# Mercury Refining Superfund Site

Towns of Guilderland and Colonie, Albany County, New York

**March 2008**

## EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Mercury Refining Superfund Site (Site), identifies a preferred remedial action, and provides the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). The preferred remedial action for contaminated soil, sediment and groundwater described in this plan addresses human and ecological risks associated with mercury at the Site. The preferred action, if selected, would constitute the final remedy for the Site.

This Proposed Plan is being provided as a supplement to the Remedial Investigation and Feasibility Study (RI/FS), to inform the public of the remedy preferred by EPA, and to solicit public comments on all of the remedial alternatives evaluated. Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), and Section 300.430(f) of the National Oil & Hazardous Substances Pollution Contingency Plan (NCP) requires EPA to solicit public comments on proposed plans. The remedial alternatives summarized here are more fully described in the FS report which is contained in the Administrative Record file for the Site.

EPA's preferred remedy for the Mercury Refining Site includes excavation and off-Site disposal of mercury-contaminated soils that are shallow and accessible and the use of solidification/stabilization technology for deeper contaminated soils and soil commingled with contaminated groundwater. Solidification/stabilization refers to treatment processes which mix or inject treatment agents into the contaminated material to immobilize the mercury. This results in chemical bonding of the mercury to reduce its solubility. This also limits the contact of groundwater and stormwater with the mercury by reducing soil permeability and reducing the exposed surface area of the contaminants which may come in contact with the groundwater and stormwater.

EPA's remedy also includes removal of contaminated sediment, dewatering of the sediment and transportation and disposal of the dewatered sediment to an off-Site landfill.

The remedy described in this Proposed Plan is the *preferred* remedy for the Site. Changes to the preferred remedy may be made if public comments or additional data indicate that such a change will result in a more

***Mark Your Calendar***

***Public comment period:***
**March 30, 2008 – April 30, 2008**
U.S. EPA will accept comments on the Proposed Plan during this public comment period.

***Public Meeting:***
**April 22, 2008 from 7:00 to 9:00 P.M.**
U.S. EPA will hold a Public meeting to explain the Proposed Plan. The meeting will be held at

**Fuller Road Firehouse**
**1342 Central Avenue**
**Colonie, New York 12205**

**For more information, see the Administrative Record file, which is available at the following locations:**

William K. Sanford Town Library
629 Albany Shaker Road
Albany, NY 12211

*Telephone*: (518) 458-9274
*Hours*: Please call for hours.

NYSDEC Central Office
625 Broadway
Albany, NY 12233-7016

*Telephone*: (518) 402-9775
*Hours:* Monday-Friday, 9:00 A.M. - 5:00 P.M.
Please call for an appointment.

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308
*Hours:* Monday-Friday, 9:00 a.m. - 5:00 p.m.

Written comments on this Proposed Plan should be addressed to:

Thomas Taccone, Project Manager
United States Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866
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appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments on the Proposed Plan.

***COMMUNITY ROLE IN SELECTION PROCESS***

EPA relies 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, this Proposed Plan, along with the supporting Remedial Investigation and Feasibility Study Reports, have been made available to the public. A public meeting will also be held at the Fuller Road Firehouse, in Colonie, New York on April 22, 2008 from 7:00 P.M. to 9:00 P.M to present the data gathered during the remedial investigation and feasibility study for the proposed remedial actions and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

***SCOPE AND ROLE OF ACTION***

This Proposed Plan presents a long-term remedial action which focuses on cleanup of the entire Site. This Proposed Plan describes EPA's preferred action to address soil, sediment and groundwater at the Site which are contaminated with mercury. EPA has designated this action as the first and final operable unit for Site remediation.

## SITE BACKGROUND

**Site Description**

The Site includes the Mercury Refining Company, Inc. (MERECO) property, which is located at 26 Railroad Avenue on the border of the Towns of Guilderland and Colonie, Albany County, New York. This approximately 0.68-acre lot was used as a mercury reclamation facility. Figure 1-2 attached hereto shows the property location and Site plan, respectively. The areas to the north, east, and west of the MERECO property are principally light industrial with some commercial use and warehousing. The Albany Pallet and Box Company (Albany Pallet) lies to the north of the property, Allied Building Products Corporation (Allied Building) is located east of the property and Diamond W Products Incorporated (Diamond W) is located west of the property. A CSX Railroad right-of-way is located south of the property. The closest residence is located approximately one-quarter mile north of the Site.

The Site, is defined by the extent of contamination associated with MERECO's past reclamation processes and includes the MERECO property, the western portion of the Allied Building property, the southern portion of Diamond W Products, the southern portion of the Albany Pallet property, and a portion of the unnamed tributary to Patroon Creek (the Unnamed Tributary), which is located immediately south of the MERECO property.

The Unnamed Tributary received and continues to receive, contaminated stormwater drainage from the southern edge of the MERECO property. Approximately 1,600 feet downstream of the MERECO property, the tributary converges with Patroon Creek. Approximately one mile downstream of the MERECO property there is a dam in the creek which forms the I-90 Pond. The Creek flows over the dam's spillway and enters the Hudson River approximately 5 miles from the stormwater outfall. The dam is owned and maintained by the City of Albany, New York.

The northeastern portion of the MERECO property is currently covered by a concrete and asphalt cap which is a single layered cap. The cap was installed to reduce the infiltration of rain water and to prevent direct contact with underlying soils which are contaminated with mercury. The southwestern portion of the property is covered by a single layered clay cap which was installed after the excavation and disposal of mercury and polychlorinated biphenyl (PCB) contaminated soils in 1985. The property currently includes two buildings, and is surrounded by a chain link fence. One of the buildings, called the Phase 1 Building, houses the past and current operation of MERECO. The other building, called the Container Storage Building, has been used to store incoming material for processing in the Phase 1 Building. A commercial asphalt roadway and a wide business driveway provide access to the MERECO property.

**Site History**

MERECO was founded in 1955. The facility used retorts to reclaim mercury from mercury batteries and other mercury-bearing materials, such as thermometers, fluorescent bulbs, spill debris, and dental amalgams. The recovered mercury was then refined and marketed. The retorts were contained in the old Retort Building which was located just north of the Container Storage Building (see figure 4-1). MERECO also collected and brokered silver powders and small quantities of other precious metals.

Before 1980, waste contaminated with mercury was dumped over an embankment of the Unnamed Tributary. From 1980 to 1998, waste batteries and other mercury-containing materials were stored in drums on wooden pallets within paved areas of the property prior to disposal.

The results of initial sampling performed by the New York State Department of Environmental Conservation's (NYSDEC) Division of Fish and Wildlife in 1981 and 1982 indicated the presence of PCBs and mercury contamination in soils on the southern edge of the MERECO property and on the embankment to the Unnamed Tributary. Results of further sampling confirmed the presence of these contaminants in soils at the MERECO property, and mercury contamination in Creek sediment. In 1983, the Site was placed on the

federal National Priorities List (NPL). At that time, the NYSDEC assumed the role of lead agency for directing and overseeing Site investigation and cleanup.

Under a September 1985 judicial Consent Decree with New York State, MERECO excavated and removed approximately 2,100 cubic yards (cy) of mercury-contaminated soil and debris, and 300 cy of PCB-contaminated soil, from contaminated areas at the MERECO property and from the (former) Owasco River Railway property (now CSX railroad) south of MERECO's property line. The excavated area was backfilled with clean fill and covered with a clay cap. An unknown amount of contaminated soil was also found beneath the former Retort Building and, after being sealed with plastic sheeting, was left in place. A concrete cap was also poured over the portion of the property which now serves as the floor of the Container Storage Building, which was constructed in 1989.

On June 9, 1989, MERECO entered into an Administrative Order on Consent under State law with NYSDEC. The 1989 Order called for identification and remediation of mercury-contaminated areas, both on and off of the MERECO property, and a program to evaluate and abate migration of mercury and other contaminants from the facility, including mercury emissions from both permitted (the retorts) and fugitive air sources. As part of these evaluations, MERECO was required to conduct an investigation of Patroon Creek.

