Superfund Proposed Plan

Crown Cleaners of Watertown, Inc. Superfund Site

Jefferson County, New York

112844

December 2011

PURPOSE OF THIS DOCUMENT

This document describes the remedial alternatives considered for the Crown Cleaners of Watertown, Inc. Superfund 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 remedial alternatives summarized in this Proposed Plan are described in the August 2010 remedial investigation (RI) report and August 2010 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 RI/FS reports to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternatives. The preferred remedy consists of decontamination and demolition of the main on-site building, excavation of contaminated wetland sediments and soils located adjacent to the former cleaner property, excavation of contaminated soil at the source area, off-site treatment/disposal of the excavated sediments, soils, and building debris, in-situ treatment of the contaminated groundwater near the source using chemical oxidation and downgradient using natural attenuation[1], development of a Site Management Plan, and an environmental easement.

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 the Proposed Plan and in the detailed analysis section of the RI/FS report because EPA and NYSDEC may select a remedy other than the preferred remedy.

[1] Natural attenuation is a variety of *in-situ* processes that under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

MARK YOUR CALENDAR

***December 12, 2011 – January 17, 2012**: Public comment period related to this Proposed Plan.*

***January 3, 2012 at 7:00 P.M.:** Public meeting at the Village of Herrings Town Hall, Herrings, NY.*

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

Carthage Free Library
412 Budd Street
Carthage, New York
315-493-2620
and
USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
212-637-4308

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 that begins on December 12, 2011 and concludes on January 17, 2012.

A public meeting will be held during the public comment period at the Village of Herrings Town Hall on January 3, 2012 at 7:00 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 that formalizes the selection of the remedy.

COMMUNITY ROLE IN SELECTION PROCESS

Written comments on the 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 soil, sediment, and groundwater contamination, to minimize the migration of contaminants, and to minimize any potential future health and environmental impacts.

SITE BACKGROUND

Site Description

The 9-acre Crown Cleaners of Watertown, Inc. site is a former dry cleaning and laundry facility located in the Village of Herrings, Jefferson County on New York State Route 3. The site is located approximately 300 feet south of the Village of Herrings' public water supply well, to the east and west of residential properties and vacant land and to the north of the Black River.

There are three buildings in poor condition and a mobile home on the site. The site is surrounded by a chain link fence.

One wetland area is located immediately west of the site and another wetland area is located approximately 800 feet southwest of the site. A significant amount of debris, including, paper waste from the former paper factory, old appliances, and several drum carcasses, is located in the wetland to the southwest.

Site History

From 1890 until the mid-1960's, the site was used by the St. Regis Paper Co. to produce paper bags. In the late 1970's, the property was purchased by Crown Cleaners of Watertown, Inc. and was operated until 1991 as a dry cleaning and laundry facility. Tetrachloroethene (PCE) and machine oils and greases were used. Wastewater was discharged into basement storage pits, which then discharged through the foundation walls to the ground. Used dry cleaning machine filters were dumped on the site property.

The residences in the area use either private wells or a public supply well for potable water supply. In 1991, the New York State Department of Health (NYSDOH) determined that the Village of Herrings' water supply well was contaminated with PCE at concentrations ranging from 25 to 50 micrograms per liter (ug/L). Later that same year, NYSDEC installed a treatment system on the Village of Herrings' water supply system and determined that the source of PCE contamination was from the site.

Several New York State investigations were conducted at the site during the 1990's which resulted in the site being referred to EPA for further evaluation in 2000.

In 2000, EPA sampled the facility's storage pits, oil tanks, on- and off-property soils, and the groundwater. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, copper, iron, mercury, zinc, beryllium, arsenic, and chromium were detected in the soils above NYSDEC's soil cleanup objectives. The highest PCE concentration found in the shallow aquifer was 9,800 ug/L. In addition to this investigation, EPA secured the property, removed and disposed of VOC-contaminated sludge and debris, sump pit water, spent dry cleaning filters, removed friable asbestos-containing materials, demolished an unstable portion of the main building and disposed of approximately 5,000 gallons of waste oil.

On September 4, 2002, the site was listed on EPA's Superfund National Priorities List.

EPA conducted several field investigations at the site from 2004 through 2011. The activities included monitoring well installation, geological and hydrogeological investigations, an ecological assessment, wetlands delineation, a residential vapor intrusion investigation[2], and collecting samples from the surface soil (top two feet of soil), subsurface soil (below two feet), wetland sediments, surface water and sediment from the Black River, groundwater, residential wells, and the public supply well. Because of the historical significance of the

[2] Vapor intrusion is a process by which VOCs move from a source below the ground surface (such as contaminated groundwater) into the indoor air of overlying or nearby buildings.

structures on the property, a Phase 1A Cultural Resources survey was performed in 2007[3].

SITE HYDROLOGY/HYDROGEOLOGY

Site Hydrology

The site is located in the Erie-Ontario Lowlands physiographic province, which includes the Black River valley. Local surface water runoff flows toward the Black River, which runs adjacent to the site along its southern boundary. The Black River in the area where it runs adjacent to the site is classified by New York State as a "Class C" surface water body. These waters should be suitable for fish propagation and survival, as well contact recreation (6 NYCRR Part 701.8). The Herrings Station dam is located just east of the site and a roughly 20-foot surface water elevation difference is maintained across the dam.

Approximately 1.4 acres of the former dry cleaner property are located in the 100-year flood plain of the Black River according to the federal Emergency Management Agency. The remainder of the site is located outside the 500-year flood plain.

Site Hydrogeology

The hydrogeology is characterized by the existence of four units, Upper Carbonate, Middle Carbonate, Lower Carbonate, and Fractured Granitic Gneiss Units.

The upper part of the site hydrogeologic unit, the Upper Carbonate Unit, consists of an unconfined, fractured unit with low permeability that is subject to seasonal variations. The Middle Carbonate Unit is a dense, massive, very low to no permeability unit, which appears to behave as a semi-confining to confining unit. Below this unit is a confined Lower Carbonate unit that provides water resources to the local area. The deepest unit evaluated during the RI investigation was the Fractured Granitic Gneiss unit, which underlies the Lower Carbonate unit. Groundwater in the Upper Carbonate unit primarily flows in a south-southwesterly direction along bedding planes partings, with secondary flow through fractures and joints. In the Lower Carbonate and Granitic Gneiss units, groundwater flow is controlled by secondary porosity through enlarged bedding planes and fractures. Groundwater in both of these units flows in a south-southwesterly direction and eventually discharges to the Black River.

RESULTS OF THE REMEDIAL INVESTIGATION

Based upon the results of the RI, EPA has concluded that VOCs are the predominant contaminants in the groundwater, soils, and sediments in the wetlands. The primary contaminant of concern (COC) identified for the site is PCE and its breakdown products, primarily trichloroethylene (TCE).

Groundwater

EPA and New York State Department of Health have promulgated health-based protective Maximum Contaminant Levels (MCLs), which are enforceable standards for various drinking water contaminants. MCLs, which ensure that drinking water does not pose either a short- or long-term health risk, will be used as the cleanup criteria for the groundwater. The MCL for both PCE and TCE is 5 ug/L.

Four rounds of groundwater sampling were conducted as part of the RI. During the first round in 2004, 24 existing monitoring wells, two piezometric wells and one residential well were sampled. In 2006, a second round of sampling was conducted and included the original 24 wells, two piezometric wells and one residential well plus 8 newly installed monitoring wells. A third sampling round covering 31 monitoring wells, five newly installed multiport wells, and two piezometers was conducted in 2009. A fourth round of groundwater sampling was conducted on these same wells in mid-2011.

Groundwater samples contained PCE in 11 of the 31 monitoring wells. Concentrations in these wells ranged from 6.7 ug/L to 6,500 ug/L. PCE was not detected in the multiport wells. The data indicates that the horizontal limit of the contaminant plume is defined by the Black River to the south, Route 3 to the north and is approximately 300 feet wide. The source of the plume occurs at the southwest corner of the main building on the property.

