RECORD OF DECISION
DECISION SUMMARY
Operable Unit 2

GCL Tie & Treating

Sidney, Delaware County, New York

413011

United States Environmental Protection Agency
Region II
New York, New York
March 1995

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

GCL Tie & Treating
Sidney, Delaware County, New York

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selection of the remedial action for the GCL Tie & Treating site (the Site) in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§9601-9675 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. An administrative record for the Site, established pursuant to the NCP, 40 CFR 300.800, contains the documents that form the basis for EPA's selection of the remedial action (see Appendix III).

The New York State Department of Environmental Conservation (NYSDEC) has been consulted on the planned remedial action in accordance with section 121(f) of CERCLA, 42 U.S.C. §9621(f), and concurs with the selected remedy (see Appendix IV) contingent upon further concurrence based on any changes made to the selected remedy during the remedial design.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy pertains to the last of two operable units for the Site and addresses the non-GCL property soils, contaminated groundwater, and surface-water sediments located at the GCL Site. The first operable unit addressed the contamination in the GCL-property soils.

The major components of the selected remedy include:

- Extraction, collection, and on-site treatment of groundwater contaminated with organic compounds; discharge of treated groundwater to the surface water. The selected remedy provides two options for primary treatment of organics: carbon adsorption or biological treatment.

Information will be obtained during the remedial design to reassess the time frame and technical practicability of achieving State and Federal drinking water standards in the aquifer. Should the remedial design data indicate that groundwater restoration through extraction and treatment is feasible and practical, additional work will be conducted to determine which groundwater treatment option (carbon adsorption or biological treatment) is more appropriate and cost-effective. If groundwater restoration is not feasible or practical, the remedy will focus on containing the groundwater contamination within the GCL-property boundaries in which case chemical-specific ARARs may be waived for all or some portions of the aquifer based on the technical impacticability of achieving further contamination reduction within a reasonable time frame. Under such a scenario, it may be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to reduce the concentration of contaminants in the aquifer groundwater to levels which are similar to those achievable under extraction and treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system; and,

- Excavating and treating contaminated sediments on-site through a thermal desorption process along with the GCL-property soils. The selected remedy will also provide for the mitigation of damages to the aquatic environment which may occur during implementation (i.e., revegetation).

In addition, EPA will recommend to local agencies that institutional control measures be undertaken to ensure that future land use of the property continues to be industrial/commercial, and precludes the use of Site groundwater for human consumption until drinking water quality is restored in the aquifer.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in Section 121 of CERCLA, 42 U.S.C. §9621 as: (1) it is protective of human health and the environment; (2) it attains a level or standard of control of the hazardous substances, pollutants and contaminants, which at least attains the legally applicable or relevant and appropriate requirements (ARARs) under State and Federal laws; (3) it is cost-effective; (4) it utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable; and (5) it satisfies the statutory preference for remedies that employ treatment to reduce the toxicity, mobility, or volume of the hazardous substances, pollutants or contaminants at a site.

A review of the remedial action pursuant to CERCLA §121(c), 42 U.S.C. §9621(c), will be conducted five years after the commencement of the remedial action to ensure that the remedy continues to provide adequate protection to human health and the environment, because this remedy will result in hazardous substances remaining on-site above health-based levels.

Jeanne M. Fox
Regional Administrator

3/31/95
Date

RECORD OF DECISION
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LIST OF TABLES

SITE NAME, LOCATION AND DESCRIPTION

The GCL Tie and Treating site (the Site) occupies approximately 60 acres in an industrial/commercial area of Delaware County, New York (see Figure 1). According to an analysis of historical photographs conducted by the U.S. Environmental Protection Agency (EPA) and accounts by local residents, wood-preserving activities at the Site date as far back as the 1940's.

The Site is bordered on the north by a railroad line. A warehouse and a municipal airport are located to the north of the railroad line. Route 8 and Delaware Avenue delineate the eastern and southern borders of the Site, respectively. A drainage ditch (Unalam Tributary) and woodland area lie between Delaware Avenue and the Site. The western portion of the property abuts a small impoundment and wetlands area. The Site eventually drains via overland flow to the Susquehanna River, which is located within one mile of the Site.

The Site includes two major areas, generally referred to as the "GCL property" and "non-GCL property" (see Figure 2). The 26-acre GCL property housed a wood-treating facility called GCL Tie & Treating, and includes four structures. The primary building housed the wood pressure treatment operations including two treatment vessels (50 feet in length by 7 feet in diameter), an office, and a small laboratory. Wood (mostly railroad ties) and creosote were introduced into the vessels which were subsequently pressurized in order to treat the wood. The remaining three structures housed a sawmill and storage space. The non-GCL portion of the Site includes two active light manufacturing companies (which did not conduct wood treatment operations) located on a parcel of land adjacent to the GCL property.

Approximately 1,100 people are employed in a nearby industrial area. About 5,000 people live within 2 miles of the Site and depend on groundwater as their potable water supply. The nearest residential well is within 0.5 mile of the Site. Two municipal wells, supplying the Village of Sidney, are located within 1.25 miles of the Site. A shopping plaza consisting of fast-food restaurants and several stores is located approximately 300 feet south of the Site. Other facilities (i.e., a hospital, public schools, senior citizen housing, and child care centers) are located within 2 miles of the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site first came to the attention of the New York State Department of Environmental Conservation (NYSDEC) in 1986, after one of the pressure vessels used at the GCL facility malfunctioned, causing a release of an estimated 30,000 gallons of creosote. GCL personnel excavated the contaminated surface soil and placed it in a mound; no further action was undertaken

at the time.

In September 1990, NYSDEC requested EPA to conduct a removal assessment at the Site. Consequently, EPA conducted sampling of the GCL Tie and Treating facility in October 1990. As a result of the data and information that were obtained as part of the assessment, a Removal Action was initiated by EPA in March 1991.

Activities conducted as part of the removal effort included: site stabilization (e.g., run-off and dust control), delineation of surface contamination, installation of a chain-link fence, identification and disposal of containerized (e.g., tanks, drums) and uncontainerized hazardous wastes (e.g., wastes in sumps); preparation of approximately 6,000 cubic yards (cy) of contaminated soil and wood debris for disposal; and a pilot study to determine the effectiveness of composting for bioremediation of creosote-contaminated soils.

The Site was proposed for inclusion on the National Priorities List (NPL) in February 1994 and was added to the NPL in May 1994. In September 1994, EPA signed a Record of Decision (ROD) for the first operable unit which called for the excavation and on-site treatment of approximately 36,100 cubic yards of contaminated soil and debris by a thermal desorption process.

EPA has been conducting a search for potentially responsible parties (PRPs). To date, only one PRP has been identified and notified of his potential liability under CERCLA; however, this PRP was not considered to be a viable candidate to undertake the necessary response actions. If EPA determines that there are one or more viable PRPs, EPA will take appropriate enforcement actions to recover its response costs pursuant to CERCLA, 42 U.S.C. § 9601 - 9675.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Remedial Investigation (RI) report and the Proposed Plan for the Site were released to the public for comment on March 1, 1995. These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, in New York City and the information repository at the Sidney Memorial Library in Sidney, NY. The notice of availability of the above-referenced documents was published in the Oneonta Daily Star on March 1, 1995. The public comment period on these documents was held from March 1, 1995 to March 30, 1995.

On March 8, 1995, EPA and NYSDEC conducted a public meeting at the Civic Center in Sidney, NY to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the Site, and to respond to any questions from area residents and other attendees.

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

SCOPE AND ROLE OF OPERABLE UNIT

The GCL Tie & Treating site was selected as a pilot project for the Superfund Accelerated Cleanup Model (SACM) initiative. The purpose of SACM is to make Superfund cleanups more timely and efficient. Under this pilot, activities which would normally have been performed sequentially (e.g., site assessment, NPL placement, removal assessment) were performed concurrently. In June 1993, while attempting to determine if the Site would score high enough for inclusion on the NPL, EPA initiated RI/FS activities to delineate further the nature and extent of contamination at the Site. These activities would not typically have been initiated until after the Site had been proposed for the NPL.

Site remediation activities are sometimes segregated into different phases, or operable units, so that remediation of different environmental media or areas of a site can proceed separately, resulting in an expeditious remediation of the entire site. EPA has designated two operable units for the GCL Tie & Treating site as described below.

- Operable unit 1 addresses the remediation of contaminated soils found on the GCL-property portion of the Site via thermal desorption. This operable unit is currently in the remedial design phase.

- Operable unit 2 addresses the contamination in the soils on the remainder of the Site (non-GCL property), and in the groundwater, surface water, and surface-water sediments. This is the final operable unit planned for this Site and the subject of this ROD.

SUMMARY OF SITE CHARACTERISTICS

The nature and extent of contamination found at the Site were assessed through a comprehensive sampling of soil, groundwater, surface water, and surface-water sediment. Sampling was conducted during the Fall/Winter of 1993. The investigation focussed on contaminants typically associated with the creosote wood-preserving process. Creosote contaminants typically found included numerous polyaromatic hydrocarbons (PAHs) such as benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo [k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-c,d] pyrene and dibenzo[a,h]anthracene.

The following paragraphs discuss the characterization of contamination in the operable unit 2 study area, namely, in the

groundwater, surface water, surface-water sediments, and non-GCL property soils.

Soils

Approximately 130 soil samples were collected from monitoring-well and soil borings drilled on the GCL property and on the non-GCL property. Samples also were collected at off-site locations to provide information on background conditions. Table 1 summarizes the analytical results for the soil samples collected on the non-GCL property. In general, relatively low levels of contaminants were detected with total PAHs ranging up to 24 parts per million (ppm). Generally, the concentrations of metals detected on-site were not significantly above background concentration ranges with the exception of beryllium (up to 3.2 ppm), copper (up to 176 ppm) and lead (up to 46 ppm), which were above their representative background concentrations of 0.6 ppm, 26.2 ppm and 11.2 ppm, respectively.

Surface Water

Surface water samples and sediments were collected at 7 locations along the drainage ditch and the impoundment. Table 3 summarizes the analytical results. Of the 14 inorganics detected in the surface water samples, only arsenic (up to 11.4 parts per billion [ppb]), copper (up to 35.2 ppb) and nickel (up to 19.6 ppb) significantly exceeded State or Federal ambient water quality standards. The only organic contaminant detected was chloroethane at a level of 12 ppb.

Surface-Water Sediments

Elevated PAH concentrations were detected at 3 of the 7 sediment sampling locations along the drainage ditch and the impoundment along the western side of the Site. Table 2 summarizes the analytical results. The extent of contamination (see Figure 3) is approximately 2,850 feet in length, 1.5 feet in width and 0.5 feet in depth in the tributary, as well as a 5-foot wide strip along the edge of the impoundment. PAHs were detected in these areas with total concentrations ranging up to 23,850 ppb. The PAH contamination detected in the unconsolidated sediments is most likely attributed to runoff from the Site soils. Arsenic (up to 16,400 ppb), copper (up to 51,900 ppb), lead (up to 70,200 ppb), manganese (up to 547,000 ppb), mercury (up to 690 ppb), nickel (up to 43,600 ppb), and zinc (up to 173,000) were detected in concentrations which exceeded their respective sediment criteria values. However, arsenic, copper, manganese, nickel, and zinc were detected at concentrations relatively equivalent to their respective background levels. The relatively elevated concentrations of these metals could be attributed to regional background variations or from off-site sources, as these contaminants are not typically associated with the wood-

preserving operations conducted at the Site.

Groundwater

Site-specific geology within the GCL property is characterized by a layer of fill approximately 5 feet thick on the western portion of the Site which gradually decreases to approximately 2 to 3 feet on the eastern section of the GCL property. The fill consists predominantly of silt and clay with significant amounts of wood and assorted debris. The fill is underlain by silt and clay type soils.

There are two hydrogeologic systems consisting of the overburden and bedrock units. The overburden unit can be further divided into shallow (approximately 5 to 16 feet in depth) and intermediate (approx. 11 to 25 feet in depth) groundwater zones. Groundwater is first encountered at depths ranging from 5 to 8 feet below grade around the Site. As a general rule, groundwater flow in the overburden aquifer appears to be in a north-northwesterly direction; groundwater movement in the bedrock appears to be in a northerly direction. Permeability of the overburden and bedrock soils is relatively low; groundwater flow through the bedrock aquifer occurs primarily through fractures.

Six previously existing groundwater monitoring wells and 14 new wells were sampled during the RI. Two rounds of samples were collected and analyzed for a full range of organic and inorganic constituents. Table 4 summarizes the analytical results. The data in Table 4 indicate the contaminants associated with the GCL site wells influenced by the Route 8 Landfill contamination (column 3 of the table) and the GCL Site wells not influenced by the Route 8 Landfill contamination (column 4 of the table). Two main groups of organic compounds were found in the groundwater above drinking water standards, namely, PAHs and volatile organic compounds (VOCs). Referring to column 4, PAHs, including benzo[b]fluoranthene (up to 3 ppb - drinking water standard of 0.2 ppb), benzo[a]pyrene (up to 2 ppb - drinking water standard of 0.2 ppb), chrysene (up to 4 ppb - drinking water standard of 0.2 ppb) and benzene (220 ppb - drinking water standard of 5 ppb) significantly exceeded drinking water standards, and are the same type of contaminants as those found in high concentrations in the Site soils. Referring to column 3, chlorinated VOCs such as vinyl chloride (up to 4,700 ppb - drinking water standard of 2 ppb), 1,1-dichloroethane (up to 1,200 ppb - drinking water standard of 5 ppb), cis-1,2-dichloroethene (up to 4,300 ppb - drinking water standard of 70 ppb), and trichloroethene (up to 1,000 ppb - drinking water standard of 5 ppb) were also found at concentrations exceeding the drinking water standards, however, they are most likely not related to the activities that took place at the GCL site. It is likely that these chlorinated VOCs originated from the Route 8 Landfill, located across from Delaware Avenue and hydraulically upgradient from the GCL Site.

The data obtained during the RI suggest that the contaminant plume originating at the Route 8 Landfill extends beneath much of the GCL Site. Currently, the Route 8 site is being remediated under the New York State hazardous waste remediation program; a groundwater collection and treatment system designed to address the groundwater contamination was constructed and recently started operation.

Aluminum (up to 6,210 ppb), iron (up to 37,600 ppb), manganese (up to 17,300), antimony (up to 44.3 ppb), chromium (up to 166 ppb), and nickel (up to 131 ppb) were detected in groundwater samples in concentrations significantly above drinking water standards. However, the presence of most of these metals at elevated concentrations in background and off-site wells is potentially indicative of background levels and/or off-site sources.

It is estimated that the GCL contaminant plume extends over an area of approximately 173,500 square feet (see Figure 4) with a thickness of approximately 45 feet. The volume of contaminated water which exceeds drinking water standards is estimated at 10 million gallons.

During the RI, a creosote product layer (referred as dense nonaqueous phase liquid [DNAPL]) was discovered in the shallow groundwater, in a localized area near the wood treatment/process buildings. DNAPLs are heavier than water, and have a tendency to sink. PAH compounds, which are the principal components of creosote, are extremely immobile and tend to attach to the aquifer soil particles rather than move with the groundwater. The DNAPL appears to be perched on many thin soil layers rather than in a single well-defined pool. It is estimated that the DNAPL layer ranged from 1 to 2 feet in thickness, and contained concentrations of PAHs in excess of 8,000 ppm. The volume of the DNAPL layer is estimated at 10,000 to 30,000 gallons. The data suggest that the DNAPL layer is contained within the property boundaries. DNAPLs constitute a highly significant source of soil and groundwater contamination at the Site.

SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site, if no remedial action were taken.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: Hazard Identification--identifies the contaminants of concern at the

site based on several factors such as toxicity, frequency of occurrence, and concentration. 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 soil) by which humans are potentially exposed. Toxicity Assessment--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). Risk Characterization--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the GCL property in its current state. The Risk Assessment focused on contaminants in the soil, surface water, surface-water sediments, and groundwater which are likely to pose significant risks to human health and the environment. A summary of the contaminants of potential concern in sampled matrices is listed in Table 5.

An exposure assessment was conducted for reasonable maximum exposures to estimate the magnitude, frequency, and duration of actual and/or potential exposures to the contaminants of potential concern present in the sampled media. Reasonable maximum exposure is defined as the highest exposure that is reasonably expected to occur at the Site for individual and combined pathways. The baseline risk assessment evaluated the current health effects which could potentially result from ingestion, inhalation, and dermal contact of soils, and ingestion and dermal contact of surface water and surface-water sediments by Site trespassers; ingestion, inhalation and dermal contact of groundwater by off-site residents; the ingestion and inhalation of soils by off-site residents; and ingestion, dermal contact, and inhalation of soils by workers (see Table 6). These exposure pathways were evaluated separately for adults and children. The future-use scenario evaluated the same scenarios and also evaluated the potential health impacts resulting from ingestion, inhalation and direct contact to soil by future on-site workers. Site-related and nonsite related (e.g., Route 8 Landfill) potential health threats were evaluated. The property is currently zoned for industrial/commercial use only. Input from the community and local officials, indicated that industrial/commercial use of the property would be the preferred use of the property in the future. Therefore, it was assumed that future land uses of the property would continue to be industrial/commercial.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and noncarcinogenic effects due to exposure to site chemicals are considered separately. It was assumed that

the toxic effects of the site-related chemicals would be additive. Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. The SFs for the compounds of concern are presented in Table 7.

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This level indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site. The total potential current and future carcinogenic health risks for all pathways are summarized in Table 8. The total potential current and future carcinogenic health risks from exposure to non-GCL property soil are: 9.2×10^{-6} for off-site children residents, 3.9×10^{-6} for off-site adult residents, 1.4×10^{-5} for on-site workers, 4×10^{-6} for children trespassers, and 4.2×10^{-6} for adult trespassers. The potential carcinogenic health risks from exposure to surface water is 3.5×10^{-6} and 1.7×10^{-5} for children and adult trespassers, respectively. For surface-water sediments, the risk is 1×10^{-5} for both children and adult trespassers. The site groundwater is not currently being used for human consumption, however, under a hypothetical future use scenario the potential carcinogenic health risk due to exposure to contaminated groundwater was calculated. For future children and adult residents the total potential risk (from site-related and upgradient contaminant sources) is 1.1×10^{-1} and 1.4×10^{-1}, respectively. For site-related groundwater contamination only, the potential risks for future children and adult residents are 2.8×10^{-4} and 2.4×10^{-3}. These risk numbers mean that approximately three persons out of ten thousand and two persons out of one thousand respectively, would potentially be at risk of developing cancer if exposed to site-related contaminated groundwater over a lifetime.

Noncarcinogenic risks were assessed using a hazard index (HI)

approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligrams/kilogram-day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). The reference doses for the compounds of concern at the Site are presented in Table 7. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that impact a particular receptor population. An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

It can be seen from Table 8 that the HIs for noncarcinogenic effects from ingestion, inhalation, and dermal contact to all media (reasonable maximum exposure) are less than 1.0 for all receptors, except for exposure to groundwater (up to HI=497) and exposure to surface water under current and future uses (up to HI=6).

Ecological Risk Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: 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. 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. Ecological Effects Assessment--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. Risk Characterization--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with evaluating the contaminants associated with the Site in conjunction with the site-specific biological species/habitat information. Principal ecological communities at the Site consist of a deciduous wetland area within the southern portion of the Site (Unalam tributary), and an emergent wetland/open water complex (impoundment) to the west of the Site (see Figure 2). The wetland areas support a wide array of animal species, including 5 mammal species, 3 frog

species, and 17 bird species.

This risk assessment evaluated the Site ecological communities and their responses to toxicological exposures. The threat of lethal accumulations of contaminants in plant and animal populations was evaluated. The results of the ecological risk assessment indicate the potential for ecological impacts due to the presence of PAH contamination in the surface water and sediments of the Unalam Tributary, drainage ditches, wetlands and pond. Since both aquatic plants and invertebrates form a portion of the diets of wading birds and waterfowl, their diet poses a potential exposure route. Although adult mallard ducks subjected to dietary exposure of levels similar to those found on Site displayed no toxic effects, studies have shown significant mortality and deformities in mallard embryos and ducklings following exposure to similar levels of PAHs. Therefore, ingestion by breeding adult waterfowl may affect nesting success in the wetland habitats present on and adjacent to the Site.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure

parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report.

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

REMEDIAL ACTION OBJECTIVES

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

The following remedial action objectives were established:

- Prevent public and biotic exposure to contaminant sources that present a significant threat (contaminated groundwater and surface-water sediments); and,

- Reduce the concentrations of contaminants in the groundwater to levels which are protective of human health and the environment (e.g., wildlife).

- Prevent further migration of groundwater contamination.

DESCRIPTION OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. §9621(b)(1), mandates that a remedial action must be protective of human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, 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. Section 121(d) of CERCLA 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 State and Federal laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. §9621(d)(4).

In the spirit of the SACM initiative and relying on the Agency's technology selection guidance for wood-treating sites, EPA considered technologies which have been consistently selected at wood-preserving sites with similar characteristics (e.g., types of contaminants present, types of disposal practices, environmental media affected) during the development of remedial alternatives. As referenced below, the time to implement a remedial alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate with responsible parties, procure contracts for design and construction, or conduct operation and maintenance at the Site.

The alternatives developed for groundwater (GW) are discussed below.

Alternative 1: No Action

Capital Cost:	Not Applicable
O & M Cost:	$27,200 for biannual monitoring $20,000 each five-year review
Present Worth Cost:	$380,700 (over 30 years)
Implementation Time:	Not Applicable

The Superfund program requires that the No Action alternative be considered as a baseline for comparison with other alternatives. The No Action alternative for the contaminated groundwater would only include a long-term monitoring program. The contaminated groundwater and DNAPL present in the subsurface would be left to naturally attenuate without any treatment. The long-term monitoring program would consist of semiannual sampling for PAHs at existing wells on-site and around the Site. A 30-year monitoring period was assumed for estimating the cost of this alternative. A total of six existing monitoring wells would be utilized to sample the groundwater to determine whether the concentrations of the contaminants of concern have been lowered to cleanup levels through natural attenuation and to monitor the migration of contaminants and free-phase DNAPL in areas surrounding the Site.

Because this alternative would result in contaminants being left on-site above health based levels, the Site would have to be reviewed every five years for a period of 30 years per the requirements of CERCLA. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative GW-2, Option A: Extraction, on-site treatment via activated carbon adsorption, and discharge to surface water

Capital Cost:	$1,883,100
O & M Cost:	$603,300 per year
Present Worth Cost:	$9,369,400
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, treatment, and discharge of treated groundwater. The treatment system would consist of an oil/water separator, followed by pretreatment for manganese removal (necessary to eliminate its potential interferences with subsequent treatment processes) and removal of organic contaminants by activated carbon adsorption. The treated groundwater would be discharged to the small unnamed stream adjacent to the Site. Although it is likely to take considerably longer than 30 years to achieve remediation goals, the treatment plant design and cost estimate is based on an operating period of 30 years.

The extraction/collection system would include a combination of a collection trench for shallow groundwater and an extraction well for the intermediate groundwater. The trench would be approximately 700 feet long and would be located at the northwestern (downgradient) boundary of the Site. It is estimated that approximately 0.4 gallons per minute (gpm) of groundwater would be pumped from the collection trench, and approximately 26.4 gpm would be pumped from the extraction well to the on-site treatment system.

In addition to groundwater extraction, if the DNAPL were found to be pumpable, DNAPL extraction wellpoints would be installed in areas of suspected DNAPL. It is envisioned that four wellpoints would be installed in the shallow overburden and would have low sustainable pumping rates (less than 1 gpm in total). Total flow to the on-site treatment system would be approximately 30 gpm. All pumping rates and numbers of wells would be refined during the design phase based on pumping tests. Extracted groundwater would be delivered to a collection tank before treatment.

Because of the nature of the creosote contaminants and the observation of DNAPL during field activities, oily product is likely to be present with the extracted groundwater. Heavy or light product would be separated using an oil/water separator. Solids and/or heavy product would settle by gravity into the separator's sludge hopper and would be removed periodically for disposal to a permitted treatment facility. Lighter product would float to the surface and be removed by a skimmer for disposal/reuse at a licensed off-site treatment/recycling facility.

The pretreatment system would consist of an individual treatment train designed for the removal of manganese. Manganese would be removed through pH adjustment, oxidation, precipitation, coagulation, clarification, neutralization, and filtration steps with the addition of caustic, acid, and polymer. Sludges produced during this step would be stored in drums or rolloffs, and sent out to an approved disposal facility. Filtration may be required to further pretreat the effluent.

After pretreatment, groundwater would be pumped to a carbon adsorption system consisting of two carbon beds connected in series. Organic contaminants (PAHs) would be removed by the carbon adsorption units to target groundwater cleanup levels. The spent carbon would be collected and shipped for off-site disposal or regeneration and reuse.

Treated groundwater would be discharged via a culvert to the small unnamed stream located on the southern border of the Site. This stream in turn discharges to an unnamed tributary to Unalam Creek, which eventually discharges to the Susquehanna River. The discharge structure would include appropriate erosion control devices such as rip rap and energy dissipation features. The discharge would comply with the New York State Pollutant Discharge Elimination System (NYSPDES) requirements. All waste residuals generated from the treatment process would be transported off-site to a permitted treatment and disposal facility, or (in the case of carbon) to a recycling facility.

The goal of this alternative is to restore groundwater to drinking water quality. However, due to the characteristics of creosote (e.g., it is extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal would be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of shallow groundwater remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs would be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable time frame. If groundwater restoration were not feasible or practical, the alternative may then focus on containing the extent of groundwater contamination within the Site boundaries. Restoration of the groundwater outside the DNAPL source areas (e.g., intermediate groundwater) is likely to be feasible, since it is mostly contaminated with mobile organic contaminants (e.g., benzene).

During design or operation of the system, it may also be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to achieve a similar level of contaminant removal and containment as groundwater extraction and

treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system. The information would also be used to reassess the time frame and technical practicability of achieving cleanup standards.

Alternative GW-2, Option B: Extraction, on-site treatment via biological treatment, and discharge to surface water

Capital Cost:	$2,058,600
O & M Cost:	$626,500
Present Worth Cost:	$9,832,800
Implementation Time:	24 months

This option is virtually identical to Alternative 2, option A. The only difference is that, following pretreatment, the remaining contaminants in the groundwater would be pumped to an aerobic biological reactor for treatment. This reactor would contain bacterial cultures capable of degrading the contaminants in the groundwater. Wastes (e.g., sludges) generated during the treatment process would be disposed off-site at a permitted disposal/treatment facility.

Alternative GW-3: Extraction, on-site pretreatment, discharge to publicly owned treatment works (POTW) for final treatment

Capital Cost:	$1,904,000
O & M Cost:	$613,600
Present Worth Cost:	$9,518,200
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, pretreatment and discharge to the local POTW. In order to comply with POTW influent requirements, manganese would have to be removed from the groundwater. This would be accomplished by using conventional pretreatment methods for manganese removal such as the treatment train described under Alternative GW-2. The extraction/collection system and pretreatment for this alternative would also be the same as that discussed for Alternative GW-2. Therefore, only those operations that differ from previous alternatives are discussed below.

Treatment of organic contaminants would be accomplished by the Village of Sidney POTW utilizing a conventional sanitary wastewater treatment process consisting mainly of aerobic biodegradation. The facility was designed for a maximum wastewater treatment capacity of 1.7 million gallons per day (MGD), and currently operates at an average capacity of 0.6 to 0.7 MGD. Effluent from the pretreatment system would be discharged to the sanitary sewer line via a metered control manhole, which would record flow to the POTW. The nearest sanitary sewer is located parallel to Delaware Avenue,

approximately 80 feet south of the roadway.

Groundwater would have to meet pretreatment requirements prior to discharge to the POTW. The Village of Sidney Municipal Code governs sewer use within the Village and regulates the discharge of wastes into the POTW. The Village has indicated that final acceptance of the pretreated GCL wastewater would not be available until a detailed application is submitted.

As described under Alternative GW-2, due to the characteristics of creosote and the complex hydrogeological setting, it is unlikely that groundwater restoration would be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). The discussion of waiving chemical-specific ARARs for a portion of the aquifer and/or containing the groundwater contamination described for Alternative GW-2, would similarly apply for GW-3.

The remedial alternatives developed for surface-water sediments (SD) are discussed below.

Alternative SD-1: No Action

Capital Cost:	$0
O & M Cost:	$18,900 for biannual monitoring $20,000 for each five-year review
Present Worth Cost:	$277,700
Implementation Time:	6 months

The No Action alternative for the sediments at the GCL Site would consist of a long-term monitoring program. For cost-estimation purposes, it is assumed that sediments would be monitored semiannually and that eight sediment samples would be collected and analyzed.

Because this alternative does not include contaminant removal, the Site will have to be reviewed every five years for a period of 30 years per the requirements of CERCLA, as amended. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative SD-2: Excavation, treatment, and disposal with GCL-property soils

Capital Cost:	$298,400
O & M Cost:	$0
Present Worth Cost:	$298,400
Implementation Time:	12 months

The contaminated sediments would be excavated during periods of

no or low flow using conventional earth moving equipment such as backhoes, bulldozers, etc. Excavation would be performed under moistened conditions to minimize the generation of fugitive dust. Erosion and sediment control measures such as silt curtains would be provided during excavation to control migration of contaminated sediment. Adjacent wetlands would be protected by erosion and sediment control measures.

The sediments would be treated via thermal desorption along with the GCL property soils as specified in the Record of Decision dated September 30, 1994 for the Site. A typical thermal desorption process consists of a feed system, thermal processor, and gas treatment system (consisting of an afterburner and scrubber or a carbon adsorption system). Screened sediments are placed in the thermal processor feed hopper. Nitrogen or steam may be used as a transfer medium for the vaporized PAHs to minimize the potential for fire. The gas would be heated and then injected into the thermal processor which would operate at a temperature of 700°F to 1000°F. PAH contaminants of concern and moisture in the contaminated sediments would be volatilized into gases, then treated in the off-gas treatment system. Treatment options for the off-gas include burning in an afterburner (operated to ensure complete destruction of the PAHs), adsorbing contaminants onto activated carbon, or collection through condensation followed by off-site disposal. Thermal desorption achieves approximately 98 to 99 percent reduction of PAHs in soil. If an afterburner were used, the treated off-gas would be treated further in the scrubber for particulate and acid gas removal. A post-treatment sampling and analysis program would be instituted in order to ensure that contamination in the soil/sediment had been reduced to below cleanup levels. The treated sediment would be redeposited along with treated soils in excavated areas on the GCL property.

Remedial activities will be conducted in a manner to minimize impact to wetlands to the extent feasible. The excavated areas of the intermittent stream and wetlands edge would be backfilled with clean material and restored to pre-excavation conditions. A wetland restoration plan will be prepared for any wetlands impacted or disturbed. The restoration would take place as soon as practicable after the sediments have been excavated, in order to minimize the period of impact to the stream and wetland. All applicable wetlands management guidelines would be followed.

The total volume of sediments to be excavated is estimated to be 125 cy. Further delineation of the extent of contamination will be conducted during the remedial design phase.

Alternative SD-3: Excavation and off-site disposal

Capital Cost:	$820,300
O & M Cost:	$0
Present Worth Cost:	$820,300
Implementation Time:	6 months

This alternative consists of excavation of 125 cy contaminated sediment as described in Alternative SD-2 and transportation of all contaminated materials to an off-site RCRA permitted facility for treatment and disposal. One hundred twenty-five cy of clean fill would be used to restore excavated areas. Wetlands would be restored as discussed in Alternative SD-2.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in section 121 of CERCLA, 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 consisted of an assessment of the alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The following "threshold" criteria must be satisfied by any alternative in order to be eligible for selection:

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

2. Compliance with ARARs addresses whether or not a remedy would meet all of the applicable (promulgated by a State or Federal authority), or relevant and appropriate requirements (that pertain to situations sufficiently similar to those encountered at a Superfund site such that their use is well suited to the site) of State and Federal environmental statutes or provide grounds for invoking a waiver.

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

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

by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment refers to a remedial technology's expected ability to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants at the site.

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

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

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

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

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

9. Community acceptance refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Community acceptance factors to be discussed below include support, reservation, and opposition by the community.

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

Groundwater

- Overall Protection of Human Health and the Environment

Over time, Alternative GW-1 would provide some limited protection of human health and the environment since contaminants would be attenuated through natural processes (e.g., biodegradation, dispersion). However, it is unlikely that full restoration of groundwater resources would be achieved. Alternatives GW-2 and GW-3 would be protective of human health and the environment, since they would actively reduce the toxicity, mobility, and volume of contaminants in the groundwater, and would protect groundwater surrounding the GCL site from further contamination. Although GW-2 and GW-3 would result in significant reduction in the mass of contaminants present in the aquifer, it is unlikely

that full restoration of groundwater resources would be achieved within a reasonable time frame.

- Compliance with ARARs

Alternative GW-1 would not comply with Federal or State drinking water standards or criteria or those ARARs required for protection of groundwater. Alternatives GW-2 and GW-3 would be designed to treat the aquifer to chemical-specific ARARs associated with State and Federal groundwater and drinking water standards. Extracted groundwater would be treated to achieve NYSPDES requirements under Alternative GW-2; under Alternative GW-3 the extracted groundwater would be treated to local pretreatment standards prior to discharge to the POTW. Each of these alternatives would be capable of removing a significant mass of contaminants in the groundwater. The goal of these alternatives is to restore groundwater to drinking water standards. However, due to the characteristics of creosote and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of DNAPL remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable time frame.

- Long-Term Effectiveness and Permanence

Alternative GW-1 would not provide for active treatment and would rely on natural attenuation processes to restore the contaminated aquifer. Therefore, this alternative would not be an effective long-term remedy.

Alternatives GW-2 and GW-3 would reduce the potential risk associated with contaminated groundwater by extracting and treating the groundwater to remove a significant mass of contaminants from the aquifer. The time to achieve these risk reductions is limited by the effective extraction rates from the aquifer. However, it is unlikely that DNAPL contamination present in the shallow aquifer can be completely remediated due to the tendency of DNAPLs to attach to the aquifer. Although none of the alternatives would be able to clean the aquifer to drinking water standards in a short period of time, the treatment alternatives would protect surrounding groundwater from further contamination.

- Reduction in Toxicity, Mobility, or Volume Through Treatment

Alternative GW-1 would not involve any removal or active treatment of the contaminants in the aquifer; therefore, would not be effective in reducing the mobility, toxicity, or volume of

contaminants. However, over time, natural attenuation processes would provide some reduction of the toxicity and volume of contaminants.

Alternatives GW-2 and GW-3 would reduce the toxicity, mobility and volume of contaminants in the aquifer to a larger extent than GW-1, since extraction and treatment of groundwater are provided.

- Short-Term Effectiveness

The implementation of Alternative GW-1 would result in no additional risk to the community during remedial activities, since no construction or remediation activities would be conducted. Workers involved in periodic sampling of site soils would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity. For purposes of this analysis, monitoring of the Site would occur for 30 years.

Alternatives GW-2 and GW-3 involve construction and operation of an on-site treatment plant. Procedures for proper handling of the treatment reagents would be followed for all treatment alternatives. Any process residuals generated would be properly handled and disposed off-site. The risk to workers involved in the remediation also would be minimized by establishing appropriate health and safety procedures and preventive measures to avoid direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA-certified and would be instructed to follow OSHA protocols.

It is estimated that the treatment alternatives would take well over 30 years to achieve the remedial action objectives. However, a 30-year period was used for cost estimation. Operation of the treatment plant would be stopped when remedial objectives are achieved i.e., levels of contaminants in the aquifer are reduced to State and Federal drinking water standards, unless it is determined that ARARs would be waived in portions of the aquifer.

- Implementability

Alternative 1 would not involve any major site activities other than monitoring and performing five-year reviews. These activities are easily implemented.

The treatment components of Alternatives GW-2 and GW-3 would be easily implemented, as the technologies are proven and readily available. The carbon adsorption technology proposed for use in Alternative GW-2A is a proven and efficient method for removal of organic contaminants. Biological treatment, specified in Alternatives GW-2B and GW-3, has been used successfully for groundwater contaminated with creosote wastes. The manganese

removal pretreatment technology required under Alternatives GW-2 and GW-3 is proven and readily available. Sufficient space is available on-site for a treatment plant.

Alternatives GW-2 and GW-3 would require institutional management of the operation and maintenance of the treated groundwater discharge system. Off-site disposal facilities are available for the disposal of the oil/water separator sludge and skimmings generated from Alternatives GW-2 and GW-3. Disposal (or recycle) facilities are also available for recovered DNAPL and the other residues generated from those alternatives.

Alternatives GW-2A and GW-2B both provide for discharge to the small stream located at the Site's southern border. Based on the review of the treated groundwater discharge requirements for the Route 8 Landfill site and the successful operation of the groundwater remediation system at this site, discharge to the stream is expected to be readily implementable for Alternative GW-2.

The Village of Sidney expressed its interest in having the pretreated groundwater transmitted to the local POTW as described under Alternative GW-3. There is a degree of uncertainty, however, as to whether final approval would be granted which would be contingent upon factors such as available capacity, waste characteristics, and POTW permit requirements concerning effluent and sludge quality. Due to this uncertainty, this alternative is considered less implementable than Alternative GW-2.

- Cost

GW-1 is the least expensive of all alternatives but would not involve treatment. Alternative 1 has a present worth cost of $380,700 which is associated with conducting a sampling and analysis program and five-year reviews over a 30-year period.

Alternative GW-2A would be the most expensive treatment alternative followed by GW-3 and GW-2B. However, the cost differences between GW-2A, GW-2B and GW-3 would be so small as to not be significant.

- State Acceptance

The New York State has concurred with the selected remedy.

- Community Acceptance

No objections by the community were raised concerning the selected remedy. The Village of Sidney has requested that EPA select Alternative GW-3 which includes discharge of the pretreated groundwater to the local POTW. A responsiveness

summary which addresses all comments received during the public comment period is attached as Appendix IV.

Sediments

- Overall Protection of Human Health and the Environment

Alternative SD-1 would not meet any of the remedial objectives and thus would not be protective of the environment. Contaminated sediments would remain on-site and would continue to pose a risk to the biota. Natural flushing would reduce contaminants in the sediments somewhat, especially after the contaminated soils on the GCL-property are remediated.

Alternative SD-2, involving on-site sediment treatment and Alternative SD-3 involving off-site treatment/disposal of sediments, would remove contamination and eliminate any environmental threats posed by the sediments. Therefore, these alternatives would meet remedial objectives.

- Compliance with ARARs

There are no chemical-specific ARARs for the contaminated sediments. Alternative SD-1 would comply with appropriate requirements such as New York State Technical and Administrative Guidance Memoranda.

Alternatives SD-2 and SD-3 would be designed and implemented to satisfy all appropriate requirements and location-specific ARARs identified for the Site. Excavation activities would be conducted in compliance with the OSHA standards, soil erosion, sediment control and wetland protection requirements. Alternative SD-2 also would comply with ARARs related to on-site treatment (e.g., disposal of treatment residuals, stormwater discharge requirements and air pollution control regulations pertaining to fugitive emissions and air quality standards). Under Alternative SD-3, excavated sediments would be sent to an appropriate treatment/disposal facility in accordance with applicable ARARs.

- Long-Term Effectiveness

Alternative SD-1 would monitor contamination in the sediments and would not remove and/or treat contaminants. Therefore, this alternative would not reduce the long-term risks to the environment associated with the sediments.

Alternative SD-2 calls for on-site sediment treatment along the GCL-property soils. The soil treatment system would reduce the levels of PAH contaminants in sediments by 98 to 99 percent.

Alternative SD-3 would provide long-term protection by removing

the contaminated sediments which would be sent to an approved disposal facility. Soil cover and revegetation would provide protection against erosion. No long-term monitoring would be required.

- Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative SD-1 would not provide immediate reduction in toxicity, mobility, or volume of contaminants because treatment is not included as part of this alternative. Some reduction may be realized after the GCL-property soils have been remediated through natural attenuation processes.

Alternatives SD-2 and SD-3 would reduce the toxicity, mobility, and volume of contaminants by removal and on-site treatment (Alternative SD-2) or off-site disposal (Alternative SD-3).

- Short-Term Effectiveness

The implementation of Alternative SD-1 would not pose any additional risks to the community, since this alternative does not involve any construction or remediation. Workers involved in periodic sampling of sediments would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity.

Alternatives SD-2 and SD-3 include activities such as excavation, screening, shredding, and handling of contaminated sediments which could result in potential exposure of workers and residents to fugitive dust, and possible suspension of sediments. In order to minimize potential short-term impacts, the area would be secured and access would be restricted to authorized personnel only. In addition, dust control measures such as wind screens and water sprays would be used to minimize fugitive dust emissions from material handling. The risk to workers involved in the remediation would also be minimized by establishing appropriate health and safety procedures and preventive measures, (e.g., enclosed cabs on backhoes and proper personal protection equipment) to prevent direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA certified and would be instructed to follow OSHA protocols. Some increase in traffic and noise pollution would be expected from site activities. Short-term impacts may be experienced for about a six-month period which is the estimated time for construction and remedial activities.

Under Alternatives SD-2 and SD-3, short-term impacts on the environment from removal of vegetation and destruction of habitat could occur. A plan would be prepared and implemented to minimize and restore (i.e., revegetate) any damage to the environment. Erosion and sediment control measures such as silt curtains and berms would be provided during material handling

activities to control migration of contaminants.

- Implementability

Alternative SD-1 would not involve any major site activities except monitoring and sampling. These activities would be easily implementable.

Alternative SD-2 would be easily implemented, as the technology is proven and readily available. The thermal desorption component of this alternative has been shown to be effective for destruction of PAHs, and is commercially available. Sufficient land is available at the Site for operation of a mobile thermal desorption system and supporting facilities. Alternative SD-3 involves off-site disposal. Capacity for the small volume of sediment should be available at a permitted facility. Implementation of Alternatives SD-2 and SD-3 would require restriction of access to the Site during the remediation process. Coordination with state and local agencies would also be required during remediation.

- Cost

Alternative SD-1 is the less expensive alternative, but does not provide treatment of contaminated sediments. Alternative SD-1 has a present worth cost of $277,700 which is associated with conducting a sampling and analyses program and five-year reviews over a 30-year period.

Alternative SD-2 is the least expensive of the treatment alternatives and has a present worth cost of $298,000. The most expensive Alternative is SD-3 with a present worth cost of $820,300.

- State Acceptance

The New York State has concurred with the selected remedy.

- Community Acceptance

No objections from the community were raised regarding the selected surface-water sediment portion of the remedy.

SELECTED REMEDY

EPA and NYSDEC have determined, after reviewing the alternatives and public comments, that Alternatives GW-2 and SD-2 are the appropriate remedies for the Site, because they best satisfy the requirements of Section 121 of CERCLA, 42 U.S.C. §9621, and the NCP's nine evaluation criteria for remedial alternatives, 40 CFR §300.430(e)(9). The total capital costs of the groundwater portion of the remedy are $1.9 million for GW-2A and $2.1 million

for GW-2B; the operation and maintenance cost is $0.6 million a year for both GW-2A and GW-2B; the present worth cost are $9.4 million for GW-2A and $9.8 million for GW-2B. The total capital cost of the surface-water sediment portion of the remedy is $0.3 million; no long-term operation and maintenance costs are expected.

The major components of the selected remedy are as follows:

- Extraction, collection, and on-site treatment of groundwater contaminated with organic compounds; discharge of treated groundwater to the surface water. The selected remedy provides two options for primary treatment of organics: carbon adsorption or biological treatment.

  Information will be obtained during the remedial design to reassess the time frame and technical practicability of achieving State and Federal drinking water standards in the aquifer. Should the remedial design data indicate that groundwater restoration through extraction and treatment is feasible and practical, additional work will be conducted to determine which groundwater treatment option (carbon adsorption or biological treatment) is more appropriate and cost-effective. If groundwater restoration is not feasible or practical, the remedy will then focus on containing the groundwater contamination within the GCL property boundaries in which case chemical-specific ARARs may be waived for all or some portions of the aquifer based on the technical impacticability of achieving further contamination reduction within a reasonable time frame. Under such a scenario, it may be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to reduce the concentration of contaminants in the aquifer groundwater to levels which are similar to those achievable under extraction and treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system; and,

- Excavating and treating contaminated sediments on-site through a thermal desorption process along with the GCL-property soils. The selected remedy will also provide for the mitigation of damages to the aquatic environment which may occur during implementation (i.e., revegetation).

In addition, EPA will recommend to local agencies that institutional control measures be undertaken to ensure that future land use of the property continues to be industrial/commercial, and precludes the use of Site groundwater for human consumption until drinking water quality is restored in the aquifer.

Remedial Goal

The goal of the groundwater portion of the remedy is to restore groundwater to drinking water quality. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of shallow groundwater remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable time frame. If groundwater restoration is not feasible or practical, the alternative may then focus on containing the extent of groundwater contamination within the site boundaries. Restoration of the groundwater outside the DNAPL source areas (e.g., intermediate groundwater) is likely to be feasible, since it is mostly contaminated with mobile organic contaminants (e.g., benzene). The treated effluent will meet NYSPDES requirements.

During design or operation of the system, it may also be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to achieve a similar level of contaminant removal and containment as groundwater extraction and treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system. The information would also be used to reassess the time frame and technical practicability of achieving cleanup standards.

The goal of the sediment excavation and treatment is to eliminated potential threats to the aquatic environment due to the presence of elevated concentrations of organic contaminants.

STATUTORY DETERMINATIONS

As previously noted, Section 121(b)(1) of CERCLA, 42 U.S.C. §9621(b)(1), mandates that a remedial action must be protective of human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a site. Section 121(d) of CERCLA, 42 U.S.C. §9621(d), further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under State and Federal laws, unless a waiver can be justified pursuant to section 121(d)(4) of CERCLA,

42 U.S.C. §9621(d)(4). As discussed below, EPA has determined that the selected remedy meets the requirements of section 121 of CERCLA, 42 U.S.C. §9621.

Protection of Human Health and the Environment

The selected remedy is considered fully protective of human health and the environment. Extraction and treatment of groundwater through the implementation of Alternative GW-2 will reduce the toxicity, mobility, or volume of contaminants in the groundwater and result in overall protection of human health and the environment. If groundwater restoration is not feasible or practical, and the selected remedy focusses on containing the extent of groundwater contamination, the remedy will reduce the mobility of contaminants in groundwater and result in overall protection of human health and the environment. Prior to discharge, the groundwater will meet all state (e.g., NYSPDES) and/or federal discharge standards. Alternative SD-2, the excavation and treatment of the contaminated surface-water sediments through a thermal desorption process, will remove the organic contaminants from the surface-water sediments. Treatment of the surface-water sediments will result in the elimination of the ecological threats posed by these sediments.

