density driven flow was not capable of detection by any of the existing assumed downgradient monitoring wells per the data included in the Revised RI Report.

Furthermore, based on Figure 3.4-5 of the Revised RI Report (top of till surface), the till surface has a substantial trough-like feature that will tend to channel this density driven flow to the northwest. The area to the northwest is devoid of any deep monitoring wells. Thus, there may, in fact, be no wells located downgradient of the mercury DNAPL.

b. Chemical

i. pH-dependence

Nowhere has AlliedSignal demonstrated the pH-dependence of mercury dissolution in site groundwater, or even an understanding of the species of mercury that would predominate in such a geochemical environment.

ii. Chloride concentration

The County's review team has independently analyzed the solubility of elemental mercury under conditions similar to those found at the LCP Bridge Street Facility. The County believes this analysis has critical implications in particular for the LCP Bridge Street Facility and possibly for every Onondaga Lake sub-site that is a source of mercury to the Onondaga Lake system as well as the mercury concentrated in the Onondaga Lake bottom sediment.

Unfortunately, the Revised RI Report addresses the issue of mercury solubility solely by reference to a work by J.D. Hem, which only evaluated the solubility of mercury in natural waters with low concentrations of chloride (i.e., 36 ppm). However, at chloride concentrations of 17,000 ppm, such as was found in MW17-D, the concentration of $HgCL_2$ and $HgCL_3$ and $HgCL_4$ in groundwater may approach one part per million (1 ppm). The potential for such high concentrations of $HgCL_2$ and $HgCL_3$ and $HgCL_4$ represents a significant impact on the migration dynamic of mercury in the environs of the Onondaga Lake System and ultimately its bioavailability. As stated, it is an impact which has not yet been accounted for in the LCP Bridge Street Facility or the Onondaga Lake System RI Reports.

The County will forward under separate cover a paper describing this analysis and suggests now that joint discussions on the implications of this analysis be scheduled upon the State's receipt of the subject report.

In sum, the issues discussed here represent significant and continuing problems which preclude the presentation of a viable or defensible feasibility study. If left uncorrected the result could be selection of an LCP Bridge Street Facility remedy (and ultimately an Onondaga Lake System remedy) that does not adequately address a substantial but unquantified amount of elemental mercury in the ground and a potential continuing source of contamination to groundwater and surface water in perpetuity.

State Comment No. 9

Page 1-8, 1st paragraph: The 3rd full sentence should read, "However, groundwater concentrations...and extend ~~no further north than~~ to the West Flume into which groundwater from the upper aquifer discharges.

The County's Response to State Comment No. 9

While the County agrees, in part, with the State's editorial change, there is still an implication that most, if not all, of the groundwater from the so-called "upper aquifer" discharges to the West Flume. As noted in the County's December, 1998 Comments, this contention is not supported by the facts. It is true that some of the shallow groundwater discharges to the West Flume; however, the groundwater monitoring level data shows a pronounced vertical gradient between shallow and deeper groundwater in the overburden. For example, the difference in the head between MW-12S and MW-12D is approximately 9.5 ft. with a screen separation of approximately 28 ft. (based on scale measurements from the cross-sections). This represents a vertical gradient of approximately 0.34. Moreover, as shown in Figure 3.4-4 of the Revised RI Report, there is no clay-silt unit in the vicinity of the West Flume to impede vertical flow. Attached hereto is one of the cross-sectional views taken from the Revised RI Report representing Section A-A prime upon which has been superimposed the equipotential lines showing the substantial vertical gradient across the site.

Again, the direction and rate of flow of contaminated groundwater at the LCP Bridge Street Site has been incompletely characterized. There are serious questions remaining about the volume and concentration of mercury-contaminated groundwater and where that groundwater ultimately discharges. These questions must be answered before appropriate remedies can be considered or selected for the LCP Bridge Street Facility or the Onondaga Lake System.

State Comment No. 17

Page 2-2, 3rd bullet: Based upon the June 1998 TOGS 1.1.1, the surface water standard for mercury in Geddes Brook is 7 x 10^{-4} *ug/L (0.7 ppt), in the dissolved form. This bullet should be modified to incorporate this comment.*

The County's Comment to State Comment No. 17

AlliedSignal's utilization of a 7Q10 flow calculation in order to suggest the "West Flume Mercury Allocation" is totally inappropriate for a contaminant such as mercury. A 7Q10 flow calculation will vastly underestimate the load of mercury transported to Geddes Brook and eventually Onondaga Lake. Any such calculation completely ignores loadings during even typical annual flow let alone high flow events. This methodology is wholly inappropriate for quantifying the mercury budget to the Lake or for partitioning such budget. Actual continuous flow measurements must be secured and utilized to calculate mercury loading from the West Flume.

State Comment No. 25

Page 2-3, 5th bullet: The text of this bullet should be deleted and rewritten as follows, "The extent of the mercury groundwater plume associated with the facility has been delineated. Data indicate that the plume discharges to the West Flume and contamination is transported off-site to Geddes Brook, Ninemile Creek and Onondaga Lake via surface water in the West Flume."

The County's Comment to State Comment No. 25

The extent of the mercury groundwater plume ***categorically*** has not been delineated. The monitor well spacings are too large; there is no verification that any well includes a screened interval which intersects the mercury maximum; assumed downgradient deep-aquifer wells do not penetrate to the till surface, and the repetitive monitoring of groundwater over time, which is standard practice for investigations such as this[3], has not been done.

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[3] By way of example, in "Contaminant Hydrogeology" by C.W. Fetter (1993), there is an extensive discussion about LNAPLs and DNAPLs. On page 238 of that text, Fetter states "special consideration must be given to the design of monitoring wells in the collection of groundwater samples to test for the presence of LNAPLs and DNAPLs (floaters and sinkers). Naturally, different types of wells are used for each separate phase." Fetters continues, "to sample a

See, Response to State Comment No. 9 (above) and Onondaga County Comment Letter, 12/11/98, at 6-8 (attached).

State Comment No. 37

Page 2-5, 3rd bullet: The bullet should be rewritten as follows, " The RI demonstrated that elemental mercury in the deep soils is likely immobile. ~~*and mercury*~~ *Mercury present in deep soil is impacting groundwater within the soil contaminated by elemental mercury. However, the mercury is not impacting downgradient groundwater quality in the lower aquifer based upon the analytical data obtained from existing monitoring wells."*

County's Comment to State Comment No. 37

By this comment the State continues to perpetuate the notion that "...mercury is not impacting the downgradient groundwater quality in the lower aquifer based upon the analytical data obtained from existing monitoring wells." The Revised RI Report and Comment No. 37 fail to point out that MW-19D, MW-12D, and DB-4 do not extend down to the till surface upon which the mercury DNAPL is located. Hence, any mercury plume stemming from the mercury DNAPL in the immediate direction of the above-referenced wells would pass beneath the alleged downgradient wells. In addition and as stated above, the monitoring well spacings are too large such that a mercury plume(s) could pass undetected between the wells that do exist and if flow is directed to the northwest by the till trough, there are simply no downgradient monitoring wells.

As concluded previously, the mercury-contaminated groundwater plumes have not been adequately characterized, either spatially or temporally, given the degree of contamination and the complexity of the subject site. The extent of DNAPL mercury has not been properly delineated. Further site investigation is essential to provide adequate data for remedy selection with respect to both the LCP Bridge Street

---

DNAPL, a monitoring well should be constructed with a screen at the very bottom aquifer. It may be helpful to have a length of solid pipe as a sump at the bottom of the screen so that if even a thin layer of mobile DNAPL is present, it can collect in the sump in a sufficient thickness to sample." Fetter concludes, "a DNAPL may sink in an aquifer until it reaches a fine grained layer. DNAPL may accumulate in a mobile layer at the bottom of the aquifer. A monitoring well screened at the bottom of the aquifer may be used to detect the presence of a DNAPL."

Facility and the Onondaga Lake System.

State Comment No. 39

Additional RAOs for deep soil should be added to the text as follows:

- *Attainment of the objectives in TAGM 4046;*
- *Prevent the potential migration of elemental mercury; and*
- *Prevent the localized release of mercury to groundwater.*

County's Comment to State Comment No. 39

Please define "localized release of mercury to groundwater."

State Comment No. 45

Page 2-6, 2nd RAO: This sentence should be modified to read, "~~Reduce~~ Eliminate, to the extent practicable, the potential mercury loading to Geddes Book and the West Flume water column associated with resuspension of sediments within the West Flume ~~during storm events~~."

County's Comment to State Comment No. 45

The County agrees with this RAO, which deals with eliminating the mercury loading to surface waters associated with resuspension of contaminated sediments. The RI was, however, woefully inadequate in this regard and failed to develop a representative database upon which to determine contaminant loading to and discharge from the West Flume, or upon which to base a remedy. Second, what little data was collected was allowed by the State to be dismissed as allegedly anomalous.

Contaminant loadings in the stream undoubtedly vary widely seasonally and with flow rate to the extent that a significant population of data is required to support a statistically valid determination of the rate of discharge of mercury (and other contaminants) to Geddes Brook via the West Flume. Absent adequate data, this process will result in an unsupportable and indefensible FS Report.

Additional Comments

The State indicates that AlliedSignal must substantially revise its evaluation of remedies. Moreover, the full degree and extent of mercury in several compartments has not been adequately characterized (e.g., liquid mercury in the deep aquifer, dissolved mercury plumes, adsorbed mercury in resuspendable streambed sediments). Thus, it would appear to be of little benefit to comment at this point in time on the remedies discussed in the draft FS Report. Nevertheless, one of the proposed remedies does require comment.

AlliedSignal has proposed to fill the East and West Ditches and the ponded area and to clean out and reline the West Flume. All of these features currently function as shallow groundwater relief features. Filling in the East and West Ditch and the ponded area, if allowed, along with the removal or plugging of sewers and deepening and/or cleaning out the West Flume will undoubtedly change the groundwater flow patterns and is likely to increase the discharge of contaminated shallow groundwater to the West Flume. This would occur as shallow groundwater levels would rise and the re-constructed West Flume would receive groundwater discharge with less impedance. This proposed remedy may indeed worsen the ongoing off-site migration of mercury contamination and add to the mercury loading of Onondaga Lake.

The draft FS Report failed to consider the contamination (i.e., toxicity) of macrobenthic organisms resulting from site conditions. These organisms enter the aquatic food chain via fish in Geddes Brook which in turn are forage for Nine Mile Creek and Onondaga Lake inhabitants. This issue should be addressed in the revised FS Report.

Conclusion

The County must reiterate that it was the State which stated as follows on page 19 of the State of New York Determination to Disapprove and Revise the October 11, 1997 LCP Bridge Street Remedial Investigation Report:

> The Remedial Investigation Report did not accurately and conservatively assess risk to human health, underestimated potential risk to the biological community, and **did not provide adequate information for remedy selection and design** (emphasis added).

The failure of the State to require that AlliedSignal carryout the multi-phased investigation approach set out in the LCP Bridge Street Work Plan, in particular the failure to revise site characterization assumptions based on field investigation data, resulted in an inadequate RI Report. That failure has not been corrected. The additional failure of the State's comments to require a comprehensive site assessment, including an approved investigation and monitoring program which results in a comprehensive site characterization and the evaluation of on-site and off-site impacts over time and varied environmental conditions, will, unless corrected, result in an overall RI/FS process which is arbitrary and capricious, contrary to law and inconsistent with the NCP.

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

enclosures: via mail only

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March 3, 1999

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Re: Mercury Solubility and LCP Bridge Street Facility, Solvay, New York RI/FS Process

Gentlemen:

Following up on references made in my correspondence of February 12, 1999 regarding the LCP Bridge Street Draft Feasibility Study, I enclose herewith for your review and consideration a paper which discusses the solubility of mercury in groundwater.

The enclosed Report was specifically prepared to address the issue of mercury solubility in groundwater at the LCP site, but we believe it has significant implications for the overall Onondaga Lake Superfund Site, including the Lake bottom itself and all subsites.

The genesis of the Report were statements in the LCP Bridge Street Facility RI/FS Reports contending that "the liquid elemental mercury in the lower aquifer appears to be stable (i.e., not

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likely to be mobile, and not contributing significantly to dissolved mercury due to the relatively neutral groundwater pH in the lower aquifer)." The enclosed Report shows, however, that the solubility of mercury in groundwater is greatly enhanced by the high chloride concentrations documented to exist at the LCP Bridge Street Facility and otherwise commonly found under and around Onondaga Lake, including the lake sediments. The Report clearly demonstrates that elemental mercury can be dissolved in groundwater at concentrations far above the maximum contaminant levels set by both New York State and the USEPA.

Given the information contained in the enclosed Report, the County submits that the issues of both mercury solubility and mobility must be reevaluated, not only in the context of the LCP Bridge Street Facility but in assessing the impact of mercury on the entire Onondaga Lake System.

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

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DISCUSSION OF MERCURY SOLUBILITY IN GROUNDWATER

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TABLE OF CONTENTS

Page No.

APPENDICES

EXECUTIVE SUMMARY

The LCP Bridge Street Remedial Investigation Report (the R.I.) documents the presence of elemental mercury at the LCP site at least 50-feet below grade and 165-feet from the presumed source area. The R.I. states that the elemental mercury will not serve as a source of ongoing groundwater contamination due to the claimed relative insolubility of mercury at a neutral pH. Cited for this proposition is an important paper written in 1970 by John D. Hem "Chemical Behavior of Mercury in Aqueous Media." Hem's paper discusses the speciation and solubility of mercury under varying Eh (oxidation-reduction) and pH conditions. Hem's paper includes an Eh/pH diagram representative of low chloride and low sulfate conditions. Contrary however to the statements made in the R.I., Hem's diagram shows a mercury solubility of 25 ppb under moderately oxidizing conditions and a pH of 5 or higher. Importantly, Hem notes that in solutions high in chloride, the solubility of mercury is greatly increased by the formation of mercury-chloride complexes.

The groundwater around and under Onondaga Lake contains high levels of chloride, in some cases exceeding the salinity of seawater. In this brief paper, the Eh/pH diagram constructed by Hem is adjusted for the much higher levels of chloride (15,000 and 30,000 ppm) which are representative of conditions at the LCP site. The adjusted Eh/pH diagram shows that the concentration of mercury as $HgCl_2$ could be as high as 200 ppb in water. However, Hem's diagram did not include the complexes of $HgCl_3$ and $HgCl_4$, which become the predominant forms of mercury at high chloride concentrations. Using the same basic chemical data utilized by Hem, the combined solubility of $HgCl_2$ and $HgCl_3$ and $HgCl_4$ were calculated as a function of chloride concentrations. At chloride concentrations similar to those found in deeper overburden monitoring wells at the LCP site, the mercury solubility would approach 1ppm.

Critically, the R.I. conducted to date has not required the placement of deep monitoring wells at the appropriate depths and/or downgradient from the known location of elemental mercury. Thus, there has been no attempt to measure or quantify the existence of soluble mercury at depth in the high chloride concentration groundwaters known to exist at the LCP site.

INTRODUCTION

The solubility and mobility of mercury in groundwater is an important concern with respect to contamination in Onondaga Lake sediments and/or other contributing sites. These other sites include, but are not limited to, the Allied waste beds, the Semet Solvay Site, the Willis Avenue site and the LCP site. The boundaries of the Onondaga Lake Superfund site, though not specifically defined, include not only the Lake but also those Allied Signal facilities releasing significant hazardous substances to the lake and its tributaries.

The New York State Revision of the Remedial Investigation Report LCP Bridge Street Site (August, 1998) discusses the solubility and mobility of mercury in groundwater generally, and specifically states,

> "At neutral pH values, mercury is fairly insoluble, except under extremely anoxic conditions (Hem, 1970). The groundwater pH in the lower aquifer is essentially neutral, with a few exceptions (Fig. 4, 4-7). These neutral pH values have rendered the mercury relatively insoluble in groundwater and hence *immobile* (emphasis added) in groundwater."

This assertion, that mercury in groundwater is relatively insoluble and hence immobile in groundwater, is carried through to the conclusions of the R.I. and serves as the basis of the Feasibility Study.

It is of critical importance to understand the mechanisms affecting the solubility of mercury and more accurately assess how mercury might migrate now and in the future from the various subsites, through the lake bottom and its sediments. The purpose of this brief report is to evaluate the solubility of mercury in water, specifically groundwater or pore water surrounding and underlying Onondaga Lake.

BACKGROUND

In the LCP R.I. report a single reference, Hem (1970), was used as the basis for the statement that mercury is relatively insoluble and hence immobile in groundwater. In his paper, "Chemical

Behavior of Mercury in Aqueous Media," Hem discusses what was known at that time, and could be determined, about the solubility of mercury and the forms it would take in river and lake water and in water-saturated sediments. He uses basic chemical data to establish the solubility of mercury under certain conditions. Like many (most) metals, mercury forms different species and associations as the pH of the water varies and as the Eh varies (more oxidizing or more reducing conditions). He uses this data to construct an Eh-pH diagram showing the forms that mercury will take and whether mercury will tend to dissolve in water. In order to construct this diagram, he not only fixes the temperature and pressure, but also the chloride and sulfate concentrations. He does this because chloride and sulfate in high concentrations can significantly affect the solubility of mercury under certain conditions of Eh and pH. The diagram produced by Hem shows that under moderately oxidizing conditions above a pH of 5, the solubility of mercury is 25 ppb. The statement in the LCP remedial investigation that mercury is relatively insoluble at neutral pH, is not supported by Hem's paper, even under the low chloride concentrations that is the basis for his original Eh/pH diagram.

The Eh-pH diagram constructed by Hem is based on standard temperature (25°C) and pressure (1 atmosphere) for low chloride concentrations of 36 ppm and he notes in the text that under these conditions of circumneutral pH "The predominant species (of mercury) is undissociated mercury... The solubility of this material is nearly constant...and is relatively low, about 25 ppb as Hg." Later in the text he states "In solutions that are high in chloride the solubility of mercury in oxygenated water may be greatly increased."

There appears to be very little in the peer-reviewed literature on the mechanisms affecting the solubility of mercury from non-natural sources in groundwater. It is obvious, based on Hem's discussion, that he considered concentrations of 25 ppb as quite low (relatively insoluble) but these concentrations are now considered to be at levels of concern. In addition to the relative solubility and speciation of mercury in natural groundwater, it is the prime purpose of this paper to evaluate the solubility of mercury in the presence of high chloride concentrations. Chloride concentrations of many thousands of ppm are very common in ground water around Onondaga Lake, discharging as groundwater to the Lake and in the pore water of the sediments of the Lake.

As described in more detail in the following sections, the same basic chemical equations used by Hem to construct an Eh-pH diagram under low chloride concentrations, are used to calculate Hg solubility under the high chloride concentrations that are so commonly found at the LCP site, other subsites, and under Onondaga Lake.

CONTROLS OVER THE CONCENTRATION OF HG IN GROUNDWATER

At the LCP site, liquid elemental mercury (Hg_l^o) occurs in the subsurface (Remedial Investigation Figure 4.5-5). When elemental mercury (liquid) first dissolves in water, it occurs in two forms. One form consists of a single mercury atom that has an electrochemical positive charge of +2 (Hg^{2+}). The second form consists of two mercury atoms that are bonded and together have an electrochemical positive charge of +2 (Hg_2^{2+}). These positively charged atoms in solution are called cations. Under normal oxygenated groundwater conditions, there is a limit to how far elemental mercury can dissolve to these cations; about 25 ug/L (ppb) in pure water (e.g. Hem, 1970). It is now known, as discussed later, that the solubility of elemental mercury in dilute water is 60 ppb.

The dissolved mercury cations are in chemical balance, called chemical equilibrium, with the liquid elemental mercury. As some of the mercury cations move away with groundwater or are converted to other molecules that have mercury as part of their chemical composition, then the elemental mercury can dissolve further.

Total dissolved mercury concentrations can be 10's to 100's of times greater than the mercury dissolving in pure water when the mercury cations combine with negatively charged dissolved solutes (called anions). For example, if the pH is greater than about 10 units, some mercury cations will combine with negatively charged hydroxide (OH^-) anions which at that pH, occur at high concentrations in the water. Hem's (1970) paper on mercury solubility in water shows that under high pH conditions, total dissolved mercury (consisting of the dissolved simple mercury cations and the mercury-hydroxide combinations called complexes) can exceed 1,000 ug/L. In some places at the LCP site, the pH of ground water is high enough to increase mercury concentrations as mercury hydroxide complexes. Measured values as high as 11 occur in shallow groundwater and as high as 10.2 in the deeper overburden (Remedial Investigation Figures 4.4-4 and 4.4-7).