The data also suggests that a separate area of PCE contamination is present in the upper unit bedrock aquifer to the west-southwest of the site. Isotopic analysis of samples collected from site wells and wells to the west-southwest of the site indicates that the PCE detected in this area is of a similar origin to the PCE detected in groundwater on-site. Sample results from this area show decreasing PCE concentrations with increasing depth, suggesting a surface source in the vicinity. In addition, the measurement of groundwater levels at various

[3] A Phase I cultural resources survey is designed to determine the presence or absence of cultural resources in the project's potential impact area. The Phase I survey is divided into two progressive units of study--Phase IA, a literature search and sensitivity study and, if necessary based upon Phase 1A survey, a Phase IB, field investigation to search for resources.

elevations within the bedrock indicates a downward hydraulic gradient. Since the dumping of debris has occurred in this area, the origin of the groundwater impacts west-southwest of the site is likely the result of the disposal of site-related wastes (e.g., drum(s)) in this area.

The data also shows a declining trend in PCE levels within the plume. Additionally, PCE's reductive dechlorination products, also known as daughter products, were detected in many of the same wells as PCE, indicating the slow natural breakdown or attenuation of the contaminants.

Soils

NYSDEC has identified soil cleanup objectives (SCOs) for the protection of the environment and for various contaminants based upon the assumed future usage of the site. Based upon the most recent active use of the site, the site will be cleaned up to "commercial" standards. The SCO for PCE for the protection of groundwater is 1.3 mg/kg[4], and 16 mg/kg for arsenic for commercial use. The commercial SCO for PAHs varies depending on the contaminant [5].

In 2004, soil samples were collected at 9 locations to a depth of 5 feet. An additional 42 soil locations were sampled in 2011 to a depth of 2 feet. Elevated PCE concentrations were found in five locations; primarily adjacent to the northern and western corners of the main building in the west-northwestern portion of the site (the highest concentration detected was 59,000 micrograms per kilogram [ug/kg]). These PCE-contaminated soils (hereinafter, "source area soils") are a source of contamination to the groundwater. In addition, elevated concentrations of polyaromatic hydrocarbons (PAHs) were detected in surface soil at 14 locations. The highest PAH concentrations detected were 58.4 mg/kg. Arsenic was detected in surface soil at one location at a concentration of 17.8 mg/kg.

Sediments

Sediment samples were collected from 15 locations in the wetland areas located immediately west and southwest of the buildings. Eight VOCs were detected in the sediment samples, including PCE as high as 0.17 mg/kg. Samples collected from the wetland area located to the southwest also showed the presence of PAHs, pesticides, and metals. Cleanup levels for wetland sediments are outlined in the NYSDEC's Guidelines for Screening Contaminated Sediments.

Attempts were made to obtain sediment samples from the Black River adjacent to the site, but there was insufficient sediment available to get a proper sample.

SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future property conditions. A baseline risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these under current and reasonably anticipated future land uses[6].

The human health estimates summarized below are based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative estimates about the frequency and duration of an individual's exposure to the COCs, as well as the toxicity of these contaminants.

A screening level ecological risk assessment (SLERA) was also conducted to assess the risk posed to ecological receptors due to site-related contamination, which resulted in the performance of a BERA, which is discussed below.

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[4] 6 NYCRR PART 375, Environmental Remediation Programs, Subpart 375-6, New York State Department of Environmental Conservation, December 14, 2006.

[5] While the land use of the site has historically been industrial/commercial, local elected officials have expressed a desire to develop a community park on the site following its remediation. In order for the property to be remediated using soil cleanup objectives that would be protective for a park (i.e. restricted residential), a local governmental entity must acquire the property. The Village Mayor and Town Supervisor are presently pursuing several options to acquire the property and change its use to recreational. If the land use for the property is changed from commercial to recreational before the design of the remedy that is ultimately selected is approved, then restricted residential SCOs would be utilized. Otherwise, commercial SCOs would be utilized.

[6] As was noted in Footnote 5, while the land use of the site has historically been industrial/commercial, the Village Mayor and Town Supervisor are presently pursuing several options to acquire the property and change its use to recreational.

Human Health Risk Assessment

As was noted above, the former Crown Cleaners property is not currently being used and is surrounded by a locked chain link fence. Although the site's historical usage was commercial/industrial, it is anticipated that the land use in the future will be recreational. The possibility that the site could be redeveloped for residential use was also considered.

The baseline risk assessment identified the current and potential future receptors that may be affected by contamination at the site, the pathways by which these receptors may be exposed to site contaminants in various environmental media, and the parameters by which these exposures and risks were quantified. A trespasser was the receptor evaluated under the current scenario. Future scenarios considered a hypothetical future commercial worker, on and off-site resident (adult and child), construction worker and utility worker.

The risks associated with potential exposures to the area-wide soils and sediment, and on-site and off-site groundwater were assessed. Potential indoor air vapor intrusion concerns were previously evaluated by EPA and found to not warrant further assessment. Since the area is served by municipal water, it is not likely that the groundwater underlying the site will be used for potable purposes in the foreseeable future; however, since regional groundwater is designated as a drinking water source, potential exposure to groundwater was evaluated.

Based on anticipated future use of the site, no excess lifetime cancer risk above the EPA reference cancer risk range or HI greater than the EPA threshold value were projected relative to any foreseeable current or future receptor exposed to site-related COCs (PCE and its breakdown products) in soil or sediment. However, PCE in the soil serves as a source of contamination to the groundwater. All scenarios involving the use of the local groundwater as a drinking water source showed considerably elevated risks, due primarily to the presence of PCE in the groundwater. The greatest risk was estimated for the hypothetical on-site child resident at 2 x 10^{-2}. Concentrations of PCE also exceed the state and federal MCLs for this compound.

Ecological Risk Assessment

Terrestrial and wetland plants were determined to be at potential risk from toxic effects from copper, lead, and selenium, based upon the comparison to phytotoxic screening benchmarks; these constituents were identified as chemicals of ecological concern (COECs). However, a qualitative survey of vegetation cover-types present did

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 under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

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

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

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

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

not reveal any areas of stressed vegetation or areas devoid of vegetation. Based upon the exposure assessment, risk characterization, and associated uncertainties, the potential risk to this assessment endpoint was considered to be low.

The exposure assessment and risk characterization for soil and sediment invertebrates revealed potential risks from toxic effects from copper exposure in upland surface soils. Anecdotal evidence of an invertebrate community suggested this exposure is not acute in nature and the associated uncertainties would indicate this potential risk is limited to only one location. In the wetland sediments, the screening assessment, using benthic community benchmarks for community level impairment, identified PAHs, chlordane, antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc as posing a potential risk to benthic community structure and function.

The short-tailed shrew was used as a representative mammalian species that is indigenous to New York and would utilize the available upland habitats present. A mean exposure evaluation employing conservative exposure parameters for upland habitats revealed no observable adverse effects level (NOAEL) hazard quotient (HQs) <1 for all COPECs but cadmium and lead. No COPECs with lowest observable adverse effects level (LOAEL) HQs >1 were identified. The lack of a LOAEL HQ>1, and the associated conservative uncertainty associated with the exposure assessment, suggests potential risks to terrestrial mammals should be considered to be low in the upland habitats. The wetland exposure evaluation for the shrew identified seven metals, aluminum, antimony, arsenic, cadmium, lead, selenium, and silver, with NOAEL HQs >1. Aluminum was the only COPEC with a LOAEL HQ > 1.0 for this receptor. While exceedance of a LOAEL value may be a basis for the conclusion of significant risk, aluminum is one of the most abundant metals in the crust of the earth and is not typically associated with significant bioaccumulation in tissues. Therefore, the potential risks to mammals associated with these metals are considered to be low in the wetland areas. The American robin was used as a representative avian species that would utilize the available upland habitats present. A mean exposure evaluation employing conservative exposure parameters identified NOAEL HQs to remain <1 for all but cadmium, lead, and selenium. Of these, lead was the only metal with a mean exposure point dosage that exceeded the LOAEL-based exposure dosage. Based upon the exceedance of a LOAEL and given that lead is not an essential macronutrient for avian metabolism, lead was identified as a COEC in the upland soils. The mean exposure assessment for the wetland habitats revealed NOAEL HQs < 1 for all COPECs except lead and zinc. Of these two metals, the mean lead exposure resulted in exceedance of the LOAEL dosage level for the receptor evaluated. Based upon the exceedance of a LOAEL, and that lead is not an essential macro-nutrient for avian nutrition, a potential significant risk exists for avian receptors from lead exposure in wetland sediments and is identified as a COEC for this environmental media.

