Peter Cooper Markhams Superfund Site

Cattaraugus County, New York

EPA

Region 2 August 2006

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated soil and groundwater at the Peter Cooper Markhams Superfund site (Site), and identifies the preferred remedy with the rationale for this preference. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination at the Site and the alternatives summarized in this Proposed Plan are described in the June 2006 remedial investigation (RI) report and July 2006 feasibility study (FS) report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site.

This Proposed Plan is being provided as a supplement to the FS report to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated. EPA's preferred remedy consists of consolidating and capping waste piles to prevent exposures to the waste. Capping would prevent direct contact and reduce infiltration, thereby reducing the generation of leachate which mobilizes contaminants into the groundwater. EPA would rely on institutional controls to limit groundwater use at the Site. Institutional controls would also be established to prevent disturbance of the cap.

The remedy described in this Proposed Plan is the preferred remedy for the Site. Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in this Proposed Plan and in the detailed analysis section of the FS report because EPA and NYSDEC may select a remedy other than the preferred remedy.

MARK YOUR CALENDAR

August 10, 2006 - September 8, 2006: Public comment period on the Proposed Plan.

August 22, 2006 at 6:30 p.m.: Public Meeting at the Fireman's Activity Hall, Maple Street, South Dayton, New York 14138

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC 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 and FS reports and this Proposed Plan have been made available to the public for a public comment period which begins on August 10, 2006 and concludes on September 8, 2006.

A public meeting will be held during the public comment period at the Fireman's Activity Hall on August 22, 2006 at 6:30 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedy, 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.

INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

Town of Dayton
Town Building
9100 Route 62
South Dayton, New York 14138
(716)532-9449

Hours: Monday, Tuesday and Thursday:
8:00 a.m.- 12:30 p.m
Friday: 1:00 p.m. - 4:00 p.m.

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, New York 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:

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SCOPE AND ROLE OF ACTION

The primary objectives of this action are to remediate the sources of contamination at the Site, reduce and minimize the downward migration of contaminants to the groundwater, control landfill gas, and minimize any potential future health and environmental impacts from exposure to the waste.

SITE BACKGROUND

Site Description

The Peter Cooper Markhams Superfund Site (the Site), is located off Bentley Road approximately 6 miles south of the Village of Gowanda in the Town of Dayton, Cattaraugus County, New York. The Site is approximately 103 acres in size and is bordered to the northwest by Bentley Road, to the northeast by a wooded property and farm field, to the southeast by a railroad right-of-way, and to the southwest by hardwood forest. Site access is restricted by a locked cable gate at the Bentley Road entrance. Surrounding property is entirely rural, consisting of small farm fields, open meadow, and forests.

The majority of the Site is characterized by mature hardwood tree cover, as well as open fields. A portion of the Site contains several covered/vegetated fill piles arranged in an elliptical pattern. The fill piles vary in size and elevation, with base dimensions ranging from approximately 1,100 - 160,000 square feet and elevations of 5 to 15 feet above surrounding grade. The total area covered by fill piles (base area) is approximately 7 acres.

No structures are present on the property, with the exception of a natural gas wellhead located east of the access drive. Figure 1 shows the Site area.

Site History

The Site was used for the disposal of wastes remaining after the manufacturing process from a former animal glue and adhesives plant located in Gowanda, New York. This waste, known as "cookhouse sludge" because of a cooking cycle that occurred just prior to extraction of the glue, is derived primarily from chrome-tanned hides obtained from tanneries. Vacuum filter sludge produced during dewatering of cookhouse sludge was also disposed at the Site. The waste material has been shown to contain elevated levels of chromium, arsenic, zinc, and several organic compounds.

Peter Cooper Corporations (PCC) reportedly purchased the Site in 1955. PCC sold the Site in 1976 to a foreign company that was subsequently renamed Peter Cooper Corporation. From approximately 1955 until September 1971, it was reported that approximately 9,600 tons of waste material from the Gowanda plant were placed at the Site over an approximately 15-acre area.

Pursuant to a New York State Supreme Court Order (8^{th} J.D. Cattaraugus County) dated June 1971, PCC transferred approximately 38,600 additional tons of waste materials from the Gowanda Landfill to the Site.

Previous Investigations

The NYSDEC completed preliminary Site Investigations in 1983 and 1985 and identified the presence of arsenic, chromium and zinc in soil samples. The results of these investigations are available in Appendix A of the 2006 RI.

In 1986, pursuant to a Consent Order with NYSDEC, PCC commissioned O'Brien & Gere Engineers, Inc. (OBG) to perform a Remedial Investigation and Feasibility Study (RI/FS) at the Site. In conjunction with the 1989 OBG RI, interim remedial measures were performed in 1989 to remove a number of buried containers that had been disposed within an isolated area of the Site . The containers held off-specification animal glue and oil. The containers and impacted soils were excavated and transported off-site for disposal.