The second negatively charged solute (anion) with which mercury cations can combine is chloride. This is the association that is of greatest concern in the Onondaga Lake environs. Stumm and Morgan (1970) show that when the concentration of chloride in water is 15,000 mg/L or more, dissolved mercury-chloride complexes will form and together can be as high as 1,000 ug/L or more in solution. Under these conditions, as the mercury cations dissolve from the elemental mercury, the mercury cations are quickly associated with dissolved chloride anions. Table 1, attached, summarizes chloride concentrations measured in deep overburden wells during October 1995. The mercury chloride association is still dissolved, but as a part of a mercury-chloride chemical compound. This combining process between mercury and chloride enables more elemental mercury to dissolve until all the mercury species, cations and complexes, are in mutual chemical equilibrium with the elemental mercury. The key to predicting how high the concentrations of dissolved mercury might reach at the LCP site is to determine the reactions likely to take place between mercury, chloride, and hydroxide.

APPROACH

Two standard geochemical methods were used to calculate the concentrations of dissolved mercury that could exist in the subsurface at the LCP site. The first approach was to construct an Eh-pH diagram using the identical method used by Hem (1970) and using the mercury species he chose for his diagram. The only difference in the parameters used to construct the diagram is that the concentrations of chloride were increased to 0.5 and 1 mole concentration (about 17,500 and 35,000 mg/L). Maximum measured concentrations of chloride in ground water at the LCP site are 42,700 mg/L. The methods used to construct the diagram are described in many aqueous geochemistry textbooks (e.g. Drever, 1988; Faure, 1991). The resulting diagram shows the form that the mercury takes as the pH increases and decreases and as the water becomes more oxygenated or oxygen depleted. It shows that at a pH of 6 or higher, and under even slightly oxygenated conditions (positive Eh), mercury is soluble as Hg^{o} at 60 ppb. In addition, the field for the solubility of Hg^{+2} has shifted down from an Eh of 0.4 to 0.2. This means that Hg can exist in this more soluble form with less oxygenation of groundwater. It should be noted that based on more current data for solubility coefficients, it is known that dissolved elemental mercury concentrations in water are calculated to be 60 ppb in equilibrium with elemental mercury.

The Eh-pH diagram prepared for this analysis only presents concentrations of one mercury-chloride complex, (in addition to elemental mercury) $HgCl_2$ the same species used by Hem (1970). Two other mercury complexes are far more important in highly saline conditions as are found at the LCP site, $HgCl_3^-$ and $HgCl_4^{2-}$. To assess how these might affect mercury concentrations, we calculated their theoretical concentrations in equilibrium with mercuric chloride from a series of algebraic equations derived from their equilibrium constant expressions (e.g. Hem, 1970; Stumm and Morgan, 1970) at 0.5 and 1 molar concentrations of chloride. In the calculations, we assumed that the reacting mercury, chloride, and mercury-chloride complexes in the chemical equations are the same as their concentrations. This assumption is reasonable for the purpose of determining whether mercury at the LCP site is likely to be soluble and mobile at concentrations that significantly exceed Maximum Contaminant Levels (calculations attached).

RESULTS:

Figure 1 is an Eh-pH diagram for the mercury species considered by Hem (1970) but prepared at chloride concentrations of about 0.5 molal (15,000 mg/L). Note how the concentrations of $HgCl_2$ considered by Hem(1970) have increased to about 200 ppb at about an Eh of +200 mv under conditions when chloride concentrations are more typical of that found in groundwater at the LCP site. Even so, this mercury-chloride complex is not the major mercury-chloride complex in high salinity ground waters. Others are far more soluble.

Figure 2 shows how the more prevalent species of $HgCl_3^-$ and $HgCl_4^{2-}$ increase the total dissolved mercury concentrations to above 1 ppm in waters with high chloride concentrations, not unlike that found at the LCP site. The dissolved mercury should be present in the subsurface at concentrations in the hundreds of ppb to even ppm ranges wherever the pH is greater than about 9 units and/or where chloride concentrations are high. Again it is important to note that these mercury-chloride species in solution are in addition to the dissolved elemental mercury.

CONCLUSIONS AND IMPLICATIONS

Based on this analysis and in the context of Onondaga Lake and its environment, several compelling conclusions can be drawn.

1. Hydraulically downgradient from the source areas at the LCP site where chloride concentrations are high, concentrations of dissolved Hg are probably much greater than those detected by existing monitoring wells. Elevated mercury concentrations in groundwater may be completely missed because the monitoring well screens are placed in the wrong locations and are not placed deep enough in the flow system to tap the dense, chloride-rich, mercury-bearing groundwater.

2. Contrary to the statements in the R.I. about the insolubility and immobility of elemental mercury by groundwater , the elemental mercury <u>is</u> soluble in groundwater. In addition, as the salinity of the water increases, the amount of mercury in solution may increase to concentrations of hundreds of parts per billion.

3. The remedial investigation has failed to define the distribution of dissolved mercury or the path that it takes as it migrates off the LCP site. Groundwater with chloride concentrations greater than about 2,500 ppm (TDS of about ~5,000 mg/L) will "plunge" in the flow system under the influence of gravity, similar to a dense non-aqueous phase liquid DNAPL (Fetter, 1993). Indeed, if concentrations of chloride approach that of sea water (about 17,000 mg/L) as they do under the LCP site, fresh water will wedge over the denser saline water, which will move down the slope of the least permeable lower boundary of the subsurface. Enhancing this downward movement of saline waters is a uniform downward hydraulic gradient from the water table towards the till everywhere at the site.

4. Groundwater at the LCP site has concentrations of chloride that <u>exceed</u> that of sea water. A trough in the underlying till is reported at the LCP site. This trough will channel the saline, dense, and mercury- bearing ground water into it and offsite. It is impossible to characterize where mercury and chloride- rich ground water may be moving at the till–silt/sand interface based on the existing monitoring network.

FIGURES:

Figure 1. Eh-pH diagram for chloride concentrations at standard temperature and pressure and chloride concentrations of 15,000 mg/L. Note the large field where dissolved mercury occurs at concentrations greater than 200 ppb and Eh greater than about 200 mv. These conditions are probably typical of most groundwater at the LCP site.

Figure. 2. Plot of dissolved concentrations of mercury-chloride complexes in equilibrium with Hg_2Cl_2 in oxygenated ground water versus chloride concentration. Note how the sum of the total dissolved mercury complexes exceeds parts per million levels at about 20,000 mg/L chloride concentration.

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Stumm, W.and Morgan, J.J. (1970), *Aquatic Chemistry*, Wiley-Interscience, New York.

March 1, 1999

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12/14/98 DIS

Preliminary and DRAFT, Subject to Revision
Previledged at Request of Attorney

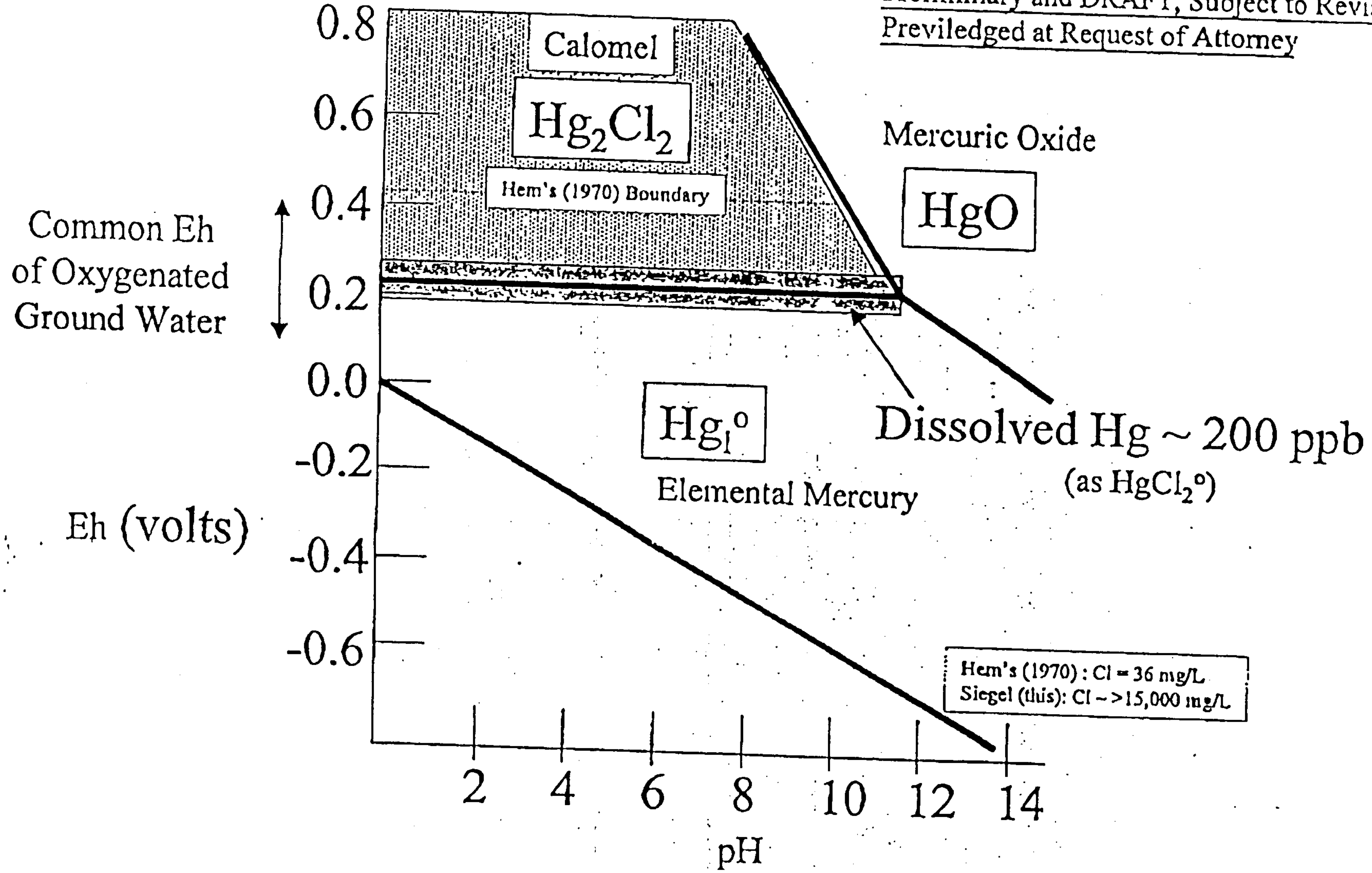

Figure 1

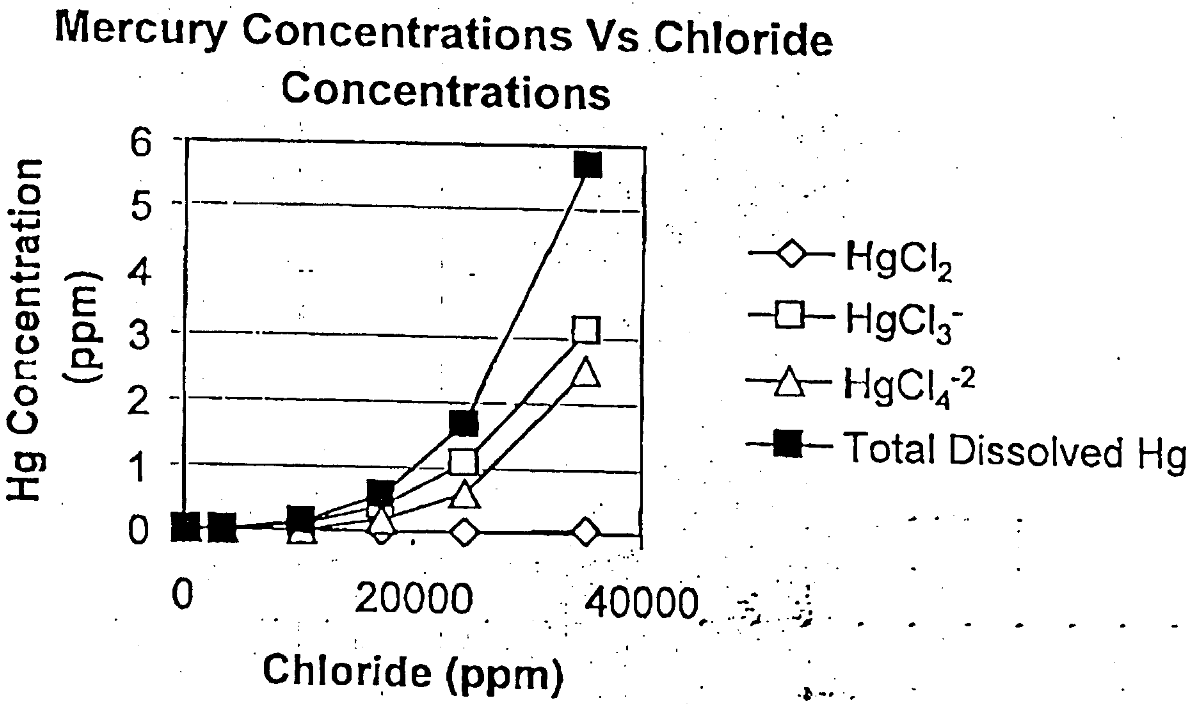
Mercury Concentrations Vs Chloride Concentrations
Hg Concentration (ppm)
6
5
4
3
2
1
0
0
20000
40000
Chloride (ppm)
$HgCl_2$
$HgCl_3^-$
$HgCl_4^{-2}$
Total Dissolved Hg

Figure 2

TABLE 1

MEASURED CHLORIDE CONCENTRATIONS
FROM SOME
DEEP OVERBURDEN MONITORING WELLS

OCTOBER 1995

Monitoring Well Designator	Chloride Concentration (parts per million)
26D	42,000
28D	16,000
29D	10,800
30D	19,000
33D	1,620
119D	14,600
24S	25,700
24D	14,500
16D	1,890
17D	17,000
18D	37,000
19D	15,500
12D	23,100
13D	14,200
14D	1,010
15D	670
9D	13,800
11D	5,440
111D	5,050

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CALCULATIONS FOR MERCURY SOLUBILITY

1. $Hg_2^{2+} = Hg^{2+} + Hg^0_L$;	$K = 10^{-2.2}$
2. $Hg^{2+} + 4Cl^- = HgCl_4^{2-}$;	$K = 10^{+15.3}$
3. $Hg^{2+} + 2Cl^- = HgCl_2$;	$K = 10^{+13.3}$
4. $Hg^{2+} + 3Cl^- = HgCl_3^-$;	$K = 10^{+15.4}$
5. $Hg_2Cl_2\,s = Hg_2^{2+} + 2Cl^-$;	$K = 10^{-18}$

Let $Cl^- = 1$ M [i] is activity

Equation (5): $10^{-18} = [Hg_2^{2+}]\,[Cl^-]^2$

$$\underline{10^{-18} = [Hg_2^{2+}]}$$

Substituting in

Equation (1): $10^{-2.2} = \dfrac{[Hg^{2+}][Hg_L^0]}{[Hg_2^{2+}]}$

$$\underline{10^{-20.2} = [Hg^{2+}]}$$

Substituting in

Equation (2): $10^{+15.3} = \dfrac{[HgCl_4^{2-}]}{[Hg^{2+}][Cl^-]^4}$

$$\underline{10^{-4.9} = [HgCl_4^{2-}]}$$

Substituting in

Equation (3): $10^{+13.3} = \dfrac{[HgCl_2^0]}{[Hg^{2+}][Cl^-]^2}$

$$\underline{1.2 \times 10^{-7} = [HgCl_2^0]}$$

Substitute in

Equation (4): $10^{+15.4} = \dfrac{[HgCl_3^-]}{[Hg^{2+}][Cl^-]^3}$

$$\underline{1.5 \times 10^{-5} = [HgCl_3^-]}$$

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Assuming $\gamma_i = 1$, such that $a_i = m_i$

$[Hg_2^{2+}] = 10^{-18}$ mol/L $\qquad \cong$ <u>negligible</u>

$[Hg^{2+}] = 10^{-20.2}$ mol/L $\qquad \cong$ <u>negligible</u>

$[HgCl_4^{2-}] = [10^{-4.9}$ mol/L] x [200g/m x 1000 mg/g x 1000 ug/mg]
$\cong$ <u>2500 ug/L</u>

$[HgCl_2^0] = [1.2 \times 10^{-7}$ mol/L] x $[2 \times 10^{8}]$ = <u>24 ug/L</u>

$[HgCl_3]^- = [1.5 \times 10^{-5}$ mol/L] x $[2 \times 10^{8}]$ = <u>3000 ug/L</u>

For elemental mercury:

$Hg^{2+} + 2e^- = Hg^0$ (aqueous); $\qquad K = 10^{-22.3}$
$Hg^{2+} + 2e^- = Hg^0$ (liquid); $\qquad K = 10^{-28.8}$

Subtracting,

Hg^0 (liq) = Hg^0 (aq); $\qquad K = 10^{-6.5}$

Therefore, the concentration of aqueous Hg at equilibrium with liquid Hg is about $10^{-6.5}$ M, or 60 ppb.

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CHEMICAL BEHAVIOR OF MERCURY IN AQUEOUS MEDIA

By JOHN D. HEM

The chemical behavior of the element mercury in water is highly interesting, although rather complicated and still not entirely explainable. Its behavior is "mercurial" in more than one sense of the word. A general statement of what is known and can reasonably be inferred about the aqueous chemistry of mercury is given here. This review should aid in the interpretation of analyses for mercury in surface and ground water and may help predict what will happen when mercury is added to river or lake water in waste-disposal processes.

OXIDATION AND REDUCTION BEHAVIOR

Under the usual conditions of temperature and pressure that occur in river and lake water and water-saturated sediment, mercury can be present in one or more of three different oxidation states. The most reduced, in a chemical sense, of these forms is the metal, which is a liquid at ordinary temperatures and which has a distinct tendency to vaporize. The other two forms are ionic; the more reduced of the two ions is the mercurous ion Hg_2^{+2}, where the average valence of mercury is +1. In oxidizing conditions, especially at low pH, the stable form is the mercuric ion, Hg^{+2}.

Although chemical oxidation does not necessarily require the presence of oxygen, this element is the most common oxidizing agent and systems in contact with air tend to be relatively oxidized. In the absence of oxygen relatively reducing conditions may become established, permitting the conversion of elements such as sulfur to the sulfide form. The intensity of oxidizing or reducing conditions in a chemical system is usually expressed as an electrical potential, in volts. The more intensely oxidizing systems have positive potentials and reducing systems have negative potentials. By theoretical chemical equations, applicable at equilibrium, the potentials to be expected in water solutions under various chemical conditions can be calculated. The theoretical solubility and stability of many elements can be usefully calculated in a similar way, by considering the interrelationships of oxidation-reduction equilibria and the effects of common anions in forming various compounds.

CHEMICAL THERMODYNAMIC DATA

Chemical research has provided basic data such as equilibrium constants, standard electrochemical potentials, and free energies of formation, for many of the most significant species of mercury that can be present in water. Table 19[1] is a compilation of chemical equilibrium constants and standard potentials that were taken from published literature. Potentials are given only for redox reactions. Data on additional species can be obtained from the compilation of Sillén and Martell (1964). These kinds of data are useful in calculating mercury behavior and solubilities. Table 20 contains standard free energies of formation of the mercury species that are reported in the literature. These permit calculation of the relative stability of different forms of mercury in aqueous media under a wide range of conditions.

STABILITY AND SOLUBILITY CALCULATIONS

As the data in tables 19 and 20 imply, mercury forms many solute species. Some of these are complex ions with a high degree of stability. A calculation of solubility for mercury must take into account a large number of possible forms. This situation is further complicated because of the possible existence of different oxidation states. Mercury in the form of liquid metal is somewhat volatile and can escape from systems open to the atmosphere, and many mercury compounds are somewhat volatile also. Mercury forms many strong organic complexes and is generally much more soluble in organic liquids than in water.

Data from tables 19 and 20 were used to construct the stability-field diagram, figure 4, which shows the solid and liquid forms of mercury that will be stable in the conditions of pH and redox po-

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[1] Tables are in the back of the report.