No COECs were identified for surface waters of the Black River. PAHs, aluminum, barium, iron, and manganese were identified as being COECs for the surface waters of the site wetlands. The risks from these COECs are associated with some degree of uncertainty given the lack of applicable background samples for similar wetland environments and the potential for colloidal particles to have been entrained in the surface water sample during collection.

<u>Summary of Human Health and Ecological Risks</u>

The results of the human health risk assessment indicate that the contaminated groundwater presents an unacceptable exposure risk and the ecological risk assessment indicates that the contaminated soils and sediments pose an unacceptable exposure risk.

Based upon the results of the RI and the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the site, if not addressed by the preferred remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific risk-based levels.

The following remedial action objectives were established for the site:

- Reduce or eliminate any direct contact, ingestion, or inhalation threat associated with contaminated soils and sediments;
- Minimize exposure of wildlife or fish to contaminated soils and sediments;
- Protect human health by preventing exposure to contaminated groundwater and soil vapor; and

- Restore groundwater to levels that meet state and federal standards within a reasonable time frame.

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. The FS report presents four soil/wetland sediment alternatives, and five groundwater alternatives. It should be noted that a capping alternative was considered in the FS report, but was screened out due to questions about its effectiveness in preventing the migration of contaminants to the groundwater in high water table areas and technical difficulties in maintaining such a cap. In addition, in-situ vapor extraction was considered and was screened out due to questions about its effectiveness in high water table areas. To facilitate the presentation and evaluation of the alternatives, the FS report alternatives were reorganized in this Proposed Plan to formulate the remedial alternatives discussed below.

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:

<u>Soil/Wetland Sediment Alternatives</u>

Alternative S-1: No Action

Capital Cost:	$0
Annual Operation, Maintenance, and Monitoring (OM&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

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

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site 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 and sediments.

Alternative S-2: Building Demolition, Limited Excavation of Sediments, and Excavation of Soils with On-Site Treatment via Ex-Situ Soil Vapor Extraction

Capital Cost:	$3,939,000
Annual OM&M Cost:	$0
Present-Worth Cost:	$3,939,000
Construction Time:	12 months

This alternative consists of decontaminating and demolishing the main building to obtain access to all of the PCE-contaminated soils underneath, transport for treatment and disposal of the building debris at an off-site Resource Conservation and Recovery Act (RCRA)-compliant disposal facility, excavation and offsite disposal of approximately 2,200 cubic yards of PAH and arsenic-contaminated soils located on-site to meet the commercial/industrial SCOs, and excavation and on-site treatment with ex-situ soil vapor extraction (ESVE) of approximately 8,400 cubic yards of PCE-contaminated source area soils and PCE-contaminated sediment and soil from the adjacent wetlands to meet the protection of groundwater SCO. Under the ESVE treatment process, a temporary on-site aboveground fully enclosed system would be constructed to contain the excavated PCE-contaminated soil and sediment. Air would be forced through a series of pipes within the structure to volatilize the PCE. The extracted vapors would be treated by granular activated carbon and/or other appropriate technologies before being vented to the atmosphere.

Following the demolition of the building, contaminated soils remaining within the footprint of the building would be addressed as described above.

Cleared vegetation would be disposed of at a nonhazardous waste landfill or could be mulched and used elsewhere on-site.

While the actual period of operation of the ESVE system would be based upon sampling results that demonstrate that the affected soil and sediments have been treated to soil cleanup levels, it is estimated that the system would operate for a period of three years.

The excavated source areas would be backfilled with treated and untreated soil and sediment. Approximately 90 cubic yards of excavated soils which would not be suitable for treatment and backfilling, would be disposed of at a RCRA-compliant disposal facility. A one-foot deep cover of clean soil would be applied where necessary to meet the commercial SCOs. The wetland areas that would be excavated would be backfilled with soil that meets the unrestricted SCOs.

Areas where residual PAH-contaminated soil would remain would also require the placement of a readily-visible and permeable subsurface demarcation delineating the interface between the residually-contaminated native and/or backfilled soils and the clean soil cover layer. These areas, totaling approximately 3.6 acres, would be seeded with grass to stabilize the soil. The disturbed wetland areas would also be restored.

Under this alternative, institutional controls in the form of an environmental easement and/or restrictive covenant would be used to prohibit future residential development/use of the site and restrict intrusive activities in areas where residual contamination remains unless the activities are in accordance with an EPA-approved Site Management Plan.

The Site Management Plan would provide for the proper management of all post-construction remedy components. Specifically, the Site Management Plan would describe procedures to confirm that the requisite engineering (*e.g.,* demarcation layer) and institutional controls are in place and that nothing has occurred that would impair the ability of said controls to protect public health or the environment. The Site Management Plan would also include an excavation plan which details the provisions for management of future excavations in areas of remaining contamination; an inventory of any use restrictions; the necessary provisions for the implementation of the requirements of the above-noted environmental easement and/or restrictive covenant; a provision for the performance of the operation, maintenance, and monitoring required by the remedy; and a provision that the property owner or party implementing the remedy submit periodic certifications that the institutional and engineering controls are in place.

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

Alternative S-3: Building Demolition, Limited Excavation of Sediments, Excavation of Soil, and Off-Site Treatment/Disposal

Capital Cost:	$4,253,000
Annual OM&M Cost:	$0
Present-Worth Cost:	$4,253,000
Construction Time:	9 months

This alternative is similar to Alternative S-2 except instead of treating the excavated soils and sediments on-site using ESVE and using them for backfill, the excavated PCE-contaminated soil and sediment would be characterized and transported for treatment/disposal at an off-site RCRA-compliant facility and the excavated PAH and arsenic contaminated soil would be used for backfill on-site.

To meet the commercial SCOs, the excavated areas would be covered with one foot of clean soil and would be seeded with grass to stabilize the soil. Areas where residual PAH-contaminated soil would remain above the commercial SCOs would also require the placement of a readily-visible and permeable subsurface demarcation layer delineating the interface between the residually-contaminated native and/or backfilled soils and the clean soil cover layer. The disturbed wetland areas would also be restored.

Similar to Alternative S-2, institutional controls in the form of an environmental easement and/or restrictive covenant would be used to prohibit future residential development/use of the site and restrict intrusive activities in areas where residual contamination remains unless the activities are in accordance with an EPA-approved Site Management Plan.

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

Groundwater Alternatives

Alternative GW-1: No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

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

Because this alternative would result in contaminants remaining on-site above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the site be reviewed at least once every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative GW-2: Source Area Enhanced Bioremediation and Downgradient Monitored Natural Attenuation

Capital Cost:	$1,435,800
Annual OM&M Cost:	$57,000
Present-Worth Cost:	$2,365,000
Construction Time:	12 months

Groundwater data for the site indicate that some level of natural biodegradation is occurring within the aquifer. This alternative would involve injecting reagents into the aquifer to enhance the natural degradation process in the source areas. Lower contaminant concentrations outside the source areas would be addressed through monitored natural attenuation, a variety of *in-situ* processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. For this site, these *in-situ* processes include degradation, dispersion, dilution, and adsorption.

For conceptual development of this alternative, it was assumed a supplemental carbon source (e.g., hydrogen releasing compound) would be injected into the most contaminated portions of the groundwater (PCE concentrations greater than 10 times the MCL) at the center of the plume to stimulate bioactivity. For development of this alternative, spacing of injection points was conservatively estimated at 20 feet and the injection rate was estimated at 5 pounds per vertical foot of treatment zone per injection point. However, bench- and pilot-scale testing would be required to determine the nature of reagents necessary to stimulate biodegradation in the aquifer and determine the optimum strategy for introducing these materials.

