E.1 PURPOSE OF THE REPORT

The purpose of the Executive Summary is to provide a concise, but brief, overview of the significant conclusions resulting from the RI/FS. Therefore, it does not provide a great level of detail. For a complete understanding, the full documents must be read. This report presents the Remedial Investigation/ Feasibility Study (RI/FS) for the Old Southington Landfill Superfund Project (OSL), pursuant to the requirements of U.S. Environmental Protection Agency (EPA) Administrative Order by Consent, Docket Number I-87-1112 (Order), effective September 29, 1987. This Report is comprised of the Remedial Investigation (RI), the Human Health and Ecological Risk Assessments (HRA and ERA), and the Feasibility Study (FS). For purposes of the RI/FS, the Study Site includes the area delineated by the RI and includes the former solid waste disposal area, the area of the "stump dump", and areas up to just south of Rejean Road. The Study Area includes the Study Site, Black Pond, and areas west of Old Turnpike Road, including land adjacent to the former municipal well No. 5, Lori Corporation, and Chuck & Eddie's Used Auto Parts.

E.2 REMEDIAL INVESTIGATION

Based on data obtained over a six year period and on numerous data points, the RI presents the following findings:

- *Delineation of Study Site Boundary* - Aggressive studies were performed to definitively delineate the boundaries of the Study Site. These studies included information obtained from interviews, historical information from numerous aerial photographs which depict the extent of the Study Site over time, and from the installation of over 90 soil borings and collection of over 75 analytical soil samples. The Study Site is bounded on the west by Old Turnpike Road, on the east by Black Pond (features which have existed throughout the active existence of the landfill), on the north by Rejean Road (actual boundary is south of Rejean Road), and extends to the south to the current property of Solomon Casket

Company. The Study Site is divided, based on findings in the RI, historical use, and ownership, into the northern portion (north of R.V. & Sons to just south of Rejean Road) and the southern portion (R.V. & Sons to Solomon Casket). The RI has further delineated the extent of encroachment of solid waste into Black Pond, along the eastern Study Site boundary, showing it to extend only to the reef-like island (which represents the original shoreline) on the west shore of Black Pond. There are currently three residences and six industrial/commercial buildings on the Study Site.

- *Air Quality* - Numerous investigations were completed during the RI to determine the potential for transport of airborne contaminants. These investigations have included a comprehensive field monitoring survey across the entire Study Area, two soil gas surveys, a comprehensive survey for combustible gases at 111 locations throughout the Study Site, collection and laboratory analysis of soil gas from numerous locations across the Study Site, air quality modeling of the laboratory analytical data for soil gas to estimate potential concentrations of contaminants in indoor and outdoor air, and a risk assessment to estimate the potential risk which might result from those indoor or outdoor concentrations. Based on this comprehensive collection of studies, the distribution of combustible gases within the Study Site has been confirmed and reported in the RI/FS. The RI/FS further concludes that, relative to toxic air pollutants, no significant risk to human health would be expected.

- *Nature and Distribution of Materials within the Study Site* - The northern portion of the Study Site is generally underlain by a thin layer (zero to nine feet) of wood ash and timber fill consisting of black coarse-to-fine sand with wood ash, wood, wood cinders, and trace amounts of glass and metal debris, as well as demolition debris consisting of wood, glass, brick, and asphalt, consistent with its historical use as a "stump dump". The southern portion of the Study Site is primarily underlain by approximately 11 to 23 feet of solid waste fill consisting predominantly of a coarse-to-fine sand matrix ranging from brown to black to yellow to green in color and containing variable proportions of paper, glass, plastic, metal, metal shavings, cloth, industrial wastes, and other materials typically associated with municipal solid waste, consistent with its use as a landfill. The solid waste is covered with one to four feet of miscellaneous granular fill. Groundwater was encountered in the test borings at depths of four to 28 feet below the ground surface. The average depth to groundwater was approximately ten feet.