Compliance with ARARs

The selected groundwater remedy, Alternative GW-2, may not be able to comply with associated chemical-specific ARARs for at least some portions of the aquifer (e.g., shallow aquifer) within a reasonable time frame. Therefore, it is likely that chemical specific-ARARs will be waived for those porions of the aquifer based in technical impracticability. However, the treatment system with meet other ARARs, including:

Action-Specific ARARs:

- RCRA - Land Disposal Restrictions
- RCRA - Standards Applicable to Transport of Hazardous Waste
- RCRA - Standards for Owners/Operators of Permitted Hazardous Waste Facilities
- RCRA - Preparedness and Prevention
- RCRA - Contingency Plan and Emergency Procedures
- DOT - Rules for Transportation of Hazardous Materials
- New York State Hazardous Waste Manifest System Rules
- New York State Hazardous Waste Treatment Storage and

Disposal facility Permitting Requirements

- New York State Pollutant Discharge Elimination System Requirements
- OSHA - Safety and Health Standards
- OSHA - Record-keeping, Reporting and Related Regulations

Chemical-Specific ARARs:

- New York State Groundwater Standards

Location-Specific ARARs:

- Clean Water Act - Wetland Protection

The selected surface-water sediment remedy, Alternative SD-2, will meet all ARARs, including:

Action-Specific ARARs:

- RCRA - Land Disposal Restrictions
- RCRA - Standards Applicable to Transport of Hazardous Waste
- RCRA - Standards for Owners/Operators of Permitted Hazardous Waste Facilities
- DOT - Rules for Transportation of Hazardous Materials
- New York State Hazardous Waste Manifest System Rules
- New York State Hazardous Waste Treatment Storage and Disposal facility Permitting Requirements
- New York State Pollutant Discharge Elimination System Requirements
- OSHA - Safety and Health Standards
- OSHA - Record keeping, Reporting and related Regulations
- Clean Water Act - Wetland Protection

Chemical-Specific ARARs:

- None

Location-Specific ARARs:

- Clean Water Act - Wetland Protection

A full list of ARARs and TBCs (e.g., advisories, criteria, and guidance) being utilized is provided in Table 9.

Cost-Effectiveness

The selected remedy is cost-effective in that it provides overall effectiveness proportional to its cost. The total capital costs of the groundwater portion of the remedy are $1.9 million for GW-2A and $2.1 million for GW-2B; the operation and maintenance cost is $0.6 million a year for both GW-2A and GW-2B; the present worth cost are $9.4 million for GW-2A and $9.8 million for GW-2B. The total capital cost of the surface-water sediment portion of the remedy is $0.3 million; no long-term operation and maintenance costs are expected. A breakdown of the costs associated with the selected remedy is provided in Table 10.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable. The groundwater portion of the selected remedy will reduce the toxicity, mobility, and volume of contaminants in the groundwater underlying the Site and prevent further degradation of the area groundwater. The selected remedy employs permanent treatment of the PAH-contaminated surface-water sediments on the Site through excavation, treatment and disposal with GCL-property soils. The potential for direct and indirect threats to human health and the environment will be eliminated. The selected remedy represents the best balance of trade-offs among the alternatives with respect to the evaluation criteria.

Preference for Treatment as a Principal Element

In keeping with the statutory preference for treatment as a principal element of the remedy, the remedy provides for the treatment of contaminated groundwater and surface-water sediments which constitute the remaining threats known to exist at the Site.

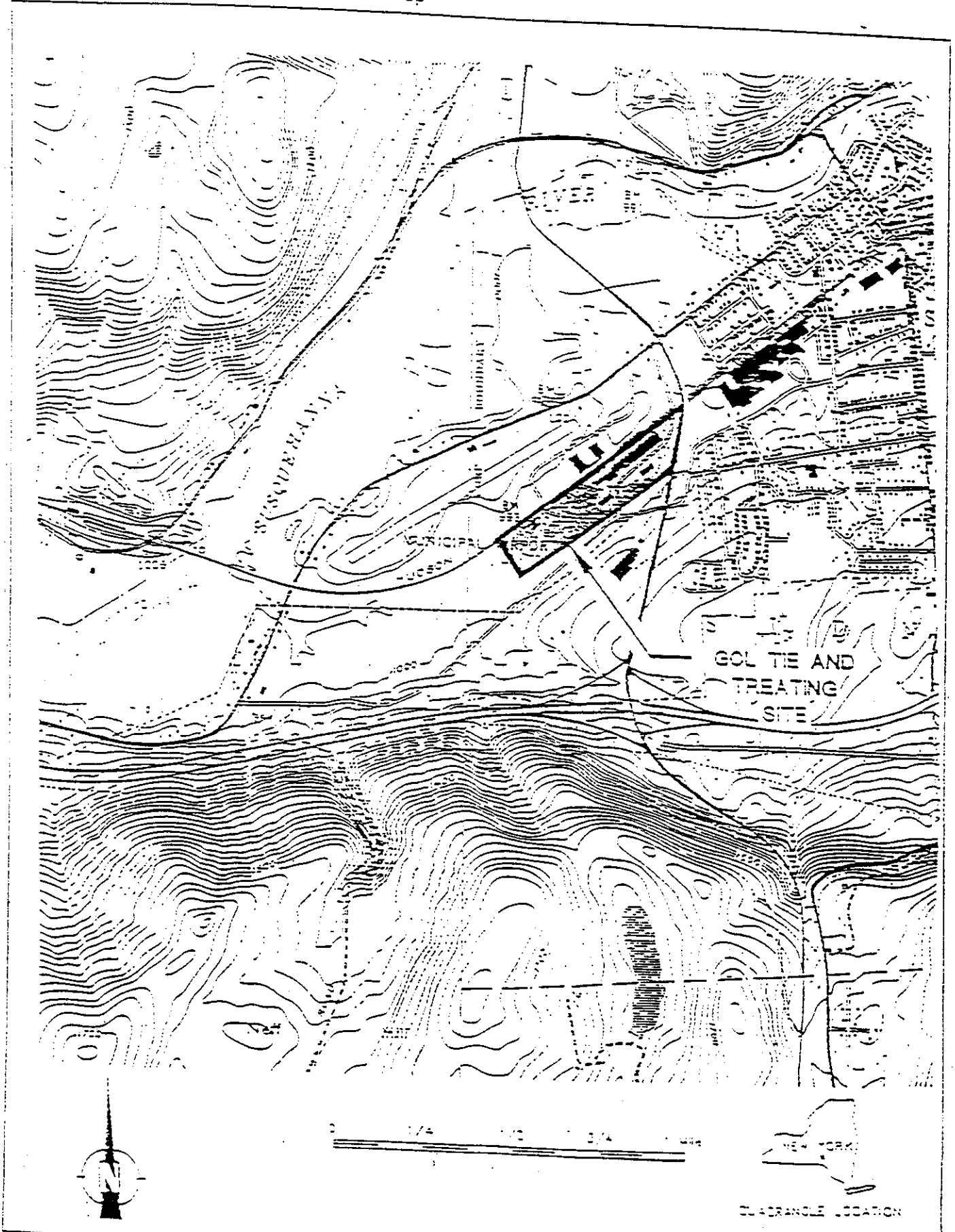
DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the Proposed Plan.

APPENDIX I

FIGURES

Figure 1. GCL Tie & Treating Site Location Map



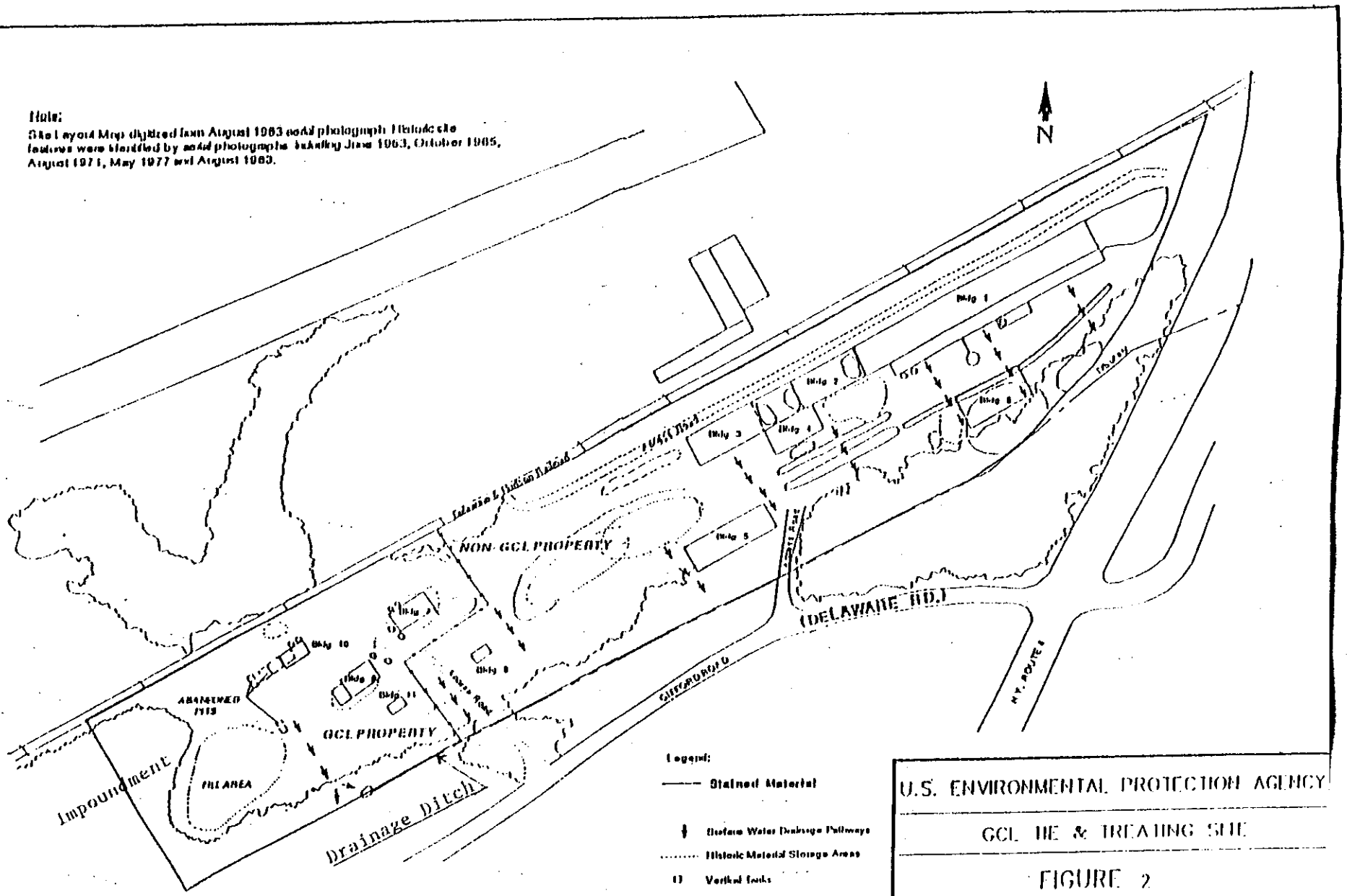

Note:
Site Layout Map digitized from August 1983 aerial photograph. Historic site features were identified by aerial photographs including June 1963, October 1965, August 1971, May 1977 and August 1983.
N
NON-GCL PROPERTY
GCL PROPERTY
ABANDONED PITS
FILL AREA
Impoundment
Drainage Ditch
DELAWARE RD.
GLEN ROCK RD.
RT. ROUTE 6
Bldg 1
Bldg 2
Bldg 3
Bldg 4
Bldg 5
Bldg 6
Bldg 7
Bldg 8
Bldg 9
Bldg 10
Bldg 11
Legend:
Stained Material
Surface Water Drainage Pathways
Historic Material Storage Areas
Vertical Tanks
0 250 500 FT.
(APPROX.)
U.S. ENVIRONMENTAL PROTECTION AGENCY
GCL TIE & TREATING SITE
FIGURE 2
HISTORICAL LAND USE
SITE LAYOUT MAP

Figure 3. . . Potential Extent of Surface-water Sediment Contamination

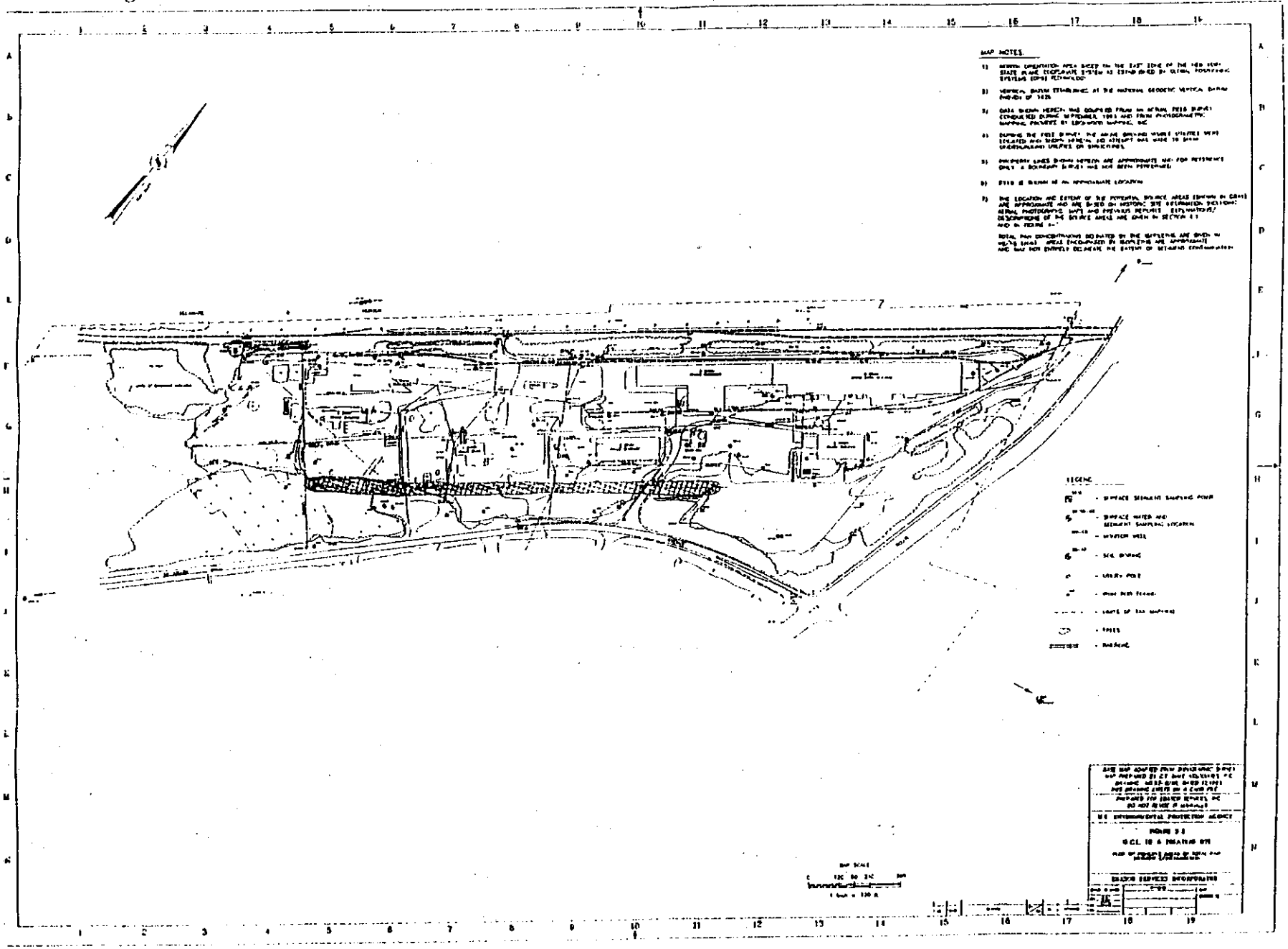
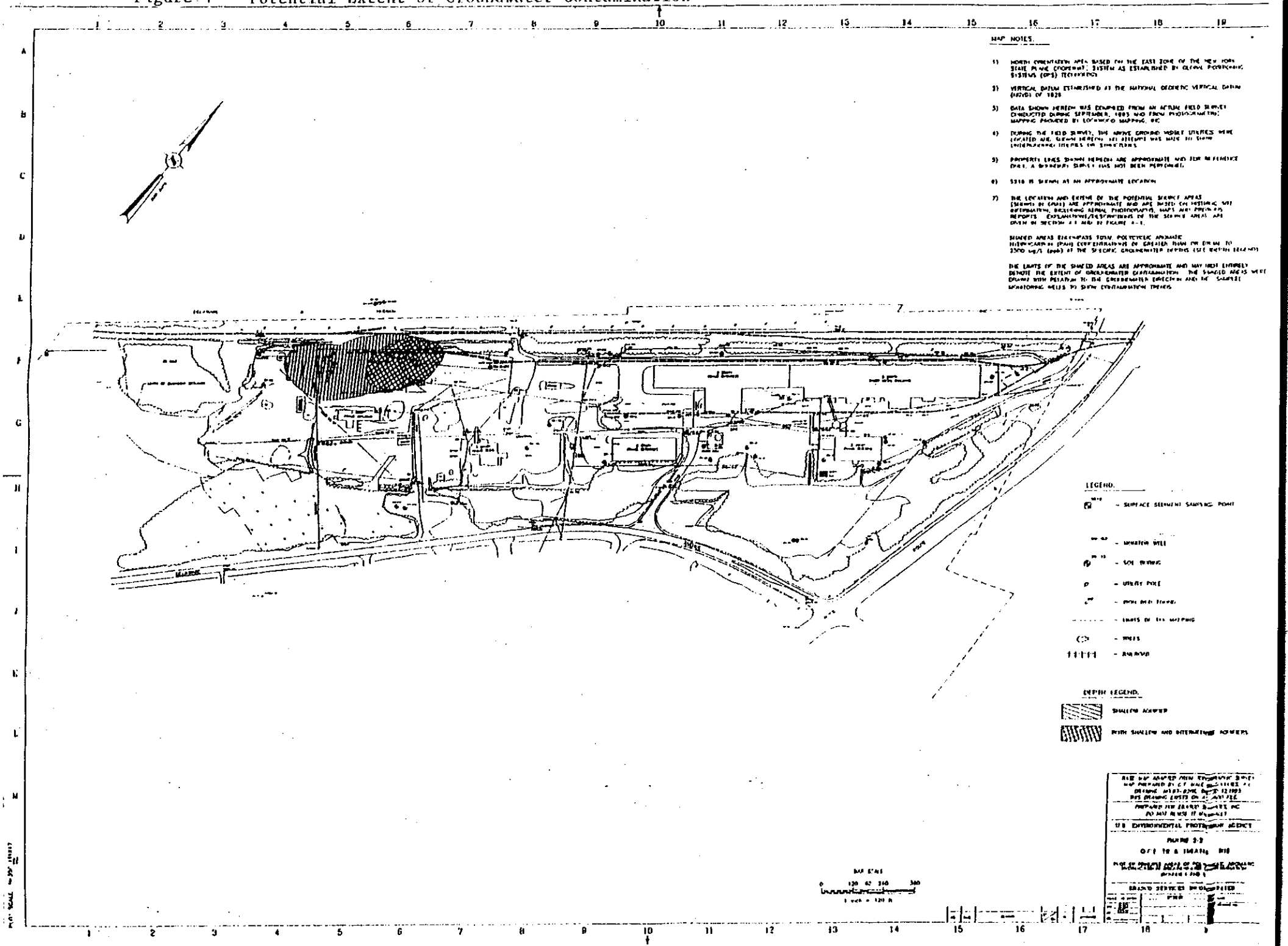


Figure 4 Potential Extent of Groundwater Contamination



APPENDIX II

TABLES

TABLE 1: SUMMARY OF NON-GCL PROPERTY SOILS ANALYTICAL RESULTS
(All values in parts per million [ppm])

CONTAMINANT	HIGHEST CONCENTRATION
Volatile Organics	
Trichloroethene	0.01
Toluene	0.024
Total Volatiles	0.042
Polyaromatic Hydrocarbons	
Fluoranthene	9.5
Pyrene	6.3
Benzo[a]anthracene	1.5
Chrysene	2.7
Benzo[b]fluoranthene	3.2
Benzo[k]fluoranthene	3.2
Benzo[a]pyrene	2.9
Total PAHs	24
Metals	
Aluminum	14,300
Arsenic	10.4
Beryllium	3.2
Cadmium	0.91
Chromium	20.8
Copper	176
Lead	46
Nickel	29.6
Zinc	78.9

Benchmark levels for comparison are NYSDEC soil cleanup objectives (VOCs only), background levels (metals only), and risk-based cleanup levels for industrial use (PAHs only, consistent with Record of Decision for Operable Unit 1).

TABLE 2: SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Arsenic	0.018	11.4
Copper	12	35.2
Manganese	Not available	8,710
Nickel	6.1	19.6
Zinc	110	116

Benchmark levels for comparison are the lower value for that contaminant from either USEPA water quality criteria or NYSDEC ambient water standards.

TABLE 3: SUMMARY OF SURFACE-WATER SEDIMENT ANALYTICAL RESULTS
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Polyaromatic Hydrocarbons		
Benzo[a]anthracene	20.8	2,200
Chrysene	20.8	4,000
Benzo[b]fluoranthene	20.8	4,300
Benzo[k]fluoranthene	20.8	3,100
Benzo[a]pyrene	20.8	1,700
Indeno[1,2,3-cd]pyrene	8.8	1,100
Total PAH	Not available	23,850
Metals		
Arsenic	5,000	16,400
Chromium	26,000	32,000
Copper	19,000	51,900
Lead	27,000	70,200
Manganese	428,000	547,000
Mercury	110	690
Nickel	22,000	43,600
Zinc	85,000	173,000

Benchmark levels for comparison are the lower value for that contaminant from either USEPA criteria for aquatic sediments (human health basis criteria) or NYSDEC sediment criteria.

TABLE 4: SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	WELLS INFLUENCED BY ROUTE 8 LANDFILL CONTAMINATION [Highest Concentration]	ALL SAMPLES EXCEPT WELLS INFLUENCED BY ROUTE 8 LANDFILL CONTAMINATION [Highest Concentration]
Volatile Organics			
Vinyl chloride	2	4,700	
Chloroethane	5	19	
Methylene chloride	5	25	
1,1-Dichloroethene	7	17	8
1,1-Dichloroethane	5	1,200	15
cis-1,2-Dichloroethene	70	4,300	36
Trichloroethene	5	1,000	48
Benzene	5	9	220
Polyaromatic Hydrocarbons			
Benzo[a]anthracene	0.1		6
Chrysene	0.2		4
Benzo[b]fluoranthene	0.2		3
Benzo[k]fluoranthene	0.2		2
Benzo[a]pyrene	0.2		2
Indeno[1,2,3-cd]pyrene	0.4		0.7
Metals			
Aluminum	50	6,210	2,230
Antimony	6	10	44.3
Arsenic	50	51.1	7.8
Chromium	100	166	40.7
Iron	50	15,400	37,600
Manganese	50	3,360	17,600
Nickel	100	131	74.2

Benchmark levels for comparison are taken from USEPA and NYSDOH drinking water MCLs. Blank spaces denote a value below analytical detection limit.

Table 5: Chemicals of Potential Concern

Groundwater

Acetone
Benzene
2-Butanone
Carbon tetrachloride*
Chlorobenzene*
Chloroform
Chloroethane*
1,2 Dichlorobenzene
1,1 Dichloroethane
1,2 Dichloroethane*
1,1-Dichloroethene
cis-1,2 Dichloroethene
trans-1,2 Dichloroethene*
Ethylbenzene
Methylene chloride*
4-Methyl-2-pentanone
Styrene
Tetrachloroethene*
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane*
Trichloroethene
Vinyl chloride
Xylenes
Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(b)flouranthene
Bis(2-ethylhexyl)phthalate
Chrysene
Fluoranthene
Fluorene
2-Methylnaphthalene*
2-Methylphenol
4-Methylphenol
Naphthalene
Phenol
Pyrene
Aldrin
Alpha BHC
beta BHC*
gamma BHC
Chlordane
DDD*
DDE
Dieldrin
Endrin
Heptachlor epoxide

Antimony
Arsenic*
Barium*
Chromium
Copper
Manganese
Nickel
Selenium
Silver
Vanadium
Zinc

Soil

Acenaphthene
Anthracene
Benzene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chrysene
DDT
Dibenz(a,h)anthracene
Ethylbenzene
Flouranthene
Fluorene
Indeno (1,2,3-cd)pyrene
Methoxychlor
4-Methylphenol
Naphthalene
PCBs
Pyrene
Styrene
Toluene
Xylenes

Surface Water

Arsenic
Barium
Chloroethane
Chromium
Copper
Manganese
Nickel
Selenium
Zinc

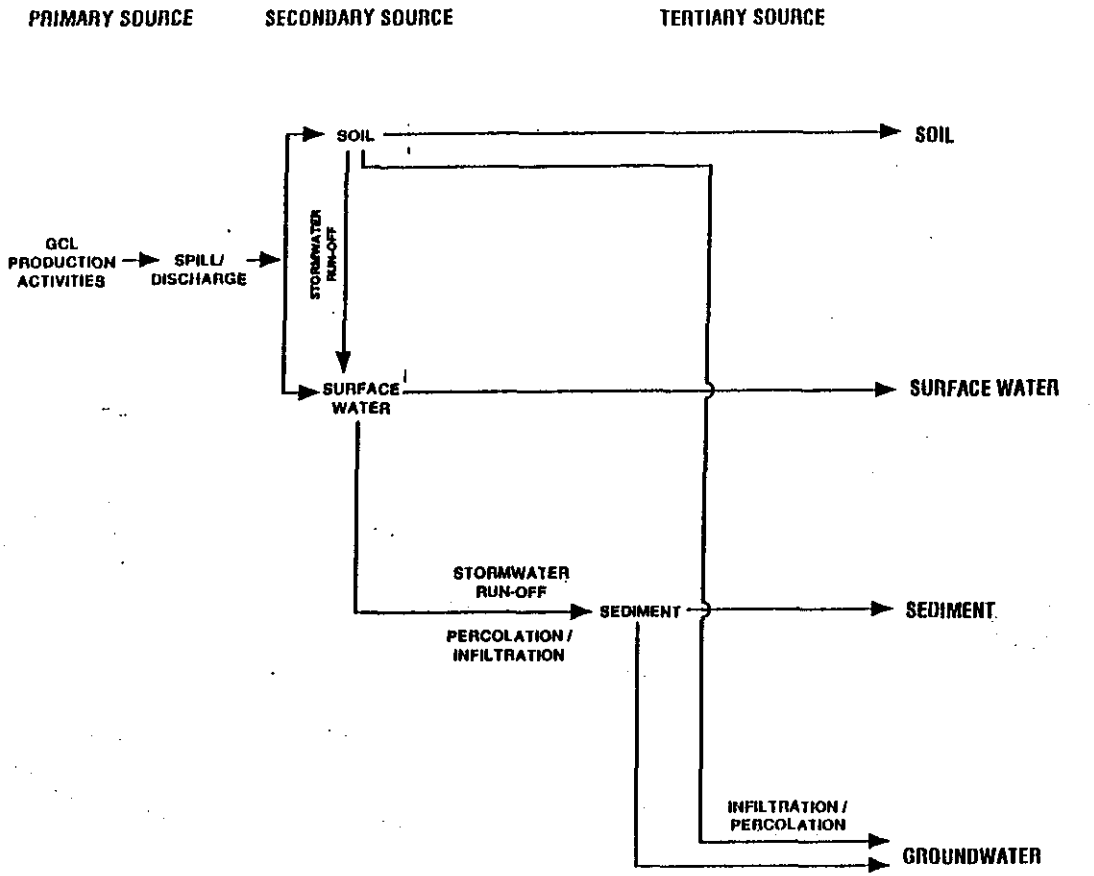
Sediment

Acenaphthene
Aldrin
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chlordane
4-Chloro-3-Methylphenol
2-Chlorophenol
Chrysene
DDT
2,4-Dinitrotoluene
Endosulfan
Fluoranthene
Indeno(1,2,3-cd)pyrene
Methylene Chloride
PCBs
Pentachlorophenol
Phenol
Pyrene

* Not a contaminant of concern when Route 8 Landfill wells are excluded.

Table 6

GCL Tie & Treating RI/FS Risk Assessment Potential Exposure Pathways



	CURRENT/FUTURE USE RECEPTORS				
	RESIDENTS		WORKERS	SITE TRESPASSERS	
	YC	A	A	OC	A
SOIL — INGESTION	●	●	●	●	●
SOIL — DERMAL	–	–	●	●	●
SOIL — INHALATION	●	●	●	●	●
SURFACE WATER — INGESTION	–	–	–	●	●
SURFACE WATER — DERMAL	–	–	–	●	●
SEDIMENT — INGESTION	–	–	–	●	●
SEDIMENT — DERMAL	–	–	–	●	●
GROUNDWATER — INGESTION	●	●	–	–	–
GROUNDWATER — DERMAL	●	●	–	–	–
GROUNDWATER — INHALATION	●	●	–	–	–

Notes:
YC – Young Children
A – Adults
OC – Older Children

EPA 2071.448/940 (6/94)

Table 7

TOXICITY DATA FOR NONCARCINOGENIC AND CARCINOGENIC RISK EVALUATION

Chemical Name		Noncarcinogen Reference Dose			Carcinogen Slope Factor				
		RfD (oral) (mg/Kg-day)	RfC Inhalation (mg/Cu.m)	RfDI (inhalation) (mg/Kg-day)	SF (Oral) (mg/Kg-day)-1	Weight of Evidence	Unit Risk (Inhalation) (ug/Cu.m)-1	SFI (Inhalation) (mg/Kg-day)-1	Weight of Evidence
Volatiles	Acetone	1.00E-01	-	-	-	D	-	-	-
	Benzene	-	-	-	2.90E-02	A	8.30E-06	2.91E-02	A
	2-Butanone	6.00E-01	1.00E+00	2.86E-01	-	D	-	-	-
	Carbon tetrachloride	7.00E-04	-	-	1.30E-01	B2	1.50E-05	5.25E-02	B2
	Chlorobenzene	2.00E-02	2.00E-02	-	-	D	-	-	-
	Chloroethane	-	1.00E+01	-	-	-	-	-	-
	Chloroform	1.00E-02	-	-	6.10E-03	B2	2.30E-05	8.05E-02	B2
	1,1 Dichloroethane	1.00E-01	5.00E-01	1.43E-01	-	C	-	-	-
	1,2 Dichloroethane	-	-	-	9.10E-02	B2	2.60E-05	9.10E-02	B2
	1,1 Dichloroethene	9.00E-03	-	-	6.00E-01	C	5.00E-05	1.75E-01	C
	cis - 1,2 - Dichloroethene	1.00E-02	-	-	-	D	-	-	-
	trans - 1,2 - Dichloroethene	2.00E-02	-	-	-	-	-	-	-
	Ethylbenzene	1.00E-01	1.00E+00	2.86E-01	-	D	-	-	-
	Methylene Chloride	6.00E-02	3.00E+00	-	7.50E-03	B2	4.70E-07	1.65E-03	B2
	4-Methyl-2-pentanone	5.00E-02	-	-	-	-	-	-	-
	Styrene	2.00E-01	1.00E+00	2.86E-01	-	-	-	-	-
	Tetrachloroethene	1.00E-02	-	-	5.20E-02	C-B2	5.80E-07	2.03E-03	C-B2
	Toluene	2.00E-01	4.00E-01	1.14E-01	-	D	-	-	-
	1,1,1 Trichloroethane	-	1.00E+00	2.86E-01	-	D	-	-	-
	1,1,2 - Trichloroethane	4.00E-03	1.00E+01	-	5.70E-02	C	1.60E-05	5.60E-02	C
	Trichloroethene	-	-	-	1.10E-02	C B2	1.70E-06	5.95E-03	C B2
	Vinyl Chloride	-	-	-	1.90E+00	A	8.40E-05	2.94E-01	A
	Xylenes	2.00E+00	-	-	-	D	-	-	-

Table 7

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Chemical Name		Noncarcinogen Reference Dose			Carcinogen Slope Factor				
		RfD (oral) (mg/Kg-day)	RfC Inhalation (mg/Cu.m)	RfDI (inhalation) (mg/Kg-day)	SF (Oral) (mg/Kg-day)-1	Weight of Evidence	Unit Risk (Inhalation) (ug/Cu.m)-1	SFI (Inhalation) (mg/Kg-day)-1	Weight of Evidence
Semi-Volatiles	Acenaphthene	6.00E-02	-	-	-	D	-	-	-
	Aniline	-	1.00E-03	-	2.60E-02	B2	-	-	-
	Anthracene	3.00E-01	-	-	-	D	-	-	-
	Benzo(a)anthracene	-	-	-	TEF-0.1	B2	-	-	-
	Benzo(a)pyrene	-	-	-	7.30E+00	B2	-	-	-
	Benzo(b)fluoranthene	-	-	-	TEF-0.1	B2	-	-	-
	Benzo(ghi)perylene	-	-	-	-	D	-	-	-
	Benzo(k)fluoranthene	-	-	-	TEF-0.01	B2	-	-	-
	Bis(2-ethylhexyl)phthalate	2.00E-02	-	-	1.40E-02	B2	-	-	-
	Butyl benzyl phthalate	2.00E-01	-	-	-	C	-	-	-
	Carbazole	-	-	-	-	-	-	-	-
	4-Chloroaniline	4.00E-03	-	-	-	-	-	-	-
	4-Chloro-3 methylphenol	-	-	-	-	-	-	-	-
	2-Chlorophenol	5.00E-03	-	-	-	-	-	-	-
	Dibenz(a,h)anthracene	-	-	-	TEF-1.0	B2	-	-	-
	Chrysene	-	-	-	TEF-0.001	B2	-	-	-
	1,2-Dichlorobenzene	9.00E-02	-	-	-	-	-	-	-
	1,4-Dichlorobenzene	-	-	-	-	-	-	-	-
	Diethyl phthalate	8.00E-01	-	-	-	D	-	-	-
	2,4-Dimethylphenol	2.00E-02	-	-	-	-	-	-	-
	Di-n-butyl phthalate	1.00E-01	-	-	-	D	-	-	-
	Di-n-octylphthalate	2.00E-02	-	-	-	-	-	-	-
	2,4-Dinitrotoluene	2.00E-03	-	-	-	-	-	-	-

Table 7

TOXICITY DATA FOR NONCARCINOGENIC AND CARCINOGENIC RISK EVALUATION

Chemical Name		Noncarcinogen Reference Dose			Carcinogen Slope Factor				
		RfD (oral) (mg/Kg-day)	RfC Inhalation (mg/Cu.m)	RfDI (inhalation) (mg/Kg-day)	SF (Oral) (mg/Kg-day)-1	Weight of Evidence -	Unit Risk (Inhalation) (ug/Cu.m)-1	SFI (Inhalation) (mg/Kg-day)-1	Weight of Evidence
	Fluorene	4.00E-02	-	-	-	D	-	-	-
	Fluoranthene	4.00E-02	-	-	-	D	-	-	-
	Indeno(123-cd)pyrene	-	-	-	TEF-0.01	B2	-	-	-
	2-Methylnaphthalene	-	-	-	-	-	-	-	-
	2-Methylphenol	5.00E-02	-	-	-	C	-	-	-
	4-Methylphenol	5.00E-03	-	-	-	C	-	-	-
	Naphthalene	4.00E-02	-	-	-	D	-	-	-
	4-Nitrophenol	-	-	-	-	-	-	-	-
	Pentachlorophenol	3.00E-02	-	-	1.20E-01	B2	-	-	-
	Phenanthrene	-	-	-	-	D	-	-	-
	Phenol	6.00E-01	-	-	-	D	-	-	-
	Pyrene	3.00E-02	-	-	-	D	-	-	-
Pesticides	Aldrin	3.00E-05	-	-	1.70E+01	B2	4.90E-03	-	B2
	alpha BHC	-	-	-	6.30E+00	B2	1.80E-03	-	B2
	beta BHC	-	-	-	1.80E+00	C	5.30E-04	-	C
	delta BHC	-	-	-	-	D	-	-	-
	gamma BHC	3.00E-04	-	-	4.50E+00	B2	-	-	-
	Chlordane	6.00E-05	-	-	1.30E+00	B2	3.70E-04	-	B2
	DDD	-	-	-	2.40E-01	B2	-	-	-
	DDE	-	-	-	3.40E-01	B2	-	-	-
	DDT	5.00E-04	-	-	3.40E-01	B2	9.75E-05	3.41E-01	B2
	Dibenzofuran	-	-	-	-	D	-	-	-
	Dieldrin	5.00E-05	-	-	1.60E+01	B2	4.60E-03	-	B2

Table 7

TOXICITY DATA FOR NONCARCINOGENIC AND CARCINOGENIC RISK EVALUATION

Chemical Name		Noncarcinogen Reference Dose			Carcinogen Slope Factor				
		RfD (oral) (mg/Kg-day)	RfC Inhalation (mg/Cu.m)	RfDI (inhalation) (mg/Kg-day)	SF (Oral) (mg/Kg-day)-1	Weight of Evidence	Unit Risk (Inhalation) (ug/Cu.m)-1	SFI (Inhalation) (mg/Kg-day)-1	Weight of Evidence
	Endosulfan	6.00E-03	-	-	-	-	-	-	-
	Endosulfan sulfate	-	-	-	-	-	-	-	-
	Endrin	3.00E-04	-	-	-	D	-	-	-
	Endrin aldehyde	-	-	-	-	-	-	-	-
	Endrin ketone	-	-	-	-	-	-	-	-
	Heptachlor	5.00E-04	-	-	4.50E+00	B2	1.30E-03	-	B2
	Heptachlor epoxide	1.30E-05	-	-	9.10E+00	B2	2.60E-03	-	B2
	Methoxychlor	5.00E-03	-	-	-	D	-	-	-
	PCBs (Aroclor 1016)	7.00E-05	-	-	7.70E+00	B2	-	-	-
Inorganics	Antimony	4.00E-04	-	-	-	-	-	-	-
	Arsenic	3.00E-04	-	-	1.75E+00*	A	4.30E-03	-	A
	Barium	7.00E-02	5.00E-04	-	-	-	-	-	-
	Beryllium	5.00E-03	-	-	4.30E+00	B2	2.40E-03	-	B2
	Chromium III	1.00E+00	-	-	-	-	-	-	-
	Chromium VI	5.00E-03	-	-	-	A	1.17E-02	-	A
	Cobalt	-	-	-	-	-	-	-	-
	Copper	3.71E-02*	-	-	-	D	-	-	-
	Lead	-	1.50E-03**	-	-	B2	-	-	-
	Manganese	5.00E-03	5.00E-05	-	-	D	-	-	-
	Mercury	3.00E-04	3.00E-04	-	-	D	-	-	-
	Nickel (Refinery Dust)	2.00E-02	-	-	-	-	2.40E-04	-	A
	Selenium	5.00E-03	-	-	-	D	-	-	-
	Silver	5.00E-03	-	-	-	D	-	-	-

100 N

TOXICITY DATA FOR NONCARCINOGENIC AND CARCINOGENIC RISK EVALUATION

Chemical Name		Noncarcinogen Reference Dose			Carcinogen Slope Factor				
		RfD (oral) (mg/Kg-day)	RfC Inhalation (mg/Cu.m)	RfDI (inhalation) (mg/Kg-day)	SF (Oral) (mg/Kg-day)-1	Weight of Evidence	Unit Risk (Inhalation) (ug/Cu.m)-1	SFI (Inhalation) (mg/Kg-day)-1	Weight of Evidence
	Thallium	-	-	-	-	-	-	-	-
	Vanadium	7.00E-03	-	-	-	-	-	-	-
	Zinc	3.00E-01	-	-	-	D	-	-	-

EPA Weight of Evidence classifications are as follows:

Group A: Human Carcinogen. Sufficient evidence from epidemiologic studies to support a casual association between exposure and cancer.
Group B1: Probable Human Carcinogen. Limited evidence of carcinogenicity in human from epidemiological studies.
Group B2: Probable Human Carcinogen. Sufficient evidence of carcinogenicity in animals. Inadequate evidence of carcinogenicity in humans.
Group C: Possible Human Carcinogen. Limited evidence of carcinogenicity in animals.
Group D: Not classified. Inadequate evidence of carcinogenicity in animals.
Note: - No data/Not available.
* For Adults Only.
** NAAQS
I RfC/RfD and Unit Risk/SF inhalation data conversion for COCs only in soil and groundwater as per HEAST.

