RECORD OF DECISION AMENDMENT

Hertel Landfill Site

Town of Plattekill, Ulster County, New York

January 2005

DECLARATION FOR THE RECORD OF DECISION AMENDMENT

SITE NAME AND LOCATION

Hertel Landfill Site

Town of Plattekill, Ulster County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents an amendment to the original remedial action for the Hertel Landfill Superfund Site (site), located in Plattekill, New York. The original remedial action was selected in a Record of Decision (ROD) issued by the United States Environmental Protection Agency (EPA) in September 1991.

The determination to amend the original remedy was made by EPA in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record file for this site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy.

ASSESSMENT OF THE SITE

The amendment of the response action selected in the 1991 Record of Decision will protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment and from pollutants or contaminants which may present an imminent and substantial endangerment to public health or welfare.

DESCRIPTION OF MODIFICATION TO THE SELECTED REMEDY

The amendment of the original remedy reassesses the need for a groundwater pump and treat system to address groundwater contamination. The original remedy selected in the 1991 ROD included capping of the landfill, restricting site access, and developing and implementing a groundwater extraction and treatment system. The capping of the landfill area was completed in December 1998 and site access has been restricted.

The major components of the modification to the selected remedy include:

- Elimination of the groundwater extraction and treatment system portion of the 1991 selected remedy;

- Implementation of a long-term monitoring program where groundwater, surface water, sediment samples, and residential well water will be collected and analyzed on an annual basis to ensure that the remedy remains protective of human health and the environment; and

- Maintenance of site access restrictions, and implementation of institutional controls to prohibit any use of the site that would impair the effectiveness of the landfill cap and leachate collection system and to prohibit any digging of wells or extraction of groundwater in or immediately adjacent to the landfill cap.

EXPLANATION OF FUNDAMENTAL CHANGES

This ROD Amendment describes the fundamental changes to the September 1991 ROD issued by the EPA and concurred on by NYSDEC.

Again, the remedy chosen by EPA in the 1991 ROD included the construction of a permanent cap over the site landfill area and a system to collect leachate from the landfill waste. The ROD remedy also included a groundwater pump and treat system. A remediation goal of the 1991 ROD was to reduce, within a reasonable time, the site groundwater and surface water contaminant levels to ambient surface water and groundwater applicable or relevant and appropriate requirements (ARARs).

The permanent cap and leachate collection system as installed have reduced the migration of contaminants sufficiently to improve site groundwater quality to the extent that the added expense of the pump and treat system is no longer warranted or needed to ensure protection of public health and the environment. Furthermore, groundwater modeling has predicted that the extraction of groundwater at the site would adversely impact the on-site wetlands.

The modified remedy will maintain site access restrictions and will implement institutional controls and a long-term monitoring program to collect groundwater, surface water, sediment, and residential well samples on an annual basis.

DECLARATION OF STATUTORY DETERMINATIONS

The modification to the response action selected in the 1991 ROD will be protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, be cost-effective, and utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this amended remedy will result in contaminants remaining on the site above levels which allow for unlimited use and unrestricted exposure, a review of the remedy will be conducted no less than every five years pursuant to Section 121(c) of CERCLA. The next review will be completed within five years of the date of this ROD Amendment.

William McCabe
William J. McCabe, Acting Director
Emergency and Remedial Response Division

January 21, 2005
Date

<u>RECORD OF DECISION AMENDMENT</u>

<u>DECISION SUMMARY</u>

Hertel Landfill Superfund Site
Town of Plattekill, Ulster County
New York

U.S. Environmental Protection Agency
Region II
New York, New York
January 2005

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Hertel Landfill Superfund Site
Town of Plattekill, Ulster County
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Site Name, Site Location and Description

The Hertel Landfill Superfund Site (site) is located in the Town of Plattekill, Ulster County, New York, just south of U.S. Route 44/NY Route 55 and approximately midway between Bedell Avenue and Tuckers Corner Road. Wetlands border the site property to the north, south, and east, and a small unnamed stream crosses the southern and eastern portion of the site and flows adjacent to the landfill. The unnamed stream flows into Pancake Hollow Creek and then Black Creek and the Hudson River. An approximate 15-acre portion of the 80-acre site property is an inactive waste disposal area that was established in 1963 as a private landfill accepting municipal and industrial waste.

The site and the area surrounding the site are zoned residential. Approximately 1,350 people live within three miles of the landfill. There are about 500 people living within a mile of the site. Residents within the area obtain their drinking water from individual drinking water wells. No permanent structures are located on the site. A locked gate has been installed across the unpaved main access road near Route 44/55 and a six foot high chain link perimeter fence has been erected around the northern, western, southern, and southeastern boundaries of the landfill area. The gate and fence act to prevent unauthorized personnel from entering the site.

There are two aquifers beneath the site. The bedrock material is the Austin Glen formation and described as a greywacke and shale; variegated light blue to blue-grey fine- to medium-grained sandstone (greywacke) with occasional seams of shale have been observed. The rock has well-defined bedding planes and the upper few feet are slightly weathered. The overburden is a glacial till deposit consisting of an mixture of material (clay, silt, sand, gravel, and boulders) which widely range in size, shape, and permeability. Overlying the till deposit is a layer of light brown fine sand and silt.

Site History and Enforcement Activities

The Hertel Landfill was established in 1963 as a private landfill accepting municipal and industrial waste. Approximately fifteen acres of the site property were used for disposal. Until 1975, the landfill was owned and operated by Carlo Hertel and later by his family through their company, Hertel Enterprises. In 1970, Dutchess Sanitation Services, Inc. began hauling refuse from Dutchess County to the Hertel Landfill and in 1975, Dutchess Sanitation Services, Inc. purchased the landfill.

In 1976, the Ulster County Department of Health (UCDOH) revoked the landfill permit for a variety of violations, among which were allegations of illegal industrial dumping. This UCDOH action and a Town of Plattekill ordinance prohibiting the dumping of out-of-town garbage resulted in the permanent closing of the Hertel Landfill in March 1977.

Sampling and analysis of site groundwater in 1980 and 1982 revealed measurable amounts of several metals. Three leachate samples were collected in March and May 1981 by NYSDEC. Analyses of these samples detected phenols, organic compounds, and a number of metals. Based on these results, NYSDEC placed the Hertel Landfill Site on the New York State Registry of Inactive Hazardous Waste Disposal Sites. In 1983, the site was recommended for inclusion on the National Priorities List (NPL) by NYSDEC and in October 1984, the United States Environmental Protection Agency (EPA) proposed the Hertel Landfill site for inclusion on the NPL. In June 1986, the site was placed on the NPL.

EPA conducted a Remedial Investigation/Feasibility Study (RI/FS) of the site between 1989 and 1991. The scope of the investigation included geophysical surveys, soil gas screening, test pit excavations, soil borings, and monitoring well installation. Samples were collected from surface water, sediment, groundwater, surface soils, subsurface soils, and leachate seeps. The results of the RI revealed the presence of low levels of volatile organic compounds (VOCs) and metals at concentrations above background levels in groundwater, surface water, sediment, and soil samples. In September 1991, based on the results of the RI/FS, EPA issued a Record of Decision (ROD) for the site. The ROD selected a remedial action which includes the construction of a multi-layer cap over the landfill portion of the Site, construction of a gas venting system and a leachate collection system, implementation of a comprehensive groundwater monitoring program for the Site, and installation of a groundwater extraction and treatment system to control leachate migration.

In September 1992, EPA issued a Unilateral Administrative Order (UAO) to six Potentially Responsible Parties (PRPs), directing them to perform the remedial design/remedial action (RD/RA). Ford Motor Company (Ford) was the only PRP at the time to comply with the UAO.