On September 14, 1989, a fire destroyed the Hand Shop building which was located on the eastern portion of the property, and which was used for storing and housing mercury purification operations and for processing silver oxide batteries. Approximately 224 cy of charred building material and destroyed equipment debris were shipped from the property for secure land burial. Soil samples collected in November 1989 in the former Hand Shop building area identified hot spots of mercury contamination which were subsequently removed. The Hand Shop building was replaced in 1991 with the "Phase I" building. This building is currently used by MERECO as an office and for processing incoming material which contain precious metals.

Another fire occurred on April 10, 1991 at the Break Trailer which was located in the western portion of the property. The fire also spread to an adjacent storage trailer. The Break Trailer had been used as a changing area/break room for employees. One-third of the trailer was also used for manual sorting and weighing of incoming mercury-containing materials to be processed.

MERECO's response to the 1989 Order was considered inadequate by NYSDEC. Another Order on Consent was signed by MERECO and NYSDEC in February 1993, under State law. The 1993 Order called for the establishment of a schedule for the completion of all activities, a permanent remedy for the abatement of emissions and migration of pollutants, quarterly groundwater monitoring for ten years, remediation/removal of contaminated soils beneath the old Retort Building and long-term monitoring of areas surrounding the Site. The 1993 Order also involved payment for civil penalties and natural resource damages.

Construction of the new retorts was completed in February 1994. The retorts were installed in the Phase 1 Building which was fitted with state-of-the-art air pollution control equipment to control emissions from the retorts. In the fall of 1994, MERECO demolished the old Retort Building and installed an asphalt and concrete cap over the area. At this time, MERECO also dismantled a stainless steel trailer that had been located just north of the Retort Building. In 1995, MERECO conducted a soil investigation beneath the asphalt and concrete cap. The investigation found visible free phase mercury in the soil from just below the concrete to depths of approximately 13 feet and 18 feet.

MERECO received a Hazardous Waste Corrective Action Management Permit pursuant to the Resource Conservation and Recovery Act (RCRA) from NYSDEC on December 31, 1996, for controlling the generation and storage of waste at the MERECO property and for completing the investigation and remediation of contamination at the property and surrounding areas. All unfinished work required by the previous consent orders were subsumed into the permit.

From 1997 through 1998, MERECO evaluated potentially suitable corrective measures for the soils beneath the old Retort Building and hired Kiber Environmental to conduct treatability studies for two potentially suitable technologies: physical treatment and in situ (in place) stabilization/solidification. In April of 1998 the NYSDEC approved MERECO's workplan for implementing the treatability studies.

In November 1999, after unsuccessfully working with MERECO to fully comply with the terms of its RCRA permit, NYSDEC requested that EPA take over as lead agency for the Site under CERCLA. In September 2000, EPA initiated a RI, which, while based on data collected under NYSDEC as the lead agency, also generated additional data to complete a full characterization of the Site.

**Summary of Data Collected while NYSDEC Served as Lead Agency**

The following is a summary of the various investigations of the Mercury Refining Site performed under the direction of the NYSDEC from 1981 to 1999. Chemical concentrations reported below are in parts per billion (ppb) or parts per million (ppm).

In 1981, 1983, 1984, and 1985, samples were collected from sediment of the Unnamed Tributary, Patroon Creek, and the I-90 Pond and were analyzed for total mercury. In 1981, the NYSDEC collected sediment samples from the bank of the Unnamed Tributary at the stormwater sewer outfall. The samples were not tested

for mercury content; however visual inspection of the samples revealed globules of mercury in the samples. In 1983, mercury concentrations in the Unnamed Tributary sediment ranged from 4.7 to 8.6 ppm. In 1984 and 1985, mercury concentrations in the Unnamed Tributary, Patroon Creek, and the I-90 Pond ranged from not detected to 2.3 ppm.

Four groundwater monitoring wells were installed at the Site in 1985 and are still present. The wells were sampled quarterly by MERECO from 1991 to 2001. During this period, the concentration of mercury in the groundwater from the downgradient wells ranged from not detected to 54 ppb, which was detected in monitoring well OW-1. This well was sampled again during EPA's RI but mercury was not detected.

The Wildlife Pathology Unit of the NYSDEC conducted a major study in 1989 which included the MERECO property, portions of the properties which border MERECO, the Unnamed Tributary, Patroon Creek, and the I-90 Pond. Sediment samples collected near the stormwater outfall, which discharges from the MERECO property to the Unnamed Tributary, revealed mercury concentrations from 3.2 to 154 ppm. Samples collected from just south of the railroad tracks and the Allied Building property contained mercury which ranged from 1.99 to 16 ppm. The highest mercury in the soil ranged from 275 to 497 ppm which was found to the east of the property at and just beyond the fence line with the Allied Building storage yard. Soil samples collected at a greater distance from the property perimeter were much less contaminated (i.e., less than 10 ppm).

MERECO collected surface and subsurface soil samples from its property in 1995 pursuant to the 1993 Order. Additional samples were collected in 1997 from the properties surrounding the MERECO property, pursuant to MERECO's New York State hazardous waste corrective action permit. Visible mercury contamination was observed in soil from several sample locations which extended to a depth of at least 30 feet below the ground surface (bgs) on the MERECO property. For the 1997 investigation, soil samples were collected from 0 to 6 inches and 6 to 12 inches bgs. Mercury concentrations were highest in samples from locations bordering the MERECO property to the east and north. The highest mercury concentration (150 ppm) was collected at 6 to 12 inches bgs from a sample east of the old Retort Building.

In 1999, NYSDEC analyzed 59 tissue samples from fish caught along the length of Patroon Creek. Mercury was detected in all samples at concentrations ranging from 0.007 to 0.914 ppm.

**Site Geology/Hydrogeology**

According to the U.S. Department of Agriculture's 1992 *Soil Survey of Albany County, New York,* the soils at the MERECO property are classified as Urban Land. This soil classification describes nearly level to strongly sloping areas where asphalt, concrete, buildings, or other impervious materials cover more than 85 percent of the land's surface. Slopes range from 0 to 15 percent. Included in this unit are small areas of mostly miscellaneous fill. The unit has very few areas that retain the original soil characteristics for that location due to its disturbance during building activities.

The undeveloped area south of the MERECO property, south of the railway, consists of soils classified as Udipsamments. This soil classification describes nearly level to very steep areas of disturbed sandy soils. Slopes range from 0 to 45 percent. These soils are well drained to somewhat excessively drained. These soils typically consists of about 40 percent cuts of mostly brown or yellowish-brown loamy fine sand and sand or Colonie or Elnora soils; 30 percent fills of mixed sandy material moved from the upper part of the Colonie or Elnora soils; 10 percent Urban land; and 20 percent other soils.

Site data for the MERECO property also indicates that groundwater flows generally in a southerly direction toward the Unnamed Tributary which flows into Patroon Creek. Three rounds of groundwater levels were collected from December 2001 to March 2002 as part of EPA's RI. The water level data showed that the hydraulic gradient doubled from the December readings to the March readings, indicating that this zone is also strongly influenced by surface runoff and precipitation.

The water level measurement data also reveal a vertical downward gradient such that the gradient could promote the downward migration of any mercury dissolved in the groundwater.

## RESULTS OF EPA's REMEDIAL INVESTIGATION

Because only limited documentation on the quality of the historic data is available, EPA could not use these data as a basis for determining the nature and extent of Site contamination. However, EPA did use the historic data as a guide for determining the number and location of samples for the RI.

EPA conducted the RI to determine the nature and extent of contamination at the Site. The RI Report, dated February 28, 2003, describes the field activities and findings of the RI in detail. The RI included the following activities:

- Sampling of soil including samples from shallow borings and deep soil borings both on and off the MERECO property;
- Sampling of surface water and sediment of six catch basins located on the MERECO property;
- A groundwater investigation, including monitoring well installation, monitoring well development, groundwater sampling and a surface water-groundwater interaction study;

- Sampling of the surface water and sediment of the Unnamed Tributary to Patroon Creek which runs along the southern edge of MERECO, Patroon Creek and the I-90 Pond;

- A supplemental investigation of the groundwater to further define the lateral and vertical boundaries of mercury contamination at the property; and

- A baseline ecological risk assessment conducted to determine the potential effects posed by mercury contaminated sediment on ecological receptors in the Unnamed Tributary, Patroon Creek and the I-90 Pond.