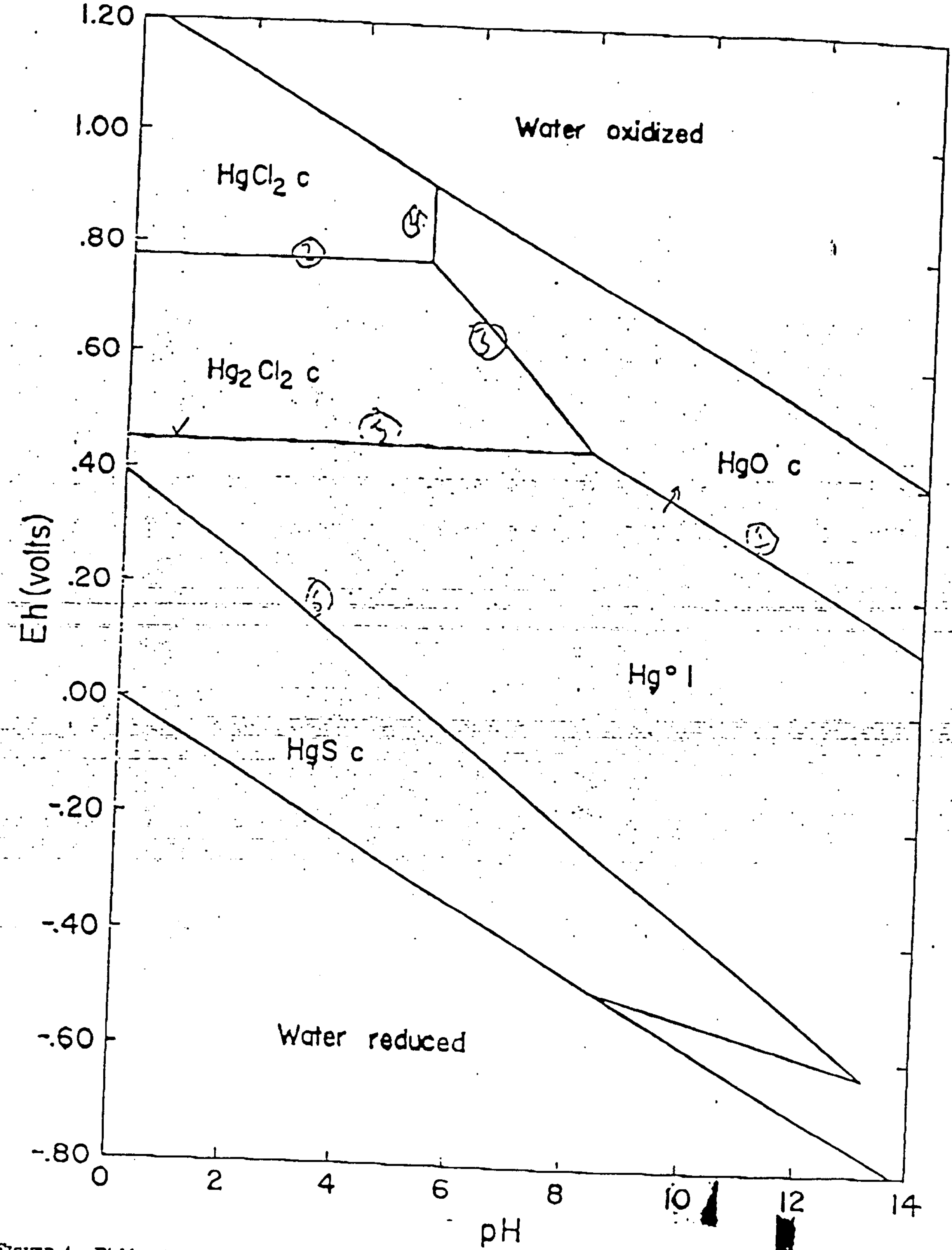

FIGURE 4.—Fields of stability for solid (c) and liquid (l) mercury species at 25°C and 1 atmosphere pressure. System includes water containing 36 ppm Cl^-, total sulfur 96 ppm as $SO_4^{=}$.

35 mg/L = 10^{-3} M Cl^-

tential under which water itself is chemically stable. The existence of mercuric chloride, calomel, and cinnabar depend on the presence of chlorine and sulfur species in the system. Values arbitrarily selected are 10^{-3} moles per liter of each. This concentration is equivalent to 36 ppm Cl^- and 96 ppm SO_4^{-2}. No single value for mercury concentration need be specified for locating the boundaries. Calculation techniques used in preparing Eh-pH diagrams have been described extensively in the literature. Solid species are identified by the abbreviation "c", gases "g", liquids by "l", and dissolved species by superscript plus or minus signs or by the abbreviation "aq" The calculations are for the standard temperature of 25°C. Effects of temperatures 10 to 15 degrees above or below this value are probably small enough to be ignored for this type of approximate treatment. Temperature effects may be important in some systems, however.

At the conditions of pH and Eh likely to occur in aerated or anaerobic water (pH 5 to 9 and Eh less than 0.5 volts) the species Hg° liquid and HgS (cinnabar) are the principal ones likely to enter into equilibria affecting the solubility of mercury. The organometallic compound dimethyl mercury for which a standard free energy value is given in table 20 was considered in preparing the stability field diagram. Dimethyl mercury is not thermodynamically stable in the system as specified.

The data in tables 19 and 20 can also be used to calculate the solubility of mercury at equilibrium in the system of figure 4 and to identify the predominant solute species at any area of interest in the diagram. Figure 5 represents the areas of dominance of the solute species that will be stable in the presence of the same levels of chloride and sulfur species as specified for figure 4.

Calculations of solubility of the dominant species also were made in preparing figure 5, and results are given in a general way on the diagram.

The main features of the aqueous inorganic chemistry of mercury under equilibrium conditions are clearly indicated by the two diagrams. Over much of the area of moderately oxidizing conditions above pH 5 the predominant mercury species in solution is undissociated mercury. The solubility of this material is nearly constant over the whole area where the liquid metal is stable, and is relatively low, about 25 ppb, as Hg. This represents the likely upper equilibrium limit of mercury in surface streams and lakes that are low in chloride. Studies of this form of aqueous mercury were made by Pa iaud and Archinard (1952).

Mildly reducing conditions, as are likely to occ in many lake and streambed sediments, can cau the mercury to be precipitated as the sulfide, cinn bar. This compound has an extremely low solubilit In the fields of $Hg(HS)_2$ aq and HgS_2^{-2} near neutr pH, the equilibrium solubility of mercury may b lower than .002 ppb. Very strongly reducing cond tions, however, may increase the solubility somewha by converting the mercuric ion to free metal.

In solutions that are high in chloride the solubilit of mercury in oxygenated water may be greatly increased by the formation of the uncharged $HgCl$ complex, or anionic complexes such as $HgCl_4^{-2}$. Th area of dominance shown for chloride complexe would be enlarged if chloride had been increase above 10^{-1} molar. Inorganic mercury complexes i waters in Sweden were reported by Anfalt an others (1968) to include $HgCl_2^\circ$, $HgOHCl^\circ$, an $Hg(OH)_2^\circ$, with predominant forms depending o chloride concentration and pH. Stability data for th $HgOHCl^\circ$ species were not given by Wagman and others (1969).

It would appear that mercury concentrations in stream water could be as high as 25 ppb without loss by chemical precipitation. It does not seem that such levels are likely to be common, however, for various reasons, two of which are:

1. Mercury tends to be volatile and will be lost as vapor from the water surface exposed to the air.
2. Most mercury species are much more soluble in organic solvents than in water. Moser and Voigt (1957) found, for example, that dissolved free mercury was taken up strongly by organic solvents. When cyclohexane was added to water that contained metallic mercury, the ratio of mercury retained in the water to that in the cyclohexane was only 0.03. This implies a mechanism for removal of mercury from water by aquatic organisms and the effect of organisms is known to be very important.

Mercury that enters reduced sediments can become relatively immobile, so long as a reasonable degree of reduction continues to prevail. At high pH, if much reduced sulfur is present, however, mercuric sulfide anions can become very soluble.

Complexes of mercuric ions with ammonia are described in the literature and some data on one such complex are given in table 19. This complex is not a predominant form of mercury unless the solution

Cl^- ≈ 36 ml

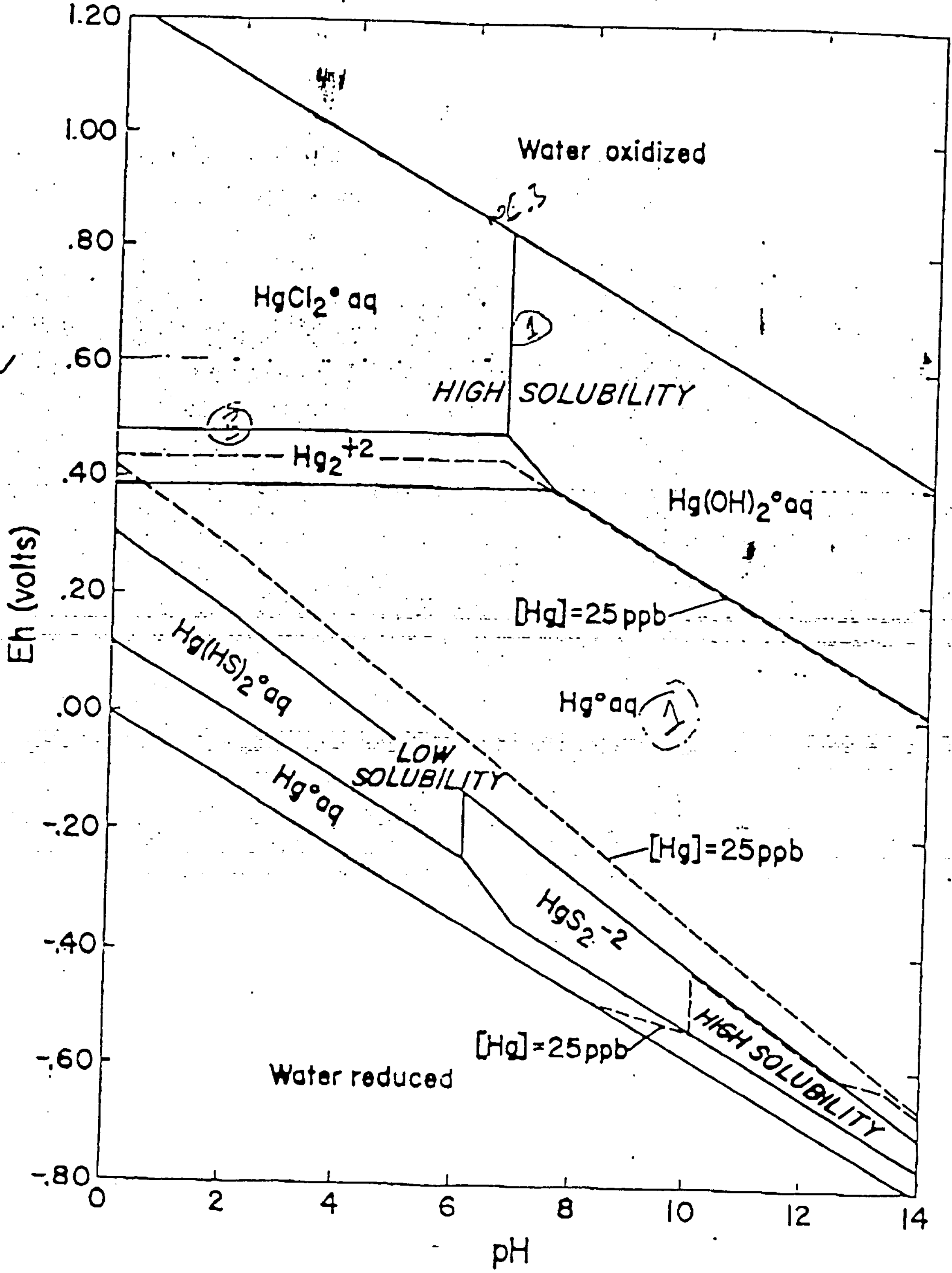

FIGURE 5.—Fields of stability for aqueous mercury species at 25°C and 1 atmosphere pressure. System includes water containing 36 ppm Cl^-, total sulfur 96 ppm as sulfate. Dashed line indicates approximate solubility of mercury in this system.

contains more than 100 ppm of NH_4^+, a level seldom attained in natural water.

ORGANIC COMPLEXING EFFECTS

The relative importance of organic solute complexes of mercury in the aqueous chemistry of the element cannot be fully decided at present. The information on such complex species is incomplete and some of it is conflicting. Mercury does form some very strong organic complexes. Some of these are relatively soluble in water. Most forms for which data are readily available, however, might be expected to be altered to other, more stable and generally less soluble, forms in natural water systems. Nevertheless, the fact that a given organic complex is not thermodynamically stable should not be used as a basis for dismissing or ignoring it. Species that are not at equilibrium are commonly found in natural water and can be very important factors in the composition of the solution. Nonequilibrium species are especially likely to be important in surface streams that are used for disposal of wastes, and organic complexes of mercury could be important in these streams.

A particularly significant question arises in connection with the organic complex methyl mercury. The liquid dimethyl mercury is reported in table 20 to have a standard free energy formation of 33.5 kcal (kilocalories) per mode. This value was used in the calculations for preparing figure 4. No region exists in the diagram where $Hg(CH_3)_2$ would be the most stable phase.

Methyl mercuric ion, $HgCH_3^+$, is cited in publications by various authors as the most important form in fish and various other food products of animal origin (Westöö, 1967). It has been identified in cultures of methane-generating bacteria to which mercuric ions had been added (Wood and others, 1968). Although the literature has been examined carefully no free-energy value for $HgCH_3^+$ could be found, and no firm basis for calculating or estimating such a value seems to be available. This species could not be considered in constructing figure 5.

In the absence of positive information it seems logical to allow for the possibility of finding methyl mercury or other organic complexes in natural water, and these complexes may offer problems to the analytical chemist.

LIMITATIONS OF THEORETICAL EVALUATION

The summary of aqueous mercury chemistry that is obtainable from the Eh-pH diagram and related calculations seems to fit reasonably with what can be observed in the field. However, there are impor-
tant areas where available information is ina
quate to permit full acceptance of the theoreti
model without further testing. The frequent dep
ture of natural systems from equilibrium is w
known, and must be kept in mind when using eq
librium calculations. There are two aspects of m
cury chemistry that are particularly importa
sources of departure from what can be predict
theoretically. One of these, the formation of orga
complexes and participation of mercury in bioche
ical processes has been mentioned already. Ho
ever, it has not been proved conclusively th
methyl mercury is produced in abundance in sed
ment by bacterial activity; the energy that the org
nisms would have to expend is large, which is co
trary to most metabolic processes.

A second property of importance is the tenc
ency for mercury to participate in dismutatio
reactions—that is, in reactions of the typ
$Hg_2^{++} = Hg^{++} + Hg^{0}$. This and similar reactions ar
well known, and provide a means whereby mer
cury could be converted to the liquid form and es
cape as vapor. The oxidation and reduction reac
tions of mercury seem to be less inhibited by energ
barriers than those for many other elements, and
the course of such reactions may be difficult to pre-
dict at times. The combination of oxidized mercuric
ion with the reduced sulfide ligand to form cinnabar, for example, is an unusual feature and seems to give a high degree of immobility to mercuric mercury in a reduced environment where it would not normally be expected to occur at all.

Thus, although a good beginning toward understanding of the aqueous chemistry of mercury has been made, a considerable amount of basic research is still needed, especially on rates and mechanisms of reaction and on the behavior of organic mercury complexes.

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TABLE 18.—*Mercury content, in parts per billion, of some sedimentary stratigraphic units in the Colorado Plateau region of the United States*

[Units are arranged in order of youngest (Tertiary) to oldest (Permian and Pennsylvanian)]

Stratigraphic unit	Number of samples	Median	Highest	Lowest	Middle 68 percent of samples	Dominant rock types	Approximate average thickness (feet)
Tertiary, northern Colorado Plateau region							
Duchesne River Formation	62	60	180	15	37–100	Sandstone	1,500
Uinta and Green River Formations	260	100	4,000	15	44–240	Shale, sandstone	8,000
Wasatch and Colton Formations	198	280	1,100	80	150–320	Mudstone, sandstone	2,000
Cretaceous, northern Colorado Plateau region							
Mesaverde Group and Mancos Shale	256	240	1,500	30	140–400	Mudstone, sandstone	5,000
Jurassic, Colorado Plateau region							
Morrison Formation	653	190	>6,000	10	84–420	Sandstone, mudstone	1,000
Entrada Sandstone	258	170	6,000	30	80–360	Sandstone	500
Carmel Formation	80	100	700	10	53–170	Sandstone, siltstone	300
Navajo Sandstone	91	40	500	<10	10–150	Sandstone	1,000
Triassic, Colorado Plateau region							
Wingate Sandstone	160	260	1,900	80	140–370	Sandstone	300
Dolores Formation	42	210	760	80	120–370	Sandstone, siltstone	[1] 300
Chinle Formation	538	260	>6,000	60	140–460	Mudstone, sandstone	1,000
Moenkopi Formation	323	110	>10,000	<10	40–320	Siltstone, sandstone	1,000
Upper Paleozoic, Colorado Plateau region							
Cutler Formation (Permian)	30	170	1,300	50	90–300	Sandstone, conglomerate	[1] 1,000
Rico and Hermosa Formations (Permian and Pennsylvanian).	61	200	2,200	20	100–370	Limestone, siltstone	[2] 2,000

[1] Sampled only in east part of region.

[2] Sampled only in central part of region.

TABLE 19.—*Equilibrium constants and standard potentials at 25°C and 1 atmosphere pressure*

[l = liquids, g = gases, c = solids, aq = dissolved species]

Equilibrium	Constant (K)	$E°$ (volts)	Source of data
$Hg_2^{+2}+2e = 2Hg\ l$	------	0.789	Latimer (1952).
$2Hg^{+2}+2e = Hg_2^{+2}$	------	.921	Do.
$Hg^{+2}+2e = Hg\ l$	------	.855	Do.
$Hg\ l+Hg^{+2} = Hg_2^{+2}$	$10^{2.\text{[illegible]}}$	-----	Do.
$Hg\ l = Hg\ aq$	$10^{-\text{[illegible]}}$	-----	Calculated from data in Wagman and others (1969).
$HgO\ c+2H^{+}+2e = Hg\ l+H_2O$	------	.925	Latimer (1952).
$Hg_2Cl_2\ c = Hg_2^{+2}+2Cl^{-}$	$10^{-17.88}$	-----	Do.
$HgCl_2^{\circ} = Hg^{+2}+2Cl^{-}$	$10^{-14.23}$	-----	Helgeson (1969).
$HgCl_3^{-} = Hg^{+2}+3Cl^{-}$	$10^{-15.24}$	-----	Do.
$HgCl_4^{-2}+2e = Hg\ l+4Cl^{-}$	------	.336	Latimer (1952).
$HgSO_4^{\circ}\ aq = Hg^{+2}+SO_4^{-2}$	$10^{-1.43}$	-----	Calculated from data in Wagman and others (1969).
$HgS_{(cinnabar)} = Hg^{+2}+S^{-2}$	$10^{-\text{[illegible]}}$	-----	Helgeson (1969).
$HgS_{(metacinnabar)} = Hg^{+2}+S^{-2}$	$10^{-\text{[illegible]}}$	-----	Do.
$HgS\ c+S^{-2} = HgS_2^{-2}$	4.57	-----	Calculated from data in Wagman and others (1969).
$Hg(HS)_2^{\circ} = Hg^{+2}+2HS^{-}$	$10^{-\text{[illegible]}.75}$	-----	Do.
$Hg(NH_3)_4^{+2} = Hg^{+2}+4NH_3\ aq$	$10^{-19.28}$	-----	Do.
$Hg(CH_3CO_2)_2\ c+2H^{+} = Hg^{+2}+2CH_3COOH\ aq$	$10^{-1.11}$	-----	Calculated from data in Latimer (1952) and Wagman and others (1968).
$Hg(CH_3)_2\ l+2H^{+} = Hg^{+2}+2CH_4\ aq$	$10^{\text{[illegible]}.60}$	-----	Calculated from data in Wagman and others (1969).
$Hg(CH_3)_2\ l+H_2O = CH_4\ aq+CH_3OH\ aq+Hg\ l$	$10^{\text{[illegible]}.74}$	-----	Calculated from data in Wagman and others (1969).
$CH_3Hg^{+}+OH^{-} = CH_3HgOH\ aq$	$10^{\text{[illegible]}}$	-----	Waugh and others (1955).
$C_2H_5Hg^{+}+OH^{-} = C_2H_5HgOH\ aq$	$10^{\text{[illegible]}}$	-----	Do.
$CH_3HgCl\ l = CH_3HgCl\ aq$	$10^{-1.70}$	-----	Do.
$CH_3HgCl\ aq = CH_3Hg^{+}+Cl^{-}$	$10^{-\text{[illegible]}}$	-----	Do.