In 1994, Ford completed a pre-design investigation for the site which defined the extent of the landfill mass, modeled site groundwater dynamics and characterized soil, groundwater, surface water, and sediment contamination. The groundwater modeling predicted that a groundwater pump and treat system, if implemented, would have a negative impact on the wetlands immediately adjacent to the landfill, without achieving the goal of remediating groundwater contamination in the saturated zone.

In addition, Ford installed gas probes to monitor potential landfill gases generated by the decomposition of landfilled material and, in 1995, installed a locked chain link fence to prevent unauthorized access to the landfill.

The remedial pre-design investigation, which formed the basis of the design of the landfill cap, was approved by EPA in September 1996. Thereafter, initial work for the construction of the cap began with the removal of vegetation growing over the landfill area, as well as the implementation of erosion control measures. In February 1997, EPA issued a second UAO to eight additional PRPs, directing these parties to cooperate and participate in the site cleanup with Ford and with Golden Books Publishing Co., Inc. (formerly Western Publishing Co., Inc.), which had come into compliance with the first UAO. In September 1998, EPA entered into a Consent Decree settlement ("RD/RA Consent Decree") with eleven PRPs, all of which had been recipients of one of the two previously issued UAOs, for continued performance of the RD/RA and recovery of EPA's and NYSDEC's site costs. At the same time, EPA entered into a second Consent Decree settlement with eight other PRPs to recover site costs. EPA entered into two additional cost recovery Consent Decree settlements with a total of five other PRPs, including F.I.C.A., a partnership that was the successor to Dutchess Sanitation Services, Inc.

Construction of the landfill cap was completed by the PRPs in December 1998. In May 1999, EPA approved a Remedial Action Report prepared by the PRPs' contractor, Killam Associates, which determined that the landfill cap and leachate collection system had been completed in accordance with the approved Remedial Design Report and New York State Part 360 solid waste landfill closure requirements. The landfill cap and leachate collection system are being monitored and maintained by the PRPs as set forth in the RD/RA Consent Decree and the EPA-approved Operation and Maintenance Manual. In accordance with the EPA-approved monitoring plan for the site, post-closure monitoring is currently occurring on a biannual basis, and post-closure maintenance is being implemented and reported on a quarterly basis to EPA. In general, the surface water, sediment, and groundwater quality has improved.

Community Participation

The Post-Decision Proposed Plan for the Hertel Landfill site and the Sampling Inspection Reports were made available to the public on July 28, 2004. These documents can be found in the Administrative Record file and the information repository maintained at the EPA Superfund Records Center in EPA Region 2, the Plattekill Town Hall, and also at the Plattekill Public Library. The notice of availability of these documents was published in the Poughkeepsie Journal on July 28, 2004.

The public comment period on the Post-Decision Proposed Plan was initially scheduled to be held from July 28, 2004 to August 27, 2004. At the public's request, EPA subsequently granted a 30-day extension to the comment period which then concluded on September 27, 2004. In addition, a public meeting was held on August 11, 2004 to discuss the proposed modification to the 1991 ROD. At this meeting, representatives from EPA, NYSDEC, and NYSDOH answered questions about the current status of the site and the remedial alternatives under consideration to amend the 1991 ROD. Subsequently a public availability session was held in Modena, New York on September 22, 2004 where EPA was available to respond to community residents' questions concerning the July 2004 sampling event of several upgradient residential wells. At this session, EPA, NYSDEC, NYSDOH, and technical consultants for a number of PRPs answered questions about groundwater flow and about the upgradient residential sampling results. Responses to the comments received during the comment period are included in the Responsiveness Summary, which is part of this ROD Amendment.

Scope and Role of Response Action

The primary objective of issuing this ROD Amendment is to amend a component of the 1991 ROD for the Hertel Landfill Superfund Site. The remediation goal of this ROD Amendment is to reduce the site groundwater and surface water contaminant levels to ambient surface water and groundwater applicable or relevant and appropriate requirements (ARARs). The remedy chosen by EPA in the 1991 ROD included the construction of a permanent cap over the site landfill area and a system to collect leachate from the landfill waste. These aspects of the remedy have been implemented.

The 1991 ROD also included a groundwater pump and treat system which has not been implemented. However, EPA now believes that the pump and treat system is no longer necessary. The installed permanent cap and leachate collection system have reduced the migration of contaminants sufficiently to improve the site groundwater quality to the extent that the added expense of the pump and treat system is not warranted. As part of the landfill post closure monitoring program, groundwater and surface water sampling was conducted. Using this data, a Human Health Risk Assessment was performed which determined that no unacceptable human health cancer risks or non-cancer health hazards associated with the groundwater contamination exist at this site.

Since human health risks are controlled and a loss of wetlands would occur if the original groundwater remedy were implemented, EPA evaluated the following three alternatives to modify the original groundwater remedy for this site: 1) No Further Action, 2) Institutional Controls and Long-Term Monitoring, and, 3) the original groundwater extraction and treatment remedy selected in the 1991 ROD. The three alternatives were described in the Post-Decision Proposed Plan and were presented to the community at the public meeting.

Summary of Site Characteristics

Sediment and Surface Water

Chemical concentrations in sediment and surface water samples collected from the site study area were compiled from several sources.

In 1994, surface water and sediment samples were analyzed for metals, pesticides, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), VOCs, and cyanide. VOCs and SVOCs were detected at all sampling locations, while PCBs were not detected in any samples. Some metals were also detected.

Following the completion of the installation of a landfill cap in 1998, the monitoring program has included annual collection of sediment and surface water samples from three different areas: upgradient of the landfill, along the landfill's eastern edge, and downgradient of the landfill. These samples are analyzed for inorganic compounds annually and for organic compounds biennially. The analytical results from the sediment and surface water samples collected in 1999 showed elevated levels of manganese downgradient of and along the eastern edge of the landfill in two seep locations which were identified as areas of potential ecological risks. The VOCs and SVOCs previously present in the surface water and sediment samples were no longer detected.

In October 2002, another round of surface water samples was collected and analyzed for inorganic and organic compounds. The results also showed elevated levels of iron and manganese at the same two seep locations along the eastern edge and downgradient of the landfill. The concentrations of iron and manganese in surface water samples were, respectively, 10,750 and 5,890 micrograms per liter (ug/L) at one seep location and 63,000 ug/L and 3490 ug/L at the other. These results exceeded NYSDEC ambient water quality standards for iron (300 ug/L) and iron-manganese combined (500 ug/L).

In December 2003, sediment and surface water samples were collected for the analysis of iron and manganese from the two seeps. The results continued to show elevated levels of these contaminaants. The concentrations of iron and manganese in the sediments were 45,500 and 1,360 mg/Kg, respectively, at one of the seep location and 48,700 and 1,360 mg/Kg at the other seep location. The surface water concentrations of iron and manganese were 10,100 and 2,480 ug/L at one seep and 42,600 ug/L and 3,840 ug/L at the other seep location.

The nature and extent of the contamination in the surface water and sediments can be described as follows:

- The concentrations of iron and manganese in the surface water from the December 2003 sampling event are similar to the levels reported for the October 2002 sampling event.

- The surface water concentrations of both iron and manganese decrease with distance downstream of the seeps.

- In the surface water beyond the seeps, some of the iron samples were found to be at or below the 300 ug/L ambient water quality standard.

Groundwater

The current groundwater monitoring program includes sampling of approximately 21 groundwater monitoring wells located at the site and analysis of these samples for organic and inorganic compounds. These groundwater monitoring wells are currently sampled semi-annually, but were sampled on a quarterly basis from December 1996 to January 2001. Iron and manganese are the contaminants which have had the highest concentrations; these concentrations remain elevated. VOCs, which were present in monitoring wells during the remedial investigation, have not been detected since 1999.