## Nature of Contamination

### Catch Basins

Mercury was detected in all of the catch basin sediment samples. Methyl mercury was detected in three of the catch basins at concentrations ranging from 61 ppb to 263 ppb. Although the methyl mercury to total mercury ratios were low, ranging from 0.1 to 1 percent, some methylation of mercury is occurring in the sediment. Methyl mercury was widely distributed in the catch basins, indicating that the catch basins provide a suitable environment for methylation of mercury. Methyl mercury is more toxic than metallic mercury and more readily bioaccumlates and biomagnifies up the food chain. Although a number of other organic compounds exceeded sediment screening criteria, they are not believed to be associated with Site activities. The organic contaminants detected are likely derived from runoff associated with the industrial nature of the overall area and with previous applications of pesticides.

One catch basin is still used to collect runoff. Effluent from this catch basin is discharged directly to the Unnamed Tributary. Contaminated water continues to discharge from the effluent pipe connected to the inactive catch basin system into the Unnamed Tributary. Analysis of surface water samples collected for the RI detected mercury ranging from 5.9 ppb to 36.8 ppb. All the other catch basins have been closed; however, the closure method does not prevent mercury from reaching the Unnamed Tributary. Based on contaminant levels detected in the active catch basin and the discharge pipe, the catch basin system remains a pathway for mercury to enter the surface water and sediment.

### Surface Water

In 2001 and 2004, two rounds of samples were collected from Inga's Pond and Rensselaer Lake, both upstream of the MERECO property, and from the Unnamed Tributary, Patroon Creek, and the I-90 Pond which are downstream. Figure 1-2 shows the location of these water bodies. The Unnamed Tributary flows from Inga's Pond. Patroon Creek flows from Rensselaer Lake which is upstream of the confluence of the Unnamed Tributary and the Creek. For both rounds, samples were collected upstream of the Site to provide background data and downstream of the Site. Surface water samples were analyzed for organic and inorganic parameters. The samples also were analyzed for total and methyl mercury.

Surface water samples rarely exceeded the organic or inorganic screening criteria. The maximum concentration of seventeen metals decreased in 2004 when compared to 2001. Mercury was not detected above its screening level in 2001 or 2004. Methyl mercury, which has no screening value, was detected at maximum concentrations of 0.86 ppb in 2001 and 0.094 ppb in 2004.

### Sediment

Sediment samples were collected from the Unnamed Tributary, Patroon Creek, and the I-90 Pond in 2001. Approximately one-half of the samples were co-located with the surface water samples. Two samples were collected upstream of the Site in the Unnamed Tributary and Patroon Creek to provide background concentrations. Sediment samples were analyzed for full organic parameters, metals and total and methyl mercury.

Mercury was detected at 38 ppm in the surface sediment which receives stormwater discharge from the MERECO property. Mercury was also detected in the surface sediment of the I-90 Pond at 1.2 ppm. Iron, lead, copper, manganese, and zinc also exceeded screening criteria both in downstream samples and background samples. Methyl mercury was detected in all sediment grab samples. Methyl mercury concentrations ranged from 1.3 ppb to 4.78 ppb in the I-90 Pond and 0.84 ppb to 12.61 ppb at the outfall.

Additional sediment samples were collected in 2004 from the following surface water bodies: Inga's Pond, Rensselaer Lake, and the Unnamed Tributary, upstream of the MERECO property; and the Unnamed Tributary, Patroon Creek and I-90 Pond, downstream of the MERECO property. Figure 1-2 shows the location of these water bodies.

Overall, the sample results for the 2004 samples were similar to the 2001 results. There was a general decrease in the surficial concentration of metals in the I-90 Pond including mercury from 2001 to 2004. The surficial concentrations ranged from not detected to 0.86 ppm. The decrease in surficial sediment concentrations could be attributable to sedimentation, stream flow, a decrease in source materials and the passage of time. The 2004 sampling indicated elevated concentrations of mercury in the I-90 Pond in sediment at depths of 2 to 3 feet. At these depths concentrations ranged from 0.16 ppm to 2.6 ppm.

With regard to PCBs, results from the samples collected in 2004 of the Unnamed Tributary, Patroon Creek and the I-90 Pond were similar to the results obtained in 2001. Results for 2001 ranged from 0.41 ppm (Aroclor

1260) in the background (upstream) segment of the Unnamed Tributary to 4.4 ppm (Aroclor 1260) in sediment collected from the I-90 Pond. The 2004 results ranged from 0.68 ppm (Aroclor 1254) in sediment from the upstream Inga's Pond to 1.1 ppm (Aroclor 1260) in the downstream I-90 Pond. In 2004, another sample was collected next to the location from where the 2001 sample detected the PCB Aroclor 1260 at a concentration of 4.4 ppm. This 2004 sample did not detect PCBs. For the 2001 and the 2004 sampling events, 4.4 ppm of Aroclor 1260 was the highest concentration of PCBs detected. Aroclor 1260, however, was not detected in the soils at the MERECO property above its screening level. This along with the detection of Aroclors 1260 and 1254 up and down stream of the MERECO property, has led to EPA's conclusion that PCB contamination detected in the sediment is not attributed to the Site.

EPA performed an analysis of the potential for the erosion of the uncontaminated surface layer and resuspension of the deeper, contaminated sediment in the I-90 Pond, during flood events such as a 100-year storm. The analysis indicated that sediment is unlikely to become resuspended during a major storm event, using the critical water velocity and shear stresses which would be induced by such a storm. Also, the top two feet of sediment in the I-90 Pond are relatively uncontaminated. This buildup of sediment in the pond supports the fact that the pond is a depositional environment, so that the possibility for contaminated sediment migrating down stream of the pond is remote.

**Fish Tissue**

Fish samples were collected in 2001 to support the ecological risk assessment and the human health risk assessment. Because results from the 2001 effort indicated a potential ecological impact on fish and other biota, additional fish samples were collected in 2004 as part of the baseline ecological risk assessment. The samples were analyzed for full organic parameters, metals and total and methyl mercury.

Pesticides detected in fish samples are not known to be Site-related and their concentrations are similar in both background and downstream samples which indicates that the Site is not a source of pesticide contamination. Regarding PCBs and Aroclor 1260, in particular, the highest concentrations detected in fish downstream and upstream of the Site detected were 410 ppb (I-90 Pond) and 98 ppb (Inga's Pond). The highest concentration of Aroclor 1254 found in fish caught upstream of the Site was 80 ppb; the highest level of Aroclor 1254 detected downstream of the Site in the I-90 Pond was 130 ppb. Aroclors 1254 and 1260 were commonly detected in all fish samples

As mentioned above, data collected while the NYSDEC served as lead agency indicated concentrations of mercury in fish which ranged from 0.007 ppm to 0.914 ppm within the lower reaches of Patroon Creek. The RI detected mercury in fish tissue at 0.11 ppm in a sample from the I-90 Pond and 0.22 ppm and 0.13 ppm in two fish caught between MERECO and the I-90 Pond. Mercury concentrations in fish collected for the baseline ecological risk assessment ranged from 0.048 ppm in fish collected from the background portion of the Unnamed Tributary to 0.175 ppm in fish from the Unnamed Tributary.

Generally, mercury found in fish tissue is in the form of methyl mercury, which is available for biomagnification in the food chain. Biomagnification is the process whereby small concentrations of contaminants, such as mercury, increase through the consumption of bioaccumulated chemicals contained in smaller prey. Fish tissue were sampled and analyzed to evaluate the potential for ecological and human health effects.

**Groundwater**

In 2001, five deep monitoring wells (MW-01D, MW-02D, MW-05D, MW-06D, and MW-07D) and one shallow monitoring well (MW-07S) were installed. See figure 2-1 attached hereto. The wells were located to monitor groundwater quality upgradient and downgradient of the Site. Two deep wells were installed on-Site and nested with the existing wells OW-1 and OW-2. One deep well, MW-5D, was installed in the center of the asphalt and concrete cap in the area with the greatest amount of free, elemental mercury contamination. A deep well (MW-07D) and a shallow well (MW-07S) were installed upgradient in a background location and a deep well was installed south of the Unnamed Tributary in a downgradient location (MW-06D).

Three rounds of groundwater samples were collected from the four existing wells and six newly installed wells. All samples were analyzed for low detection levels of volatile organic compounds (VOCs), semi-VOCs, pesticides, PCBs, and inorganic chemicals.