The 1989 OBG RI indicated the presence of total chromium, hexavalent chromium and arsenic above background levels in waste materials and some adjacent soils. Low levels of these contaminants were also detected in groundwater wells installed immediately adjacent to the fill piles. None of the samples tested exhibited hazardous waste (toxicity) characteristics. OBG completed a FS for the Site in March 1991. The FS recommended a remedial alternative involving consolidation, compaction, and covering of the waste materials.

However, because the waste at the Site did not meet the statutory definition in effect at the time in New York State for an inactive hazardous waste disposal site, NYSDEC could not use State funds to implement a remedial program. Consequently, the NYSDEC removed the site from its Registry of Inactive Hazardous Waste Disposal Sites.

In 1993, EPA conducted a Site Sampling Inspection, which included the collection and analysis of soil and surface water samples from the Site. Chromium and arsenic were detected in soils above background concentrations within the waste piles.

Based on the above information, the Site was added to the EPA's National Priorities List (NPL) on February 3, 2000. On September 29, 2000, USEPA issued a Unilateral Administrative Order (UAO) to several potentially responsible parties (PRPs) to perform the RI/FS for the Site. The RI/FS was performed by Benchmark Environmental Engineering and Science, PLLC and Geomatrix Consultants, Inc, consultants for the PRPs, subject to EPA oversight.

Site Geology

The Site is located on glacial sediments deposited in pre-glacial Conewango Lake. Two distinct types of fill material have been disposed of at the Site: a waste-fill material consisting of dewatered sludge, silt, sand and gravel, and a non-waste fill, consisting of native soil mixed with occasional debris from building construction (i.e.. shingles, concrete, plastic, etc.). Fill materials are generally unsaturated and cover the glacially-derived soils. The thickness of the fill material ranges from approximately 2 to 15 feet.

The overburden thickness at the Site is reported to be approximately 440 feet based on the well log for the gas well located near the entrance road to the Site. Native glacially derived materials consist of a glacial outwash unit, and a lacustrine (lake deposited) unit. The outwash deposits are continuous across the Site, and consist of poorly sorted fine to coarse sand and fine gravel. The outwash unit varies in thickness from 8 feet near the center of the Site to a maximum of 18 feet at the southwest corner of the Site. Lacustrine silt and fine sand are located below the outwash sand. The lacustrine deposits are locally stratified, and exhibit discontinuous, alternating layers of silt and clay suggesting periods of a deep water depositional environment.

Six, noncontiguous, distinct wetland areas were identified during the RI. The wetland areas are generally characterized by slightly lower topography with a thin layer (< 2 feet) of vegetative matter, detrital matter and peat.

Each of the larger wetland areas was assigned an alphabetic designation (Wetland A through F). Standing water is present seasonally (generally December through April months) in all of the wetland areas. Wetland B, located north of the fill piles, retains standing surface water longer than the other wetland areas on the Site. Wetland F, the largest wetland area on-Site, contains both wetland vegetation and large trees with high water demand (cottonwoods and poplars).

Hydrogeology

Groundwater monitoring well screens were installed in the outwash sand deposits and in the lacustrine fine sand and silt deposits at the Site.

Groundwater is present from approximately 1.5 feet below ground surface to over 14 feet deep and seasonally fluctuates within a five-foot range. Groundwater levels measured in the deep monitoring wells near the fill piles were generally lower than the shallow wells, indicating a slight downward vertical hydraulic gradient.

However, water levels measured in deep monitoring wells farther downgradient of the fill piles were generally higher than the shallow wells, indicating an upward vertical hydraulic gradient in the southwestern portion of the Site.

Groundwater flows generally in a southwesterly direction at the Site toward the locally significant groundwater discharge area, Wetland F. During periods of higher groundwater elevations, localized groundwater discharge also occurs to Wetland D. The upward vertical hydraulic gradients that exist below and downgradient of the fill piles indicate groundwater at the Site is strongly influenced by Wetland F and groundwater will ultimately flow toward Wetland F located southwest of the fill piles.

RESULTS OF THE REMEDIAL INVESTIGATION

The Remedial Investigation characterized the physical properties of the soil fill piles, soil around the perimeter of the fill piles (perimeter surface soils), native subsurface soils, wetland sediments, groundwater and soil gas as described below.

Chemical and physical data were collected to determine the nature and extent of contamination associated with the Site. Media sampled during the RI included: waste fill; surface and subsurface soil; groundwater; wetland surface water; wetland sediments; and soil vapor landfill gas. All field activities were conducted with oversight by EPA's contractor, TAMs Consultants, Inc., now known as Earth Tech. The constituent concentrations detected during this RI are generally consistent with the data from the 1989 RI. The results of the RI are summarized below.

Waste Fill

No seeps or significant erosional features were observed on the fill piles. Waste fill samples were collected from three borings. The three samples were analyzed for total metal constituents of potential concern (COPCs), identified as arsenic, total chromium, and hexavalent chromium. The COPCs were also analyzed utilizing the EPA Synthetic Precipitation Leaching Procedure (SPLP) to assess the leachability of the waste fill contaminants to the groundwater.