The locations of two semi-solid disposal areas (SSDA 1 and SSDA 2) have been inferred as a result of interviews with former and current Town employees, and information contained in public documents on disposal practices, as well as geophysical testing (ground penetrating radar) and test borings drilled within the inferred areas. This information confirms use of such areas for disposal of semi-solid wastes during a limited period of time (approximately 1964-1967). An extensive investigatory program was performed to assess the significance of the SSDAs pursuant to the EPA Municipal Landfill Guidance (EPA, 1991), although disposal practices throughout the operation of the landfill involved commingling of commercial, industrial and residential wastes, and, consistent with EPA's findings in its guidance, contains a significant mixture of waste types which result in a broad-based distribution of potential sources. The investigations determined the following:

- SSDA 2 contains solid waste similar in materials and appearance to the waste discovered throughout the southern portion of the Study Site. The levels of contaminants detected in SSDA 2 are similar to levels detected elsewhere in the southern portion of the Study Site. SSDA 2 waste materials are above the water table.

- Material in SSDA 1 is not significantly different in materials or appearance from the rest of the southern portion of the Study Site, except for two areas of discrete materials. The majority of waste within SSDA 1 is similar in type of contaminants and concentrations to the remainder of the southern portion.

- *Distribution of Contaminants in Soils* - Polynuclear aromatic hydrocarbons (PAH) constitute the primary contaminants present in surface and subsurface soils in the northern portion (stump dump). PAH compounds are likely the result of low-temperature burning of wood. The presence of PAH compounds is consistent with the reported use and ownership of the northern portion. These compounds are also consistent with the types of materials which could result from construction activities and residential activities occurring since closure of the landfill. No VOC compounds were identified in surface soils in the northern portion.

  Contaminants in the southern portion are characteristic of a typical solid waste landfill. Only isolated, low level concentrations of VOC were detected in the surficial soil throughout the southern portion. Although metals were measured at concentrations above the levels found in designated background samples, these measurements could be the result of existing industrial activities in the southern portion, including outdoor operations such as painting, welding, and metal finishing. PAH and PCB were detected in surficial soil around some of the buildings in the southern portion. These measurements could be the result of existing industrial activities, mixing of subsurface soils with cover material during closure, and/or the condition of the fill material used for cover.

  Analytical results for subsurface soil samples show that VOC are distributed throughout the southern portion of the Study Site. Elevated levels of VOC were measured in Discrete Materials A and B at SSDA 1. Semi-volatile organics, pesticides, and PCB were detected infrequently but throughout subsurface soils in various locations in the southern portion. Detected SVOC are typical landfill degradation constituents: phenolics, phthalates, and PAH. Some SVOC levels detected at SSDA 1 are also likely a result of disposal of industrial wastes. Various metals were detected above background in subsurface soils throughout the southern portion. However, the distribution is random and is not indicative of significant metals disposal activities.

- *Hydrogeology Within the Study Area* - The unconsolidated deposits in the Study Area form a single unconfined aquifer. Permeabilities in the aquifer are relatively high, although the upper portion of the aquifer beneath the Study Site is lower in permeability. In the Study Site, vertical groundwater flow is very important relative to horizontal flow for three reasons: (1) increased groundwater recharge rates associated with neighboring wetlands and ponding of surface water runoff in local depressions during rainfall events, (2) groundwater recharge from Black Pond, and (3) higher aquifer permeability with depth in the southern portion of the Study Site. Downward flow in the Study Site also appears to be enhanced because shallow, low-permeability soils in the wetlands and low-permeability waste debris in the landfill promote vertical drainage into permeable aquifer soils. Evidence of the importance of vertical flow in the vicinity of the southern portion of the Study Site is provided by the large vertical hydraulic gradients measured in the mid to lower portion of the aquifer, which are approximately ten times greater than the horizontal Study Area gradient (horizontal groundwater flow is generally east to west in the Study Area. Downgradient from the Study Site, the vertical hydraulic gradient becomes very small throughout the entire aquifer thickness.

- *Nature and Distribution of Contaminants in Groundwater* - As stated above, the groundwater aquifer within the Study Area is generally highly permeable. This results in a significant dilution capacity once contaminants from the debris mass enter the groundwater. This dilution capacity, in conjunction with the hydrologic influence of Black Pond (significant source of recharge to groundwater), plays a significant role in the distribution and concentrations of contaminants in groundwater downgradient of the Study Site. SVOC, pesticides, and PCB are not present in groundwater within the Study Site at levels significantly above the detection limit. VOC and metals are the primary contaminants measured in groundwater. No VOC have been detected in groundwater downgradient from the northern portion, which is consistent with the types of materials deposited there and with the analytical results for soil samples. The distribution of VOC and groundwater flow patterns do not indicate contaminant migration toward or beneath the northern portion of the Study Site.