The results of the groundwater data show that high levels of manganese, measured at 12,005 ug/L (and exceeding the 880 ug/L preliminary remediation goal for manganese developed by EPA through its Region 9 office), have persisted in wells along the eastern border of the landfill. Manganese also has been consistently detected above 880 ug/L in a monitoring well and residential wells located as far as approximately 100 feet downgradient of the site at levels ranging from 1,000 to 3,000 ug/L. The manganese concentrations detected in the off-site wells located further downgradient of the site usually did not exceed the 880 ug/L concentration level.

Summary of Site Risks

Human Health Risk Assessment

The baseline risk assessment estimates what risks the site presents. Its purpose is to identify potential cancer risks and non-cancer health hazards at the site, assuming that no further remedial action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD Amendment summarizes the results of the baseline risk assessment for the Hertel Landfill site.

The reasonable maximum human exposure is evaluated. A four-step process is used for assessing site-related human health risks for a reasonable maximum exposure scenario:

1) Identification of Chemicals of Concern (COC) - identifies the contaminants of concern at the Site based on several factors such as contaminant toxicity, frequency of occurrence, and concentration.

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

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

4) Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related cancer risks and non-cancer health hazards and the associated uncertainties.

Identification of Chemicals of Concern

During the 1989-1991 RI/FS, an analysis was performed to evaluate the cancer risks and the non-cancer health hazards that would result if no remedial action was taken to remediate the groundwater at the Hertel Landfill site. The focus of the risk assessment was on the potential health effects that could result from a direct contact with groundwater under current and future exposures through ingestion, inhalation, and dermal absorption of the groundwater. The chemicals of potential concern (COPC) identified in the groundwater were arsenic, chromium, and manganese. The ROD signed in 1991 required the capping of the landfill and groundwater treatment via microfiltration and UV oxidation to mitigate the contamination associated with the site.

In 2003, an updated risk assessment was performed to evaluate potential risks from exposure to the contaminated groundwater at the landfill and downgradient. The purpose of the risk assessment was to identify potential cancer risks and non-cancer health hazards assuming that no further remedial action was taken. The risk assessment was based on the most recent sampling data from the on-site monitoring wells and off-site residential samples taken from the outside tap or kitchen tap. The sampling data used to determine the cancer risks and non-cancer health hazards associated with exposure to groundwater from on-site monitoring wells was collected from January 1998 - October 2002. The sampling period used to determine the cancer risks and non-cancer health hazards associated with exposure to tap water from the residential properties (off-site) are based on one round of sampling performed in July 2001. A summary of the collected on-site and off-site data is presented in Tables 1A and 1B, respectively. Although not used in this assessment, a confirmatory sampling event occurred in December 2003. The results of this sampling event were consistent with that of the 2001 event.

Exposure Assessment

Table 2 provides the conceptual site model for the risk assessment. The assessment evaluated the cancer risks and non-cancer health hazards to the Reasonably Maximally Exposed Individual or RME. The RME is considered the maximum exposure that is reasonably estimated to occur at the site and it is not a worst case scenario. Based on the results of the risk assessment which found the risks were within the NCP risk range (described below) a Central Tendency or average risks was not calculated.

On-site the receptors included the on-site industrial worker who may consume one liter/day from the aquifer while working at the site for 250 days/year for a period of 30 years. Off-site receptors included: the residential adult and child (0 to 6 years). The off-site receptors ingestion rates were: 2 liters/day for 350 days/year for 24 years for the adult and 1 liter/day for 350 days/year for 6 years for the young child.

Toxicity Assessment

The toxicity information used in the risk assessment was obtained from the Integrated Risk Information System (IRIS), the Agency's consensus database of toxicity information. For chemicals lacking files in IRIS, the toxicity information was obtained from EPA's National Center for Environmental Assessment's Superfund Technical Support Center.

Cancer: Table 3 provides the Weight of Evidence (WOE) and the Cancer Slope Factors (CSFs) for the chemicals of potential concern. The WOE provides information regarding the potential for a chemical to cause cancer based on the available human epidemiological data and animal studies. The classifications for chemical carcinogens include: known human carcinogen, probable human carcinogen, possible human carcinogen, not classifiable and not known to cause cancer in humans. The CSF provides an upper bound estimate of the potential for a chemical to cause cancer in humans.

Non-Cancer: Non-cancer toxicity is evaluated using a Reference Dose (RfD). An RfD is an estimate of a daily exposure level for the human population, including sensitive subpopulations, that are likely to be without an appreciable risk of deleterious effects during a lifetime. Table 4 provides the Reference Doses for the chemicals of potential concern and the associated health endpoints and the source of the data.

Risk Characterization

Cancer: The cancer risk assessment multiplies the Lifetime Average Daily Dose calculated based on the receptor's exposure assumptions by the chemical-specific Cancer Slope Factor (CSF). The results of this assessment are provided in Table 5.

For the on-site worker, using data from the 1998-2002 sampling events and the exposure assumptions identified above, it was determined that the total cancer risk for the industrial worker is 5.3×10^{-5} (i.e., an excess lifetime cancer risk of 5 in 100,000 as a result of site related exposure). The cancer risks to the on-site worker are within the NCP's acceptable cancer risk range of 1×10^{-4} to 1×10^{-6}.

For the off-site resident, sampling data obtained from the residential wells during the 2001 sampling event were combined with the above-mentioned exposure assumptions to calculate the risks to the adult resident, child resident, and the combined child and adult resident. Based on this analysis, it was determined that the total cancer risk for the residential adult and child is 8.7×10^{-5} (i.e., an excess lifetime cancer risk of 9 in 100,000 as a result of site-related exposure). These risks are within the NCP's cancer risk range of 1×10^{-4} to 1×10^{-6}.

Non-Cancer: To assess the overall potential for non-cancer health effects posed by a chemical, EPA develops a Hazard Quotient (HQ). The HQ is calculated by comparing an individual's chronic daily intake (CDI) over a specified period of time with an RfD for a similar exposure period. For more than one contaminant, EPA uses a hazard index (HI). The HI is generated by adding the hazard quotients (HQs) for all chemical(s) of potential concern that effect the same target organ or act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-cancer health effects from all contaminants are unlikely.

An HI greater than 1 indicates that a site-related exposure may present a hazard to human health.

The non-cancer health assessment results are provided in Table 6. The total non-cancer hazard index for the industrial worker is 2. However, based on organ specific endpoints, the hazard index is below 1 for the specific health endpoints. The total non-cancer hazard index for the residential adult is 1 and for the child is 0.9. These Hazard Indices are below EPA's level of concern for non-cancer health effects.

Lead

Lead does not have a CSF or RfD. The health risk posed by lead with respect to the site was evaluated by comparison to the Safe Drinking Water Act Action Level of 15 micrograms per liter (ug/l). On-site, the maximum concentration of lead was 32.9 ug/l; however, the average concentration in groundwater was less than 15 ug/l for all wells sampled.

The off-site residential sampling event indicated that the maximum detected concentration of lead, in an outside residential tap water sample, was 50.5 ug/l. However, the concentration from the tap water within the residence was 2.3 ug/l, below the 15 ug/l Action Level established for residential water consumption.

For the remaining 10 properties sampled, the residential tap water samples were below the Action Level of 15 ug/l (the concentrations ranged from non-detect to 1.9 ug/l).

Based on the concentration gradient found between the on-site maximum concentration (32.9 ug/l) and the off-site concentrations (average concentration of 14.2 ug/l), the potential exists that the off-site residential lead concentrations may be related to other possible sources of lead contamination not related to the site (e.g., lead in plumbing).

Uncertainties

The procedures used to assess potential human health risks and hazards in this evaluation are subject to a variety of uncertainties. In general, the main sources of uncertainty include: Data analysis, Exposure Assessment, and Toxicity Assessment

Data Analysis

The data was collected consistent with the Quality Assurance Project Plan and met all appropriate Quality Assurance/Quality Control procedures. Data qualified as rejected was removed from the data set. Generally, laboratory related uncertainties are minor relative to other uncertainties and they tend to cancel out.