The metal COPCs detected at maximum concentration in the waste fill were arsenic (65.6 mg/kg), chromium (31,200 mg/kg), and hexavalent chromium (4.7 mg/kg).

The concentrations of pollutants in SPLP leachate can be measured and compared to groundwater quality criteria to determine if groundwater contamination is likely. The analysis of leachable metal COPCs detected the following maximum concentrations: arsenic (14.2 µg/L), chromium (1,010 µg/L), and hexavalent chromium (22.0 µg/L). The groundwater criterion for arsenic and total chromium are 25 ug/L and 50 ug/L, respectively. The data suggests the potential for impact to groundwater.

Soil Contamination

Surface and subsurface soil samples were collected at the Site. Surface soils samples were collected from the following three distinct locations: upgradient of the fill piles, surface of the fill piles, and areas adjacent to the fill piles. There are currently no federal or state promulgated standards for contaminant levels in soils. As a result, soil sampling data were compared to the New York State cleanup objectives defined in the Technical and Administrative Guidance Memorandum (TAGM)[1].

Site background (SB) surface soil samples were collected at six locations upgradient of the fill piles and analyzed for arsenic and chromium. Background concentrations ranged from nondetectable to 8.1 mg/kg for arsenic and 7.8 to 31.8 mg/kg for total chromium. TAGM soil cleanup objectives for arsenic and total chromium are 7.5 mg/kg or SB and 10 mg/kg or SB, respectively.

Nine surface soil samples were collected from the surface of the fill piles and analyzed for metal COPCs. Arsenic concentrations were detected in seven of the nine soil samples above the soil cleanup objective at a maximum concentration of 95.5 mg/kg. Total chromium was detected at all nine locations above the soil cleanup objective at a maximum concentration of 65,300 mg/kg.

A total of 48 discrete surface soil samples were collected adjacent to and downgradient from the waste fill piles and analyzed for metal COPCs. Arsenic concentrations were detected in 19 of the 48 soil samples above the soil cleanup objective at a maximum concentration of 55.1 mg/kg. Total chromium concentrations were detected in 42 of the 48 soil samples above the soil cleanup objective at a maximum concentration of 11,800 mg/kg.

Ten of the samples were also analyzed for VOCs and SVOCs. No VOCs or SVOCs were detected above the soil cleanup objectives.

Perimeter subsurface soil samples were collected at 29 sample locations from depths of 6 to 12 inches below ground surface (bgs) and analyzed for metal COPCs. Arsenic concentrations were detected in 24 of the 29 samples above the soil cleanup objective with a maximum concentration of 28.9 mg/kg. Total chromium was detected at all 29 locations above the soil cleanup objective at a maximum concentration of 19,700 mg/kg.

Subsurface soil samples were also collected from monitoring wells and soil boring locations. Native soil

[1] *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994.*

samples (nonwaste fill) were collected below the waste fill from four soil borings at three discrete intervals: immediately below the waste fill/native soil interface, the subsequent one-foot incremental depth, and soil immediately above the water table. A subsurface soil sample was also collected from the unsaturated zone (1 foot above the water table) at monitoring well location MW-8S. Discrete native soil samples were analyzed for metal COPCs (arsenic, chromium, and hexavalent chromium) at each of the depth.

Arsenic concentration ranged from 4.7 to 13.4 mg/kg and was detected at 11 of the 13 locations sampled ,slightly above the soil cleanup objective.

Total chromium concentrations were detected above the soil cleanup objective at three boring locations: B-1A (10 -11 fbgs), B-4 (16 to 17 fbgs, depth interval of 1 to 2 feet below the waste fill) and B-6 (7.5 to 8.5 fbgs, depth interval of 1 to 2 feet below the waste fill). The total chromium concentrations at these locations were 65.1 mg/kg, 1,150 mg/kg and 5,860 mg/kg, respectively. Total chromium concentrations below these sample depths were within SB levels. Hexavalent chromium was not detected in any of the samples analyzed. These data indicate that metal COPCs have not migrated substantially in native soil below the bottom of the waste fill piles.

Groundwater Contamination

Groundwater samples collected from nine shallow and nine deep overburden monitoring wells, during two rounds of sampling, were compared to groundwater regulatory levels including water quality standards. Data were also collected to evaluate the movement of groundwater in these areas and the extent of contamination.

Two COPC metals, arsenic and total chromium were detected above the ground water criteria in MW-2S during the first round of sampling. Arsenic was detected at a maximum concentration of 133 µg/L, which is, above the groundwater criteria of 25 µg/L. Total chromium was detected at a maximum concentration of 981 µg/L, which is above the groundwater criteria of 50 ug/L. Hexavalent chromium was not detected in any of the groundwater samples. Inorganic constituents such as ammonia, nitrate, and sulfate are elevated at various locations in groundwater downgradient of the fill piles.