Table 8

SITE WORKER RISK LEVELS AND HAZARD INDEX VALUES
SUMMARY ACROSS EXPOSURE PATHWAYS
PRESENT/FUTURE USE SCENARIOS

Present/Future Use Scenarios:

Exposure to non-GCL Property Soil	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
Site Worker		
1) Inhalation	8.90E-12	1.26E-09
2) Ingestion	1.40E-05	2.04E-03
3) Dermal Contact	6.88E-08	3.57E-04

Total Health Risk = Soil Inhalation + Soil Ingestion + Soil Dermal Contact

Summation Results - Site Worker:

Carcinogenic Health Effects = 1.40E-05 Noncarcinogenic Health Effects = 2.40E-03

D0, N

Table 8

OFF-SITE RESIDENT RISK LEVELS AND HAZARD INDEX VALUES
SUMMARY ACROSS EXPOSURE PATHWAYS
PRESENT/FUTURE USE SCENARIOS

Present/Future Use Scenarios:

Exposure to Non-GCL Property Soil	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
Off-Site Resident Adults		
1) Inhalation	1.49E-12	2.20E-10
2) Ingestion	3.92E-06	5.95E-04
Off-Site Resident Young Children		
1) Inhalation	2.06E-11	1.54E-09
2) Ingestion	9.16E-06	5.56E-03
Exposure to Groundwater (including R8 wells)		
Off-Site Resident Adults		
1) Inhalation	2.98E-02	4.85E-01
2) Ingestion	1.05E-01	1.17E+02
3) Dermal Contact	2.48E-03	9.95E+00
Off-Site Resident Young Children		
1) Inhalation	2.78E-02	2.27E+00
2) Ingestion	9.80E-02	5.45E-02
3) Dermal Contact	9.24E-05	1.85E+00

OFF-SITE RESIDENT RISK LEVELS AND HAZARD INDEX VALUES
SUMMARY ACROSS EXPOSURE PATHWAYS
PRESENT/FUTURE USE SCENARIOS

Exposure to Groundwater (excluding R8 wells)	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
Off-Site Resident Adults		
1) Inhalation	6.99E-05	6.17E-02
2) Ingestion	2.38E-04	1.06E+02
3) Dermal Contact	2.15E-03	1.72E+01
Off-Site Resident Young Children		
1) Inhalation	6.54E-05	2.88E-01
2) Ingestion	1.33E-04	4.94E+02
3) Dermal Contact	8.01E-05	3.21E+00

Total Health Risk = Soil Inhalation + Soil Ingestion + Groundwater Ingestion + Groundwater Inhalation + Groundwater Dermal Contact

Summation Results (including R8 wells) - Off-Site Resident Adults:

Carcinogenic Health Effects = 1.37E-01 Noncarcinogenic Health Effects = 1.27E+02

Summation Results (including R8 wells) - Off-Site Resident Children:

Carcinogenic Health Effects = 1.26E-01 Noncarcinogenic Health Effects = 5.49E+02

Summation Results (excluding R8 wells) - Off-Site Resident Adults:

Carcinogenic Health Effects = 2.46E-03 Noncarcinogenic Health Effects = 1.23E+02

Summation Results (excluding R8 wells) - Off-Site Resident Children:

Carcinogenic Health Effects = 2.88E-04 Noncarcinogenic Health Effects = 4.98E+02

Table 8

SITE TRESPASSER RISK LEVELS AND HAZARD INDEX VALUES
SUMMARY ACROSS EXPOSURE PATHWAYS
PRESENT/FUTURE USE SCENARIOS

Present/Future Use Scenarios:	Carcinogenic Risk Levels	Noncarcinogenic Hazard Index Values
Exposure to non-GCL Property Soil	Reasonable Maximum Exposure	Reasonable Maximum Exposure
Adult Trespassers		
1) Inhalation	1.20E-11	1.76E-09
2) Ingestion	3.92E-06	5.95E-04
3) Dermal Contact	3.35E-07	1.45E-03
Older Child Trespassers		
1) Inhalation	3.74E-12	2.20E-09
2) Ingestion	3.92E-06	2.38E-03
3) Dermal Contact	9.24E-08	2.00E-03
Exposure to Surface Water		
Adult Trespassers		
1) Ingestion	1.52E-05	3.18E+00
2) Dermal Contact	2.15E-06	9.32E-03
Older Child Trespassers		
1) Ingestion	3.05E-06	6.36E+00
2) Dermal Contact	4.87E-07	3.78E-03
Exposure to Sediment		
Adult Trespassers		
1) Ingestion	1.08E-05	2.70E-03
2) Dermal Contact	2.15E-06	9.32E-03

SITE TRESPASSER RISK LEVELS AND HAZARD INDEX VALUES
SUMMARY ACROSS EXPOSURE PATHWAYS
PRESENT/FUTURE USE SCENARIOS

Exposure to Sediment (Cont'd)	Carcinogenic Risk Levels Reasonable Maximum Exposure	Noncarcinogenic Hazard Index Values Reasonable Maximum Exposure
Older Child Trespassers		
1) Ingestion	8.60E-06	1.08E-02
2) Dermal Contact	5.94E-07	6.93E-06

Total Health Risk = Soil Inhalation + Soil Ingestion + Soil Dermal Contact + Surface Water Ingestion + Surface Water Dermal Contact + Sediment Ingestion + Sediment Dermal Contact

Summation Results - Adult Trespassers:

Carcinogenic Health Effects = 3.41E-05 Noncarcinogenic Health Effects = 3.19E+00

Summation Results - Older Child Trespassers:

Carcinogenic Health Effects = 1.66E-05 Noncarcinogenic Health Effects = 6.38E+00

Table 9. List of Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) for the Selected Remedy

REGULATION	STATUS	REGULATORY LEVEL	DESCRIPTION	RATIONALE
ACTION-SPECIFIC				
RCRA- Land Disposal Restrictions (40 CFR 268)	ARAR	Federal	Regulates Land Disposal of Hazardous Wastes	Off-site Disposal of Treatment Residues
RCRA- Standards Applicable to Transport of Hazardous Waste (CFR 263.11, 263.20-21 And 263.30-31)	ARAR	Federal	Regulates Transport of Hazardous Waste	Off-site Disposal of Treatment Residues
RCRA- Standards for Owners/Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10-264.18)	ARAR	Federal	Regulates Hazardous Waste Treatment, Storage or Disposal Facilities	Off-site Disposal of Treatment Residues
DOT- Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-172.558)	ARAR	Federal	Regulates Transport of Hazardous Waste	Off-site Disposal of Treatment Residues
New York State Hazardous Waste Manifest System Rules (6NYCRR 372)	ARAR	NY State	Regulates the Manifesting of Hazardous Wastes	Off-site Disposal of Treatment Residues
New York Hazardous Waste Treatment Storage and Disposal Facility Permitting Requirements (6 NYCRR 370 and 373)	ARAR	NY State	Regulates Hazardous Waste Treatment, Storage or Disposal Facilities	Off-site Disposal of Treatment Residues
OSHA- Safety and Health Standards (29 CFR 1926)	TBC	Federal	Regulates Occupational Exposure/Protection	Workers Health and Safety
OSHA- Record keeping, Reporting and related Regulations (29 CFR 1904)	TBC	Federal	Regulates Record Keeping and Reporting Requirements	Workers Health and Safety
CHEMICAL-SPECIFIC				
National Ambient Air Quality Standards (NAAQS) (40 CFR 50)	TBC	Federal	Regulates Air Emissions	Operation of Thermal Desorption System
Safe Drinking Water Act (40 CFR 141)	ARAR	Federal	Regulates Standards for Drinking Water Protection	Groundwater Treatment
New York State Air Criteria Requirements 6 NYCRR 200-212)	TBC	NY State	Regulates Air Emission Requirements	Operation of Thermal Desorption System
New York State Pollution Discharge Eliminantion System (SPDES) (6 NYCRR 750)	TBC	NY State	Regulates Discharges to Surface Waters	Groundwater Treatment
New York State Surface and Groundwater Quality Standards (6NYCRR Part 703)	ARAR	NY State	Regulates Surface and Groundwater Quality	Groundwater Treatment

REGULATION	STATUS	REGULATORY LEVEL	DESCRIPTION	RATIONALE
LOCATION-SPECIFIC				
New York State Wetland Protection Regulations (6 NYCRR 661)	ARAR	NY State	Regulates Disturbance of Freshwater Wetlands	Surface-water Sediment Remediation
New York State Floodplain Management Regulations (6 NYCRR 500)	ARAR	NY State	Regulates Disturbances to Floodplain Areas	Surface-water Sediment Remediation
National Historic Preservation Act	TBC	Federal	Regulates Protection of Historic and Cultural Resources	Surface-water Sediment Remediation
Executive Orders on Floodplain Management and Wetland Protection #11988 and 11990	TBC	Federal	Requires Assessment of Impacts to Floodplains and Wetlands	Surface-water Sediment Remediation

Table 10

Alternative GW-2A

TREATMENT OPTION 1: EXTRACTION/PHASE SEPARATION/PRETREATMENT/CARBON ADSORPTION/ DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION		ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
I.	SECURITY SYSTEM						
1.	Warning Signs	31	80	2,500	20	600	3,100
2.	Fence Completion	1,200 lf	18	21,600	8	9,600	31,200
3.	Equipment Parking and Storage Area	2,500 sy	8	20,000	4	10,000	30,000
II.	SUPPORT FACILITIES						
1.	Office Trailer	1	14,300	14,300		Included	14,300
2.	Decontamination Trailer	1	42,900	42,900		Included	42,900
III.	GROUNDWATER EXTRACTION						
1.	Trenches	1	59,400	59,400		Included	59,400
2.	Pumps	2	2,000	4,000	1,500	3,000	7,000
3.	Piping	1,000 ft.	6	6,000	15	15,000	21,000
4.	Extraction Well	1	7,000	7,000	8,000	8,000	15,000
5.	Pumps	2	1,500	3,000	2,000	4,000	7,000
6.	Piping	500 ft	6	3,000	15	7,500	10,500
7.	Hot Spot Extraction Wells	4	2,000	8,000	2,500	10,000	18,000
8.	Pumps	8	1,000	8,000	1,500	12,000	20,000
9.	Piping	1,000 lf.	6	6,000	15	15,000	21,000
IV.	COLLECTION						
1.	Collection Tank	1	5,000	5,000	3,000	3,000	8,000
2.	Pumps	2	2,000	4,000	2,000	4,000	8,000
3.	Piping	500 ft.	6	3,000	15	7,500	10,500
V.	PHASE SEPARATION	1	15,000	15,000		Included	15,000
VI.	OFF-SITE DNAPL RECYCLE/DISPOSAL						
1.	Tank	1	5,000	5,000	3,000	3,000	8,000
2.	Contractor	125 tons (30,000 gal)	1,800	225,000		Included	225,000

Alternative GW-2A
TREATMENT OPTION 1: EXTRACTION/PHASE SEPARATION/PRETREATMENT/CARBON ADSORPTION/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION		ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
VII.	CHEMICAL PRECIPITATION SYSTEM						
1.	Rapid Mix Tank	1	5,000	5,000	3,000	3,000	8,000
2.	Flocculator	1	Included in Clarifier Unit				
3.	Clarifier	1	35,000	35,000	5,000	5,000	40,000
4.	Caustic feed tank	1	1,000	1,000	300	300	1,300
5.	Caustic feed pumps	2	500	1,000	1,000	2,000	3,000
6.	Polymer feed tank	1	9,000	9,000	2,500	2,500	11,500
7.	Polymer feed pumps	2	500	1,000	1,000	2,000	3,000
8.	Acid feed tank	1	9,000	9,000	2,500	2,500	11,500
9.	Acid feed pumps	2	500	1,000	1,000	2,000	3,000
10.	Process piping	150 ft	15	2,300	50	7,500	9,800
VIII.	FILTRATION SYSTEM						
1.	Filter feed water sump	1	9,000	9,000	2,500	2,500	11,500
2.	Filter feed pumps	2	1,800	3,600	2,000	4,000	7,600
3.	Process piping	150 ft	15	2,300	50	7,500	9,800
4.	Dual media pressure filters	2	50,000	100,000	4,000	8,000	108,000
IX.	SLUDGE HANDLING SYSTEM						
1.	Sludge pumps	2	750	1,500	1,000	2,000	3,500
2.	Filter press	1	50,000	50,000	25,000	25,000	75,000
3.	Filtrate pumps	2	1,500	3,000	1,250	2,500	5,500
X.	ACTIVATED CARBON ADSORPTION SYSTEM						
1.	Activated carbon adsorber	2	10,000	20,000	5,000	10,000	30,000
2.	Treated water tank	1	5,000	5,000	3,000	3,000	8,000
3.	Treated water pumps	2	2,000	4,000	2,000	4,000	8,000
4.	Process Piping	500 ft	6	3,000	15	7,500	10,500

* All numbers are rounded to nearest hundred.

Alternative GW-2A

TREATMENT OPTION I: EXTRACTION/PHASE SEPARATION/PRETREATMENT/CARBON ADSORPTION/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
XI. TREATED WATER DISCHARGE						
1. Pipeline	1,000 ft	6	6,000	15	15,000	21,000
2. Outfall structure	LS	5,000	5,000		Included	5,000
XII. OFFICE AND CONTROL BUILDING	LS	40,000	40,000	50,000	50,000	90,000
XIII. ELECTRICALS	LS	Included in installation		100,000	100,000	100,000
XIV. INSTRUMENTATION AND CONTROLS	LS	Included in installation		60,000	60,000	60,000
XV. PROCESS WATER SUPPLY	LS	1,200	1,200	1,800	1,800	3,000
XVI. FOUNDATIONS AND PADS	LS	5,000	5,000	7,500	7,500	12,500
XVII. HEALTH AND SAFETY	LS	Included in installation		50,000	50,000	50,000
XVIII. TREATABILITY STUDY	LS	Included in installation		60,000	60,000	60,000
XIX. MOBILIZATION/DEMOBILIZATION	LS	Included in installation		50,000	50,000	50,000

Total Direct Construction Cost (TDCC)	1,394,900
Contingency @ 20% of TDCC	279,000
Engineering @ 10% of TDCC	139,500
Legal and Administrative @ 5% of TDCC	69,700
Total Construction Cost	1,883,100

* All numbers are rounded to nearest hundred.

Table 10
Alternative GW-2B
TREATMENT OPTION 3: EXTRACTION/PHASE SEPARATION/PRETREATMENT/BIOLOGICAL TREATMENT/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
I. SECURITY SYSTEM						
1. Warning Signs	31	80	2,500	20	600	3,100
2. Fence Completion	1,200 lf	18	21,600	8	9,600	31,200
3. Equipment Parking and Storage Area	2,500 sy	8	20,000	4	10,000	30,000
II. SUPPORT FACILITIES						
1. Office Trailer	1	14,300	14,300	Included		14,300
2. Decontamination Trailer	1	42,900	42,900	Included		42,900
III. GROUNDWATER EXTRACTION						
1. Trench	1	59,400	59,400	Included		59,400
2. Pumps	2	2,000	4,000	1,500	3,000	7,000
3. Piping	1,000 ft	6	6,000	15	15,000	21,000
4. Extraction Well	1	7,000	7,000	8,000	8,000	15,000
5. Pumps	2	1,500	3,000	2,000	4,000	7,000
6. Piping	500 ft	6	3,000	15	7,500	10,500
7. Hot Spot Extraction Wells	4	2,000	8,000	2,500	10,000	18,000
8. Pumps	8	1,000	8,000	1,500	12,000	20,000
9. Piping	1,000 ft	6	6,000	15	15,000	21,000
IV. COLLECTION						
1. Collection Tank	1	5,000	5,000	3,000	3,000	8,000
2. Pumps	2	2,000	4,000	2,000	4,200	8,000
3. Piping	500 ft	6	3,000	15	7,500	10,500
V. PHASE SEPARATION	1	15,000	15,000	Included		15,000

Table 10
Alternative GW-2B
TREATMENT OPTION 3: EXTRACTION/PHASE SEPARATION/PRETREATMENT/BIOLOGICAL TREATMENT/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
VI. OFF-SITE DNAPL RECYCLE/DISPOSAL						
1. Tank	1	5,000	5,000	3,000	3,000	8,000
2. Contractor	125 tons (30,000 gal)	1,800	225,000	Included		225,000
VII. CHEMICAL PRECIPITATION SYSTEM						
1. Rapid Mix Tank	1	5,000	5,000	3,000	3,000	8,000
2. Flocculator	1	Included in Clarifier Unit				
3. Clarifier	1	35,000	35,000	5,000	5,000	40,000
4. Caustic feed tank	1	1,000	1,000	300	300	1,300
5. Caustic feed pumps	2	500	1,000	1,000	2,000	3,000
6. Polymer feed tank	1	4,000	4,000	2,500	6,500	11,500
7. Polymer feed pumps	2	500	1,000	1,000	2,000	3,000
8. Acid feed tank	1	9,000	9,000	2,500	2,500	11,500
9. Acid feed pumps	2	500	1,000	1,000	2,000	3,000
10. Process piping	150 ft	15	2,300	50	7,500	9,800
VIII. FILTRATION SYSTEM						
1. Filter feed water sump	1	9,000	9,000	2,500	2,500	11,500
2. Filter feed pumps	2	1,800	3,600	2,000	4,000	7,600
3. Process piping	150 ft	15	2,300	50	7,500	9,800
4. Dual media pressure filters	2	50,000	100,000	4,000	8,000	108,000
IX. SLUDGE HANDLING SYSTEM						
1. Sludge pumps	2	750	1,500	1,000	2,000	3,500
2. Filter press	1	50,000	50,000	25,000	25,000	75,000
3. Filtrate pumps	2	1,500	3,000	1,250	2,500	5,500

Table 10
Alternative GW-2B

TREATMENT OPTION 3: EXTRACTION/PHASE SEPARATION/PRETREATMENT/BIOLOGICAL TREATMENT/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION		ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
X.	BIOLOGICAL TREATMENT						
1.	Biotreatment Unit	1	Included in installation		140,000	140,000	140,000
2.	Treated Water Tank	1	5,000	5,000	3,000	3,000	8,000
3.	Treated Water Pumps	2	2,000	4,000	2,000	4,000	8,000
4.	Process Piping	500 ft.	6	3,000	15	7,500	10,500
XI.	TREATED WATER DISCHARGE						
1.	Pipeline	1,000	6	6,000	15	15,000	21,000
2.	Outfall Structure	LS	5,000	5,000		Included	5,000
XII.	OFFICE AND CONTROL BUILDING	LS	40,000	40,000	50,000	50,000	90,000
XIII.	ELECTRICALS	LS	Included in installation		100,000	100,000	100,000
XIV.	INSTRUMENTATION AND CONTROLS	LS	Included in installation		80,000	80,000	80,000
XV.	PROCESS WATER SUPPLY	LS	1,200	1,200	1,800	1,800	3,000
XVI.	FOUNDATIONS AND PADS	LS	5,000	5,000	7,500	7,500	12,500
XVII.	TREATABILITY STUDY	LS	Included in installation		60,000	60,000	60,000

Table 10
Alternative GW-2B
TREATMENT OPTION 3: EXTRACTION/PHASE SEPARATION/PRETREATMENT/BIOLOGICAL TREATMENT/DISCHARGE TO SURFACE WATER

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION	ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
XVIII. HEALTH AND SAFETY	LS	Included in installation		50,000	50,000	50,000
XIX. MOBILIZATION/DEMOBILIZATION	LS	Included in installation		50,000	50,000	50,000

Total Direct Construction Cost (TDCC)	1,524,900
Contingency @ 20% of TDCC	305,000
Engineering @ 10% of TDCC	152,500
Legal and Administrative @ 5% of TDCC	76,200
Total Construction Cost	2,058,600

* All numbers are rounded to nearest hundred.

Table 10

ALTERNATIVE SD-2: EXCAVATION/DEWATERING/TREATMENT AND DISPOSAL WITH GCL PROPERTY SOILS

CAPITAL COST ESTIMATES (1995 DOLLARS)

FACILITY/CONSTRUCTION		ESTIMATED QUANTITIES	MATERIAL UNIT PRICE	MATERIAL COST	INSTALLATION UNIT PRICE	INSTALLATION COST	DIRECT CONSTRUCTION COST*
I.	SITE PREPARATION	Shared with GCL property soils action.					
II.	SUPPORT FACILITIES	Shared with GCL property soils action.					
III.	CLEARING AND GRUBBING	1,688 sf	Included in installation		0.15	300	300
IV.	CONTAMINATED SEDIMENT EXCAVATION	125 cy	Included in installation		25	3,100	3,100
V.	DEWATERING	125 cy	400	50,000	Included		50,000
VI.	ON-SITE THERMAL DESORPTION	125 cy	200	25,000	Included		25,000
VII.	DISPOSAL	125 cy	10	1,300	Included		1,300
VIII.	STREAM/WETLAND RESTORATION	125 cy	40	5,000	10	1,300	6,300
IX.	HEALTH AND SAFETY	LS	100,000	100,000	Included		100,000
X.	MOBILIZATION/DEMOBILIZATION	LS	35,000	35,000	Included		35,000
			Total Direct Construction Cost (TDCC)				221,000
			Contingency @ 20% TDCC				44,200
			Engineering @ 10% TDCC				22,100
			Legal and Administrative @ 5% TDCC				11,100
			Total Construction Cost				298,400

* All numbers rounded to the nearest hundred.

APPENDIX III

ADMINISTRATIVE RECORD INDEX

GCL TIE & TREATING SITE
OPERABLE UNIT TWO
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

3.0 REMEDIAL INVESTIGATION

3.4 Remedial Investigation Reports

P. 300001-300936 Report: Final Remedial Investigation Report, GCL Tie & Treating Site, Sidney, New York, Volume I of II, prepared by Mr. Howard Lazarus, P.E., Site Manager, Ebasco Services Incorporated, January 1995.

P. 300937-300959 Report: Final Remedial Investigation Report, GCL Tie & Treating Site, Sidney, New York, Volume II of II, prepared by Mr. Howard Lazarus, P.E., Site Manager, Ebasco Services Incorporated, January 1995.

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. 400001-400511 Report: Final Feasibility Study Report, GCL Tie & Treating Site, Sidney, New York, prepared by Mr. Howard Lazarus, P.E., Site Manager, Ebasco Services Incorporated, January 1995.

APPENDIX IV

STATE LETTER OF CONCURRENCE

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To Cathleen Ramos	From Mike O'Toole
Co. EPA	Co. DEC
Dept.	Phone # 518 457 5861
Fax # 212 637-3966	Fax # 518 485 8404

New York State Department of Environme
50 Wolf Road, Albany, New York 12233-7010

Commissioner

MAR 30 1995

Ms. Kathleen C. Callahan
Director
Emergency & Remedial Response Division
United States Environmental Protection Agency
Region II
290 Broadway, 19th Floor
New York, NY 10007-1866

Dear Ms. Callahan:

Re: GCL Tie & Treating Site ID # 413011
Draft Record of Decision, Operable Unit 2

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the draft Record of Decision (ROD) for the GCL Tie & Treating site, Operable Unit 2, remediation of contaminated groundwater and sediments, and in particular the selection of Alternatives GW-2 and SD-2. These alternatives will incorporate the following:

SD-2, Sediment excavation, treatment, and disposal with GCL property soils.

1. Thermal desorption of 125 cubic yards of contaminated sediment on the GCL-property and non-GCL property portions (Operable Unit 2) of the site;

2. Post-treatment sampling and analysis to ensure attainment of established cleanup levels;

3. Deposition of treated soils into areas excavated during the clean up of O.U. 1, grading to restore drainage pathways, backfilling with clean material, seeding to establish vegetation cover, general restoration to pre-excavation conditions;

4. Remedial design in concert with Operable Unit 1 to determine: plans, operating specifications, and performance parameters (including pilot studies) for the on-site thermal desorption system; engineering controls and mitigation options for emissions, dusts, runoff, and other residual wastes generated during the remedial action; off-site disposal options for untreatable residues; sampling and analytical protocols; grading and vegetation plans; and site security and access.

GW-2, Groundwater extraction and treatment.

1. Groundwater and DNAPL extraction through a combination of collection trenches and extraction wells;

2. On-site treatment to ARAR levels;

3. Remedial design to include: plume and DNAPL area delineation; investigation of current aquifer conditions and hydrologic parameters; evaluation of additional groundwater treatment alternatives; plans, operating specifications, and performance parameters for on-site groundwater treatment; engineering controls and mitigation options for discharges and other residual wastes generated during the remedial action; off-site disposal options for untreatable residues; sampling and analytical protocols; and maintenance, site security and access.

The NYSDEC and NYSDOH concur with the selected remedies for Operable Unit 2. Our concurrence is conditioned on the completion of a Remedial Design which further evaluates the feasibility and practicability of groundwater treatment. It is understood that the results of the additional investigations of the plume and DNAPL areas will be used to develop a detailed evaluation of the actual scope of the groundwater remedial program. Alternatives to the full scale program outlined in the ROD might include enhanced bioremediation or DNAPL removal only, alternatives which would represent significant capital and O&M cost savings and yet be equally protective. The operation and maintenance (subject to the 90%/10% federal/State split) of any system will be the responsibility of USEPA for a period of ten (10) years.

It is also understood that EPA may seek technology-based chemical-specific waivers of ARARs for the DNAPL areas of the site if it is determined from the Remedial Design or through operation of a groundwater treatment system that contaminant reductions to standards are not feasible or cannot be achieved within a reasonable time frame. The NYSDEC reserves concurrence on this issue.

If you have any questions, please contact Walter E. Demick, P.E. at (518) 457-5637.

Sincerely,

Michael J. O'Toole, Jr.
Director
Div. of Hazardous Waste Remediation

APPENDIX V

RESPONSIVENESS SUMMARY

APPENDIX V

RESPONSIVENESS SUMMARY

GCL TIE & TREATING SUPERFUND SITE

INTRODUCTION

A responsiveness summary is required by the Superfund legislation. It provides a summary of citizens' comments and concerns received during the public comment period, and the United States Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation's (NYSDEC's) responses to those comments and concerns. All comments summarized in this document have been considered in EPA and NYSDEC's final decision for selection of a remedial alternative for the GCL Tie & Treating site.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

Community involvement at the site has been moderate. EPA has served as the lead Agency for community relations and remedial activities at the site. EPA initiated its community relations activities on August 19, 1993 with the conduct of community interviews with local officials and residents. Public meetings were held on August 19, 1993 and August 5, 1994 to discuss planned site activities and seek comments on the preferred remedy for contaminated soils (Operable Unit 1), respectively.

The remedial investigation and feasibility study (RI/FS) reports and the Proposed Plan for Operable Unit 2 of the site were released to the public for comment on March 1, 1995. These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, New York City, and in the information repository at the Sidney Memorial Library, Main Street, Sidney, New York. The notice of availability for the above-referenced documents was published in the Oneonta Daily Star on March 1, 1995. The public comment period on these documents was held from March 1, 1995 to March 30, 1995.

On March 8, 1995, EPA conducted a public meeting at the Civic Center in Sidney, New York to discuss remedial alternatives for the second operable unit of site remediation, namely, contaminated groundwater and surface-water sediments, to present EPA's preferred remedial alternative, and to provide an opportunity for the interested parties to present oral comments and questions to EPA.

Attached to the Responsiveness Summary are the following Appendices:

Appendix A - Proposed Plan

Superfund Proposed Plan

GCL TIE & TREATING SITE

Operable Unit 2

Town of Sidney
Delaware County, New York

EPA
Region 2

February 1995

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated groundwater and surface-water sediments located at the GCL Tie & Treating site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the 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 Section 300.430(f) of the National Contingency Plan (NCP). The remedial alternatives summarized here are described in the remedial investigation and feasibility study (RI/FS) reports which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the RI/FS reports to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

The remedy described in this Proposed Plan is the preferred remedy for contaminated groundwater and surface-water sediments at 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. We are soliciting public comment on all of the alternatives considered in the detailed analysis section of the FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS reports, Proposed Plan, and supporting documentation have been made available to the public for a public comment period which begins on March 1st and ends on March 30th, 1995.

Dates to remember:
MARK YOUR CALENDAR

March 1st to March 30th, 1995
Public comment period on RI/FS reports, Proposed Plan, and remedies considered

March 8th, 1995
Public meeting at the Civic Center, 21 Liberty Street, Sidney, NY

A public meeting will be held during the public comment period at the Sidney Civic Center on March 8, 1995 at 7:00 p.m. to present the conclusions of the FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

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

All written comments should be addressed to:

Carlos R. Ramos, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866

Copies of the Remedial Investigation and Feasibility Study Reports dated January 1995, Proposed Plan, and supporting documentation are available at the following repositories:

Sidney Memorial Library
Main Street
Sidney, NY
Telephone: (607) 563-8021

and

U.S. Environmental Protection Agency
Emergency and Remedial Response Division
Superfund Records Center
290 Broadway, 18th Floor
New York, N.Y. 10007-1866

[After March 1, 1995]

SITE BACKGROUND

The GCL Tie and Treating site occupies approximately 60 acres in an industrial/commercial area of Delaware County, New York (see Figure 1). According to an analysis of historical photographs conducted by EPA and accounts by local residents, wood-preserving activities at the site date as far back as the 1940's.

The site is bordered on the north by a railroad line. A warehouse and a municipal airport are located to the north of the railroad line. Route 8 and Delaware Avenue delineate the eastern and southern borders of the site, respectively. A drainage ditch (Unalam Tributary) and woodland area lie between Delaware Avenue and the site. The western portion of the property abuts a small impoundment and wetlands area. The site eventually drains via overland flow to the Susquehanna River, which is located within one mile of the site.

The site includes two major areas, generally referred as the "GCL property" and "non-GCL property". The 26-acre GCL property housed a wood-treating facility called GCL Tie & Treating, and includes four structures. The primary building housed the wood pressure treatment operations including two treatment vessels (50 feet in length by 7 feet in diameter), an office, and a small laboratory. Wood (mostly railroad ties) and creosote were introduced into the vessels which were subsequently pressurized in order to treat the wood. The remaining three structures housed a sawmill and storage space. The non-GCL portion of the site includes two active light manufacturing companies (which did not conduct wood treatment operations) located on a parcel of land adjacent to the GCL property.

Approximately 1,100 people are employed in a nearby industrial area. About 5,000 people live within 2 miles of the site and depend on groundwater as their potable water supply. The nearest residential well is within 0.5 mile of the site. Two municipal wells, supplying the Village of Sidney, are located within 1.25 miles of the site. A shopping plaza consisting of fast-food restaurants and several stores is located approximately 300 feet south of the site. Other facilities (i.e., a hospital, public schools, senior citizen housing, and child care centers) are located within 2 miles of the site.

The site first came to the attention of the NYSDEC in 1986, after one of the pressure vessels used at the GCL facility malfunctioned, causing a release of an estimated 30,000-gallons of creosote. GCL representatives excavated the contaminated surface soil and placed it in a mound; no further action was undertaken at the time.

In September 1990, NYSDEC requested EPA to conduct a removal assessment at the site. Consequently, EPA conducted sampling of the GCL Tie and Treating facility in December 1989, October 1990, and August 1990. As a result of the data and information that were obtained as part of the assessment, a Removal Action was initiated by EPA in March 1991.

Activities conducted as part of the removal effort included: site stabilization (e.g., run-off and dust control), delineation of surface contamination, installation of a chain-link fence, identification and disposal of containerized (e.g., tanks, drums) and uncontainerized hazardous wastes (e.g., wastes in sumps); preparation of approximately 6,000 cubic yards (cy) of contaminated soil and wood debris for disposal; and a pilot study to determine the effectiveness of composting for bioremediation of creosote-contaminated soils.

The site was proposed for inclusion on the National Priorities List (NPL) in February 1994 and was added to the NPL in May 1994. In September 1994, EPA signed a Record of Decision for the first operable unit which called for the excavation and on-site treatment of approximately 36,100 cubic yards of contaminated soil and debris by a thermal desorption process.

EPA has been conducting a search for potentially responsible parties (PRPs). If EPA determines that there are one or more viable PRPs, EPA will take appropriate enforcement actions to recover its response costs pursuant section 107(a) of CERCLA, 24 U.S.C. § 2907(A). To date, only one PRP has been identified and notified of his potential liability under CERCLA; however, this PRP was not considered to be a viable candidate to undertake the necessary response actions.

SCOPE AND ROLE OF ACTION

The GCL Tie & Treating site was selected as a pilot project for the Superfund Accelerated Cleanup Model (SACM) initiative. The purpose of SACM is to make Superfund cleanups more timely and efficient. Under this pilot, activities which would normally have been performed sequentially (e.g., site assessment, NPL placement, removal assessment) were performed concurrently. In June 1993, while attempting to determine if the site would score high enough for inclusion on the NPL, EPA initiated RI/FS activities to delineate further the nature and extent of contamination at the site. These activities would not typically have been initiated until after the site had been proposed to the NPL.

Site remediation activities are sometimes segregated into different phases, or operable units, so that remediation of different environmental media or areas of a site can proceed separately, resulting in an expeditious remediation of the entire site. EPA has designated two operable units for the GCL Tie & Treating site as described below.

- Operable unit 1 addresses the remediation of contaminated soils found on the GCL-property portion of the site. This unit is currently in the remedial design phase.

- Operable unit 2 addresses the contamination in the soils on the remainder of the site (non-GCL property), and in the groundwater, surface water, and surface-water sediments. This is the final operable unit planned for this site and the focus of this Proposed Plan.

REMEDIAL INVESTIGATION SUMMARY

The nature and extent of contamination found at the GCL site was assessed through a comprehensive sampling of soil, groundwater, surface water, and surface-water sediment. Sampling was conducted during the Fall/Winter of 1993. The investigation focussed on contaminants typically associated with the creosote wood-preserving process. Creosote contaminants typically found included numerous polyaromatic hydrocarbons (PAHs) such as benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo [k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-c,d] pyrene and dibenzo[a,h]anthracene.

The following paragraphs discuss the characterization of contamination in the operable unit 2 study area, namely, in the non-GCL property soils, groundwater, surface water, and surface-water sediments.

Soils

Soil samples were collected from monitoring wells and soil borings drilled on the GCL property and on the non-GCL property. Samples were also collected at off-site locations to provide information on background conditions. Table 1 summarizes the analytical results for the soil sampling for the non-GCL property. In general, relatively low levels of contaminants were detected with total PAHs ranging up to 24 parts per million (ppm). Generally, the concentrations of metals detected on-site were not significantly above background concentration ranges with the exception of beryllium (up to 3.2 ppm), copper (up

to 176 ppm) and lead (up to 46 ppm), which were above their representative background concentrations of 0.6 ppm, 26.2 ppm and 11.2 ppm, respectively.

Table 1. Summary of Non-GCL Property Soils Analytical Results
(All values in parts per million [ppm])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Volatile Organics		
Trichloroethene	0.7	0.01
Toluene	1.5	0.024
Total Volatiles	10	0.042
Polyaromatic Hydrocarbons		
Fluoranthene	50	9.5
Pyrene	50	6.3
Benzo[a]anthracene	78	1.5
Chrysene	7,840	2.7
Benzo[b]fluoranthene	678	3.2
Benzo[k]fluoranthene	78	3.2
Benzo[a]pyrene	8	2.9
Total PAHs	500	24
Metals		
Aluminum	11,300	14,300
Arsenic	8.5	10.4
Beryllium	0.6	3.2
Cadmium	1.0	0.91
Chromium	16.2	20.8
Copper	26.2	176
Lead	11.2	46
Nickel	24.4	29.6
Zinc	57.0	78.9

Benchmark levels for comparison are NYSDEC soil cleanup objectives (VOCs only), background levels (metals only), and risk-based cleanup levels for industrial use (PAHs only, consistent with Record of Decision for operable unit 1).

Surface Water and Surface-Water Sediments

Surface water samples and sediments were collected along the Unalam tributary and the impoundment. Tables 2 and 3 summarize the analytical results.

Table 2. Summary of Surface Water Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Arsenic	0.018	11.4
Copper	12	35.2
Manganese	Not available	8,710
Nickel	6.1	19.6
Zinc	110	116

Benchmark levels for comparison are the low value for that contaminant from either USEPA water quality criteria or NYSDEC ambient water standards.

Table 3. Summary of Surface-Water Sediment Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Polyaromatic Hydrocarbons		
Benzo[a]anthracene	20.8	2,200
Chrysene	20.8	4,000
Benzo[b]fluoranthene	20.8	4,300
Benzo[k]fluoranthene	20.8	3,100
Benzo[a]pyrene	20.8	1,700
Indeno[1,2,3-cd]pyrene	8.8	1,100
Total PAH	Not available	23,850
Metals		
Arsenic	5,000	16,400
Chromium	26,000	32,000
Copper	19,000	51,900
Lead	27,000	70,200
Manganese	428,000	547,000
Mercury	110	690
Nickel	22,000	43,600
Zinc	85,000	173,000

Benchmark levels for comparison are the low value for that contaminant from either USEPA criteria for aquatic sediments (human health basis criteria) or NYSDEC sediment criteria.

Of the 14 inorganics detected in the surface water samples, only arsenic (up to 11.4 (parts per billion) ppb) and copper (up to 35.2 ppb)

significantly exceeded state or federal ambient water quality standards. Elevated PAH concentrations were detected at 3 of the 7 sediment sampling locations. PAHs were detected in these areas with total concentrations ranging up to 23,850 ppb. The PAH contamination detected in the sediments is most likely attributed to runoff from the site soils. Lead, chromium, and mercury were detected in concentrations above background levels which could be attributed to regional background variations or from off-site sources, as these contaminants are not typically associated with the wood-preserving operations conducted at the site. The results of the sediment sampling indicate that unconsolidated sediments along the Unalam tributary and the impoundment along the western side of the site contain elevated levels of PAHs. The extent of contamination is approximately 2,850 feet in length, 1.5 feet in width and 0.5 feet in depth in the tributary, as well as a 5-foot wide strip along the edge of the impoundment.

Groundwater

Site-specific geology within the GCL property is characterized by a layer of fill approximately 5 feet thick in the western portion of the site which gradually decreases to approximately 2 to 3 feet in the eastern section of the GCL property. The fill consists predominantly of silt and clay with significant amounts of wood and assorted debris on the GCL property. The fill is underlain by silt and clay type soils.

There are two hydrogeologic systems consisting of the overburden and bedrock units. The overburden unit can be further divided into shallow (approx. 5 to 16 feet in depth) and intermediate (approx. 11 to 25 feet in depth) groundwater zones. Groundwater is first encountered at depths ranging from 5 to 8 feet below grade around the site. As a general rule, groundwater flow in the overburden aquifer appears to be in a north-northwesterly direction; groundwater movement in the bedrock appears to be in a northerly direction. Permeability of the overburden and bedrock soils is relatively low; groundwater flow through the bedrock aquifer occurs primarily through fractures.

Six previously existing groundwater monitoring wells and 14 newly installed wells were sampled during the RI. Samples were collected during two separate rounds of sampling, and analyzed for a full range of organic and inorganic constituents. Table 4 summarizes the analytical results. Two main groups of organic compounds were found in the groundwater above drinking water standards, namely, volatile organic compounds (VOCs) and PAHs. PAHs, including benzo[b]fluoranthene (up to 3 ppb), benzo[a]pyrene (up to 2 ppb), chrysene (up to 4 ppb) and benzene (220 ppb) significantly exceeded drinking water standards, and are the same type of contaminants as those found in high concentrations in the site soils. Chlorinated VOCs such as vinyl chloride (up to 4,700 ppb), 1,1-Dichloroethane (up to 1,200 ppb), cis-1,2-dichloroethene (up to 4,300 ppb), and trichloroethene (up to 1,000 ppb) were also found at concentrations exceeding drinking water standards, however, they are most likely not related to the activities that took place at the GCL site. It is likely that the chlorinated VOCs originated from the former Route 8 Landfill, located across from Delaware Avenue and hydraulically upgradient from the GCL site. The data obtained during the RI suggest that the contaminant plume originating at the Route 8 Landfill extends beneath much of the GCL site. Currently, the Route 8 site is being remediated under the New York State hazardous waste remediation program; a groundwater collection and treatment system designed to address the groundwater contamination was constructed and recently started operation.

Aluminum (up to 6,210 ppb), iron (up to 37,600 ppb), manganese (up to 17,300), antimony (up to 44.3 ppb), chromium (up to 166 ppb), and nickel (up to 131 ppb) were detected in groundwater samples in concentrations significantly above drinking water standards. However, the presence of most of these metals at elevated concentrations in background and off-site wells is potentially indicative of background levels and/or off-site sources.

It is estimated that the GCL contaminant plume extends over an area of approximately 173,500 square feet with a thickness of approximately 45 feet. The volume of water which exceeds drinking water standards is estimated at 10 million gallons.

During the RI, a creosote product layer (referred

as dense nonaqueous phase liquid [DNAPL]) wasdiscovered in the shallow groundwater, in a localized area near the wood treatment/process buildings. The DNAPL appears to be perched on many thin soil layers rather than in a single well-defined pool. It is estimated that the DNAPL layer ranged from 1 to 2 feet in thickness, and contained concentrations of PAHs in excess of 8,000 ppm. The volume of the DNAPL layer is estimated at 10,000 to 30,000 gallons. The data suggest that the DNAPL layer is contained within the property boundaries. DNAPLs are heavier than water, and have a tendency to sink. PAH compounds, which are the principal components of creosote, are extremely immobile and tend to sorb to the aquifer rather than move with the groundwater. DNAPLs constitute a highly significant source of soil and groundwater contamination at the site.

SUMMARY OF SITE RISK

Based upon the results of the investigations, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site, if no remedial action were taken.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *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 well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The baseline risk assessment began with selecting contaminants of concern which would be representative of site risks. These contaminants are summarized in Table 5, and include several contaminants which are known to cause cancer in laboratory animals and are suspected to be human carcinogens. In addition, since the current land use of the property is industrial, and based on input from the community and local officials, it was assumed that future land uses of the property would continue to be industrial.

The baseline risk assessment evaluated the health effects which could result from exposure to contamination as a result of:

- Ingestion and inhalation of soil by young children and adult residents living off-site;

- Ingestion, inhalation and dermal contact with soil by older children and adults trespassing on the site;

- Ingestion and dermal contact with surface water and sediments by older children and adults trespassing on the site;

- Ingestion, inhalation and dermal contact with groundwater by children and adults living in the vicinity of the site in the future; and

- Ingestion, inhalation and dermal contact with soil by on-site workers.

Current federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6} (e.g., a one-in-ten-thousand to a one-in-a-million excess cancer risk) and a maximum health Hazard Index (which reflects noncarcinogenic effects for a human receptor) equal to 1.0. A Hazard Index greater than 1.0 indicates a potential for noncarcinogenic health effects.

The results of the baseline risk assessment indicate that of all pathway scenarios evaluated, only one, future consumption of groundwater, poses a potential health threat. Although site groundwater is not currently being used for human consumption, under a hypothetical future use scenario, children and adults consuming contaminated groundwater in the vicinity of the site would be at risk. The total potential

Table 4. Summary of Groundwater Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	GCL PROPERTY HIGHEST CONCENTRATION	NON-GCL PROPERTY HIGHEST CONCENTRATION	OFF-SITE HIGHEST CONCENTRATION
Volatile Organics				
Vinyl chloride	2		4,700	
Chloroethane	5		19	
Methylene chloride	5		25	
1,1-Dichloroethene	7	8	17	6
1,1-Dichloroethane	5	15	1,200	13
cis-1,2-Dichloroethene	70	36	4,300	29
Trichloroethene	5	48	1,000	30
Benzene	5	220	9	
Polyaromatic Hydrocarbons				
Benzo[a]anthracene	0.1	6		
Chrysene	0.2	4		
Benzo[b]fluoranthene	0.2	3		
Benzo[k]fluoranthene	0.2	2		
Benzo[a]pyrene	0.2	2		
Indeno[1,2,3-cd]pyrene	0.4	0.7		
Metals				
Aluminum	50	2,230	6,210	827
Antimony	6	44.3	10	
Arsenic	50	7.8	51.1	6.4
Chromium	100	40.7	166	17.2
Iron	50	37,600	15,400	1,220
Manganese	50	17,600	3,360	519
Nickel	100	74.2	131	35.2

Benchmark levels for comparison are taken from USEPA and NYSDOH drinking water MCLs. Blank spaces denote a value below analytical detection limit.

carcinogenic health risk due to ingestion, inhalation and dermal contact with contaminated groundwater (from site related and upgradient contaminant sources) by future children and adult residents is 1.3×10^{-1}. For site-related groundwater contamination only, the total potential carcinogenic health risk is 7.1×10^{-4}. These risk numbers mean that approximately one person out of ten and one person out of ten-thousand respectively, would be at risk of developing cancer, if the site were not remediated. The total potential carcinogenic health risks (via exposure to surface water, sediments, and soils) to the other potential receptors were within EPA's acceptable range and varied from 10^{-5} to 10^{-12}. The HI is less than 1.0 for all receptors, except for exposure to groundwater under the future use scenario (up to HI=387) and exposure to surface water under current and future uses (up to HI=6).

Ecological Risk Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *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. *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. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with evaluating the contaminants associated with the site in conjunction with the site-specific biological species/habitat information. Principal ecological communities at the site consist of a deciduous wetland area within the southern portion of the site (Unalam tributary), and an emergent wetland/open water complex (impoundment) to the west of the site (see Figure 1). The wetland areas support a wide array of animal species, including 5 mammal species, 3 frog species, and 17 bird species.

This risk assessment evaluated the site ecological communities and their responses to toxicological exposures. The threat of lethal accumulations of contaminants in plant and animal populations was evaluated. The results of the ecological risk assessment indicate the potential for ecological impacts due to the presence of PAH contamination in the surface water and sediments of the Unalam Tributary, drainage ditches, wetlands and pond. The invertebrate and plant communities present at the site appear to bioconcentrate PAHs. Since both aquatic plants and invertebrates form a portion of the diets of wading birds and waterfowl, their diet poses a potential exposure route. Although adult mallard ducks subjected to dietary exposure of levels similar to those found on site displayed no toxic effects, studies have shown significant mortality and deformities in mallard embryos and ducklings following exposure to similar levels of PAHs. Therefore, ingestion by breeding adult waterfowl may affect nesting success on the wetland habitats present on and adjacent to the site.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare or the environment.

REMEDIAL ACTION OBJECTIVES

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

Organic contamination has been detected at the site at concentrations above levels determined to be protective of human health and the environment in groundwater and sediments, respectively. Therefore, the following remedial action objectives have been established for the contaminated soil:

- Prevent public and biotic exposure to contaminant sources that present a significant threat (contaminated groundwater and surface-water sediments); and,

- Reduce the concentrations of contaminants in the groundwater to levels which are protective of human health and the environment (e.g., wildlife).

- Prevent further migration of groundwater contamination.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute

Table 5. Chemicals of Potential Concern

Groundwater

Acetone
Benzene
2-Butanone
Carbon tetrachloride
Chlorobenzene*
Chloroform
Chloroethane*
1,2 Dichlorobenzene
1,1 Dichloroethane
1,2 Dichloroethane*
1,1-Dichloroethene
cis-1,2 Dichloroethene
trans-1,2 Dichloroethene*
Ethylbenzene
Methylene chloride*
4-Methyl-2-pentanone
Styrene
Tetrachloroethene*
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane*
Trichloroethene
Vinyl chloride
Xylenes
Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(b)flouranthene
Bis(2-ethylhexyl)phthalate
Chrysene
Fluoranthene
Fluorene
2-Methylnaphthalene*
2-Methylphenol
4-Methylphenol
Naphthalene
Phenol
Pyrene
Aldrin
Alpha BHC
beta BHC*
gamma BHC
Chlordane
DDD*
DDE
Dieldrin
Endrin
Heptachlor epoxide
Antimony
Arsenic*
Barium*
Chromium
Copper
Manganese
Nickel
Selenium
Silver
Vanadium
Zinc

Soil

Acenaphthene
Anthracene
Benzene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chrysene
DDT
Dibenz(a,h)anthracene
Ethylbenzene
Flouranthene
Fluorene
Indeno (1,2,3-cd)pyrene
Methoxychlor
4-Methylphenol
Naphthalene
PCBs
Pyrene
Styrene
Toluene
Xylenes

Surface Water

Arsenic
Barium
Chloroethane
Chromium
Copper
Manganese
Nickel
Selenium
Zinc

Sediment

Acenaphthene
Aldrin
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chlordane
4-Chloro-3-Methylphenol
2-Chlorophenol
Chrysene
DDT
2,4-Dinitrotoluene
Endosulfan
Fluoranthene
Indeno(1,2,3-cd)pyrene
Methylene Chloride
PCBs
Pentachlorophenol
Phenol
Pyrene

* Not a contaminant of concern when Route 8 wells are excluded.

includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances. Implementation time includes time necessary to contract and design the alternative.

In the spirit of the SACM initiative and relying on the Agency's technology selection guidance for wood-treating sites, EPA considered technologies which have been consistently selected at wood-preserving sites with similar characteristics (e.g., types of contaminants present, types of disposal practices, environmental media affected) during the development of remedial alternatives.

The alternatives developed for groundwater (GW) are:

Alternative 1: No Action

Capital Cost:	Not Applicable
O & M Cost:	$27,200 for biannual monitoring $20,000 each five-year review
Present Worth Cost:	$380,700 (over 30 years)
Implementation Time:	Not Applicable

The Superfund program requires that the No Action alternative be considered as a baseline for comparison with other alternatives. The No Action alternative for the contaminated groundwater would only include a long-term monitoring program. The contaminated groundwater and DNAPL present in the subsurface would be left to naturally attenuate without any treatment. The long-term monitoring program would consist of semiannual sampling for PAHs at existing wells on-site and around the site. A 30-year monitoring period was assumed for estimating the cost of this alternative. A total of six existing monitoring wells would be utilized to sample the groundwater to determine whether the concentration of the contaminants of concern have been lowered to cleanup levels through natural attenuation and to monitor the migration of contaminants and free-phase DNAPL in areas surrounding the site.

Because this alternative would result in contaminants being left on-site above health based levels, the site would have to be reviewed every five years for a period of 30 years per the requirements of CERCLA. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative GW-2, Option A: Extraction, on-site treatment via activated carbon adsorption, and discharge to surface water

Capital Cost:	$1,883,100
O & M Cost:	$603,300 per year
Present Worth Cost:	$9,369,400
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, treatment and discharge of treated groundwater. The treatment system would consist of an oil/water separator for phase separation, followed by pretreatment for manganese removal (necessary to eliminate potential interferences with subsequent treatment processes) and removal of organic contaminants by activated carbon adsorption. The treated groundwater would be discharged to the small unnamed stream adjacent to the site. Although it is likely to take considerable longer than 30 years to achieve remediation goals, the treatment plant design and cost estimate is based on an operating period of 30 years.

The extraction/collection system would include a combination of a collection trench for shallow groundwater and an extraction well for the intermediate groundwater. The trench would be approximately 700 feet long and would be located at the northwestern (downgradient) boundary of the site. It is estimated that approximately 0.4 gallons per minute (gpm) of groundwater would be pumped from the collection trench, and approximately 26.4 gpm would be pumped from the extraction well to the on-site treatment system.

In addition to groundwater extraction, if the DNAPL is found to be pumpable, DNAPL extraction wellpoints would be installed in areas of suspected DNAPL. It is envisioned that four wellpoints would be installed in the shallow overburden and would have low sustainable pumping rates (less than 1 gpm in total). Total flow to the on-site treatment system would be

approximately 30 gpm. All pumping rates would be refined during the design phase based on pumping tests. Extracted groundwater would be delivered to a collection tank before treatment.

Because of the nature of the creosote contaminants and the observation of DNAPL during field activities, oily product is likely to be present with the extracted groundwater. Heavy or light product would be separated using an oil/water separator. Solids and/or heavy product would settle by gravity into the separator's sludge hopper and would be removed periodically for disposal to a permitted treatment facility. Lighter product would float to the surface and be removed by a skimmer for disposal/reuse at a licensed off-site treatment/recycling facility.

The pretreatment system would consist of an individual treatment train designed for the removal of manganese. Manganese would be removed through pH adjustment, oxidation, precipitation, coagulation, clarification, neutralization, and filtration steps with the addition of caustic, acid, and polymer. Sludges produced during this step would be stored in drums or rolloffs, and sent out to an approved disposal facility. Filtration may be required to further pretreat the effluent.

After pretreatment, groundwater would be pumped to a carbon adsorption system consisting of two carbon beds connected in series. Organic contaminants (PAHs) would be removed by the carbon adsorption units to target groundwater cleanup levels. The spent carbon would be collected and shipped for off-site disposal or regeneration and reuse.