Many detection limits were elevated in on-site samples. If a COPC was found at a nondetectable level at an elevated detection limit, two uncertainties could result: 1) the chemical could be eliminated as a COPC if there were no positive detections in the media, even if the detection limit was elevated; and 2) for COPCs, the constituent could be assumed to be present in the sample at one-half the detection limit for calculating EPCs. In the first case, the risk may be underestimated. In the second case, the risk may be overestimated if the COPC is present at far less than the half the elevated detection limit, or underestimated if the actual concentrations were closer to the detection limit.

Most of the on-site groundwater wells have been sampled on a quarterly basis since 1998. However, the residential (off-site) tap water sample data set consists of one round of sampling during June 2001. A confirmatory sampling event occurred in December 2003. The results of this sampling event were consistent with that from 2001. This limited data set represents a potential uncertainty in estimating average concentrations at the site. Arsenic was detected in one residential sample (in 2001) downgradient from the Hertel property; however, this chemical was not detected in any residential sample between the Hertel property and the residential well in question (MW-9). During the 2003 sampling event, arsenic was not detected in any of the residential wells.

Exposure Assessment

In this risk assessment, the reasonable maximum exposed (RME) individual was evaluated. Use of the RME scenario includes assumptions regarding the types of exposure that may occur, the frequency and duration of these exposures, and the concentrations of COPCs at the points of exposure. These exposure parameters are meant to be protective exposure assumptions and are intended to represent intake estimates that are protective of human health, but which may also be a potential overestimation of potential cancer risks and non-cancer health hazards.

Toxicity

General uncertainties in toxicity assessment stem from a lack of toxicity data for chemicals of potential concern, which is apparent in Tables 3 and 4. In addition, there are uncertainties due to the use of animal studies, calculation of cancer risks based on less than lifetime exposure data, and application of dose-additivity for carcinogens and non-carcinogens. There are also uncertainties in extrapolating from animal to human for both carcinogenic and non-carcinogenic effects.

For non-carcinogens, such uncertainties are addressed by applying uncertainty factors ranging from one to an order of magnitude uncertainty factors in calculating RfDs from animal lowest-observed-adverse-effect-levels (LOAELs), and no-observed-adverse-effect-levels (NOAELs). Uncertainty factors are also applied to account for sub-chronic to chronic exposure extrapolation, sensitive sub-groups, extrapolation from LOAELs to NOAELs, and lack of reproductive and developmental toxicity data. The application of these uncertainty factors may underestimate or overestimate the RfD.

For carcinogens, uncertainty begins with whether the particular chemical is a human carcinogen or a potential human carcinogen. This is represented as the weight of evidence classification, which is also considered with each chemical's calculated risk. In calculating cancer slope factors, there are uncertainties due to extrapolating from high dose animal and human studies and calculating lifetime cancer risks based on less than lifetime exposure data.

Inhalation cancer slope factors are not available for many COPCs, particularly metals; this may result in the underestimation of inhalation exposure. In cases where no toxicity values were available from the IRIS database or recommended by the EPA National Center for Environmental Assessment, risks related to these specific COPCs were not quantified, therefore resulting in an underestimation of cancer risks and non-cancer hazards.

Conclusions

Based upon the results of this reassessment and the risk assessment, site-related exposures are at acceptable levels. Therefore, EPA has determined that actual or threatened releases of hazardous substances from the site do not present a potential threat to human health and that no further action, other than long-term monitoring, implementation of institutional controls, and continued operation and maintenance of the landfill cap and leachate collection system, is necessary.

Ecological Risk Assessment

The purpose of an Ecological Risk Assessment (ERA) is to provide a baseline evaluation of the nature and geographical extent of possible ecological risks based on current environmental conditions.

An ERA involves a qualitative and/or quantitative appraisal of the actual or potential effects of a hazardous waste site on plants and animals. A four-step process is used for assessing site-related ecological risks for a reasonable maximum exposure scenario: (1) Problem Formulation - a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study; (2) Exposure Assessment - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations; (3) Ecological Effects Assessment - literature reviews, field studies and/or tests linking contaminant concentrations to effects on ecological receptors; and (4) Risk Characterization - measurement or estimation of both current and future adverse effects.

In March 2003, EPA completed a baseline ecological risk assessment (BERA) of potential ecological risks for aquatic and wetlands areas adjacent to and downstream of the Hertel Landfill. Ecological receptors of concern include sediment-dwelling (benthic) intervertebrates, zooplankton, amphibians, and aquatic-feeding insectivorous birds based on exposure potential and sensitivity. The data from the 1994 through October 2002 sampling efforts were used to identify the COCs and to conduct the exposure and toxicity evaluations of the ecological receptors in the aquatic and wetland habitat.

In the BERA, EPA considered the toxicity test results and analytical data for surface water and sediment. Chemistry data were evaluated to identify the causes of observed toxicity, using methods developed by EPA to account for site-specific chemical bioavailability and potential toxicity.

EPA found in the BERA that the aquatic and benthic organisms in the majority of the aquatic and wetland habitat adjacent to and downstream of the Hertel Landfill are not at risk due to the COCs. Possible adverse effects on aquatic organisms of COCs are generally limited to two discrete seeps immediately adjacent to the landfill within the site. The primary COCs in the two areas are iron and manganese, both of which exceed NYSDEC ambient water quality standards. EPA determined that iron and manganese pose unacceptable levels of risk to aquatic ecological receptors at these two seep locations.

Additional samples were collected in December 2003 to further characterize the nature and extent of iron and manganese at these two seeps. Iron and manganese concentrations at the seeps remain elevated and levels of risk continue to exist at these discrete locations. However, concentrations of iron and manganese in the surface water decreased with distance downstream of the seeps.

Considering EPA's conclusions in the BERA and the results from the October 2002 and December 2003 sampling events, it is appropriate to monitor the site for the natural recovery of the sediments and the groundwater.

Remedial Action Objectives

Remedial action objectives are specific goals to protect human health and the environment. These objectives are developed considering exposure routes; human, ecological, and environmental receptors;

protection of groundwater resources; and potential future land use. The remedial action objectives are based on available information, standards such as ARARs, and risk-based levels established in the risk assessment.

The objective of the site feasibility study (FS) was to identify and evaluate cost-effective remedial action alternatives which would minimize the risk to public health and the environment resulting from groundwater contamination at the site. The 1989 FS report had evaluated in detail five remedial alternatives for addressing the contamination associated with the site. The remedy which EPA selected included capping of the landfill, groundwater extraction, and groundwater treatment through innovative treatment technology. The construction of the landfill cap and leachate collection system was completed in December 1998. The landfill cap and leachate collection system are being maintained by the PRPs.

Given the improvements in site groundwater quality over the past several years, EPA has re-evaluated the active groundwater extraction and treatment remedy specified in the 1991 ROD. The remedial action objectives for the groundwater remedy are to:

(1) protect human health by ensuring that future residents are not exposed to contaminated groundwater; and

(2) reduce the further contamination of the wetlands in the area, and the migration of contaminants in groundwater.

Description of Remedial Alternatives

CERCLA requires that the 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 and 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 the hazardous substances.