Performance and compliance monitoring and testing would be performed during and after the injections to determine residual contaminant concentrations, assess the need for additional treatment, and monitor the natural attenuation[7] of the contamination at the periphery of the plume.

It has been estimated that it would take thirty years to remediate the contaminated groundwater to federal and state standards under this alternative.

Since the entire groundwater plume would not immediately achieve cleanup levels upon implementation of this alternative, an environmental easement would be required to prevent use of groundwater and would also require that future buildings on the site either be subject to vapor intrusion study or be built with vapor intrusion mitigation systems in place until the cleanup criteria have been achieved throughout the entire area.

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

[7] Monitored natural attenuation is the process by which a natural systems ability to attenuate contaminant(s) at a specific site is confirmed, monitored and quantified. Contaminant concentrations may attenuate in natural systems through biodegradation; sorption; volatilization; radioactive decay; chemical or biological stabilization; transformation dispersion; dilution and/or the destruction of contaminants (DER-10 1.3(b)(31).

Alternative GW-3: Source Area In-Situ Chemical Oxidation and Downgradient Monitored Natural Attenuation

Capital Cost:	$2,424,000
Annual OM&M Cost:	$57,000
Present-Worth Cost:	$3,353,000
Construction Time:	12 months

Under this alternative, an oxidizing agent would be injected into the contaminated groundwater at the source areas to chemically transform the VOCs into less toxic compounds or to carbon dioxide, and water. Bench- and pilot-scale treatability studies would be performed to optimize the effectiveness of the injection system and to determine optimum oxidant delivery rates and locations for the injection-well points.

Lower contaminant concentrations outside the source areas would be addressed through monitored natural attenuation, a variety of *in-situ* processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. For this site, these *in-situ* processes include degradation, dispersion, dilution, and adsorption.

For conceptual development of this alternative, it was assumed the oxidant would be injected into the most contaminated groundwater (PCE concentrations greater than 10 times the MCL) at the center of the plume. For development of this alternative, spacing of injection points was conservatively estimated at 10 feet due to the rapid reaction time of oxidants, and the injection rate was estimated at 10 pounds per vertical foot of treatment zone per injection point. However, actual injection spacing and rates for remediation would need to be determined from pilot-scale treatability studies.

Performance and compliance monitoring and testing would be performed during and after the injections to determine residual contaminant concentrations, assess the need for additional treatment, and monitor the natural attenuation of the contamination at the periphery of the plume.

It has been estimated that it would take thirty years to remediate the contaminated groundwater to federal and state standards under this alternative.

Since the entire groundwater plume would not immediately achieve cleanup levels upon implementation of this alternative, an environmental easement would be required to prevent use of groundwater and would also require that future buildings on the site either be subject to vapor intrusion studies or be built with vapor intrusion mitigation systems in place until the cleanup criteria have been achieved throughout the entire area.

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

Alternative GW-4: Source Area Groundwater Extraction and Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$5,404,000
Annual OM&M Cost:	$555,000
Present-Worth Cost:	$13,987,000
Construction Time:	12 months

Under this alternative, four groundwater extraction wells would be installed to extract contaminated groundwater from the source areas.

Lower contaminant concentrations outside the source areas would be addressed through monitored natural attenuation, a variety of *in-situ* processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. For this site, these *in-situ* processes include degradation, dispersion, dilution, and adsorption.

The extracted water would be treated at an on-site facility by air stripping, carbon adsorption, and methods appropriate for the treatment of metals. The treated water, which would meet applicable discharge requirements, would be discharged to surface water.

Air stripping involves pumping untreated groundwater to the top of a “packed” column, which contains a specified amount of inert packing material. The column receives ambient air under pressure in an upward direction from the bottom of the column as the water flows downward, transferring VOCs to the air phase. The air-stripping process would be followed by a groundwater polishing system using granular activated carbon and/or other appropriate technologies. To comply with New York State air guidelines, granular activated carbon treatment of the air strippers’ air exhaust streams may be necessary.

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Pilot testing, including pump tests, would be required to determine final pumping rates, well spacing, optimum well locations, well design, and treatment options.

In order to evaluate the performance of this alternative, periodic monitoring of the groundwater would be performed. Monitoring of the treatment system performance would also be required. The resulting data would be used to optimize the treatment process and evaluate the effectiveness of this remedial alternative.

It has been estimated that it would take thirty years to remediate the contaminated groundwater to federal and state standards under this alternative.

Since the entire groundwater plume would not immediately achieve cleanup levels upon implementation of this alternative, an environmental easement would be required to prevent use of groundwater and would also require that future buildings on the site either be subject to vapor intrusion studies or be built with vapor intrusion mitigation systems in place until the cleanup criteria have been achieved throughout the entire area.

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

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.

X 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.

X Compliance with ARARs addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

X 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.

X 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.

X 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.

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

X Cost includes estimated capital and OM&M costs, and net present-worth costs.

X State acceptance indicates if, based on its review of the RI/FS and Proposed Plan, the state concurs with the preferred remedy at the present time.

X 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 S-1 would not be protective of the environment, since it would not actively address the contaminated sediments, which present an ecological risk. Alternative S-1 would also not be protective of human health and the environment, since it would not actively address the contaminated soil, which presents unacceptable risks of ecological exposure and is a source of groundwater contamination, which poses a human health risk. Alternatives S-2 and S-3 would be protective of human health and the environment, since both of the alternatives rely upon a remedial strategy or treatment technology capable of eliminating human and ecological exposure and removing the source of groundwater contamination.

Since Alternative GW-1 would rely on natural attenuation (a process which has been demonstrated to be occurring on-site albeit slowly) to restore groundwater quality to drinking water standards, it would not be as protective as Alternatives GW-2, GW-3, and GW-4, which include active treatment of the groundwater either in-situ or ex-situ. The institutional controls under Alternatives GW-2, GW-3, and GW-4 would provide protection of public health until groundwater standards are met.

Under Alternative GW-1, the restoration of the groundwater would take a significantly longer time (estimated to be at least 100 years) in comparison to the other alternatives. All three of the active groundwater alternatives are estimated to restore groundwater quality significantly faster (approximately thirty years) and, therefore, would be protective of human health and the environment.

<u>Compliance with ARARS</u>

There are currently no federal or state promulgated standards for contaminant levels in sediments. There are, however, other federal or state advisories, criteria, or guidance (which are used as TBC criteria). Specifically, NYSDEC's sediment screening values are a TBC criteria. Soil cleanup objectives were evaluated against NYSDEC's 6 NYCRR Part 375, Environmental Remediation Programs, Subpart 375-6, effective December 14, 2006.

Since the contaminated soils and sediments would not be addressed under Alternative S-1, this alternative would not achieve the cleanup levels for soils and the sediment cleanup objectives.

Alternatives S-2 and S-3 would attain the cleanup levels for soils and the sediment cleanup objectives.

Both Alternative S-2 and S-3 would be subject to New York State and federal regulations related to the off-site transportation of wastes.

Since Alternatives S-2 and S-3 would involve the excavation of contaminated soils and sediment, these alternatives would require compliance with fugitive dust and volatile organic compound emission regulations. In addition, this alternative would be subject to New York State and federal regulations related to the transportation and off-site treatment/disposal of wastes. In the case of Alternatives S-2 and GW-4, compliance with air emission standards would be required for the ESVE and air stripper systems. Specifically, treatment of off-gases would have to meet the substantive requirements of New York State Regulations for Prevention and Control of Air Contamination and Air Pollution (6 NYCRR Part 200, *et seq*.) and comply with the substantive requirements of other state and federal air emission standards.

EPA and NYSDOH have promulgated health-based protective MCLs (40 CFR Part 141, and 10NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). Although the groundwater at the site is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable standard, because area groundwater is a source of drinking water.