Treated groundwater would be discharged via a culvert to the small unnamed stream located on the southern border of the site. This stream in turn discharges to an unnamed tributary to Unalam Creek, which eventually discharges to the Susquehanna River. The discharge structure would include appropriate erosion control devices such as rip rap and energy dissipation features. The discharge would comply with the New York State Pollutant Discharge Elimination System (NYSPDES) requirements. All waste residuals generated from the treatment process would be transported off-site to a permitted treatment and disposal facility, or (in the case of carbon) to a recycling facility.

The goal of this alternative is to restore groundwater to drinking water quality. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of shallow ground water remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable time frame. If groundwater restoration is not feasible or practical, the alternative may then focus on containing the extent of groundwater contamination within the site boundaries. Restoration of the groundwater outside the DNAPL source areas (e.g., intermediate groundwater) is likely to be feasible, since it is mostly contaminated with mobile organic contaminants (e.g., benzene).

During design or operation of the system, it may also be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to achieve a similar level of contaminant removal and containment as groundwater extraction and treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system. The information would also be used to reassess the time frame and technical practicability of achieving cleanup standards.

Alternative GW-2, Option B: Extraction, on-site treatment via biological treatment, and discharge to surface water

Capital Cost:	$2,058,600
O & M Cost:	$626,500
Present Worth Cost:	$9,832,800
Implementation Time:	24 months

This option is virtually identical to Alternative 2, option A. The only difference is that, following pretreatment, the remaining contaminants in the groundwater would be pumped to an aerobic

biological reactor for treatment. This reactor would contain bacterial cultures capable of degrading the contaminants in the groundwater. Wastes (e.g., sludges) generated during the treatment process would be disposed off-site at a permitted disposal/treatment facility.

Alternative GW-3: Extraction, on-site pretreatment, discharge to publicly owned treatment works (POTW) for final treatment

Capital Cost:	$1,904,000
O & M Cost:	$613,600
Present Worth Cost:	$9,518,200
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, pretreatment and discharge to the local POTW. In order to comply with POTW influent requirements, manganese would have to be removed from the groundwater. This would be accomplished by using conventional pretreatment methods for manganese removal such as the treatment train described under Alternative GW-2. The extraction/collection system and pretreatment for this alternative would also be the same as that discussed for Alternative GW-2. Therefore, only those operations that differ from previous alternatives are discussed below.

Treatment of organic contaminants would be accomplished by the Village of Sidney POTW utilizing a conventional sanitary wastewater treatment process consisting mainly of aerobic biodegradation. The facility was designed for a maximum wastewater treatment capacity of 1.7 million gallons per day (MGD), and currently operates at an average capacity of 0.6 to 0.7 MGD. Effluent from the pretreatment system would be discharged to the sanitary sewer line via a metered control manhole, which would record flow to the POTW. The nearest sanitary sewer is located parallel to Delaware Avenue, approximately 80 feet south of the roadway.

Groundwater would have to meet pretreatment requirements prior to discharge to the POTW. The Village of Sidney Municipal Code governs sewer use within the Village and regulates the discharge of wastes into the POTW. The Village has indicated that final acceptance of the pretreated GCL wastewater would not be available until a detailed application is submitted.

It is noted, however, that due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of DNAPL remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable timeframe.

The alternatives developed for surface-water sediments (SD) are:

Alternative SD-1: No Action

Capital Cost:	$0
O & M Cost:	$18,900 for biannual monitoring $20,000 for each five-year review
Present Worth Cost:	$277,700
Implementation Time:	6 months

The No Action alternative for the sediments at the GCL site would consist of a long-term monitoring program. For cost-estimating purposes, it is assumed that sediments would be monitored semiannually and that eight sediment samples would be collected and analyzed.

Because this alternative does not include contaminant removal, the site will have to be reviewed every five years for a period of 30 years per the requirements of CERCLA, as amended. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative SD-2: Excavation, treatment and disposal with GCL- property soils

Capital Cost:	$298,400
O & M Cost:	$0
Present Worth Cost:	$298,400
Implementation Time:	24 months

The contaminated sediments would be excavated during periods of no or low flow using conventional earth moving equipment such as backhoes, bulldozers, etc. The total volume of sediments to be excavated is estimated to be 125 cy. Excavation would be performed under moistened conditions to minimize the generation of fugitive dust. Erosion and sediment control measures such as silt curtains would be provided during excavation to control migration of contaminated sediment. Adjacent wetlands would be protected by erosion and sediment control measures.

The sediments would be treated via thermal desorption along with the GCL property soils (see Record of Decision dated 9/30/94); the design of the remedy was recently initiated. A typical thermal desorption process consists of a feed system, thermal processor, and gas treatment system (consisting of an afterburner and scrubber or a carbon adsorption system). Screened sediments are placed in the thermal processor feed hopper. Nitrogen or steam may be used as a transfer medium for the vaporized PAHs to minimize the potential for fire. The gas would be heated and then injected into the thermal processor at a typical operating temperature of 700°F to 1000°F. PAH contaminants of concern and moisture in the contaminated sediments would be volatilized into gases, then treated in the off-gas treatment system. Treatment options for the off-gas include burning in an afterburner (operated to ensure complete destruction of the PAHs), adsorbing contaminants onto activated carbon, or collection through condensation followed by off-site disposal. Thermal desorption achieves approximately 98 to 99 percent reduction of PAHs in soil. If an afterburner were used, the treated off-gas would be treated further in the scrubber for particulate and acid gas removal. A post-treatment sampling and analysis program would be instituted in order to ensure that contamination in the soil/sediment had been reduced to below cleanup levels. The treated sediment would be redeposited along with treated soils in excavated areas on the GCL property.

The excavated areas of the intermittent stream and wetlands edge would be backfilled with clean material and restored to pre-excavation conditions. The restoration would take place as soon as practicable after the sediments have been excavated, in order to minimize the period of impact to the stream and wetland. All applicable wetlands management guidelines would be followed.

Alternative SD-3: Excavation and off-site disposal

Capital Cost:	$820,300
O & M Cost:	$0
Present Worth Cost:	$820,300
Implementation Time:	24 months

This alternative consists of excavation of 125 cy contaminated sediment as described in Alternative SD-2 and transportation of all contaminated materials to an off-site RCRA permitted facility for treatment and disposal. One hundred twenty-five cy of clean fill would be used to restore excavated areas. Wetlands would be restored as discussed in Alternative SD-2.

EVALUATION 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 ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

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 pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses

whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and environmental statutes and requirements or provide grounds for invoking a waiver.

▸ 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.

▸ Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies 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 FFS report and Proposed Plan, the concurs, opposes, or has no comment on the preferred alternative at the present time.

• Community acceptance will be assessed in the Record of Decision (ROD) following a review of the public comments received on the FFS report and the Proposed Plan.

A comparative analysis of the remedial alternatives based upon the preceding evaluation criteria follows.

Groundwater

▸ Overall Protection of Human Health and the Environment

Over time, Alternative GW-1 would provide some limited protection of human health and the environment since contaminants would be attenuated through natural processes (e.g., biodegradation, dispersion). Alternatives GW-2 and GW-3 would be protective of human health and the environment, since they would actively reduce the toxicity, mobility and volume of contaminants in the groundwater, and would protect groundwater surrounding the GCL site from further contamination. Although GW-2 and GW-3 would result in significant reduction in the mass of contaminants present in the aquifer, it is unlikely that full restoration of groundwater resources would be achieved within a reasonable time frame.

• Compliance with ARARs

Alternative GW-1 would not comply with federal or state drinking water standards or criteria or those ARARs required for protection of groundwater. Alternatives GW-2 and GW-3 would be designed to treat the aquifer to chemical-specific ARARs associated with state and federal groundwater and drinking water standards. Extracted groundwater would be treated to achieve NYSPDES requirements under Alternative GW-2; under Alternative GW-3 the extracted groundwater would be treated to local pretreatment standards prior to discharge to the POTW. Each of these alternatives would be capable of removing a significant mass of contaminants in the groundwater. The goal of these alternatives is to restore groundwater to drinking water standards. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of DNAPL remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable timeframe.

• Long-Term Effectiveness and Permanence

Alternative GW-1 would not provide for active treatment and would rely on natural attenuation

processes to restore the contaminated aquifer. Therefore, this alternative would not be an effective long-term remedy.

Alternatives GW-2 and GW-3 would reduce the potential risk associated with groundwater ingestion by extracting and treating the groundwater to remove a significant mass of contaminants from the aquifer. The time to achieve these risk reductions is limited by the effective extraction rates from the aquifer. However, it is unlikely that DNAPL contamination present in the shallow aquifer can be completely remediated due to the tendency of DNAPLs to sorb to the aquifer. Although none of the alternatives would be able to clean the aquifer to drinking water standards in a short period of time, the treatment alternatives would protect surrounding groundwater from further contamination.

- Reduction in Toxicity, Mobility, or Volume Through Treatment

Alternative GW-1 would not involve any removal or active treatment of the contaminants in the aquifer; therefore, would not be effective in reducing the mobility, toxicity, or volume through a treatment process. However, over time, natural attenuation processes would provide some reduction of the toxicity and volume of contaminants.

Alternatives GW-2 and GW-3 would reduce the toxicity, mobility and volume of contaminants in the aquifer to a larger extent than GW-1 since extraction and treatment of groundwater are provided.

- Short-Term Effectiveness

The implementation of Alternative GW-1 would result in no additional risk to the community during remedial activities, since no construction or remediation activities would be conducted. Workers involved in periodic sampling of site soils would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity. For purposes of this analysis, monitoring of the site would occur for 30 years.

Alternatives GW-2 and GW-3 involve construction and operation of an on-site treatment plant. Procedures for proper handling of the treatment reagents would be followed for all treatment alternatives. Any process residuals generated would be properly handled and disposed off-site. The risk to workers involved in the remediation would also be minimized by establishing appropriate health and safety procedures and preventive measures to avoid direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA-certified and would be instructed to follow OSHA protocols.

It is estimated that the treatment alternatives would take well over 30 years to achieve the remedial action objectives. However, a 30-year period was used for costing purposes. Operation of the treatment plant would be stopped when remedial objectives are achieved i.e., levels of contaminants in the aquifer are reduced to State and Federal drinking water standards, unless it is determined that ARARs must be waived in portions of the aquifer.

- Implementability

Alternative 1 would not involve any major site activities other than monitoring and performing five-year reviews. These activities are easily implemented.
The treatment components of Alternatives GW-2 and GW-3 would be easily implemented, as the technologies are proven and readily available. The carbon adsorption technology proposed for use in Alternative GW-2A is a proven and efficient method for removal of organic contaminants. Biological treatment, specified in Alternatives GW-2B and GW-3, has been used successfully for groundwater contaminated with creosote wastes. The manganese removal pretreatment technology required under Alternatives GW-2 and GW-3 is proven and readily available. Sufficient space is available on-site for a treatment plant.

Alternatives GW-2 and GW-3 would require institutional management of the operation and maintenance of the treated groundwater discharge system. Off-site disposal facilities are available for the disposal of the oil/water separator sludge and skimmings generated from Alternatives GW-2 and GW-3. Disposal (or

recycle) facilities are also available for recovered DNAPL and the other residues generated from those alternatives. Although treatment processes utilized in Alternative GW-3 are proven, it is uncertain whether the Village of Sidney POTW would accept the treated groundwater. Acceptance of the GCL effluent by the POTW would be contingent upon factors such as capacity available, waste characteristics, and permit requirements.

- Cost

GW-1 is the least expensive of all alternatives but would not involve treatment. Alternative 1 has a present worth cost of $380,700 which is associated with conducting a sampling and analyses program and five-year reviews over a 30-year period.

Alternative GW-2A would be the most expensive treatment alternative followed by GW-3 and GW-2B. However, the cost differences between GW-2A, GW-2B and GW-3 would be so small as to not be significant.

- State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

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

Sediments

- Overall Protection of Human Health and the Environment

Alternative SD-1 would not meet any of the remedial objectives and thus would not be protective of the environment. Contaminated sediments would remain on-site and would continue to pose a risk to the biota. Natural flushing would reduce contaminants in the sediments somewhat, especially after the contaminated soils on the GCL-property are remediated.

Alternative SD-2, involving on-site sediment treatment and Alternative SD-3 involving off-site treatment/disposal of sediments, would remove contamination and eliminate any environmental threats posed by the sediments. Therefore, these alternatives would meet remedial objectives.

- Compliance with ARARs

There are no chemical-specific ARARs for the contaminated sediments. Alternative SD-1 would comply with appropriate requirements such as New York State Technical and Administrative Guidance Memorandums.

Alternatives SD-2 and SD-3 would be designed and implemented to satisfy all appropriate requirements and location-specific ARARs identified for the site. Excavation activities would be conducted in compliance with the OSHA standards, soil erosion, sediment control and wetland protection requirements. Alternative SD-2 would also comply with ARARs related to on-site treatment (e.g., disposal of treatment residuals, stormwater discharge requirements and air pollution control regulations pertaining to fugitive emissions and air quality standards). Under Alternative SD-3, excavated sediments would be sent to an appropriate treatment/disposal facility in accordance with applicable ARARs.

- Long-Term Effectiveness

Alternative SD-1 would monitor contamination in the sediments and would not remove and/or treat contaminants. Therefore, this alternative would not reduce the long-term risks to the environment associated with the sediments.

Alternative SD-2 calls for on-site sediment treatment along the GCL-property soils. The soil treatment system, currently under design, would reduce the levels of PAH contaminants in sediments by 98 to 99 percent.

Alternative SD-3 would provide long-term protection by removing the contaminated sediments which would be sent to an approved disposal facility. Soil cover and revegetation would provide protection against erosion. No long-term monitoring would be required.

▸ Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative SD-1 would not provide immediate reduction in toxicity, mobility or volume of contaminants because treatment is not included as part of this alternative. Some reduction may be realized after the GCL-property soils have been remediated through natural attenuation processes.

Alternatives SD-2 and SD-3 would reduce the toxicity, mobility and volume of contaminants by removal and on-site treatment (Alternative SD-2) or off-site disposal (Alternative SD-3).

▸ Short-Term Effectiveness

The implementation of Alternative SD-1 would not pose any additional risks to the community, since this alternative does not involve any construction or remediation. Workers involved in periodic sampling of sediments would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity.

Alternatives SD-2 and SD-3 include activities such as excavation, screening, shredding, and handling of contaminated sediments which could result in potential exposure of workers and residents to fugitive dust, and possible suspension of sediments. In order to minimize potential short-term impacts, the area would be secured and access would be restricted to authorized personnel only. In addition, dust control measures such as wind screens and water sprays would be used to minimize fugitive dust emissions from material handling. The risk to workers involved in the remediation would also be minimized by establishing appropriate health and safety procedures and preventive measures, (e.g., enclosed cabs on backhoes and proper personal protection equipment) to prevent direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA certified and would be instructed to follow OSHA protocols. Some increase in traffic and noise pollution would be expected from site activities. Short-term impacts may be experienced for about a six-month period which is the estimated time for construction and remedial activities.

Under Alternatives SD-2 and SD-3, short-term impacts on the environment from removal of vegetation and destruction of habitat could occur. A plan would be prepared and implemented to minimize and restore (i.e., revegetate) any damage to the environment. Erosion and sediment control measures such as silt curtains and berms would be provided during material handling activities to control migration of contaminants.

▸ Implementability

Alternative SD-1 would not involve any major site activities except monitoring and sampling. These activities would be easily implementable. Alternative SD-2 would be easily implemented, as the technology is proven and readily available. The thermal desorption component of this alternative has been shown to be effective for destruction of PAHs, and is commercially available. Sufficient land is available at the site for operation of a mobile thermal desorption system and supporting facilities. Alternative SD-3 involves off-site disposal. Capacity for the small volume of sediment should be available at a permitted facility. Implementation of Alternatives SD-2 and SD-3 would require restriction of access to the site during the remediation process. Coordination with state and local agencies would also be required during remediation.

▸ Cost

Alternative SD-1 is the less expensive alternative, but does not provide treatment of contaminated sediments. Alternative SD-1 has a present worth cost of $277,700 which is associated with conducting a sampling and analyses program and five-year reviews over a 30-year period.

Alternative SD-2 is the least expensive of the treatment alternatives and has a present worth cost of $298,000. The most expensive Alternative is SD-3 with a present worth cost of $820,300.

▸ State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

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

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternatives GW-2 and SD-2 as the preferred alternatives for remediation of contaminated groundwater and sediment on the GCL site.

Alternative GW-2 would address the contaminated groundwater through the extraction, collection, on-site treatment and discharge of treated groundwater to the surface water. Alternative GW-2 provides two options for primary treatment of organics, carbon absorption (GW-2A) and biological treatment (GW-2B). Given the information currently available, both options appear to be equally reliable and cost-effective. Therefore, a more detailed evaluation of the two options will be conducted during the remedial design through treatability studies. The additional information gathered from the treatability studies will be used to determine which option is more appropriate and cost-effective. As noted above, the information gathered during remedial design would also be used to reassess the timeframe and technical practicability of achieving State and Federal drinking water standards.

Alternative SD-2 will address the contamination by excavating and treating contaminated sediment on-site through a thermal desorption process. Treating the contaminated sediments along with the GCL-property soils provides an effective and cost-effective method for addressing the contaminated sediments. Alternative SD-2 will also provide for the mitigation of damages to the aquatic environment which may occur during the implementation of this alternative.

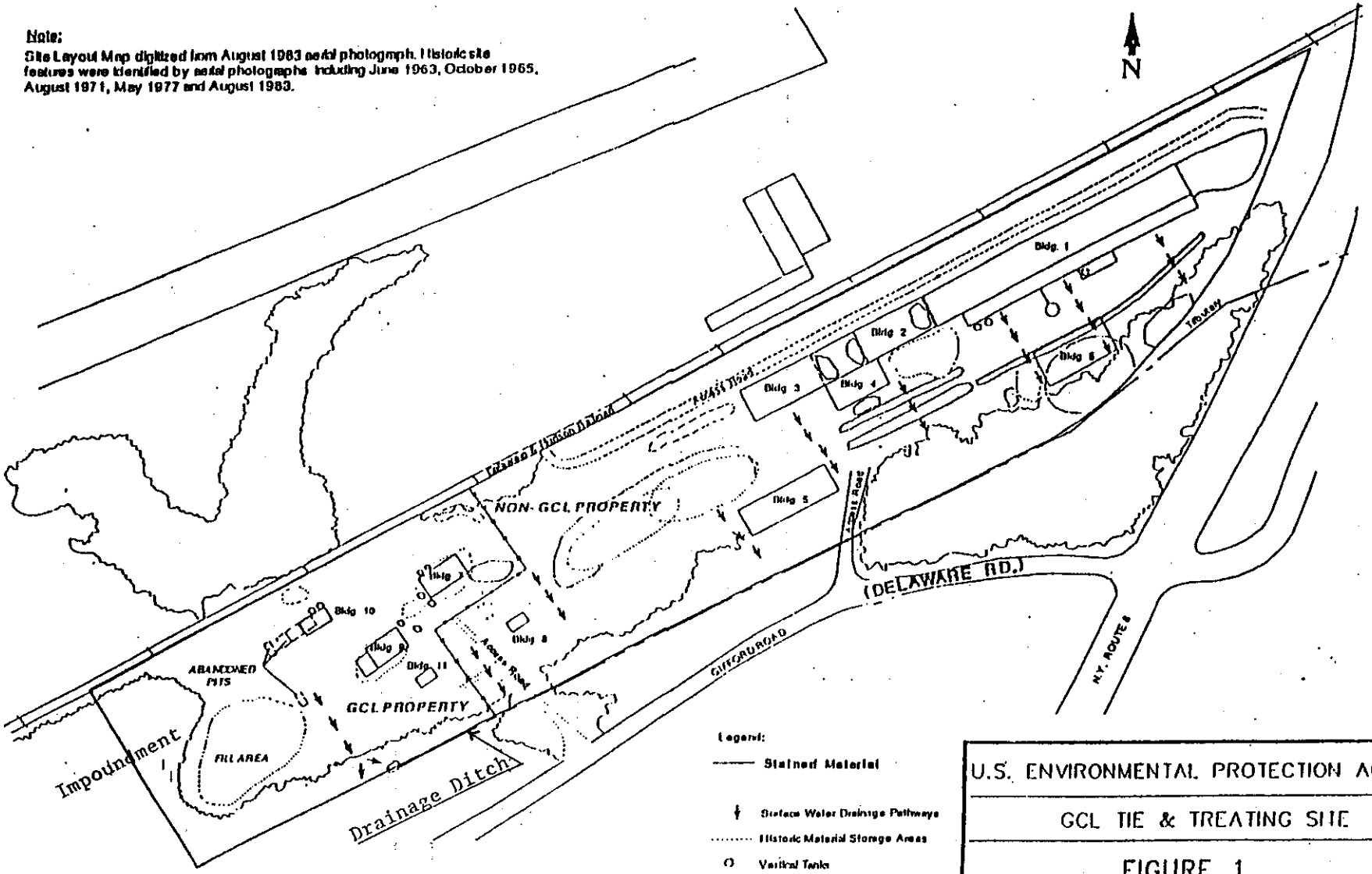
The preferred alternative would provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and the NYSDEC believe that the preferred alternative would be protective of human health and the environment, would comply with ARARs (unless it is subsequently proven to be technically impracticable), would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also would meet the statutory preference for the use of treatment as a principal element.

APPENDIX A

PROPOSED PLAN

APPENDIX B

PUBLIC NOTICES



U.S. ENVIRONMENTAL PROTECTION AGENCY

GCL TIE & TREATING SITE

FIGURE 1

HISTORICAL LAND USE
SITE LAYOUT MAP

Appendix B - Public Notice

Appendix C - March 8, 1995 Public Meeting Attendance Sheets

Appendix D - March 8, 1995 Public Meeting Transcript

Appendix E - Letters Submitted During the Public Comment Period

SUMMARY OF COMMENTS AND RESPONSES

Comments expressed at the public meeting and written comments received from the Village of Sidney and New York State Electric and Gas Corporation during the public comment period have been categorized as follows:

A. Selected Remedy

B. Nature and Extent of Contamination

C. Health Effects

D. Land Use

E. Impact of Cleanup Activities on the Local Economy and Job Market

A summary of the comments and EPA's responses to the comments is provided below.

A. Selected Remedy

Comment #1: EPA received correspondence from the Village of Sidney requesting that EPA consider selecting Alternative GW-3 for the groundwater remedy. The Village indicated that the relatively low estimated pretreated groundwater effluent flow of approximately 30 gallons per minute generated under Alternative GW-3 would not be expected to interfere with the treatment process at the publicly owned treatment works (POTW). Although the Village could not presently commit to accepting the waste stream, they expressed their desire and willingness to pursue this issue by obtaining additional information on the impact of the potential discharge on the POTW's effluent and sludge quality, and consulting with NYSDEC and Delaware County on these issues.

Response #1: Given the information currently available, and lacking a firm commitment from the Village of Sidney, EPA believes that Alternative GW-2 is the best choice for remediating groundwater at the site. EPA's main concern regarding Alternative GW-3 is the uncertainty associated with whether the Village would be able to obtain the necessary clearances (from

local and State agencies) to accept the groundwater effluent. Less uncertainty is associated with the implementation of Alternative GW-2 since a similar groundwater pump and treat system is being utilized for remediation of the Route 8 Landfill, located just southeast of the site. The treated effluent from the Route 8 Landfill is discharged into the same drainage ditch contemplated as a discharge point under Alternative GW-2. The Route 8 discharge has been able to meet all New York State Pollutant Discharge Elimination System (NYSPDES) requirements. The effluent generated under Alternative GW-2 would meet standards similar to those required for the Route 8 Landfill system.

Pending the results of the work to be conducted during the remedial design phase, and pending further input from the Village as to whether they will enter into a long-term commitment to accept the waste stream, EPA may re-evaluate the feasibility and cost-effectiveness of utilizing the POTW. If after evaluating the additional information EPA determines that the Village is willing and able to accept pretreated groundwater at the POTW and that this is the most cost-effective alternative, EPA may consider modification of the groundwater remedy.

Comment #2: Village representatives were interested in obtaining information regarding the anticipated chemical characteristics of the groundwater following separation and manganese pretreatment which could potentially be discharged to the POTW.

Response #2: A detailed characterization of the groundwater at various stages of treatment would be available during the remedial design phase.

Comment #3: Proposed Remedy, page 12. The "goal" of Alternative GW-3, referred in the last paragraph of the alternative description, is not stated.

Response #3: The "goal" of the active groundwater restoration alternatives was detailed in the Alternative GW-2 description summary. The groundwater remediation goal is the same for both Alternatives GW-2 and GW-3, namely, to restore the groundwater to drinking water quality.

Comment #4: Village officials submitted additional cost data, including information on likely discharge fees associated with discharge of pretreated effluent to the POTW.

Response #4: EPA considered the revised estimate and acknowledges that this estimate would result in an overall lower cost for Alternative GW-3. However, as noted above, significant uncertainty exists regarding the implementability of Alternative GW-3. This uncertainty, rather than cost, was the significant

factor in selecting Alternative GW-2 rather than Alternative GW-3.

Comment #5: The Village also noted that although the closest connection point to the public sewer system is on the south side of Delaware Avenue, the most expedient connection point would be to the public sewer on Unalam property which runs in a north-south direction in the vicinity of the Unalam water well.

Response #5: This information will be considered during the remedial design phase for any action which may require connection to the sanitary sewer.

B. Nature and Extent of Contamination

Comment #1: A commenter suggested that groundwater contaminant boundaries in the shallow intermediate and deep zones had not been established and was confirmed as indicated by contamination found in perimeter wells. It was also noted that since there are residential groundwater users located northwesterly of the site, the potential impact to these users due to offsite migration, whether site or nonsite related, should be considered.

Response #1: Contamination due to GCL site activities has been established. The information obtained as part of EPA's RI indicates that GCL-related groundwater contamination is limited vertically to the shallow and intermediate deep zones, and horizontally to a narrow portion of the aquifer beneath the GCL facility. There is no evidence that suggests that the GCL contaminant plume has moved beyond the GCL property boundaries. Groundwater contamination, especially in the wells along the northern perimeter, is attributed to the Route 8 Landfill. Although additional information will be collected during the remedial design phase (including installation of new monitoring wells, and sampling of existing and newly installed wells) to refine further the extent of the GCL contaminant plume, it is unlikely that private residential wells will be sampled unless the data generated during the remedial design suggest that such action is warranted. The selected remedy will be designed to contain the GCL groundwater contamination within the property boundaries so that offsite wells (including those located northwesterly of the site) are not affected. Individuals concerned with the quality of their residential well water could have their private wells tested by the New York State Department of Health (NYSDOH).

Non-GCL contamination associated with the Route 8 Landfill plume is already being remediated under the NYSDEC's hazardous waste remediation program; a groundwater collection and treatment system designed to address the groundwater contamination was constructed and recently started operation. It is expected that operation of the Route 8 Landfill remediation system will

significantly reduce or eliminate groundwater contamination from upgradient sources. EPA will work with New York State and the responsible party for the Route 8 Landfill site to evaluate the effectiveness of the groundwater restoration system.

Comment #2: EPA should consider including monitoring of existing downgradient wells in all alternatives including "no build" for reasons mentioned above.

Response #2: All of the groundwater remedial alternatives evaluated in the Proposed Plan, including the selected remedy, include further delineation of the GCL contaminant plume. Although the exact location and number of wells to be installed and sampled will be determined during the remedial design phase, sampling of existing residential wells will be conducted provided it is deemed to be necessary for developing the remedial design (see also comment #1 above).

Comment #3: It appears that there is significant groundwater contamination which is not related to the GCL site. Since the full extent of the non-GCL contamination was not addressed in the RI, is EPA planning to define other contaminant plumes, even if they are not related to the GCL site?

Response #3: Two contaminant plumes were identified in the area of study: the GCL site plume and the Route 8 Landfill plume. The Route 8 Landfill plume is considerably deeper and larger in extent than the GCL plume, and consists of some contaminants (e.g., PCBs) not found in the GCL contaminant plume. The Route 8 Landfill contamination is not related to the activities conducted at the GCL site; remediation at the Route 8 Landfill site is being undertaken by a private party under the supervision of NYSDEC. One of the activities being conducted at the Route 8 Landfill is the installation and sampling of numerous monitoring wells to define the nature and extent of groundwater contamination. Individuals interested in learning more about remedial activities at the Route 8 Landfill should contact NYSDEC Region 4 in Schenectady, NY., at (518) 357-2045.

EPA's RI focussed on contamination which resulted from wood-preserving activities at the GCL site. The contaminant plume originating at GCL appears to be limited to the shallow/intermediate portion of the aquifer and contained within the property boundaries. However, additional sampling of existing and new monitoring wells will be conducted during the remedial design phase to further detail the extent of groundwater contamination and to ensure that the contamination will not impact areas outside the GCL property.

C. Health and Environmental Effects

Comment #1: Residents expressed concern about health threats resulting from exposure to contaminated groundwater.

Response #1: The results of the RI indicate that site-related groundwater contamination is contained within the GCL property boundaries. No private or public drinking water supply wells exist within the boundaries or immediately adjacent to the GCL contaminant plume. Therefore, there is no known current human exposure to contaminated groundwater from the GCL site; the groundwater remedy will prevent future exposure to contaminated groundwater. However, due to the existence of other potential sources of groundwater contamination in the area such as the Route 8 Landfill, households which have private wells should consider having their water tested for drinking water parameters. NYSDOH has recently sampled private wells in the Delaware County area and should be contacted for additional information on regional groundwater quality.

Comment #2: A resident expressed concern about health and environmental threats resulting from the discharge of treated groundwater to the surface water.

Response #2: The groundwater remedy provides for discharge of treated groundwater to the drainage ditch that runs along the southern border of the site. The treated groundwater would comply with the NYSPDES requirements, which are designed to protect both human health and the environment. Therefore, no significant impact to human health or the environment is expected due to the discharge of treated GCL site groundwater to the drainage ditch.

D. Land Use

Comment #1: Village officials and residents have expressed concern about future land use of the site property. They noted that the site is zoned for industrial use, with no change in zoning expected.

Response #1: The remedy that EPA has selected for the site soils, sediments and groundwater will allow for an industrial/commercial use of the property in the future. In addition, EPA will recommend to local agencies that institutional control measures be undertaken to ensure that future land use of the property continues to be industrial/commercial, and precludes the use of Site groundwater for human consumption until drinking water quality is restored in the aquifer.

E. Impact of Cleanup Activities on the Local Economy and Job Market

Comment #1: After the selected remedies for soil, surface-water sediments and groundwater are implemented, can the land be utilized?

Response #1: Based upon input from community and local officials, the selected soils, sediments and groundwater remedies will be designed to allow for an industrial/commercial use of the property in the future. EPA shares the Village's interest of returning the property to productive use as soon as possible. To achieve this, the most important step is completing the soil remediation. As no viable potentially responsible parties (PRPs) have been identified to implement the site remedies, EPA would utilize the Superfund to pay for the remedies. It is expected that EPA will complete the design and procurement of a contractor to remediate the soils and surface-water sediments in approximately 1.5 years. In addition, the remedial action for soils and surface-water sediments should be completed approximately 1 year thereafter. During this time, EPA will be conducting the additional investigatory work needed to implement the groundwater remedy. Although a small portion of the property may be required for the long-term operation of the groundwater restoration system, the majority of the property could be returned to productive use shortly after implementation of the soil and sediment remedy.

Comment #2: Representatives of local industries were generally concerned about the job market. They noted that manufacturing jobs have decreased in the area and expressed their desire that remediation activities not cause any further losses of jobs. They asked whether local merchants and contractors will be utilized or benefit from the remedial work to be conducted at the site.

Response #2: EPA does not anticipate any negative impact to the local economy as a result of the remedial activities planned for the GCL property. It is EPA's intent to remediate the property as quickly as possible, so that it can be returned to productive use.

All cleanup activities to date have been funded by the Federal government. When hiring contractors to perform work at a site, EPA must abide by federal procurement regulations. The regulations are intended to ensure fair, competitive bidding, resulting in the hiring of responsible firms, capable of performing the type of specialized work required at Superfund sites. EPA cannot assure that local contractors will be hired to perform work at the site. Conducting work at hazardous waste sites requires certain level of worker health and safety training, which is often difficult for small local companies to

afford. However, local contractors capable of performing requisite Superfund site work are frequently utilized, since they may have a competitive advantage over nonlocal contractors who would incur expenses for travel, lodging, etc. In addition, EPA contractors often utilize local services and suppliers (e.g., lodging, food, and general supplies).

The Oneanta Daily Star
March 1, 1995

...gh, St. Louis, Texas

...em, that we have no ... to make," Hemond

...ancel the games was baseball operations ...m of the commis-

with the union were never the same," Alou said. "I am not a strikebreaker. It isn't us managers putting this show on.

"If I leave, it won't be on any kind of a leave of absence. If I run away from this, it's for the rest of my life. Otherwise I'm going to stick around to see the end of this."

Alou also attacked acting commis-

Pedro Borbon, 48 years old and 15 years removed from the majors, signed for real Tuesday as a replacement player, threw in the bullpen and declared himself ready to pitch.

The Reds erroneously issued a news release Monday saying they had signed Borbon. General manager Jim Bowden later said that the right-hander would

"Sometimes it gets to a point you want to cry because you've got to make a decision on something you love more than anything in the world and maybe something that's going to ruin you for the rest of your career," said Carter, who plans to play in exhibitions but not as a regular-season replacement.

Free agent pitcher Todd Stottlemyre, who spent the last six seasons with Toronto, thinks the players will face a huge task trying to win back fans.

"I think it'll be important ... that maybe the players do stop and sign a few more autographs, talk to the fans," Stottlemyre said. "They've been the ones who've lost the most in this thing and you have to have respect for that."

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...rent New York Giants ...up. Before taking the ...lor stood shaking his ...smiling widely as wres... aels delivered a wild, ... rant.

... met Bam Bam.

... Bam Bigelow was on ...ll-field, playing in the ... wouldn't be hearing ...rence Taylor," Bigelow ...d with a straight (for ... "I know I could have ...ter job than LT."

...ight end Howard Cross, ...in the crowd, was re... giggles at this point. ...low concluded his com... "This is my world. LT" ...rinned and announced, ...ot to love that. That was

...tes Thomas Randolph, ...orn and Willie Beamon ...ically agreed.

...ll entertainment and ... cornerback Randolph. ... well."

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THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
Invites

PUBLIC COMMENT ON THE PROPOSED CLEANUP OF THE GCL TIE & TREATING SUPERFUND SITE

at

DELAWARE AVENUE, SIDNEY, NEW YORK

The U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) will hold a public meeting to discuss the findings of the Remedial Investigation and Feasibility Study (RI/FS) and the Proposed Plan (PP) for the GCL Tie & Treating Superfund Site.

The meeting will be held on Wednesday, March 8, 1995 at 7 pm in the Sidney Civic Center, 21 Liberty Street, Sidney, NY. The release of the Proposed Plan and the scheduled public meeting are in accordance with EPA's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.

Site remediation activities at this site were segregated into two different phases, or operable units, so that remediation of different environmental media or areas of the site could proceed separately, resulting in the expeditious remediation of the entire site. The first phase remedy, which was selected this past summer, addresses the contaminated soils and debris on the GCL property portion of the site; this phase is currently in the remedial design stage. The second and final phase, addresses contamination in the groundwater and surface water sediments.

Based on the available information, the goal of the preferred groundwater remedy for the second phase is to restore groundwater to drinking water quality. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex site hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for at least some portions of the aquifer. If groundwater restoration is not feasible or practical, the alternative may then focus on containing the extent of groundwater contamination within the site boundaries, and/or using natural attenuation or other processes to achieve contaminant reduction. The preferred remedy for contaminated surface-water sediments is treatment via thermal desorption along with the GCL property soils.

EPA, in consultation with NYSDEC, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified herein. Documentation of the project findings is presented in the site file. These documents are available at the:

Sidney Memorial Library
Main Street
Sidney, NY

Comments of the Proposed Plan will be summarized and responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision is the document that presents EPA's final selection for response actions. Written comments on this Proposed Plan should be sent by close of business, March 30, 1994 to:

Carlos R. Ramos, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, New York 10007-1866

APPENDIX C

MARCH 8, 1995 PUBLIC MEETING ATTENDANCE SHEETS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GCL Tie & Treating Superfund Site
Sidney, New York

Wednesday, March 8, 1995
ATTENDEES

(Please Print Clearly)

Added 3/13/95

3:00 PM Meetings
3:45 PM

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Rick Roberts	101 O'Neil Rd.	Sidney	13838	(607) 563-9411	Keith Clark
Cynthia K Shamblen	101 O'Neil Rd	Sidney	13838	(607) 563-9411	Keith Clark
Keith Clarion	101 O'Neil Rd	Sidney	13838	607-563-9411	Keith Clark
Clyde Tiffany	22 Loomis Dr.	Sidney	13838	607-563-3338	Village (Trustee) Sidney
B.H. Shepperd	21 W. Main St	Sidney	13838	607-563-3162	" (Trustee) Sidney
Elwood Davis	48 River St.	Sidney	13838	607-563-3975	Village of Sidney (Mayor)
John Woodyshek	21 Liberty St	Sidney	13838	607-561-2324	Village Engineer Village of Sidney
Craig Van Cott	32 Clifton St	Unadilla	13849	369-9341	Una Lam
Henry J. Mitchell	40-60 Delaware Ave	Sidney	13838	607-563-5940	Amphenol
Cecilia Echols					EPA
Doug Barbarini					EPA
Carlos Ramos					EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GCL Tie & Treating Superfund Site
Sidney, New York

Wednesday, March 8, 1995
ATTENDEES

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
Clarence D Fox	4 Weis	Sidney	13838	563-3667	
Brent Hollenbeck	M-14 Cartwright Ave.	Sidney	13838	563-1493	The Daily Star, Oneonta
Marion Brand	50 Wolf Road	Albany	12233	(518) 457-5637	NYSDEC
James Carr	Box-263	Gilbertsville	13776	607-783-2406	Unadilla Silo Co.
Edward Davis	48 River St	Sidney	13838	607-563-3925	Village of Sidney
Rose Milotta	Valley View #10	Sidney	13838	5633859	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GCL Tie & Treating Superfund Site
Sidney, New York

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GCL Tie & Treating Superfund Site
Sidney, New York

Wednesday, March 8, 1995
ATTENDEES

(Please Print Clearly)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING
GREG UMBER	RD 1 Box 91	UNADILLA	13849	5632104	—
Howard Lazarus	1290 Broad St West	Clifton, NJ	07071	201-842-7062	EBASCO

APPENDIX D

MARCH 8, 1995 PUBLIC MEETING TRANSCRIPT

U.S. ENVIRONMENTAL PROTECTION AGENCY PUBLIC MEETING

GCL TIE & TREATING SUPERFUND SITE

A public meeting held at the Sidney Civic Center, 21 Liberty Street, Sidney, New York, 13838, on Wednesday, the 8th day of March, 1995, commencing at 7:06 p.m.

APPEARANCES:

CECILIA ECHOLS
Community Relations Coordinator

DOUGLAS GARBARINI, Chief
New York/Caribbean Superfund Section I

CARLOS RAMOS
Project Manager

BEFORE:

Ruth I. Lynch
Registered Professional Reporter

Empire Court Reporters
One Marine Midland Plaza
Binghamton, NY 13901

MS. ECHOLS: Okay, we're ready to begin. Good evening, I'm Cecilia Echols, Community Relations Coordinator for the GCL Tie and Treating Superfund Site. We're here to speak about the second operable unit regarding the site and to give EPA's preferred remedy for the groundwater and surface water sediments. I would assume that everyone received a proposed plan in the mail and has been able to review it, if not I think everyone received one from the table in the back. I hope everyone has signed in.

The public comment period began on March 1st, it ends on March 30th. If you have any comments or questions to ask the EPA you can send in your written comments to Carlos Ramos, his address is in the proposed plan. And he will address all of your questions in a responsiveness summary which will become part of the record of decision. If you're interested in finding out more information about the GCL Tie and Treating plant, there is an information repository at the Sidney Memorial Library on Main Street. And I'm gonna pass it over to Doug.

MR. GARBARINI: Okay, thank you, Cecilia.

My name is Doug Garbarini, I'm the supervisor in the Region II New York City office, and Region II is one of ten regional office across the country that EPA

has, and we're responsible for environmental protection in New York, New Jersey, Puerto Rico and the Virgin Islands. I think before we get into the project details here of the GCL site, what I typically do is go through a ten-minute spiel on the Superfund process. But looking out here, I think all of you were present at the last meeting, so I don't want to necessarily bore you with that. There might be one new face.

AN ATTENDEE: I was at one -- one meeting, I don't know whether --

MS. ECHOLS: The last one was in August you were here probably for.

AN ATTENDEE: Yeah, original one.

MR. GARBARINI: The original one. Okay. Do you have a little bit of familiarity with the Superfund process, or do you --

AN ATTENDEE: Yeah.

MR. GARBARINI: Would you like me to go over anything for you?

AN ATTENDEE: I'm just interested in listening to what's being said anyway. I haven't got any ax to grind or anything.

MR. GARBARINI: Okay, I guess, then, what we'll do is just get right into the project details. And if you have any overall related questions about the

Superfund process, you know, feel free to ask them at that point in time.

Yeah, I guess in general, you know that it's -- we're here representing the Federal Government, and the Superfund program just deals with federally -- federal sites on the national priorities list, I guess you're pretty much familiar with that. Okay, so what I'll do is just pass it right on over to Carlos.

MR. RAMOS: My name's Carlos Ramos, and I am the project manager for this specific site. And I won't give you too much detail and background because most of you know the site, you know where it is and everything, but I just want to go briefly about some of the features of the site.

This is what they call the historical GCL -- can everybody see this, or am I blocking views?

MS. ECHOLS: I'll turn off the lights.

MR. RAMOS: Okay. This is the site, this is the historical size of the site. We divided the site into two areas, what we call the GCL portion, which is this area in general, and the non-GCL portion, which is kind of historical site. We did sampling throughout all the property, we took surface sediment samples from the drainage ditch that runs around the south to the side, this is the blue line here, and also from the

impoundment area on this other portion of the site. We took soil samples from all the areas of the site. We took groundwater samples through all the site.

And just to show you the property, you're pretty much familiar that the shopping center, the Kmart is on this outer edge of the property, the northern area is Keith Clark and the airport, and Route 8 is on eastern portion of the site. Just to give you an idea of how the site looks.

MS. ECHOLS: Excuse me, by the way, all of this information that Carlos is looking at is in the handout. Okay?

MR. RAMOS: The second slide is just to refresh your minds regarding how EPA is -- is working at this site. You know, how -- how is our cleanup working at this site.

We have three main phases. The first one started is what we call a removal action. And a removal action was designed to address the most immediate threats associated with the site. And that was the disposal of wastes contained in drums, in tanks, and so forth. That phase is completed already. All the immediate threats, potential threats associated with the site in terms of immediate concerns are being addressed, and that -- that activity's close.

Last summer we came here to talk about the focus feasibility study and to talk about cleaning up the soils on the GCL portion of the site, and that was that yellow portion of the figure I showed you before. That work is already in the remedial design phase. Tonight we are here basically to talk about this last portion of the site, which is the remedial investigation that we did in the remaining portions of the site, and that includes groundwater, surface water and soils on the non-GCL portions of the site. That's outside that yellow area.

So we did the remedial investigation, we -- we actually defined the nature and the extent of contamination of the site, we did a feasibility study which tells you what can you -- what shall we do or what alternative do we have for addressing that contamination found at the site, and we are here tonight with a proposed remedy. And inform you on that.

Now I'm just gonna go briefly about some of the sampling soil results that we found at the site. This figure again is in your handout. Specifically for the non-GCL property soils. And just let me superimpose another one here. Remember, the non-GCL is the western -- the eastern portion of the site. Which is

the non -- non yellow one.

You can see from -- from this figure, you compare the benchmark, which is just a level to help you compare it, the concentration we found on the site versus what could be considered as a safe level, in some cases it's just background, like in the case of metals, these are typical background concentrations for this area. That means if you are testing soils that were not contaminated, these were the typical concentration that you will find. You can see we didn't find really much on the non-GCL property soils.

We just try to take concentrations of organic compounds and some concentrations of metals which are close to background in most of the cases. The components that we are most interested with are these components here, which are creosote-related compounds, and creosote was the contaminant that we found at this property. So these are the ones that we are more concerned about, polyaromatic hydrocarbons, as you can see that even those, these benchmark, and what we found at the site, the non-GCL property, is -- is way below benchmarks. So that means that there's really nothing much to be concerned about on the non-GCL property, as far as soil contamination.

We're going to the groundwater, we have a similar

analysis. We have here five columns. The first column is the contaminants of concern, the second column is the benchmark, which in this case is the drinking water standard. The next column is what we call a GCL property highest concentration. Those highest concentration are for that yellow portion of the site. Then we go into non-GCL property and off-site contamination, which were wells located outside the influence of the site.

We have three types of contaminants here also, three -- three criterias. We have volatile organics, polyaromatic hydrocarbons, and metals. Of these three contaminants the only one which is site related is polyaromatic hydrocarbons, because those were the materials used at the site and those were also the materials found in the site soils. For a specific case of polyaromatic hydrocarbons, you see that you compare the benchmark and the GCL concentration, we indeed have concentration in the groundwater which is above the drinking water standards for most of the polyaromatic hydrocarbons. We see that we don't find the hydrocarbon off site of the GCL property wells. We didn't find them in locations outside the GCL site influence.

You look at volatile organics, you see that we

found very rather low concentration of most of the volatile organics at the GCL property. To compare that to the MCL, or the maximum contaminant level, the drinking water standard, which is the same thing, these are relatively low levels. We compared those levels to non-GCL property wells, you can see they are much, much higher on wells which are not actually affected by the GCL site but which are actually affected by other sites in the region. So that tells you that there is a groundwater problem in the area which is not site related. Related to other sites in the area.

When you go to metals you'll see that some of the metals are elevated, but there are no metals we can see that are much concern. So in the case of manganese, which is much higher elevated, we also find it in other wells outside of the property. Most of the property relates to polyaromatic hydrocarbons, which is related to the operations of the GCL property, and volatile organic compounds, which are not related to the GCL site.

We go into surface water, we see that we didn't have as much a problem there neither. There were some -- some of the metals that were slightly elevated, but not really in that significant amout. Arsenic is too high.

Then we jump in surface water sediments. And again we have contaminants of concern and then we have the benchmark levels which are kind of guidance volumes that we use to define whether contaminants may be high or low, and we have the concentrations that we find at the site. As you can see here, again we have kind of a relatively high concentrations of polyaromatic hydrocarbons. On the sediments which we collected from the -- that drainage ditch at the site. Metals can kind of vary through, most of the time metals were at the -- you know, within one or two times benchmark levels.