TABLE 20.—*Standard free energies of formation of certain mercury species, in kilocalories per mole*

[Leaders indicate no common names. l = liquids, g = gases, c = solids, aq = dissolved species. Data from Latimer (1952) and Wagman and others (1969)]

Formula	Description	Free energies (G°_f)
Hg° l	Metallic mercury	0.0
Hg° g	Mercury vapor	16.3
Hg° aq	Dissolved mercury	9.4
Hg_2^{+2}	Mercurous ion	36.70
Hg^{+2}	Mercuric ion	39.30
Hg_2Cl_2 c	Calomel	−50.33
$HgCl_2$ c	Mercuric chloride	−42.7
HgO c	Red oxide	−13.995
HgO c	Yellow oxide	−13.964
$HgOH^+$		−12.5
$HgO\ OH^-$		−45.5
$Hg(OH)_2$ aq		−65.70
HgS c	Cinnabar	−12.1
HgS c	Metacinnabar	−11.4
Hg_2SO_4 c		−149.589
$HgSO_4^\circ$ aq		−140.6
Hg_2CO_3 c		−105.8
$HgCl_2^\circ$ aq		−41.4
$HgCl_4^{-2}$		−107.7
$Hg(CH_3)_2$ l		33.5

TABLE 21.—*Mercury concentrations from results of analyses of selected thermal and mineral waters and their deposits, Northern California mercury district*

[Detection limit, 0.01 part per billion. N.d., not detected. Analyses by M. E. Hinkle]

Sample	County	Mercury concentration (in ppb)
Condensates, condenser coil packed in ice		
McKinley well 1	Lake	3.0
McKinley well 3	do	1.0
Waters of low to moderate salinity, T <40°C		
Allen Spring	Lake	N.d.
Bartlet Spring	do	N.d.
Spring east of Alice mine	Colusa	N.d.
Waters of high salinity, T <40°C		
Grizzly Spring	Lake	N.d.
Abbott Mine water	do	1.0
Dead Shot Spring	Colusa	N.d.
Wilbur oil test well	do	0.2
Salt spring north of Wilbur Springs	do	.1
Complexion Spring	Lake	1.5
Salt Spring north of Stonyford	Glenn	N.d.
Redeye Spring (Fouts Springs)	Colusa	N.d.
Waters of low salinity, T >40°C		
Castle Rock Spring	Lake	N.d.
Anderson Spring	do	N.d.
Seigler Spring	do	N.d.
Waters of moderate to high salinity, T >40°C		
Sulphur Bank	Lake	1.5
Wilbur Springs	Colusa	1.5
Solids		
Sulfur floating on Wilbur Springs	Colusa	30,000
Magnesia-silica gel from Complexion Spring	Lake	800
Silica-magnesia gel from Aqua de Ney	Siskiyou	500

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June 29, 1999

Via Facsimile & U.S. Mail

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Re: Baseline Ecological Risk Assessment Report
LCP Bridge Street Facility, Solvay, New York dated December, 1997

Gentlemen:

The following comments[1] and attached enclosure supplement Onondaga County's December 11, 1998 Comments regarding New York State's decision to disapprove and the State's comments on the December, 1997 LCP Bridge Street Draft Feasibility Study. The County's comments are limited to the Baseline Ecological Risk Assessment portion of the Report and are fully set out in the enclosed Ecology & Environment memorandum.

To summarize, the County's comments concern the experimental design, the pathway analysis, the criteria-specific analysis, Section 5.3.3 (Potential Risk to Aquatic Life), Section 5.3.4 (Potential Risk to Wildlife), and the uncertainty analysis. Of note, the comments again serve to highlight the inadequate sampling (both location and quantity) completed to date, in particular regarding the

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[1] The County was assisted in the preparation of these comments by: Ecology & Environment, Inc., 368 Pleasant View Drive, Lancaster, New York 14086.

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adjacent wetlands, the benthic survey, and again the West Flume.

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

cc: Mr. David Coburn, Onondaga County Office of the Environment
Mr. Joseph J. Mastriano, Onondaga County Department of Drainage & Sanitation
Dr. Russell Nemecek, Onondaga County Health Department
Luis A. Mendez, Esq., Onondaga County Department of Law
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Mr. Robert Montione, New York State Department of Health
Mr. Ronald Heerkens, New York State Department of Health
Mr. Mel Hauptman, US EPA NYC

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MEMORANDUM

PRIVILEGED AND CONFIDENTIAL
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Date: April 21, 1999

To: Kevin Murphy, Esq.
Devorsetz, Stinziano, Giolberti, Heintz & Smith, P.C.
555 East Genesee Street
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From: Steven C. Peterson, Ph.D. SP
Ecology & Environment, Inc.
368 Pleasant View Drive
Lancaster, New York 14086

Subject: New York State Revision of the Remedial Investigation Report
LCP Bridge Street Site, Solvay, New York
Baseline Ecological Risk Assessment, September 1998
Review Comments

Overview

This memo provides a review by Ecology & Environment, Inc. (E & E) of the following report:

New York State Revision of the Baseline Ecological Risk Assessment Prepared by AlliedSignal, Inc. (September 1997) for the AlliedSignal/LCP Bridge Street Site Facility, prepared by TAMS Consultants, Inc. and the New York State Department of Environmental Conservation, dated September 1998.

E & E's review focuses on the scientific and technical merit of the report (referred to in the comments that follow as the Bridge Street BERA).

In addition to the Bridge Street BERA, E & E has reviewed related documents provided to us as background. These include the State of New York's Determination to Disapprove and Revise the LCP Bridge Street Remedial Investigation Report, and other volumes of the New York State Revision of the RI Report, including the Human Health Risk Assessment.

Ecology & Environment, Inc.
Review Comments
Bridge Street BERA

1. Experimental Design (Section 2)

The Bridge Street BERA does not address the risks posed by site-related contamination to receptors in valuable habitats located adjacent to and downstream from the site (i.e., Geddes Brook and Ninemile Creek). No samples were collected below the mouth of the West Flume. Yet the entire site area including the West Flume is described in the report as being of low habitat quality, whereas downstream resources are described as valuable habitat with high species diversity (see page 16). Wetlands A and B located along the West Flume also do not appear to have been investigated, despite being identified as Federal jurisdictional wetlands (see page 13). Not only could these wetlands and other resources be areas where significant exposure is occurring, they could also be active sites for mercury methylation and export to Onondaga Lake. The issue of offsite migration and potential to affect downstream resources that may be more significant ecologically than the site itself is of central importance. A more systematic sampling and analysis program is needed to identify the extent of offsite ecological effects. The issue of offsite effects is critical to understanding the relationship between the Bridge Street site and surrounding sites and Onondaga Lake itself.

This issue is of particular concern in light of the elevated levels of mercury found in surface water from the West Flume. The concentration reported at the most downstream station (SW 11), where the West Flume enters Geddes Brook , was 3.304 ug/L total mercury in water. Even higher levels, 9.05 ug/L were reported upstream in the West Flume, at Station SW 12. These levels are more than 100 times the USEPA freshwater criterion for mercury of 0.012 ug/L. The maximum concentration of dissolved mercury in the West Flume was 2.3 ug/L, still over 100 times the criterion (see Table 10). Mercury in dissolved form would be readily available for uptake by aquatic organisms in the West Flume and in water bodies receiving discharge from the West Flume.

Even within the boundaries of the site investigation, the numbers of samples for sediment and surface soils were insufficient to provide a representative coverage of the site. For example, only two sediment samples taken from the West Flume were used in the risk assessment. Additional sampling appears to have been done, but the data were rejected for unspecified quality assurance reasons. There is no discussion of the quality or adequacy of the data in the text, so the reasons for data rejection are unclear.

For the majority of chemicals, soil exposure calculations are based on a single data point (see Table 1). This cannot provide a reasonable estimate of exposure at the site.

The sample locations also were not adequate to address risks within each of the investigation areas. Surface water and sediment samples were generally taken from near the outlet of each water body (see page 5), but it is not clear that these areas are depositional in nature.

2. Pathway Analysis (Section 5.1)

In addition to the shrew, an insectivorous bird such as the American robin should be included as a surrogate species for the terrestrial wildlife pathway. Several songbird species were observed at the site (see Table 7), and the toxicity of many chemicals is markedly different for birds and mammals. In particular, birds are ten times more sensitive than small mammals to adverse effects of methylmercury, based on published NOAELs (see Sample *et al.*, 1996, Toxicological Benchmarks for Wildlife: 1996 Revision, Oak Ridge National Laboratory, ES/ER/TM-86/R3).

The kingfisher and mink are not among the species listed in Table 7. Based on the disturbed nature of the site and the lack of significant fish populations to serve as a food source, it is questionable whether these species make use of the site, or whether significant exposure to piscivorous wildlife is occurring at the site itself. However, these species are valid surrogate species for the areas of valuable habitat located downstream from the West Flume.

The potential pathway for inhalation of mercury vapors is not addressed. A NAPL of elemental mercury is present in the subsurface soil at the site. A notable property of elemental mercury is its high vapor pressure. There is no indication that the soil concentrations of mercury vapors were measured or estimated. Animals that reside at or just below the ground surface could be exposed to soil vapors, especially in partially enclosed burrows.

3. Criteria-specific Analysis (Section 5.2)

The relevance of the Canadian soil criteria presented in Table 8 should be discussed and a reference should be provided. The USGS provides background concentrations for metals in eastern US soils (see Efroymson *et al.*, 1997, Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision, Oak Ridge National Laboratory, ES/ER/TM-85/R3). These values would seem to be more applicable to the site than are values from British Columbia. In addition, the benchmark concentration for plant effects listed for PCBs in Table 8A is in error. The screening value should be 40,000 ug/kg (40 mg/kg) rather than 40 ug/kg as listed in the table. PCB levels in soil at the site are erroneously identified as exceeding phytotoxicity criteria from Efroymson, *et al.* (1997).

In Table 9, the NYSDEC and Province of Ontario mercury criteria for benthic life should not be applied to both total mercury and methymercury sediment concentrations. The criteria were developed based on empirical data for the toxicity of total mercury in bulk sediment. Methylmercury criteria have not been developed, but can be presumed to be much lower than the total mercury criteria, since methylmercury is usually just a small fraction of the concentration of total mercury in sediment. The table is misleading in showing that methylmercury at the site does not exceed the total mercury criteria, which may be misinterpreted to imply that methylmercury concentrations are not present at levels toxic to benthic aquatic life. In addition, New York State provides both a Lowest

Effect Level (LEL) and a Severe Effect Level (SEL) for metals in sediment. Only the LEL is shown in Table 9. The total mercury levels at the site exceed both the LEL of 0.15 mg/kg and the SEL of 1.3 mg/kg, indicating that the sediments are severely impacted.

Similarly, the NYSDEC and USEPA water quality criteria for mercury shown in Table 10 are for total mercury, not methylmercury as the table erroneously indicates.

The mercury toxicological criterion for mercury body burdens of 0.024 mg/kg shown in Table 11 is from an outdated 1994 reference. The latest version of this reference is Sample *et al.* (1996), where the NOAEL-based value presented for the kingfisher is 0.013 mg/kg in food, approximately one-half of the criterion that was used in the BERA. This implies that risks to the kingfisher are actually almost twice as great as the risks estimated in the report.

4. Potential Risk to Aquatic Life (Section 5.3.3)

For both the toxicity studies and especially the macrobenthos survey, an unimpacted reference area nearby would have enhanced the results. For the toxicity studies, the only reference is the laboratory control. For the benthic survey there is no reference sample at all. The lack of reference area data makes it difficult to interpret the results of these analyses and determine the level of site-related stress in the West Flume.

The results of the toxicity tests and macrobenthic community analysis are poorly summarized and little or no attempt is made to interpret the results. Significant toxicity was observed only in the Ponded Area (water) and the West Ditch (water and sediment). Given the number and extent of chemicals exceeding benchmarks at the other locations, including the West Flume, this result is somewhat surprising.

5. Potential Risk to Wildlife (Section 5.3.4)

As discussed above, the risks to birds may have been underestimated due to the use of an outdated reference, or even entirely overlooked in the case of terrestrial birds. The soil and sediment data are inadequate to provide any confidence in the predicted exposures for wildlife at the site.

The incorporation of a TUF (time-use-factor) of 50% in the food web model for the kingfisher rests on questionable logic (see page 33). Although adult birds are migratory, juveniles are likely to be the most sensitive life-stage, and juvenile birds could be exposed throughout their development. Mercury toxicity benchmarks for birds are based on juvenile effects. Therefore, a TUF of 50% is not appropriate in this case. The elimination of the TUF from the exposure model would result in a doubling of the risk for the kingfisher. In combination with the underestimation of the NOAEL described above, the mercury risk for juvenile kingfishers at the site is approximately four times as high as the risk estimated in the BERA.

The calculation of mean and maximum prey concentrations is based on the combined biota data (see page 33). This calculation implicitly assumes that all prey are represented equally in the receptor's diet, which is unlikely to be the case. Typically, dietary composition is evaluated in risk assessments based on literature values provided in references such as USEPA, 1993, Wildlife Exposure Factors Handbook., EPA/600/R-93/187.

As noted on page 39, a greater range of chemicals should have been included in the calculations of risk for the short-tailed shrew. Risks to small mammals may have been overlooked by not including these chemicals.

6. Uncertainty Analysis (Section 6)

The major uncertainties related to data quality, offsite migration, and missing pathways are not adequately addressed in this section. In particular, the site-related risks to juvenile piscivorous birds, terrestrial songbirds, and burrowing small mammals appear to have been ignored or significantly underestimated in the report. Despite the underestimation of onsite and offsite risks, the report identifies unacceptable levels of risk for ecological receptors at the site. Based on the very preliminary and incomplete nature of this study, and the high levels of risk in evidence, the need for further investigation should have been emphasized.

Devorsetz Stinziano Gilberti Heintz & Smith, P.C.
ATTORNEYS AND COUNSELORS AT LAW

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February 4, 2000

Richard A. Mustico, P.E.
Project Manager
Bureau of Central Remedial Action
Room 228, Division of Environmental Remediation
NYS Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Re: Onondaga Lake System RI/FS
LCP Bridge Street Facility, Solvay, New York (Site # 7-34-049) RI/FS
May 28, 1999 Revised Feasibility Study Report

Dear Mr. Mustico:

The following comments regarding the May 28, 1999 Revised LCP Bridge Street Facility Feasibility Study Report prepared by Parsons Engineering Service, Inc. and Gradient Corporation and submitted to NYSDEC for approval by AlliedSignal (the "Revised FS Report" or the "Report") are submitted for the NYSDEC's review and consideration on behalf of Onondaga County.

In sum, the County continues to agree with the State's assessment that the Remedial Investigation Report for the Site "did not provide adequate information for remedy selection and design." *State of New York Determination to Disapprove*, at 19. To date, no further site investigation has occurred subsequent to the State's *Determination to Disapprove* and AlliedSignal has not otherwise addressed the concerns raised in the County's previous RI/FS comments. Accordingly, and for the reasons set forth below, the County submits that the Revised FS Report is not in an approvable form and must be rejected.

A. Inadequate Site Investigation and Delineation

Section 1.4.2. of the Report, "Site Geology and Hydrogeology" erroneously states "Four overburden stratigraphic units were identified at the facility . . . These units include (from the ground surface downward): fill, clayey silt, silty sand and *relatively impermeable* glacial till" (emphasis added).

There is no basis for suggesting that the glacial till is "relatively impermeable" and no such finding or statement was made in the August 1998 New York State Revision of the Remedial Investigation Report for the site. In fact, there has been little, if any, investigation of the till, its location, contour, thickness or permeability. Given that the success of AlliedSignal's preferred remedy is largely dependent on the actual existence of an impermeable "floor" to the site, selection of a low-permeability cap should not proceed absent significant further investigation which confirms the actual nature of the underlying till.

As noted above, regarding the definition of the extent, distribution, migration and impact of mercury in groundwater at the site, the County disputes the adequacy of the site investigation to date. In particular, the County disputes the contention in Section 5.5.1 of the Report that "elemental mercury in the deep soil is limited in extent and appears to be stable" and "is not impacting downgradient groundwater quality." As explained in the County's prior comments, the RI was incapable of defining the extent of the deep aquifer mercury contamination as wells were not placed in appropriate downgradient locations, at the correct depth or with sufficient frequency and did not consider the likely impact of the site's geochemistry on the existing subsurface pool of elemental mercury. Of concern, the RI Report (at 44) confirms that the lower aquifer does not discharge to the West Flume and thus further corroborates that the impact on downgradient groundwater quality remains unknown.

Lastly, in this regard, the County remains concerned that adequate investigation sufficient to characterize the nature and extent of mercury soil and groundwater contamination has not been conducted north of the West Flume, particularly in the vicinity of MW-11 and the facility.

B. AlliedSignal's Preferred Remedy Is Neither Permanent nor Protective of Human Health and the Environment

For the reasons set forth below, the County submits that (1) removal and off-site disposal is the most permanent and effective remedy for the purpose of restoring the site for unrestricted future use and (2) AlliedSignal's recommended preferred alternative -- an in perpetuity mercury landfill -- would not be adequately protective of human health and the environment:

- AlliedSignal's preferred remedy would result in the creation of a hazardous waste landfill in the Village of Solvay. Thus, the site would continue to pose a potential threat to human health and the environment.

- AlliedSignal's preferred remedy eliminates any possibility for restoring the site for unrestricted future use.

- AlliedSignal's preferred remedy would result in the loss of 18± acres of previously productive land.

- The removal of waste from the site would allow the potential for the site to be delisted from the State Registry of Inactive Hazardous Waste sites as opposed to being re-classified.

- Given the failure of the RI to provide the data necessary for remedy selection, the removal of mercury wastes is the only remedy which would eliminate the potential for recontamination of the West Flume and the subsequent migration of mercury into Geddes Book and ultimately the Onondaga Lake system.

- AlliedSignal's preferred remedy would require on-site monitoring, maintenance and potential additional remedies in perpetuity.

C. If Selected, AlliedSignal's Preferred Remedy Should Be Managed As a Hazardous Waste Landfill

AlliedSignal's preferred remedy -- construction of an after-the-fact hazardous waste landfill -- should be regulated, managed and the cost of operation and maintenance calculated consistent with federal hazardous waste landfill and State secure landburial facility requirements set forth, respectively, in 40 C.F.R. Part 364 and 6 NYCRR Subpart 373-2.

As described by the Revised FS Report, AlliedSignal's preferred remedy does not incorporate numerous hazardous waste landfill regulatory requirements. Thus, the following recommendations are made:

The potential low-permeability cap/subsurface barrier wall should include the installation of a leak detection system modified to reflect the proposed method of construction but otherwise capable of detecting, collecting and removing hazardous waste constituents that escape under or through the proposed containment; run-on and run-off control and collection systems; a post-closure plan and response action plan. In addition, all contaminated materials should terminate at least fifty (50) feet from the site boundary.

Cost estimates should be calculated based on the cost of a third-party providing all necessary services. In addition, all cost estimates should be modified to reflect likely necessary repairs and/or maintenance or replacement of pumps, wells, etc. Sludge management costs should not be limited to disposal costs but include management, collection and transportation costs.

Hazardous waste treatment, storage and disposal facility regulations require that post-closure costs be funded in full at the time of closure and actual costs separately paid at the time they are incurred. The same should be required for AlliedSignal's preferred remedy. The regulations require at least thirty (30) years of post-closure monitoring for hazardous waste landfills. Given that AlliedSignal's preferred remedy would exist in place in perpetuity any post-closure fund should be calculated based on at least fifty (50) years of third-party post-closure operation and maintenance ("O&M") costs and should remain in place undiminished by actual on-going out-of-pocket O&M expenses.

Insurance coverage for both sudden accidental occurrences and nonsudden accidental occurrences should be required in the event any claims arise as a result of the past and/or future management, location, operation and maintenance of and/or exposure from the site.

Lastly, the Revised FS Report fails to consider the costs and time necessary to secure all necessary state and local approvals and permits, if any, with respect to citing such a facility. The Report must be revised to include consideration of the cost necessary to secure any such approvals or permits and the resulting delay in implementation of AlliedSignal's preferred remedy.

D. The RI/FS Process to Date

The County must note that the RI/FS process to date for this site has not involved the effected community and could greatly limit the possibility of the community playing a meaningful role in the risk assessment/remedy selection process.

Consistent with *U.S. EPA's Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual Supplement to Part A: Community Involvement in Superfund Risk Assessments*, March 1999, the public should be afforded opportunities "to be *in* the process, not *buy in* at the end." Thus, the County would request that from this point forward every appropriate opportunity for public participation should be utilized and no decision regarding a site remedy should be made unless and until adequate meaningful public participation is afforded the effected community.

E. Miscellaneous Comments

Table 4-1

With respect to sewer remediation alternatives, Table 4-1 (at 4-11) has apparently inadvertently transposed the "clean and fill" and "clean catch basin" alternatives with their respective description and discussion of effectiveness, implementability and capital cost.

Section 5.4.2 Brine Mud Disposal Area Alternative 2 - Excavation/Disposal

It is incorrectly stated on page 5-22 that both Alternative 2a-Onsite Disposal and Alternative 2B-Off-site disposal represent permanent remedies. Onsite disposal is not a permanent remedy.

F. CONCLUSION

For the reasons set forth above and in its prior written comments, Onondaga County submits that the Revised FS Report submitted by AlliedSignal is not in approvable form. Moreover, the County cannot support the selection of any remedy which is not both protective of human health and the environment and permanent. A remedy which results in the creation of a mercury waste landfill and thus, minimal, if any, potential future beneficial site use and a continuing threat to Onondaga Lake and the community's health and the environment is not acceptable.

Very truly yours,

DEVORSETZ STINZIANO GILBERTI HEINTZ & SMITH, P.C.