In the RI report, the PRPs' consultants described difficulties they experienced in obtaining representative samples from well MW-2S possibly related to its age and construction materials. They concluded that the groundwater analytical results collected from well MW-2S during the first and second sampling events might not be representative of site groundwater. EPA acknowledges the information presented by the PRPs' consultant. However, EPA believes that until further monitoring is conducted, a definitive conclusion that water samples from MW-2S are not representative of groundwater quality in the surrounding formation cannot be supported. Nonetheless, even if the data from monitoring well MW-2S were to be completely discounted, other groundwater data from the site demonstrate that there is an unacceptable noncancer health hazard for the future industrial worker. However, based on data from the other wells at the site, it appears that the area of groundwater contamination may be limited to a relatively small area, under the waste piles.

To address the limitations of the sampling from monitoring well MW-2S, any groundwater monitoring program at the site would include replacing MW-2S and conducting analytical sampling for metals.

Wetland Surface Water Contamination

Surface water samples were collected from wetland areas and analyzed for metal COPCs. Surface water criteria for applicable analyte detection comparisons are found in New York State Division of Water Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998.

Arsenic and total chromium were not detected in the surface water samples. Hexavalent chromium was detected at 13.0 µg/L in SW-2, above the surface water criteria of 11 µg/L, during the first sampling round; however, the result was flagged as estimated by the laboratory and the detected presence of this contaminant was not confirmed during the second sampling round nor was total chromium detected in the sample above the reporting limit of 10 µg/L.

Sulfate was detected at a maximum concentration of 337 mg/L in SW-1, above the surface water criterion of 250 mg/L in surface water sample collected from Wetland F. However, sulfate concentration was detected below the surface water criterion during the second sampling event. Surface water in Wetland F receives groundwater discharge with elevated sulfate concentrations. Sulfate was detected in Wetlands B and D at maximum concentrations of 34.5 mg/L and 27.8 mg/L, respectively. Sulfide was not detected in any of the surface water samples.

Ammonia was detected during the second sampling event in sample SW-2 at a concentration of 110 ug/L, above the surface water criterion of 2.5 ug/L, but was not detected at that location during the first sampling event or at other surface water sample locations.

Wetland Sediment Contamination

Sediment sampling data were compared to the Low Effect Level (LEL) and Severe Effect Level (SEL) sediment quality guideline values presented in NYSDEC Division of Fish, Wildlife, and Marine Resources Technical Guidance for Screening Contaminated Sediments for arsenic and chromium.

Background wetland sediment samples were collected at nine sample locations during the first sampling event and analyzed for arsenic and chromium. Arsenic concentrations ranged from 1.4 to 10.3 mg/kg and total chromium concentration ranged from 7.8 to 23.1 mg/kg.

Arsenic concentrations were detected in five of the nine background sediment samples above the LEL of 6.0 mg/kg, but below the SEL of 33 mg/kg, at a maximum concentration of 10.3 mg/kg. All of the total chromium background samples were below both the LEL of 26 mg/kg and the SEL of 110 mg/kg.

Fourteen sediment samples were collected from wetland areas near and downgradient from the waste fill piles during the initial sampling event and analyzed for metal COPCs. The metal COPCs detected included arsenic which ranged from 2.3 to 11.4 mg/kg, total chromium which ranged from 9.2 to 215 mg/kg and hexavalent chromium which ranged from 1.3 to 18.3 mg/kg.

Total chromium concentrations in 7 of the 14 wetland sediment samples were detected above the LEL of 26 mg/kg at a maximum concentration of 97.8 mg/kg. Total chromium was not detected above the SEL of 110 mg/kg. Arsenic concentrations were detected below both the LEL of 6.0 mg/kg and the SEL of 33 mg/kg. Hexavalent chromium was detected in two of the sediment samples. A sediment quality criterion is not available for hexavalent chromium.

Wetland F is the receptor of groundwater discharge from the Site. Metal COPCs detected in samples collected from this wetland were not elevated compared to Site background.

Soil Gas Contamination

Two field-measured soil vapor samples were analyzed using a calibrated multi-gas meter at gas probe GPZ-1; one during the initial monitoring event and the other during the second monitoring event. The soil vapor monitoring data are summarized as follows:

The lower explosive limit (percent of methane in air) exceeded the range of the instrument (0 to 5% methane) in both samples, indicating high methane levels. Hydrogen sulfide was detected at low levels (1 to 4 ppm) during the first monitoring event, and ranged from 195 to 305 ppm during the second monitoring event. Hydrogen sulfide has a “rotten egg” odor with a very low concentration threshold. Oxygen content was detected near 0% (0.4 to 0.9 %) during the first monitoring event, indicating an anoxic or anaerobic subsurface condition, and ranged from 6.1 to 9.8 % during the second monitoring event. Carbon monoxide was detected at low levels (3 to 6 ppm) during the first monitoring event and ranged from 103 to 185 ppm during the second monitoring event. No vapors were detected in ambient air on or near the waste fill piles, indicating the elevated hydrogen sulfide and methane detected in the gas probe are not being emitted in significant quantities and/or they are being dispersed in ambient air.