Alternative GW-1 would not provide for any direct remediation of groundwater and would, therefore, rely upon natural processes to achieve chemical-specific ARARs. Alternatives GW-2, GW-3, and GW-4 would be more effective in reducing groundwater contaminant concentrations below MCLs, since they include active remediation of the contaminated groundwater source areas. Alternative GW-4 would also be subject to surface water discharge ARARs since treated water would be discharged into the Black River.

The provisions of New York State Environmental Conservation Law Section 27-1318, Institutional and Engineering Controls, is applicable to the environmental easements in Alternatives GW-2, GW-3, and GW-4.

<u>Long-Term Effectiveness and Permanence</u>

Alternative S-1 would involve no active remedial measures and, therefore, would not be effective in eliminating the potential exposure to contaminants in soil and would allow the continued migration of contaminants from the soil to the groundwater. Alternatives S-2 and S-3 would both be effective in the long term and would provide permanent remediation by removing the contaminated source area soils and contaminated wetland sediment and either treat them on-site or treat/dispose them off-site.

Under Alternative S-2, pilot-scale treatability testing would be required for the purpose of identifying the configuration and number of vacuum extraction pipes

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within the treatment unit and evaluating and characterizing the extracted soil vapors and other performance parameters. These data would be used in the system design evaluation, and the system performance would be monitored with extracted vapor measurements and soil samples. Under Alternative S-2, the extracted vapors would be treated by granular activated carbon before being vented to the atmosphere. The granular activated carbon would have to be appropriately handled (off-site treatment/disposal). Alternatives S-1 and S-3 would not generate such treatment residuals.

Both action alternatives would maintain reliable protection of human health and the environment over time.

Alternative GW-1 would be expected to have minimal long-term effectiveness, since it would rely upon natural attenuation to restore groundwater quality. Alternative GW-4 would generate treatment residues that would have to be appropriately handled; Alternatives GW-2 and GW-3 would not generate such residues.

<u>Reduction in Toxicity, Mobility, or Volume Through Treatment</u>

Alternative S-1 would provide no reduction in toxicity, mobility or volume. Under Alternative S-2, the toxicity, mobility, and volume of contaminants would be reduced or eliminated through on-site treatment. Under Alternative S-3, the mobility of the contaminants would be eliminated by removing the VOC-contaminated soil from the property and the toxicity would be reduced through treatment off-site.

Alternative GW-1 would not effectively reduce the toxicity, mobility, or volume of contaminants in the groundwater, as this alternative involves no active remedial measures. This alternative would rely on natural attenuation to reduce the levels of contaminants; a process that has been slowly occurring at this site. Alternatives GW-2, GW-3, and GW-4, on the other hand, would reduce the toxicity, mobility, and volume of contaminants, thereby satisfying CERCLA's preference for treatment.

<u>Short-Term Effectiveness</u>

Alternative S-1 does not include any physical construction measures in any areas of contamination and, therefore, would not present any potential adverse impacts to remediation workers or the community as a result of its implementation. Alternatives S-2 and S-3 could present some limited adverse impacts to remediation workers through dermal contact and inhalation related to excavation activities. Noise from the treatment unit and the excavation work associated with Alternatives S-2 and S-3, respectively, could present some limited adverse impacts to remediation workers and nearby residents. In addition, interim and post-remediation soil sampling activities would pose some risk. The risks to remediation workers and nearby residents under all of the alternatives could, however, be mitigated by following appropriate health and safety protocols, by exercising sound engineering practices, and by utilizing proper protective equipment.

Since it is estimated that the on-site treatment of the excavated soil and sediment with ESVE would require 3 years under Alternative S-2, the excavation would remain open until the soils could be backfilled. Therefore, the excavation would have to be secured to prevent on-site worker injuries.

Alternative S-3 would require the off-site transport of contaminated soil (approximately 350 truck loads), which would potentially adversely affect local traffic and may pose the potential for traffic accidents, which in turn could result in releases of hazardous substances.

For Alternatives S-2 and S-3, there is a potential for increased stormwater runoff and erosion during construction and excavation activities that would have to be properly managed to prevent or minimize any adverse impacts. For these alternatives, appropriate measures would have to be taken during excavation activities to prevent transport of fugitive dust and exposure of workers and downgradient receptors to PCE.

Since no actions would be performed under Alternative S-1, there would be no implementation time. It is estimated that Alternative S-2 would require three months to decontaminate and demolish the building, three months to construct the ESVE system, and six months to achieve the soil cleanup objectives. It is estimated that it would take require three months to decontaminate and demolish the building and three months to excavate and transport the contaminated soils to an EPA-approved treatment/disposal facility under Alternative S-3.

Alternative GW-1 would have no short-term impact to workers or the community and would have no adverse environmental impacts, since no actions would be taken. Alternatives GW-2, GW-3 and GW-4 might present some limited risk to remediation workers through dermal contact and inhalation related to groundwater sampling and injection activities. The installation of additional wells for the purpose of monitoring, groundwater extraction, and/or reagent injections would pose an additional risk to on-site workers, since it would involve the installation of wells through potentially contaminated soils and groundwater. The risks to on-site workers could, however, be minimized by utilizing proper protective equipment.

The time for implementing Alternative GW-2, including bench- and pilot-scale testing, bidding, selecting a contractor, and initiate treatment of the high concentration source areas, is estimated to be within 1 year of completion of the design. Multiple injections over several years would likely be necessary to sustain the enhanced biodegradation rates. The overall duration of this remedy to achieve the cleanup criteria throughout the entire groundwater plume is estimated to be 30 years.

For Alternative GW-3, treatment of the high concentration source areas by oxidation may achieve cleanup standards in the source area over a very short treatment period (*e.g.,* less than 1 year). Natural attenuation of the contamination at the periphery of the source areas would likely achieve the cleanup standards in 30 years.

For Alternative GW-4, the total time for implementing this alternative, including design, testing, bidding, selecting a contractor and the installation of the groundwater extraction and treatment systems, is estimated to be 2 years. The overall duration of this remedy to achieve the cleanup criteria throughout the entire groundwater plume is estimated to be 30 years.

<u>Implementability</u>

Alternative S-1 would be the easiest soil alternative to implement, as there are no activities to undertake.

Both Alternatives S-2 and S-3 would employ technologies known to be reliable and that can be readily implemented. Equipment, services, and materials needed for Alternatives S-2 and S-3 are readily available, and the actions under these alternatives would be administratively feasible. Sufficient facilities are available for the treatment/disposal of the excavated materials under Alternative S-3.

While soil excavation under Alternatives S-2 and S-3 is technically feasible, there are several site-specific complications related to this remedial approach. Since there would be insufficient room on the site to create a significant excavation stockpile, it is likely that the excavation and backfilling would need to be performed incrementally. At the same time, post-excavation sampling and rapid turnaround analyses would need to be integrated into the process. There would be a need to monitor for PCE and dust during the excavation, especially since there are nearby homes.

Monitoring the effectiveness of the ESVE system under Alternative S-2 would be easily accomplished through soil and soil-vapor sampling and analysis. Under Alternative S-3, determining the achievement of the soil cleanup objectives could be easily accomplished through post-excavation soil sampling and analysis.

Since no action would be performed under Alternative GW-1, there would be no implementation time. Alternatives GW-2, GW-3, and GW-4 would each take about 12 months to implement.
Alternative GW-1 would be the easiest to implement, since they would not entail the performance of any activities.

Equipment, services, and materials needed for all of the groundwater action alternatives are readily available and the actions under these alternatives would be administratively feasible. Groundwater injections and extraction and treatment systems similar to that which would be used under Alternatives GW-2, GW-3 and GW-4 have been implemented successfully at numerous sites to treat contaminated groundwater.

The implementation of institutional controls would be relatively easy to implement under the groundwater alternatives.

There are considerable uncertainties in the potential radius of influence of injections for Alternatives GW-2 and GW-3. Furthermore, injection of the reagent slurry for Alternative GW-2 may be hindered by bridging across fractures, and limited mobility in tight fractures. Alternative GW-3 would not be subject to these limitations. There are also considerable uncertainties in the number and location of extraction wells and the achievable groundwater extraction rate for treatment for Alternative GW-4. In addition, it may be difficult to maintain continuous operations of an active treatment system (Alternative GW-4) during the winter months in this remote location, and Alternative GW-4 would require more maintenance than Alternatives GW-2 or GW-3.