Because based on hydrogeological conditions, the lateral dispersion of contaminants in groundwater downgradient of the source(s) is minimal, the overall width of the contaminant plume reflects the width of the source of groundwater constituents. The lateral (north-south) dimension of the contaminant plume downgradient of the southern portion of the Study Site indicates that contaminants are introduced into groundwater from across the southern portion of the Study Site rather than from any single, isolated source area. This analysis is strongly supported by the distribution of contaminants in soils. The primary VOC constituents present in groundwater are chlorinated ethenes and petroleum related VOC (benezene, toluene, xylenes). Chlorinated ethanes, although present at elevated levels at shallow locations on or near the Study Site, were detected at only trace levels outside the Study Site. VOC are present in groundwater in excess of MCL in a defined area west of the Study Site, to locations B308 and B309 and bounded on the north by location GZ-12 and on the south by GZ-14.

A variety of heavy metals are present in groundwater both upgradient and downgradient of the Study Site at levels in excess of the MCL. Metals in excess of MCL were measured in two of three upgradient wells. Concentrations of metals downgradient of the Study Site are not reasonably explainable based on only sources within the Study Site. It is likely, therefore, that another source exists for the shallow metals contamination found downgradient. Since very high concentrations of aluminum and iron are associated with this shallow downgradient groundwater contamination, this source area may include the area between the Study Site and monitoring wells B308 and B309 where these and other metals are abundant on the ground surface.

E.3 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

E.3.1 HUMAN HEALTH RISK ASSESSMENT

A Human Health Risk Assessment (HRA) was performed to determine the level of human health risk posed by the Study Site. Because the Old Southington Landfill Superfund Site represents a typical CERCLA municipal landfill, and based on the presumption that there may be a potential health risk associated with direct contact with soil and debris, EPA has supported the concept of capping as the presumptive remedy. Therefore, a streamlined risk evaluation was performed that assumes capping of the Study Site will be performed and does not include evaluation of direct exposure to subsurface soil as an exposure pathway. Estimated health risks associated with various other potential exposure pathways are summarized as follows:

- *On-Site Resident in the Northern Portion*

  The estimate of current risk to an on-site resident in the northern portion of the Study Site results from an assumed exposure to contaminants in surface soil by incidental ingestion and dermal contact, and in indoor and outdoor air by inhalation. The risks result primarily from an assumed exposure to potentially carcinogenic polynuclear aromatic hydrocarbons (PAH) through incidental ingestion and dermal contact with surface soil (air exposure was also considered, but only contributes a small proportion of the risk). The hazard indices (HI) for the average and maximum cases are below EPA regulatory target values. The excess lifetime cancer risks (ELCR, defined as the additional increase in cancer risk above and beyond the "background" cancer rate [1 in 5] estimated for any person, thought to be attributed to environmental factors such as UV radiation from sunlight, cigarette smoke, and ambient "pollution") for the average case are within the EPA target risk range (1 in 1,000,000 to 1 in 10,000), while the conservative maximum case is slightly greater than 1 in 10,000.

- *On-Site Outdoor Worker in the Southern Portion*

  The estimate of current risk to an on-site outdoor worker in the southern portion of the Study Site results from an assumed exposure to contaminants in surface soil by incidental ingestion and dermal contact, and in outdoor air by inhalation. The HI for all exposures are below EPA target values. The ELCR for the average case and for the conservative maximum case are both within the EPA target risk ranges (approximately 2 in 100,000 and 7 in 100,000, respectively).

- *On-Site Indoor Worker in the Southern Portion*

  The estimate of current risk to an on-site indoor worker results from an assumed exposure to contaminants in indoor air by inhalation. The HI are below EPA regulatory target values. The ELCR for the average case and the conservative maximum case are both within the EPA target risk range (approximately 6 in 1,000,000 and 2 in 100,000, respectively).

- *Swimmer in Black Pond*

  The estimate of current and future risks to a swimmer in Black Pond results from an assumed exposure to contaminants in surface water by incidental ingestion and dermal contact, and to sediment by dermal contact. The HI for both the average and the maximum cases are below EPA regulatory target values. The ELCR for the average and the conservative maximum cases are both within the EPA target acceptable risk range (approximately 2 in 1,000,000 and 5 in 1,000,000, respectively).