The first two rounds collected samples from all ten wells and were conducted in 2001 and in 2002. The third round of sampling, which occurred in 2003, included sampling of monitoring well MW-5D and the four existing monitoring wells and additional vertical profile sampling. Vertical profile groundwater samples were collected to define further the extent of groundwater contamination using direct push technology and were only analyzed for mercury.

The three rounds of groundwater monitoring well samples detected mercury in MW-5D at 11.1 ppb, 19.8 ppb and 22.5 ppb which exceeded the New York State Water Quality Standard (NYSWQS) limit of 0.7 ppb and the federal and New York State maximum contaminant level (MCL) for drinking water of 2 ppb. Manganese was detected upgradient from not detected to 3,470 ppb. No MCL has been established for manganese. With the exception of OW-3, downgradient samples ranged from not detected to 1,690 ppb of manganese. The New York water quality limit for manganese is 300 ppb. Arsenic was detected at concentrations which ranged from not

detected to 19.2 ppb, exceeding the federal and New York State MCL of 10 ppb.

For the three rounds of sampling, samples collected from monitoring well OW-3 detected the highest concentrations of manganese (45,800 ppb), iron (60,500 ppb), sodium (65,300 ppb) and arsenic (19.2 ppb). Mercury was not detected in OW-3. Manganese and arsenic were also detected in the soil consistently within a narrow range of concentrations on-Site and off-Site. On- and off-Site concentrations of these minerals were similar. Also, neither arsenic nor manganese were found at elevated concentrations in those areas on the property which have elevated concentrations of mercury (i.e, the soil beneath the old Retort Building). Manganese was detected in the soil at 349 ppm to 575 ppm. Arsenic was detected in the soil at concentrations which ranged from 2.6 ppm to 7.8 ppm. The upper ranges slightly exceeded the Site background concentrations for manganese and arsenic of 559 ppm and 6.9 ppm, respectively. Since on-Site concentrations of manganese and arsenic are consistent with background concentrations and these minerals are naturally occurring in the soil and the aquifer, EPA believes that manganese and arsenic are not Site-related. However, this will be confirmed by additional sampling which will be conducted during the pre-design phase of the selected remedy for the Site.

The highest total mercury concentration observed in the vertical profile samples was 901 ppb, which was located approximately 40 feet downgradient from MW-05D (see figure 2-1). The profile samples collected around the perimeter of the MERECO property indicate that the mercury contaminant plume is primarily contained within the boundaries of the MERECO property.

Based on analytical results collected during the vertical profile event and groundwater sampling for rounds 1, 2, and 3, the lateral and vertical extent of the groundwater plume has been adequately characterized and defined. Groundwater contamination does not appear to be migrating off-Site, primarily due to the low solubility of elemental mercury in water and mercury's propensity to form complexes and sorb to aquifer materials. The distribution of contamination appears to be related to MERECO work areas, where mercury releases occurred. A small portion of the plume is also shown to be on the adjacent Allied Building property, to the east of MERECO.

**Soil**

The soil investigation program consisted of surface and subsurface soil samples. Surface soil samples were collected from areas downwind of MERECO's retort furnaces in the prevailing wind direction (southeast). Subsurface and surface samples were also collected at the MERECO property and at the adjoining properties. The samples were analyzed for organic and inorganic parameters.

Because of the possibility of air deposition of mercury from the operations of MERECO, samples were collected from an area to the southeast of the MERECO facility, which is used for recreation, as evidenced by an All Terrain Vehicle (ATV) trail. During dry weather, ATVs generate significant quantities of dust, which increases the potential for human exposure and migration of contaminants via the air pathway. Mercury, manganese and arsenic exceeded their screening criterion in the off-property surface soil samples. Mercury was detected at concentrations which ranged from 0.24 ppm to 1.3 ppm. Manganese was detected at concentrations which were below the screening criteria of 340 ppm to 442 ppm and, arsenic was detected at concentrations which were below the screening criteria of 2.4 ppm to 6.9 ppm However, as indicated above, concentrations of manganese and arsenic which were detected on the ATV trail, the MERECO property and the adjoining properties are consistent with the background concentrations and thus are naturally occurring minerals. These minerals also were not found in high concentrations in those areas of the Site which are contaminated with mercury.

The concentrations of mercury detected at the ATV trail were not high enough to contribute to air pathway risks. The mercury contamination that was detected is most likely related to wet and dry deposition of mercury emissions from historical Site operations.

Inorganic contaminants were widely distributed in subsurface soil samples collected on the MERECO property. The highest detected concentrations of mercury, were observed in samples collected from four locations (MW-5D, SBD-02, SBD-03, and SBD-04), all within 100 feet of the eastern border of the property. The highest concentration of mercury, 38,000 ppm, was detected in the sample collected approximately 10 feet below the ground in the boring located for the installation of monitoring well MW-05D. Beads of elemental mercury were observed in samples from MW-05D down to a depth of 56 feet below ground surface (bgs). In addition to MW-05D, mercury was detected above its screening criterion at depths ranging from 4 to 18 ft bgs in samples across the Site. The mercury distribution suggests that contamination in the subsurface was likely the result of spills or discharges in a fairly limited area.

Due to its high specific gravity, the major direction of elemental mercury migration in subsurface soils is downward. Beads of elemental mercury were also observed near the bottom of boring MW-05D, near the surface of a clay layer. The limitation of visible elemental mercury to shallower depths in soil borings located in the eastern portion of the MERECO property suggests that it has not reached the confining layer at all locations.

Although elemental mercury has a very low solubility in water, elemental mercury observed in the soil boring samples will continue to be a potential source of groundwater contamination.

**Summary of Site Risks**

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water and sediment uses. The baseline risk assessment includes a human health risk assessment (HHRA) and an ecological risk assessment.

The cancer risk and noncancer health hazard estimates in the HHRA are based on current reasonable maximum exposure scenarios and were developed by taking into account various health protective estimates about the frequency and duration of an individual's exposure to chemicals selected as chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and non-cancer health hazard indexes (HIs) are summarized below.

Because results from the RI's 2001 sampling program indicated a potential ecological impact on biota, sediment and biota, additional samples were collected in 2004 as part of the baseline ecological risk assessment. The assessment was conducted to assess the potential for risk to ecological receptors due to Site-related contamination. For ecological risks, hazard quotients (HQs) are developed to evaluate potential adverse effects to ecological receptors. HQs greater than 1 generally indicate a potential for adverse effects.

**Human Health Risk Assessment**

**WHAT IS RISK AND HOW IS IT CALCULATED?**

Human Health Risk Assessment:
A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

*Hazard Identification:* In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

*Exposure Assessment:* In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

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

*Risk Characterization:* This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a $10^{-4}$ cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for acceptable exposures are an individual excess lifetime cancer risk of $10^{-4}$ to $10^{-6}$, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is $10^{-6}$ for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a $10^{-4}$ cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

The MERECO property and the adjacent properties are currently zoned for industrial use, however the ATV trails, Patroon Creek and the pond are not. Future land use is expected to remain the same in all areas. The baseline risk assessment began by selecting COPCs in the various media that would be representative of site risks. The only chemical of concern (COC) for the Site, or the chemical driving the need for remedial action, is mercury in soils, groundwater, and sediment.

The baseline risk assessment evaluated health effects that could result from exposure to contaminated media though ingestion of and dermal contact with mercury and inhalation of mercury vapors. Although residents and businesses in the area are served by municipal water, groundwater is designated by the State as a potable water supply, meaning it could be available for drinking in the future. Therefore, potential future exposure to groundwater was evaluated.

Based on the current zoning and anticipated future use, the risk assessment focused on a variety of possible receptors, including current and future site workers, future construction workers, recreational adolescents, and potential future adult and child residents. A complete discussion of the exposure pathways and

estimates of risk can be found in the Human Health Risk Assessment for the Site in the information repository.

EPA's statistical analysis of exposure to soils at the Site by current and potential future workers indicates that construction workers could be exposed to mercury at a concentration of 17,000 ppm, which is associated with a noncancer hazard index of 70. Mercury is not a carcinogen.