<u>Cost</u>

The present-worth costs associated with the soil remedies are calculated using a discount rate of seven percent and a five-year time interval. The present-worth costs associated with the groundwater remedies are calculated using a discount rate of seven percent and a thirty-year time interval.

The estimated capital, OM&M, and present-worth costs for each of the alternatives are presented below.

Alternative	Capital	Annual O&M	Total Present Worth
S-1	$0	$0	$0
S-2	$3,939,000	$0	$3,939,000
S-3	$4,253,000	$0	$4,253,000
GW-1	$0	$0	$0
GW-2	$1,436,000	$57,000	$2,365,000
GW-3	$2,424,000	$57,000	$3,353,000
GW-4	$5,404,000	$555,000	$13,987,000

State Acceptance

NYSDEC concurs with the proposed remedy.

Community Acceptance

Community acceptance of the preferred alternative will be addressed 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, in consultation with NYSDEC, recommends Alternative S-3 (building demolition, limited excavation of sediments, and excavation and disposal of soil) as the preferred alternative to address the contaminated soil and sediment at the site and Alternative GW-3 (source area in-situ chemical oxidation and downgradient monitored natural attenuation) as the preferred alternative for the groundwater.

The soil component for this remedy would include the excavation of PAH-contaminated soil to a depth of one foot[8] and the excavation of PCE-contaminated soils to a depth of four feet. The excavated PAH-contaminated soils would also be utilized as backfill to a depth of not less than 1 foot below the ground surface (bgs)[9] in the areas where PCE-contaminated soil would be excavated. Before backfilling with clean soil those areas where residual PAH-contaminated soil would remain, a readily-visible and permeable subsurface demarcation delineating the interface between the residually-contaminated native soils and the clean backfill would be installed. Following the demolition of the building, contaminated soils remaining within the footprint of the building will be addressed as described above. The wetland areas that would be excavated would be backfilled with soil that meets the unrestricted SCOs.

The remedy would also include the excavation of PCE-contaminated sediment and soil from the adjacent wetlands to meet the protection of groundwater SCO. These areas would be backfilled with clean soil.

Under the groundwater component of this remedy, the oxidizing agent that would be injected into the contaminated groundwater at the source areas would chemically transform the VOCs into less toxic compounds or to carbon dioxide, and water. Lower contaminant concentrations outside the source areas would be addressed through monitored natural attenuation.

During the design, samples would be collected to define the limits of the soil and sediment excavation.

Bench- and pilot-scale treatability studies would be performed to optimize the effectiveness of the injection system and to determine optimum oxidant delivery rates and locations for the injection-well points.

Performance and compliance monitoring and testing would be performed during and after the injections to determine residual contaminant concentrations, assess the need for additional treatment, and monitor the natural attenuation of the contamination at the periphery of the plume.

During the design, a Phase 1B Cultural Resources Survey would be performed to document the site's historic resources.

Since the entire groundwater plume will not immediately achieve cleanup levels upon implementation of this alternative, an environmental easement/restrictive covenant would be filed in the property records of Jefferson County. The easement/covenant would, at a minimum, restrict the use of the site to commercial and industrial uses, restrict intrusive activities in areas where residual contamination remains unless the activities are in accordance with an EPA-approved Site Management Plan (see below), and restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH or the County Department of Health.

[8] If the land use for the property is changed from commercial to recreational before the design of the remedy is approved, then restricted residential SCOs would be utilized, which would allow for recreational use of the property. Accordingly, the PAH-contaminated soils would be excavated to a depth of two feet and backfilled with clean soil. This change would result in the excavation of an additional 1,650 cubic yards of PAH-contaminated soils and would cost an additional $900,000.

[9] The excavated PAH-contaminated soils would be utilized as backfill to a depth of not less than 2 feet bgs if the land use is changed to recreational.

The Site Management Plan would provide for the proper management of all post-construction remedy components. Specifically, the Site Management Plan would describe procedures to confirm that the requisite engineering (subsurface demarcation) and institutional controls are in place and that nothing has occurred that would impair the ability of said controls to protect public health or the environment. The Site Management Plan would also include a soil management plan, an inventory of any use restrictions, the necessary provisions for the implementation of the requirements of the above-noted environmental easement and/or restrictive covenant; a provision for the performance of the operation, maintenance, and monitoring required by the remedy; and a provision that the property owner or party implementing the remedy submit periodic certifications that the institutional and engineering controls are in place. In addition, if in the future, structures are proposed to be built on the property or any existing buildings are reoccupied, as required by the SMP, a soil vapor intrusion evaluation and, potentially, vapor intrusion mitigation systems may be needed until the cleanup criteria have been achieved throughout the entire area

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

Basis for the Remedy Preference

Alternative S-2 and Alternative S-3 would both effectively achieve the soil cleanup levels. While Alternative S-3 is slightly more expensive than Alternative S-2, Alternative S-2 would require the performance of pilot-scale treatability studies and would take longer to achieve the soil cleanup level than Alternative S-3. In addition, since it is estimated that the on-site treatment of the excavated soil and sediment with ESVE would require 3 years under Alternative S-2, the excavation would remain open until the soils could be backfilled. Therefore, the excavation would have to be secured to prevent on-site worker injuries. Therefore, EPA believes that Alternative S-3 would effectuate the soil cleanup while providing the best balance of tradeoffs with respect to the evaluating criteria.

There are considerable uncertainties in the number and location of extraction wells and the achievable groundwater extraction rate for treatment for Alternative GW-4. In addition, it may be difficult to maintain continuous operations of an active treatment system (Alternative GW-4) during the winter months in this remote location, and Alternative GW-4 would require more maintenance than Alternatives GW-2 or GW-3. In addition, Alternative GW-4 is significantly more expensive than the other two action alternatives. There are considerable uncertainties in the potential radius of influence of injections for Alternatives GW-2 and GW-3. Furthermore, injection of the reagent slurry for Alternative GW-2 may be hindered by bridging across fractures, and limited mobility in tight fractures. It is estimated that Alternative GW-3 would achieve groundwater standards in significantly less time than Alternatives GW-2 and GW-4.

For these reasons, EPA has identified Alternative GW-3 as its preferred groundwater alternative since it would effectuate the groundwater cleanup while providing the best balance of tradeoffs among the alternatives with respect to the evaluating criteria.

The preferred remedy is believed to provide the greatest protection of human health and the environment, provide the greatest long-term effectiveness, be able to achieve the ARARs more quickly, or as quickly, as the other alternatives, and is cost effective. Therefore, the preferred remedy will provide the best balance of tradeoffs among alternatives with respect to the evaluating criteria. EPA and NYSDEC believe that the preferred remedy will treat principal threats, be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The preferred remedy also will meet the statutory preference for the use of treatment as a principal element.

The environmental benefits of the preferred remedy may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy and NYSDEC's Green Remediation Policy[10]. This will include consideration of green remediation technologies and practices.

[10] See http://epa.gov/region2/superfund/green_remediation and http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf.