- *Wader in the Wetland Area*

  The wading scenario was conducted for both on-site and off-site wetland areas. The estimate of current and future risks to the water in the wetlands area results from assumed exposures to contaminants in surface water (dermal absorption) and sediment by dermal absorption and incidental ingestion. The HI for both the average and the conservative maximum cases are below EPA regulatory target values, both on-site and off-site. The ELCR for the average and the conservative maximum cases for off-site exposure are both within the EPA target acceptable risk range (approximately 1 in 100,000 and 3 in 100,000, respectively). The ELCR for the average on-site case are within the EPA target risk range, while the conservative maximum case is slightly above 1 in 10,000.

- *Future Hypothetical Off-Site Resident*

The hypothetical future risks to the off-site resident results from an assumed exposure to contaminants in groundwater used as drinking water. Future use of groundwater assumes long-term drinking of the highest levels for each contaminant in groundwater anywhere in the Study Area. No drinking water sources are currently in use, and are not allowed by existing or local and state regulations. Were the long-term use of untreated drinking water, taken from groundwater directly beneath the Study Site (where the highest levels of groundwater contamination have been detected), to occur, both hazard indices and cancer risk estimates would be above EPA target levels (HI of 63 and 1420 for averages and maximum cases, and 3 in 1,000 and 1 in 10 cancer risk for average and maximum cases, respectively).

E.3.2 ECOLOGICAL RISK ASSESSMENT

The ERA presents a delineation of existing wetlands and an evaluation of the social significance, effectiveness, and viability of the wetlands (Wet II). The ERA also evaluates the impact on aquatic and terrestrial wildlife. The ERA relied upon previous ecological field assessments and upon analytical data collected during the RI. The ERA took into account analytical data from surface water and sediment sampling and analysis. The ERA concludes that potential risks to aquatic or terrestrial wildlife are generally minimal, and limited to specific, isolated locations.

E.4 FEASIBILITY STUDY

The FS process provides for the development and evaluation of potential remedial alternatives that may be applicable for remediation of a given site. The FS process involves several development and evaluation steps for alternatives. First, remedial action objectives are set. The following remedial Response objectives have been identified:

- prevent direct contact with, and ingestion of, soils or waste in excess of a total Hazard Index greater than unity for noncarcinogenic compounds having the same target endpoint of toxicity and in excess of a total excess cancer risk level for all carcinogenic compounds of 10^{-4} to 10^{-6};

- minimize, to the extent practicable, the potential for leaching of hazardous substances from the soil or waste into the groundwater that will cause groundwater concentrations greater than the remediation goals;

- control surface water runoff and erosion;

- prevent ingestion of groundwater contamination in excess of relevant and appropriate drinking water standards or, in their absence, an excess cancer risk level of 10^{-6}, for each carcinogenic compound; prevent ingestion of groundwater contaminated in excess of a total excess cancer risk level for all carcinogenic compounds of 10^{-4} to 10^{-6};

- prevent ingestion of groundwater contaminated in excess of relevant and appropriate drinking water standards for each noncarcinogenic compound and a total Hazard Index greater than unity (1) for noncarcinogenic compounds having the same target endpoint of toxicity; and

- comply with Federal and state "applicable or relevant and appropriate requirements" (ARARs).

Then general response measures considered applicable for each of the identified response areas are identified. For each general response measure, remediation technologies, and processes specific to these technologies, are then identified. A preliminary screening of these technologies and specific processes is conducted to determine their applicability and technical feasibility. Those remedial technologies considered ineffective or unsuitable for implementation are eliminated from further consideration during the preliminary technology screening. Then, in order to simplify the subsequent development and evaluation of alternatives without limiting flexibility during remedial design, representative technologies/process options are selected.

The representative technologies/process options that remain after the preliminary screening are developed into potential remedial alternatives. An initial screening evaluation, which consists of an evaluation of each alternatives's effectiveness and implementability, is conducted on each of the potential remedial alternatives. Those alternatives that have significant adverse impacts or do not adequately contribute to the protection of public health or the environment are eliminated from further consideration. In addition, an order of magnitude cost comparison between alternatives that would provide a commensurate level of protection to public health and the environment is conducted.