SUMMARY OF SITE RISKS

As part of the RI/FS, a baseline human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) were conducted to estimate the current and future effects of contaminants in soils and sediments, groundwater and surface water on human health and the environment. The HHRA and SLERA provide analyses of the potential adverse human health and ecological effects caused by the release of hazardous substances from the Site. Both assessments evaluate the risks in the absence of any actions or controls to mitigate these releases under current and future land uses. Consistent with the NYSDEC GA groundwater classification, the groundwater was evaluated as a potable water supply although the site groundwater is not currently used as a drinking water source. Residential wells are in the area of the site. The closest well is located 1/4 mile west of the site. This well was sampled by EPA and found to be free of site-related contaminants.

Human Health Risks

Detailed results of the HHRA can be found in a document titled “Baseline Risk Assessment” , dated July 2006, prepared by Geomatrix Consultants, Inc. and Benchmark Environmental Engineering and Science, PLLC, and reviewed by EPA. The HHRA risk estimates are based on current/future reasonable maximum exposure (RME) scenarios developed taking into account various health protective exposure assumptions about the frequency and duration of an individual’s exposure to the soil, sediment, and volatilized contaminants from groundwater, groundwater (shallow and deep), and surface water.

The HHRA also evaluated the toxicity of the contaminants of potential concern found at the site. RME exposure and central tendency exposures (CTE) or average exposures are included. Central Tendency or average exposures were calculated for those pathways that exceeded a risk level of 1×10^{-4} (or one in ten thousand) or a Hazard Index (HI) of 1 for noncancer health effects (HI =1).

WHAT IS RISK AND HOW IS IT CALCULATED?

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 releases 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 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 identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of 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 effects, 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 effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. 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 explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

Determinations regarding remedial action at the site are based on the RME scenarios which exceeded the risk range. The NCP outlines a risk range from cancer risk of one in a million (1×10^{-6}) to one in ten thousand (1×10^{-4}) and a HI of one for noncancer health effects.

As described in the box "WHAT IS RISK AND HOW IS IT CALCULATED?", the HHRA followed a four step process that includes: Hazard Identification, Dose-Response, Exposure Assessment and Risk Characterization. A brief description of the results of each of these steps is provided below.

Hazard identification. The HHRA used data meeting all appropriate QA/QC requirements. Data sets included past investigations of the landfill area supplemented with additional sampling to support the HHRA conducted in 2003. The HHRA evaluated Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCS), Target Analyte List (TAL), and hexavalent chromium data collected during the RI. Some of the chemicals found at the landfill occur as natural components of soil and others are present due to past activities associated with the site. The assessment identified a large number of Contaminants of Potential Concern (COPC) that were evaluated in the HHRA. Based on this analysis, the primary COPCs that exceeded the risk range described above included: antimony, arsenic, cadmium, hexavalent chromium, iron, manganese and thallium in groundwater.

Dose-Response. Toxicity data was obtained from EPA's consensus toxicity database the Integrated Risk Information System and other appropriate sources. Toxicity data included weight of evidence classifications for carcinogens and chemical-specific toxicity values for cancer andnoncancer health effects. Toxicity values for inhalation, dermal and ingestion of COPCs in the landfill were selected based on the potential routes of exposure and available toxicity information. The Adult Lead model was used to evaluate exposures to lead in groundwater.

Exposure Assessment. The HHRA focused on current and future health effects to both adult and adolescent trespassers, future outdoor and indoor industrial workers, and future construction workers from contaminants in soil and groundwater. Exposure routes included incidental ingestion, inhalation of volatilized chemicals from soils, and dermal contact with surface and subsurface soil and groundwater.

The HHRA evaluated exposures in the absence of institutional controls or remedial actions. These receptor populations were considered "reasonable maximum exposure," and therefore protective of human health under the current and future exposure scenarios. The HHRA included standard default exposure assumptions. The exposure point concentration was calculated using EPA statistical software. EPA approved models for estimating indoor air and fugitive dust emissions were also used in the assessment.

Risk Characterization. Chemical data from the previous steps were combined to calculate cancer risks and noncancer health hazards expressed as a total Hazard Index (HI) or individual Hazard Quotients (HQ). The HHRA found the risks did not exceed the risk range for most exposure scenarios. Exposure scenarios exceeding the risk range are provided below including information on the Central Tendency or average risks where the upper bounds of the risk range of 10^{-4} or an HI = 1 were exceeded.

- **Future Industrial Worker**. The cancer risks for the future industrial workers at the site were 3×10^{-4} (three in ten thousand) and noncancer health hazards for total chemicals were an HI = 230. The cancer risks and noncancer HI exceed the risk range. The risk is primarily attributed to the future ingestion of groundwater underlying the site contaminated with arsenic (2.4×10^{-4}) and the noncancer health assessment for arsenic (HQ = 1.5); cadmium (HQ = 3.8); hexavalent chromium (HQ = 1.2); iron (HQ = 94), manganese (HQ = 5.9) and thallium (HQ = 119). The Central Tendency or average risk from ingestion of groundwater was (6 x 10^{-5} (or six in one hundred thousand) from arsenic in groundwater; and the HI was 90 which was primarily attributable to potential exposure to thallium (HQ = 81.9) and cadmium (HQ = 3.5).