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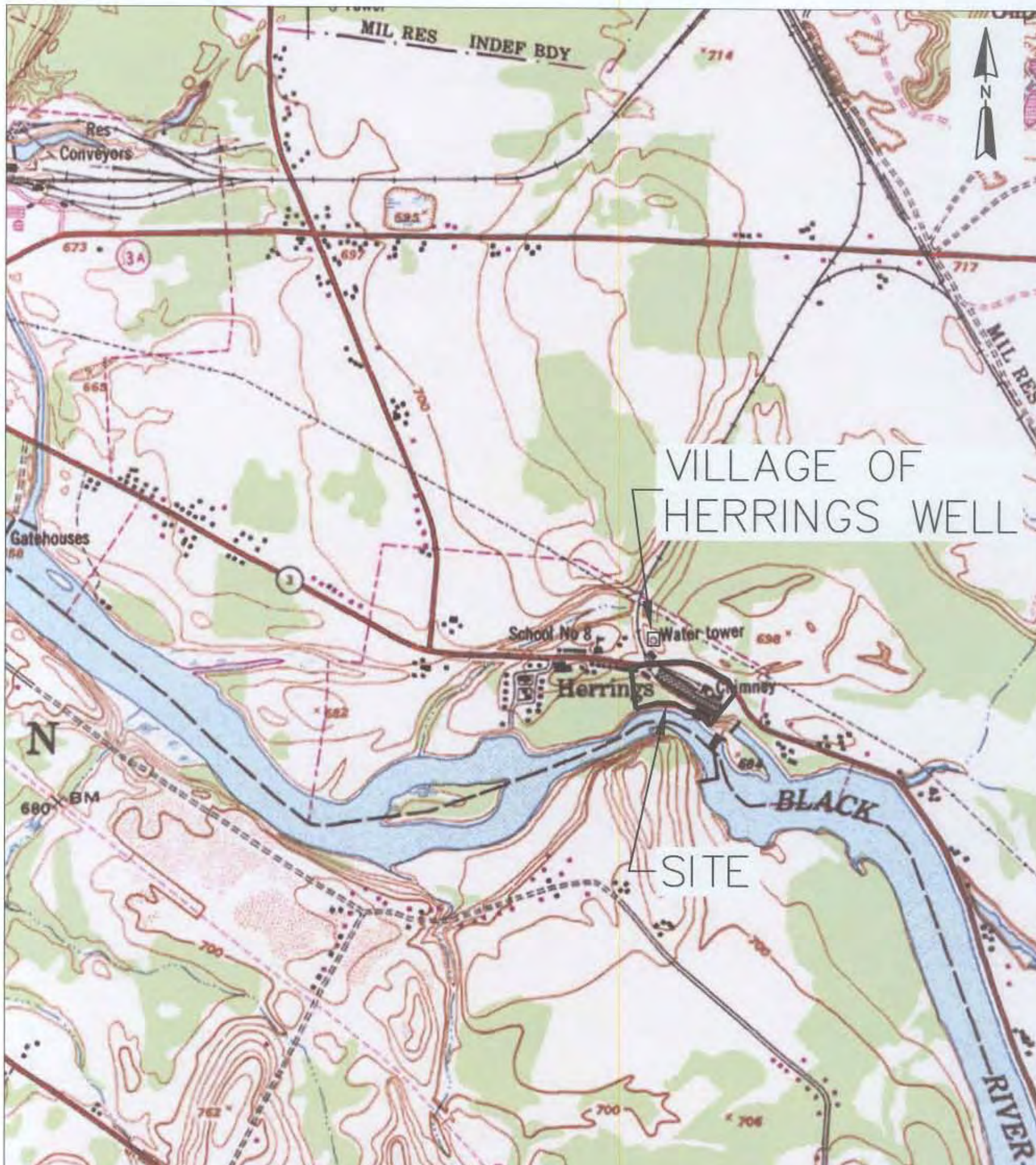

TETRA TECH EC, INC.	TITLE: SITE LOCATION Remedial Investigation Report Crown Cleaners of Watertown, Inc.	DWN: LMC CHKD: LEA DATE: 08/09/2011	DES.: CTS APPD: RCC REV.: 1	PROJECT NO.: 106–3810.0008 FIGURE 1

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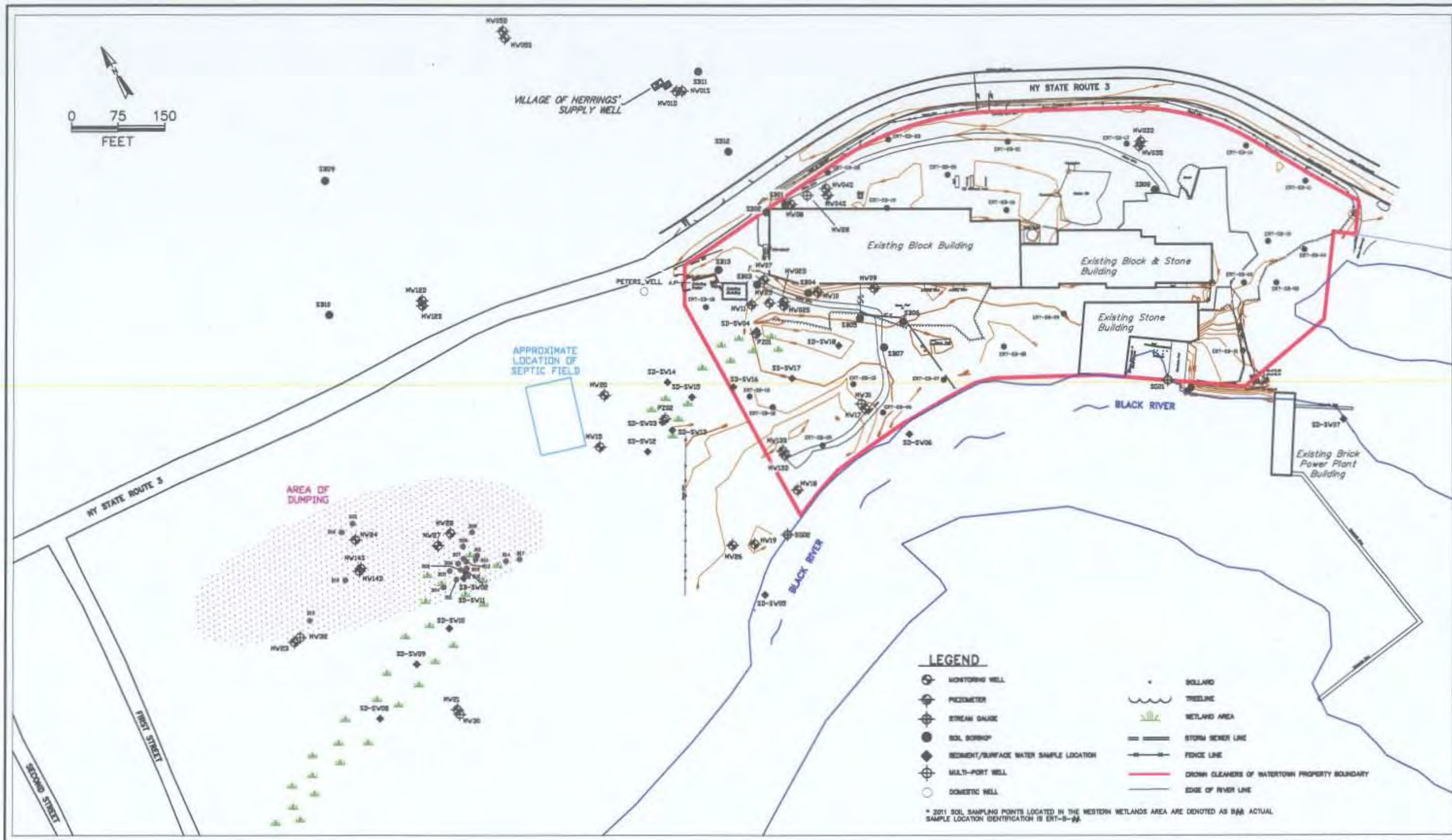

TETRA TECH EC, INC.	TITLE: SITE MAP Crown Cleaners of Watertown, Inc.	DWN.: LMB CHKD: DES.: LEA	DATE: 09/12/11 REV.: 2 APPD:	PROJECT NO.: 106-3810.0008 FIGURE NO.: 2