Kevin C. Murphy

KCM/dmm

cc:
Mr. David Coburn, Onondaga County Office of the Environment
Mr. Joseph J. Mastriano, Onondaga County Department of Drainage & Sanitation
Dr. Russell Nemecek, Onondaga County Health Department
Luis A. Mendez, Esq., Onondaga County Department of Law
Mr. Alfred J. Labuz, Honeywell
Mr. Robert Ford, Honeywell
Gordan Quin, Esq., Honeywell
Manning Gasch, Jr., Esq. - Hunton & Williams
Mr. Leonard Sarapas, Dames & Moore
Norman Spiegel, Esq., New York State Department of Law
Mr. John Davis, New York State Department of Law
Mr. Donald J. Hesler, New York State Department of Environmental Conservation
Timothy J. Larson, P.E., New York State Department of Environmental Conservation
Mr. Robert Montione, New York State Department of Health
Mr. Ronald Heerkens, New York State Department of Health
Mr. Richard L. Caspe, US EPA
Mr. Mel Hauptman, US EPA NYC
Philip Bein, Esq., AAG, New York State Department of Law

The Izaak Walton
League of America

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REMEDIAL ACTION

July 24, 2000

Richard Mustico, Project Manager
LCP Bridge Street Site
NYS Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Dear Mr. Mustico:

I wish to submit the following comments concerning NYSDEC's Proposed Plan for remediation of the LCP Bridge Street Site on behalf of the Izaak Walton League, Central New York Chapter. I attended the public meeting held on July 19 at the Geddes Town Hall.

Background Findings
The LCP Bridge Street Site has been a source of chemical contaminants to ground and surface waters in the Town of Geddes since 1953, when Allied Chemical constructed a chlor-alkali manufacturing facility at the site. Based on results of the Remedial Investigations ordered by NYSDEC in 1995, chemical contamination has been found in soils, groundwater, sediment and surface waters, as well as in fish and wildlife, with the main contaminants of concern being identified as mercury and PCB's.
NYSDEC's proposed plan for remediation of the LCP Bridge Street Site includes the following goal (among others): "to eliminate, to the extent practicable, contaminant migration from the Site to the Onondaga Lake environs and environmental media (e.g., groundwater, surface waters, soil, air and sediment)".
As part of the remediation plan, NYSDEC and USEPA are proposing a list of remedies to address the contamination remaining at the site. The remedies include "performance of remedial program effectiveness reviews every 5 years to determine if the remedy is still protective of human health and the environment". The IWLA Central New York Chapter strongly supports achievement of the above goal and remedial program effectiveness reviews.

Contamination of Fish and Wildlife Populations
The Central New York Chapter, IWLA, is particularly concerned over the high concentrations of mercury, PCB's and HCB's which have been found in fish, crayfish, hellgrammites and organisms collected at various locations in the West Flume at the LCP project site. The West Flume is identified as a New York State classified stream, and mercury contamination on and off

the site can be traced back to 1953, when Allied Chemical began discharging process wastes to this tributary of Geddes Brook. Onondaga Lake has also been a recipient of mercury, PCB's and other chemical contaminants originating from the LCP Bridge Street Site via the connecting waters of Geddes Brook and lower Nine Mile Creek.

CNY Chapter/IWLA Recommendations

(1) Since the active life of chemical contaminants such as mercury and PCB's is difficult to determine, the Central New York Chapter, IWLA, recommends that a biological monitoring program focused on fish and macroinvertebrate populations in the West Flume, Geddes Brook, and lower Nine Mile Creek be made a mandatory part of the LCP Bridge Street Site remediation process. The biological monitoring should continue until such time as mercury and PCB levels in these fish and macroinvertebrate populations reach acceptable ecological background levels.

(2) The CNY Chapter supports the performance of remedial program effectiveness reviews every 5 years as part of the proposed LCP Site Reclamation Plan. The biological monitoring should not be limited to the West Flume adjacent to the LCP Site, but should also include monitoring of fish and macroinvertebrate populations in Geddes Brook and lower Nine Mile Creek between Onondaga Lake and the West Flume tributary.

(3) The CNY Chapter also recommends that results of the biological monitoring should be made available to interested citizens and environmental groups until such time as mercury and PCB levels found in the fish and wildlife populations inhabiting the lower Nine Mile Creek basin are found to have fallen below acceptable ecological background levels.

Respectfully submitted,

Les Monostory

Les Monostory, V. P.
Central New York Chapter, IWLA
P.O. Box 364
Syracuse, NY 13201

Onondaga County Legislature

WILLIAM E. SANFORD
Chairman

407 Court House
Syracuse, New York 13202
435-2070

RECEIVED
JUL 31 2000

July 28, 2000

Richard Mustico
Project Manager
NYSDEC
50 Wolf road
Albany, N.Y. 12233-7010

Re: LCP Bridge Street Proposed Plan (Site # 7-34-049)

Dear Mr Mustico:

This is in response to the Department of Environmental Conservation's request for written comments about the proposed to remediate mercury contamination at the LCP Bridge Street Site, a sub-site of the Onondaga Lake National Priorities List (NPL) Site.

I have reviewed the plan proposed by Honeywell International, Inc. (successor to Allied Chemical) to remediate mercury contamination on the site. Based on this review, I wish to express my agreement with the Onondaga County Executive and the Onondaga County Office of the Environment, and so do not support the proposed plan.

I do believe that a subsurface wall and cap, enclosing approximately 20 acres of mercury-contaminated soil, which constitutes the preferred remedy under the plan, will prove beneficial. However, I am concerned that this plan, because it involves isolation on-site and not removal and disposal, may not fully protect land adjacent to the site or Onondaga Lake from seepage of mercury from the site. I am also concerned that mercury contamination is so widespread and pervasive, that even successful immobilization of the most concentrated pool of the metal will not serve to fully keep mercury from leaching into

Onondaga Lake. Any such leaching would, obviously, diminish the benefits anticipated to arise from improvements to Onondaga County Sanitary District facilities, improvements that are intended, in part, to improve the water quality in Onondaga Lake.

If the proposed plan is approved, I urge the Department to make it clear that implementation of the plan does not end Honeywell's responsibility for mercury contamination beyond the walled and capped site and/or for seepage of mercury into Onondaga Lake.

Thank you for your attention. I appreciate having the opportunity to present these comments.

Sincerely,

William E. Sanford

William E. Sanford

Honeywell

Rick

Honeywell
6711 Towpath Road
P.O. Box 310
Suite 255
East Syracuse, NY 13057-0310

315 289-0092
315 289-0098 Fax

July 31, 2000

Mr. Richard A. Mustico
Project Manager
Division of Environmental Remediation
NYSDEC
50 Wolf Road
Albany, NY 12233-7010

RE: **LCP Bridge Street Site (Inactive Hazardous Waste Site No. 7-34-049)
Proposed Remedial Alternative Plan (PRAP)**

Dear Mr. Mustico:

I would like to make only one comment on the LCP PRAP on behalf of Honeywell.

The PRAP calls for a protective site "cap" to be placed over the site once the groundwater control remedies are in place. Often, the cap significantly changes site elevations, especially in the center of the project area. Various engineering controls can be added to the cap to permit site elevations that will permit redevelopment of the site once all remedies are in place. Please consider the proposal by Honeywell to design a protective cap that will meet all criteria for this alternative and yet allow redevelopment of the site as a light industrial park, warehouse facility or other useful purpose. I believe the Town of Geddes and Village of Solvay would appreciate the economic boost a redeveloped site could offer. I look forward to working with you and other NYSDEC personnel during the Remedial Design phase of this project to show you how this concept can work. Thank you for the opportunity to present our comment.

Sincerely,

A. J. Labuz

A. J. Labuz
Manager
Remediation & Evaluation Services

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cc: R. J. Ford
G. D. Quin, Esq.
R. Montione - NYSDOH
C. Conyers, Esq. – NYSDEC
R. Nunes – USEPA Region II
C. Branagh – NYSDEC Region 7
H. Hamel – NYSDOH

From: "Mark Hettler" <mhettler@tfgcpa.com>
To: <rxmustic@gw.dec.state.ny.us>
Date: 9/5/00 10:16AM
Subject: LCP Bridge Street Cleanup

Mr. Mustico,

After a review of the information provided by both the DEC and Atlantic States Legal Foundation, Inc. I would side with the alternative to have the Excavation and off-site disposal of the contaminated materials as opposed to on- site disposal. I have lived across the lake in Liverpool my entire life of 45 years and have seen the changes the lake has undergone. I have fished the lake since I was a kid and continue to fish the lake with my sons along with boating on the lake. Without a final solution to the pollution that has occurred over the last hundred years we will never be able to consider the lake a true resource to the community and an economic stimulus unless we can tell outside people of the true cleanup of the area.

I would thus ask that you reconsider the alternatives to your plan and have the materials moved off-site once and for all. This will help to ensure that my sons and their kids can enjoy the lake the way they should. Thanks for listening and my family and I look forward to your decision.

Mark P. Hettler

WORK COPY

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

JOAN K. CHRISTENSEN
Assemblywoman 119th District

CHAIR
Administrative Regulations Review Commission

Assembly Task Force on
Women's Issues

COMMITTEES
Housing
Labor
Higher Education
Insurance
Small Business
Real Property Taxation

September 6, 2000

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Dear Mr. Mustico:

I am writing concerning the New York State Department of Environmental Conservation's (DEC) proposal to deal with the LCP Bridge Street clean up as part of the Federal Consent Decree and New York State Administrative Consent orders addressing the contamination in sites around Onondaga Lake. As you are aware, this site, which was built by Honeywell (Allied Chemical), produced hydrogen peroxide, resulting in widespread xylene, PCB, and mercury contamination.

Presently, the DEC is proposing and excavation and on-site disposal of contaminate sediments from the West Flume and wetlands to restore the area, the excavation of brine mud and on-site disposal, a slurry wall containment barrier around the site and extending 55 feet deep, cleaning of the catch basin and manholes, and deed restrictions. Because the plan calls for on-site disposal and containment, I do have grave concerns as to the effectiveness and permanence of these actions in meeting the requirements as set forth by the Superfund Act (CERCLA). It is my fear, as well as other knowledgeable individuals in the field, that there will still be a large amount (10 tons or more) of mercury remaining with in the containment system. Historically, this type of containment system has been known to fail, resulting in the release of hundreds of pounds of mercury into the environment.

I would urge the DEC to consider all the options and ramifications of this proposal, particularly as these decisions relate to monitoring and cleanup contingencies. Let us not continue to make hasty decisions, but rather learn from our past mistakes.

I would appreciate a response to my concerns and to those issues I raise.

Sincerely,

Joan K Christensen

Joan K. Christensen
Member of Assembly

JKC/sld

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☐ Room 502, Legislative Office Building, Albany, New York 12248, (518) 455-5383, FAX (518) 455-5417
☐ 4317 E. Genesee Street, Room 103, Syracuse, New York 13214, (315) 449-9536, FAX (315) 449-0712

WORK COPY

Fred Miller
7730 Apricot Lane
Liverpool, NY 13090

September 7, 2000

Mr. Richard Mustico
Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Rd.
Albany, NY 12233-7010

RE: LCP Bridge Street, Onondaga Lake Superfund Subsite

Dear Mr. Mustico:

DEC's Preferred Remedial Alternative proposed does not put forth a permanent solution required by the Superfund Act(CERCLA) because the plan calls for on-site disposal and containment.

The Preferred Remedial Alternative does not provide for a comprehensive monitoring plan for detecting containment failure. Such containment barriers have been known to fail. Without comprehensive on-going monitoring should the barrier fail it could release dangerous levels of mercury into our community.

It makes good sense to have an on-going comprehensive monitoring program in and around the site to detect any containment failures thus providing the community with ample warning.

Further, if the containment barrier should fail clean-up contingencies should be addressed and apparently are not in the DEC's preferred alternative.

The financial responsibility of this possibility should be placed upon Honeywell and not passed along to taxpayers who would ultimately have to pay for such failure clean-up should Honeywell be completely relieved of any/all financial responsibilities.

Please add these comments to your public comment file on the matter.

Sincerely,

Fred Miller

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From: "Aggie Lane" <aggielane@a-znet.com>
To: <rxmustic@gw.dec.state.ny.us>
Date: 9/12/00 12:57PM
Subject: Public Comment on the Cleanup of the LCP Bridge Street Facility

To the DEC:

I am opposed to the containment method proposed for LCP Bridge Street Onondaga Lake Superfund Subsite. I feel that the proposed slurry wall to contain up to 10 tons of mercury could become a serious problem in the years to come. Let's do a complete and thorough job of cleaning the soil NOW!

Please clean the soil completely and recycle the mercury!

Agnes Lane
340 Midland Avenue
Syracuse, NY 13202

Honeywell

Honeywell
6711 Towpath Road
P.O. Box 310
Suite 255
East Syracuse, NY 13057-0310
315 289-0092
315 289-0098 Fax

RICK'S COPY

September 13, 2000

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BUREAU OF CENTRAL
REMEDIAL ACTION

Richard Mustico, Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Wolf Road
Albany, New York 12233-7010

Re: Comments on LCP Bridge Street Proposed Plan (Site #7-34-049)

Dear Mr. Mustico:

This letter presents Honeywell's comments regarding the consolidation of materials onsite under the preferred remedy cap (Preferred Remedy Alternative SSBMS-2) at the LCP Bridge Street site, Village of Solvay, Onondaga County, New York. Honeywell proposes to consolidate non-hazardous mercury-containing sediment from Geddes Brook and Ninemile Creek at the LCP Facility under the preferred remedy cap. The need to propose consolidation of such additional materials is the direct result of Honeywell's consideration and planning for an early remedial action for Geddes Brook and Ninemile Creek to eliminate, to the extent practicable, contaminant migration to Onondaga Lake from the sediments.

As specified in the LCP Bridge Street Proposed Plan (Proposed Plan), the preferred remedy includes the excavation and consolidation of West Flume sediments and other materials under a New York State 6 NYCRR Part 360 equivalent low-permeability cap. Honeywell has had several discussions with the New York State Department of Environmental Conservation (NYSDEC), prior to issuance of the LCP Proposed Plan, regarding the consolidation of additional mercury-containing sediment to be generated by the anticipated remedial activities for Geddes Brook and Ninemile Creek. Honeywell is considering removal of sediments from Geddes Brook and Ninemile Creek and proposes that those sediments be consolidated with other materials on-site under the LCP cap. The excavation and consolidation of sediments from Geddes Brook and Ninemile Creek would be consistent with the remedial action objectives described in the Proposed Plan because these sediments, like the West Flume sediments, have been impacted by mercury releases from the LCP Facility.

As is the case for the West Flume sediments, the Geddes Brook and Ninemile Creek sediments would need to be regarded as non-hazardous under EPA toxicity characteristic testing protocol, prior to consolidation beneath the LCP cap. The concentrations of mercury detected in Geddes Brook and Ninemile Creek sediments are lower than those found in the West Flume sediments, as shown in the following table of maximum and mean mercury concentrations (dry weight) for each area:

	Mercury Concentration (mg/kg)	
	Max.	Mean
West Flume Sediments	110	30
Geddes Brook Sediments	3.8	1.6
Ninemile Creek Sediments	12.6	1.8

Our initial evaluation of potential sediment excavation volumes indicates that up to approximately 15,000 cubic yards of sediment may be excavated from Geddes Brook and Ninemile Creek. Consolidation of these sediments under the cap at the LCP Facility would provide reliable and cost-effective containment that would be protective of human health and the environment without compromising the effectiveness of the cap or overall remedy at the LCP site. In addition, the preferred remedy for the LCP Facility would require imported fill material to bring the cap to grade. The Geddes Brook and Ninemile Creek sediments would fulfill this need.

Thus, Honeywell proposes that the Geddes Brook and Ninemile Creek sediments targeted for remediation be consolidated on-site at the LCP Facility. As with the West Flume sediments, Honeywell would develop specific consolidation plans in conjunction with the detailed design process for the LCP site. Such plans would not be expected to slow or disrupt the timely closure of the LCP site.

Sincerely,

Alfred J. Labuz
Manager – Remediation and Evaluation Services

cc: Robert Ford
Gordon Quin, Esq.
James Kavney
Robert Nunes-USEPA Region II
Robert Montione-NYSDOH
William Daigle-NYSDEC
David L. Palmerton, P.G.-BBL
Joseph A. Detor, P.E.-BBL

From: Lucas Lorenz <Lucas.Lorenz@aslf.org>
To: <rxmustic@gw.dec.state.ny.us>
Date: 9/14/00 8:51AM
Subject: LCP Bridge Street Public Comments

Dear Mr. Mustico,

As part of our Onondaga Lake information booth at the 2000 New York State Fair, we here at Atlantic States collected comments from the public on the LCP Bridge Street cleanup. In addition, some people informed us that they would be e-mailing their comments to you to be considered and placed on the administrative record.

This message is just to inform you that we are sending the comments that we collected, which should arrive at your office by monday.

Thank you for your time.

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

RECEIVED
SEP 18 2000
BUREAU OF CENTRAL REMEDIAL ACTION

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

What are you going to do with the leachate. Michael P Fudish
P.O. Box 683, Gloversville, NY. 12078

Signed:______________________ Date:__________

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

LCP chemical site should be cleaned up, not contained.

As life long residents of the Village of Solvay, we believe the "Lake Cleanup" should be funded by the company accountable.

Thank you,

Mr. & Mrs. John DeSpirito IV
105 Smith St.
Manlius, NY 13104

Signed:_____________________________ Date:____________

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

The planned circling of the LCP Site at Bridge Street should be amended and Allied Chemical encouraged (made to) pay to have the mercury removed from the soil.

Thank you for your support of this change (please).

Signed: Mary Thurber Date: 8/26/00

103 Wilkie Place
Syracuse
NY 13203

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

I feel the state's plan is unacceptable. I feel Allied should pay to have the mercury removed from the ~~lake~~, LCP site.

Signed: Lynn Robarge Date: 8/26/00

1860 Bellevue Ave
Syracuse, N.Y. 13204

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

Since local residents are so unhappy, please try to find another way at another place. This is defindtely not a community friendly idea.
Good luck!!

Signed:______________________ Date:__________

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

I BELIEVE THAT A LIMITED PROPOSAL TO CLEAN UP AND REMEDIATE THE WATER IN ONANDAGA LAKE IS NOT SUFFACIENT.

MEASURES SHOULD BE TAKEN TO PERFORM A COMPLETE AND COMPREHENSIVE REMEDIATION EVEN AT THE HIGHER COST IT WOULD INVOLVE.

Signed: Ray Dunnigan Date: 8/26/2000

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

Being an envrionmentalist, I believe leaving mercury on site is wrong. I would prefer we clean up Onondaga Lake It is disgusting.

It is such a waste to everyone

Signed: Catherine G Beach Date: 8/26/00

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

Lake Cleanup is taking way too long. Too [illegible] Much Money and time is being spent talking instead of acting. Proposed LCP Bridge street "Cleanup" isn't actually cleaning, its just temporary avoidance.

Signed: Paul Folary Date: 8/27/00

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

Keep Pataki out! - We want a permanent disposal of the mercury instead of only a "Band Aid" solution

Signed: Marie Salenske Date: 8/25/06

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

We as a NY family who enjoy clean water, believe that the best plan to eliminate the chemical problem in lake Onondaga area VIZ: Allied-Honeywell contaminated land (mercury) should be to remove all the dirt. Then purify via proper means and dispose of the chemicals and refill the land. The company is the responsible party and should be held accountable for all A Costs!!!

Signed: D G DeOlden Family Date: 8-28-2000

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

I have lived my entire life on Canandaigua Lake. I think that Syracuse would be a much nicer city if the lake was cleaned up.

Signed: Mike Cooney Date: 8/27/00

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments: Just Do it !!

☺

why not. Forget studying it. Just Do it. Clean it up so everyone can enjoy it's beauty "in it".

Signed: Nancy J Sochia Date: 8/28/00

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

I'm glad you want to Clean it UP..
Clean it for my Children for the fucture

Signed: Mr + Mrs Edmond Widger SR Date: 8/24/00

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

Ann Costello

Clean it up - Now

Signed: Ann B. Costello Date: 8/28/2006

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

all Contaiments should be removed
not Covered up

Signed: Ernest Smith Date: 8/26/00

1402 White Rd Cato NY 13033

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

LCP Chemical site near Onondaga Lake should be removed instead of capped or surrounded by Allied Chemical. I am concerned about mercury levels running off into Onondaga Lake if this soil is not removed - that is not a permanent solution

Signed: Janie Polich (POLECH) Date: 8/26/00

8151 Toscano Dr.
Clay NY 13041

Richard Mustico, Project Manager
NYSDEC Div. of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Public Comments for LCP Bridge Street Cleanup

Dear Mr. Richard Mustico:

My comments:

The States plan is unacceptable to encircle the mercury in Onondaga Lake LCP site Allied Chemical should be forced to clean up the mercury. This could be a large attraction for Syracuse & end up generating considerable revenue. We do NOT need any more malls! I also do not want my water supply contaminated. The lake should also NOT be used as a toilet - It is public knowledge that the overflow sewage is still being dumped.

Signed: Michelle Burdett Date: 8/26/00

6648 Winchell Rd
Warners NY 13164

From: martha holly loew <marthaloew@compuserve.com>
To: Richard Mustico <rxmustic@gw.dec.state.ny.us>
Date: 9/15/00 11:04AM
Subject: LCP Bridge Street cleanup plan-Onondaga Lake Superfund Site

Dear Mr. Mustico,

The Iroquois Group of the Atlantic Chapter urges you to reconsider the proposed remedial treatment for the LCP site in Syracuse. This is not a permanent solution as required by superfund.