  In the HHRA, the PRPs' consultant described difficulties they experienced in obtaining representative samples from well MW-2S possibly related to its age and construction materials. They concluded that the groundwater analytical results collected from well MW-2S during the first and second sampling events might not be representative of site groundwater. Nonetheless, even if the data from monitoring well MW-2S were to be completely discounted, other groundwater data demonstrate that there is an unacceptable noncancer health hazard for the future industrial worker (HI = 8 with the primary contaminants hexavalent chromium (HQ = 1.2) and manganese (HQ = 5.9).

  The Central Tendency or average noncancer health hazards were an HI = 1.9 which were attributable to hexavalent chromium (HQ = 1.0) and manganese (HQ = 0.9).

- **Future Construction Worker**. Future construction workers at the landfill had cancer risks of 3×10^{-6} and a noncancer HI = 5.2. The chemicals contributing to an HI greater than one were cadmium (HI = 1.9) and thallium (HI = 1.6).

The HHRA found that other exposure scenarios for other receptors were either within or below the risk range.The HHRA provides details regarding the results of these individual assessments.

Ecological Risks

A Screening-Level Ecological Risk Assessment (SLERA) was prepared to assess the potential ecological risks associated with chemicals detected at and adjacent to the Site. The objective of the SLERA was to fulfill Steps 1 and 2 outlined in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (ERAGS, USEPA, 1997b). The draft SLERA was prepared by Environmental Risk Group (ERG).

The SLERA was prepared as a two-step process, with Step I modeling risks to ecological receptors under maximum (worst case) exposure scenarios, and Step II employing a more likely food chain model that considered: average concentrations of the constituents of concern; bioavailability of chromium; and, in the case of the modeled omnivorous mammal (raccoon), a distributed diet and typical home range.

Modeling performed under Step II of the SLERA suggests only minimal increased ecological hazard to avian omnivores and insectivores preying on invertebrates exposed to elevated COPC concentrations at the Site, with remaining ecological receptors at or within acceptable risk levels. The SLERA further indicates that the most significant potential risk is primarily due to direct soil/fill exposure. Considering the available data, the SLERA concluded that any ecological impact would be highly localized.

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 site-specific risk-based levels.

The following RAOs were established for the Site:

- Reduce or eliminate any direct contact threat associated with the contaminated soils/fill; and
- Minimize or eliminate contaminant migration from contaminated soils to the groundwater.

Soil cleanup objectives will be those established pursuant to the TAGM guidelines. These levels are the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater as specified in the TAGM. All of these levels fall within EPA's acceptable risk range.

Groundwater cleanup goals will be the more stringent of the state or federal promulgated standards.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARS, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. 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 §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 §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. As the groundwater contamination is limited to a small area, under the waste piles and institutional controls would be required to prevent the use of groundwater under the Site, remedial alternatives do not address the groundwater. The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The remedial alternatives are described below.

<u>REMEDIAL ALTERNATIVES</u>

ALTERNATIVE 1: NO ACTION

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives. Under this alternative, no action would be taken to contain wastes, reduce infiltration into the landfill, eliminate areas of exposed waste, or control and treat leachate discharging from the landfill or address groundwater. Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site conditions be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

Capital Cost:	$0
Annual Operation and Maintenance Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

ALTERNATIVE 2: INSTITUTIONAL CONTROLS

This alternative would consist of environmental easements and/or restrictive covenants that would be designed to prevent direct contact with the waste/fill material by limiting future Site use. The environmental easements and/or restrictive covenants would also be designed to prevent groundwater use on the Site for drinking water or potable purposes.

Institutional controls for the waste fill would include access restrictions via fencing and/or appropriate signage to prevent the entry of trespassers onto the area of the Site that contains the waste fill piles; maintenance of the existing vegetative cover; and a Soil/Fill Management Plan to provide guidance for handling soil/fill from this area during future Site industrial use (e.g., personal protective equipment requirements during underground utilities construction, methods for disposing of soil/fill removed from excavation, etc.). Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site conditions be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove, treat, or contain the contaminated soils.

Capital Cost:	$153,000
Annual Operation and Maintenance Cost:	$15,500
Present-Worth Cost:	$392,000
Construction Time:	2 months

ALTERNATIVE 3: CONTAINMENT/ISOLATION WITH SOIL COVER ENHANCEMENT

This alternative would involve minor regrading of the waste fill piles followed by placement of 6 to 12 inches of topsoil.

A suitable seed mix would be spread and raked into the soil to provide for final vegetative cover following cover soil placement. Some reworking of the fill piles would be necessary to ensure uniform coverage. The total base area covered by the waste fill piles is approximately 7 acres.

Site conditions would be reviewed at least once every five years as per CERCLA, because this alternative would result in contaminants remaining on-site above health-based levels.