A detailed evaluation, based on seven of the nine criteria enumerated in the National Contingency Plan (NCP) the regulations implementing the Superfund statute (CERCLA), is conducted on the remedial alternatives remaining after the initial screening. The following alternatives were evaluated in detail:

Alternative SC1: No Action Study Site

Alternative SC2: Cap Study Site/No Action Groundwater

Alternative SC2a: Soil Cap on Northern Portion/Composite-Barrier Cap on Southern Portion

Alternative SC2b: Single-Barrier Cap on Northern Portion/Composite-Barrier Cap on Southern Portion

Alternative SC3:	Cap Study Site[1]/Upper Aquifer Groundwater Extraction at Study Site Boundary
Alternative SC4:	Cap Study Site[1]/Upper Aquifer Groundwater Extraction Within Southern Portion of Study Site
Alternative SC5:	Cap Study Site[1]/Full Aquifer Groundwater Extraction at Study Site[2]
Alternative SC6:	Cap Study Site[1]/Excavate Discrete Material within SSDA 1 and Consolidate in Lined Cell Beneath Cap[3]
Alternative SC7:	Cap Study Site[1]/Excavate Discrete Material SSDA 1 and Incinerate Off-Site
Alternative MM1:	Downgradient Groundwater Extraction[4]

The detailed analysis consists of an assessment of individual alternatives against seven of nine criteria described in the NCP. The remaining two criteria (state and community acceptance) are evaluated by EPA following public comment. The strengths and weaknesses of the alternatives relative to one another, with respect to each criterion, are:

[1] Evaluated with both a soil cap or a single-barrier cap on the northern portion.

[2] Evaluated both with and without an upgradient groundwater extraction system.

[3] May be combined with Alternatives SC2 through SC5.

[4] May be combined with source control Alternatives SC2, SC3, SC4, SC6 or SC7.

- *Overall Protection of Human health and the Environment*

All of the alternatives except for the No Action Alternative provide a similar level of human health protection, since they all include a cap to prevent direct contact with soil and debris on the Study Site and institutional controls to prevent the ingestion of impacted groundwater. The groundwater in the Study Area is not and may not be used as a drinking water source.

Implementation of any of the alternatives, other than SC1: No Action, would result in a significant improvement in groundwater quality downgradient of the Study Site. Under SC2 alone, significant downgradient groundwater improvement would occur due to the effect of the impermeable cap, which would isolate a large proportion of the waste material that is located in the unsaturated zone within the southern portion of the Study Site.

Under any of the alternatives involving Study Site groundwater extraction (Alternatives SC3, SC4 or SC5), the groundwater beneath the Study Site would not reduce to drinking water standards in the foreseeable future, and therefore these pumping systems would have to remain in operation indefinitely in order to attain these goals. Furthermore, the groundwater treatment systems included in Alternatives SC3, SC4, SC5 and MM1 would generate treatment residuals (spent carbon and metals sludge) which would require treatment/recycling and off-site disposal. Wetlands impacts may also result from groundwater extraction, especially when large volumes are extracted (as under Alternatives SC5 and MM1).

Implementation of a groundwater extraction measure in addition to the cap would decrease the time period required to meet drinking water standards downgradient of the Study Site. However, groundwater in the Study Area is not and may not be used as a drinking water source. Calculations indicate that drinking water standards may be met downgradient of the Study Site extraction system in approximately 5 years under Alternative MM1(with SC4), 15 years for SC4 alone, and 60 years for Alternative SC5. The time period required to reach drinking water standards in downgradient groundwater under Alternative SC3 cannot be calculated because the Study Site sources may not be completely contained. However, the rate of groundwater quality improvement would be greater than under SC5, and Alternative SC3 is also the most efficient groundwater extraction measure with respect to contaminant mass removal from the Study Site.

Alternatives SC6 and SC7, if combined with Alternatives SC2 through SC5, would not appreciably affect the human health or environmental protectiveness of these alternatives. Additionally, there may be a significant potential risk, which would have to be addressed, of worker and community exposure associated with implementation of these alternatives.

- *Compliance with ARARs*

All of the alternatives, other than SC1, would comply with ARARs associated with capping of the Study Site. The alternatives vary primarily in the time that it would take to meet federal and state groundwater standards. Under Alternatives SC4 and MM1 (with SC4), it is estimated that Constituents of Potential Concern in downgradient groundwater would reduce to drinking water standards within 15 years. Although groundwater quality improvement would occur as a result of implementation of any of the other alternatives (except for SC1), federal and state drinking water standards are unlikely to be attained in the near future.