Hundreds of pounds of Mercury have the potential to be released into the environment in event of even a small failure.

Sierra Club requests off-site disposal of these materials.

Our membership would be interested in updates on this problem.

Sincerely,
Martha H. Loew, Chair,
Iroqouis Group, Atlantic chapter
po box 182
Jamesville, N.Y. 13078 315-492-4745

WORK COPY

JOSEPH J. HEATH
ATTORNEY AT LAW
716 EAST WASHINGTON STREET
SUITE 104
SYRACUSE, NEW YORK 13210-1502
315-475-2559
Facsimile
315-475-2465

September 15, 2000 **VIA E-MAIL and REGULAR MAIL**

Richard Mustico, Project Manager
NYSDEC Division of Environmental Remediation
50 wolf Road
Albany, NY 12233-7010

RECEIVED
SEP 18 2000
BUREAU OF CENTRAL
REMEDIAL ACTION

RE: L.C.P. BRIDGE STREET FACILITY
ONONDAGA LAKE SUPERFUND SUBSITE

Dear Mr. Mustico:

Please be advised that I am general counsel for the Onondaga Nation and their Council of Chiefs has requested that I write this letter to state their vigorous opposition to the DEC's proposed preferred remedy of this hazardous waste site, which is contaminated with mercury, PCBs and xylene.

The Onondaga Nation has an intense interest in this site because it is located within their land claim area and because it drains into Onondaga Lake. Onondaga Lake is sacred to the Onondagas and the rest of the Haudenosaunee because it was on these shores that their Peacemaker formed the Confederacy over 1000 years ago.

Since this toxic waste site is on Onondaga Nation land, the Chiefs and Clan Mothers of the Nation are duty bound to care for and preserve the land and water for the use of the seventh generation yet to be born. It is offensive enough that such toxics as mercury, PCBs and xylene have been left on this site, but it is even more offensive to the Onondaga's environmental mandate to leave these toxics so close to wetlands and to the Lake. This is not acceptable to the Nation.

The Onondaga Nation is poised to file its land claim against the State and other defendants and the area of land to be reclaimed therein includes this location. Enclosed please find a map of the area of the proposed Onondaga Land Claim.

As we have repeated stated to the DEC, your agency's failure to specifically notify the Nation of this project has placed us in the uncomfortable position of not finding out about this problem until the eleventh hour and then having to play catch-up, in order to meet your deadlines. In the future, the Nation requests specific notice of all DEC projects within the are of the land claim as shown on the enclosed map. We have addressed this repeated problem of lack of specific notice to the Nation with the Commissioner directly and, more recently, with the Commissioner's Environmental Justice task force.

Since this property is on land that belongs to the Onondaga Nation, which was taken by the state in the late 1790's in violation of the federal Indian Trade and Intercourse Act and in violation of the United States Constitution, the Nation has a fundamental interest in this land and its pollution impact on Onondaga Lake.

Please be specifically advised that the DEC's "Preferred Remedial Alternative" for this toxic site in not acceptable to the Nation. It is not a permanent solution, as required by CERCLA, since it calls for on-site disposal and containment. Permitting tons of mercury to remain on the site within a containment system is not acceptable to the Nation.

The Nation is also concerned that DEC's incomplete information and planning will allow your preferred alternation to be approved without a comprehensive monitoring plan for detecting containment failure or for clean up contingencies, if containment should fail. Since, historically these types of containment systems have been known to fail, the Nation can not agree to this alternative because it is too risky and may well leal to further toxic pollution of Onondaga Lake. Even a minor failure of this system would release hundreds of pounds of mercury into the environment and eventually into the Lake.

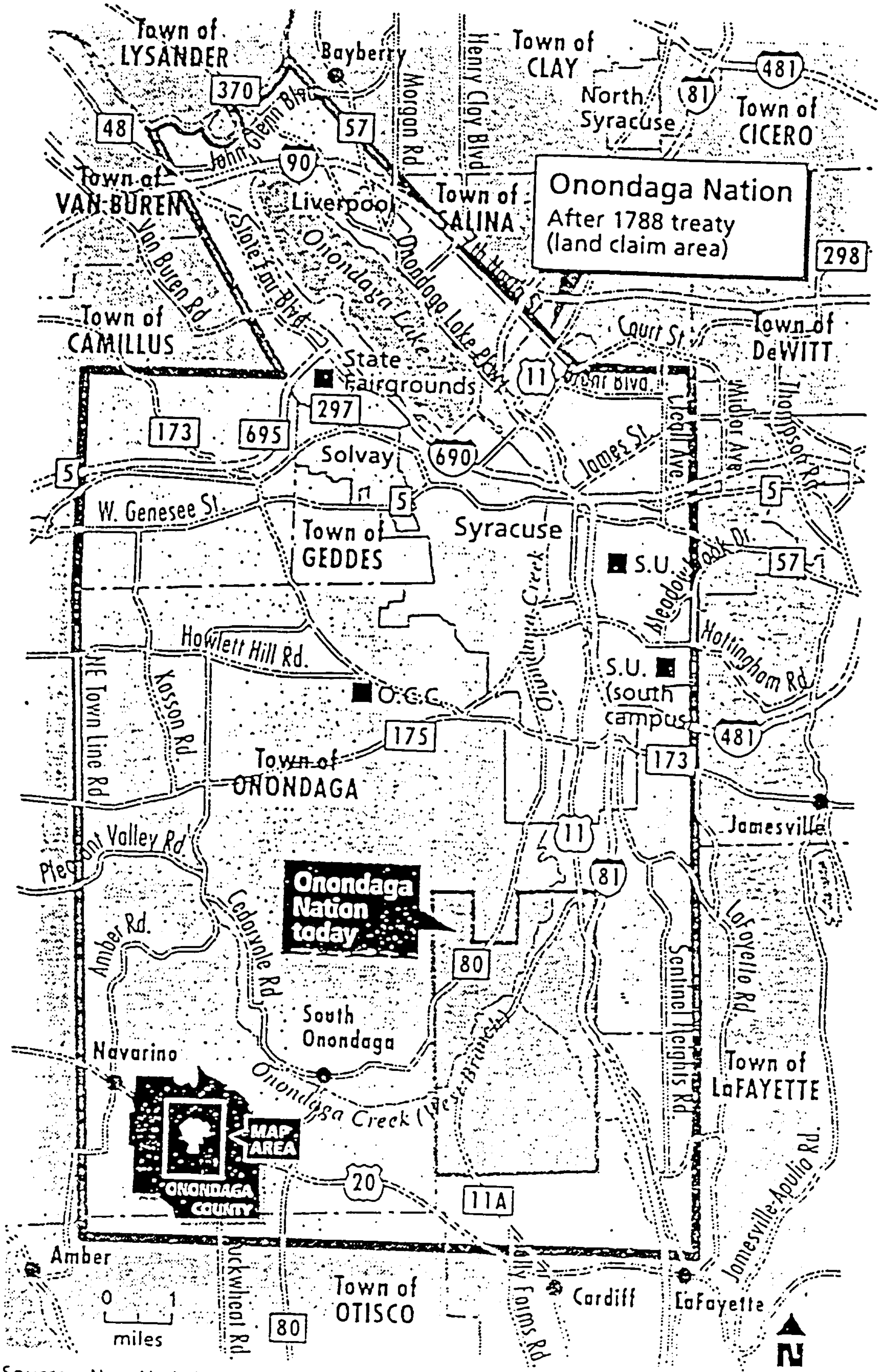
The Onondaga Nation is firmly opposed to your agency's proposed "preferred remedial alternative. The Nation does not accept leaving tons of mercury on site as a responsible method of addressing this toxic waste problem.

There is at least one additional aspect of this project which causes the Nation great concern. It is well known that, prior to European expansion into this region, Onondaga villages were located on the shores of Onondaga Lake and the creeks which feed it. Since your preferred alternative calls for extensive excavation, we could never agree to it until we have been fully advised of the state's knowledge of known archeological sites in the area. We have not been informed sufficiently for us to form an opinion of the likelihood of such excavation causing extensive damage to ancient Onondaga villages and cultural sites.

Sincerely yours,

Joseph J. Heath
JJH/pe

Enc.



Sources: New York State treaties, Onondaga Nation

Syracuse Newspaper

ATLANTIC STATES
LEGAL FOUNDATION, INC.

September 18, 2000

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SEP 20 2000
BUREAU OF CENTRAL
REMEDIAL ACTION

Richard Mustico, Project Manager
NY Department of Environmental Conservation
Division of Environmental Remediation
50 Wolf Road
Albany, NY 12233-7010

Re: Comments on the Proposed Remedial Action Plan for the LCP Bridge Street Facility, sub-site of the Onondaga Lake Superfund site

Dear Mr. Mustico:

After concluding a review of the Proposed Remedial Action Plan (hereafter "PRAP") for LCP Bridge Street sub-site, Atlantic States Legal Foundation offers the following comments:

Overall, it is our position that the proposed barrier wall and cap system is completely unsatisfactory. Atlantic States urges NYSDEC to protect human and environmental health by seriously considering alternative plans that utilize a long-term perspective. Relying on a slurry barrier and cap system to contain tons of highly toxic mercury wastes, including liquid mercury, is not acceptable both legally and ethically. The PRAP is certainly questionable from a regulatory and human health perspective.

Mercury is a highly toxic substance that must be handled with great care. Although not considered a carcinogen, mercury and its compounds are potent neurotoxins. For instance, a single gram of mercuric chloride will produce severe neurological effects, which last for months or even years. A dose of a few grams is deadly.

Mercury is also quite mobile in the environment. Metallic mercury has a high vapor pressure and can volatilize, transferring the hazardous constituents from one medium to another (from sludge to air). All forms of mercury dissolve in water, which can then migrate. In addition, metallic mercury, because it is a liquid, can flow freely through the pores of soil.

1. Residual Mercury Contamination

The site contains two types of mercury contamination: compounds of mercury which are incorporated into the soil matrix; and liquid (elemental) mercury. The first type of contamination is, in all likelihood, relatively immobile. The mercury compounds are attached to soil particles that, in all probability, can be safely retained on site.

In contrast, liquid elemental mercury is highly mobile: it is a very dense liquid (specific gravity = 13.6) that can and will move downward and outward through the sandy soils which characterize most of the site. This is evidenced by the fact that mercury, originally spilled at the surface, has already migrated 50 feet downwards. Any substantial accumulation of elemental mercury represents a *principal threat* under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), since such accumulations are source materials which are both highly toxic and highly mobile. It is expected that treatment shall be utilized, wherever practicable, to address principal threats.

> "Principal threats are characterized as wastes that cannot be reliably controlled in place, such as liquids, highly mobile materials, and high concentrations of toxic compounds (e.g. several orders of magnitude above levels that allow for unrestricted use and unlimited exposure.)" 55 F.R. 8703

Unfortunately, the PRAP addresses only surface soils. These are appropriately identified as principal threat materials due to the presence of high concentrations of mercury, including elemental mercury in the Mercury Cell Building. We estimate that approximately 10-40 tons of mercury are contained in these soils. We agree with the PRAP, that these soils should be excavated and treated.

Inexplicably, however, the PRAP fails to identify the deeper soils (> 6 ft.) as principal threats. These soils contain substantially greater quantities of liquid mercury compared to the surface soils. As shown in Figure 1, there is a region of elemental mercury just north of the Mercury Cell Building which begins in the region between DB-2 and DB-4, and extends west to a point beyond DB-3. The northern boundary of this deposit is between DB-5 and DB-1. The southern extent of the deposit is very poorly defined, due to the presence of the Mercury Cell Building. We estimate that the mass of liquid mercury could well exceed 100 tons. (Calculations attached.)

The PRAP asserts that the elemental mercury in deep soils "appears to be stable (i.e. not likely to be mobile), and is not contributing significantly, in terms of areal extent, to dissolved mercury concentrations in the lower aquifer." (p.9)

The first part of this statement is perhaps a case of over optimism: There is no reason to believe that the elemental mercury is "stable"—i.e. that it will not continue to migrate downwards and outward through the sandy soils of the site. The plant opened in 1953. Over the last 47 years, mercury has moved downward 50 feet. The downward migration of mercury will continue, and can be expected to spread outward along the glacial till surface. The lack of deep borings to the south and west of the main body of elemental mercury gives no assurance that this is not already happening.

The second part of the quoted PRAP statement focuses on dissolved mercury. A review of the site analysis raises questions as to the validity of this statement. The limited extent of contamination in the lower aquifer may reflect the slower hydrological movement of this aquifer, or it may simply reflect that elemental mercury did not penetrate to this depth until recently. It cannot reasonably be assumed that lesser concentrations of mercury in the lower aquifer can be equated with a limited migration of contamination and/or the cessation of migration of elemental mercury. All these levels conclusively show, is present contamination of the aquifer.

2. Preferred Remedial Alternative

The remedial alternative proposed in the PRAP calls for excavation and treatment of a limited quantity of surface oils (4500 c.y.); off-site disposal of a small quantity of PCB-contaminated soils and on-site containment of essentially everything else. This is simply unacceptable. It is not only unethical to leave hundreds of tons of highly toxic and mobile liquid mercury on site, but it goes against the principles outlined in the NCP. The PRAP alternatives evaluation criteria include: Long-term effectiveness and permanence; and, Reduction of toxicity, mobility, or volume through treatment. The preferred alternative fails on both counts.

Containment is not a permanent remedy. Due to the vast amount of mercury on site, any such system would have to be 100% effective for a very long time (i.e. thousands of years). According to the USEPA Handbook *Remedial Action at Waste Disposal Sites* (EPA/625/6-85/006), the design lifetime of a multi-layer cap is "uncertain" due to uncertainties about the life of the synthetic liner, the amount of rainfall which will infiltrate the liner materials, and "the uncertain rate of waste migration." The handbook goes on to state that the design life "may extend to over 100 years" if certain conditions are met, including:

- a synthetic liner is supported by a low-permeability base (e.g. clay);
- the underlying wastes are unsaturated (which is not the case at LCP);
- there is great distance between the waste and the groundwater table (the wastes at LCP are *below* the groundwater table); and
- proper maintenance is performed. (EPA/625/6-85/006, P. 3-4)

The handbook guidelines, of course, where not based on prior experience but rather on future projections. Assuming EPA's guidance projections are correct, the cap at the LCP site can be expected to fail approximately 50 to 100+ years from its installation. Then what? Who will be around to construct a new cap? There is no explicit contingency for Honeywell, or its successors, to maintain the integrity of the engineered cap in perpetuity.

The PRAP does not offer a prediction for the long term stability of the proposed slurry wall. Indeed, the aforementioned USEPA handbook states:

> Another limiting factor in the use of soil-bentonite slurry systems for pollution migration control is the lack of long-term performance data. Soil-bentonite walls have been used for decades for groundwater control in conjunction with large dam projects, and there is ample evidence of their success in this application. However, the ability of these walls to withstand long-term permeation by many contaminants is in question. Most contaminant/backfill compatibility questions have been answered by laboratory permeation tests and not by long-term field studies.

It should be noted that both saline solutions (NaCl) and caustic soda (NaOH) could adversely affect the permeability of soil-bentonite. There is evidence of both elevated salt concentrations (chloride) and elevated pH in the upper aquifer at LCP.

Slurry walls can and do fail, especially if not properly installed. Even if properly constructed, the PRAP does not offer an expected performance lifetime for the slurry wall containment system. The elemental mercury will still remain, as toxic in the future as it is now. Again, we must ask: What next? Who will be around to construct a new slurry wall if and when the proposed containment breaches?

The glacial till underlying the site is assumed to be impervious to penetration by mercury. However, glacial till is a heterogeneous mixture of rock, gravel, sand, silt and clay. The PRAP offers no assurance that liquid mercury cannot penetrate this material. There is no scientific or other justification for the statements that the glacial till is impervious.

In conclusion, we must call into question the assertion that "containment is a proven and reliable approach to long-term risk management," given the massive amount of mercury which needs to be contained at the LCP site, combined with the lack of a proper long-term containment strategy.

3. Other Alternatives

In the context of the Feasibility Study a number of potentially effective remedial alternatives were considered for treating the contaminated deep soils. These included excavation of deep soils, followed by physical separation of elemental mercury. Excavation depths were limited to 20 feet and 55 feet. The former was retained, while the latter was not retained due to questionable effectiveness and difficult implementation. We would first point out that 20 feet is an arbitrary depth-- one could just as easily have considered remediation to depths of 30 or 40 feet.

The alternatives which address deep soil contamination were ruled out for several reasons. None of these reasons stand up to scrutiny:

1) There are no risks associated with elemental mercury in the deep soil because there are no complete exposure pathways.

> This analysis takes the short-sighted view that the elemental mercury in the deep soil is not capable of eventually moving off-site, leading to contamination of nearby aquifers, surface waters, and eventually, Onondaga Lake. It is clear that the mercury has moved vertically, and is quite capable of moving horizontally

2) Breaching the silty clay layer separating the upper and lower aquifers could result in geochemical changes in the deep aquifer which could increase the mobility of the elemental mercury.

This seems highly unlikely, as the volume of the lower aquifer is far greater than the upper aquifer. The depressed redox potential of the upper aquifer may actually *decrease* the mobility of soluble mercury through the formation of insoluble mercuric sulfide. Even if geochemical changes were a possibility, constructing a smaller slurry wall around the immediate vicinity of the excavation could prevent it from happening.

The fact that contamination exists in the deep aquifer should raise concerns about downward movement of mercury through the intervening low-permeable layer. This strongly suggests that immobilization or removal of the contamination in the lower aquifer is an absolute necessity. Again referring back to the NCP, principal threats include "wastes that cannot be reliably controlled in place, such as liquids, [and] highly mobile materials." These wastes should, wherever practicable, be treated.

In addition, we call your attention to Figure 1-4 in the FS which clearly shows no silty-clay layer separating the upper and lower aquifers in the vicinity of the West Flume. The PRAP (p.4) states that groundwater in the lower aquifer "may eventually discharge to the West Flume or Geddes Brook at a location west of, and downstream of, the facility."

3) Excavation depths are extreme and therefore treatment is difficult to implement.

Excavation depths of 55 feet are not uncommon in construction and mining activities. While the sandy soil at the site would pose challenges to the contractor, they are certainly not insurmountable. Stepped-back slopes, sheet piling, and other techniques can be used to excavate the deep soils that contain large amounts of elemental mercury. Containment structures, such as slurry walls, can be used temporarily to limit movement of the mercury.

As far as we have ascertained, no consideration has been given, in the Feasibility Study or elsewhere, to:

1) Recovery of liquid mercury through DNAPL recovery wells.

That is, one could install wells through out the area of deep soil contamination, with the purpose of recovering liquid mercury, much like PCBs or other DNAPLs are recovered at other sites. The recovery of this usable product has the added benefit of reducing the environmental costs of producing 100+ tons of elemental mercury in another location.

2) The future use of the site has been ignored.

It is simply assumed that this parcel will be redeveloped for industrial purposes. It is hard to believe that any industry would be willing to locate on this property unless the contaminants were thoroughly treated. Being that property values for unspoiled acreage is so low in Central New York, this parcel, with the proposed incomplete remediation, will remain vacant and unusable in perpetuity.

4. Cleanup Levels

The PRAP states that surface soils contaminated with mercury exceeding a concentration of >260 mg/kg would be collected, treated (treatment type is not identified), and buried on-site. This contaminated soil would be contained within a slurry wall and low permeable cap. The compositions of the cap and slurry wall are not specified in the proposal –we assume bentonite clay and soil.

The use of the 260 mg/kg limit for removal and treatment is questionable, since this is a concentration set under RCRA regulations for disposal in licensed disposal facilities. The concentration is based on the assumption that the disposal facility meets all the regulatory requirements for disposal. The LCP plan does not meet the requirements of a RCRA hazardous waste landfill in any respect. Notably, there is no liner for the waste material. Rather, the PRAP relies on assumptions of the underlying glacial till's impermeability. In addition, the hazardous waste at the LCP site is not isolated from the groundwater; rather, the upper and lower aquifers are saturated with elemental mercury. Furthermore, the monitoring provisions of the PRAP are vague, and contingency plans are non-existent. Thus, the RCRA limit of 260 mg/kg is neither relevant nor appropriate.

The site contains surface soil concentrations of mercury as high as 19,200 mg/kg; that is 192,000 times the soil clean-up objective (0.1 mg/kg) set by NYSDEC. Concentrations in the deep soil are presumably even higher, since elemental mercury is present.

It again should be reminded here that principal threats, those that require treatment wherever practicable, include "high concentrations of toxic compounds (e.g. several orders of magnitude above levels that allow for unrestricted use and unlimited exposure.)."