Capital Cost:	$577,000
Annual Operation and Maintenance Cost:	$14,500
Present-Worth Cost:	$800,000
Construction Time:	5 months

ALTERNATIVE 4: CONSOLIDATION/CONTAINMENT WITH LOW-PERMEABILITY SOIL (PART 360-EQUIVALENT) COVER

This alternative would include the environmental easement described in Alternative 2 above. This Alternative would involve clearing and grubbing a consolidation area in the vicinity of the waste fill piles; consolidating the smaller, outlying waste fill piles to the larger piles to create an approximate 7 acre or less consolidated waste/fill area.

The waste piles to be consolidated will be removed to native soil. Results of subsurface data indicate that metal COPCs have not migrated substantially in native soil below the bottom of the waste fill piles. The consolidated waste fill would be graded to promote surface water drainage, and capped with a low permeability soil cover i.e., consistent with 6 New York Code Rules Regulations Part 360. The cap would consist of the following components:

6-12 inches topsoil
18-24 inches low permeability soil

The site conditions would be reviewed at least once every five years as per CERCLA, because this alternative would result in contaminants remaining on-site above health-based levels.

Capital Cost:	$1M
Annual Operation and Maintenance Cost:	$15,000
Present-Worth Cost:	$1.3 M
Construction Time:	7months

Additional Components of the Remedial Action Common to Alternatives 3 and 4

The containment alternatives, consistent with NYSDEC closure requirements, would require post-closure operation and maintenance to operate and maintain the vegetative cover and gas venting systems. In addition, a gas, air, and groundwater monitoring program would be required.

Current New York State landfill closure regulations require the installation of a passive gas venting system comprised of at least one gas vent riser per acre, to minimize landfill gas build-ups within the fill.

ALTERNATIVE 5: EXCAVATION/OFF-SITE DISPOSAL

This alternative would involve excavation of a total of approximately 48,000 tons of waste/fill material from the waste piles with transport of excavated materials to a permitted, off-site disposal facility for treatment and/or disposal. Where necessary, the areas would then be backfilled with clean soil to match the surrounding grade, covered with topsoil, and seeded to promote vegetative growth. On-site dewatering of the sludge fill and/or admixing with drier soils would be required during removal of saturated materials in order to eliminate free liquid. The estimated amount of material requiring disposal is 60, 000 tons, assuming admixing was employed at a rate of approximately one ton dry soil to two tons of sludge fill material.

Since the waste would be removed, the waste piles will no longer be acting as a source of contamination to the groundwater and would no longer present potential health and environmental impacts.

Capital Cost:	$4.8 M
Annual Operation and Maintenance Cost:	$0
Present-Worth Cost:	$4.8
Construction Time:	6 months

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, *Overall protection of human health, and the environment*, *Compliance with applicable, or relevant and appropriate requirements*, *Long-term effectiveness and* *permanence, Reduction of toxicity, mobility, or volume through treatment, Short-term effectiveness, Implementability*, *Cost,* *and State and Community acceptance*.

The evaluation criteria are described below.

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 Federal and State environmental statutes and requirements or provide grounds for invoking a waiver.

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, that 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 periods until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

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

8. State acceptance indicates if, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations regarding the preferred alternative.

9. 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 these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

Alternative 1 (no action) and Alternative 2 (institutional controls) would not be protective of human health and the environment because they would not minimize infiltration and groundwater flow into the waste/fill material, thereby allowing further leaching of contaminants into the aquifer; they would prevent direct contact with the waste/fill piles; and they would do not protect terrestrial mammals from soil contamination.

Alternatives 3 and 4 would provide good overall protection of human health and the environment by containing waste with a landfill cap and controlling landfill gas through venting. Alternative 4 would be more protective than Alternative 3 because it requires a thicker cap of low permeability material to reduce infiltration, thereby reducing the generation of leachate which would mobilize contaminants into the groundwater. Alternative 5 would be the most protective because it would permanently remove the source of contamination to the groundwater and would prevent future direct contact with the waste.

Compliance with ARARs

There are currently no federal or state promulgated standards for contaminant levels in soils. Action-specific ARARs include 6NYCRR Part 360 requirements for closure and post-closure of municipal landfills. The Part 360 regulations require that the landfill cap promote runoff, minimize infiltration, and maintain vegetative growth for slope stability. Unlike Alternative 3, Alternative 4 would include an equivalent cap design as specified in 6 NYCRR Part 360. Alternative 5 would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes.

Long-Term Effectiveness and Permanence

Alternatives 1 and 2 would involve no active remedial measures and, therefore, would not be effective in eliminating potential exposure to contaminants in soil or groundwater. These alternatives would allow the continued migration of contaminants from the soil to the groundwater.

A landfill cap is considered a reliable remedial measure that, when properly designed and installed, provides a high level of protection. Of the two cap alternatives considered in detail, Alternative 3 would be less reliable in protecting human health and the environment than Alternative 4 because it allows more precipitation to infiltrate through the waste piles which would result in a greater degree of leaching of contaminants to groundwater. Post-closure operation and maintenance requirements would ensure the continued effectiveness of the landfill cap.

Alternative 5 would be the most effective alternative over the long term.

Reduction in Toxicity, Mobility, or Volume through treatment

Alternatives 1 and 2 would provide no reduction in toxicity, mobility or volume.