If Site groundwater were to be used for drinking water and if the water was not treated to remove contamination, EPA's statistical analysis of groundwater shows that exposure to mercury at a concentration of 12 ppb would result in a noncancer hazard index of 30 for the adult resident and 250 for the child resident. In addition, the concentration of mercury exceeds both the State and federal MCL of 2 ppb and the New York State Water Quality Standard (NYSWQS) of 0.7 ppb. As stated above, EPA sampled and analyzed fish tissue and determined that consumption of fish does not pose unacceptable health risks due to mercury.

These noncancer health hazards indicate that there is significant potential risk to potentially exposed populations from direct exposure to mercury. For these receptors, exposure to mercury results in an HI above the acceptable level of 1. Mercury is the site-related chemical in soil and groundwater that contributes most significantly to the non-cancer hazard. It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

**Ecological Risk Assessment**

The potential risk to ecological receptors was also evaluated. For there to be an exposure, there must be a pathway through which a receptor (e.g. flora, fauna) comes into contact with one or more contaminants of potential concern for a site. Without a complete pathway or receptor, there is no exposure and hence, no risk. Mercury is the only COPC for this Site.

EPA conducted an additional investigation in 2004 to supplement the data collected in 2001 for the remedial investigation. Data collected for the RI and the supplemental investigation were used for a baseline ecological risk assessment (BERA).

The BERA determined significant risks to a diverse benthic community of aquatic insects and other invertebrates exposed to mercury contaminated sediment at several locations. Ecological hazard quotients (HQs) exceeded 1.0 for total mercury at Rensselaer Lake, Inga's Pond, I-90 Pond, and the Unnamed Tributary. HQs exceeded 1.0 for methyl mercury for all locations except for Rensselaer Lake where no data was available.

HQs for background sampling locations collected upstream of the Site ranged from 1.7 at Rensselaer Lake to 101 for the segment of the Unnamed Tributary that is upstream of the Site, for mercury and methyl mercury. Methyl mercury is the major contributor of elevated HQ values calculated for the sediment samples collected upstream and downstream of the Site. The highest HQ was calculated for sediment at the MERECO stormwater outfall, which contains elevated levels of mercury and methyl mercury contamination that can act as a source of contamination to ecological receptors downstream. The HQs calculated for mercury and methyl mercury at the outfall were 50 and 901, respectively.

An elevated HQ for mercury was also calculated for the sediment in the I-90 Pond. However, there is currently a two-foot layer of less contaminated sediment at the surface of the pond which, as discussed above, functions as a cap which isolates the subsurface contamination which are more contaminated. Because the pond is depositional and because there are no plans to maintain the pond's water depth by periodic dredging, the top layer of sediment will increase in thickness. Moreover, the top six inches, which presents the most risk to the biota, will become less contaminated as this layer thickens. An analysis conducted of the near-term possibility of a storm event removing this top layer determined that such an event is remote.

The calculated risks to the biota require EPA to undertake remedial measures to reduce the risks associated with the observed contamination and restore the sediment to reduce the risk to an acceptable level. The risks calculated for mercury and methyl mercury in the sediment at the stormwater sewer outfall, which discharges to the Unnamed Tributary, can be mitigated.

## REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as Applicable or Relevant and Appropriate Requirements (ARARs), to-be-considered (TBC) guidance, and other guidance.

The RI results indicate that surface and subsurface soil and groundwater at the MERECO property, and portions of the adjoining properties are contaminated with mercury. The baseline human health risk assessment indicates that mercury poses a future health risk to Site workers through ingestion and direct contact to soil and ingestion of groundwater by adults and children. The following RAOs have been identified for the contaminated soil and groundwater:

- Prevent or minimize potential future human exposures including ingestion and dermal contact with mercury-contaminated soil. This RAO is 5.7 ppm, which is based on the New York State's Soil Cleanup objectives 6 NYCRR Part 375;

- Prevent or minimize potential ingestion of mercury-contaminated groundwater and minimize mercury contamination in soil as a source of groundwater contamination at the facility. This RAO will be applied to the subsurface in the aquifer where the groundwater has a dissolved mercury concentration which exceeds the NYSWQS of 0.7 ppb.

The risk assessment indicates an unacceptable risk from the ingestion of fish due to PCBs. However, PCBs in sediment were determined not to be related to a contaminant source at the Site and therefore we do not have an RAO for PCBs. Food chain modeling results indicate that detected concentrations of mercury in sediment within the Unnamed Tributary present risks to ecological receptors. The RAO identified for sediment is:

- Remediate mercury contaminated sediment in the Unnamed Tributary to levels that are protective of the biota such that the most significant impacts are eliminated.

The RAO for sediments are the sediment screening values identified in NYSDEC's Technical Guidance for Screening Contaminated Sediment, 1994. The primary sediment RAO is mercury at 1.3 ppm which is the SEL (severe effect level). Sediment which is above this concentration is likely to result in significant harm to benthic aquatic life and will be remediated. Although EPA's preferred action will remove the most highly contaminated sediments, remaining sediments may still present some risks.

**Areas to be Remediated**

Estimates were made of the quantity of contaminated soil and sediment present at the Site. These estimates were determined based on the contaminant data presented in the RI report that exceeded the RAOs identified above. Quantity estimates for each media are presented below.

| Location | Depth | Area | Volume of Soils | Volume of Sediment |
|---|---|---|---|---|
| Storm Sewer | 0- 10' | 1,300 $ft^2$ | 480 $yd^3$ | - |
| Outfall | 0-2' | 1,500 $ft^2$ | - | 110 $yd^3$ |
| Soil on and West of the MERECO property | 1' | 36,100 $ft^2$ | 1340 $yd^3$ | - |
| Soil on and East of the MERECO property | 0'-10' | 7,600 $ft^2$ | 450 $yd^3$ | - |
| Subsurface Soil | 66' | 5,900 $ft^2$ | 14,400 $yd^3$ | - |
| **TOTAL** | | 52,400 $ft^2$ | 16,670 $yd^3$ | 110 $yd^3$ |

**Location Descriptions and Assumptions:**

**Sediment:** EPA estimates the sediment to be remediated at the stormwater outfall will include an area which is approximately 100 feet long by 15 feet wide by two feet deep. Mercury is present in the sediment here at 38 ppm. Sediment to be remediated at the stormwater outfall is shown on Figure 4-1 attached hereto.

**Soil:** Soil to be remediated at the eastern and western portions of the MERECO property includes the storm sewer and portions of the Diamond W, Allied Building and Albany Pallet properties which are contaminated with mercury at concentrations which exceed 5.7 ppm. Soil in these areas includes Areas A, B, C and D on figure 4-1, attached hereto. The highest mercury concentration detected in the surface soil is 150 mg/kg at 0-2' bgs on the Allied Building property.

An area of subsurface soil will also have to be remediated. The area includes soil which contains groundwater with a dissolved mercury concentration of greater than 0.7 ppb. The remediation of this soil will also extend to the ground surface. This area is located on and around MERECO's processing and office building and the container storage building and includes area E on Figure 4-1. The highest mercury concentration in Area E is 38,800 ppm at 13' bgs. Area E also includes free phase mercury which is visible down to 60' bgs. The water table is 10' bgs and clay is at 61' bgs.

## SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with ARARS, and utilize permanent solutions and alternative treatment technologies or resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of hazardous substances.

The Feasibility Study provides a more detailed explanation of each of the remedial alternatives described below.

### Remedial Action Alternatives for Soil and Groundwater

**S-1: No Action**

The Superfund program requires that a "No Action" alternative be considered as a baseline for comparison with the other alternatives.

| | |
|---|---|
| Capital Cost | $0 |
| Annual Cost | $0 |
| Present Worth Cost | $69,120 |
| Construction Time | N/A |

Under this alternative, no further action would be implemented, and the current status of the Site would remain unchanged. This alternative would not involve reducing the toxicity, mobility, or the volume of the contaminants in the soil or the groundwater. Institutional controls would not be implemented to restrict future Site development or use.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years. The present worth estimate for this alternative would be the cost to conduct these reviews.