- *Long-Term Effectiveness and Permanence*

All of the alternatives considered, except for SC1, would result in a similar level of residual risk, since the cap would prevent direct contact with soil and debris on the Study Site and continuation of existing institutional controls which prohibit use of the Study Area aquifer as a drinking water supply would prevent the ingestion of impacted groundwater.

The alternatives vary primarily in the degree of groundwater control (other than institutional controls) that they provide. Implementation of Alternatives SC2 (due to the cap) and SC3 (due to the cap and groundwater extraction system) would result in significant improvement in downgradient groundwater quality. Under Alternative SC1, levels of Constituents of Potential Concern in Study Area groundwater would gradually reduce due to natural flushing and degradation processes. Alternatives SC4, SC5 and MM1 would prevent the movement of groundwater, containing constituents above drinking water standards, off of the Study Site (SC4 and SC5) or beyond the area known to be impacted by the Study Site (MM1). However, as mentioned previously, groundwater within this aquifer is not and may not be used as a drinking water source. The time to achieve drinking water standards in groundwater directly beneath the Study Site cannot be calculated for any of the alternatives, since these standards would not be attained until all of the sources are depleted, and the total mass of source material cannot be reliably determined.

- *Reduction of Toxicity, Mobility and Volume through Treatment (TMV)*

Alternative SC2 would provide a reduction in the mobility of the Constituents of Potential Concern by incorporating capping to reduce leaching to groundwater. The reduction in leaching would be significant, since a significant proportion of the waste materials in the southern portion of the Study Site are located within the unsaturated zone (i.e., the area above groundwater). Alternatives SC3, SC4, SC5 and MM1 would further reduce the mobility of Constituents of Potential Concern through extraction and treatment of groundwater. However, the degree of expected reduction in TMV cannot be calculated for any of the alternatives because the total contaminant mass associated with source materials on the Study Site cannot be determined. SC6 and SC7 would not significantly reduce the mobility of Constituents of Potential Concern in soil and debris, since constituents would continue to leach from known sources in the saturated zone throughout the southern portion of the Study Site and they would not significantly decrease the amount of source area contributing to groundwater contamination. Under Alternatives SC3 through SC5, and MM1, the toxicity of Constituents of Potential Concern in extracted groundwater would be permanently reduced through treatment for organic constituents using GAC and for metals using sulfide precipitation. However, the overall toxicity of the contaminants would be transferred to a different medium which would require treatment/disposal. Alternatives involving the extraction and treatment of groundwater (SC3, SC4, SC5, and MM1, as well as SC6 and SC7 if they are combined with a groundwater extraction measure) would result in spent carbon and metal sludge treatment residuals which would require appropriate treatment/disposal (Alternative SC3: 91,615 lbs of spent carbon/year; Alternative SC4: 16,425 lbs/year of metal sludge; Alternative SC5: approximately 985,500 lbs/year spent carbon and 223,380 lbs/year dewatered metal sludge). Under Alternative SC7, toxic metals would remain in the ash following incineration. This ash would require appropriate disposal.

- *Short-Term Effectiveness*

Most of the alternatives would provide a similar level of protection of the community and workers during remedial action implementation. The exceptions are Alternative SC1, which would pose the lowest potential risk to the community and workers, and Alternatives SC6 and SC7, which would pose the largest and significantly greater potential short-term risk to the community and workers. Potential short-term risks associated with Alternatives SC2, SC3, SC4, SC5 and MM1 (unless combined with SC6 or SC7) would be primarily associated with construction of the cap and (for alternatives involving extraction and treatment of groundwater) installation of sheet piling and construction of the discharge pipeline. There would be a high potential risk, which would have to be addressed, of worker and community exposure to subsurface soil and debris during excavation and handling of discrete materials within SSDA 1 under

Alternatives SC6 or SC7. These potential risks would need to be addressed through compliance with a comprehensive health and safety plan and airborne dust control measures. There would be minimal adverse environmental impacts associated with implementation of Alternatives SC1 through SC4. Significant potential wetlands impacts could be associated with implementation of Alternative SC5 and MM1 due to the large groundwater extraction rates and associated water table lowering. During implementation of Alternative SC6 or SC7, there would be some risk of remobilizing Constituents of Potential Concern during excavation and worsening the extent of environmental impact, and there would be the potential for releases of Constituents of Potential Concern to air during excavation, handling and transport (if applicable).