Compared to Alternative 3, Alternative 4 would provide greater reduction in the mobility of contaminants by restricting infiltration through a thicker low permeability landfill cap, which would reduce the further leaching of contaminants to groundwater.

Alternative 5 would reduce the mobility of waste in the waste/fill piles. However, admixing the sludge fill with drier soils in order to meet landfill acceptance criteria would increase the volume of sludge fill requiring disposal.

Short-Term Effectiveness

Alternatives 1 and 2 do not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts on property workers or the community as a result of its implementation.

There are short-term risks associated with Alternatives 3 and 4. These alternatives include caps, which would involve clearing, grubbing, and regrading of the waste piles. Alternative 4 would present a somewhat greater short-term risk than Alternative 3 since it would require excavation and consolidation of the waste piles which would result in greater generation of dust and noise than Alternative 3 . Alternative 4 would be more effective in the short-term than Alternative 3 because it would limit leachate production to a greater extent than Alternative 3. All three action alternatives (Alternatives 3, 4 and 5) can be accomplished in about the same time frame namely five to seven months.

There would be short-term risks and the possibility of disruption of the community associated with Alternative 5. These include: an increase in traffic flow along local roads for an approximately six-month period; noise from heavy equipment use; and strong odors. This traffic would raise dust and increase noise levels locally. However, proper construction techniques and operational procedures would minimize these impacts. Short- term risks to workers could be increased to the extent that surficial wastes are encountered during excavation activities, but this risk would be minimized through the use of personal protection equipment.

Once the surface of the waste/fill is consolidated and is completely covered or removed, these short-term impacts to the community, workers, and the environment would no longer be present.

Implementability

Alternatives 1 and 2 would be the easiest soil alternatives to implement, as there are no active remedial measures to undertake.

Alternatives 3 and 4 can be readily implemented from an engineering standpoint and utilize commercially available products and accessible technology.

Alternative 5 would pose several implementability issues including truck traffic coordination through the residential neighborhood and the City and odor. These issues would be addressed through appropriate mitigative measures.

Cost

The estimated capital, operation, maintenance, and monitoring (O&M), and 30-Year present-worth costs for each of the alternatives are presented below. The annual O&M costs for Alternatives 2, 3, 4, and 5 would include groundwater monitoring.

Alterna tive	Capital	Annual O&M	Total Present Worth
1	$0	$0	$0
2	$153,000	$15,500	$392,000
3	$577,000	$14,500	$800,000
4	$1,000,000	$15,000	$1,300,000
5	$4,800,000	$0	$4,800,000

Alternative 5, excavation, has the highest cost of any alternative with a capital cost of $4.8 million. Of the two containment alternatives, Alternative 3 has the lower capital and O & M costs, resulting in a net present worth of $800,000 because it uses less cover and minimal fill. Alternative 4 has the highest cost, with a net present worth of $1,300,000.

State Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

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

PROPOSED REMEDY

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 4 (Consolidation/Containment with low permeability soil (Part 360-Equivalent) cover and Institutional Controls as the preferred remedy for the Site. Specifically, this would involve the following:

- Consolidating the waste/fill piles into 7 -acres or less then capping with a low permeability soil cover, consistent with the requirements of 6 NYCRR Part 360, including seeding with a mixture to foster natural habitat. Waste piles moved during consolidation will be removed to native soil. Removal to this depth will insure that any remaining contaminants will be within background concentrations.

- Imposing institutional controls in the form of an environmental easement and/or restrictive covenants that would require: (a) restricting the use of groundwater as a source of potable or process water unless groundwater quality standards are met; (b) restricting activities on the site that could compromise the integrity of the cap; and (c) the owner/operator to complete and submit periodic certifications that the institutional and engineering controls are in place;

- Developing a site management plan that provides for the proper management of all Site remedy components post-construction, such as institutional controls, and that shall also include: (a) monitoring of groundwater to ensure that, following the capping, the contamination is attenuating and groundwater quality continues to improve; (b) identification of any use restrictions on the Site; and (c) provision for any operation and maintenance required of the components of the remedy; and

- Evaluating Site conditions at least once every five years to ensure that the remedy continues to protect public health and the environment.

Basis for the Remedy Preference

The preferred alternative would provide the most cost-effective solution applying the evaluation criteria given reasonably anticipated future land use of the site. Waste piles moved during consolidation would be removed to native soil. Removal to this depth would insure that any remaining contaminants will be within background concentrations. Results of subsurface soil samples taken below the waste piles indicate that metal COPCs have not migrated substantially in native soil below the bottom of the waste fill piles.

Capping would prevent direct contact and reduce infiltration, thereby reducing the generation of leachate which mobilizes contaminants into the groundwater. EPA is not proposing an active groundwater remedy because of limited groundwater contamination underlying the waste piles at the Site; instead, institutional controls would be required to prevent the use of groundwater at the site.

Given these factors, the selected alternative provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the selected alternative would be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and treatment technologies to the maximum extent practicable.