**S-2 Limited Soil Excavation, Cap Maintenance, Groundwater Monitoring and Institutional Controls**

| | |
|---|---|
| Capital Cost | $ 2,871,891 |
| Annual Cost | $ 1,195,,874 |
| Present Worth cost | $ 4,136,858 |
| Construction Time | Less Than 1 Year |

This alternative would include the following major components:

- Inspection and, if necessary, repair of the existing concrete/asphalt and clay caps.
- Excavation of storm sewer/catch basins and surrounding soils to be disposed of off-site.
- Excavation of surface and subsurface soils above the water table which are outside of the capped areas on-Site and which exceed the RAO for soil of 5.7 ppm of mercury.
- Disposal of excavated soils in accordance with applicable regulatory requirements at off-Site facilities.
- Backfill with clean soil into excavated zones.
- Implementation of institutional controls to address future development/use of the property, to protect the concrete/asphalt and clay caps and restrict groundwater use.
- Implementation of a Site Management Plan (SMP) to address future development/use of the property, long-term maintenance of the existing asphalt/ concrete and clay caps, and long-term groundwater monitoring.
- Five-year reviews.

This alternative would include excavation and off-site disposal of surface and subsurface soils above the water table from areas A, B, C and D which contain mercury which exceeds the RAO of 5.7 ppm. The soils in Areas A, B, C and D are outside of the existing caps and include soils associated with the stormwater sewer/catch basin systems.

Additionally, this alternative involves repairing the existing concrete/asphalt and clay caps on Site to reduce the amount of rain water infiltrating through the soil, thereby reducing the transport of contaminants to the groundwater. This alternative does not include excavation and disposal of contaminated material below the caps since the material extends to an approximate depth of 66 feet. Excavation of this material is not feasible given the proximity of the CSX railroad and the two buildings on the MERECO property.

In addition, institutional controls would be implemented to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) prevent the disturbance of the asphalt/concrete cap; (c) prevent the disturbance of the clay cap; (d) prevent the excavation of soils which lay beneath the Phase I or Container Storage Buildings; and (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

Long-term operation and maintenance (O&M) of the Site will be accomplished through the development and implementation of an EPA approved SMP. The SMP, will, among other things, address any future excavation of soils including, but not limited to, soils beneath the Phase 1 and Container Storage Buildings or any other on-Site soils, including soils on the adjoining properties (i.e. Diamond W, Albany Pallet and Allied Building), which may not be remediated by this alternative, to insure that the soils are properly tested and handled to protect the health and safety of the workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the EPA approved SMP. Finally, the plan would provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of Site groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality continues to improve; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the asphalt/concrete and clay caps; and (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

**S-3: Cap Maintenance, Groundwater Monitoring, In-Situ Solidification/Stabilization, Limited Soil Excavation and Institutional Controls**

| | |
|---|---|
| Capital Cost | $ 9,206,521 |
| Annual Cost | $1,021,947 |
| Present Worth cost | $10,297,587 |
| Construction Time | 1 Year |

This alternative would include the following major components:

- Removal and disposal of the concrete /asphalt caps.
- Excavation of storm sewer/catch basins and surrounding soils which exceed the RAO for soil of 5.7 ppm and disposal off-site in accordance with applicable regulatory requirements.
- Excavation of surface and subsurface soils above the water table which exceed the RAO for surface soil of 5.7 ppm of mercury.
- Disposal of excavated soils at off-Site facilities, in accordance with applicable regulatory requirements.
- Backfill with clean soil into excavated zones.
- Perform treatability testing to optimize treatment results.
- Treatment through solidification of surface and subsurface soil where the groundwater has a dissolved mercury concentration above the RAO of 0.7ppb
- Post-remediation sampling to verify achievement of the RAOs for soil and groundwater.
- Implementation of institutional controls to restrict future development/use of the property, to protect the existing clay cap and to restrict groundwater use.
- Implementation of a Site Management Plan (SMP) to address future development/use of the property, long-term maintenance of the clay cap, and long-term groundwater monitoring.
- Five-year reviews.

This alternative would include excavation and off-site disposal of surface and subsurface soils above the water table areas A, B, C and D and shallow soils in Area E which contain mercury and which exceed the RAO of 5.7 ppm. These soils also include the soils associated with the stormwater sewer/catch basin systems.

Additionally, this alternative includes solidification /stabilization which will be conducted in Area E (as depicted on Figure 4-1) on surface and subsurface soils[1] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb. Solidification/stabilization refers to treatment processes which mix or inject binding agents into the contaminated material to immobilize and encapsulate the contaminants. This results in chemical bonding of the contaminant to reduce its solubility and soil permeability, thereby limiting contact with groundwater and stormwater. This remedy also reduces the exposed surface area, further limiting exposure to groundwater and stormwater. This reduces the contact of groundwater/stormwater with the contaminants by reducing the permeability of the soil matrix. Groundwater and soil sampling would also be performed following the remedial action.

The remediation of Site soils in the plume of dissolved mercury would eliminate the source of potential future groundwater contamination because it will prevent leaching from the contaminated soil mass to the groundwater. Most of the soils in the plume are highly contaminated with mercury. Any groundwater which is not immediately treated will be restored through the natural processes of dispersion and dilution.

Treatability tests on this technology were performed under the direction of MERECO, while the NYSDEC served as the lead agency. The tests showed that the technology was able to stabilize Site soils with mercury contamination.

In addition, institutional controls would be implemented to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) prevent the disturbance of the clay cap; (c) prevent the disturbance of the solidified/stabilized mass; (d) prevent the excavation of soils which lay beneath the Phase I or Container Storage Buildings; and (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

Long-term operation and maintenance (O&M) of the Site would be accomplished through the development and implementation of the EPA approved SMP. The SMP, will, among other things, address any future excavation of soils including but not limited to soils beneath the Phase 1 and Container Storage Buildings or any other on-Site soils, including soils on the adjoining properties (i.e. Diamond W Albany Pallet and Allied Building), which may not be remediated by this alternative, to insure that the soils are properly tested and handled to protect the health and safety of the workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the EPA-approved SMP. Finally, the plan would provide for the proper management of all Site remedy components post-construction and shall include: (a)

[1] This would include soils beneath the existing asphalt/ concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

monitoring of Site groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality continues to improve; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the clay cap; and (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

**S-4: Cap Maintenance, Groundwater Monitoring, Electrochemical Treatment, Limited Soil Excavation and Institutional Controls**

| | |
|---|---|
| Capital Cost | $20,831,978 |
| Annual Cost | $1,021,947 |
| Present Worth Cost | **$21,923,045** |
| Construction Time | 3 Years |

This alternative would include the following major components:

- Removal and disposal of the concrete /asphalt caps.
- Excavation of storm sewer/catch basins and surrounding soils which exceed the RAO for soil of 5.7 ppm and disposal off-site in accordance with applicable regulatory requirements.
- Excavation of surface and subsurface soils above the water table which exceed the RAO for surface soil of 5.7 ppm of mercury.
- Disposal of excavated soils at off-Site facilities, in accordance with applicable regulatory requirements.
- Backfill with clean soil into excavated zones.
- Perform treatability testing to optimize treatment results
- In-situ treatment of surface and subsurface soil where the groundwater has a dissolved mercury concentration above the RAO of 0.7ppb.
- Post remediation sampling to verify achievement of the soil and groundwater RAOs.
- Implementation of institutional controls to restrict future development/use of the property, to protect the integrity of the clay cap and to restrict groundwater use.
- Implementation of a Site Management Plan (SMP) to address future development/use of the property, long-term maintenance of the existing clay cap, and long-term groundwater monitoring.
- Five-year review(s).

This alternative would include excavation and off-site disposal of surface and subsurface soils above the water table from areas A, B, C and D which contain mercury which exceeds the RAO of 5.7 ppm. The soils include soils associated with the stormwater and sewer/catch basin systems.

Additionally, this alternative includes electrochemical treatment which will be conducted in Area E (as depicted on Figure 4-1) on surface and subsurface soils[2] and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb. Electrochemical treatment involves the burying of electrodes in the soil. When the induced electrical current is passed through the soil, the soil particles become polarized. These polarized soil particles discharge electricity, causing metals to migrate towards and be deposited on the electrodes. The electrodes, with deposited mercury, would be removed at the end of the treatment process. This technology may also involve the addition of chemical amendments which may be necessary to assist in extraction and mobilization of mercury in the soil.

A laboratory scale treatability study was undertaken for EPA in 2006 by the Mississippi State University to determine whether electrochemical treatment technology could be used to remove mercury from contaminated soil and groundwater from the Site. The study used electro-chemical test cells to evaluate the technology. Various chemical amendments were added to the cells to assist in extracting and mobilizing the mercury in the soil. The study showed that the addition of the chemical amend-ment potassium iodide resulted in a 98.5 percent reduction of mercury in the soil.