This ROD Amendment evaluates three alternatives for addressing groundwater contamination which are provided below and are identified as Alternative GW-1, Alternative GW-2, and Alternative GW-3. Consistent with EPA guidance documents concerning ROD Amendments, the components of the original remedy proposed for amendment have been updated and are being compared to a new preferred alternative which was developed based upon existing site circumstances. The groundwater remedial alternatives are:

Alternative GW-1 - No Further Action

Capital Cost:	$0
Annual O&M Cost:	$0
Present Worth Cost:	Not Applicable
Construction Time:	Not Applicable
Duration:	Not Applicable

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

Under this alternative, EPA would take no further action at the site to prevent exposure to soil and groundwater contamination. The alternative considers remedial activities previously implemented. However, it does not further reduce impacts to groundwater. Under this alternative, the current monitoring program would be discontinued and no institutional controls would be put in place. As a result, EPA would be unable to determine if contaminants were leaching to groundwater.

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

Alternative GW-2 - Institutional Controls and Long-Term Monitoring

Capital Cost:	$114,000
Annual O&M Cost:	$105,000 per year
Present Worth Cost:	$1,728,000
Construction Time:	Not Applicable
Duration:	30 years

Since 1995, the site access has been restricted. In December 1998, the landfill cap and leachate collection system was completed. The cap and leachate collection system are being inspected on a quarterly basis as part of the remedy chosen in the 1991 ROD. This alternative would maintain restricted site access as well as the operation and maintenance of the cap and leachate collection system. This alternative would also include a long-term program to monitor the site for the natural recovery of the sediments and the natural attenuation of iron and manganese contamination in groundwater. Under this monitoring program, groundwater, surface water, and sediment samples would be collected and analyzed on an annual basis. In addition, nearby residential wells would be sampled annually. Groundwater would be sampled annually for inorganic compounds (including iron and manganese) and for the VOCs benzene, toluene, ethylbenze, and xylene. Institutional controls would be put in place to prohibit any use of the site that would impair the effectiveness of the landfill cap and leachate collection system, and to prohibit any digging of wells or extraction of groundwater in or immediately adjacent to the landfill cap. Institutional controls would also be put in place to insure continued access to the site by EPA and the State of New York.

Because this alternative would result in some contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, CERCLA requires that the site be reviewed at least once every five years. Using, among other things, data from the groundwater sampling program, these five-year reviews would include the reassessment of health and environmental risks. If justified by a five-year review, additional remedial actions may be implemented in the future.

Note that the 30-year duration referred to above and under Alternative GW-3 below is only an assumption being made for cost-comparison purposes. The actual duration may differ.

<u>Alternative GW-3 - Existing Remedy (Groundwater Extraction and On-site Innovative Treatment)</u>

Capital Cost:	$810,540	
Annual O&M Cost:	$421,860/yr	years 0-12
	$257,224/yr	years 13-17
	$48,980/yr	years 18-30
Present Worth Cost:	$5,367,567	
Construction Time:	2 years	
Duration:	30 years	

Under this alternative, the remedy chosen in the 1991 ROD would continue to be implemented. This alternative would include the groundwater extraction system that would consist of a series of pumping wells installed inside of the confines of the landfill, with each well penetrating 15 feet into the saturated zone. It is estimated that approximately 22 wells would be required to provide capture of the contaminated groundwater beneath the landfill. The extracted groundwater would be pre-filtered to remove gross solids and then pumped into an equalization tank. This tank would be utilized to equalize the groundwater flow and contaminant concentrations, which may be variable. The collected groundwater would be treated in an on-site treatment system consisting of a membrane microfiltration unit for inorganic removal and ultraviolet (UV) oxidation for organic contaminant removal. The microfiltration system would be designed to remove soil particles from liquid wastes using an automatic pressure filter combined with special filter material. Solids greater than one ten-millionth of a meter would be retained as a filter cake.

UV oxidation would follow the membrane microfiltration unit. UV oxidation is a process in which UV light and hydrogen peroxide chemically oxidize organic contaminants dissolved in water. The combined UV light and hydroxy radicals (strong oxidizers formed from hydrogen peroxide) promote rapid breakdown of organic contaminants into carbon dioxide and water without the creation of air emissions or residual waste streams. The oxidation unit would be operated to reduce the contaminant levels in groundwater to Federal or State criteria in accordance with State discharge requirements. Operation and maintenance of the unit would consist of a UV lamp replacement every four months and occasional replenishment of the hydrogen peroxide supply.

Summary of Comparative Analysis 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 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.

The evaluation criteria are described below:

- 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 Amendment, and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports.

The following presents a comparative analysis of the alternatives for the site based upon the evaluation criteria noted above.

Overall Protection of Human Health and the Environment

All alternatives except GW-1 would provide adequate protection of human health and the environment. Both Alternatives GW-2 and GW-3 are similar in their ability to protect human health but they are not similar in their ability to protect the environment. As noted above in the risk assessment section, there are no unacceptable human health cancer risks or non-cancer health hazards associated with the groundwater contamination at the site. The onsite groundwater is not being used as a source of drinking water. In addition, no significant impacts to ecological receptors have been observed. The future and present use carcinogenic risks at the site are within EPA's risk range; moreover, these risks assume that the site groundwater is utilized as a potable water supply, an event that is highly unlikely into the future.

As there are no current or anticipated future users of the site groundwater and since the levels of contaminants in the groundwater have stabilized in the last few years at levels slightly above Remediation Goals or ARARs, and the levels would further attenuate under either alternative, EPA believes that both Alternatives GW-2 and GW-3 would provide full protection of human health. However, Alternative GW-3 does not provide full protection of the environment, because if implemented, the system will result in loss of approximately 25-30% of the wetlands surrounding the landfill.

Compliance with ARARs

For Alternative GW-2, ARARs would be achieved over time through natural attentuation; compliance with ARARs would be demonstrated through an annual monitoring program.

Alternative GW-3 is expected to meet chemical-specific ARARs for the groundwater. However, once pumping and treatment operations are discontinued, the resumption of contact between the soil/waste matrix and the groundwater may cause exceedances of chemical-specific groundwater ARARs. If this were to be the case, continued pulse pumping and treatment of the groundwater would be necessary.

Long-Term Effectiveness and Permanence

Alternative GW-2 is expected, over time, to provide the same level of long-term effectiveness and permanence as Alternative GW-3. Although Alternative GW-3 would potentially achieve cleanup goals in a shorter timeframe than Alternative GW-2, the difference in timeframe would not be expected to be significant. This is supported by the fact that groundwater contaminant levels have stabilized at levels which are slightly above remediation goals or ARARs over the past several years. Alternative GW-3 would also result in the loss of wetlands surrounding the landfill.

Alternative GW-1 offers no long-term effectiveness in terms of protection against current risks associated with dermal contact with soil contaminants or future groundwater ingestion scenarios.

Reduction in Toxicity, Mobility or Volume

Alternative GW-2 relies on the cap and leachate collection system already constructed at the site; therefore it reduces the mobility of the soil contaminants through containment measures and natural degradation. It does not actively reduce the toxicity, mobility, or volume of contaminants in the groundwater.

Alternative GW-3 would reduce the toxicity, mobility, and volume of contaminated groundwater through treatment and reduce mobility of soil contaminants through containment.

Alternative GW-1 provides no reduction in toxicity, mobility, or volume of contaminants of any media through treatment. Future risks posed by the site under this alternative would depend on future site usage.

Short-Term Effectiveness

Alternatives GW-1 and GW-2 present virtually no short-term impacts to human health and the environment since no construction is involved with either alternative. The construction activities required to implement Alternative GW-3 would potentially result in greater short-term exposure to contaminants by workers who would come into contact with the treatment system. While efforts would be made to minimize the impacts, some disturbances would result from disruption of traffic, excavation activities on public and private land, noise, and fugitive dust emissions. However, proper health and safety precautions would minimize these impacts.

Implementability

The three alternatives can be readily implemented. The technologies proposed for extraction and treatment of contaminated groundwater in Alternative GW-3 would be expected to achieve the specified cleanup goals; however, Alternative GW-3 would be much more complex to implement than Alternatives GW-1 and GW-2. Alternatives GW-1 and GW-2 do not involve any construction and, consequently, are much easier to implement. Alternative GW-2 requires a monitoring program utilizing existing monitoring wells. The efficiency of Alternative GW-3 would be significantly decreased by the large volumes of relatively clean surface water which would be drawn from the wetlands into the groundwater extraction wells.