Although Honeywell has had some success at its Baltimore Maryland site (conversation with J. Kavney), there are no assurances that the engineered system at the LCP site will retain its integrity in perpetuity. Slurry walls of this composition have a history of breaching and failure with a subsequent release of contents.

Given the concentration of the mercury within this system even a very small failure could lead to high contamination in the groundwater surrounding the structure and even in surface waters at the site. Moreover, on-site disposal of contaminated materials is not a permanent solution as required by CERCLA.

5. Monitoring program

Comprehensive monitoring plans are conspicuously absent from the PRAP, although DEC has indicated that such a monitoring program will be developed as part of the overall remedy. The absence of a monitoring plan is unacceptable, since the public has no means to evaluate the acceptability of any proposed monitoring plan. The comprehensive monitoring program *must* be an integral part of the PRAP and subject to public review prior to final approval and implementation.

A second, very troubling, deficiency in the PRAP is the lack of discussion concerning the slurry wall and glacial till interface. Mercury has 13.6 times the density of water and will therefore rapidly settle to the bottom of the barrier system. The most likely place of initial leakage is at the interface of the slurry wall and glacial till. However, no provision is made for verifying a "complete" seal at this critical location. A verification system should be required for the slurry wall, cap and all points of interface. The monitoring program should address these points specifically.

6. Contingency plans

Contingency plans are not required of Honeywell as part of the proposed remedy even though highly contaminated materials will remain on-site in perpetuity within an engineered barrier system. Conspicuously lacking are contingency funds to carry out alternative remedial action plans should a failure in the barrier system occur. The fact that neither NYSDEC nor Honeywell can give assurances that a failure will not occur requires that provisions be made and included in the Plan for such an event. Emergency and comprehensive contingency provisions *must* be included in the design of the proposed remedy and subject to public review prior to approval and implementation.

7. Site characterization

The PRAP contains insufficient characterization data to justify the course of action. Groundwater data are limited in scope, both temporally (last sampled in 1995) and spatially (there are wide gaps between monitoring wells). We call your attention to the area south of MW-17, where the Mercury Cell Building, the Diaphragm Cell Building, the Caustic Plant, Salt Plant, and other structures are or were standing (depending on the progress of demolition). There are simply no wells in this area. This area extends over approximately 4 acres of the plant! Since these buildings are presently being razed, additional monitoring wells should be installed.

Of even greater concern is the poor characterization of the deep soils where elemental mercury is found. As with the groundwater, the area previously covered by the various structures—especially the Mercury Cell Building –has been precluded from proper investigation. Now that the buildings are coming down, a proper investigation of the subsurface can be initiated. We recommend that such action be taken *before* making a final decision on a remedy.

In summary, the primary concern of Atlantic States Legal Foundation at this Superfund sub-site will remain a risk to human health and the environment. On-site disposal of unstabilized soils highly contaminated with mercury is an unacceptable remedy for the LCP Bridge Street sub-site. This fact is especially true, since in-situ barriers and caps have a history of failure. Thus, the preferred alternative should be screened out from the Feasibility Study. Other remedial alternatives should be considered, including:

1. The permanent stabilization of contaminated materials within an engineered containment system;
2. Immediate construction of a slurry wall around the contaminated deep soils to contain

the elemental mercury for the next several years;

3. The removal, treatment via physical separation, and on-site disposal of treated deep soils;
4. The removal, treatment via thermal desorption, and on-site disposal of treated deep soils; and
5. Installation of mercury DNAPL recovery wells.

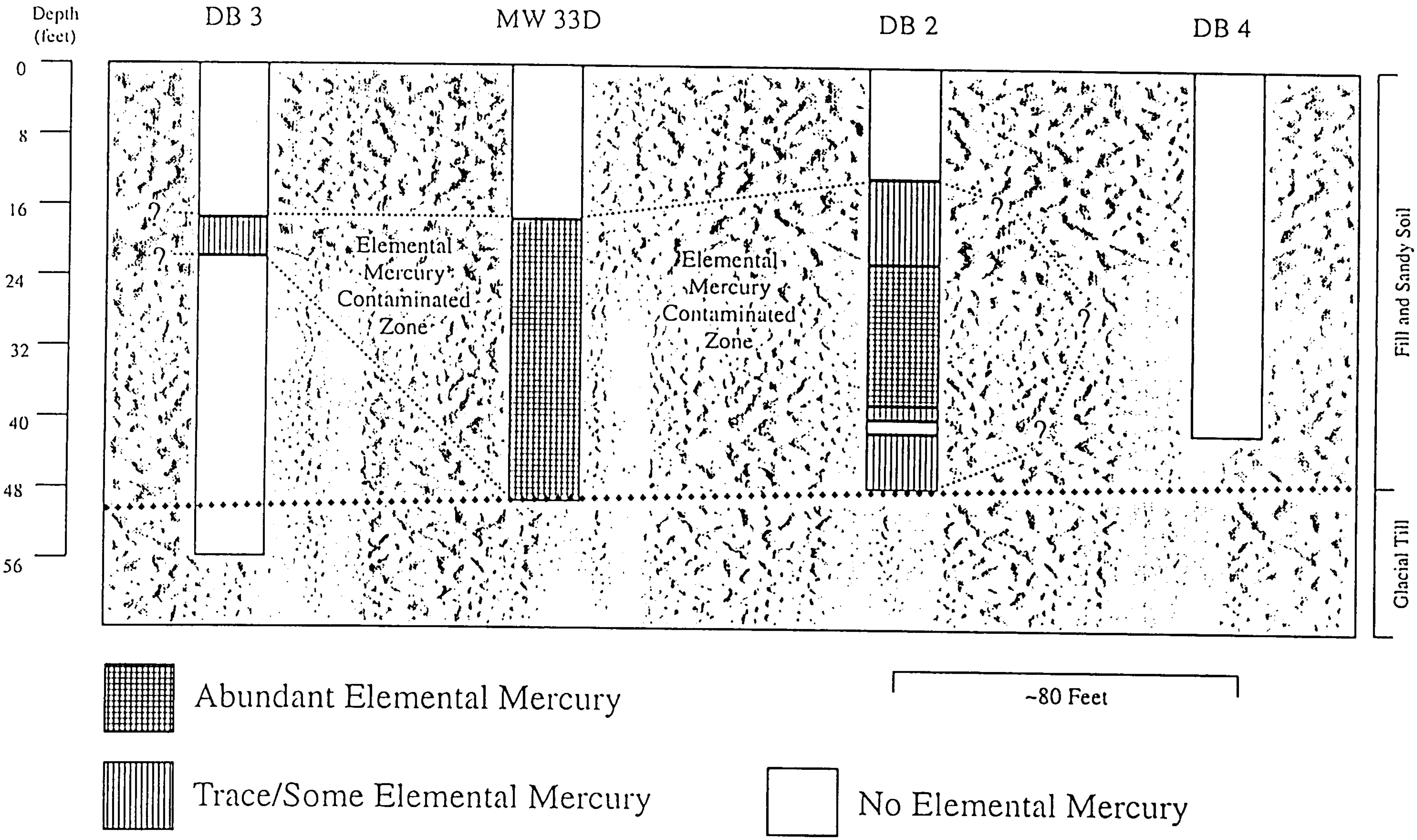
If you have any questions concerning these comments or would like to discuss this matter more fully, please contact Atlantic States Legal Foundation at (315) 475-1170, or Don Hughes at (315) 470-6597.

Sincerely,

Samuel H. Sage, President
Atlantic States Legal Foundation

FIGURE 1.

Cross Section: LCP Bridge Street



CALCULATION OF FREE (LIQUID) MERCURY AT THE LCP BRIDGE ST. FACILITY, DEEP SOIL

The area where elemental mercury has been found in deep soils, based on the limited information currently available, is an approximate circular area centered on MW-33D. The diameter of this circle is about 250 ft.

The surface area = $\pi r^2 = (3.141)(125\ \text{ft})^2 = 49{,}000\ \text{ft}^2$

Depth of affected soils ranges from 14 to 50 ft. Soil thickness = 50 – 14 = 36 ft.

Volume of affected soil = cylinder with radius of 125 ft and height of 36 ft.

$$\text{Soil volume} = (49{,}000\ \text{ft}^2 \times 36\ \text{ft.})/(27\ \text{ft}^3/\text{cy}) = 65{,}300\ \text{cy}$$

Assume pore space in soil = 30% of soil volume (typical value)

Volume of pore space = 0.3 (65,300 cy) = 19,600 cy

One may assume that soil pore in the heaviest area of contamination (MW-33D) are nearly saturated with mercury, but that this degree of contamination rapidly drops as one moves away from this area. A conservative assumption is that, on average, 0.1% of the available pore space is filled with mercury. This yields an estimated volume of mercury of 19.6 cy (3,900 gal).

The density of mercury = 13.6 kg/L = 22,840 lb/cy = 11.4 tons/cy.

The estimated mass of mercury is therefore 19.6cy x 11.4 ton/cy = 223 tons. Given the rough nature of this calculation, a range of 100 to 400 tons is suggested.

* *

Over the 35-year operating life of this facility, 223 tons corresponds to an average loss of 35 lb/day (about 1 liter per day) to the site soils/groundwater. This appears plausible, given that losses of mercury to Onondaga Lake via wastewater discharges have been estimated at 20 lb/day prior to 1970.

APPENDIX V-b

TRANSCRIPT OF THE PUBLIC MEETING FOR THE PROPOSED PLAN

RECEIVED
AUG - 3 2000
BUREAU OF CENTRAL
REMEDIAL ACTION

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
TOWN OF GEDDES

- - - - - - - - - - - - - - - - - - -

In the Matter of

Proposed Remedial Action Plan for LCP BRIDGE STREET SUB-SITE OF THE ONONDAGA LAKE SUPERFUND SITE

- - - - - - - - - - - - - - - - - - -

PUBLIC HEARING in the above matter conducted at the Geddes Town Hall, Woods Road, Solvay, New York on July 19, 2000, 7:00 p.m.

PRESENT:

KEN LYNCH, NYS DEC Regional Director
Region 7

RICHARD MUSTICO, NYSDEC Project Engineer
DONALD HESLER, NYSDEC Acting Section Chief
WILLIAM DAIGLE, NYSDEC Acting Bureau Director

ROBERT NUNES, Environmental Protection Agency
ROBERT MONTIONE, NYS Department of Health

ACTION
REPORTING SERVICE, LLC
Dey's Centennial Plaza, Suite 100
401 South Salina Street, Syracuse, NY 13202
315-428-9311 • 800-515-DEPO

LAWYER'S NOTES

Page	Line	

LAWYER'S NOTES

Page	Line	

Lynch

DIRECTOR LYNCH: Good afternoon. Can everybody hear me? My name is Ken Lynch, I'm the Regional Director or Region 7, New York State DEC. I want to welcome everyone to the public meeting on the Proposed Remedial Action Plan for the LCP site.

I would like to remind everyone that there is a sign up sheet going around, would ask each of you to sign that sign up sheet. There is also these comment cards that are available for anyone who wishes to make a formal statement for the record tonight. Or that can be used to submit a written statement tonight. We will also be accepting written comments to our office through August 4th, next month.

I'd like to introduce, before we start, who we have up front. On my far right is Don Hesler, he's with our remedial group in Albany.

Next to him with the remediation group is Bill Daigle. Right next to me here is Bob Nunes with the EPA. On my left here is Bob Montione with the New York State Department of

Health. Over here we have Rick Mustico who is with our Albany remediation office.

We're going to start off with a brief presentation explaining what is proposed for the remedial action plan. Then we'll have a short question and answer period. If you have any questions regarding our presentation, and then we will take formal statements from anyone who wishes to make one for the record. And I'm going to turn it over to Rick now.

MR. MUSTICO: Thank you, again. I would like to thank everybody for coming today. As Ken said, my name is Rick Mustico, I'm the project manager for New York State DEC out of the Albany office, central office.

What I would like to discuss here today, the main reason why we're here today is for the discussion of the proposed plan. So I'll be giving a brief site history, which will include not just the RI/FS, the Remedial Investigation Feasibility Study that we just completed for the site, but past site usage and different remedial actions that we've taken, remedial measures that we've taken thus far.

Hopefully all of you have gotten the handouts, if not there are several more up here. If you could look at Figure 1 right now. This little circle here is the site, right there. Basically it's a little south of the Fair Grounds, the State Fair Grounds. The site itself is located approximately 2 miles west of Syracuse.

It is in both the village of Solvay and the Town of Geddes. The line runs through the site. As I said it's south of the Fair Grounds and it's just a little north of an impact portion of the Erie Canal right there that runs right here.

The site, switch over to Figure 2 here. The site includes some man-made drainage features. We've got the West Flume which travels in an east to west direction through the site where it discharges to Geddes Brook under I-695. We also have a wetland, wetland areas, this is Wetland B here and Wetland A over here. Those are named Ponded Area. It's slightly less than 10 acres of federal wetland.

And the facility itself which is right here, is approximately 20 to 25 acres. The facility next door right here, that is the Kamine Syracuse co-generation facility. The West Flume itself after it discharges to Geddes Brook the surface water runs from Geddes Brook to Nine Mile Creek and then discharges into Onondaga Lake.

For some site history, in 1959 Allied Chemical Company constructed a chlor-alkali facility at this site and produced mainly caustic soda or sodium hydroxide, and they also produced chlorine. They did this using the mercury cell process and later on both the mercury and diaphragm cell processes.

Also between 1955 and 1969 Allied produced hydrogen peroxide, and this was manufactured with the use of hydrogen gas, which was an off product or byproduct from the production of chlorine, from the chlorine and sodium hydroxide.

Then in 1979 the plant was sold to LCP Chemicals. LCP operated the facility until

1988, and manufacturing at the facility ceased at that time. In 1992 LCP declared bankruptcy.

In 1994 Onondaga Lake and other areas which were known to contribute contamination to the lake were added to EPA's national priority list or NPL. LCP was included as a subsite to the Onondaga Lake NPL site.

Some remediation history. Back in 1990 there were some - this is Figure 3 - there was some PCB contaminated soils removed from the Eastern Rectiformer Area, and they were disposed of off-site.

And in 1995, March of 1995 Allied removed approximately 21,000 gallons of PCB contaminated oil and approximately 200,000 pounds of PCB contaminated electrical equipment from the Western Rectiformer Area, which is right there.

Then in October of 1995 the State of New York, which included New York State Department of Environmental Conservation and the New York State Attorney General's Office entered into a legal agreement with the then Allied Signal, now the Honeywell International Corp., to

Mustico

conduct a Remedial Investigation and Feasibility Study at the site.

The remedial investigation was to determine the nature and extent of the contamination. And the feasibility study basically uses the information gained in the remedial investigation to develop remedial alternatives for the site.

Field work for the remedial investigation included - began in October of 1995 and didn't end until April of 1998. Field work mostly consisted of sampling site soils, site groundwater, surface water and sediments. And in addition to those air and aquatic creatures basically including fish, were sampled.

The results of the RI, soils, the soil investigation included over 100 borings. The soil contamination, that major portion of the soil contamination is generally in the vicinity of the Mercury Cell Building for mercury. And for PCBs it is generally in the vicinity of the Western Rectiformer Area. The Mercury Cell Building is here, and again the Western Rectiformer Area is here.

Mustico

This dotted oval is the extent of elemental mercury, separate phase. When you take soil out of the ground you can see silver beads of mercury.

The groundwater investigation, groundwater quality and movement was determined by sampling 35 groundwater monitoring wells at the site. We determined that there are two groundwater systems at the site. There is an upper and a lower aquifer.

And we determined that mercury is the primary contaminant of concern in the groundwater and it's most frequently detected in the upper aquifer. The upper aquifer discharges to the West Flume, which is here on this site running from east or here on this figure running from east to west.

And as I mentioned before the water then would discharge do Geddes Brook, Nine Mile Creek and Onondaga Lake. Mercury was detected in the groundwater in the lower aquifer. However, it was detected only in three wells, and the downgradient wells, wells further down from those contaminated wells, were either -

mercury in those wells were either not detectable or they were below the New York State DEC groundwater quality standard for mercury.

The investigation of sediments in surface water, those two are primarily contaminated with mercury. As I said, the surface water from the site eventually discharges to Onondaga Lake through Geddes Brook and Nine Mile Creek.

Air quality investigation. Honeywell's consultants did perimeter air monitoring and they did not detect mercury contamination in the air at the perimeter of the site at various locations. Air monitoring however in the Mercury Cell Building right there, at times mercury in the air was detected above OSHA levels.

Fish and wildlife were also looked at. As far as fish samples from the site go, there was mercury, PCBs and hexachlorabenzene in fish. There were also mercury and PCBs detected in insects and crayfish obtained from the site as part of the remedial investigation.

Then in May of 1999 the Remedial Investigation report was finalized and the state received a revised feasibility study from Honeywell in June of 1999. The report itself however is dated May, 1999.

As far as other Interim Remedial Measures that have occurred at the site there's been several performed by Honeywell. In March of 1999 a laboratory packet removal was completed and this included segregating laboratory chemicals, packing them in drums and shipping them off-site for disposal.

In July of 1999 a couple tank IRMs were completed. Hazardous wastewater and sludge were removed from on-site tanks and this waste was disposed of off-site and then the tanks were power washed and cleaned.

A sewer IRM was conducted or began in December of 1999, and completed in March 2000. And the sewer IRM was conducted to cut off process sewers that were leaking into the West Flume, they were leaking contaminated water, mercury contaminated water into the West Flume.

And what that Interim Remedial Measure consisted of was collecting the water out of these sewers, digging out the downstream and downgradient end of the sewers, and plugging both the upstream and downwater gradient ends of the sewers and then backfilling the excavation areas with a soil betonite mixture. And what that did was, that prevented a preferential pathway for groundwater to migrate through the area that had just been excavated and filled.

Not only did we - there were approximately 13 pipes, some of them were leaking but we also had pipes that we excavated out that had the potential to leak mercury contaminated groundwater too. So we didn't just attack the pipes that were a problem, we attacked the ones that were a potential problem too.

A general building demolition Interim Remedial Measure began just in May of 2000. And what this -- this is ongoing now, it includes decontamination and demolition of most of the on site buildings and structures, which includes tanks.

And finally, as far as the Interim Remedial Measures go a cell building IRM commenced in July 2000 and that will consist of decontamination and demolition of the Mercury Cell Building and the Diaphragm Cell Building right next to it. And also this little building over here connected to the Mercury Cell Building, which is the Rectifier Building.

In October of 1999 the Department obtained some groundwater samples from an area north of the West Flume, over in this area. They had high concentrations of xylene. And xylene was one of the chemicals used in the hydrogen peroxide process, as I mentioned before. This process was conducted by Allied Signal.

This area of contamination isn't being addressed by this proposed plan or Record Of Decision, this area of contamination will be investigated under a separate operable unit and it will be OU 2. And then this will be done under a future Remedial Investigation and

Feasibility Study. And there will be a separate proposed plan and Record Of Decision for that.

Our overall remedial goal for the site is to meet all of the applicable or relevant and appropriate requirements. These are known as ARARs. And to be protective of both human health and the environment. And at a minimum the remedy selected should eliminate or mitigate all significant threats to public health and to the environment presented by the hazardous waste disposed of at this site.

The proposed plan itself suggests several remedies to address. The remaining site contamination, the contamination that will be left after the Interim Remedial Measures are completed.

Turn to figure 4. Under the proposed plan the state is suggesting, proposing removal of sediments, all the sediments from the West Flume from basically the facility boundary down to Geddes Brook with a clean up goal of 0.2 parts per million of mercury. And it's estimated that this would be all, basically all the sediments in the West Flume.

We're also proposing to remove the sediments in the wetland areas here and here. Again, down to 0.2 parts per million of mercury. And it is estimated that this would be, the excavation would be 3 feet of sediment throughout the wetlands.

The excavated sediment would then be brought on site and dewatered and then placed on site. It would have to pass testing or if it doesn't pass testing would have to be treated somehow, but it's assumed that it will pass testing and be able to be placed on site.

After, basically, the excavation will basically destroy the wetlands so after excavation is done we'll need to do a restoration and revegetation of the West Flume and the ponded area. As I said before, the ponded area is a federally -- is a federal wetland, we'll be having a wetlands assessment and restoration plan to restore the wetland. And we'll be having, after the remedy is complete, we'll be having monitoring of the

Mustico

surface water, monitoring of the sediments and also monitoring of the biota that would be in the -- these aquatic habitats, such as fish, crayfish, things like that.

Another part of the proposed remedy, this is Figure 5, is for site sewers. This is additional work to what I had discussed before for the Interim Remedial Measure. And this, is a part of this portion of the proposed remedy. The site sewers, catch basins and manhole structures would be filled prior to that.

The catch basins and manhole structures would be cleaned. And then after that then they would be filled with a flowable route, basically for better, lack of better term is concrete, that would fill up the sewers and seal them off. And then the manholes, structures and the catch basins would be sealed off with concrete. And that is -- that would occur in the shaded areas here. As you can see there is several feet, several linear feet of sewer piping that would be included as part of this proposed remedy.