Under all of the alternatives except for Alternative SC1: No Action, the remedial response objectives would be achieved immediately after construction of the cap, since the cap would prevent direct contact with soil and debris that may potentially pose a human health risk, and institutional controls, which are already in place, would prevent the ingestion of groundwater. The implementation time would be shortest for Alternative SC2 (approximately 37 months) and longest for Alternative MM1 (46 months).

- *Implementability*

The implementability of Alternatives SC2, SC3 and SC4 would be similar; there would not be significant implementability concerns associated with any of these alternatives. Under Alternative SC1, deed restrictions on the Study Site would be very difficult to enforce in the vicinity of residences and operating industries. The predesign pumping tests for Alternatives SC5 and MM1 would generate large quantities of extracted groundwater. Appropriate treatment/disposal of these large volumes of groundwater would be difficult. If Alternative SC5 includes upgradient groundwater extraction, it may be difficult to obtain a permit for the discharge of clean, untreated groundwater from the upgradient extraction wells to Black Pond. Significant materials handling may be required under Alternatives

SC6 and SC7, depending on the nature of the materials encountered, and under Alternative SC7 transport over a long distance to an off-site incineration facility may be necessary. The nearest currently available off-site incinerator is located in Bridgeport, New Jersey.

- *Cost*

No action (SC1) would be the least expensive alternative ($1-1.5 million), with costs primarily associated with the long-term monitoring program. Capping the Study Site, with no-action groundwater (SC2) would be more expensive ($7-12 million) than SC1 but less expensive than any other alternatives. The costs for SC2 are primarily associated with construction of the cap and vary depending on the type of cap installed on the northern portion of the Study Site. All other alternatives would include capping plus groundwater treatment (SC6 and SC7 combined with SC2 would not include groundwater treatment).

Alternative SC3 ($19-34 million) is the least expensive groundwater treatment alternative, despite the fact that it would remove a greater mass of contaminants per unit volume of groundwater extracted. Alternative SC4 ($24-38 million) is more expensive because of the significant increase in flow rate necessary and the installation of many more wells. The potential costs for SC5 ($30-60 million) are highly dependant upon whether upgradient diversion water, not impacted by the Study Site, is determined to require treatment. If non-impacted, upgradient diversion water is allowed to be re-circulated without treatment, alternative SC5 costs would potentially be as low as SC4.

The potential costs associated with excavation of subsurface wastes, in conjunction with capping and groundwater treatment, (SC6 and SC7) are the highest (as high as $65-75 million). The unique costs for SC6 and SC7 are associated with excavation, shipment, treatment and disposal.

Costs associated with downgradient groundwater extraction/treatment (MM1) also have the potential to be very high ($35-72 million). The unique costs associated with alternative MM1 involve the extraction and treatment of a large volume of groundwater downgradient of the Study Site, and the potential adverse wetlands impacts and mitigation requirements associated with such large volume pumping.