Cost

The estimated capital, annual operation and maintenance (O&M) (including monitoring), and present-worth costs for each of the alternatives are as follows:

Alternative	Capital Cost	Annual O&M	Present Worth
GW-1	$0	$0	N/A
GW-2	$114,000	$105,000	$1,728,800
GW-3	$810,540	Refer to text	$5,367,576

According to the capital cost, O&M cost and present worth cost estimates, Alternative GW-1 has the lowest cost compared to Alternatives GW-2 and GW-3.

State Acceptance

The State of New York through NYSDEC supports the selected remedy presented in this ROD Amendment for the Hertel Superfund site.

Community Acceptance

Community acceptance was evaluated after the close of the public comment period. EPA received comments on the Post-Decision Proposed Plan during the public meeting and public availability session and thereafter in writing.

The majority of the questions raised during the public meeting were concerned with the direction of groundwater flow underneath the landfill and whether the direction of groundwater flow had been adequately characterized. Some commenters felt that deep bedrock monitoring wells needed to be installed in and around the landfill.

Selected Remedy

Based upon an evaluation of the various alternatives, EPA has determined that Alternative GW-2, Institutional Controls and Long-Term Monitoring, is the appropriate amended remedy for the groundwater at the Site.

Alternative GW-2 provides the best balance of trade-offs among the three alternatives with respect to the evaluation criteria. EPA believes that the selected modified remedy is protective of human health and the environment, complies with ARARs, is cost-effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Statutory Determinations

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

For the reasons discussed below, EPA and NYSDEC have determined that the selected remedy meets the requirements of Section 121 of CERCLA.

Protection of Human Health and the Environment

The selected remedy for groundwater is protective of human health and the environment. The cap over the contaminated areas will continue to prevent exposure to the low-level contamination that will remain on the Site. Implementation of institutional controls to prohibit any use of the site that would impair the effectiveness of the landfill cap and leachate collection system and to prohibit any digging of wells or extraction of groundwater in or immediately adjacent to the landfill cap, will also contribute to the mitigation of human risk related to any exposure to remaining contaminants. Site access has already been restricted in accordance with the 1991 ROD and such restrictions will be maintained; institutional controls will also ensure continued access to the site by EPA and the State. Furthermore, the cap will be monitored and maintained as part of a long term monitoring program for the natural recovery of the sediments and the natural attenuation of iron and manganese contamination in groundwater.

Since there is no construction involved with this remedy, there will be no use of engineering controls (e.g., for excavation); therefore, there are no resulting unacceptable short-term risks or cross-media impacts.

Compliance with ARARs

The selected remedy will achieve the following ARARs:

Action-Specific ARARs:

- RCRA 40 C.F.R. Part 264 - Subpart F Applicable to Groundwater Monitoring at Hazardous Waste Facilities

Chemical Specific ARARs:

- Safe Drinking Water Act MCLs
- 6 NYCRR Part 703.5 Groundwater Quality Regulations

Location-specific ARARs:

- None

Other Criteria, Advisories, or Guidelines To Be Considered:

- New York Guidelines for Soil Erosion and Sediment Control

Cost-effectiveness

The modified selected remedy is cost effective and provides for overall effectiveness in proportion to its cost. The net present value of the estimated total project cost is $1,728,000.

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

The modified selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at the site.

Preference for Treatment as a Principal Element

Treatment of the groundwater is determined not to be cost-effective at this site. Furthermore, treatment of the groundwater would cause an adverse impact on freshwater wetlands adjacent to the site.

Five-Year Review Requirement

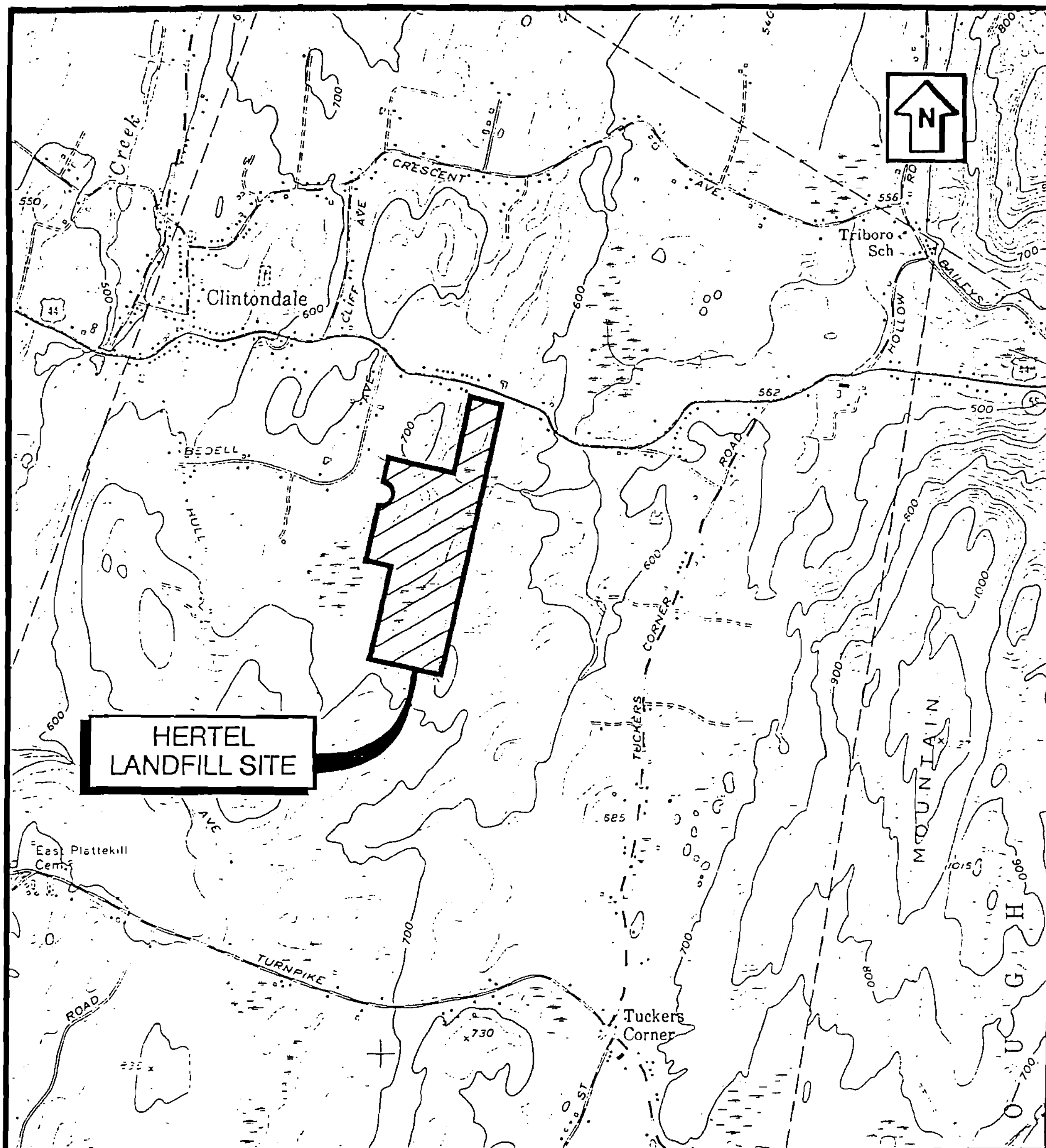
Since this remedy will result in pollutants or contaminants remaining on the site above levels that would allow for unlimited unrestricted use, a statutory review will be conducted within five years of the date of this ROD Amendment and each five years thereafter.