Mustico

On Figure 6 the first thing I'd like to touch on here, part of the proposed remedy includes excavation of these brine mud areas here. It's approximately 3,200 cubic yards of brine mud. They would be excavated from this area and then placed on site. Then this area here would be backfilled with topsoil and seeded to prevent erosion and things like that.

On Figure 7 we're proposing soil excavation and treatment of approximately 4,500 cubic yards of soil that's contaminated with mercury. And that would be soil here, here and here. They would be, it's envisioned that they would be excavated, treated on site then placed back into the excavation areas.

And also this portion of the remedy would include the excavation and off-site disposal of some PCB contaminated soil, which is mostly in this western rectiformer area also, and also a little bit north of the West Flume right there.

You can turn back to Figure 6. As I was saying before, a lot of the soil and sediments would be placed on site. After this occurred then what we're proposing is a cap, which is this area here, which is almost all the facility. There would be a couple areas approximately 2.2 acres that would be outside of the footprint of the cap, that would be here in this box here and then right here in this little box here. They would be excavated down to approximately 3 feet. That soil would be placed underneath the cap and then that would be backfilled with approximately two feet of fill, approximately one foot of soil and -- topsoil, and then seeded.

Also to prevent groundwater from leaving the site we are suggesting hydraulic containment, you have upper and lower aquifers with subsurface barrier wall, that is the dash line here. And that would be keyed into a low, to impermeable till, which is approximately 50 to 55 feet below the ground surface, and that would also be done in concert with the cap.

The cap would be to prevent contact with the contaminated soil, prevent runoff, the rainwater from getting into -- into the

Mustico

ground. And then the slurry wall would be to prevent the groundwater from getting off-site. And that would allow -- what we would need to do is extract the groundwater from the inside of this cap slurry wall system so if any water -- if there were to be any problems with the system, water would come into the system and not leak out. So this water would need to be collected and treated.

And then the last portion of the proposed remedy would be for a deed restriction on future use of this portion of the site. And we would be doing that to - basically it's a human health protection, to prevent people from drinking the groundwater. Not that that's a foreseeable use because of public water, but also for the protection of the slurry wall and the protection of the cap, so we make sure that this system doesn't get damaged.

And then because we're leaving, we would be leaving contamination on the site under these alternatives CERCLA, the Conprehensive Environmental Response Compensation and

Liability Act requires that the site be reviewed every five years. And if justified by this review or assessment remedial actions remaining to be implemented to remove or treat the waste. And then again that's if warranted.

Basically what we're doing here with the proposed remedy, the preferred remedy is this remedy would mitigate, it would stop the migration of contamination to Onondaga Lake, to the Onondaga Lake system from the site. And that's what we're trying to do here. We're trying to cut off the contamination leaving the site and entering into the Onondaga Lake system.

The remedy would satisfy all of the ARARs. As I mentioned before ARAR, with the exception of the groundwater remedial action objective or ARAR, and that would be, that is basically to restore groundwater to drinking water standards. And in this case it wouldn't be really doable.

And then finally we believe that the remedy would -- our preferred remedy would provide an overall protection of human health -- to human health and the environment.

The cost of this proposed remedy, and this doesn't include -- does not include the remedial action measures that Honeywell has undertaken in the last few years, the present worth cost of this proposed remedial action would be 14.4 million dollars. And of that 12.4 million dollars approximately would be in capital costs. And there would be approximately $160,000 of annual operation and maintenance costs to Honeywell.

That's kind of it in a nutshell. Does anybody have any questions? That's a lot to throw out real quick. Do you have anything to add Bill or Don?

CHET MISZTAL: Chet Misztal, 126 West Beldon Avenue. Time lines, that's what I'm interested in. If this proposal turns into a plan, do you have time lines to establish when you're going to begin work, specifically the excavation?

MR. MUSTICO: The excavation of the soils?

Q&A Mustico - Misztal

MR. MISZTAL: Yes.

MR. MUSTICO: It will take approximately two years to implement the remedy. It will probably take about a year to -- maybe more to negotiate a legal agreement with Honeywell and get all of the design details worked out. So it's kind of dependent on -- it will be within those two years time be before the cap is built. But it will probably be after a year. So the question is, the sequence hasn't been worked out.

MR. MISZTAL: I understand.

MR. MUSTICO: Of what will be done first. I think we're hoping to do a few things at least at the same time. I was talking to Honeywell this afternoon, we could be excavating sediments from the West Flume at the same time we're excavating brine muds. They're really not too dependent on each other besides.

Q. (Misztal) How about season, any idea when it would be, fall, summer? I'm with the State Fair and my concerns are the dust that's going to be raised.

Q&A Mustico - Misztal

A. (Mustico) Yes, that would also be a human health concern. It's also a concern that we're dealing with for the building demolition. And we're requiring Honeywell to take precautions to prevent dust from migrating. Spraying the building down with water, things like that. The Fair is in August?

Q. Late August, early September.

A. I believe that Honeywell's contractors would want to work from as early as they can until as late as they can, but we would definitely take into consideration, we would have to take into consideration the concerns of that nature.

MR. MONTIONE: The dust issues we'll be monitoring on site and if that exceeds essentially above background levels they'll be required to address that immediately.

MR. MUSTICO: Right, as part of the remediation, we don't have just excavation of the soils but any type of excavation would be -- we would want to make sure we don't have problems with contaminants leaving the site.

Q&A Mustico - Albert

JEFF ALBERT: I came up here from Texas. Aren't you excavating wet materials to start with from the west flume and the wetlands?

MR. MUSTICO: The West Flume, the wetlands aren't really shown here except for a little bit. This one is shown. Yes, they are going to be - basically what we'll have to do with those is dewater first, the wetlands. But you're right they'll be wet. So you won't have the dust problem that you would say with excavating soils or demolishing buildings.

The West Flume, they will be excavating, plan calls for excavating the West Flume in segments, so what we would do would be to dam up a portion of the West Flume, send it around downstream and then work, excavate in the dry area.

MR. ALBERT: I just heard you say this would be put on site and dewatering, if they are that wet the chance of getting dust off is pretty slim.

MR. MONTIONE: There will be some other excavation other than the on-site stuff.

Q&A Mustico - Caveny

MR. MUSTICO: Right, you have excavation of brine muds, excavation of the highly contaminated soil, which would be treated on site. Then there is also emissions concerns, we want to make sure we don't have emissions problems from the treatment of the soils.

JIM CAVENY: Jim Caveny, Honeywell Director of Community Relations. Honeywell during this period will be working very closely with DEC, State Fair officials and the community in general and be very sensitive to the requirements that are needed in that once a year period State Fair.

MR. MUSTICO: Just to follow up on that too as far as emissions, be it from the treatment system or from dust or what have you, that type of information would need to be worked out as part of the remedial design. Our department of health would be involved with making sure that they were comfortable with what was -- what the design called for as far as dust control. And also EPA too would need to be involved in that.

MR. MONTIONE: I'm sure there are also other issues besides the State Fair, traffic, parking.

MR. MISZTAL: I understand it has to be done, just curious about the time, the time it's going to be occurring.

MR. MONTIONE: The dust probably is the only issue need to be coordinated with the State Fair.

MR. MISZTAL: Miscreated by wetlands contamination, water can carry contaminants molecular level. So it's just a question of when and what are you going to do about it.

LES MONTESORI: Les Montesori, (phonetic) Fayetteville. My question is about biological monitoring. I know there's been monitoring conducted, he's got some information about the levels of PCBs and others found in fish and other organisms. How long is biological monitoring going to be continued after completion of this? What happens if the biological indication is that there is still contamination?

Q&A Mustico - Montesori

MR. MUSTICO: As far as the biological monitoring, that would be at least five years. And then depending on what the results tell us that would help us to determine whether we need more or future biological monitoring, future biological monitoring. It could tell us we could cut back on biological monitoring but keep doing it less often. If there is still contamination we would have to look into where it's coming from. Is the system having a problem somewhere along the line?

You know, we would also be looking at the surface water and the sediments. So you know, we also look to see what the surface water sediment values tell us to see if there is contamination that's still around.

LES MONTESORI: The physical limits basically are the LCP site and you mentioned the wetlands and the West Flume. Are those primarily the areas that physically you're going to be investigating in terms of say the biological as well as the chemical impacts?

MR. MUSTICO: Yes, for this site the

aquatic areas would include the West Flume and the ponded areas, the wetlands. Downgradient as I said before, the West Flume discharges to Geddes Brook and Nine Mile Creek. Investigation of that, those two pieces of stream are being done under a different investigation and we'll have a different or an additional proposed plan and Record Of Decision. So there is still further work with those sediments that will be going on.

LES MONTESORI: Is that written up somewhere in terms of, do you have this public information about the LCP site but that is additional investigation, is that available for public information review?

MR. MUSTICO: Don, do you know what's available for the Geddes Brook, Nine Mile Creek remediation investigation?

MR. HESLER: If somebody put in a request to receive such information we could provide all the data that we have. The maps showing the locations as well as the data that's been generated from samples collected out there. There is not really any kind of text report.

Actually we do have a draft ECO report that we'll be getting in soon and draft interim report, that generally the draft reports are generally not releasable. But the fact reports, figures and data could be brought to the public upon request.

MR. MUSTICO: How about the work plan for the investigation for the work that was done?

MR. HESLER: The work plans, that could be provided.

MR. MUSTICO: The work plan basically states what will be done as part of the investigation, what samples will be taken where and for what, what types of contaminants. So that gives a good, gives you a good idea as to how the sediments samples were taken, how much surface water samples were taken, how many fish or biota samples were taken and what they were taken for parameters, chemical parameters that were looked at.

LES MONTESORI: You're saying this will be done for at least five years in the future.

MR. MUSTICO: Biota monitoring for this site, yes. I believe the proposed plan calls for at least five years of monitoring.

MR. HESLER: That's correct.

MR. MUSTICO: Then the monitoring would tell us what we need to do.

CAROL MANGO: I live here in Solvay but to get it clear for me, so the goal pretty much is to, there is no way possible to bring up the groundwater but you need to take all the contaminated soils and water and areas basically, like wall it up and trap it so it won't be pushed out into Onondaga Lake?

MR. MUSTICO: Basically what we're trying to do is there has been some waste that's left the facility proper, the facility itself, that's in the sediments.

We want to get that back in, keep it on the site and keep it so it doesn't get back out again, including in the groundwater. We want to prevent groundwater from escaping from the site, prevent it from contaminating surface waters including Onondaga Lake.

Q. (Mango) And that's pretty much through the cap?

A. (Mustico) Right, the main portion of that would be the cap and the slurry wall in concert with your hydraulic containment, pumping water from within out, so you would always have water wanted to get through the barrier wall, it would want to go in through the containment not out from the containment and escape out into the environment.

SUPERVISOR VINCENT PALERINO: I'm the supervisor here at the Town of Geddes. Probably Mr. Misztal and I are probably the only people in the room that don't have a Ph.D. So I just want to say that Allied, Honeywell probably 50 days ago in this very room talked to 70 or 80 residents prior to the May start up of this remediation work.

Did an excellent job of not only assuring the men and women who were employed in some of these operations but continue to live here that this was a significant commitment, clean up, and that the agency seated up at that table were going to use the latest technology

Spvsr Palerino

to make sure it happens to protect the environment that's left behind after the removal of LCP, the neighbor that didn't quite do his job when they left.

I just want to applaud the work of not only Jim's staff but the people from Allied who have come back to do what is the right thing to do. The residents here and Mr. Ferranti knows of which I speak, we have four or five generations of family that made a living here and hopefully their passing won't be because of some environmental mistake, it will be because we do the right thing for our children in the future.

And Geddes is still a nice place to live, it's the home of the New York State Fair, and as the gentleman said, millions of people visit here for tourism. And we hope that this one step in the clean up not only makes a better quality of life for people who are going to remain here, for our visitors on tourism for the future and that hopefully in our lifetime Onondaga Lake will resume to be the kind of area that people will visit and be applauding the clean up.

$14 million certainly got somebody's attention. And we know that a lot of the technology here is woven together to make sure that money is well spent. We just want to thank everybody who has taken their part here to do the job. And we hope that we count on all your agencies to make sure that all during this process the residents here are safe and hopefully pleased that the project is done, and we thank you for your effort.

MR. MUSTICO: Thank you.

DIRECTOR LYNCH: Any other questions?

JOHN FERRANTI: Could someone comment for me on what they believe the feasibility of maintaining a 55 foot slurry wall around this site is for such a long period of time? Because we're not talking 10 years, 15 years I'm not sure what we're talking in terms of years.

But I really don't have a lot of confidence in the integrity of a slurry wall of that magnitude for a long time. And I'd like to have someone comment on it.

MR. HESLER: John, I can speak to that. Slurry walls aren't all that, I mean they haven't been around for many many decades, so granted we go into this with the best engineering, best technology we can, best design work to get the best wall that we can.

If there were ever any release in the future they would surely be picked up by the detection system that would be installed around the wall. That would be looking at hydraulic monitoring, making sure the gradient is in the right direction. They can make certain the groundwater is not getting worse outside the water, but getting better. Because the groundwater outside is not impacted by that that's within.

If per chance there was monitoring information that indicated the wall has been breached, then Honeywell would have the responsibility, as part of the overall maintenance program, to correct that.

MR. FERRANTI: I'm glad you mentioned that Don because I think folks need to know that there is a complete monitoring program that's associated with that. Not only the biological that Les brought up but also the chemical, and that's really important, it's not just going to be put there and left alone.

MR. HESLER: That's the major flaw in the remedy. The only other thing to mention that slurry walls, while not around for many many decades they are being used at many many sites and we are getting more and more information about the success of them.

DIRECTOR LYNCH: Any other questions?

JEFF ALBERT: I had another one. You mentioned in the West Flume you're going to be removing all soils to 0.2 parts per million mercury level is that TCLP or total?

MR. MUSTICO: No, that's total.

JEFF ALBERT: Why so low?

MR. MUSTICO: Good question. During the remedial investigation we discovered a couple things. One, the upstream sediment value in the West Flume was 0.2 parts per million of mercury. New York State has sediment criteria guidelines and for different chemicals and for metals. For mercury it has two numbers, a severe effect level, and a lowest effect level. I believe the severe effect level is somewhere around 9, the lowest effect level is somewhere around, is 0.15 parts per million.

Basically there is no difference between 0.15 and 0.2. Especially when you're talking about a backhoe that would be excavating material.

Honeywell's consultants knew this too, so what they assumed was that they were going to excavate all of the sediments from the West Flume. As part of our ecological risk assessment for the remedial investigation we did some -- we did some modeling and tried to figure out a sediment clean up number.

That didn't work too well because we used methyl mercury values and they didn't convert over the well to mercury values and the number was -- there was a wide range of numbers. So it wasn't doable, it just didn't work out that way.

So what we said was, okay, well, we have background upstream and we've got a number that's extremely close to the lowest effect levels DEC sediment criteria guidance, we'll go with that. So that's where we came up with .2. And again as I said in the West Flume it's basically removing all the sediments in the wetlands.

What Honeywell consultants figured was three feet, and in both cases we'll be doing confirmatory sampling to make sure that we got what our goals are.

MR. FERRANTI: I think that's also approximately background for mercury.

JEFF ALBERT: They're talking about 0.2.

MR. FERRANTI: 0.2 is background.

JEFF ALBERT: Is the soil a lot above that right now?

MR. MUSTICO: On the site?

JEFF ALBERT: No, on the West Flume of the wetlands. If you're destroying the wetlands with the 0.2 parts per million mercury?

MR. MUSTICO: The soil or the sediments in the wetlands, I believe the highest concentration of sediments in both the wetlands and the West Flume was about 130 parts per million of mercury.

DIRECTOR LYNCH: Other questions? Anybody want to make a formal statement for the record tonight? Mr. Coburn.

DAVID COBURN: My name is David Coburn, I'm the Director of the Onondaga County Office of Environment. The brief oral testimony I am presenting tonight on behalf of Onondaga County represents a summary of the more detailed and technical written comments that the county will be submitting prior to August 4, 2000.

Let me state at the outset that Onondaga County does not currently support, but will not oppose the state proceeding with the proposed remedy. Not because the County is confident that the remedy will stand the test of time, but because addressing the contamination at this site is long overdue.

Coburn

The County does not believe the creation of a permanent mercury waste landfill on the shores of Onondaga Lake is desirable. While it is time for action, the County cautions that it would be foolhardy to assume that the proposed remedy represents a complete, final or lasting solution to the gross contamination at this site.

In 1995 Allied Signal agreed in a consent order to study this site in order to characterize the sources, types and extent of contamination. In May of 1997 Allied Signal submitted a First Draft Remedial Investigation Report or RI report. The first draft was rejected by the State. And before the State even completed its review of Allied's revised RI report Allied submitted a draft feasibility study presenting their proposed clean up plan for the site.

In 1998, because Allied either could not or would not revise the draft RI in a manner acceptable to the State, the State rejected Allied's Revised RI Report, took matters in to its own hands and revised the RI Report.

Since it does not appear in any of the three local Syracuse repositories let me read just a few sentences of what the state wrote in its determination to disapprove Allied's second Revised Remedial Investigation Report.

And I quote, "The Remedial Investigation Report prepared by Allied Signal does not properly describe the extent and transport of site contamination. Among other things the report understates the amount of mercury contamination originating at the site and fails to adequately describe the off-site migration of such contamination."

The State also wrote in its determination to disapprove the report, and I'm quoting again, "The Remedial Investigation Report is inadequate because of substantial deficiencies in its description of contamination at and near the site and substantial deficiencies in its assessment of the risks to human health and the biological community posed by such contamination. The Remedial Investigation Report did not accurately and conservatively assess risks to human health, underestimated

Coburn

potential risks to the biological community, and did not provide adequate information for remedy selection and design."

Of concern to Onondaga County, to our knowledge, no additional data has been collected and the deficiencies in the RI Report that were properly identified by the State remain uncorrected.

The LCP Bridge Street site, like virtually all of the Allied sites the County has been afforded the opportunity to review is grossly contaminated. As with the other Allied sites the County has reviewed, this site has not been well characterized; investigators do not know where all of the contamination is migrated.

But as with the other Allied sites currently under investigation, it is known that contamination has and continues to migrate off-site and impact Onondaga Lake.

The County agrees with the state's conclusion that the RI Report failed to adequately characterize the LCP Bridge Street site, largely due to its reliance on too little data. The County agrees with the State's conclusion that the data on which the RI Report is based fails to provide adequate information for selecting or designing a remedy. Unfortunately, in spite of the time that has passed and the effort expended, the County cannot overcome its apprehension that the proposed remedy is not complete or a lasting solution to the contamination problems at this site.

The County is concerned that the capped mercury waste landfill the State and Allied have opted for will be no more than a $14 million carpet under which years of monumental contamination will be swept. The County fears that in the long run this remedy will not prevent the migration of contaminants off of this site and ultimately into Onondaga Lake or its tributaries.

Recently, eight years after the decision was made to cap contaminants at the Shattuck Superfund Site in Colorado, the United States Environmental Protection Agency decided it is now necessary to excavate and haul away the waste underlying the cap at that site. This decision was made out of concern that the cap might fail in the future. It is this scenario and this uncertainty that the County does not want to see repeated here.

The County is disappointed that on this, the first of a number of Allied site cleanups, Allied Signal is attempting to set the standard for cleanup so low. The County does not agree with the suggestion that this site, underlain by mercury waste, will ever be capable of being redeveloped to its full potential and only hopes that this course of action does not set a precedent for the cleanup of other Allied sites.

Finally, in closing, I'm compelled to note for the record what a terrible wrong Allied is attempting to perpetrate against this community. At this very moment Allied continues to prosecute a lawsuit against the County in an effort to force taxpayers to pay the cost of cleaning up the thousands of pounds of mercury contamination Allied knowingly poured into Onondaga Lake and its surrounding environment.

The taxpayers are already spending $380 million to upgrade the Metro wastewater treatment plant and collection system to improve water quality in Onondaga Lake. And it would be a terrible injustice if the taxpayers had to pay millions of additional dollars to clean up the hundred years of pollution Allied is responsible for. Thank you.

DIRECTOR LYNCH: Any other comments for the record? No other comments. Questions? Anything else from us?

MR. HESLER: No.

MR. MONTIONE: If anybody wants to talk after the formal meeting breaks up we'll be around for a while.

DIRECTOR LYNCH: We all will.

MR. DAIGLE: We will be preparing a response and summary to those comments we received tonight as well as those we receive between now and the time of the written comment period.

DIRECTOR LYNCH: Written comments

will be accepted through August 4th. Thank everyone for coming and again we'll be around too for a little while if you have any further questions.

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CERTIFICATE

This is to certify that I am a Certified Shorthand Reporter and Notary Public in and for the State of New York, that I attended and reported the above entitled proceedings, that I have compared the foregoing with my original minutes taken therein and that it is a true and correct transcript thereof and all of the proceedings had therein.

John F. Drury

John F. Drury, CSR, RPR

Dated: July 31, 2000