This remediation technology would eliminate the source of potential future groundwater contamination (the contaminated soil) but would also remediate the groundwater by polarizing the mercury in the groundwater causing it to migrate to the electrodes. However, groundwater sampling would also be performed following the remedial action on an annual basis for the first five years. Sampling and the performance of five-year reviews thereafter would be based on the results of previous sampling rounds. This technology would be run until the concentration of mercury in the groundwater reaches 0.7 ppb or until the rate of mercury removal from the soil becomes negligible and reaches a steady state.

In addition, institutional controls would be implemented to restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) prevent the disturbance of the clay cap; (c) prevent the excavation of soils which lay beneath the Phase I or

[2] This would include soils beneath the existing asphalt/ concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

Container Storage Buildings; and (d) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

Long-term operation and maintenance (O&M) of the Site will be accomplished through the development and implementation of the EPA approved SMP. The SMP, will, among other things, address any future excavation of soils including but not limited to soils beneath the Phase 1 and Container Storage Buildings or any other on-Site soils, including soils on the adjoining properties (i.e. Diamond W Albany Pallet and Allied Building), which may not be remediated by this alternative, to insure that the soils are properly tested and handled to protect the health and safety of the workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future and mitigation, if necessary, in compliance with the EPA-approved SMP. Finally, the plan would provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of Site groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality continues to improve; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the clay cap; and (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

## Sediment

### SD-1: No Action

The Superfund program requires that a "No Action" alternative be considered as a baseline for comparison with the other alternatives.

| | |
|---|---|
| Capital Cost | $0 |
| Annual Cost | $0 |
| Present Worth Cost | $69,120 |
| Construction Time | N/A |

Under this alternative, no further action would be implemented, and the current status of the Site would remain unchanged. This alternative would not involve reducing the toxicity, mobility, or the volume of the contaminants in the sediment. Institutional controls would not be implemented to restrict future site development or use.

Because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

### SD-2: Contaminated Sediment Removal and Disposal

| | |
|---|---|
| Capital Cost | $355,347 |
| Annual Cost | $357,183 |
| Present Worth Cost | $781,650 |
| Construction Time | N/A |

This alternative would include the following major components:

- Removal and dewatering of contaminated sediment from the Unnamed Tributary
- Post remediation sampling to verify achievement of sediment RAOs
- Sediment sampling to assess future risks to the biota

This alternative would include the removal of mercury contaminated sediment from the Unnamed Tributary, dewatering of removed sediment, transportation and disposal of dewatered sediment at an off-Site landfill. Verification sampling would be conducted after the removal of mercury contaminated sediment to ensure that the sediment cleanup objective of 1.3 ppm is achieved. If necessary, the dredged area would be backfilled with clean soil.

Sampling of the fish, surface water and sediments in Patroon Creek, the Unnamed Tributary and the I-90 Pond to assess impacts on the biota on an annual basis for five years to determine if mercury contamination in the surface sediment stays below the RAO of 1.3 ppm. Sampling thereafter would be based on a review of the first five years of data. However, should conditions change with regard to the I-90 Pond dam (i.e., the dam is repaired, removed, or if it should fail) EPA will evaluate the potential impact of any significant releases and, if necessary, take or require response actions to mitigate their potential impact.

## EVALUATION OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA § 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 EPA OSWER Directive 9355.3-01. The detailed analysis consists 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.

- 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.

- Compliance with applicable or relevant and appropriate requirements 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 regulations or provide grounds for invoking a waiver.

- Long-Term effectiveness and permanence refer 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.

- 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.

- 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.

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

- Cost includes estimated capital and operation and maintenance costs, and net present-worth costs.

- State acceptance indicates whether, based on its review of the RI/FS reports and the Proposed Plan, the State concurs with, opposes, or has no comment on the preferred remedy at the present time.

- Community acceptance will be assessed in the ROD, and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

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

- Overall Protection of Human Health and the Environment

Alternative S1 would not be protective of human health and the environment since soils and groundwater exceed the remediation goals would remain in place. Alternative S2 would provide protection to human health through capping and institutional controls, however, it would not be fully protective because most of the mercury contaminated soil and free-phase mercury would remain in the subsurface soils where they have the potential to contribute to groundwater contamination. Alternative S2 would provide some protection since contaminated surface soil would be disposed of off-Site. Alternatives S3 and S4 would be protective of human health and the environment since contaminated surface and subsurface soils and groundwater would be either remediated or removed from the Site.

- Compliance with ARARs

EPA has identified New York State's soil cleanup objective of 5.7 ppm for mercury for an industrial facility as an ARAR, TBC or other guidance to address contaminated surface and subsurface soils above the water table at the Site. The NYSWQS are chemical specific ARARs for the groundwater and are being used to address soils below the water table. Alternatives S1 and S2 would not meet the ARAR for groundwater since the groundwater which exceeds the cleanup criteria would remain in place and no measures would be implemented to reduce or eliminate the dissolution of mercury into the groundwater. Alternatives S3 and S4 could meet the ARAR for groundwater, since the contaminated subsurface soil and groundwater would be treated. All location- and action-specific ARARs would be achieved under Alternatives S2, S3 and S4.

- Long-Term Effectiveness and Permanence

Alternative S1 would not be effective or permanent, since no remedial action would be implemented. Alternative S2 would be more effective and permanent than Alternative S1, but less than Alternatives S3 and S4, since untreated contaminated subsurface soil and groundwater would remain on Site. Alternative S3 would be permanent since it would remove and dispose of surface and subsurface soils off-Site and would employ solidification/stabilization on contaminated subsurface soils which would remain in place and the contamination would not be available to receptors. Under Alternative S4, the contaminants would be removed from the subsurface soil and groundwater through treatment, and surface and subsurface soils would be moved off-Site, eliminating their ability to impact Site receptors in the future.

Regarding Alternative S3, two solidification/stabilization treatability studies have been performed on Site soils and both studies were able to treat the soils to below the

RCRA TCLP[3] limit of 0.2 ppm. The use of electrochemical treatment in Alternative S4 would be permanent but its effectiveness would need to be determined by a treatability test on-Site. The effectiveness of electrokinetics has not been fully demonstrated, although a bench-scale study demonstrated that the technology could potentially attain the RAOs under laboratory conditions. The on-Site treatability test would be required to confirm the effectiveness and to obtain design parameters for this technology.

- Reduction in Toxicity, Mobility or Volume (TMV) through Treatment

Since Alternative S1 does not include treatment or excavation, it would not reduce the TMV of contaminated soils through treatment. Alternative S2 would not reduce the TMV of the contaminated subsurface soil because capping is not considered a treatment technology. S2, S3 and S4 would reduce the volume and mobility through excavation and off-Site disposal/treatment but not the toxicity of Site surface soils. Alternative S3 would reduce the mobility and the toxicity of the highly contaminated subsurface soils through solidification/stabilization. Alternative S4 would reduce the TMV of soil through electrochemical treatment.

- Short-Term Effectiveness

Alternative S1 would have the fewest short-term impacts and the least amount of intrusive construction activities and would not require MERECO or adjacent businesses to suspend or relocate operations. Alternatives S2, S3 and S4 would have more short-term impacts than S1 due to the removal of contaminated surface soils at the MERECO property and its adjoining properties. Alternatives S3 and S4 would have somewhat greater short-term impacts than alternative S2 due to the temporary risk and disturbance created by treatment activities at the MERECO property and its adjoining properties which would require MERECO to suspend or relocate operations during construction. Alternative S3 and S4 would also have more short-term impacts than Alternative S2 on on-Site construction workers due to additional construction activities and a longer period of project duration, about one year for Alternative S3 and about three years for Alternative S4.

- Implementability

Alternative S1 would be easiest to implement both technically and administratively. Alternative S2 would be the second easiest to implement. Alternatives S3 and S4 would be more difficult to implement than Alternative S2 based upon the additional construction activities required. Alternative S3 is considered more technically implementable than Alternative S4, since solidification/ stabilization has been more widely used and is more commercially available. Alternative S4 involves the use of an innovative technology that is only available through a limited number of vendors and has not been demonstrated on a full-scale basis in the United States for mercury. However, a recently completed bench-scale test of electrokinetics indicated that it could likely be effective in removing mercury from the Site soils.