Here we are, okay. And this is just a figure that summarize the extent of groundwater contamination that we found at the site. And let me explain this thing. The orange dots are water wells that we found or installed at the site, and we sampled them. You can see they cover pretty much the whole property, there are some around here also, you can see with the colors. And what we did, we sampled all those wells twice, at different times of the year, we collected the data, and we -- based on that data we developed the extent of the groundwater contamination at the site. And this is what you have here.

In this area you have an aquifer to be called

overburden, which is the first aquifer you encounter, and then we have what we call a deep aquifer, which is kind of bedrock in this area. The contamination that we found which is related to this site is all within the overburden, it's on the overburden aquifer. Within that overburden aquifer we -- we divided that zone -- that aquifer into two zones, we call them shallow zone and then we have the intermediate zone. And that's where we had contamination which is related to the GCL site. The green color, that's the shallow aquifer. In that area we found that we actually had what we call pure creosote. And that was creosote that was used during the operation of the GCL facility, and through the years made its way into the soils, into the groundwater. It's a very limited area, about 250 feet in diameter, as far as we know. This, of course, will be very further delineated, but right now that's the approximate extent of contamination.

Creosote is a very viscous material, it really binds pretty well to the soils. Once -- once it moves to a certain distance it tends not to move anymore. It doesn't move very rapidly also. Kind of it's like you're pouring oil, it's pretty much putting oil into the ground, goes down to a certain level, but at some point it reaches a depth where it doesn't move anymore.

That's what we have here.

The yellow zone is an area where we have a different type of contaminant, which is benzene. Mostly benzene. Which is more soluble and more -- more mobile than -- than creosote. And that's a bit -- bit bigger plume than the one before. But it still is a relatively small area of the site if you look at the site as a whole. This is a relatively small area.

Okay. This area is to show you the approximate extent of sediment contamination at the site. This is the drainage ditch that runs about the southern edge of the site, and the approximate extent of the soil contamination is around this area here.

Okay. So what we did with this information? Now we know what's at the site, and we know where that contamination is. Based on that we -- we start what we call a risk assessment. A risk assessment is a document that looking at the concentrations and looking at the selection of contaminants at the site tells you what kind of risk might be associated with that contaminant. And to do that the first thing that we do is that we identify chemicals of concern. And that's done based on the frequency, on the toxicity and the distribution of those contaminants at the site. Once we do that we go through a screening process and we

determine which -- which chemical we should be paying more attention to and which chemicals will be driving the risks at the site.

Okay. And this is basically the result of the risk assessment that we did. And in the risk assessment we look at different things. We look at different scenarios and we try to check all the potential populations that could be in contact with contamination and could be at risk. In this case we have children and adults living off site but near the site; children and adults trespassing on the site. We have -- we have -- we have children living in the vicinity of the site, we have adults living in the vicinity of the site, and we have on-site workers. And for those scenarios we have different pathways. For children living off site, what will happen, they will ingest or inhalate some of the soils at the site. What would happen with them if they ingest or inhalate some of the soil. And to each one of those pathways and scenarios we calculated a potential health risk number. We have to tell you what would be the potential risk to that person.

So if you go scenario for scenario, you will see that most of the risks are really reasonable. The EPA has what we call an acceptable risk range, which is

actually 1 to 10,000 to 1 in a million. That's what we call acceptable risk range. If we are within that risk range, usually we don't take any action at a site. In this -- in this case you can see that for most of these pathways, the risk are very small, they're in the range of 9 out of a million, 4 out of a million, and so forth.

The only two pathway scenarios where they have some significant risk is for people ingesting, inhaling or in dermal contact with the groundwater. And that's an assumption that that -- that's a pathway that assumes that somebody will be drinking that contaminated water at the site, which is not the case. The contamination, as you saw, is a very localized to what's in the site; nobody's drinking that water. But this scenario assumes that somebody in the future might drink that water. And if that were the case then you will assign the risk number to that.

In the case of people exposed to groundwater, you'll see that the risk are much more significant. In the range of 2 out of a thousand. And we have here, we decorated the risk of groundwater two ways, since we know that we have a real groundwater problem in the area, we have contamination there which is not related to GCL in that area, we calculated the risk posed by

exposure to all the contamination in the groundwater, site related and non site related, and that's the total. How we decorated the number just for the GCL contamination.

As you can see, once you take out in those times the contamination, the risk is much more smaller.

Okay. Knowing all the contamination that we have at a site, knowing all the risks posed by the site, we develop our alternatives for that contamination at the site. An alternative available focus on those two medias which are the concern. One media that is a concern is the groundwater where we found contamination which is above drinking water standard. The other concern is the surface water sediments, since we found contamination which is above the benchmark levels that we have established. We went through a process where we -- we tried to look at different technologies and different ways of getting up the groundwater. And we developed these three alternatives for the groundwater.

The first once that we have is no action. We are required by law to first consider no action, as a baseline. Just to give you a comparison number for the rest of the alternatives. So we did no action, which actually what is involved is long-term monitoring. Just going out there and sampling the wells year after

year to see what will happen to the contamination. The cost for that activity over a 30-year period will be roughly $380,000.

The next alternative that we developed was extraction of the groundwater, on-site treatment of that groundwater, and discharge of the treated groundwater to surface water. Which was that drainage ditch that runs around the southern edge of the property.

In terms of treating the groundwater, we had different ways that we could do that. We could do carbon absorption, which is a very common treatment technology where you put your contamination through a carbon filter and at the end you have clean groundwater and the carbon retains the contamination. You can also go a way of biological treatment, which is not too far from what you have in your local wastewater treatment facility.

We have some problem at this site regarding the cleaning up of the aquifer. And these -- and it relates to the -- to the type of contamination we have there, and -- and the geology that we have at the site. And the first one that we have is that creosote, as I mentioned before, tends to bind pretty tightly with the soil particles. So it is very difficult to clean

up areas where we have creosote contamination. And our experience has been that in places where we have topical contamination we pretty much can pump the water for many, many, many years and still there will be some residue creosote in the water. So that's -- that's very unlikely that we'll be able to clean up that portion of the aquifer containing creosote.

However, there is another portion of the aquifer, and that was the benzene area I showed you before in green, and that area is -- we would like it to be clean. And about -- well, before we start actually pumping and treating, we would like to try some things which have been tried at other sites to clean up groundwater. And we would like to see whether technology such as bioremediation would work for the benzene, specifically. We have seen that sometimes benzene can be biodegrated. By treating the soils you provide the material with some help. Like in some cases you can provide oxygen or nutrient to the bacteria and that helps to clean up the water.

So this is one of the things that we have to try before we start pumping and treating to see how much of that we can -- how much contamination reduction we can achieve that way. If not, you know, you know, we will be then pumping and treating.

Our first concern is to make sure that the plume doesn't move from the site, it doesn't leave the site and move anywhere. And that's -- that's our first priority. And once we made sure that that's done, then we -- we have time to address the groundwater either through pumping it, to pumping and treating, or to using some of these natural attenuation processes which might get us the same type of attenuation, at a more lower cost.

For the second alternative we have extracting the water, doing on-site treatment and then sending the discharge to a POTW, which is your local wastewater treatment facility.

And those are the two alternatives that we have for the groundwater.

The costs associated with those two alternatives are two million, pretty much. The differentiation of the cost estimates are wide enough that there's no significant difference to those numbers. So either alternative would cost about 2 million in capital costs, and the alternative, the alternative for on-site treatment and the discharge of surface water, will take -- cost about ten million.

You can see there is a long-term operation and maintenance cost of the wastewater treatment facility.

For the -- the discharge to a POTW, the total cost is about $9.5 million, that's including the operation and maintenance over a 30-year period.

The other media that we are addressing is surface water sediments, and again we have three alternative, the first one being no action, which we're again required to include. And the cost of just monitoring the sediment contamination will cost -- will be roughly about 277,000 over a 30-year period. The other alternative that we have is the first one, on-site treatment of those sediments, using the same thermal desorption system that we're going to be using for the GCL property soils.

As you might remember from before, last summer we selected the remedy for the soils which actually includes excavation of the soils and treating them on-site using that thermal desorption system. Since the sediment has the same type of contamination, you could excavate the sediments and run them through the same treatment system as you -- as you've already assigned for the soils. The cost of doing that will be roughly $300,000.

If you were to take the same sediments and you were to send them off site to a private treatment and disposal facility, that would cost you roughly

$820,000.

So those are -- we have three alternative, then, for groundwater, and three for surface water sediments.

Do you have any questions at any point, please feel free to interrupt me.

The next thing that we did was we put those six alternative through a detailed evaluation process, and for doing that we have a set of criteria that include nine elements. And this is what is required by law for us to do. The first criteria is overall protection of human health and the environment. Second one, in compliance with all applicable regulations. The third one is long-term effectiveness and permanence. The next one is reduction of toxicity, mobility, or volume through treatment. Next one is short-term effectiveness, implementability, cost, the state acceptance, and that's New York State acceptance; and the last one, which is the one that we are here for, is community acceptance.

So we put our alternatives through that nine criteria process. And based on that we are recommending that we implement on the site the second alternative for the groundwater, which is extracting the groundwater and treating the groundwater on-site with the discharge of the treated groundwater to

surface water. And we are proposing that we implement on-site treatment of the sediments with the soils on-site.

So those -- those two items must constitute our preferred alternative for the site, and we will -- we would like to hear from you in terms of what you think of cleaning of the property using those -- those two alternatives.

MS. ECHOLS: Finished?

MR. RAMOS: I think that's pretty much it, yeah.

MS. ECHOLS: Okay, we're gonna open up for questions and answers. Please state your name loudly so the stenographer can record it properly.

Any questions? Let me turn on the lights.

Don't be shy now.

AN ATTENDEE: Are you gonna further investigate the possibility of using our wastewater treatment facility?

MR. RAMOS: Yes.

AN ATTENDEE: Instead of this, you know, as John Woodisheck expressed earlier?

MR. GARBARINI: Yeah. I guess based upon the meeting that we had this afternoon it sounded like John was going to be sending in a comment letter to us.

AN ATTENDEE: I just thought the people here

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might like to know that, that the thing is even though these are your recommendations at the moment, John Woodisheck, the village engineer, indicated that he thought it could be done more cost effectively by putting it through our wastewater treatment plant, there are certain details that would have to be worked out, but. I thought the people should know that.

MR. GARBARINI: Yeah, I think that's very important. As with any of the alternatives that were mentioned there, the people here could express their desire for us to implement any one of those, but I think the Town's willingness to allow us to use the POTW is a very important consideration for us. And I guess John will be putting something in writing to that effect.

AN ATTENDEE: Right.

MR. GARBARINI: It had seemed a lot more uncertain to us going back a few months ago whether there would be the ability to use the POTW. But if we could get something in writing.

AN ATTENDEE: John will get something to you in writing.

MR. GARBARINI: And I guess actually in going through our cost analysis we had used the higher end range of treatment costs for going through the POTW.

But apparently John is indicating that's probably a high end range cost, and maybe he will give us some additional cost information. That may make that alternative the less costly or significantly less costly than the one we're currently proposing.

AN ATTENDEE: Okay, thank you.

MR. GARBARINI: I guess, I guess one thing I just can't emphasize too much here regarding the groundwater remedy is the fact that when we deal with pump and treat systems, we really are dealing with some great unknowns as to how long it might take to clean up an aquifer and how effective actual pumping and treating might be. We get into a lot of these cases where we have dense, nonaquous phase liquids on-site, and as Carlos has mentioned we found out that it could take, you know, centuries to clean them up. So that's a very, very important consideration. We do have the benzene plume here, which looks like it might be manageable. And we're really gonna start to target our efforts at cleaning that benzene plume up. But again, during the design phase we'll be doing greater investigation of the subsurface.

AN ATTENDEE: Good question.

MR. GARBARINI: And that could definitely impact the type of remedy we ultimately implement here.

We had stated that we would try to achieve the ARARs, which are basically drinking water standards for the groundwater. But it may not actually be possible to achieve those levels. So that's an important consideration in selecting a remedy as well as how long we actually operate the system that is designed to achieve those levels.

AN ATTENDEE: I should point out that if it were feasible to use the wastewater treatment plant, we -- we aren't proposing that we lock you into a long-term contract, because at some time you -- at some point decide that you didn't need to do it anymore or whatever. So there'd be that flexibility built into the agreement, which -- which could be lived -- lived by by both parties. I'm sure we could work that out.

MR. GARBARINI: Okay.

AN ATTENDEE: We aren't particularly interested in -- I mean this isn't baseball, but this is, you know.

MR. GARBARINI: Right. Right.

AN ATTENDEE: Go on strike?

MR. GARBARINI: As I had mentioned to you earlier, sometimes we're a little bit reluctant to go ahead and select a remedy that involves sending the discharge off to a POTW --

AN ATTENDEE: Right.

MR. GARBARINI: -- when we really don't have a firm commitment on behalf of the town. Certainly as you understand with potential change in administrations and all that, we have to take that all into consideration. So the stronger opinion we get from you on that end of things the better the likelihood that we would, you know, select that alternative.

AN ATTENDEE: Well, it's in our best interest as taxpayers to keep the costs down as much as possible, and if we can -- and we have the capacity at our treatment plant and it's doable from your standpoint, why not. So.

MR. GARBARINI: I appreciate that.

AN ATTENDEE: James Carr. I assume that area down there will be locked as far as further usage for quite a period of time for anything else?

MR. GARBARINI: The site?

AN ATTENDEE: That GCL will be a 30-year plan?

MR. GARBARINI: No, not necessarily.

AN ATTENDEE: Okay.

MR. GARBARINI: Basically the key thing that we are concerned about is getting the soils and the leftover creosote scraps of wood out of there, basically, and treat it. And then obviously if --

depending upon what our ultimate groundwater remedy looks like, we're gonna need some space for piping and for the treatment facility itself. So, but aside from that small amount of area, the rest of the property would be useable. After the soil work is all completed.

AN ATTENDEE: I should point out that that area is zoned industrial, and there's -- I can't see anybody's intention of ever zoning it otherwise. I mean it's -- it's all contiguous with other industrial facilities, so it -- there'd be no point, the point being that nobody is going to sell it for a housing development.

AN ATTENDEE: Which wouldn't be recommended by you people anyway.

MR. GARBARINI: Exactly. And I guess we'd be very interested in working with you and trying to get the property back to some sort of use as soon as possible also.

AN ATTENDEE: Let us know who owns it.

AN ATTENDEE: Do you have any -- do you have any target, target dates or time frame, or, am I putting you on the spot?

MR. GARBARINI: Well, you're putting us on the spot, but that's fine. Basically, as Carlos mentioned,

we're about to go through the remedial design process now for the soil treatment system. So generally, you know, that takes us anywhere about -- I'd say about 18 months or so to complete that process. And then I think we were projecting about another year to treat the contaminated soils after that. So I think we're probably looking at about two and a half years from now before the soil work is all done. And in the meantime the design, if we go ahead and move forward with the selection of the groundwater remedy, we would be out there probably doing some significant additional investigatory work to try and figure out exactly how to implement the remedy. And I'd -- I'd say the design of that system would probably be more in the order of maybe two and a half years, two, two and a half years.

AN ATTENDEE: Thank you.

MS. ECHOLS: Any more questions?

AN ATTENDEE: Brent Hollenbeck for the Daily Star. I talked with Carlos last week. I'm still a little unclear as to the total, total cost of the Phase 1 and Phase 2. I know the EPA talked about a 15 million cost at one point, and I wasn't sure if that was just for Phase 1 or if that included Phase 1 and Phase 2, the entire cleanup at the site. Do you have an overall total cost estimate for the work there?

MR. RAMOS: Yes, but you called it Phase 1, this is remedy, we selected last summer for the soils, and that's roughly close to five -- you know, 14 point something, I guess, or roughly about $15 million. That's only for the soils. What we're saying today is the cost for this additional work that needs to be done at the site, and that's -- that's the cost for the groundwater and the sediments, and the groundwater I guess the cost is roughly about ten million over a 30-year period, and for the sediments about $300,000. So you add all that up, I guess we have 15 plus 10, plus 25, plus 300, so it's about 25.3, roughly.

AN ATTENDEE: 25.3 million for the both phases?

MR. RAMOS: Yeah, all the phases.

MR. GARBARINI: That is an estimated cost too. One thing that we've learned since the last public meeting, actually when we came -- arrived at those costs of the $15 million, is that there is the possibility that approximately one-third of the material may be able to go over to the New York State Electric and Gas authority for treatment. We're going to be exploring that option with them based upon some input we got from the community and -- and NYSEG also. So that could result in some significant savings on that front. And again, this -- this estimate for the

groundwater, we're looking at $2 million in capital costs, and then the projected cost for 30 years of treatment bring it up to the $10 million total. So there's -- depending upon what our future investigations reveal, that number could be very different.

MS. ECHOLS: Any more questions? Okay.

MR. GARBARINI: People want a few more minutes to think about things before we close the meeting? See if you have any other questions?

AN ATTENDEE: Does anybody check your risk analysis figures?

MR. RAMOS: We do have our contractor working out the numbers and we have our in-house risk assessor that verify the numbers. So they are checked twice, by our contractors, by ourselves. Plus we brought it up for public comment also.

AN ATTENDEE: So if -- if someone had made a mistake, say, and -- and I guess the one risk area was the groundwater, if someone actually ingested the groundwater?

MR. RAMOS: Yeah.

AN ATTENDEE: That's the one that is requiring this to be cleaned up?

MR. RAMOS: Yes.

AN ATTENDEE: And there's only --

MR. RAMOS: In addition to that risk, the contaminations in the groundwater is above the drinking water standards. So just by being above the drinking water standard, which is a health based number, an action may need to be taken. This just quantifies a number of what would be the risk. But yes, we have a very lengthy internal review and extensive review process, comes from the contractor to us, we review them, we send them also to New York State and they review them.

AN ATTENDEE: So that was two -- there was a risk of 2 in 1,000 or 2 in 10,000 was it, that --

MR. RAMOS: For --

AN ATTENDEE: For drinking the groundwater?

MR. RAMOS: If the groundwater will be roughly at two -- two in a thousand for adults living in the vicinity of the site.

MR. GARBARINI: Lots of time at sites groundwater remedies will just be driven by the fact that levels are above drinking water standards.

AN ATTENDEE: How much, can you reach that -- just from background information for future thought, to reach that 2 in 1,000, how much water did the individual have to drink over how much -- what period

of time?

MR. RAMOS: I don't recall the exact number. But it's -- it considers the amount of water that the person drinks, it includes the body weight, children have a different body weight than adults; it includes the typical contaminated areas, it includes the amount of time, I mean the -- the -- for example, children who were drinking water for a year, that can happen. So there are different -- all these factors are -- are put together into a formal list, then you come up with a calculation on that. The specific numbers, liters of -- of water per day, I don't recall. We can check it out when the meeting's finished, I have the report there. And we can -- do you remember that by any chance, off the top of your head? I'm sorry, do you remember from the top of your head?

AN ATTENDEE: No. It's a reasonable amount. All the -- there is three factors there too, there's -- there's not only ingestion but there's inhalation, if you have volatiles and you -- typical case is in a shower, where it volatilizes and it also contacts with the skin. Through washing of hands and other things. All the parameters that went into the models are in the remedial investigation report.

MR. RAMOS: Yeah.

AN ATTENDEE: And they're all based, as Carlos said, upon body weight, upon number of days in the area, especially when you deal with older children who may be gone. And all those are based upon EPA acceptance standards and practices which we employ quantitative amount.

AN ATTENDEE: But it's just like not casual contact if you --

AN ATTENDEE: They're based on prolonged exposure.

MR. GARBARINI: And lots of cases, I'm not saying for this site that was done, but in a lot of cases standards of acceptances are something like 2 liters a day over the course of 30 years, assuming a lifetime of 70 years, something like that.

AN ATTENDEE: And then there is an increased possibility of the 2 in 1,000 that they could develop some --

MR. RAMOS: That's -- that's a potential risk, doesn't mean that you're gonna get any cancer, that's just a potential risk. And that's just a way for us to assess the potential problems that maybe that will be caused by the site. So it's not that it's gonna happen, but there's a potential that it can happen.

MR. GARBARINI: Especially, as you know, we've

all discussed before, no one is currently drinking the groundwater at the site, and it is zoned industrial. So.

MS. ECHOLS: Okay. Any more questions?

AN ATTENDEE: Thank you for the presentation and the opportunity to ask questions. Appreciate your coming.

MR. RAMOS: As Cecilia mentioned, the comment period ends on March 30th. So if you have any comments you want to put in, you know, on paper, please feel free to do that. And send it to us, we'll be happy to include that in our responsiveness summary section of the record of decision. Or, you know, just a comment, if you want to call us up and just let us know about it, that's fine.

AN ATTENDEE: Who reads that?

MR. RAMOS: Who reads what?

AN ATTENDEE: Reads the public comment.

MR. GARBARINI: Basically the way the process works is the public comments will come in to Carlos and Cecilia, either written or verbal here tonight, then there will be -- the responsiveness summary will be prepared. It usually goes -- that's part of a larger document called the record of decision. And a record of decision is the document that provides a conceptual

plan for the remedy, it actually selects the remedy that's gonna be implemented, and that's signed by the highest ranking official in the Region II office, the regional administrator. And so the entire document generally goes through the loop all the way up the chain of command, so a lot of people read it.

AN ATTENDEE: Well, what just appears to me is that you've already got -- you've got those nine criteria, you've already made your decision, we've got public comment tonight, it's kind of after the fact.

MR. GARBARINI: No. No. That's not the case. The idea, that's why we're using the term the preferred alternative. We're saying that that's what's preferred at this point in time. We've basically taken our -- we've -- we've figured out what the nature and extent of contamination is, we have determined what the risks are, we have determined that there are some unacceptable risks and some levels of contamination in the groundwater that look like they need remediation, we've looked at different alternatives for cleaning up the site to acceptable levels, and now what we're doing is saying based upon our evaluation of those alternatives we are preferring the one alternative for the groundwater, alternative two, and alternative three for the -- alternative two for the soils -- sed -- I'm

sorry, surface water sediments also. But that's why we're soliciting comments, because we could ultimately change that when we sign the record of decision. And that would also be documented, any significant changes would be documented in the record of decision.

MR. RAMOS: I just -- I mean we take comments very seriously. Last year we did modify the remedy between -- the remedy for the soils to incorporate the comments that we received here. So, you know, we do indeed take very seriously your comments. And in many cases we will modify or change remedies based on that.

MS. ECHOLS: Sir?

AN ATTENDEE: Glen Umbra, from Unadilla. Do you -- it says here in the risk assessment, it just says potential excess cancer risk for GCL related only. There seems to be a lot more, you know, chemicals, metals in there other than what is just from the polyaromatic from the plant itself. Are you gonna -- are you doing anything with these other, you know, the other high metal con' -- you know, concentrations that are in there? Is there any risk from them being there?

MR. RAMOS: You talking about the metals -- excuse me, let me just put that table up. Okay. Here we are. Yes. Your comment specifically about the non-GCL risk?

AN ATTENDEE: Right, well, you've only -- you've only covered -- there's only so many things from the GCL plant that's on the -- in the ground there.

MR. RAMOS: Yeah.

AN ATTENDEE: There seems to be a heck of a lot more with your volatile organics and your metals that are in there.

MR. RAMOS: That's true.

AN ATTENDEE: Are you taking that into consideration with these risks?

MR. RAMOS: Yes, it is. When we have the risk that we calculated for total, which is this -- this column here, we have total risk, it includes everything; includes metal, volatile organic compounds, all the contamination that we found there, which is -- which isn't the less contaminant of concern. Let me just backtrack a bit here. You can see this is more from this figure. These are the contaminants of concern. You can see quite a few of the contaminants have to be more clear asterisks next to it. And there's a note at the end to say not a contaminant of concern when Route 8 landfill wells are excluded. And what that means is that those were contaminants which were included in the risk assessment for total risk. But we know that they are not site related. So that,

to answer your question, we have, yes, you're right, there are many other contaminants which are not GCL site contaminants. But they were indeed included when we calculated the total risk.

AN ATTENDEE: You already have the Route -- the Route 8 site's already there, you're gonna be setting up another site, another whatever you want to call it, on that site, the GCL site, to --

MR. RAMOS: You're talking about groundwater restoration system.

AN ATTENDEE: Right.

MR. RAMOS: Exactly.

AN ATTENDEE: So you're gonna be more or less, are you gonna be working hand in hand with the other one to be remediating that site? Of everything?

MR. RAMOS: From the very beginning, for example, we went to Una-Lam and asked them for the information that they have in the groundwater. They have a very extensive network of -- of monitoring wells. So from the beginning we went there to say, you know, you have wells in the area, can we have your data. So they supply us with data. After we examine that data we say, you know, we want samples on your wells as part of your investigation. So we use -- we used their wells and took samples for us. And we used that to determine

what was site related and what wasn't site related. And also determine the full extent of contamination from the GCL site.

After that the Route 8 landfill was in the process of putting together groundwater extraction and treatment system, they have remediation system on their -- under the -- under the New York State Department of Environmental Conservation oversight, which is actually addressing groundwater contamination, they're already there pumping their own water and treating the groundwater. And we certainly -- we will continue to make efforts in the future to make sure that one system doesn't interfere with the other system, second, make sure that whatever they -- you know, we do, just addresses our plume, if they're doing something to help us then we don't have to redo it.

Certainly as more information is developed from their system and more information is developed from our system, we will make sure that -- that both systems are -- are operating in the fashion that they compliment each other and they don't actually interfere one with the other. So there will be a lot more coordination in the future as we move from the design into the actual remedial action phase.

AN ATTENDEE: Okay. What about the -- you said over land flow, you're gonna be -- that was one option of pumping it out and then just over land flow to the -- after you treat it?

MR. RAMOS: Discharging into the drainage ditch.

AN ATTENDEE: The drainage, where does that flow?

MR. RAMOS: That flows eventually through the Una-Lam and further down the line to the Susquehanna River. And that's the same point where -- actually where that landfill is -- is discharging their treated water.

AN ATTENDEE: Okay. My -- my -- I guess what I was asking is there --

MR. RAMOS: I'm sorry.

AN ATTENDEE: Is there a potential risk for the farther on, like the back River Road and on the back side of the airport farther on down Gifford Road?

MR. RAMOS: No, we didn't find any contamination outside, as a matter of fact we have a well which is close to the railroad tracks, let me just pull the other figures with the nice colors on.

MR. GARBARINI: Are you concerned about the existing contamination or contamination that might be caused by our discharge?

AN ATTENDEE: Both. Both from, you know,

going -- it would be heading -- well, this is north so it would be heading toward west, toward the back River Road and back of the airport. Where there's a farm back that way.

MR. RAMOS: From groundwater or from discharged water?

AN ATTENDEE: Discharge water.

MR. RAMOS: Okay, the water which is gonna be discharged somewhere around this drainage ditch here. And we'll meet all -- all the cleanup standards, that's the Federal Government and the state required to make sure that doesn't have any impact in the -- in the eco system or in the drinking wa' -- in the surface water or supposed to be made for the underlined.

MR. GARBARINI: You could probably -- you could drink the water that we're gonna be discharging in there.

MR. RAMOS: Basically many times it's - it's more cleaner than drinking water.

MR. GARBARINI: Yeah.

MR. RAMOS: You know, sometimes -- sometimes some of these cleanup numbers are more stringent than drinking water standards. So. It is extremely good quality water. So, and that's -- I mean that's for the discharge.

As of contamination of the property, so far we haven't found any GCL related contamination of the groundwater outside the property, there is some contamination in the area, in the groundwater, but it's not site related. It's probably that renewed program with the VOCs for the Route 8 landfill, and that's, as I mentioned before, being addressed, they're now operating groundwater pump on two different systems so hopefully that will resolve significantly that problem.

That's -- I mean creosote, you know, has a good side and a bad side. You know, the -- the bad side is that once it gets into the groundwater it's very hard to clean. But the good side is that it doesn't move freely much. So once it gets there and reaches a certain level it really doesn't move much more. Doesn't move more, much, it will stay pretty much put. And that's why after all these years at the site you only have, you know, some very limited areas of groundwater contamination.

MR. GARBARINI: They really -- our primary concern too is making sure that the contaminants don't migrate off site. So the key thing is to make sure everything is contained. I mean we could -- we could ultimately just end up in designing some sort of remedy where we made sure if the contaminants aren't already

contained, just made sure that they don't migrate off site. And then perhaps when we look at the pumping and treating we may find out that hey, we're really not doing the groundwater any good by continuing to pump and treat. So let's just hold our horses and make sure that we contain the contamination. Because --

AN ATTENDEE: The groundwater flow actually does flow that -- toward the west, right?

MR. RAMOS: It flows towards the Susquehanna River.

AN ATTENDEE: To the northwest, right?

MR. RAMOS: No, actually it runs toward -- funny thing is that groundwater movement there is a bit complex in terms of shallow aquifer is a little bit different than the deep aquifer in a different direction. But generally it moves toward the Susquehanna River. This is north here, the Susquehanna is near north, kind of northeast kind of fashion. So this is most of the general flow of the groundwater there. In different areas it moves a bit different, but it moves always toward the Susquehanna.

AN ATTENDEE: Where does your ditch go you're talking about?

MR. RAMOS: It will be on-site, it will --

AN ATTENDEE: On-site, where does it -- it's got

to go somewhere, is it just gonna be a lagoon?

MR. RAMOS: Exactly, it would be on the edge -- you mean the collection?

AN ATTENDEE: Where is it gonna go eventually, the ditch?

MR. RAMOS: Oh, the ditch where we're gonna be discharging the water? Yeah, that's the --

AN ATTENDEE: It isn't gonna go north towards the Susquehanna.

MR. RAMOS: Eventually, eventually goes to the Susquehanna.

AN ATTENDEE: Yeah, it will, but it has to go west, as he says, before it ever gets there. East, I'm sorry, I'm sorry.

MR. RAMOS: Yeah, this is additional here, the discharge to this point, let's say discharge here the water would direction this way.

AN ATTENDEE: It's gonna go that way.

MR. RAMOS: That way, until eventually --

AN ATTENDEE: That's toward the town wells.

AN ATTENDEE: On the other side of Route 8.

AN ATTENDEE: Okay, okay, now I see.

AN ATTENDEE: It goes both ways, doesn't it? Right about -- right about where your pen is it starts going the other way, doesn't it?

MR. RAMOS: You are down here, this is a wetland here, if you are within the wetland area, it goes that way.

AN ATTENDEE: Right.

MR. RAMOS: It goes toward the west.

AN ATTENDEE: How far?

AN ATTENDEE: It's heading west, and the groundwater flows toward the back River Road toward the barn, toward that farm.

AN ATTENDEE: No.

MR. RAMOS: That water moves towards the Susquehanna that way.

AN ATTENDEE: Surface water does.

MR. RAMOS: Surface water. There's a point here, there's like a barrier here, from -- from some point here down the groundwater moves -- moves east. At some point here it moves west.

AN ATTENDEE: Surface water.

MR. RAMOS: Surface water we're talking about, yeah. Surface water. So if it went to the chart, it would chart someplace here, which would eventually go towards this, from the drainage ditch to that Una-Lam, and eventually it would reach into the Susquehanna River.

But as I mentioned before, the water that will be

discharging there is -- is many cases cleaner than drinking water. So we -- you know, we are not discharging -- if we were to pump and treat, you know, we would not be discharging any water that have contamination that would affect either the biol -- the biology of the stream or people down the line.

MS. ECHOLS: Any more questions?

Okay, I guess we're gonna wrap it up. And as Carlos said, the public comment period ends on March 30th, if you have any comments you can write into our office, our address is in the proposed plan. And thanks so much for coming out.

MR. GARBARINI: Thank you very much.

MR. RAMOS: Thanks a lot.

(Proceedings were adjourned at 8:06 p.m.)

C E R T I F I C A T E

IN THE MATTER OF: Public Meeting
GCL Tie & Treating Superfund Site

ON: Wednesday, March 8, 1995

BEFORE: RUTH I. LYNCH
Registered Professional Reporter

This is to certify that the foregoing is a true and correct transcript, to the best of my ability, of the stenographic minutes of a public hearing held in the above-mentioned matter, on the above-mentioned date, and of the whole thereof, taken by Ruth I. Lynch, Registered Professional Reporter.

EMPIRE COURT REPORTERS

Signed this 23rd day of March, 1995

By Ruth I. Lynch RPR
Ruth I. Lynch
Registered Professional Reporter

Telephone: (607) 724-8724

APPENDIX E

LETTERS SUBMITTED DURING THE PUBLIC COMMENT PERIOD

FAXED & MAILED

VILLAGE OF SIDNEY

Sidney Civic Center, 21 Liberty Street
Sidney, New York 13838
Phone (607) 561-2324
Fax (607) 561-2310

March 21, 1995

Mr. Carlos R. Ramos
Remedial Project Manager
US Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866

Re: GCL Tie & Treating Site Operable Unit 2
Village of Sidney, Delaware County, New York

Dear Mr. Ramos:

The following comments are provided in review of the above referenced project:

1. Ground water contaminant boundaries in the shallow intermediate and deep zones have apparently not been established and confirmed as evidenced by contamination in perimeter wells. At the preliminary meeting on March 8, 1995 it was noted by EPA representatives that contamination due to GCL site activities have been established and that contamination especially in the wells along the northern perimeter is attributed to the Rt. 8 landfill project. As there are residential ground water users located northwesterly of the site the potential impact to these users due to offsite migration whether GCL or non GCL related should be considered.

2. With respect to alternatives evaluation consider including monitoring of existing down stream wells in all alternatives including "no build" for reasons mentioned above.

3. After soils are remediated through operable unit 1 and 2 and the ground water recovery system is in place, can the land be utilized?

4. Ref. page 12 of Summary: The goal of alternative GW-3 referred in the last paragraph of the alternative description is not stated. I would suggest inserting "the goal of alternate GW-3 is -----" prior to last paragraph (complete the statement as appropriate).

5. Although the closest connection point to the public sewer system on the south side of Delaware Avenue, probably the most expedient connection point would be to the public sewer on Unalam property running in a north-south direction in the vicinity of the Unalam water well which sewer continues along the southerly side of the railroad near MW-04 shown on figure 1-12 (see attached sewer drawing).

6. Can EPA furnish the anticipated makeup (even worst case) of the discharge following separation and manganese pretreatment, i.e., what would be discharged to the public sewer under alternate GW-3?

7. EPA has identified two basic technologically feasible remediation alternative with treatment onsite (GW-2) and treatment offsite at the Village POTW (GW-3). Carbon adsorption and biological treatment would be options within the GW-2 alternative.

   $5/1000 gal. was used as the treatment cost at the POTW which implies $92,000/yr. O&M cost.

   The current rate for sewage treatment is $2.26/1000 gal. At 30 gpm this rate would imply $35,635/yr. O&M cost.

   The Present Worth (P.W.) of $92,000/yr., 30 yrs., 7% = $1,141,628
   The P.W. of $35,635/yr., 30 yrs., 7% = 442,194
   P.W. difference = $699,434

   Therefore, the potential P.W. of alternate GW-3 = $8,818,766

   Both alternatives, GW-2 and GW-3, are expected to require phase separation and pretreatment. The GW-2 alternative may require bench or pilot studies for: bioreaction sizing, nutrient addition, media replacement; provision for removal of excess biomass, recycling of biomass, and/or excess biomass disposal; contaminant degradation levels evaluation with further bench or pilot studies to determine if carbon adsorption would be needed to polish the effluent prior to surface discharge. In other words, the selection of GW-2 is not without possibly significant further investigation.

   With respect to alternative GW-3 (treatment at the Village POTW): 30 gpm is small in comparison with the normal 416 gpm average plant flow and is not expected to interfere with the treatment process. Discharges from the POTW as in the case of GW-2 are liquid (effluent), solid (sludge) and air. Plant effluent is discharged to the Susquehanna River via a SPDES permit regulated by NYSDEC. Dewatered sludge is disposed of at the Delaware County landfill regulated by Delaware County and NYSDEC. Air discharges are not regulated.

If EPA requires a long term commitment on behalf of the Village to accept the effluent, the Village prudently should:

1) Get a formal opinion on the likely impact on our effluent and sludge discharges based on a profile of the expected influent.
2) Obtain concurrence of NYSDEC with respect to the SPDES discharge permit.
3) Obtain concurrence of Delaware County and NYSDEC with respect to the sludge discharge to Delaware County landfill.

I expect that Delaware County would require that our sludge not exceed land application criteria and I have no reason to believe that it would exceed this criteria as a result of accepting this discharge.

The revenue to the Village of Sidney would benefit the sewer fund budget. One of the reasons and probably the primary reason that the Village has not implemented water metering for residential customers is due to the loss of revenue that would take place in the switch from flat rate to metered rate. The revenue accrued from accepting this flow could help make complete water metering feasible thereby providing a secondary benefit to the Village and help meet the NYSDEC objective of metering.

We request that EPA consider making alternative GW-3 the preferred alternative.

It is understood that with preliminary conceptual approval the Village would pursue the three items outlined above in a timely fashion and would complete same on a mutually agreed upon schedule.

We would appreciate your consideration and response, and if you have any questions, please contact me.

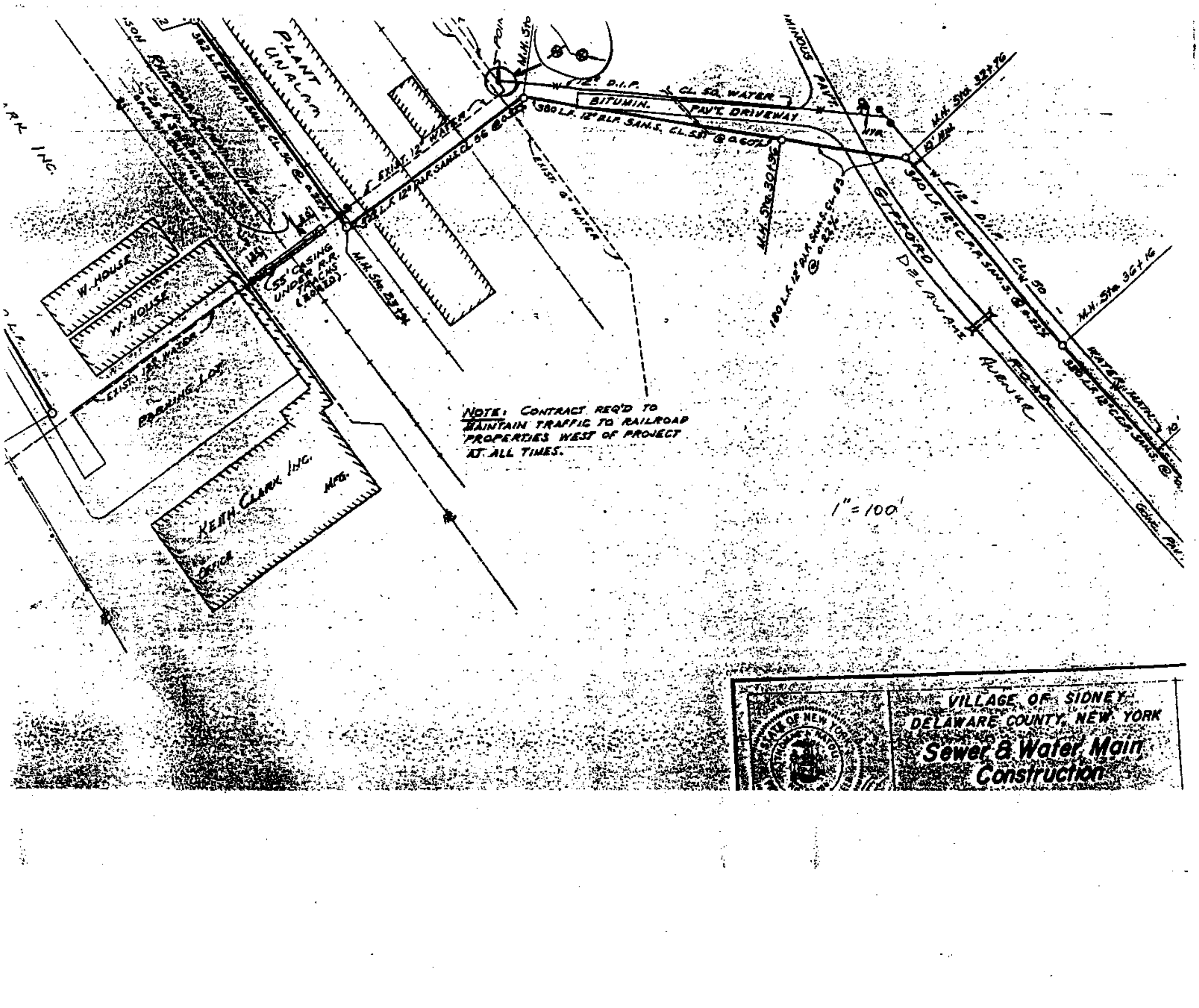
Sincerely,
VILLAGE OF SIDNEY

John J. Woodyshek, P.E.
Village Engineer

JJW:hj

Attachment

cc: Mayor Davis
Trustees
Frank Holley


PLANT
UNALAM
BITUMIN.
PAV'T DRIVEWAY
12" D.I.P.
CL. 50 WATER
EXIST. 12" WATER
EXIST. 8" WATER
M.H. Sta. 30+56
M.H. Sta. 33+96
M.H. Sta. 36+16
12" D.I.P.
GIFFORD
DELAWARE AVENUE
55' CASING UNDER R.R. TRACKS (BORED)
W. HOUSE
W. HOUSE
EXIST. 12" WATER
PARKING LOT
KEITH CLARK INC.
MFG.
OFFICE
NOTE: CONTRACT REQ'D TO MAINTAIN TRAFFIC TO RAILROAD PROPERTIES WEST OF PROJECT AT ALL TIMES.
1"=100'
VILLAGE OF SIDNEY
DELAWARE COUNTY, NEW YORK
Sewer & Water Main Construction

NYSEG

March 17, 1995

Mr. Timothy Fields, Jr.
Deputy Assistant Administrator
Office of Solid Waste and Emergency Response
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Fields:

It was indeed a pleasure meeting you at Temple University's workshop on "Impact of Environmental Remediation Requirements on Inner City Revitalization" and listening to your update on the Superfund program and the Brownfield Redevelopment Program. As we had discussed, I've attached information for your review on what NYSEG is doing for remediation of former Manufactured Gas Plant (MGP) sites.

NYSEG has obtained permits from NYSDEC to burn coal tar soil (CTS) from MGP sites in our utility boilers. In the last six months, NYSEG has provided an environmentally safe and economic remediation technology for clean-up of four MGP sites in the northeast.

Maybe just a drop in the bucket when considering the estimated 1,500 to 2,500 sites that may exist nationwide, but it was only six months, and doesn't include the other utilities across the country with similar capability.

The biggest asset to this movement has been the EPA's approval of EEI's MGP site remediation strategy. Rather than having to manage the MGP contaminated soils as a characteristic hazardous waste, the strategy allows for blending the other less contaminated material on site to render the entire volume non-hazardous. As a result, the utility can transport and burn the material as a solid waste. In addition, the cost associated with remediation is significantly reduced. As the cost of remediation goes down, this is an incentive to clean up more sites.