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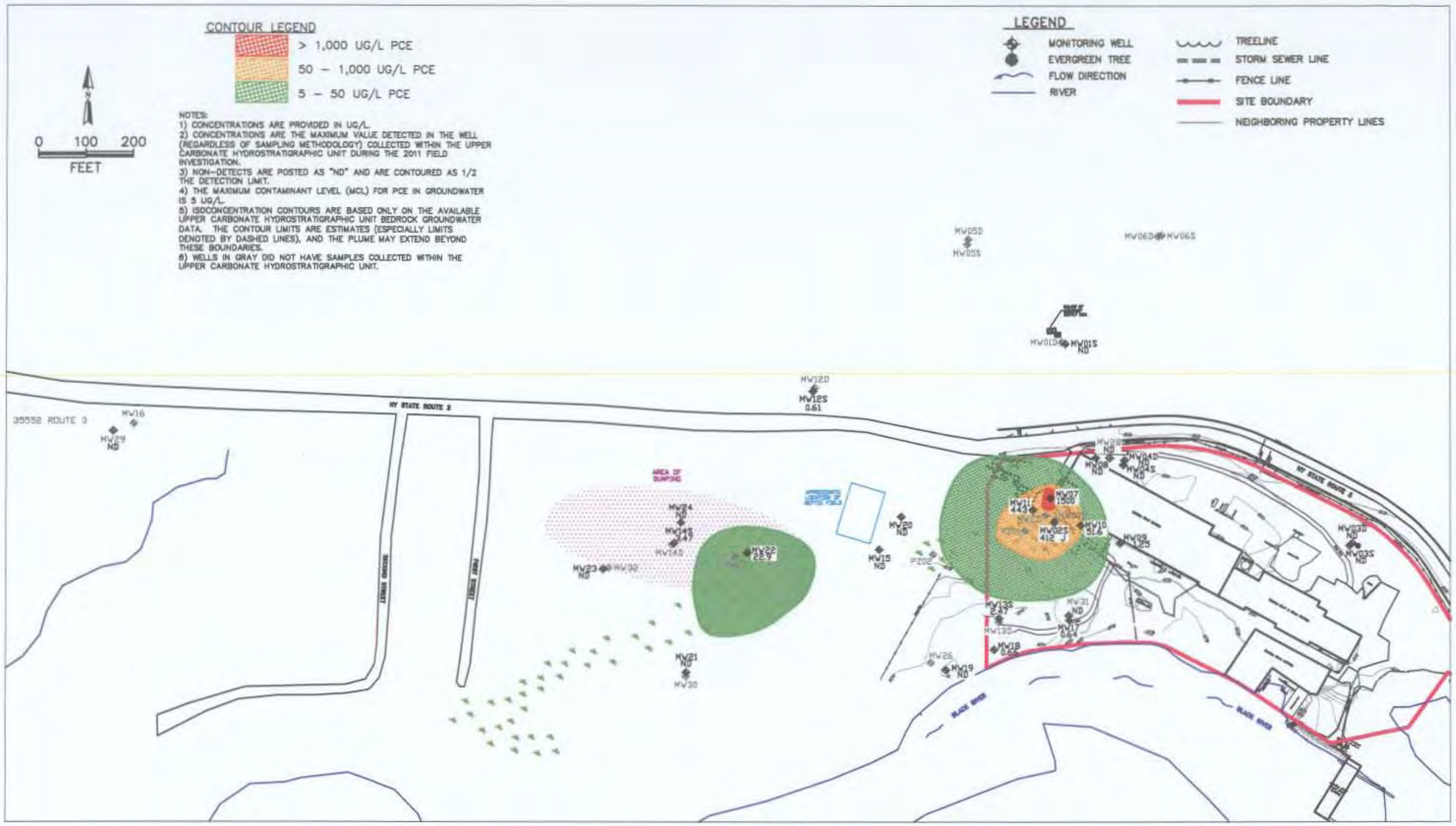

TETRA TECH EC, INC.	TITLE: ISOCONCENTRATION CONTOUR EXTENT OF PCE IN UPPER UNIT GROUNDWATER – 2011 Remedial Investigation Report Crown Cleaners of Watertown, Inc.	DWN.: LEA CHKD: DES.: LEA	DATE: 08/10/11 REV.: 1 APPD:	PROJECT NO.: 106-3810.0008 FIGURE N° 3

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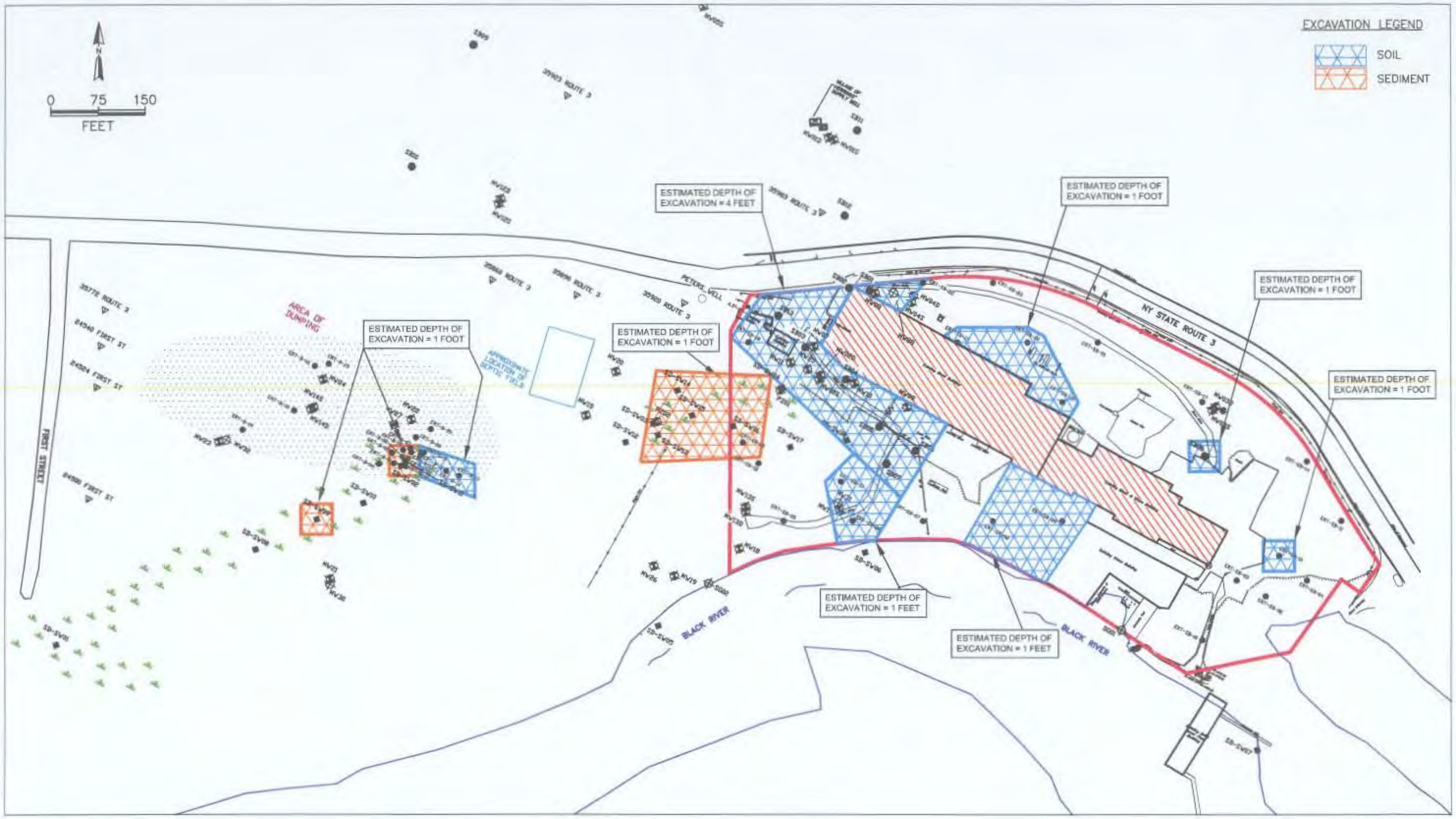

TETRA TECH EC, INC.

TITLE: ESTIMATED EXTENT OF EXCAVATION (ALTERNATIVE S–3 and S–4) Feasibility Study Report Crown Cleaners of Watertown, Inc.	DWN.: LMC CHKD: DES.: RC	DATE: 11/10/11 REV.: 0 APPD:	PROJECT NO.: 106–3810.0008 FIGURE NO.: 4

R2-0002498