- Cost

The estimated capital, annual operation and maintenance (O&M), which includes monitoring, and present-worth costs for each of the soil/groundwater remediation alternatives are presented below:

| Alternative | Capital Cost | Annual O&M | Present Worth |
|---|---|---|---|
| S-1 | $0 | $0 | $69,120 |
| S-2 | $2,871,891 | $1,195,847 | $4,136,858 |
| S-3 | $9,206,521 | $1,021,947 | $10,297,587 |
| S-4 | $20,831,978 | $1,021,947 | $21,923,045 |

- State Acceptance

NYSDEC concurs with the preferred alternative.

- Community Acceptance

Community acceptance of the preferred remedy for the soil and groundwater will be assessed in the ROD following review of the public comments received on the Proposed Plan.

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

- Overall Protection of Human Health and the Environment

Alternative SD1 would not be protective of the biota, since sediment exceeding the mercury cleanup goal would remain in place. Alternative SD2 would be protective of the biota because contaminated sediment above the RAO for sediment would be removed. There is currently no risk to human health due to contaminated sediment.

- Compliance with ARARs

There are no chemical-specific ARARs for contaminated sediment. The cleanup level identified above is derived from a New York State guidance which is considered a "To Be Considered" (TBC). Alternative SD1 would not meet the RAO, since sediment exceeding the mercury cleanup criteria would remain in place. Alternative SD2 would meet the RAO and would comply with location-, and action-specific ARARs.

[3] TCLP refers to the Toxicity Characteristic Leachate Procedure under RCRA which measures the leachability and mobility of certain toxic contaminants such as mercury from the soil into the groundwater.

- Long-Term Effectiveness and Permanence

Alternative SD1 would not be effective or permanent, since no remedial action would be implemented. Alternative SD2 would be effective and permanent since contaminated sediment would be removed.

- Reduction in Toxicity, Mobility or Volume through Treatment

Neither Alternatives SD1 nor SD2 would reduce the toxicity or volume of contaminated sediment since neither alternative involves treatment. Alternative SD2 would reduce potential mobility and volume via the relocation of the contaminated sediment to a landfill. Alternative SD1 would have no effect on mobility or volume.

- Short-Term Effectiveness

Alternative SD1 would have no short-term impacts, since no action would be implemented. In consideration of the limited temporary increase in potential impacts to construction workers, human health and the environment during implementation, Alternative SD2 would have moderate short-term impacts in comparison to Alternative SD1. Both alternatives would have minimal impact to nearby residents, because the Site is located in an industrial area.

- Implementability

Alternative SD1 would be easiest to implement, technically and administratively. Alternative SD2 would be more difficult to implement technically, however it involves common technologies and readily available equipment.

- Cost

The follow table compares the alternative for the sediment alternatives.

| Alternative | Capital Cost | Annual O&M | Present Worth |
|---|---|---|---|
| SD-1 | $0 | $0 | $69,120 |
| SD-2 | $355,347 | $357,183 | $781,650 |

- State Acceptance

NYSDEC concurs with the preferred alternative for sediment.

- Community Acceptance

Community acceptance of the preferred remedy for sediment will be assessed in the ROD following review of the public comments received on the Proposed Plan.

## PREFERRED ALTERNATIVE

EPA's preferred alternative for mercury-contaminated soil is Alternative S3. Under this alternative, contaminated surface and subsurface soil above the water table with a concentration of 5.7 ppm would be excavated from areas A, B, C and D from the MERECO property and portions of the Allied Building, Diamond W and Albany Pallet properties. These soils would be sent off-Site for treatment/disposal. In addition, surface and subsurface soils in Area E and soils below the water table where the groundwater exhibits a mercury concentration above the NYSWQS of 0.7 ppb, would be solidified. EPA believes that implementing the proposed remedial action for contaminated soils will result in meeting the groundwater quality standard of 0.7 ppb for mercury in the aquifer.

EPA's preferred alternative for the contaminated sediment in the Unnamed Tributary is Alternative SD2, which would include the removal of the sediment above the RAO of 1.3 ppm for mercury, dewatering of the sediment and transportation and disposal of the sediment to an off-Site landfill.

Specifically, the proposed remedies would involve the following:

- Excavation and off-site disposal of surface soils and subsurface soils above the water table from areas A, B, C and D (refer to Figure 4-1), and shallow soils from Area E which contain mercury which exceeds the RAO of 5.7 ppm. These soils also include the soils associated with the stormwater sewer/catch basin systems. Clean soil would be backfilled into the excavated areas.

- Mixing or injection of treatment agents in Area E to immobilize contaminants in surface soils, subsurface soils[4], and soils below the water table where the groundwater has a dissolved mercury concentration which exceeds the NYSDEC water quality standard of 0.7 ppb (refer to Figure 4-1). Verification sampling would be performed to confirm the effectiveness of the remedy.

- Imposition of institutional controls would restrict future development/use of the Site. Specifically, environmental easements/restrictive covenants would be filed in the property records of Albany County. The easements/covenants would at a minimum: (a) limit the Site to industrial uses; (b) prevent the disturbance of the clay cap; (c) prevent the disturbance of the solidified/stabilized mass; (d) prevent the

[4] This would include soils beneath the existing asphalt/ concrete cap but not soils beneath the Container Storage Building or the existing clay cap.

excavation of soils which lay beneath the Phase I or Container Storage Buildings; and (e) restrict the use of groundwater as a source of potable or process water until groundwater quality standards are met.

- Long-term operation and maintenance (O&M) of the Site would be accomplished through the development and implementation of the EPA approved SMP. The SMP, will, among other things, address any future excavation of soils including but not limited to soils beneath the Phase 1 and Container Storage Buildings or any other on-Site soils, including soils on the adjoining properties (i.e. Diamond W, Albany Pallet and Allied Building), which may not be remediated by this alternative, to insure that the soils are properly tested and handled to protect the health and safety of the workers and the nearby community. The approved SMP will also require an evaluation of the potential for vapor intrusion at all existing buildings on-Site and/or those to be constructed in the future, and mitigation, if necessary, in compliance with the EPA-approved SMP. Finally, the plan would provide for the proper management of all Site remedy components post-construction and shall include: (a) monitoring of Site groundwater to ensure that, following Site remediation, the contamination is attenuating and groundwater quality continues to improve; (b) monitoring and maintenance of institutional controls; (c) a provision for operation and maintenance of the clay cap; and (d) periodic certifications by the owners/operators of the Site properties or other party implementing the remedy that the institutional and engineering controls are in place.

- Removing, dewatering and disposing of the mercury-contaminated sediment in the Unnamed Tributary exceeding the RAO for mercury of 1.3 ppm.

- Verification sampling after removal of sediment from the Unnamed Tributary to determine whether the sediment RAO has been met. Backfilling of the dredged area with clean soil, if determined necessary during the remedial design.

- Verification sampling after the removal of contaminated soil from Areas A, B, C and D, and solidification/stabilization of contaminated soil and groundwater in Area E to determine whether the RAOs for soil and groundwater have been met.

- Sampling of the fish, surface water and sediments in Patroon Creek, the Unnamed Tributary and the I-90 Pond to assess impacts on the biota on an annual basis for five years. Sampling thereafter would be based on the results of the five annual sampling rounds, as reported within the first five-year review. Should conditions change with regard to the I-90 Pond dam (i.e., the dam is repaired, removed, or if it should fail), EPA will evaluate the potential impact of any significant releases and, if necessary, take or require response actions to mitigate their potential impact.

- In accordance with CERCLA and because this alternative would result in contaminants remaining on-Site above levels that would allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

Alternatives S-3 and SD-2 would provide the best balance of trade-offs among the potential alternatives evaluated with respect to the evaluating criteria. EPA believes that the preferred alternatives for soil/groundwater and sediments would be protective of human health and the environment, would comply with ARARs, TBCs and other guidance, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Alternative S2 was not proposed since it would not address the mercury contamination in the soils below the existing concrete/asphalt and clay caps or the plume of dissolved mercury in the aquifer. Alternative S4 was not proposed since electrochemical treatment is not a technology which has been widely used as well as proven and would be significantly more expensive to perform.