If the strategy developed by EEI for MGP sites could be utilized on other contaminated sites, similar remediation activity would begin to take place. Many sites have contaminated material of high BTU value, making them ideal for combustion in

APPENDIX VI

STATISTICAL SUMMARY OF ANALYTICAL RESULTS

Table 1

CHEMICAL SUMMARY STATISTICS FOR SOILS - VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Chloromethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Bromomethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Vinyl chloride	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Chloroethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Methylene chloride	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
Acetone	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
Carbon disulfide	31	1	30	1	0	0.03	130.00	130.00	6.00	8.0778	12.4032	22.6103	2.0891	0.6958	31	5.0516	12.9169	13.4325	
1,1-Dichloroethene	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
1,1-Dichloroethane	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
1,2-Dichloroethene	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
Chloroform	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
1,2-Dichloroethane	31	2	29	1	0	0.06	11.00	18.00	6.00	6.9307	7.7419	5.1799	1.9360	0.4082	31	5.2624	9.1279	8.6537	
2-Butanone	31	1	30	1	0	0.03	130.00	130.00	6.00	8.0778	12.4032	22.6103	2.0891	0.6958	31	5.0516	12.9169	13.4325	
1,1,1-Trichloroethane	31	1	30	1	0	0.03	5.00	5.00	6.00	5.9255	6.8548	4.9970	1.7793	0.5325	31	4.1371	8.4871	8.2565	x
Carbon tetrachloride	31	0	31	0	0	0.00	1.00	1.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Bromodichloromethane	31	3	28	3	0	0.10	0.00	0.00	6.00	6.2798	7.0161	4.8794	1.8373	0.4171	31	4.7395	8.3207	7.8976	x
1,2-Dichloropropane	31	0	31	0	0	0.00	2.00	2.00	6.00	6.2798	7.0161	4.8794	1.8373	0.4171	31	4.7395	8.3207	7.8976	x
cis-1,3-Dichloropropene	31	1	30	1	0	0.03	2.00	2.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Trichloroethene	31	1	30	1	0	0.03	2.00	2.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Dibromochloromethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
1,1,2-Trichloroethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Benzene	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
trans-1,3-Dichloropropene	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Bromoform	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
4-Methyl-2-pentanone	31	1	30	1	0	0.03	6.00	6.00	6.00	6.3541	6.9355	4.6935	1.8491	0.3384	31	5.0569	7.9840	7.5276	x
2-Hexanone	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Tetrachloroethene	31	1	30	1	0	0.03	2.00	2.00	6.00	6.2486	6.9839	4.8828	1.8324	0.4167	31	4.7173	8.2771	7.8557	x
1,1,2,2-Tetrachloroethane	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Toluene	31	13	18	9	0	0.42	1.00	89.00	6.00	7.2804	12.3710	18.1723	1.9852	0.9384	31	3.8655	13.7121	16.9206	
Chlorobenzene	31	0	31	0	0	0.00	0.00	0.00	6.00	6.5063	7.1452	4.7944	1.8728	0.3593	31	5.1057	8.2912	7.8250	x
Ethylbenzene	31	5	26	4	0	0.16	2.00	100.00	6.00	7.2116	11.3548	18.8473	1.9757	0.7416	31	4.3726	11.8940	12.6898	
Styrene	31	3	28	2	0	0.10	11.00	120.00	6.00	7.2119	11.3548	21.7026	1.9757	0.6734	31	4.5786	11.3598	11.6795	
Xylenes	31	5	26	2	0	0.16	11.00	560.00	6.00	9.5292	39.7742	109.2204	2.2544	1.2594	31	4.0743	22.2871	39.6264	

NOTES:
Concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 1

CHEMICAL SUMMARY STATISTICS FOR SOILS - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stder(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Phenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
bis[2-Chloroethyl]ether	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2-Chlorophenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
1,3-Dichlorobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
1,4-Dichlorobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
1,2-Dichlorobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2-Methylphenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2,2'-oxybis-1-Chloropropane	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
4-Methylphenol	29	2	27	2	2	0.07	53.00	1600.00	195.00	222.8964	436.8276	1101.9699	5.4067	0.7903	29	130.7788	379.8998	423.4977	
N-Nitrosodi-n-propylamine	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Hexachloroethane	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Nitrobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Isophorone	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2-Nitrophenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2,4-Dimethylphenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
bis[2-Chloroethoxy]methane	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2,4-Dichlorophenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
1,2,4-Trichlorobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Naphthalene	138	47	91	28	20	0.34	22.00	92000.00	165.00	245.4386	2566.5145	13377.9568	5.5030	1.3191	138	100.7926	597.6636	774.1675	
4-Chloroaniline	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Hexachlorobutadiene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
4-Chloro-3-methylphenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2-Methylnaphthalene	30	8	22	7	1	0.27	50.00	36000.00	197.50	260.5522	1528.7333	6532.2726	5.5628	1.1940	30	116.4235	583.1081	962.0109	
Hexachlorocyclopentadiene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2,4,6-Trichlorophenol	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2,4,5-Trichlorophenol	29	0	29	0	2	0.00	0.00	0.00	475.00	592.5723	1469.8276	3750.1475	6.3845	0.8975	29	323.4150	1085.7317	1314.9355	x
2-Chloronaphthalene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
2-Nitroaniline	29	0	29	0	2	0.00	0.00	0.00	475.00	540.5496	1442.9310	3758.6376	6.2926	0.9682	29	281.2871	1038.7747	1341.5739	x
Dimethylphthalate	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Acenaphthylene	139	24	115	22	19	0.17	35.00	11000.00	165.00	176.8729	318.7626	1078.5680	5.1754	0.6475	139	114.2701	273.7728	242.2552	
2,6-Dinitrotoluene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
3-Nitroaniline	21	0	21	0	10	0.00	0.00	0.00	490.00	660.4250	1859.7619	4371.5159	6.4929	1.0403	21	327.3428	1332.4295	2086.6320	x
Acenaphthene	137	35	102	27	21	0.26	34.00	410000.00	165.00	216.6689	4347.5547	35846.9136	5.3784	1.2673	137	92.1478	509.4578	629.2528	
2,4-Dinitrophenol	29	0	29	0	2	0.00	0.00	0.00	475.00	592.5723	1469.8276	3750.1475	6.3845	0.8975	29	323.4150	1085.7317	1314.9355	x
4-Nitrophenol	29	0	29	0	2	0.00	0.00	0.00	475.00	592.5723	1469.8276	3750.1475	6.3845	0.8975	29	323.4150	1085.7317	1314.9355	x
Dibenzofuran	30	8	22	7	1	0.27	69.00	31000.00	195.00	261.4305	2083.1333	7211.1072	5.5662	1.3121	30	107.8696	633.5971	1233.1480	
2,4-Dinitrotoluene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Diethylphthalate	29	1	28	1	2	0.03	110.00	110.00	195.00	240.5143	591.5517	1498.1906	5.4828	0.8998	29	131.0644	441.3642	535.5947	x
4-Chlorophenyl phenylether	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Fluorene	139	37	102	28	19	0.27	19.00	240000.00	165.00	210.8038	3023.7698	21223.5957	5.3509	1.2796	139	88.9090	499.8168	623.0291	
4-Nitroaniline	28	0	28	0	3	0.00	0.00	0.00	480.00	600.1587	1507.5000	3813.3711	6.3972	0.9113	28	324.5192	1109.9203	1372.8563	x
4,6-Dinitro-2-methylphenol	29	0	29	0	2	0.00	0.00	0.00	475.00	592.5723	1469.8276	3750.1475	6.3845	0.8975	29	323.4150	1085.7317	1314.9355	x

NOTES:
Concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 1

CHEMICAL SUMMARY STATISTICS FOR SOILS - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
N-Nitrosodiphenylamine	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
4-Bromophenyl phenylether	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Hexachlorobenzene	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Pentachlorophenol	29	0	29	0	2	0.00	0.00	0.00	475.00	592.5723	1469.8276	3750.1475	6.3845	0.8975	29	323.4150	1085.7317	1314.9355	x
Phenanthrene	140	53	87	37	18	0.38	22.00	570000.00	165.00	263.6221	5346.5429	48683.0623	5.5745	1.3511	140	105.9520	655.9252	874.8563	
Anthracene	140	40	100	31	18	0.29	25.00	330000.00	165.00	218.1026	3964.4357	29885.3442	5.3850	1.2478	140	93.9811	506.1521	612.5094	
Carbazole	30	9	21	9	1	0.30	41.00	27000.00	192.50	224.9271	1272.4333	4978.1315	5.4158	1.1885	30	100.8803	501.5071	821.4556	
Di-n-butylphthalate	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
Fluoranthene	143	58	85	36	15	0.41	26.00	980000.00	165.00	324.0151	8356.6923	82059.4096	5.7808	1.4859	143	118.9022	882.9591	1358.0923	
Pyrene	144	60	84	38	14	0.42	49.00	600000.00	165.00	321.0549	5325.5278	50039.9020	5.7716	1.4383	144	121.6650	847.2137	1233.0200	
Butylbenzylphthalate	29	0	29	0	2	0.00	0.00	0.00	195.00	244.6336	593.9655	1497.4433	5.4998	0.8891	29	134.2756	445.6921	535.9449	x
3,3'-Dichlorobenzidine	20	0	20	0	11	0.00	0.00	0.00	187.50	189.3348	189.7500	12.9244	5.2435	0.0678	20	180.8676	198.1984	194.8931	x
Benzo[a]anthracene	143	48	95	32	15	0.34	47.00	190000.00	165.00	258.2713	1949.6294	15945.2828	5.5540	1.1378	143	119.8698	556.4709	614.1456	
Chrysene	142	49	93	32	16	0.35	22.00	210000.00	165.00	279.7824	2521.5282	18321.5524	5.6340	1.2736	142	118.4779	660.6987	816.5507	
bis[2-Ethylhexyl]phthalate	31	10	21	10	0	0.32	40.00	280.00	190.00	215.2594	558.9032	1453.7869	5.3718	0.9773	31	111.3270	416.2206	532.2508	x
Di-n-octylphthalate	28	0	28	0	3	0.00	0.00	0.00	197.50	246.8517	608.3929	1522.8677	5.5088	0.9041	28	134.1323	454.2959	558.3152	x
Benzo[b]fluoranthene	30	8	22	7	1	0.27	240.00	77000.00	205.00	359.5353	3090.3333	13985.9126	5.8848	1.3446	30	145.1344	890.6616	1821.0824	
Benzo[k]fluoranthene	30	9	21	8	1	0.30	150.00	81000.00	205.00	369.6281	3286.3333	14717.5741	5.9125	1.3764	30	146.0415	935.5214	2010.7316	
Benzo(b/k)fluoranthene	113	37	76	20	14	0.33	34.00	12000.00	165.00	282.8221	752.8584	1619.1043	5.6448	1.1627	113	129.0759	619.6998	719.2950	
Benzo[a]pyrene	141	41	100	29	17	0.29	150.00	64000.00	165.00	274.2705	1157.6241	6106.1583	5.6141	1.0364	141	136.3059	551.8784	583.0572	
Indeno[1,2,3-cd]pyrene	139	33	106	19	19	0.24	100.00	14000.00	165.00	230.8309	416.5468	1248.5085	5.4417	0.7431	139	139.8147	381.0966	344.5796	
Dibenzo[a,h]anthracene	137	22	115	16	21	0.16	60.00	8300.00	165.00	200.6938	360.1460	1008.8369	5.3018	0.6604	137	128.5421	313.3449	278.1371	
Benzo[g,h,i]perylene	137	26	111	19	21	0.19	28.00	8700.00	165.00	209.8463	379.7226	985.9136	5.3464	0.7403	137	127.3508	345.7808	312.6985	

NOTES:
Concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 1

CHEMICAL SUMMARY STATISTICS FOR SOILS - METALS
GCL Tie and Treating Site

Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	31	31	0	0	0	1.00	5670.00	14300.00	10100.00	9689.5184	9987.7419	2387.3105	9.1788	0.2568	31	8148.1087	11522.5227	10880.6957	
Antimony	31	1	30	1	0	0.03	10.40	10.40	4.10	3.8572	4.0903	1.4961	1.3500	0.3533	31	3.0391	4.8956	4.6188	
Arsenic	31	30	1	10	0	0.97	4.30	13.60	7.00	6.4865	7.0703	2.2424	1.8697	0.5398	31	4.5065	9.3363	9.1024	
Barium	31	31	0	0	0	1.00	22.80	82.50	39.80	40.1772	43.1290	16.8031	3.6933	0.3808	31	31.0751	51.9453	49.1030	
Beryllium	31	14	17	0	0	0.45	0.22	3.20	0.25	0.3245	0.4202	0.5368	-1.1254	0.5791	31	0.2196	0.4796	0.4737	
Cadmium	31	3	28	0	0	0.10	0.86	1.10	0.35	0.3918	0.4158	0.1859	-0.9370	0.3103	31	0.3178	0.4830	0.4552	
Calcium	31	31	0	5	0	1.00	303.00	14200.00	1070.00	1352.9337	2338.9032	3069.9587	7.2100	0.9977	31	690.1415	2652.2526	3458.7178	
Chromium	31	31	0	0	0	1.00	8.50	23.30	14.00	14.0705	14.4903	3.5234	2.6441	0.2494	31	11.8913	16.6491	15.7304	
Cobalt	31	31	0	0	0	1.00	5.50	17.20	10.10	9.4667	9.8065	2.6825	2.2478	0.2695	31	7.8928	11.3544	10.7134	
Copper	31	31	0	11	0	1.00	10.80	176.00	22.20	24.4416	30.4677	30.3286	3.1963	0.5843	31	16.4793	36.2511	35.8710	
Iron	31	31	0	0	0	1.00	13600.00	32100.00	22200.00	22116.6306	22745.1613	5270.0942	10.0041	0.2458	31	18737.3610	26105.3489	24672.2994	
Lead	31	31	0	31	0	1.00	5.50	46.00	9.80	11.0092	12.2871	7.7355	2.3987	0.4251	31	8.2643	14.6658	13.9356	
Magnesium	31	31	0	0	0	1.00	1500.00	5380.00	3350.00	3336.9784	3429.3548	778.1257	8.1128	0.2459	31	2826.7983	3939.2357	3722.9406	
Manganese	31	31	0	0	0	1.00	114.00	865.00	440.00	395.6301	439.4194	187.4675	5.9805	0.4945	31	283.4069	552.2915	531.8669	
Mercury	31	0	31	0	0	0.00	0.00	0.00	0.06	0.0601	0.0603	0.0056	-2.8121	0.0902	31	0.0565	0.0638	0.0620	x
Nickel	31	31	0	1	0	1.00	13.50	29.60	21.20	21.1514	21.5677	4.2366	3.0517	0.2035	31	18.4383	24.2638	23.0388	
Potassium	31	30	1	0	0	0.97	429.00	1400.00	990.00	835.7229	899.1774	297.1177	6.7283	0.4316	31	624.5892	1118.2275	1063.6061	
Selenium	31	0	31	0	0	0.00	0.00	0.00	0.25	0.3588	0.6052	0.7899	-1.0250	0.9096	31	0.1942	0.6627	0.7977	x
Silver	31	0	31	0	0	0.00	0.00	0.00	0.65	0.5450	0.5739	0.1648	-0.6070	0.3501	31	0.4303	0.6902	0.6511	x
Sodium	31	31	0	0	0	1.00	52.50	412.00	126.00	127.7032	151.2226	96.3311	4.8497	0.5764	31	86.5603	188.4017	185.8991	
Thallium	31	9	22	8	0	0.29	0.19	1.30	0.38	0.3721	0.4715	0.3061	-0.9885	0.7692	31	0.2215	0.6253	0.6785	
Vanadium	30	30	0	0	1	1.00	5.70	20.50	13.20	12.8662	13.4933	4.1003	2.5546	0.3207	30	10.3628	15.9743	15.0851	
Zinc	31	31	0	7	0	1.00	34.10	78.90	57.00	55.6731	57.0097	12.1220	4.0195	0.2266	31	47.7813	64.8682	61.4204	

NOTES:
Concentrations are given in mg/kg (ppm).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 1

CHEMICAL SUMMARY STATISTICS FOR SOILS - PESTICIDES
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
alpha-BHC	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
beta-BHC	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
delta-BHC	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
gamma-BHC	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
Heptachlor	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
Aldrin	29	1	28	1	2	0.03	0.70	0.70	1.00	1.1488	1.4379	1.6461	0.1388	0.5235	29	0.8070	1.6355	1.5989	x
Heptachlor epoxide	27	0	27	0	4	0.00	0.00	0.00	1.00	1.0842	1.1852	0.7947	0.0809	0.3453	27	0.8589	1.3687	1.3030	x
Endosulfan I	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
Dieldrin	28	0	28	0	3	0.00	0.00	0.00	1.98	2.2226	2.7554	3.1376	0.7987	0.5032	28	1.5827	3.1210	3.0453	x
DDE	29	0	29	0	2	0.00	0.00	0.00	2.00	2.2700	2.8017	3.0912	0.8198	0.5071	29	1.6123	3.1959	3.1095	x
Endrin	27	0	27	0	4	0.00	0.00	0.00	2.00	2.2880	2.8574	3.2001	0.8277	0.5246	27	1.6069	3.2596	3.2146	x
Endosulfan II	27	1	26	1	4	0.04	2.20	2.20	2.00	2.0151	2.0444	0.4324	0.7007	0.1576	27	1.8118	2.2412	2.1524	
DDD	30	1	29	1	1	0.03	11.00	11.00	2.00	2.3926	3.0750	3.3862	0.8724	0.5755	30	1.6227	3.5278	3.4942	
Endosulfan sulfate	29	0	29	0	2	0.00	0.00	0.00	2.00	2.2700	2.8017	3.0912	0.8198	0.5071	29	1.6123	3.1959	3.1095	x
DDT	29	3	26	3	2	0.10	1.40	120.00	2.00	2.4937	6.4500	21.8927	0.9138	0.8319	29	1.4226	4.3712	5.0216	
Methoxychlor	26	2	24	2	5	0.08	0.68	39.00	10.25	9.7336	11.1608	6.4096	2.2756	0.6243	26	6.3877	14.8321	15.3039	
Endrin ketone	28	3	25	3	3	0.11	4.00	38.00	2.03	2.6982	4.6500	8.0121	0.9926	0.8075	28	1.5648	4.6524	5.2891	
Endrin aldehyde	29	0	29	0	2	0.00	0.00	0.00	2.00	2.2700	2.8017	3.0912	0.8198	0.5071	29	1.6123	3.1959	3.1095	x
alpha-Chlordane	27	0	27	0	4	0.00	0.00	0.00	1.00	1.0739	1.2889	1.5429	0.0713	0.4314	27	0.8027	1.4366	1.3834	x
gamma-Chlordane	29	0	29	0	2	0.00	0.00	0.00	1.00	1.1588	1.4448	1.6433	0.1474	0.5171	29	0.8176	1.6426	1.6027	x
Toxaphene	29	0	29	0	2	0.00	0.00	0.00	100.00	115.8846	144.4828	164.3349	4.7526	0.5171	29	81.7569	164.2581	160.2730	x
Aroclor-1016	29	0	29	0	2	0.00	0.00	0.00	20.00	22.6999	28.0172	30.9116	3.1224	0.5071	29	16.1233	31.9589	31.0954	x
Aroclor-1221	29	0	29	0	2	0.00	0.00	0.00	40.50	45.9115	56.9828	63.8108	3.8267	0.5133	29	32.4724	64.9124	63.2696	x
Aroclor-1232	29	0	29	0	2	0.00	0.00	0.00	20.00	22.6999	28.0172	30.9116	3.1224	0.5071	29	16.1233	31.9589	31.0954	x
Aroclor-1242	29	0	29	0	2	0.00	0.00	0.00	20.00	22.6999	28.0172	30.9116	3.1224	0.5071	29	16.1233	31.9589	31.0954	x
Aroclor-1248	29	1	28	0	2	0.03	140.00	140.00	20.00	24.3637	32.2241	37.1682	3.1931	0.6068	29	16.1789	36.6891	36.9529	
Aroclor-1254	30	1	29	1	1	0.03	440.00	440.00	20.00	25.0575	41.7500	81.1187	3.2212	0.7356	30	15.2543	41.1607	44.0149	
Aroclor-1260	29	2	27	2	2	0.07	12.00	14.00	19.50	22.0923	27.5862	31.0791	3.0952	0.5262	29	15.4902	31.5082	30.8272	x

NOTES:
Concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 2

CHEMICAL SUMMARY STATISTICS FOR SURFACE WATER - VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Chloromethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Bromomethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Vinyl chloride	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Chloroethane	6	1	5	0	0	0.17	12.00	12.00	5.00	5.7855	6.1667	2.8577	1.7553	0.3574	6	4.5459	7.3631	8.9506	
Methylene chloride	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Acetone	6	0	6	0	0	0.00	0.00	0.00	5.00	6.1343	6.8333	4.2505	1.8139	0.4557	6	4.5106	8.3423	11.4082	x
Carbon disulfide	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,1-Dichloroethene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,1-Dichloroethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,2-Dichloroethene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Chloroform	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,2-Dichloroethane	6	0	6	0	0	0.00	0.00	0.00	8.00	7.9187	8.3333	3.0768	2.0692	0.3430	6	6.2830	9.9802	11.9564	x
2-Butanone	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,1,1-Trichloroethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Carbon tetrachloride	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Bromodichloromethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,2-Dichloropropane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
cis-1,3-Dichloropropene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Trichloroethene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Dibromochloromethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,1,2-Trichloroethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Benzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
trans-1,3-Dichloropropene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Bromoform	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
4-Methyl-2-pentanone	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Hexanone	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Tetrachloroethene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,1,2,2-Tetrachloroethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Toluene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Chlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Ethylbenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Styrene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Xylenes	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 2

CHEMICAL SUMMARY STATISTICS FOR SURFACE WATER - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Phenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
bis[2-Chloroethyl]ether	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Chlorophenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,3-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,4-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,2-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Methylphenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,2'-oxybis-1-Chloropropane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
4-Methylphenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
N-Nitrosodi-n-propylamine	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Hexachloroethane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Nitrobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Isophorone	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Nitrophenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,4-Dimethylphenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
bis[2-Chloroethoxy]methane	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,4-Dichlorophenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
1,2,4-Trichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Naphthalene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	#DIV/0!	1.6094	#DIV/0!	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
4-Chloroaniline	1	0	1	0	5	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Hexachlorobutadiene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
4-Chloro-3-methylphenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Methylnaphthalene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Hexachlorocyclopentadiene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,4,6-Trichlorophenol	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
2,4,5-Trichlorophenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2-Chloronaphthalene	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
2-Nitroaniline	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Dimethylphthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Acenaphthylene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,6-Dinitrotoluene	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	5	12.5000	12.5000	12.5000	x
3-Nitroaniline	5	0	5	0	1	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Acenaphthene	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
2,4-Dinitrophenol	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
4-Nitrophenol	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Dibenzofuran	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
2,4-Dinitrotoluene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Diethylphthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
4-Chlorophenyl phenylether	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Fluorene	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	#DIV/0!	2.5257	#DIV/0!	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
4-Nitroaniline	1	0	1	0	5	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
4,6-Dinitro-2-methylphenol	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 2

CHEMICAL SUMMARY STATISTICS FOR SURFACE WATER - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
N-Nitrosodiphenylamine	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
4-Bromophenyl phenylether	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Hexachlorobenzene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Pentachlorophenol	6	0	6	0	0	0.00	0.00	0.00	12.50	12.5000	12.5000	0.0000	2.5257	0.0000	6	12.5000	12.5000	12.5000	x
Phenanthrene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Anthracene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Carbazole	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Di-n-butylphthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Fluoranthene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Pyrene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Butylbenzylphthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
3,3'-Dichlorobenzidine	1	0	1	0	5	0.00	0.00	0.00	5.00	5.0000	5.0000	#DIV/0!	1.6094	#DIV/0!	1	#DIV/0!	#DIV/0!	#DIV/0!	#
Benzo[a]anthracene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Chrysene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
bis(2-Ethylhexyl)phthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Di-n-octylphthalate	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Benzo[b]fluoranthene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Benzo[k]fluoranthene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Benzo[a]pyrene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Indeno[1,2,3-cd]pyrene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Dibenzo[a,h]anthracene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x
Benzo[g,h,i]perylene	6	0	6	0	0	0.00	0.00	0.00	5.00	5.0000	5.0000	0.0000	1.6094	0.0000	6	5.0000	5.0000	5.0000	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 2

CHEMICAL SUMMARY STATISTICS FOR SURFACE WATER - METALS
GCL Tie and Treating Site

Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	6	6	0	0	0	1.00	124.00	8420.00	2292.00	1313.8401	3432.6667	3686.7409	7.1807	1.7838	6	394.3376	4377.4063	1597293.2913	x
Antimony	6	0	6	0	0	0.00	0.00	0.00	18.00	18.0000	18.0000	0.0000	2.8904	0.0000	6	18.0000	18.0000	18.0000	x
Arsenic	6	3	3	1	0	0.50	5.00	11.40	3.50	4.0585	5.3667	4.2472	1.4008	0.8234	6	2.3287	7.0732	21.0544	x
Barium	6	6	0	0	0	1.00	48.10	298.00	66.05	83.8320	107.0500	96.8497	4.4288	0.7011	6	52.2374	134.5358	290.1790	
Beryllium	6	0	6	0	0	0.00	0.00	0.00	1.00	1.0000	1.0000	0.0000	0.0000	0.0000	6	1.0000	1.0000	1.0000	x
Cadmium	6	0	6	0	0	0.00	0.00	0.00	1.50	1.5000	1.5000	0.0000	0.4055	0.0000	6	1.5000	1.5000	1.5000	x
Calcium	6	6	0	0	0	1.00	27900.00	64400.00	44150.00	41254.9556	43100.0000	13768.9506	10.6275	0.3272	6	33084.1057	51443.7772	60703.1921	
Chromium	6	3	3	0	0	0.50	6.20	12.20	4.60	5.1372	6.0667	3.8588	1.6365	0.6270	6	3.3651	7.8424	14.3631	x
Cobalt	6	0	6	0	0	0.00	0.00	0.00	4.00	4.0000	4.0000	0.0000	1.3863	0.0000	6	4.0000	4.0000	4.0000	x
Copper	6	3	3	0	0	0.50	16.80	35.20	11.15	11.6946	15.7500	12.6464	2.4591	0.8592	6	6.5500	20.8801	69.1433	x
Iron	6	6	0	0	0	1.00	756.00	11700.00	3130.00	3113.5123	4889.3333	4561.6412	8.0435	1.0972	6	1485.1662	6527.1880	50638.9535	x
Lead	0	0	0	0	6	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	#DIV/0!	#DIV/0!	#DIV/0!	x
Magnesium	6	6	0	0	0	1.00	2480.00	16400.00	5075.00	5291.4066	6780.0000	5385.0720	8.5738	0.7616	6	3165.3926	8845.3432	22192.4532	x
Manganese	6	6	0	0	0	1.00	110.00	8710.00	1097.50	777.6803	2236.0000	3302.6386	6.6563	1.7015	6	246.7522	2450.9879	505323.5278	x
Mercury	6	0	6	0	0	0.00	0.00	0.00	0.10	0.1000	0.1000	0.0000	-2.3026	0.0000	6	0.1000	0.1000	0.1000	x
Nickel	6	2	4	0	0	0.33	12.50	19.60	6.00	8.2597	9.3500	5.6546	2.1114	0.5152	6	5.8346	11.6926	17.4672	
Potassium	6	6	0	0	0	1.00	3450.00	9620.00	5880.00	5725.3877	6143.3333	2469.3940	8.6527	0.4164	6	4323.0309	7582.6579	9853.0333	x
Selenium	6	1	5	1	0	0.17	2.00	2.00	1.00	1.1225	1.1667	0.4082	0.1155	0.2830	6	0.9274	1.3586	1.5428	
Silver	6	0	6	0	0	0.00	0.00	0.00	3.00	3.0000	3.0000	0.0000	1.0986	0.0000	6	3.0000	3.0000	3.0000	x
Sodium	6	6	0	0	0	1.00	4940.00	54000.00	18185.00	14572.7417	22688.3333	20407.1854	9.5869	1.0871	6	6998.8444	30342.8379	225930.3156	x
Thallium	6	0	6	0	0	0.00	0.00	0.00	1.50	1.5000	1.5000	0.0000	0.4055	0.0000	6	1.5000	1.5000	1.5000	x
Vanadium	6	0	6	0	0	0.00	0.00	0.00	6.00	6.0000	6.0000	0.0000	1.7918	0.0000	6	6.0000	6.0000	6.0000	x
Zinc	6	6	0	6	0	1.00	14.20	116.00	48.75	46.2014	54.9500	33.8460	3.8330	0.6854	6	29.0953	73.3649	152.5502	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 2

CHEMICAL SUMMARY STATISTICS FOR SURFACE WATER - PESTICIDES
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
alpha-BHC	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
beta-BHC	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
delta-BHC	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
gamma-BHC	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
Heptachlor	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
Aldrin	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
Heptachlor epoxide	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
Endosulfan I	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Dieldrin	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
DDE	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Endrin	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Endosulfan II	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
DDD	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Endosulfan sulfate	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
DDT	6	0	6	0	0	0.00	0.00	0.00	0.25	0.2500	0.2500	0.0000	-1.3863	0.0000	6	0.2500	0.2500	0.2500	x
Methoxychlor	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Endrin ketone	6	0	6	0	0	0.00	0.00	0.00	0.05	0.0500	0.0500	0.0000	-2.9957	0.0000	6	0.0500	0.0500	0.0500	x
Endrin aldehyde	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
alpha-Chlordane	6	0	6	0	0	0.00	0.00	0.00	0.03	0.0250	0.0250	0.0000	-3.6889	0.0000	6	0.0250	0.0250	0.0250	x
gamma-Chlordane	6	0	6	0	0	0.00	0.00	0.00	2.50	2.5000	2.5000	0.0000	0.9163	0.0000	6	2.5000	2.5000	2.5000	x
Toxaphene	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1016	6	0	6	0	0	0.00	0.00	0.00	1.00	1.0000	1.0000	0.0000	0.0000	0.0000	6	1.0000	1.0000	1.0000	x
Aroclor-1221	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1232	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1242	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1248	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1254	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x
Aroclor-1260	6	0	6	0	0	0.00	0.00	0.00	0.50	0.5000	0.5000	0.0000	-0.6931	0.0000	6	0.5000	0.5000	0.5000	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far-right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 3

CHEMICAL SUMMARY STATISTICS FOR SEDIMENT - VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Chloromethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Bromomethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Vinyl chloride	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Chloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Methylene chloride	6	1	5	1	0	0.17	15.00	15.00	10.00	9.5783	10.1667	3.6968	2.2595	0.3861	6	7.3818	12.4283	15.5818	x
Acetone	6	0	6	0	0	0.00	0.00	0.00	10.25	14.6659	21.9167	21.4229	2.6855	0.9647	6	7.6495	28.1180	131.7117	x
Carbon disulfide	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,1-Dichloroethene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,1-Dichloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,2-Dichloroethene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Chloroform	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,2-Dichloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
2-Butanone	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,1,1-Trichloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Carbon tetrachloride	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Bromodichloromethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,2-Dichloropropane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
cis-1,3-Dichloropropene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Trichloroethene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Dibromochloromethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,1,2-Trichloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Benzene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
trans-1,3-Dichloropropene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Bromoform	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
4-Methyl-2-pentanone	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
2-Hexanone	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Tetrachloroethene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
1,1,2,2-Tetrachloroethane	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Toluene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Chlorobenzene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Ethylbenzene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Styrene	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x
Xylenes	6	0	6	0	0	0.00	0.00	0.00	8.25	8.7132	9.0833	2.8534	2.1648	0.3177	6	7.0323	10.7959	12.6285	x

NOTES:
Concentrations are given in units of ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the detected concentration.

Table 3

CHEMICAL SUMMARY STATISTICS FOR SEDIMENT - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Phenol	6	1	5	1	0	0.17	750.00	750.00	335.00	337.1586	376.6667	204.1976	5.8206	0.5083	6	239.2812	475.0724	701.9601	
bis[2-Chloroethyl]ether	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2-Chlorophenol	6	1	5	1	0	0.17	690.00	690.00	335.00	332.5055	366.6667	182.5833	5.8067	0.4825	6	240.1134	460.4487	654.2036	
1,3-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
1,4-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
1,2-Dichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2-Methylphenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,2'-oxybis-1-Chloropropane	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Methylphenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
N-Nitrosodi-n-propylamine	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Hexachloroethane	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Nitrobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Isophorone	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2-Nitrophenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,4-Dimethylphenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
bis[2-Chloroethoxy]methane	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,4-Dichlorophenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
1,2,4-Trichlorobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Naphthalene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Chloroaniline	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Hexachlorobutadiene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Chloro-3-methylphenol	6	1	5	1	0	0.17	980.00	980.00	335.00	352.5291	415.0000	291.3074	5.8651	0.5965	6	235.7326	527.1939	908.6905	
2-Methylnaphthalene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Hexachlorocyclopentadiene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,4,6-Trichlorophenol	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,4,5-Trichlorophenol	6	0	6	0	0	0.00	0.00	0.00	650.00	679.1797	710.0000	226.2742	6.5209	0.3313	6	543.1547	849.2700	1006.0159	x
2-Chloronaphthalene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2-Nitroaniline	6	0	6	0	0	0.00	0.00	0.00	650.00	679.1797	710.0000	226.2742	6.5209	0.3313	6	543.1547	849.2700	1006.0159	x
Dimethylphthalate	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Acenaphthylene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,6-Dinitrotoluene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
3-Nitroaniline	2	0	2	0	4	0.00	0.00	0.00	650.00	648.0741	650.0000	70.7107	6.4740	0.1090	2	602.1253	697.5292	1002.6683	x
Acenaphthene	6	1	5	1	0	0.17	680.00	680.00	335.00	331.6974	365.0000	179.0531	5.8042	0.4781	6	240.2421	457.9680	646.4972	
2,4-Dinitrophenol	6	0	6	0	0	0.00	0.00	0.00	650.00	679.1797	710.0000	226.2742	6.5209	0.3313	6	543.1547	849.2700	1006.0159	x
4-Nitrophenol	6	1	5	1	0	0.17	690.00	690.00	695.00	695.1859	725.0000	220.4314	6.5442	0.3257	6	558.0571	866.0109	1020.4732	x
Dibenzofuran	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
2,4-Dinitrotoluene	6	1	5	1	0	0.17	560.00	560.00	335.00	321.1357	345.0000	139.0683	5.7719	0.4232	6	241.3660	427.2687	559.9252	
Diethylphthalate	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Chlorophenyl phenylether	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Fluorene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Nitroaniline	4	0	4	0	2	0.00	0.00	0.00	775.00	695.2879	740.0000	282.9605	6.5443	0.4204	4	523.5847	923.2990	1622.4045	x
4,6-Dinitro-2-methylphenol	6	0	6	0	0	0.00	0.00	0.00	650.00	679.1797	710.0000	226.2742	6.5209	0.3313	6	543.1547	849.2700	1006.0159	x

NOTES:
All concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Table 3

CHEMICAL SUMMARY STATISTICS FOR SEDIMENT - SEMI-VOLATILE ORGANICS
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
N-Nitrosodiphenylamine	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
4-Bromophenyl phenylether	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Hexachlorobenzene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Pentachlorophenol	6	1	5	1	0	0.17	1000.00	1000.00	825.00	739.5362	776.6667	245.4927	6.6060	0.3576	6	580.9962	941.3381	1144.5449	x
Phenanthrene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Anthracene	6	1	5	1	0	0.17	1200.00	1200.00	267.50	339.3132	429.1667	386.3731	5.8269	0.6835	6	213.9620	538.1023	1113.9161	
Carbazole	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Di-n-butylphthalate	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Fluoranthene	6	3	3	3	0	0.50	770.00	2600.00	510.00	604.7652	1056.6667	1104.3128	6.4048	1.1951	6	270.0388	1354.4014	16038.0704	x
Pyrene	6	5	1	4	0	0.83	620.00	3000.00	1215.00	979.2567	1386.6667	1052.1533	6.8868	1.0372	6	486.4041	1971.4956	12054.7707	x
Butylbenzylphthalate	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
3,3'-Dichlorobenzidine	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Benzo[a]anthracene	6	3	3	3	0	0.50	540.00	2200.00	395.00	516.2651	818.3333	838.7471	6.2466	1.0513	6	253.9948	1049.3507	6777.7014	x
Chrysene	6	4	2	3	0	0.67	510.00	4000.00	855.00	776.0742	1371.6667	1477.3411	6.6542	1.2357	6	337.1580	1786.3768	25528.6109	x
bis[2-Ethylhexyl]phthalate	6	1	5	1	0	0.17	1200.00	1200.00	392.50	424.6479	525.8333	385.8810	6.0513	0.7134	6	262.4272	687.1460	1526.2698	x
Di-n-octylphthalate	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Benzo[b]fluoranthene	6	3	3	3	0	0.50	1100.00	4300.00	692.50	690.9948	1334.1667	1600.1638	6.5381	1.2935	6	288.7102	1653.8165	31261.2924	x
Benzo[k]fluoranthene	6	2	4	2	0	0.33	1700.00	3100.00	267.50	501.7616	959.1667	1201.2594	6.2181	1.2056	6	222.4612	1131.7240	14059.6839	x
Benzo[a]pyrene	6	3	3	2	0	0.50	540.00	1700.00	480.00	473.7563	628.3333	557.9755	6.1607	0.8080	6	274.6630	817.1653	2327.7585	x
Indeno[1,2,3-cd]pyrene	6	1	5	1	0	0.17	1100.00	1100.00	317.50	351.6187	429.1667	341.5906	5.8625	0.6483	6	227.0486	544.5340	1042.7293	
Dibenzo[a,h]anthracene	6	0	6	0	0	0.00	0.00	0.00	267.50	280.7463	293.3333	93.2559	5.6375	0.3289	6	224.8821	350.4880	414.2380	x
Benzo[g,h,i]perylene	6	2	4	2	0	0.33	750.00	850.00	335.00	376.4232	448.3333	286.1060	5.9307	0.6508	6	242.6594	583.9231	1124.1168	x

NOTES:
All concentrations are given in ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 3

CHEMICAL SUMMARY STATISTICS FOR SEDIMENT - PESTICIDES
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
alpha-BHC	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
beta-BHC	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
delta-BHC	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
gamma-BHC	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
Heptachlor	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
Aldrin	4	2	2	2	2	0.50	0.67	0.82	1.06	1.6548	3.3225	4.7925	0.5037	1.2626	4	0.7060	3.8789	1611.4639	x
Heptachlor epoxide	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
Endosulfan I	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
Dieldrin	4	0	4	0	2	0.00	0.00	0.00	2.55	3.8799	6.8250	9.1255	1.3558	1.1261	4	1.8150	8.2941	941.5504	x
DDE	5	2	3	2	1	0.40	2.50	3.80	2.55	3.5659	4.9100	5.1367	1.2714	0.8158	5	2.0566	6.1828	26.7700	x
Endrin	5	0	5	0	1	0.00	0.00	0.00	2.55	5.0151	8.2600	8.5295	1.6125	1.1315	5	2.3374	10.7604	210.9570	x
Endosulfan II	5	4	1	4	1	0.80	0.22	6.60	1.50	2.1187	4.7440	5.7291	0.7508	1.6029	5	0.7185	6.2478	3340.3699	x
DDD	5	0	5	0	1	0.00	0.00	0.00	2.55	5.0151	8.2600	8.5295	1.6125	1.1315	5	2.3374	10.7604	210.9570	x
Endosulfan sulfate	5	0	5	0	1	0.00	0.00	0.00	2.55	5.0151	8.2600	8.5295	1.6125	1.1315	5	2.3374	10.7604	210.9570	x
DDT	4	1	3	1	2	0.25	1.00	1.00	7.85	4.6998	9.3000	9.5600	1.5475	1.5044	4	1.7033	12.9683	79237.1645	x
Methoxychlor	2	0	2	0	4	0.00	0.00	0.00	59.00	36.9459	59.0000	65.0538	3.6095	1.4772	2	13.6381	100.0872	2.62E+28	x
Endrin ketone	5	0	5	0	1	0.00	0.00	0.00	2.55	5.0151	8.2600	8.5295	1.6125	1.1315	5	2.3374	10.7604	210.9570	x
Endrin aldehyde	5	0	5	0	1	0.00	0.00	0.00	2.55	5.0151	8.2600	8.5295	1.6125	1.1315	5	2.3374	10.7604	210.9570	x
alpha-Chlordane	5	0	5	0	1	0.00	0.00	0.00	1.30	2.5746	4.2900	4.4323	0.9457	1.1490	5	1.1859	5.5896	121.1389	x
gamma-Chlordane	4	1	3	1	2	0.25	0.96	0.76	4.18	2.6707	4.9025	4.8875	0.9823	1.3941	4	1.0427	6.8407	11522.8303	x
Toxaphene	5	0	5	0	1	0.00	0.00	0.00	130.00	257.4609	429.0000	443.2324	5.5509	1.1490	5	118.5873	558.9648	12113.8857	x
Aroclor-1016	5	0	5	0	1	0.00	0.00	0.00	25.50	50.1513	82.6000	85.2946	3.9150	1.1315	5	23.3741	107.6043	2109.5705	x
Aroclor-1221	5	0	5	0	1	0.00	0.00	0.00	50.00	100.6400	167.9000	175.2592	4.6115	1.1456	5	46.4628	217.9897	4631.4394	x
Aroclor-1232	5	0	5	0	1	0.00	0.00	0.00	25.50	50.1513	82.6000	85.2946	3.9150	1.1315	5	23.3741	107.6043	2109.5705	x
Aroclor-1242	5	0	5	0	1	0.00	0.00	0.00	25.50	50.1513	82.6000	85.2946	3.9150	1.1315	5	23.3741	107.6043	2109.5705	x
Aroclor-1248	5	1	4	1	1	0.20	90.00	90.00	90.00	64.5391	95.5000	79.1565	4.1673	1.0826	5	31.0900	133.9752	2003.2465	x
Aroclor-1254	5	0	5	0	1	0.00	0.00	0.00	25.50	50.1513	82.6000	85.2946	3.9150	1.1315	5	23.3741	107.6043	2109.5705	x
Aroclor-1260	5	0	5	0	1	0.00	0.00	0.00	25.50	50.1513	82.6000	85.2946	3.9150	1.1315	5	23.3741	107.6043	2109.5705	x

NOTES:
Concentrations are given in units of ug/kg (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 3

CHEMICAL SUMMARY STATISTICS FOR SEDIMENT - METALS
GCL Tie and Treating Site

Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	6	6	0	1	0	1.00	10700.00	27800.00	14550.00	15361.8010	16133.3333	6071.1339	9.6396	0.3282	6	12310.4910	19169.4166	22642.1657	
Antimony	6	0	6	0	0	0.00	0.00	0.00	6.68	6.6104	6.7917	1.7571	1.8886	0.2542	6	5.5688	7.8469	8.7175	x
Arsenic	6	6	0	1	0	1.00	7.00	16.40	8.25	9.0957	9.5000	3.4653	2.2078	0.3037	6	7.4105	11.1643	12.8992	
Barium	6	6	0	1	0	1.00	45.70	127.00	88.70	85.4538	89.4833	27.3744	4.4480	0.3491	6	67.5232	108.1458	130.3507	x
Beryllium	6	0	6	0	0	0.00	0.00	0.00	0.37	0.3672	0.3775	0.0989	-1.0018	0.2565	6	0.3089	0.4366	0.4859	x
Cadmium	6	0	6	0	0	0.00	0.00	0.00	0.58	0.5565	0.5708	0.1400	-0.5861	0.2492	6	0.4704	0.6584	0.7288	x
Calcium	6	6	0	6	0	1.00	2280.00	13600.00	2915.00	3621.1085	4600.0000	4422.0312	8.1945	0.6599	6	2319.9844	5651.9461	11098.5257	
Chromium	6	6	0	1	0	1.00	15.00	32.00	19.90	21.0698	21.7500	6.1899	3.0478	0.2724	6	17.5323	25.3211	28.5169	
Cobalt	6	6	0	1	0	1.00	7.30	16.40	8.60	10.0354	10.5167	3.7064	2.3061	0.3264	6	8.0519	12.5074	14.7482	
Copper	6	6	0	6	0	1.00	21.90	51.90	30.05	31.8510	33.1667	10.7925	3.4611	0.3058	6	25.9139	39.1482	45.3117	
Iron	6	6	0	1	0	1.00	15600.00	40300.00	23700.00	23772.1423	24916.6667	8696.7618	10.0763	0.3310	6	19013.9081	29721.1254	35199.3125	
Lead	6	6	0	6	0	1.00	22.80	70.20	28.45	34.3205	37.5000	18.6845	3.5357	0.4425	6	25.4622	46.2607	62.1498	
Magnesium	6	6	0	1	0	1.00	2560.00	6160.00	3480.00	3638.1499	3820.0000	1363.7008	8.1992	0.3355	6	2901.1194	4562.4233	5426.6068	
Manganese	6	6	0	1	0	1.00	310.00	547.00	391.50	392.0690	399.1667	85.3075	5.9714	0.2048	6	341.4780	450.1551	484.2015	
Mercury	6	2	4	0	0	0.33	0.47	0.69	0.12	0.1686	0.2567	0.2609	-1.7802	0.9791	6	0.0871	0.3264	1.6087	x
Nickel	6	6	0	1	0	1.00	14.40	43.60	24.40	24.5810	26.3000	10.6733	3.2020	0.4029	6	18.7301	32.2596	41.2402	
Potassium	6	6	0	1	0	1.00	801.00	4480.00	1220.00	1468.6617	1755.1667	1366.7510	7.2921	0.5984	6	980.8396	2199.1029	3804.1518	
Selenium	6	0	6	0	0	0.00	0.00	0.00	3.70	3.6666	3.7667	0.9714	1.2993	0.2537	6	3.0899	4.3510	4.8320	x
Silver	6	0	6	0	0	0.00	0.00	0.00	1.10	1.0944	1.1250	0.2962	0.0902	0.2554	6	0.9212	1.3002	1.4458	x
Sodium	6	6	0	1	0	1.00	375.00	902.00	519.50	539.1231	562.1667	188.1355	6.2899	0.3093	6	437.5900	664.2145	771.1589	
Thallium	6	0	6	0	0	0.00	0.00	0.00	0.58	0.5565	0.5708	0.1400	-0.5861	0.2492	6	0.4704	0.6584	0.7288	x
Vanadium	6	6	0	1	0	1.00	15.90	38.90	19.55	21.8569	22.9833	8.6456	3.0845	0.3338	6	17.4489	27.3784	32.5114	
Zinc	6	6	0	6	0	1.00	63.00	173.00	150.00	118.5629	128.7000	50.7998	4.7754	0.4686	6	86.4244	162.6527	226.4990	x