Documentation of Significant Changes

The Post-Decision Proposed Plan for the Site was released to the public on August 11, 2004. The Proposed Plan identified the preferred alternative for the Site. EPA and NYSDEC reviewed all comments received during the 60-day public comment period (a 30-day extension to the initial public comment period was requested and granted by EPA). Upon review of these comments, EPA and NYSDEC determined that no significant changes to the selected remedy as identified in the Post-Decision Proposed Plan were necessary.

APPENDIX I

Figures



QUADRANGLE LOCATION

0 2000 FT
SCALE

From Clintondale, NY U.S.G.S. 7.5' Topographic Map, 1957

T A M S/T R C

PREPARED FOR U.S. EPA, REGION II — ARCS

HERTEL LANDFILL, PLATTEKILL, NY — FS REPORT

FIGURE 1
SITE LOCATION MAP

APPENDIX II

Tables

Table No.	Title
1.A.	Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations
1.B.	Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations
2.	Selection of Exposure Pathways
3.	Cancer Toxicity Data Summary
4.	Non-Cancer Toxicity Data Summary
5.	Risk Characterization Summary - Carcinogens
6.	Risk Characterization Summary - Noncarcinogens

TABLE 1A

Page 1

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

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater On-site

Exposure Point	Chemical of Concern	Concentration Detected		Concen-tration Units	Frequency of Detection	Exposure Point Concen-tration	Exposure Point Concen-tration Units	Statistic
		Min	Max					
Groundwater	Arsenic	1	45.7	ug/l	111/322	8.3	ug/l	95% Chebyshev
	Chromium III	0.3	387	ug/l	153/322	10.1	ug/l	95% Chebyshev
	Chromium VI	0.3	387	ug/l	153/322	10.1	ug/l	95% Chebyshev
	Iron	2	83100	ug/l	312/322	10145.8	ug/l	95% Chebyshev
	Manganese	0.5	120005	ug/l	311/322	9060.8	ug/l	95% Chebyshev
	Thallium	1	32.8	ug/l	75/316	3.2	ug/l	95% Chebyshev
	Benzene	0.5	2	ug/l	37/305	4.8	ug/l	95% Chebyshev
	Aluminum	5	20700	ug/l	256/303	1321.3	ug/l	95% Chebyshev
	Antimony	1	5.3	ug/l	16/323	1.6	ug/l	95% Chebyshev
	Barium	3	424	ug/l	272/286	114.9	ug/l	95% Chebyshev
	Mercury	0.0045	1.1	ug/l	112/326	0.06	ug/l	95% Chebyshev
	Vanadium	0.2	31.5	ug/l	131/324	2.2	ug/l	95% Chebyshev
	Lead*	1	32.9	ug/l	135/319	2.2	ug/l	average

Key

ug/l: microgram/liter
95% Chebyshev: 95% Upper Confidence Limit - Chebyshev Statistic
*: Lead concentration was compared to the Clean Water Act Action Level (15 ug/l)

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

The table presents the chemicals of concern (COPCs) and exposure point concentration (EPC) for each of the COPCs detected above their respective Region 9 Preliminary Remediation Goals (PRG). The PRG screening levels are equivalent to a cancer risk of 1×10^{-6} or an HI = 0.1. The EPC was calculated using Pro-UCL, Version 2.0 for the majority of the COPCs. The evaluation of lead requires that the EPC be determined by averaging the concentrations of lead detected across the site. The EPC was used to calculate the human health risk and hazard through exposure pathways identified in the risk assessment. The table includes the range of concentrations detected for each COPC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site from 1998-2002), the exposure point concentration (EPC), and how the EPC was derived (i.e. statistic).

TABLE 1B

Page 1

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

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

Exposure Point	Chemical of Concern	Concentration Detected		Concen-tration Units	Frequency of Detection	Exposure Point Concen-tration	Exposure Point Concentration Units	Statistic
		Min	Max					
Groundwater	Arsenic	3.9	3.9	ug/l	1/10	3.9	ug/l	MAX
	Manganese	0.7	88.1	ug/l	10/10	82.5	ug/l	95% Chebyshev
	Lead*	1.9	50.5	ug/l	4/10	14.15	ug/l	average

Key

ug/l: microgram/liter
MAX: Maximum Concentration
95% Chebyshev: 95% Upper Confidence Limit - Chebyshev Statistic
*: Lead was qualitatively evaluated in the human health risk assessment

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

The table presents the chemicals of concern (COPCs) and exposure point concentration (EPC) for each of the COPCs detected above their respective Region 9 Preliminary Remediation Goals (PRG). The PRG screening levels are equivalent to a cancer risk of 1×10^{-6} or an HI = 0.1. The EPC was determined using Pro-UCL, Version 2.0, or by using the maximum detected concentration (if the COPC was detected in less than 10 samples). The evaluation of lead requires that the EPC be determined by averaging the concentrations of lead detected across the site. The EPC was used to calculate the human health risk and hazard through exposure pathways identified in the risk assessment. The table includes the range of concentrations detected for each COPC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected in 2001 from private wells downgradient of the Hertel Landfill), the exposure point concentration (EPC), and how the EPC was derived (i.e. statistic).

TABLE 2
Selection of Exposure Pathways
Hertel Landfill Superfund Site

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Groundwater	Groundwater	Groundwater	Residential Adult	Adult >18 years old	Ingestion	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
			OFF-SITE			Inhalation	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
						Dermal	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
Current/Future	Groundwater	Groundwater	Groundwater	Residential Child	Child (0-6 years old)	Ingestion	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
			OFF-SITE			Inhalation	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
						Dermal	Quantitative	Residents living downgradient from the site are using the groundwater as their drinking water source and therefore the exposure pathway is complete and was evaluated quantitatively.
Future	Groundwater	Groundwater	Groundwater	Industrial Worker	Adult >18 years old	Ingestion	Quantitative	Industrial workers may be exposed to on-site groundwater in the future if the aquifer is used as a drinking water supply. Currently, the aquifer is classified by the New York State DEC as a potable water supply.
			ON-SITE			Inhalation	Qualitative	Industrial workers may be exposed if the water supply was used in the future for showering. However, the evaluation of groundwater ingestion found that the risks associated with ingestion for benzene was 1 x10-6 and therefore quantization of this exposure pathway for benzene would not significantly contribute to the overall risk to the on-site industrial worker.

TABLE 2 Continued
Selection of Exposure Pathways
Hertel Landfill Superfund Site

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
						Dermal	Qualitative	Industrial workers may be exposed if the water supply was used in the future for showering. However, the evaluation of groundwater ingestion found that the risks associated with ingestion for arsenic and arsenic was 5x10-5 and therefore quantization of this exposure pathway for benzene and arsenic would not significantly contribute to the overall risk to the on-site industrial worker.
Current/Future	Soil	Soil	Surface Soil ON-SITE	Trespasser	Adolescent (10-18 years old)	Ingestion	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
						Inhalation	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
						Dermal	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
Current/Future	Soil	Soil	Surface Soil ON-SITE	Industrial Worker	Adult >18 years old	Ingestion	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
						Inhalation	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
						Dermal	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.
Current/Future	Soil	Soil	Surface Soil ON-SITE	Industrial Worker	Adult >18 years old	Ingestion	Qualitative	Cap remedy implemented to prevent exposure to contaminants. Exposure pathway is not complete.

TABLE 3

Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Arsenic	1.5	$(mg/kg\text{-}day)^{-1}$	1.5	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/2003
Chromium III	-	-	-	-	D	IRIS	8/2003
Chromium VI	-	-	-	-	D	IRIS	8/2003
Iron	-	-	-	-	C	NCEA	8/2003
Lead	-	-	-	-	B2	IRIS	8/2003
Manganese	-	-	-	-	D	IRIS	8/2003
Thallium	-	-	-	-	D	IRIS	8/2003
Benzene	5.5E-2	$(mg/kg\text{-}day)^{-1}$	5.5E-2	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/2003
Aluminum	-	-	-	-	D	NCEA	9/2003
Antimony	-	-	-	-	B1	NCEA	9/2003
Barium	-	-	-	-	D	IRIS	9/2003
Mercury	-	-	-	-	D	IRIS	9/2003
Vanadium	-	-	-	-	-	NCEA	9/2003

TABLE 3 - Continued

Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Arsenic	4.3	mg/m^3	1.5E+1	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/2003
Chromium III	-	-	-	-	D	IRIS	8/2003
Chromium VI	12	mg/m^3	4.2E+1	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/2003
Iron	-	-	-	-	C	NCEA	8/2003
Lead	-	-	-	-	B2	IRIS	8/2003
Manganese	-	-	-	-	D	IRIS	8/2003
Thallium	-	-	-	-	D	IRIS	8/2003
Benzene	0.0078	mg/m^3	2.7E-2	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/2003
Aluminum	-	-	-	-	D	NCEA	9/2003
Antimony	-	-	-	-	B1	NCEA	9/2003
Barium	-	-	-	-	D	IRIS	9/2003
Mercury	-	-	-	-	D	IRIS	9/2003
Vanadium	-	-	-	-	-	NCEA	9/2003

Key

- : No information available
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: USEPAs National Center for Environmental Assessment (Technical Support Center for Toxicity Information)

EPA Group:

A - Human carcinogen
B1 - Probable Human Carcinogen - Indicates that limited human data are available
B2 - Probable Human Carcinogen - Indicates sufficient evidence in animals associated with the site and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Summary of Toxicity Assessment

This table provides carcinogenic risk information which is relevant to the contaminants of potential concern in groundwater. Toxicity data are provided for both the oral and inhalation routes of exposure.

TABLE 4

Non-Cancer Toxicity Data Summary

Pathway: Oral/Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (for Dermal)	Adjusted RfD (for Dermal)	Adjusted Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Date
Arsenic	Chronic	3.0E-4	mg/kg-day	100%	3.0E-4	mg/kg-day	Skin	3	IRIS	8/2003
Chromium III	Chronic	1.5E+0	mg/kg-day	NA	NA	NA	NOAEL	1000	IRIS	8/2003
Chromium VI	Chronic	3.0E-3	mg/kg-day	NA	NA	NA	NOAEL	900	IRIS	8/2003
Iron	Chronic	3.0E-1	mg/kg-day	NA	NA	NA	NOAEL	1	NCEA	8/2003
Lead	Chronic	-	mg/kg-day	NA	NA	NA	-	-	IRIS	8/2003
Manganese	Chronic	1.4E-1	mg/kg-day	100%	1.4E-1	mg/kg-day	CNS	1	IRIS	8/2003
Thallium	Chronic	9.0E-5	mg/kg-day	NA	NA	NA	Blood	3000	IRIS	8/2003
Benzene	Chronic	4.0E-3	mg/kg-day	NA	NA	NA	Lymphocyte	300	IRIS	8/2003
Aluminum	Chronic	1.0E+0	mg/kg-day	NA	NA	NA	CNS	-	NCEA	9/2003
Antimony	Chronic	4.0E-4	mg/kg-day	2.5%	7.5E-5	mg/kg-day	Blood	1000	IRIS	9/2003
Barium	Chronic	7.0E-2	mg/kg-day	NA	NA	NA	Kidney	3	IRIS	9/2003
Mercury	Chronic	-	mg/kg-day	NA	NA	NA	-	-	IRIS	9/2003
Vanadium	Chronic	1.0E-3	mg/kg-day	NA	NA	NA	Kidney	300	NCEA	10/2003

TABLE 4 - Continued

Non-Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfDi	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD: Target Organ	Date
Arsenic	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	IRIS	8/2003
Chromium III	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	IRIS	8/2003
Chromium VI	Chronic	8.0E-6	mg/cu. m	2.2E-6	mg/kg-day	Nasal Septum	90	IRIS	8/2003
Iron	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	NCEA	8/2003
Lead	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	IRIS	8/2003
Manganese	Chronic	5.0E-5	mg/cu. m	1.4E-5	mg/kg-day	CNS	1000	IRIS	8/2003
Thallium	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	IRIS	8/2003
Benzene	Chronic	3.0E-2	mg/cu. m	8.6E-3	mg/kg-day	Lymphocyte	300	IRIS	8/2003
Aluminum	Chronic	5.0E-3	mg/cu. m	1.4E-2	mg/kg-day	CNS	300	NCEA	9/2003
Antimony	Chronic	-	mg/cu. m	-	mg/kg-day	-	-	IRIS	9/2003
Barium	Chronic	-	mg/cu m.	-	mg/kg-day	-	-	IRIS	9/2003
Mercury	Chronic	3.0E-4	mg/cu m.	8.6E-5	mg/kg-day	CNS	30	IRIS	9/2003
Vanadium	Chronic	-	mg/cu m.	-	mg/kg-day	-	-	NCEA	10/2003

Key | **Definition**

- : No information available
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: USEPA National Center for Environmental Assessment (Technical Support Center for toxicity information)

CNS: Central Nervous System
NOAEL: No Observed Adverse Effect Level

Summary of Toxicity Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in groundwater. When available, the chronic toxicity data have been used to develop oral reference doses (RfDs) and inhalation reference doses (RfDi).

TABLE 5
Page 1
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult (>18 years old)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater On-site	Arsenic	5.2E-5	NE	NE	5.2E-5
			Chromium III	-	-	-	-
			Chromium VI	-	NE	-	-
			Iron	-	-	-	-
			Manganese	-	-	-	-
			Thallium	-	-	-	-
			Benzene	1.1E-6	NE	NE	1.1E-6
			Aluminum	-	-	-	-
			Antimony	-	-	-	-
			Barium	-	-	-	-
			Mercury	-	-	-	-
			Vanadium	-	-	-	-
						Industrial Total Cancer Risk =	5.3E-5*

TABLE 5
Page 2
Risk Characterization Summary - Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult (>18 years old)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap water/ Shower head	Arsenic	5.5E-5	-	4.9E-7	5.5E-5
			Manganese	-	-	-	-
						Total Cancer Risk (Adult) =	5.5E-5*

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child (Ages 0-6)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap water/ Shower head	Arsenic	3.2E-5	-	2.1E-7	3.2E-5
			Manganese	-	-	-	-
						Total Cancer Risk (Child) =	3.2E-5
						Residential (Child & Adult) Groundwater Cancer Risk Total =	8.7E-5*

Key

- :Toxicity criteria are not available to quantitatively address this route of exposure
NE: Exposure pathway not evaluated since majority of risk is dependent on exposure via ingestion of groundwater.
*: Within NCPs risk range

Definition

CNS: Central Nervous System
NOAEL: No Observed Adverse Effect Level

Summary of Risk Characterization - Carcinogens

The table presents risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various health protective assumptions for the industrial and residential scenarios with regard to the frequency and duration of the receptors exposure to groundwater, as well as the toxicity of the COCs. The total risk from direct exposure to groundwater to the resident (adult and child) is estimated to be 8.7 x 10-5, which is within NCPs risk range. The risk level indicate that if no action were taken, an resident (total risk for the adult and child) would have an increased probability of 9 in 100,000 of developing cancer due to site-related exposure to COPCs.

The total risk from direct exposure to groundwater to the industrial worker is estimated to be 5.3 x 10-5, which is within NCPs risk range. The risk level indicate that if no action were taken, an industrial worker would have an increased probability of 5 in 100,000 of developing cancer due to site-related exposure to COPCs.