NOTES:
Concentrations are given in mg/kg (ppm).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - VOLATILE ORGANICS
[ALL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Chloromethane	40	1	39	1	0	0.03	0.80	0.80	0.50	1.2016	7.0950	15.8382	0.1836	1.6355	40	0.3986	3.6222	10.3188	x
Bromomethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
Vinyl chloride	40	15	25	8	0	0.38	0.10	4700.00	0.50	6.8836	391.7900	1095.5551	1.9291	3.2245	40	0.7817	60.6178	20128.9616	x
Chloroethane	40	5	35	1	0	0.13	2.00	19.00	0.50	1.6149	8.0750	15.8007	0.4793	1.7117	40	0.5089	5.1251	16.8239	
Methylene chloride	40	3	37	1	0	0.08	8.00	25.00	2.00	4.5692	56.0625	145.4642	1.5193	2.0746	40	1.1271	18.5224	134.5584	x
Acetone	16	6	10	6	24	0.38	3.00	8000.00	3.50	9.0737	909.5938	2490.1469	2.2054	2.6361	16	1.5325	53.7258	63752.4643	x
Carbon disulfide	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,1-Dichloroethene	40	13	27	5	0	0.33	0.20	17.00	0.65	2.2170	9.0500	15.5539	0.7961	1.7580	40	0.6771	7.2587	26.0795	x
1,1-Dichloroethane	40	20	20	10	0	0.50	10.00	1200.00	12.75	7.8663	111.7250	277.8728	2.0626	2.6508	40	1.3154	47.0401	1809.0187	x
cis-1,2-Dichloroethene	40	24	16	12	0	0.60	0.02	4300.00	17.50	11.7593	397.4198	834.8435	2.4646	3.4673	40	1.1336	121.9857	117126.1930	x
trans-1,2-Dichloroethene	40	6	34	3	0	0.15	0.20	5.00	0.50	1.7128	11.0500	22.3390	0.5381	1.8661	40	0.4864	6.0323	27.0999	x
Chloroform	40	11	29	8	0	0.28	0.20	110.00	0.50	1.8130	12.0750	23.5661	0.5950	1.9783	40	0.4773	6.8873	39.7522	
1,2-Dichloroethane	40	4	36	0	0	0.10	14.00	23.00	2.00	3.3244	9.7750	15.5819	1.2013	1.4829	40	1.2224	9.0409	19.9004	
2-Butanone	2	2	0	2	38	1.00	6.00	520.00	263.00	55.8570	263.0000	363.4529	4.0228	3.1552	2	6.6466	469.4098	4.16E+124	x
1,1,1-Trichloroethane	40	13	27	6	0	0.33	0.60	200.00	0.75	3.3389	24.8875	46.5880	1.2056	2.2174	40	0.7480	14.9048	156.2246	
Carbon tetrachloride	40	2	38	0	0	0.05	2.00	7.00	0.50	1.3133	7.2875	15.7907	0.2725	1.6520	40	0.4308	4.0032	11.7509	x
Bromodichloromethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,2-Dichloropropane	40	1	39	1	0	0.03	0.20	0.20	0.50	1.1607	7.0800	15.8446	0.1490	1.6589	40	0.3790	3.5544	10.5656	x
cis-1,3-Dichloropropene	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
Trichloroethene	40	18	22	8	0	0.45	0.60	1000.00	3.00	4.9316	60.5650	174.9370	1.5957	2.3484	40	1.0113	24.0480	362.3978	
Dibromochloromethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,1,2-Trichloroethane	40	5	35	1	0	0.13	0.30	6.00	0.50	1.4478	7.4575	15.7281	0.3700	1.6636	40	0.4713	4.4477	13.3361	x
1,2-Dibromomethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
Benzene	40	8	32	1	0	0.20	2.00	220.00	0.50	2.4339	21.7875	52.2861	0.8895	2.0379	40	0.6154	9.6254	63.9591	
trans-1,3-Dichloropropene	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
Bromoform	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
4-Methyl-2-pentanone	37	7	30	5	3	0.19	0.60	18.00	2.50	6.0209	34.6297	79.9957	1.7952	1.6755	37	1.9441	18.6464	60.2417	x
2-Hexanone	21	0	21	0	19	0.00	0.00	0.00	2.50	3.3254	7.0238	14.2876	1.2016	0.9011	21	1.8106	6.1076	8.1490	x
Tetrachloroethene	40	3	37	1	0	0.08	0.50	1.00	0.50	1.2294	7.1125	15.8310	0.2066	1.6285	40	0.4098	3.6887	10.3774	x
Bromochloromethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,1,2,2-Tetrachloroethane	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
Toluene	40	9	31	6	0	0.23	2.00	180.00	0.50	2.4497	16.5125	33.3094	0.8959	2.0323	40	0.6218	9.6513	63.2741	
Chlorobenzene	40	2	38	2	0	0.05	0.70	0.70	0.50	1.2077	7.0975	15.8371	0.1887	1.6328	40	0.4014	3.6338	10.3007	x
Ethylbenzene	40	12	28	4	0	0.30	0.20	580.00	0.50	2.3444	33.3375	103.6189	0.8520	2.2561	40	0.5117	10.7413	124.9673	
Styrene	40	4	36	1	0	0.10	11.00	130.00	0.50	1.5574	12.3750	27.2834	0.4430	1.9029	40	0.4314	5.6228	27.3674	
Xylenes	40	10	30	3	0	0.25	0.50	2200.00	0.50	2.9841	97.4000	356.2928	1.0933	2.6083	40	0.5135	17.3403	579.6993	
1,2-Dichlorobenzene	40	7	33	4	0	0.18	0.30	1200.00	0.50	1.8020	48.8925	194.2211	0.5889	2.2635	40	0.3913	8.2979	98.5379	
1,3-Dichlorobenzene	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,4-Dichlorobenzene	40	0	40	0	0	0.00	0.00	0.00	0.50	1.1876	7.0875	15.8413	0.1719	1.6402	40	0.3927	3.5912	10.3174	x
1,2-Dibromo-3-chloropropane	22	0	22	0	18	0.00	0.00	0.00	0.50	0.6565	1.3636	2.7953	-0.4208	0.8815	22	0.3622	1.1899	1.5338	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - SEMI-VOLATILE ORGANICS
[ALL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	sdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Phenol	39	7	32	5	0	0.18	1.00	42.00	2.50	2.8027	*4.1667	7.5353	1.0306	0.6177	39	1.8475	4.2515	4.1361	
bis[2-Chloroethyl]ether	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2-Chlorophenol	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2-Methylphenol	39	8	36	3	0	0.08	0.70	3.00	2.50	2.4539	2.4923	0.3239	0.8977	0.2119	39	2.1270	2.8311	2.6635	
2,2'-oxybis-1-Chloropropane	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
4-Methylphenol	39	5	34	3	0	0.13	1.00	26.00	2.50	2.6492	3.3462	4.2475	0.9742	0.5213	39	1.8637	3.7657	3.5657	
N-Nitrosodi-n-propylamine	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Hexachloroethane	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Nitrobenzene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Isophorone	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2-Nitrophenol	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2,4-Dimethylphenol	39	1	38	1	0	0.03	4.00	4.00	2.50	2.5422	2.5513	0.2512	0.9330	0.0800	39	2.4086	2.6832	2.6066	
bis[2-Chloroethoxy]methane	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2,4-Dichlorophenol	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
1,2,4-Trichlorobenzene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Naphthalene	39	12	27	5	0	0.31	0.60	12000.00	2.50	7.8505	806.9718	2379.4252	2.0606	2.9149	39	1.0986	56.1014	5730.3856	
4-Chloroaniline	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Hexachlorobutadiene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
4-Chloro-3-methylphenol	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2-Methylnaphthalene	39	7	32	6	0	0.18	92.00	1400.00	2.50	5.5709	72.6282	253.5510	1.7176	1.7795	39	1.6770	18.5064	70.6635	
Hexachlorocyclopentadiene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2,4,6-Trichlorophenol	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
2,4,5-Trichlorophenol	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2-Chloronaphthalene	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
2-Nitroaniline	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Dimethylphthalate	39	0	39	0	0	0.00	0.00	0.00	2.50	3.4134	4.7564	5.5142	1.2277	0.6854	39	2.1496	5.4203	5.4144	
Acenaphthylene	39	7	32	0	0	0.18	8.00	25.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
2,6-Dinitrotoluene	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
3-Nitroaniline	39	0	39	0	0	0.00	0.00	0.00	2.50	4.6357	23.0385	63.8486	1.5338	1.3843	39	1.8219	11.7956	22.6367	
Acenaphthene	39	7	32	4	0	0.18	25.00	310.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
2,4-Dinitrophenol	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
4-Nitrophenol	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
Dibenzofuran	39	7	32	2	0	0.18	35.00	180.00	2.50	4.5416	16.3974	36.9265	1.5133	1.3024	39	1.8863	10.9346	18.7338	
2,4-Dinitrotoluene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Diethylphthalate	39	1	38	1	0	0.03	0.80	0.80	2.50	2.4394	2.4692	0.2858	0.8917	0.1855	39	2.1524	2.7647	2.6136	x
4-Chlorophenyl phenylether	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Fluorene	39	7	32	4	0	0.18	2.00	140.00	2.50	3.5043	11.5256	31.5056	1.2540	1.0746	39	1.6972	7.2357	9.5293	
4-Nitroaniline	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
4,6-Dinitro-2-methylphenol	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
N-Nitrosodiphenylamine	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
4-Bromophenyl phenylether	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Hexachlorobenzene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x

NOTES:
Concentrations are given in ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - SEMI-VOLATILE ORGANICS
[ALL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Pentachlorophenol	39	0	39	0	0	0.00	0.00	0.00	10.00	10.0469	10.0513	0.3203	2.3073	0.0292	39	9.8509	10.2467	10.1310	x
Phenanthrene	39	7	32	5	0	0.18	2.00	180.00	2.50	3.5585	13.3205	38.2965	1.2693	1.1227	39	1.6684	7.5896	10.4995	
Anthracene	39	5	34	2	0	0.13	0.80	16.00	2.50	2.7439	3.1615	2.5908	1.0094	0.4515	39	2.0234	3.7211	3.4817	
Di-n-butylphthalate	39	1	38	1	0	0.03	0.30	1.00	2.50	2.4534	2.4744	0.2552	0.8975	0.1504	39	2.2167	2.7153	2.5866	x
Fluoranthene	39	5	34	2	0	0.13	0.70	54.00	2.50	2.8967	4.5949	9.1268	1.0636	0.6781	39	1.8332	4.5770	4.5575	
Pyrene	39	5	34	3	0	0.13	0.40	32.00	2.50	2.7325	3.6385	5.2242	1.0052	0.5963	39	1.8275	4.0858	3.9469	
Butylbenzylphthalate	39	0	39	0	0	0.00	0.60	0.60	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
3,3'-Dichlorobenzidine	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Benzo[a]anthracene	39	2	37	1	0	0.05	2.00	6.00	2.50	2.5541	2.5897	0.5721	0.9377	0.1479	39	2.3115	2.8221	2.6901	
Chrysene	39	3	36	3	0	0.08	0.30	4.00	2.50	2.3517	2.4564	0.5004	0.8552	0.3785	39	1.8218	3.0359	2.8241	
bis[2-Ethylhexyl]phthalate	39	5	34	4	0	0.13	0.70	51.00	2.50	3.3364	8.3154	18.7803	1.2049	1.0401	39	1.6540	6.7301	8.5728	
Di-n-octylphthalate	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Benzo[b]fluoranthene	39	2	37	2	0	0.05	0.20	3.00	2.50	2.3652	2.4667	0.3889	0.8609	0.4080	39	1.7961	3.1148	2.9019	
Benzo[k]fluoranthene	39	1	38	1	0	0.03	2.00	2.00	2.50	2.4974	2.5000	0.1147	0.9152	0.0467	39	2.4199	2.5774	2.5320	x
Benzo[a]pyrene	39	1	38	1	0	0.03	2.00	2.00	2.50	2.4974	2.5000	0.1147	0.9152	0.0467	39	2.4199	2.5774	2.5320	x
Indeno[1,2,3-cd]pyrene	39	1	38	1	0	0.03	0.70	0.70	2.50	2.4311	2.4667	0.3012	0.8883	0.2067	39	2.1146	2.7948	2.6317	x
Dibenzo[a,h]anthracene	39	0	39	0	0	0.00	0.00	0.00	2.50	2.5117	2.5128	0.0801	0.9210	0.0292	39	2.4627	2.5617	2.5327	x
Benzo[g,h,i]perylene	39	1	38	1	0	0.03	0.60	0.60	2.50	2.4215	2.4641	0.3166	0.8844	0.2311	39	2.0718	2.8301	2.6546	x

NOTES:
Concentrations are given in ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDATER - PESTICIDES
[ALL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
alpha-BHC	39	4	35	4	0	0.10	0.0006	0.0081	0.01	0.0052	0.0072	0.0101	-5.2591	0.7086	39	0.0032	0.0084	0.0085	x
beta-BHC	38	4	34	4	1	0.11	0.0021	0.0130	0.01	0.0060	0.0079	0.0102	-5.1242	0.5799	38	0.0040	0.0088	0.0085	
delta-BHC	38	5	33	5	1	0.13	0.0004	0.0028	0.01	0.0045	0.0069	0.0104	-5.3979	0.8510	38	0.0025	0.0080	0.0088	x
gamma-BHC	39	6	33	6	0	0.15	0.0025	0.0520	0.01	0.0059	0.0088	0.0126	-5.1319	0.7026	39	0.0037	0.0095	0.0096	
Heptachlor	38	0	38	0	1	0.00	0.0000	0.0000	0.01	0.0056	0.0074	0.0102	-5.1771	0.5211	38	0.0040	0.0080	0.0076	x
Aldrin	39	4	35	4	0	0.10	0.0005	0.0048	0.01	0.0052	0.0071	0.0101	-5.2596	0.6606	39	0.0033	0.0081	0.0080	x
Heptachlor epoxide	32	8	24	8	7	0.25	0.0009	0.0390	0.01	0.0051	0.0073	0.0101	-5.2874	0.7356	32	0.0031	0.0083	0.0088	
Endosulfan I	38	0	38	0	1	0.00	0.0000	0.0000	0.01	0.0056	0.0074	0.0102	-5.1771	0.5211	38	0.0040	0.0080	0.0076	x
Dieldrin	39	8	31	8	0	0.21	0.0004	0.2600	0.01	0.0110	0.0263	0.0556	-4.5114	1.1810	39	0.0049	0.0244	0.0366	
DDE	39	4	35	4	0	0.10	0.0006	0.0046	0.01	0.0096	0.0139	0.0204	-4.6506	0.7853	39	0.0056	0.0162	0.0171	x
Endrin	39	7	32	7	0	0.18	0.0100	0.1800	0.01	0.0128	0.0185	0.0295	-4.3615	0.6502	39	0.0082	0.0198	0.0195	
Endosulfan II	37	1	36	1	2	0.03	0.0006	0.0006	0.01	0.0105	0.0146	0.0208	-4.5591	0.7253	37	0.0064	0.0171	0.0175	x
DDD	38	2	36	2	1	0.05	0.0046	0.0130	0.01	0.0111	0.0147	0.0204	-4.4975	0.5411	38	0.0077	0.0160	0.0153	x
Endosulfan sulfate	38	5	33	5	1	0.13	0.0008	0.0620	0.01	0.0102	0.0161	0.0224	-4.5896	0.9434	38	0.0054	0.0192	0.0226	
DDT	39	1	38	1	0	0.03	0.0052	0.0052	0.01	0.0111	0.0145	0.0202	-4.5039	0.5289	39	0.0077	0.0158	0.0150	x
Methoxychlor	38	1	37	1	1	0.03	0.0140	0.0140	0.05	0.0546	0.0727	0.1022	-2.9080	0.5679	38	0.0372	0.0801	0.0769	x
Endrin ketone	39	1	38	1	0	0.03	0.0092	0.0092	0.01	0.0112	0.0146	0.0201	-4.4892	0.5152	39	0.0079	0.0159	0.0150	x
Endrin aldehyde	38	8	30	8	1	0.21	0.0016	0.1400	0.01	0.0118	0.0182	0.0271	-4.4373	0.7813	38	0.0070	0.0200	0.0211	
alpha-Chlordane	39	7	32	7	0	0.18	0.0006	0.1200	0.01	0.0059	0.0107	0.0210	-5.1361	0.8718	39	0.0033	0.0106	0.0118	
gamma-Chlordane	38	5	33	5	1	0.13	0.0005	0.0330	0.01	0.0051	0.0067	0.0086	-5.2748	0.6288	38	0.0033	0.0078	0.0077	
Toxaphene	38	0	38	0	1	0.00	0.0000	0.0000	0.50	0.5644	0.7368	1.0183	-0.5720	0.5211	38	0.3971	0.8022	0.7617	x
Aroclor-1016	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x
Aroclor-1221	38	0	38	0	1	0.00	0.0000	0.0000	0.20	0.2258	0.2947	0.4073	-1.4882	0.5211	38	0.1589	0.3209	0.3047	x
Aroclor-1232	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x
Aroclor-1242	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x
Aroclor-1248	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x
Aroclor-1254	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x
Aroclor-1260	38	0	38	0	1	0.00	0.0000	0.0000	0.10	0.1129	0.1474	0.2037	-2.1814	0.5211	38	0.0794	0.1604	0.1523	x

NOTES:
Concentrations are given in units of ug/l. (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - TOTAL METALS
[ALL SAMPLES]
GCL Tie and Treating Site

Total Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	39	39	0	11	1	1.00	48.50	6210.00	368.00	412.0567	968.7615	1388.0310	6.0212	1.3433	39	166.4818	1019.8756	1849.9286	
Antimony	40	6	34	1	0	0.15	9.50	44.30	10.83	10.9869	14.9738	11.1625	2.3967	0.8226	40	6.3072	19.1387	20.4753	
Arsenic	40	30	10	8	0	0.75	1.20	51.10	3.35	3.5632	7.9913	12.5409	1.2707	1.2508	40	1.5323	8.2857	13.1724	
Barium	40	40	0	5	0	1.00	7.20	1080.00	84.35	95.3896	171.8525	241.0794	4.5580	1.0798	40	46.0369	197.6498	259.9124	
Beryllium	40	0	40	0	0	0.00	0.00	0.00	0.10	0.2428	0.3863	0.3726	-1.4154	0.9825	40	0.1252	0.4712	0.5667	x
Cadmium	40	0	40	0	0	0.00	0.00	0.00	0.50	0.9809	1.2800	0.9084	-0.0193	0.7438	40	0.5938	1.6202	1.6578	x
Calcium	40	40	0	6	0	1.00	1660.00	113000.00	36350.00	30904.7310	43969.5000	29422.4093	10.3387	1.0351	40	15372.3290	62131.2747	78288.5710	
Chromium	26	14	12	8	14	0.54	4.30	166.00	4.30	7.5092	26.1923	47.9610	2.0161	1.5124	26	2.7068	20.8320	61.8507	
Cobalt	40	20	20	4	0	0.50	3.30	79.10	4.00	6.0806	12.6725	17.6005	1.8051	1.1953	40	2.7147	13.6199	20.2637	
Copper	40	14	26	4	0	0.35	3.10	25.60	3.00	3.5843	5.5525	5.7557	1.2766	0.9091	40	1.9410	6.6190	7.5107	
Iron	37	37	0	13	3	1.00	83.20	37600.00	4510.00	2739.8107	8928.2676	10979.1429	7.9156	1.9096	37	755.4566	9936.4572	52648.7876	x
Lead	27	12	15	4	13	0.44	1.20	14.90	1.45	2.4226	3.7463	3.8303	0.8848	0.9228	27	1.2999	4.5149	5.6987	
Magnesium	40	40	0	5	0	1.00	222.00	34400.00	4775.00	4048.2140	7376.1750	8415.9423	8.3060	1.2690	40	1719.6593	9529.8160	15498.7394	
Manganese	39	39	0	7	1	1.00	2.80	17300.00	338.00	385.0584	3060.9821	5014.7572	5.9534	2.5593	39	68.4932	2164.7415	64477.2653	x
Mercury	40	0	40	0	0	0.00	0.00	0.00	0.10	0.1000	0.1000	0.0000	-2.3026	0.0000	40	0.1000	0.1000	0.1000	x
Nickel	37	32	5	8	3	0.86	3.90	131.00	14.10	15.1292	27.3689	31.2903	2.7166	1.1463	37	6.9813	32.7863	47.4302	
Potassium	40	36	4	6	0	0.90	564.00	16000.00	1605.00	1757.2517	2849.2000	3815.8931	7.4715	0.8996	40	957.7264	3224.2333	3633.0802	
Selenium	39	2	37	2	1	0.05	2.20	2.40	1.40	1.1322	1.2308	0.4438	0.1241	0.4543	39	0.8333	1.5383	1.4480	
Silver	40	2	38	2	0	0.05	4.00	4.60	1.85	1.9715	2.0150	0.5429	0.6788	0.1877	40	1.7371	2.2376	2.1129	
Sodium	40	40	0	5	0	1.00	3260.00	98100.00	12350.00	12877.0684	18740.0000	20269.9099	9.4632	0.8382	40	7315.0641	22668.1391	24490.4049	
Thallium	40	7	33	2	0	0.18	1.70	2.80	1.00	0.9698	1.0788	0.5523	-0.0307	0.4536	40	0.7141	1.3170	1.2302	
Vanadium	40	20	20	5	0	0.50	2.80	28.70	3.50	4.0821	6.1900	6.9602	1.4066	0.8621	40	2.2818	7.3028	8.0151	
Zinc	28	25	3	8	12	0.89	8.60	1360.00	21.70	26.5146	121.9393	342.8202	3.2777	1.3855	28	10.4120	67.5208	152.6867	

NOTES:
Concentrations are given in ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - DISSOLVED METALS
[ALL SAMPLES]
GCL Tie and Treating Site

Dissolved Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	39	26	13	8	1	0.67	17.40	3650.00	24.00	46.1812	223.2577	654.9187	3.8326	1.4348	39	17.5409	121.5845	251.9726	
Antimony	40	1	39	0	0	0.03	18.30	18.30	8.90	10.1181	13.1813	9.2515	2.3143	0.7467	40	6.1137	16.7453	17.1603	
Arsenic	40	22	18	7	0	0.55	2.00	36.40	2.25	2.4597	6.0588	9.8065	0.9000	1.3041	40	1.0204	5.9290	10.0886	
Barium	40	40	0	7	0	1.00	6.30	1060.00	69.20	84.5737	159.4750	238.2946	4.4376	1.1000	40	40.2652	177.6404	238.3523	
Beryllium	40	0	40	0	0	0.00	0.00	0.00	0.10	0.2346	0.3513	0.3029	-1.4499	0.9291	40	0.1253	0.4391	0.5058	x
Cadmium	40	0	40	0	0	0.00	0.00	0.00	0.65	1.0343	1.3163	0.8878	0.0338	0.7103	40	0.6405	1.6702	1.6814	x
Calcium	40	40	0	10	0	1.00	1760.00	116000.00	36300.00	29824.4693	43733.0000	30584.1586	10.3031	1.0869	40	14325.1059	62093.7100	82230.8982	
Chromium	35	15	20	10	5	0.43	3.10	40.70	3.50	3.8421	5.1700	6.5707	1.3460	0.6763	35	2.4345	6.0634	6.1317	
Cobalt	40	16	24	3	0	0.40	3.90	92.10	4.00	4.9748	12.7900	20.3596	1.6044	1.3261	40	2.0334	12.1710	21.3247	
Copper	40	4	36	3	0	0.10	4.90	24.50	2.20	2.2388	2.9113	3.7193	0.8060	0.5984	40	1.4951	3.3525	3.2317	
Iron	31	31	0	9	9	1.00	17.70	36100.00	168.00	514.9117	7396.6419	12468.8819	6.2440	2.6199	31	87.9187	3015.6733	156615.9414	x
Lead	38	2	36	0	2	0.05	1.70	2.90	1.45	0.9326	1.0763	0.5633	-0.0698	0.5552	38	0.6412	1.3564	1.2988	
Magnesium	40	40	0	7	0	1.00	72.60	34600.00	4345.00	3131.3196	6922.1400	8572.8165	8.0492	1.5581	40	1094.4642	8958.8705	22327.0473	
Manganese	39	37	2	9	1	0.95	1.60	17600.00	313.00	175.9328	3055.4256	5144.4906	5.1701	3.3525	39	18.3253	1689.0468	1.04E+06	x
Mercury	40	0	40	0	0	0.00	0.00	0.00	0.10	0.1000	0.1000	0.0000	-2.3026	0.0000	40	0.1000	0.1000	0.1000	x
Nickel	40	20	20	4	0	0.50	4.20	73.50	6.00	6.9657	13.9625	19.5192	1.9410	1.1312	40	3.2473	14.9420	20.7083	
Potassium	40	36	4	7	0	0.90	477.00	15200.00	1465.00	1612.3113	2651.8250	3627.7350	7.3854	0.9028	40	876.8297	2964.7120	3348.5001	
Selenium	40	3	37	1	0	0.08	2.50	3.30	1.40	1.2491	1.4225	0.8242	0.2225	0.5184	40	0.8805	1.7721	1.6731	
Silver	40	1	39	1	0	0.03	3.50	3.50	1.85	1.8359	1.8688	0.3693	0.6076	0.1900	40	1.6151	2.0870	1.9698	
Sodium	40	40	0	7	0	1.00	3140.00	91500.00	12100.00	12810.3137	18546.2500	19565.3293	9.4580	0.8370	40	7282.8956	22532.8146	24325.9365	
Thallium	40	9	31	3	0	0.23	1.60	3.40	1.00	1.0586	1.2313	0.7740	0.0570	0.5293	40	0.7407	1.5130	1.4318	
Vanadium	40	6	34	3	0	0.15	2.70	27.90	2.75	2.6612	3.5963	4.4701	0.9788	0.6722	40	1.6909	4.1881	4.1463	
Zinc	26	19	7	8	14	0.73	9.10	74.00	12.15	12.2732	16.5596	15.2686	2.5074	0.7670	26	7.3151	20.5918	22.9377	

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - VOLATILE ORGANICS
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Chloromethane	26	1	25	1	0	0.04	0.80	0.80	0.50	0.7452	1.7231	3.3820	-0.2942	0.9974	26	0.3802	1.4605	2.0089	x
Bromomethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Vinyl chloride	26	3	23	2	0	0.12	0.10	28.00	0.50	0.8699	3.0231	6.2342	-0.1393	1.3685	26	0.3456	2.1900	5.0145	
Chloroethane	26	1	25	0	0	0.04	10.00	10.00	0.50	0.8212	2.0769	3.7435	-0.1970	1.1201	26	0.3857	1.7483	2.7752	
Methylene chloride	26	0	26	0	0	0.00	0.00	0.00	1.00	2.0741	6.2115	14.9614	0.7296	1.2515	26	0.8916	4.8259	9.1805	x
Acetone	9	4	5	4	17	0.44	3.00	8.00	4.00	3.9442	4.3333	2.0616	1.3722	0.4526	9	2.9063	5.3526	6.2201	
Carbon disulfide	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,1-Dichloroethene	26	6	20	3	0	0.23	0.50	8.00	0.50	1.0560	2.4423	3.4852	0.0545	1.2132	26	0.4658	2.3940	4.3074	
1,1-Dichloroethane	26	7	19	3	0	0.27	10.00	46.00	0.50	1.6266	6.2308	10.2491	0.4865	1.6744	26	0.5256	5.0335	20.8699	
cis-1,2-Dichloroethene	26	10	16	5	0	0.38	0.02	54.00	0.50	1.5370	10.0688	15.4814	0.4298	2.2178	26	0.3442	6.8628	120.8455	x
trans-1,2-Dichloroethene	26	1	25	1	0	0.04	0.40	0.40	0.50	0.7255	1.7077	3.3873	-0.3208	1.0047	26	0.3684	1.4291	1.9811	x
Chloroform	26	4	22	4	0	0.15	0.30	0.50	0.50	0.7054	1.6962	3.3918	-0.3491	1.0212	26	0.3541	1.4049	1.9831	x
1,2-Dichloroethane	26	1	25	0	0	0.04	18.00	18.00	1.50	1.5784	3.0000	4.4227	0.4564	1.0335	26	0.7859	3.1698	4.5363	
2-Butanone	1	1	0	1	25	1.00	6.00	6.00	6.00	6.0000	6.0000	#DIV/0!	1.7918	#DIV/0!	1	#DIV/0!	#DIV/0!	#DIV/0!	#
1,1,1-Trichloroethane	26	6	20	2	0	0.23	3.00	40.00	0.50	1.4255	8.1346	14.6973	0.3545	1.7697	26	0.4320	4.7043	24.2408	
Carbon tetrachloride	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Bromodichloromethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,2-Dichloropropane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
cis-1,3-Dichloropropene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Trichloroethene	26	9	17	3	0	0.35	2.00	48.00	0.50	1.9404	9.3462	16.0548	0.6629	1.7916	26	0.5793	6.4991	35.2849	
Dibromochloromethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,1,2-Trichloroethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,2-Dibromomethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Benzene	26	5	21	1	0	0.19	2.00	220.00	0.50	1.4577	23.3654	63.1760	0.3769	2.0020	26	0.3776	5.6268	52.5288	
trans-1,3-Dichloropropene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Bromoform	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
4-Methyl-2-pentanone	24	4	20	3	2	0.17	2.00	18.00	2.50	4.2661	9.9792	17.2567	1.4507	1.1062	24	2.0226	8.9978	14.4943	
2-Hexanone	14	0	14	0	12	0.00	0.00	0.00	2.50	3.8353	9.2857	17.2490	1.3443	1.0879	14	1.8410	7.9900	16.8273	x
Tetrachloroethene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Bromochloromethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,1,2,2-Tetrachloroethane	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Toluene	26	7	19	5	0	0.27	2.00	180.00	0.50	1.5830	13.4615	36.8369	0.4593	1.8956	26	0.4406	5.6872	39.9850	
Chlorobenzene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
Ethylbenzene	26	7	19	1	0	0.27	13.00	580.00	0.50	1.8808	41.5769	127.5335	0.6317	2.2785	26	0.4043	8.7484	186.7462	
Styrene	26	4	22	1	0	0.15	11.00	130.00	0.50	1.1105	9.8462	29.1221	0.1049	1.6761	26	0.3584	3.4407	14.3219	
Xylenes	26	4	22	0	0	0.15	67.00	2200.00	0.50	1.6218	119.2500	438.3157	0.4835	2.5212	26	0.2960	8.8861	436.7259	
1,2-Dichlorobenzene	26	4	22	1	0	0.15	0.30	1200.00	0.50	1.3080	60.5692	239.3188	0.2685	2.1692	26	0.3027	5.6518	85.6632	
1,3-Dichlorobenzene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,4-Dichlorobenzene	26	0	26	0	0	0.00	0.00	0.00	0.50	0.7318	1.7115	3.3858	-0.3122	1.0004	26	0.3726	1.4372	1.9830	x
1,2-Dibromo-3-chloropropane	15	0	15	0	11	0.00	0.00	0.00	0.50	0.7455	1.7667	3.3427	-0.2937	1.0541	15	0.3661	1.5181	2.8848	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - SEMI-VOLATILE ORGANICS
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Phenol	25	3	22	1	0	0.12	2.00	42.00	2.50	3.0819	5.1400	9.3291	1.1256	0.7347	25	1.8773	5.0594	5.6010	
bis[2-Chloroethyl]ether	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2-Chlorophenol	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2-Methylphenol	25	3	22	3	0	0.12	0.70	3.00	2.50	2.4284	2.4880	0.4076	0.8873	0.2661	25	2.0294	2.9060	2.7732	
2,2'-oxybis-1-Chloropropane	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
4-Methylphenol	25	4	21	2	0	0.16	1.00	26.00	2.50	2.7611	3.8400	5.2772	1.0156	0.6506	25	1.7801	4.2827	4.5077	
N-Nitrosodi-n-propylamine	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Hexachloroethane	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Nitrobenzene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Isophorone	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2-Nitrophenol	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	
2,4-Dimethylphenol	25	1	24	1	0	0.04	4.00	4.00	2.50	2.5661	2.5800	0.3122	0.9424	0.0994	25	2.3996	2.7441	2.6699	
bis[2-Chloroethoxy]methane	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2,4-Dichlorophenol	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
1,2,4-Trichlorobenzene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Naphthalene	25	10	15	3	0	0.40	0.70	12000.00	2.50	16.7023	1257.6280	2893.9549	2.8155	3.4137	25	1.6693	167.1140	476660.2074	x
4-Chloroaniline	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Hexachlorobutadiene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
4-Chloro-3-methylphenol	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2-Methylnaphthalene	25	7	18	6	0	0.28	92.00	1400.00	2.50	8.7257	111.9000	311.9521	2.1663	2.1046	25	2.1093	36.0963	474.6334	
Hexachlorocyclopentadiene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2,4,6-Trichlorophenol	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2,4,5-Trichlorophenol	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
2-Chloronaphthalene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
2-Nitroaniline	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
Dimethylphthalate	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Acenaphthylene	25	7	18	0	0	0.28	8.00	25.00	2.50	4.0638	6.0200	6.5962	1.4021	0.8097	25	2.3534	7.0174	8.2023	
2,6-Dinitrotoluene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
3-Nitroaniline	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
Acenaphthene	25	7	18	4	0	0.28	25.00	310.00	2.50	6.5509	34.5400	77.9155	1.8796	1.6392	25	2.1677	19.7969	78.4969	
2,4-Dinitrophenol	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
4-Nitrophenol	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
Dibenzofuran	25	7	18	2	0	0.28	35.00	180.00	2.50	6.3445	24.1800	44.5334	1.8476	1.5366	25	2.2499	17.8909	57.2626	
2,4-Dinitrotoluene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Diethylphthalate	25	1	24	1	0	0.04	0.80	0.80	2.50	2.4061	2.4520	0.3584	0.8780	0.2323	25	2.0571	2.8143	2.6887	x
4-Chlorophenyl phenylether	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Fluorene	25	7	18	4	0	0.28	2.00	140.00	2.50	4.2339	16.5800	38.6975	1.4431	1.3133	25	1.7456	10.2692	21.9390	
4-Nitroaniline	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
4,6-Dinitro-2-methylphenol	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
N-Nitrosodiphenylamine	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
4-Bromophenyl phenylether	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Hexachlorobenzene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - SEMI-VOLATILE ORGANICS
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Pentachlorophenol	25	0	25	0	0	0.00	0.00	0.00	10.00	10.0732	10.0800	0.4000	2.3099	0.0365	25	9.8284	10.3241	10.2074	x
Phenanthrene	25	7	18	5	0	0.28	2.00	180.00	2.50	4.3363	19.3800	47.0703	1.4670	1.3720	25	1.7184	10.9424	25.7833	
Anthracene	25	5	20	2	0	0.20	0.80	16.00	2.50	2.8908	3.5320	3.1984	1.0615	0.5612	25	1.9797	4.2213	4.2609	
Di-n-butylphthalate	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Fluoranthene	25	5	20	2	0	0.20	0.70	54.00	2.50	3.1457	5.7680	11.3091	1.1460	0.8416	25	1.7829	5.5501	6.6570	
Pyrene	25	5	20	3	0	0.20	0.40	32.00	2.50	2.8721	4.2760	6.4833	1.0550	0.7455	25	1.7368	4.7493	5.2960	
Butylbenzylphthalate	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
3,3'-Dichlorobenzidine	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Benzo[a]anthracene	25	2	23	1	0	0.08	2.00	6.00	2.50	2.5849	2.6400	0.7147	0.9497	0.1850	25	2.2815	2.9285	2.8090	
Chrysene	25	3	22	3	0	0.12	0.30	4.00	2.50	2.2726	2.4320	0.6283	0.8209	0.4727	25	1.6521	3.1262	3.0633	
bis(2-Ethylhexyl)phthalate	25	3	22	2	0	0.12	0.70	51.00	2.50	3.8182	11.1480	23.0566	1.3398	1.1886	25	1.7123	8.5139	15.0616	
Di-n-octylphthalate	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Benzo[b]fluoranthene	25	2	23	2	0	0.08	0.20	3.00	2.50	2.2930	2.4480	0.4883	0.8298	0.5107	25	1.6247	3.2361	3.2072	x
Benzo[k]fluoranthene	25	1	24	1	0	0.04	2.00	2.00	2.50	2.4959	2.5000	0.1443	0.9147	0.0588	25	2.3989	2.5969	2.5517	x
Benzo[a]pyrene	25	1	24	1	0	0.04	2.00	2.00	2.50	2.4959	2.5000	0.1443	0.9147	0.0588	25	2.3989	2.5969	2.5517	x
Indeno[1,2,3-cd]pyrene	25	1	24	1	0	0.04	0.70	0.70	2.50	2.3933	2.4480	0.3776	0.8727	0.2587	25	2.0100	2.8496	2.7198	x
Dibenzo[a,h]anthracene	25	0	25	0	0	0.00	0.00	0.00	2.50	2.5183	2.5200	0.1000	0.9236	0.0365	25	2.4571	2.5810	2.5519	x
Benzo[g,h,i]perylene	25	1	24	1	0	0.04	0.60	0.60	2.50	2.3786	2.4440	0.3969	0.8665	0.2892	25	1.9569	2.8911	2.7593	x

NOTES:
Concentrations are given in units of ug/L (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - PESTICIDES
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Compound	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
alpha-BHC	25	2	23	2	0	0.08	0.0006	0.0079	0.01	0.0057	0.0085	0.0125	-5.1717	0.7641	25	0.0034	0.0095	0.0107	x
beta-BHC	24	1	23	1	1	0.04	0.0110	0.0110	0.01	0.0065	0.0092	0.0127	-5.0427	0.6662	24	0.0041	0.0101	0.0108	
delta-BHC	24	3	21	3	1	0.13	0.0011	0.0028	0.01	0.0052	0.0083	0.0129	-5.2531	0.8135	24	0.0030	0.0091	0.0107	x
gamma-BHC	25	5	20	5	0	0.20	0.0025	0.0520	0.01	0.0066	0.0110	0.0154	-5.0141	0.8525	25	0.0037	0.0118	0.0143	
Heptachlor	24	0	24	0	1	0.00	0.0000	0.0000	0.01	0.0061	0.0088	0.0127	-5.1064	0.6501	24	0.0039	0.0094	0.0100	x
Aldrin	25	3	22	3	0	0.12	0.0005	0.0041	0.01	0.0053	0.0083	0.0126	-5.2362	0.8303	25	0.0030	0.0093	0.0111	x
Heptachlor epoxide	20	5	15	5	5	0.25	0.0014	0.0390	0.01	0.0058	0.0091	0.0126	-5.1517	0.8277	20	0.0033	0.0101	0.0128	
Endosulfan I	24	0	24	0	1	0.00	0.0000	0.0000	0.01	0.0061	0.0088	0.0127	-5.1064	0.6501	24	0.0039	0.0094	0.0100	x
Dieldrin	25	8	17	8	0	0.32	0.0004	0.2600	0.01	0.0116	0.0354	0.0682	-4.4588	1.4871	25	0.0042	0.0316	0.0917	
DDE	25	3	22	3	0	0.12	0.0006	0.0046	0.01	0.0097	0.0163	0.0253	-4.6404	0.9723	25	0.0050	0.0186	0.0252	x
Endrin	25	7	18	7	0	0.28	0.0100	0.1800	0.01	0.0146	0.0232	0.0362	-4.2250	0.7844	25	0.0086	0.0248	0.0285	
Endosulfan II	23	1	22	1	2	0.04	0.0006	0.0006	0.01	0.0108	0.0174	0.0261	-4.5311	0.9266	23	0.0058	0.0201	0.0267	x
DDD	24	1	23	1	1	0.04	0.0130	0.0130	0.01	0.0122	0.0176	0.0254	-4.4024	0.6489	24	0.0079	0.0190	0.0201	x
Endosulfan sulfate	24	3	21	3	1	0.13	0.0009	0.0620	0.01	0.0125	0.0205	0.0273	-4.3806	0.9359	24	0.0067	0.0235	0.0312	
DDT	25	1	24	1	0	0.04	0.0052	0.0052	0.01	0.0117	0.0170	0.0250	-4.4471	0.6585	25	0.0075	0.0183	0.0193	x
Methoxychlor	24	1	23	1	1	0.04	0.0140	0.0140	0.05	0.0574	0.0860	0.1277	-2.8569	0.7151	24	0.0355	0.0931	0.1026	x
Endrin ketone	25	1	24	1	0	0.04	0.0092	0.0092	0.01	0.0120	0.0172	0.0249	-4.4243	0.6388	25	0.0078	0.0184	0.0193	x
Endrin aldehyde	25	8	17	8	0	0.32	0.0016	0.1400	0.01	0.0129	0.0225	0.0328	-4.3500	0.9581	25	0.0068	0.0246	0.0329	
alpha-Chlordane	25	7	18	7	0	0.28	0.0006	0.1200	0.01	0.0064	0.0139	0.0258	-5.0453	1.0860	25	0.0031	0.0134	0.0207	
gamma-Chlordane	24	5	19	5	1	0.21	0.0005	0.0330	0.01	0.0052	0.0077	0.0108	-5.2611	0.7972	24	0.0030	0.0089	0.0104	
Toxaphene	24	0	24	0	1	0.00	0.0000	0.0000	0.50	0.6058	0.8750	1.2705	-0.5013	0.6501	24	0.3907	0.9393	0.9954	x
Aroclor-1016	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x
Aroclor-1221	24	0	24	0	1	0.00	0.0000	0.0000	0.20	0.2423	0.3500	0.5082	-1.4176	0.6501	24	0.1563	0.3757	0.3982	x
Aroclor-1232	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x
Aroclor-1242	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x
Aroclor-1248	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x
Aroclor-1254	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x
Aroclor-1260	24	0	24	0	1	0.00	0.0000	0.0000	0.10	0.1212	0.1750	0.2541	-2.1107	0.6501	24	0.0781	0.1879	0.1991	x

NOTES:
Concentrations are given in units of ug/l. (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - TOTAL METALS
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Total Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	25	25	0	4	1	1.00	51.10	6210.00	383.00	456.7848	937.0200	1310.8667	6.1242	1.2441	25	197.3202	1057.4305	2027.9584	
Antimony	26	3	23	1	0	0.12	10.00	44.30	25.50	15.9860	19.8904	10.9227	2.7717	0.7582	26	9.5848	26.6621	29.7422	
Arsenic	26	17	9	2	0	0.65	1.20	7.80	2.25	2.0241	2.8423	2.2175	0.7051	0.8877	26	1.1120	3.6841	4.5509	
Barium	26	26	0	1	0	1.00	7.20	192.00	72.55	59.5281	76.9962	49.3756	4.0864	0.8309	26	33.9822	104.2782	122.7801	
Beryllium	26	0	26	0	0	0.00	0.00	0.00	0.50	0.3915	0.5404	0.3821	-0.9377	0.9097	26	0.2119	0.7233	0.9116	x
Cadmium	26	0	26	0	0	0.00	0.00	0.00	1.98	1.4099	1.7000	0.8735	0.3435	0.6870	26	0.8870	2.2412	2.3903	x
Calcium	26	26	0	2	0	1.00	1660.00	84400.00	42400.00	30257.2310	42456.1538	24770.7665	10.3175	1.0685	26	14715.0725	62215.1217	92709.3092	x
Chromium	17	8	9	5	9	0.47	7.20	166.00	3.50	9.2521	35.6088	57.1847	2.2248	1.7182	17	2.9027	29.4903	213.5797	x
Cobalt	26	12	14	2	0	0.46	6.00	79.10	4.00	6.9288	14.4769	20.2464	1.9357	1.1896	26	3.1052	15.4605	26.9110	
Copper	26	11	15	4	0	0.42	3.10	25.60	3.00	4.5510	6.4519	6.0162	1.5153	0.8227	26	2.6125	7.9278	9.2733	
Iron	25	25	0	10	1	1.00	83.20	37600.00	1220.00	1958.8044	9441.8360	12978.8596	7.5801	2.1258	25	466.7799	8219.9664	115169.5709	x
Lead	15	8	7	2	11	0.53	1.20	14.90	1.45	2.4819	4.1233	4.2990	0.9090	1.0537	15	1.2191	5.0527	9.5954	
Magnesium	26	26	0	1	0	1.00	222.00	13500.00	4845.00	3518.6312	5774.1923	4215.3013	8.1658	1.2705	26	1493.1461	8291.7308	16230.4205	x
Manganese	25	25	0	2	1	1.00	2.80	17300.00	518.00	519.9522	4194.3600	5920.1028	6.2537	2.8163	25	77.7651	3476.4991	589338.6180	x
Mercury	26	0	26	0	0	0.00	0.00	0.00	0.10	0.1000	0.1000	0.0000	-2.3026	0.0000	26	0.1000	0.1000	0.1000	x
Nickel	26	22	4	4	0	0.85	3.90	131.00	21.90	19.7564	34.5808	34.6814	2.9835	1.1905	26	8.8486	44.1103	76.8764	
Potassium	26	22	4	2	0	0.85	564.00	16000.00	1715.00	2025.9305	3610.0000	4568.6184	7.6138	1.0610	26	990.2224	4144.9216	6122.7012	
Selenium	25	2	23	2	1	0.08	2.20	2.40	1.00	1.0053	1.1360	0.5345	0.0052	0.5346	25	0.7009	1.4418	1.4407	
Silver	26	2	24	2	0	0.08	4.00	4.60	2.00	2.0402	2.1038	0.6606	0.7130	0.2268	26	1.7507	2.3776	2.2681	
Sodium	26	26	0	1	0	1.00	3260.00	98100.00	12250.00	12295.7921	18619.6154	23202.0221	9.4170	0.8445	26	6955.1566	21737.3256	25877.3747	
Thallium	26	3	23	1	0	0.12	1.90	2.80	1.00	0.9402	1.0558	0.5710	-0.0617	0.4792	26	0.6804	1.2990	1.2696	
Vanadium	26	11	15	4	0	0.42	3.60	28.70	3.50	4.9735	7.6115	8.1341	1.6041	0.8890	26	2.7302	9.0600	11.2042	
Zinc	16	15	1	3	10	0.94	8.60	55.50	16.90	18.2276	21.7563	13.4530	2.9029	0.6279	16	11.9334	27.8418	31.6728	

NOTES:
Concentrations are given in units of ug/l. (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater then the maximum detected concentration.

Table 4

CHEMICAL SUMMARY STATISTICS FOR GROUNDWATER - DISSOLVED METALS
[NO R8 WELL SAMPLES]
GCL Tie and Treating Site

Dissolved Metal Analytes	Valid	Occur	Undetect	Estimated	Reject	Frequency Detected	Minimum Concentration Detected	Maximum Concentration Detected	Median	Geometric Mean	Arithmetic Mean	Standard Deviation	mean(y)	stdev(y)	n(y)	Lower Quartile	Upper Quartile	Upper 95	
Aluminum	25	14	11	4	1	0.56	18.20	1670.00	23.00	55.1358	187.6380	409.5587	4.0098	1.4065	25	21.3456	142.4160	356.4980	
Antimony	26	0	26	0	0	0.00	0.00	0.00	21.55	13.5673	16.8481	9.3273	2.6077	0.7374	26	8.3498	22.3122	24.5451	x
Arsenic	26	11	15	2	0	0.42	2.00	7.50	1.05	1.4536	2.2692	2.2449	0.3740	0.9522	26	0.7646	2.7634	3.6276	
Barium	26	26	0	4	0	1.00	6.30	175.00	63.55	52.7082	69.0692	47.0617	3.9648	0.8365	26	29.9762	92.6785	109.6116	
Beryllium	26	0	26	0	0	0.00	0.00	0.00	0.50	0.3713	0.4865	0.2978	-0.9907	0.8486	26	0.2094	0.6582	0.7862	x
Cadmium	26	0	26	0	0	0.00	0.00	0.00	1.98	1.4255	1.7154	0.8678	0.3545	0.6867	26	0.8969	2.2656	2.4161	x
Calcium	26	26	0	7	0	1.00	1760.00	94100.00	40200.00	30158.0919	42085.3846	25075.1098	10.3142	1.0516	26	14834.9404	61308.6725	89569.1536	
Chromium	24	6	18	6	2	0.25	5.50	40.70	3.50	3.9027	5.4563	7.7821	1.3617	0.6654	24	2.4912	6.1139	6.5355	
Cobalt	26	12	14	1	0	0.46	6.30	92.10	4.00	6.8080	16.0808	23.6162	1.9181	1.2957	26	2.8403	16.3181	33.2046	
Copper	26	2	24	2	0	0.08	4.90	24.50	3.00	2.5981	3.3596	4.3903	0.9548	0.5726	26	1.7655	3.8234	3.8558	
Iron	22	22	0	6	4	1.00	17.70	36100.00	155.00	565.8455	9169.3182	14082.0306	6.3383	2.8571	22	82.3277	3889.1045	1.08E+06	x
Lead	26	2	24	0	0	0.08	1.70	2.90	0.55	0.7607	0.9038	0.6096	-0.2735	0.5653	26	0.5195	1.1139	1.1201	
Magnesium	26	26	0	4	0	1.00	72.60	13200.00	4430.00	2722.1184	5289.1769	4146.7830	7.9092	1.5364	26	965.4829	7674.8417	23874.4389	x
Manganese	25	23	2	5	1	0.92	1.60	17600.00	519.00	264.7784	4225.3400	6078.2413	5.5789	3.6261	25	22.9313	3057.2884	2.76OE+07	x
Mercury	26	0	26	0	0	0.00	0.00	0.00	0.10	0.1000	0.1000	0.0000	-2.3026	0.0000	26	0.1000	0.1000	0.1000	x
Nickel	26	12	14	1	0	0.46	5.20	73.50	6.00	9.5039	18.5115	22.7849	2.2517	1.1615	26	4.3408	20.8085	34.8626	
Potassium	26	22	4	4	0	0.85	477.00	15200.00	1725.00	1921.0640	3417.5385	4324.5141	7.5606	1.0565	26	941.8630	3918.2841	5757.1109	
Selenium	26	1	25	1	0	0.04	2.50	2.50	1.00	1.1053	1.3038	0.9035	0.1001	0.5755	26	0.7496	1.6297	1.6454	
Silver	26	1	25	1	0	0.04	3.50	3.50	2.00	2.0106	2.0269	0.3099	0.6984	0.1197	26	1.8546	2.1797	2.1100	
Sodium	26	26	0	4	0	1.00	3140.00	91500.00	12100.00	12144.3582	18176.5385	22128.5439	9.4046	0.8374	26	6902.6048	21366.6438	25288.6781	
Thallium	26	3	23	1	0	0.12	1.80	2.60	1.00	0.9490	1.0558	0.5529	-0.0524	0.4560	26	0.6977	1.2907	1.2541	
Vanadium	26	6	20	3	0	0.23	2.70	27.90	3.50	3.1989	4.4423	5.3619	1.1628	0.7250	26	1.9615	5.2169	5.6934	
Zinc	15	10	5	5	11	0.67	9.10	43.60	11.50	11.3760	14.6300	11.0431	2.4315	0.7385	15	6.9121	18.7226	23.7948	

NOTES:
Concentrations are given in units of ug/l. (ppb).
The "x" in the far right column indicates that the 95% Upper Confidence Limit is greater than the maximum detected concentration.

Environmental Soil Management of New York (ESMI)

Environmental Soil Management of New York (ESMI) operates a recycling facility in Fort Edward, New York to process non-hazardous petroleum contaminated soils, and non-hazardous soils contaminated with coal tar/MGP wastes. The facility uses thermal desorption processes to remove and destroy hydrocarbon contaminants from these soils. The Part 360 permit for the facility authorizes up to 1400 tons per day of these wastes to be treated. No waste is generated from the thermal treatment processing operations, and the clean soil generated from the processing can be reused in accordance with the conditions of their Part 360 permit, or Department-issued Beneficial Use Determination. The facility is also currently seeking a permit modification to allow the inclusion of additional contaminants on the facility's list of approved waste contaminants. Examples of additional contaminants include: non-TSCA PCB's, non-hazardous solvents, waxes, and greases. The proposed permit modification is still in the DEC review process.

TPST Soil Recyclers of New York

TPST Soil Recylers of New York is authorized through permit to operate a stationary soil remediation unit (SRU) for the treatment of non-hazardous petroleum contaminated soils at their 4.4 acre site in New Windsor, New York. The facility's Part 360 permit allows the facility to operate for a maximum of 21 hours per day Monday thru Saturday, and may not exceed a design capacity of 525 tons of PCS per operating day.

Superfund Proposed Plan

GCL TIE & TREATING SITE

Operable Unit 2

Town of Sidney
Delaware County, New York

EPA
Region 2

February 1995

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated groundwater and surface-water sediments located at the GCL Tie & Treating site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the 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 Section 300.430(f) of the National Contingency Plan (NCP). The remedial alternatives summarized here are described in the remedial investigation and feasibility study (RI/FS) reports which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the RI/FS reports to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

The remedy described in this Proposed Plan is the preferred remedy for contaminated groundwater and surface-water sediments at 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. We are soliciting public comment on all of the alternatives considered in the detailed analysis section of the FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS reports, Proposed Plan, and supporting documentation have been made available to the public for a public comment period which begins on March 1st and ends on March 30th, 1995.

Dates to remember:
MARK YOUR CALENDAR

March 1st to March 30th, 1995
Public comment period on RI/FS reports, Proposed Plan, and remedies considered

March 8th, 1995
Public meeting at the Civic Center, 21 Liberty Street, Sidney, NY

A public meeting will be held during the public comment period at the Sidney Civic Center on March 8, 1995 at 7:00 p.m. to present the conclusions of the FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

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

All written comments should be addressed to:

Carlos R. Ramos, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866

Copies of the Remedial Investigation and Feasibility Study Reports dated January 1995, Proposed Plan, and supporting documentation are available at the following repositories:

Sidney Memorial Library
Main Street
Sidney, NY
Telephone: (607) 563-8021

and

U.S. Environmental Protection Agency
Emergency and Remedial Response Division
Superfund Records Center
290 Broadway, 18th Floor
New York, N.Y. 10007-1866

[After March 1, 1995]

SITE BACKGROUND

The GCL Tie and Treating site occupies approximately 60 acres in an industrial/commercial area of Delaware County, New York (see Figure 1). According to an analysis of historical photographs conducted by EPA and accounts by local residents, wood-preserving activities at the site date as far back as the 1940's.

The site is bordered on the north by a railroad line. A warehouse and a municipal airport are located to the north of the railroad line. Route 8 and Delaware Avenue delineate the eastern and southern borders of the site, respectively. A drainage ditch (Unalam Tributary) and woodland area lie between Delaware Avenue and the site. The western portion of the property abuts a small impoundment and wetlands area. The site eventually drains via overland flow to the Susquehanna River, which is located within one mile of the site.

The site includes two major areas, generally referred as the "GCL property" and "non-GCL property". The 26-acre GCL property housed a wood-treating facility called GCL Tie & Treating, and includes four structures. The primary building housed the wood pressure treatment operations including two treatment vessels (50 feet in length by 7 feet in diameter), an office, and a small laboratory. Wood (mostly railroad ties) and creosote were introduced into the vessels which were subsequently pressurized in order to treat the wood. The remaining three structures housed a sawmill and storage space. The non-GCL portion of the site includes two active light manufacturing companies (which did not conduct wood treatment operations) located on a parcel of land adjacent to the GCL property.

Approximately 1,100 people are employed in a nearby industrial area. About 5,000 people live within 2 miles of the site and depend on groundwater as their potable water supply. The nearest residential well is within 0.5 mile of the site. Two municipal wells, supplying the Village of Sidney, are located within 1.25 miles of the site. A shopping plaza consisting of fast-food restaurants and several stores is located approximately 300 feet south of the site. Other facilities (i.e., a hospital, public schools, senior citizen housing, and child care centers) are located within 2 miles of the site.

The site first came to the attention of the NYSDEC in 1986, after one of the pressure vessels used at the GCL facility malfunctioned, causing a release of an estimated 30,000-gallons of creosote. GCL representatives excavated the contaminated surface soil and placed it in a mound; no further action was undertaken at the time.

In September 1990, NYSDEC requested EPA to conduct a removal assessment at the site. Consequently, EPA conducted sampling of the GCL Tie and Treating facility in December 1989, October 1990, and August 1990. As a result of the data and information that were obtained as part of the assessment, a Removal Action was initiated by EPA in March 1991.

Activities conducted as part of the removal effort included: site stabilization (e.g., run-off and dust control), delineation of surface contamination, installation of a chain-link fence, identification and disposal of containerized (e.g., tanks, drums) and uncontainerized hazardous wastes (e.g., wastes in sumps); preparation of approximately 6,000 cubic yards (cy) of contaminated soil and wood debris for disposal; and a pilot study to determine the effectiveness of composting for bioremediation of creosote-contaminated soils.

The site was proposed for inclusion on the National Priorities List (NPL) in February 1994 and was added to the NPL in May 1994. In September 1994, EPA signed a Record of Decision for the first operable unit which called for the excavation and on-site treatment of approximately 36,100 cubic yards of contaminated soil and debris by a thermal desorption process.

EPA has been conducting a search for potentially responsible parties (PRPs). If EPA determines that there are one or more viable PRPs, EPA will take appropriate enforcement actions to recover its response costs pursuant section 107(a) of CERCLA, 24 U.S.C. § 2907(A). To date, only one PRP has been identified and notified of his potential liability under CERCLA; however, this PRP was not considered to be a viable candidate to undertake the necessary response actions.

SCOPE AND ROLE OF ACTION

The GCL Tie & Treating site was selected as a pilot project for the Superfund Accelerated Cleanup Model (SACM) initiative. The purpose of SACM is to make Superfund cleanups more timely and efficient. Under this pilot, activities which would normally have been performed sequentially (e.g., site assessment, NPL placement, removal assessment) were performed concurrently. In June 1993, while attempting to determine if the site would score high enough for inclusion on the NPL, EPA initiated RI/FS activities to delineate further the nature and extent of contamination at the site. These activities would not typically have been initiated until after the site had been proposed to the NPL.

Site remediation activities are sometimes segregated into different phases, or operable units, so that remediation of different environmental media or areas of a site can proceed separately, resulting in an expeditious remediation of the entire site. EPA has designated two operable units for the GCL Tie & Treating site as described below.

- Operable unit 1 addresses the remediation of contaminated soils found on the GCL-property portion of the site. This unit is currently in the remedial design phase.

- Operable unit 2 addresses the contamination in the soils on the remainder of the site (non-GCL property), and in the groundwater, surface water, and surface-water sediments. This is the final operable unit planned for this site and the focus of this Proposed Plan.

REMEDIAL INVESTIGATION SUMMARY

The nature and extent of contamination found at the GCL site was assessed through a comprehensive sampling of soil, groundwater, surface water, and surface-water sediment. Sampling was conducted during the Fall/Winter of 1993. The investigation focussed on contaminants typically associated with the creosote wood-preserving process. Creosote contaminants typically found included numerous polyaromatic hydrocarbons (PAHs) such as benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo [k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-c,d] pyrene and dibenzo[a,h]anthracene.

The following paragraphs discuss the characterization of contamination in the operable unit 2 study area, namely, in the non-GCL property soils, groundwater, surface water, and surface-water sediments.

Soils

Soil samples were collected from monitoring wells and soil borings drilled on the GCL property and on the non-GCL property. Samples were also collected at off-site locations to provide information on background conditions. Table 1 summarizes the analytical results for the soil sampling for the non-GCL property. In general, relatively low levels of contaminants were detected with total PAHs ranging up to 24 parts per million (ppm). Generally, the concentrations of metals detected on-site were not significantly above background concentration ranges with the exception of beryllium (up to 3.2 ppm), copper (up

to 176 ppm) and lead (up to 46 ppm), which were above their representative background concentrations of 0.6 ppm, 26.2 ppm and 11.2 ppm, respectively.

Table 1. Summary of Non-GCL Property Soils Analytical Results
(All values in parts per million [ppm])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Volatile Organics		
Trichloroethene	0.7	0.01
Toluene	1.5	0.024
Total Volatiles	10	0.042
Polyaromatic Hydrocarbons		
Fluoranthene	50	9.5
Pyrene	50	6.3
Benzo[a]anthracene	78	1.5
Chrysene	7,840	2.7
Benzo[b]fluoranthene	678	3.2
Benzo[k]fluoranthene	78	3.2
Benzo[a]pyrene	8	2.9
Total PAHs	500	24
Metals		
Aluminum	11,300	14,300
Arsenic	8.5	10.4
Beryllium	0.6	3.2
Cadmium	1.0	0.91
Chromium	16.2	20.8
Copper	26.2	176
Lead	11.2	46
Nickel	24.4	29.6
Zinc	57.0	78.9

Benchmark levels for comparison are NYSDEC soil cleanup objectives (VOCs only), background levels (metals only), and risk-based cleanup levels for industrial use (PAHs only, consistent with Record of Decision for operable unit 1).

Surface Water and Surface-Water Sediments

Surface water samples and sediments were collected along the Unalam tributary and the impoundment. Tables 2 and 3 summarize the analytical results.

Table 2. Summary of Surface Water Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Arsenic	0.018	11.4
Copper	12	35.2
Manganese	Not available	8,710
Nickel	6.1	19.6
Zinc	110	116

Benchmark levels for comparison are the low value for that contaminant from either USEPA water quality criteria or NYSDEC ambient water standards.

Table 3. Summary of Surface-Water Sediment Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	HIGHEST CONCENTRATION
Polyaromatic Hydrocarbons		
Benzo[a]anthracene	20.8	2,200
Chrysene	20.8	4,000
Benzo[b]fluoranthene	20.8	4,300
Benzo[k]fluoranthene	20.8	3,100
Benzo[a]pyrene	20.8	1,700
Indeno[1,2,3-cd]pyrene	8.8	1,100
Total PAH	Not available	23,850
Metals		
Arsenic	5,000	16,400
Chromium	26,000	32,000
Copper	19,000	51,900
Lead	27,000	70,200
Manganese	428,000	547,000
Mercury	110	690
Nickel	22,000	43,600
Zinc	85,000	173,000

Benchmark levels for comparison are the low value for that contaminant from either USEPA criteria for aquatic sediments (human health basis criteria) or NYSDEC sediment criteria.

Of the 14 inorganics detected in the surface water samples, only arsenic (up to 11.4 (parts per billion) ppb) and copper (up to 35.2 ppb)

significantly exceeded state or federal ambient water quality standards. Elevated PAH concentrations were detected at 3 of the 7 sediment sampling locations. PAHs were detected in these areas with total concentrations ranging up to 23,850 ppb. The PAH contamination detected in the sediments is most likely attributed to runoff from the site soils. Lead, chromium, and mercury were detected in concentrations above background levels which could be attributed to regional background variations or from off-site sources, as these contaminants are not typically associated with the wood-preserving operations conducted at the site. The results of the sediment sampling indicate that unconsolidated sediments along the Unalam tributary and the impoundment along the western side of the site contain elevated levels of PAHs. The extent of contamination is approximately 2,850 feet in length, 1.5 feet in width and 0.5 feet in depth in the tributary, as well as a 5-foot wide strip along the edge of the impoundment.

Groundwater

Site-specific geology within the GCL property is characterized by a layer of fill approximately 5 feet thick in the western portion of the site which gradually decreases to approximately 2 to 3 feet in the eastern section of the GCL property. The fill consists predominantly of silt and clay with significant amounts of wood and assorted debris on the GCL property. The fill is underlain by silt and clay type soils.

There are two hydrogeologic systems consisting of the overburden and bedrock units. The overburden unit can be further divided into shallow (approx. 5 to 16 feet in depth) and intermediate (approx. 11 to 25 feet in depth) groundwater zones. Groundwater is first encountered at depths ranging from 5 to 8 feet below grade around the site. As a general rule, groundwater flow in the overburden aquifer appears to be in a north-northwesterly direction; groundwater movement in the bedrock appears to be in a northerly direction. Permeability of the overburden and bedrock soils is relatively low; groundwater flow through the bedrock aquifer occurs primarily through fractures.

Six previously existing groundwater monitoring wells and 14 newly installed wells were sampled during the RI. Samples were collected during two separate rounds of sampling, and analyzed for a full range of organic and inorganic constituents. Table 4 summarizes the analytical results. Two main groups of organic compounds were found in the groundwater above drinking water standards, namely, volatile organic compounds (VOCs) and PAHs. PAHs, including benzo[b]fluoranthene (up to 3 ppb), benzo[a]pyrene (up to 2 ppb), chrysene (up to 4 ppb) and benzene (220 ppb) significantly exceeded drinking water standards, and are the same type of contaminants as those found in high concentrations in the site soils. Chlorinated VOCs such as vinyl chloride (up to 4,700 ppb), 1,1-Dichloroethane (up to 1,200 ppb), cis-1,2-dichloroethene (up to 4,300 ppb), and trichloroethene (up to 1,000 ppb) were also found at concentrations exceeding drinking water standards, however, they are most likely not related to the activities that took place at the GCL site. It is likely that the chlorinated VOCs originated from the former Route 8 Landfill, located across from Delaware Avenue and hydraulically upgradient from the GCL site. The data obtained during the RI suggest that the contaminant plume originating at the Route 8 Landfill extends beneath much of the GCL site. Currently, the Route 8 site is being remediated under the New York State hazardous waste remediation program; a groundwater collection and treatment system designed to address the groundwater contamination was constructed and recently started operation.

Aluminum (up to 6,210 ppb), iron (up to 37,600 ppb), manganese (up to 17,300), antimony (up to 44.3 ppb), chromium (up to 166 ppb), and nickel (up to 131 ppb) were detected in groundwater samples in concentrations significantly above drinking water standards. However, the presence of most of these metals at elevated concentrations in background and off-site wells is potentially indicative of background levels and/or off-site sources.

It is estimated that the GCL contaminant plume extends over an area of approximately 173,500 square feet with a thickness of approximately 45 feet. The volume of water which exceeds drinking water standards is estimated at 10 million gallons.

During the RI, a creosote product layer (referred

as dense nonaqueous phase liquid (DNAPL) wasdiscovered in the shallow groundwater, in a localized area near the wood treatment/process buildings. The DNAPL appears to be perched on many thin soil layers rather than in a single well-defined pool. It is estimated that the DNAPL layer ranged from 1 to 2 feet in thickness, and contained concentrations of PAHs in excess of 8,000 ppm. The volume of the DNAPL layer is estimated at 10,000 to 30,000 gallons. The data suggest that the DNAPL layer is contained within the property boundaries. DNAPLs are heavier than water, and have a tendency to sink. PAH compounds, which are the principal components of creosote, are extremely immobile and tend to sorb to the aquifer rather than move with the groundwater. DNAPLs constitute a highly significant source of soil and groundwater contamination at the site.

SUMMARY OF SITE RISK

Based upon the results of the investigations, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site, if no remedial action were taken.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *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 well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The baseline risk assessment began with selecting contaminants of concern which would be representative of site risks. These contaminants are summarized in Table 5, and include several contaminants which are known to cause cancer in laboratory animals and are suspected to be human carcinogens. In addition, since the current land use of the property is industrial, and based on input from the community and local officials, it was assumed that future land uses of the property would continue to be industrial.

The baseline risk assessment evaluated the health effects which could result from exposure to contamination as a result of:

- Ingestion and inhalation of soil by young children and adult residents living off-site;

- Ingestion, inhalation and dermal contact with soil by older children and adults trespassing on the site;

- Ingestion and dermal contact with surface water and sediments by older children and adults trespassing on the site;

- Ingestion, inhalation and dermal contact with groundwater by children and adults living in the vicinity of the site in the future; and

- Ingestion, inhalation and dermal contact with soil by on-site workers.

Current federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6} (e.g., a one-in-ten-thousand to a one-in-a-million excess cancer risk) and a maximum health Hazard Index (which reflects noncarcinogenic effects for a human receptor) equal to 1.0. A Hazard Index greater than 1.0 indicates a potential for noncarcinogenic health effects.

The results of the baseline risk assessment indicate that of all pathway scenarios evaluated, only one, future consumption of groundwater, poses a potential health threat. Although site groundwater is not currently being used for human consumption, under a hypothetical future use scenario, children and adults consuming contaminated groundwater in the vicinity of the site would be at risk. The total potential

Table 4. Summary of Groundwater Analytical Results
(All values in parts per billion [ppb])

CONTAMINANT	BENCHMARK LEVEL FOR COMPARISON	GCL PROPERTY HIGHEST CONCENTRATION	NON-GCL PROPERTY HIGHEST CONCENTRATION	OFF-SITE HIGHEST CONCENTRATION
Volatile Organics				
Vinyl chloride	2		4,700	
Chloroethane	5		19	
Methylene chloride	5		25	
1,1-Dichloroethene	7	8	17	6
1,1-Dichloroethane	5	15	1,200	13
cis-1,2-Dichloroethene	70	36	4,300	29
Trichloroethene	5	48	1,000	30
Benzene	5	220	9	
Polyaromatic Hydrocarbons				
Benzo[a]anthracene	0.1	6		
Chrysene	0.2	4		
Benzo[b]fluoranthene	0.2	3		
Benzo[k]fluoranthene	0.2	2		
Benzo[a]pyrene	0.2	2		
Indeno[1,2,3-cd]pyrene	0.4	0.7		
Metals				
Aluminum	50	2,230	6,210	827
Antimony	6	44.3	10	
Arsenic	50	7.8	51.1	6.4
Chromium	100	40.7	166	17.2
Iron	50	37,600	15,400	1,220
Manganese	50	17,600	3,360	519
Nickel	100	74.2	131	35.2

Benchmark levels for comparison are taken from USEPA and NYSDOH drinking water MCLs. Blank spaces denote a value below analytical detection limit.

carcinogenic health risk due to ingestion, inhalation and dermal contact with contaminated groundwater (from site related and upgradient contaminant sources) by future children and adult residents is 1.3×10^{-1}. For site-related groundwater contamination only, the total potential carcinogenic health risk is 7.1×10^{-4}. These risk numbers mean that approximately one person out of ten and one person out of ten-thousand respectively, would be at risk of developing cancer, if the site were not remediated. The total potential carcinogenic health risks (via exposure to surface water, sediments, and soils) to the other potential receptors were within EPA's acceptable range and varied from 10^{-5} to 10^{-12}. The HI is less than 1.0 for all receptors, except for exposure to groundwater under the future use scenario (up to HI=387) and exposure to surface water under current and future uses (up to HI=6).

Ecological Risk Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *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. *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. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with evaluating the contaminants associated with the site in conjunction with the site-specific biological species/habitat information. Principal ecological communities at the site consist of a deciduous wetland area within the southern portion of the site (Unalam tributary), and an emergent wetland/open water complex (impoundment) to the west of the site (see Figure 1). The wetland areas support a wide array of animal species, including 5 mammal species, 3 frog species, and 17 bird species.

This risk assessment evaluated the site ecological communities and their responses to toxicological exposures. The threat of lethal accumulations of contaminants in plant and animal populations was evaluated. The results of the ecological risk assessment indicate the potential for ecological impacts due to the presence of PAH contamination in the surface water and sediments of the Unalam Tributary, drainage ditches, wetlands and pond. The invertebrate and plant communities present at the site appear to bioconcentrate PAHs. Since both aquatic plants and invertebrates form a portion of the diets of wading birds and waterfowl, their diet poses a potential exposure route. Although adult mallard ducks subjected to dietary exposure of levels similar to those found on site displayed no toxic effects, studies have shown significant mortality and deformities in mallard embryos and ducklings following exposure to similar levels of PAHs. Therefore, ingestion by breeding adult waterfowl may affect nesting success on the wetland habitats present on and adjacent to the site.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare or the environment.

REMEDIAL ACTION OBJECTIVES

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

Organic contamination has been detected at the site at concentrations above levels determined to be protective of human health and the environment in groundwater and sediments, respectively. Therefore, the following remedial action objectives have been established for the contaminated soil:

- Prevent public and biotic exposure to contaminant sources that present a significant threat (contaminated groundwater and surface-water sediments); and,

- Reduce the concentrations of contaminants in the groundwater to levels which are protective of human health and the environment (e.g., wildlife).

- Prevent further migration of groundwater contamination.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute

Table 5. Chemicals of Potential Concern

Groundwater

Acetone
Benzene
2-Butanone
Carbon tetrachloride
Chlorobenzene*
Chloroform
Chloroethane*
1,2 Dichlorobenzene
1,1 Dichloroethane
1,2 Dichloroethane*
1,1-Dichloroethene
cis-1,2 Dichloroethene
trans-1,2 Dichloroethene*
Ethylbenzene
Methylene chloride*
4-Methyl-2-pentanone
Styrene
Tetrachloroethene*
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane*
Trichloroethene
Vinyl chloride
Xylenes
Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(b)flouranthene
Bis(2-ethylhexyl)phthalate
Chrysene
Fluoranthene
Fluorene
2-Methylnaphthalene*
2-Methylphenol
4-Methylphenol
Naphthalene
Phenol
Pyrene
Aldrin
Alpha BHC
beta BHC*
gamma BHC
Chlordane
DDD*
DDE
Dieldrin
Endrin
Heptachlor epoxide

Antimony
Arsenic*
Barium*
Chromium
Copper
Manganese
Nickel
Selenium
Silver
Vanadium
Zinc

Soil

Acenaphthene
Anthracene
Benzene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chrysene
DDT
Dibenz(a,h)anthracene
Ethylbenzene
Flouranthene
Fluorene
Indeno (1,2,3-cd)pyrene
Methoxychlor
4-Methylphenol
Naphthalene
PCBs
Pyrene
Styrene
Toluene
Xylenes

Surface Water

Arsenic
Barium
Chloroethane
Chromium
Copper
Manganese
Nickel
Selenium
Zinc

Sediment

Acenaphthene
Aldrin
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Chlordane
4-Chloro-3-Methylphenol
2-Chlorophenol
Chrysene
DDT
2,4-Dinitrotoluene
Endosulfan
Fluoranthene
Indeno(1,2,3-cd)pyrene
Methylene Chloride
PCBs
Pentachlorophenol
Phenol
Pyrene

* Not a contaminant of concern when Route 8 wells are excluded.

includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances. Implementation time includes time necessary to contract and design the alternative.

In the spirit of the SACM initiative and relying on the Agency's technology selection guidance for wood-treating sites, EPA considered technologies which have been consistently selected at wood-preserving sites with similar characteristics (e.g., types of contaminants present, types of disposal practices, environmental media affected) during the development of remedial alternatives.

The alternatives developed for groundwater (GW) are:

Alternative 1: No Action

Capital Cost:	Not Applicable
O & M Cost:	$27,200 for biannual monitoring $20,000 each five-year review
Present Worth Cost:	$380,700 (over 30 years)
Implementation Time:	Not Applicable

The Superfund program requires that the No Action alternative be considered as a baseline for comparison with other alternatives. The No Action alternative for the contaminated groundwater would only include a long-term monitoring program. The contaminated groundwater and DNAPL present in the subsurface would be left to naturally attenuate without any treatment. The long-term monitoring program would consist of semiannual sampling for PAHs at existing wells on-site and around the site. A 30-year monitoring period was assumed for estimating the cost of this alternative. A total of six existing monitoring wells would be utilized to sample the groundwater to determine whether the concentration of the contaminants of concern have been lowered to cleanup levels through natural attenuation and to monitor the migration of contaminants and free-phase DNAPL in areas surrounding the site.

Because this alternative would result in contaminants being left on-site above health based levels, the site would have to be reviewed every five years for a period of 30 years per the requirements of CERCLA. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative GW-2, Option A: Extraction, on-site treatment via activated carbon adsorption, and discharge to surface water

Capital Cost:	$1,883,100
O & M Cost:	$603,300 per year
Present Worth Cost:	$9,369,400
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, treatment and discharge of treated groundwater. The treatment system would consist of an oil/water separator for phase separation, followed by pretreatment for manganese removal (necessary to eliminate potential interferences with subsequent treatment processes) and removal of organic contaminants by activated carbon adsorption. The treated groundwater would be discharged to the small unnamed stream adjacent to the site. Although it is likely to take considerable longer than 30 years to achieve remediation goals, the treatment plant design and cost estimate is based on an operating period of 30 years.

The extraction/collection system would include a combination of a collection trench for shallow groundwater and an extraction well for the intermediate groundwater. The trench would be approximately 700 feet long and would be located at the northwestern (downgradient) boundary of the site. It is estimated that approximately 0.4 gallons per minute (gpm) of groundwater would be pumped from the collection trench, and approximately 26.4 gpm would be pumped from the extraction well to the on-site treatment system.

In addition to groundwater extraction, if the DNAPL is found to be pumpable, DNAPL extraction wellpoints would be installed in areas of suspected DNAPL. It is envisioned that four wellpoints would be installed in the shallow overburden and would have low sustainable pumping rates (less than 1 gpm in total). Total flow to the on-site treatment system would be

approximately 30 gpm. All pumping rates would be refined during the design phase based on pumping tests. Extracted groundwater would be delivered to a collection tank before treatment.

Because of the nature of the creosote contaminants and the observation of DNAPL during field activities, oily product is likely to be present with the extracted groundwater. Heavy or light product would be separated using an oil/water separator. Solids and/or heavy product would settle by gravity into the separator's sludge hopper and would be removed periodically for disposal to a permitted treatment facility. Lighter product would float to the surface and be removed by a skimmer for disposal/reuse at a licensed off-site treatment/recycling facility.

The pretreatment system would consist of an individual treatment train designed for the removal of manganese. Manganese would be removed through pH adjustment, oxidation, precipitation, coagulation, clarification, neutralization, and filtration steps with the addition of caustic, acid, and polymer. Sludges produced during this step would be stored in drums or rolloffs, and sent out to an approved disposal facility. Filtration may be required to further pretreat the effluent.

After pretreatment, groundwater would be pumped to a carbon adsorption system consisting of two carbon beds connected in series. Organic contaminants (PAHs) would be removed by the carbon adsorption units to target groundwater cleanup levels. The spent carbon would be collected and shipped for off-site disposal or regeneration and reuse.

Treated groundwater would be discharged via a culvert to the small unnamed stream located on the southern border of the site. This stream in turn discharges to an unnamed tributary to Unalam Creek, which eventually discharges to the Susquehanna River. The discharge structure would include appropriate erosion control devices such as rip rap and energy dissipation features. The discharge would comply with the New York State Pollutant Discharge Elimination System (NYSPDES) requirements. All waste residuals generated from the treatment process would be transported off-site to a permitted treatment and disposal facility, or (in the case of carbon) to a recycling facility.

The goal of this alternative is to restore groundwater to drinking water quality. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of shallow ground water remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable time frame. If groundwater restoration is not feasible or practical, the alternative may then focus on containing the extent of groundwater contamination within the site boundaries. Restoration of the groundwater outside the DNAPL source areas (e.g., intermediate groundwater) is likely to be feasible, since it is mostly contaminated with mobile organic contaminants (e.g., benzene).

During design or operation of the system, it may also be determined that natural attenuation or enhanced biodegradation (e.g., introduction of air to increase the rate of biodegradation) would be able to achieve a similar level of contaminant removal and containment as groundwater extraction and treatment, but at a lower cost. Such information would be utilized during the remedial design to maximize the effectiveness and efficiency of the system. The information would also be used to reassess the time frame and technical practicability of achieving cleanup standards.

Alternative GW-2, Option B: Extraction, on-site treatment via biological treatment, and discharge to surface water

Capital Cost:	$2,058,600
O & M Cost:	$626,500
Present Worth Cost:	$9,832,800
Implementation Time:	24 months

This option is virtually identical to Alternative 2, option A. The only difference is that, following pretreatment, the remaining contaminants in the groundwater would be pumped to an aerobic

biological reactor for treatment. This reactor would contain bacterial cultures capable of degrading the contaminants in the groundwater. Wastes (e.g., sludges) generated during the treatment process would be disposed off-site at a permitted disposal/treatment facility.

Alternative GW-3: Extraction, on-site pretreatment, discharge to publicly owned treatment works (POTW) for final treatment

Capital Cost:	$1,904,000
O & M Cost:	$613,600
Present Worth Cost:	$9,518,200
Implementation Time:	24 months

The major features of this alternative are groundwater extraction, collection, pretreatment and discharge to the local POTW. In order to comply with POTW influent requirements, manganese would have to be removed from the groundwater. This would be accomplished by using conventional pretreatment methods for manganese removal such as the treatment train described under Alternative GW-2. The extraction/collection system and pretreatment for this alternative would also be the same as that discussed for Alternative GW-2. Therefore, only those operations that differ from previous alternatives are discussed below.

Treatment of organic contaminants would be accomplished by the Village of Sidney POTW utilizing a conventional sanitary wastewater treatment process consisting mainly of aerobic biodegradation. The facility was designed for a maximum wastewater treatment capacity of 1.7 million gallons per day (MGD), and currently operates at an average capacity of 0.6 to 0.7 MGD. Effluent from the pretreatment system would be discharged to the sanitary sewer line via a metered control manhole, which would record flow to the POTW. The nearest sanitary sewer is located parallel to Delaware Avenue, approximately 80 feet south of the roadway.

Groundwater would have to meet pretreatment requirements prior to discharge to the POTW. The Village of Sidney Municipal Code governs sewer use within the Village and regulates the discharge of wastes into the POTW. The Village has indicated that final acceptance of the pretreated GCL wastewater would not be available until a detailed application is submitted.

It is noted, however, that due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of DNAPL remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable timeframe.

<u>The alternatives developed for surface-water sediments (SD) are</u>:

Alternative SD-1: No Action

Capital Cost:	$0
O & M Cost:	$18,900 for biannual monitoring $20,000 for each five-year review
Present Worth Cost:	$277,700
Implementation Time:	6 months

The No Action alternative for the sediments at the GCL site would consist of a long-term monitoring program. For cost-estimating purposes, it is assumed that sediments would be monitored semiannually and that eight sediment samples would be collected and analyzed.

Because this alternative does not include contami nant removal, the site will have to be reviewed every five years for a period of 30 years per the requirements of CERCLA, as amended. These five-year reviews would include the reassessment of human health and environmental risks due to the contaminated material left on-site, using data obtained from the monitoring program.

Alternative SD-2: Excavation, treatment and disposal with GCL- property soils

Capital Cost:	$298,400
O & M Cost:	$0
Present Worth Cost:	$298,400
Implementation Time:	24 months

The contaminated sediments would be excavated during periods of no or low flow using conventional earth moving equipment such as backhoes, bulldozers, etc. The total volume of sediments to be excavated is estimated to be 125 cy. Excavation would be performed under moistened conditions to minimize the generation of fugitive dust. Erosion and sediment control measures such as silt curtains would be provided during excavation to control migration of contaminated sediment. Adjacent wetlands would be protected by erosion and sediment control measures.

The sediments would be treated via thermal desorption along with the GCL property soils (see Record of Decision dated 9/30/94); the design of the remedy was recently initiated. A typical thermal desorption process consists of a feed system, thermal processor, and gas treatment system (consisting of an afterburner and scrubber or a carbon adsorption system). Screened sediments are placed in the thermal processor feed hopper. Nitrogen or steam may be used as a transfer medium for the vaporized PAHs to minimize the potential for fire. The gas would be heated and then injected into the thermal processor at a typical operating temperature of 700°F to 1000°F. PAH contaminants of concern and moisture in the contaminated sediments would be volatilized into gases, then treated in the off-gas treatment system. Treatment options for the off-gas include burning in an afterburner (operated to ensure complete destruction of the PAHs), adsorbing contaminants onto activated carbon, or collection through condensation followed by off-site disposal. Thermal desorption achieves approximately 98 to 99 percent reduction of PAHs in soil. If an afterburner were used, the treated off-gas would be treated further in the scrubber for particulate and acid gas removal. A post-treatment sampling and analysis program would be instituted in order to ensure that contamination in the soil/sediment had been reduced to below cleanup levels. The treated sediment would be redeposited along with treated soils in excavated areas on the GCL property.

The excavated areas of the intermittent stream and wetlands edge would be backfilled with clean material and restored to pre-excavation conditions. The restoration would take place as soon as practicable after the sediments have been excavated, in order to minimize the period of impact to the stream and wetland. All applicable wetlands management guidelines would be followed.

Alternative SD-3: Excavation and off-site disposal

Capital Cost:	$820,300
O & M Cost:	$0
Present Worth Cost:	$820,300
Implementation Time:	24 months

This alternative consists of excavation of 125 cy contaminated sediment as described in Alternative SD-2 and transportation of all contaminated materials to an off-site RCRA permitted facility for treatment and disposal. One hundred twenty-five cy of clean fill would be used to restore excavated areas. Wetlands would be restored as discussed in Alternative SD-2.

EVALUATION 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 ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

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 pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses

whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and environmental statutes and requirements or provide grounds for invoking a waiver.

- 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.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies 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 FFS report and Proposed Plan, the concurs, opposes, or has no comment on the preferred alternative at the present time.

- Community acceptance will be assessed in the Record of Decision (ROD) following a review of the public comments received on the FFS report and the Proposed Plan.

A comparative analysis of the remedial alternatives based upon the preceding evaluation criteria follows.

Groundwater

- Overall Protection of Human Health and the Environment

Over time, Alternative GW-1 would provide some limited protection of human health and the environment since contaminants would be attenuated through natural processes (e.g., biodegradation, dispersion). Alternatives GW-2 and GW-3 would be protective of human health and the environment, since they would actively reduce the toxicity, mobility and volume of contaminants in the groundwater, and would protect groundwater surrounding the GCL site from further contamination. Although GW-2 and GW-3 would result in significant reduction in the mass of contaminants present in the aquifer, it is unlikely that full restoration of groundwater resources would be achieved within a reasonable time frame.

- Compliance with ARARs

Alternative GW-1 would not comply with federal or state drinking water standards or criteria or those ARARs required for protection of groundwater. Alternatives GW-2 and GW-3 would be designed to treat the aquifer to chemical-specific ARARs associated with state and federal groundwater and drinking water standards. Extracted groundwater would be treated to achieve NYSPDES requirements under Alternative GW-2; under Alternative GW-3 the extracted groundwater would be treated to local pretreatment standards prior to discharge to the POTW. Each of these alternatives would be capable of removing a significant mass of contaminants in the groundwater. The goal of these alternatives is to restore groundwater to drinking water standards. However, due to the characteristics of creosote (e.g., extremely viscous and difficult to pump) and the complex hydrogeological setting, it is unlikely that this goal will be achieved within a reasonable time frame for areas containing the creosote layer (e.g., shallow groundwater). Current estimates of DNAPL remediation are on the order of several hundred years. As such, it is likely that chemical-specific ARARs will be waived for those portions of the aquifer based on the technical impracticability of achieving further contamination reduction within a reasonable timeframe.

- Long-Term Effectiveness and Permanence

Alternative GW-1 would not provide for active treatment and would rely on natural attenuation

processes to restore the contaminated aquifer. Therefore, this alternative would not be an effective long-term remedy.

Alternatives GW-2 and GW-3 would reduce the potential risk associated with groundwater ingestion by extracting and treating the groundwater to remove a significant mass of contaminants from the aquifer. The time to achieve these risk reductions is limited by the effective extraction rates from the aquifer. However, it is unlikely that DNAPL contamination present in the shallow aquifer can be completely remediated due to the tendency of DNAPLs to sorb to the aquifer. Although none of the alternatives would be able to clean the aquifer to drinking water standards in a short period of time, the treatment alternatives would protect surrounding groundwater from further contamination.

- Reduction in Toxicity, Mobility, or Volume Through Treatment

Alternative GW-1 would not involve any removal or active treatment of the contaminants in the aquifer; therefore, would not be effective in reducing the mobility, toxicity, or volume through a treatment process. However, over time, natural attenuation processes would provide some reduction of the toxicity and volume of contaminants.

Alternatives GW-2 and GW-3 would reduce the toxicity, mobility and volume of contaminants in the aquifer to a larger extent than GW-1 since extraction and treatment of groundwater are provided.

- Short-Term Effectiveness

The implementation of Alternative GW-1 would result in no additional risk to the community during remedial activities, since no construction or remediation activities would be conducted. Workers involved in periodic sampling of site soils would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity. For purposes of this analysis, monitoring of the site would occur for 30 years.

Alternatives GW-2 and GW-3 involve construction and operation of an on-site treatment plant. Procedures for proper handling of the treatment reagents would be followed for all treatment alternatives. Any process residuals generated would be properly handled and disposed off-site. The risk to workers involved in the remediation would also be minimized by establishing appropriate health and safety procedures and preventive measures to avoid direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA-certified and would be instructed to follow OSHA protocols.

It is estimated that the treatment alternatives would take well over 30 years to achieve the remedial action objectives. However, a 30-year period was used for costing purposes. Operation of the treatment plant would be stopped when remedial objectives are achieved i.e., levels of contaminants in the aquifer are reduced to State and Federal drinking water standards, unless it is determined that ARARs must be waived in portions of the aquifer.

- Implementability

Alternative 1 would not involve any major site activities other than monitoring and performing five-year reviews. These activities are easily implemented.
The treatment components of Alternatives GW-2 and GW-3 would be easily implemented, as the technologies are proven and readily available. The carbon adsorption technology proposed for use in Alternative GW-2A is a proven and efficient method for removal of organic contaminants. Biological treatment, specified in Alternatives GW-2B and GW-3, has been used successfully for groundwater contaminated with creosote wastes. The manganese removal pretreatment technology required under Alternatives GW-2 and GW-3 is proven and readily available. Sufficient space is available on-site for a treatment plant.

Alternatives GW-2 and GW-3 would require institutional management of the operation and maintenance of the treated groundwater discharge system. Off-site disposal facilities are available for the disposal of the oil/water separator sludge and skimmings generated from Alternatives GW-2 and GW-3. Disposal (or

recycle) facilities are also available for recovered DNAPL and the other residues generated from those alternatives. Although treatment processes utilized in Alternative GW-3 are proven, it is uncertain whether the Village of Sidney POTW would accept the treated groundwater. Acceptance of the GCL effluent by the POTW would be contingent upon factors such as capacity available, waste characteristics, and permit requirements.

- Cost

GW-1 is the least expensive of all alternatives but would not involve treatment. Alternative 1 has a present worth cost of $380,700 which is associated with conducting a sampling and analyses program and five-year reviews over a 30-year period.

Alternative GW-2A would be the most expensive treatment alternative followed by GW-3 and GW-2B. However, the cost differences between GW-2A, GW-2B and GW-3 would be so small as to not be significant.

- State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

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

Sediments

- Overall Protection of Human Health and the Environment

Alternative SD-1 would not meet any of the remedial objectives and thus would not be protective of the environment. Contaminated sediments would remain on-site and would continue to pose a risk to the biota. Natural flushing would reduce contaminants in the sediments somewhat, especially after the contaminated soils on the GCL-property are remediated.

Alternative SD-2, involving on-site sediment treatment and Alternative SD-3 involving off-site treatment/disposal of sediments, would remove contamination and eliminate any environmental threats posed by the sediments. Therefore, these alternatives would meet remedial objectives.

- Compliance with ARARs

There are no chemical-specific ARARs for the contaminated sediments. Alternative SD-1 would comply with appropriate requirements such as New York State Technical and Administrative Guidance Memorandums.

Alternatives SD-2 and SD-3 would be designed and implemented to satisfy all appropriate requirements and location-specific ARARs identified for the site. Excavation activities would be conducted in compliance with the OSHA standards, soil erosion, sediment control and wetland protection requirements. Alternative SD-2 would also comply with ARARs related to on-site treatment (e.g., disposal of treatment residuals, stormwater discharge requirements and air pollution control regulations pertaining to fugitive emissions and air quality standards). Under Alternative SD-3, excavated sediments would be sent to an appropriate treatment/disposal facility in accordance with applicable ARARs.

- Long-Term Effectiveness

Alternative SD-1 would monitor contamination in the sediments and would not remove and/or treat contaminants. Therefore, this alternative would not reduce the long-term risks to the environment associated with the sediments.

Alternative SD-2 calls for on-site sediment treatment along the GCL-property soils. The soil treatment system, currently under design, would reduce the levels of PAH contaminants in sediments by 98 to 99 percent.

Alternative SD-3 would provide long-term protection by removing the contaminated sediments which would be sent to an approved disposal facility. Soil cover and revegetation would provide protection against erosion. No long-term monitoring would be required.

- Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative SD-1 would not provide immediate reduction in toxicity, mobility or volume of contaminants because treatment is not included as part of this alternative. Some reduction may be realized after the GCL-property soils have been remediated through natural attenuation processes.

Alternatives SD-2 and SD-3 would reduce the toxicity, mobility and volume of contaminants by removal and on-site treatment (Alternative SD-2) or off-site disposal (Alternative SD-3).

- Short-Term Effectiveness

The implementation of Alternative SD-1 would not pose any additional risks to the community, since this alternative does not involve any construction or remediation. Workers involved in periodic sampling of sediments would be exposed to minimal risks because appropriate health and safety protocols would be followed for this activity.

Alternatives SD-2 and SD-3 include activities such as excavation, screening, shredding, and handling of contaminated sediments which could result in potential exposure of workers and residents to fugitive dust, and possible suspension of sediments. In order to minimize potential short-term impacts, the area would be secured and access would be restricted to authorized personnel only. In addition, dust control measures such as wind screens and water sprays would be used to minimize fugitive dust emissions from material handling. The risk to workers involved in the remediation would also be minimized by establishing appropriate health and safety procedures and preventive measures, (e.g., enclosed cabs on backhoes and proper personal protection equipment) to prevent direct contact with contaminated materials and ingestion/inhalation of fugitive dust. All site workers would be OSHA certified and would be instructed to follow OSHA protocols. Some increase in traffic and noise pollution would be expected from site activities. Short-term impacts may be experienced for about a six-month period which is the estimated time for construction and remedial activities.

Under Alternatives SD-2 and SD-3, short-term impacts on the environment from removal of vegetation and destruction of habitat could occur. A plan would be prepared and implemented to minimize and restore (i.e., revegetate) any damage to the environment. Erosion and sediment control measures such as silt curtains and berms would be provided during material handling activities to control migration of contaminants.

- Implementability

Alternative SD-1 would not involve any major site activities except monitoring and sampling. These activities would be easily implementable. Alternative SD-2 would be easily implemented, as the technology is proven and readily available. The thermal desorption component of this alternative has been shown to be effective for destruction of PAHs, and is commercially available. Sufficient land is available at the site for operation of a mobile thermal desorption system and supporting facilities. Alternative SD-3 involves off-site disposal. Capacity for the small volume of sediment should be available at a permitted facility. Implementation of Alternatives SD-2 and SD-3 would require restriction of access to the site during the remediation process. Coordination with state and local agencies would also be required during remediation.

- Cost

Alternative SD-1 is the less expensive alternative but does not provide treatment of contaminated sediments. Alternative SD-1 has a present worth cost of $277,700 which is associated with conducting a sampling and analyses program and five-year reviews over a 30-year period.

Alternative SD-2 is the least expensive of the treatment alternatives and has a present worth cost of $298,000. The most expensive Alternative is SD-3 with a present worth cost of $820,300.

- State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

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

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternatives GW-2 and SD-2 as the preferred alternatives for remediation of contaminated groundwater and sediment on the GCL site.

Alternative GW-2 would address the contaminated groundwater through the extraction, collection, on-site treatment and discharge of treated groundwater to the surface water. Alternative GW-2 provides two options for primary treatment of organics, carbon absorption (GW-2A) and biological treatment (GW-2B). Given the information currently available, both options appear to be equally reliable and cost-effective. Therefore, a more detailed evaluation of the two options will be conducted during the remedial design through treatability studies. The additional information gathered from the treatability studies will be used to determine which option is more appropriate and cost-effective. As noted above, the information gathered during remedial design would also be used to reassess the timeframe and technical practicability of achieving State and Federal drinking water standards.

Alternative SD-2 will address the contamination by excavating and treating contaminated sediment on-site through a thermal desorption process. Treating the contaminated sediments along with the GCL-property soils provides an effective and cost-effective method for addressing the contaminated sediments. Alternative SD-2 will also provide for the mitigation of damages to the aquatic environment which may occur during the implementation of this alternative.

The preferred alternative would provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and the NYSDEC believe that the preferred alternative would be protective of human health and the environment, would comply with ARARs (unless it is subsequently proven to be technically impracticable), would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also would meet the statutory preference for the use of treatment as a principal element.