RI/FS TABLE OF CONTENTS

REMEDIAL INVESTIGATION REPORT

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

ESE

A CILCORP Company

TABLE OF CONTENTS

ESE

LIST OF FIGURES

VOLUME 1B

LIST OF TABLES

LIST OF PLATES

VOLUME 1C

VOLUME 1D

VOLUME 1E

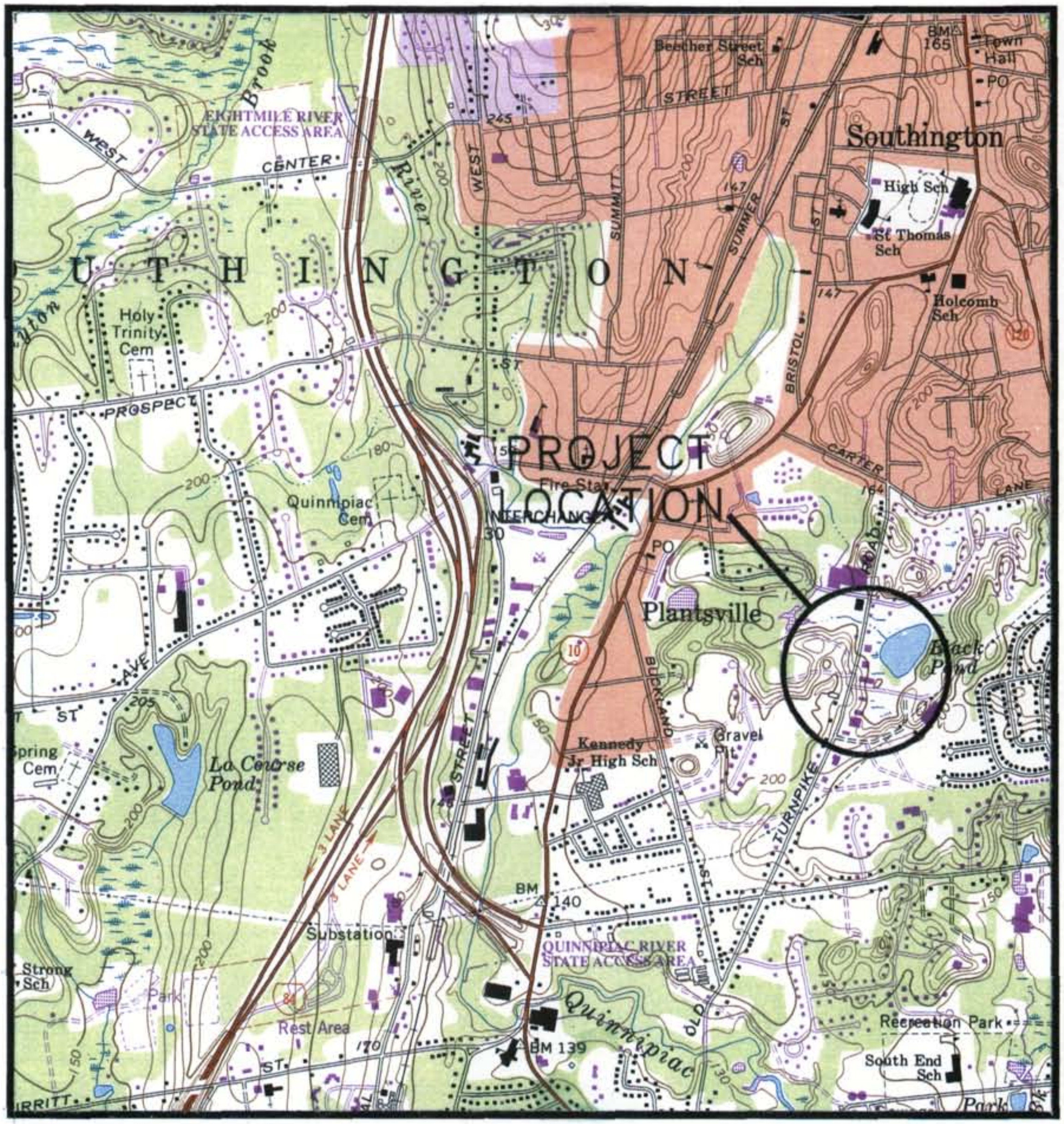
1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This document was prepared by Environmental Science & Engineering, Inc. (ESE) on behalf of the Parties (PRP) undertaking the Remedial Investigation (RI) for the Old Southington Landfill Superfund Site. It presents the results of the RI completed pursuant to the requirements of U.S. Environmental Protection Agency (EPA) Administrative Order by Consent, Docket Number I-87-11 12 (Order), effective September 29, 1987.

The Old Southington Landfill Superfund Site (Study Site) encompasses approximately thirteen acres on the east side of Old Turnpike Road in Southington, Connecticut (see Figure 1-1). During the period from about 1920 to 1967, the southern portion of the Study Site was used for disposal of waste materials by local residents and area businesses. The northern portion was used for wood, stumps, construction debris, etc., pursuant to agreements between the Town and the owner of the northern portion of the Study Site. Closure of the former landfill and the northern portion of the Study Site was completed in 1967 and included compaction, cover with two feet of clean fill, and seeding for erosion control. For purposes of the Remedial Investigation/Feasibility Study (RI/FS), the "Study Area" includes the Study Site, Black Pond and areas west of Old Turnpike Road, including land adjacent to the former Well No. 5, Lori Corporation, and Chuck & Eddie's Used Auto Parts.

The Connecticut Department of Public Health and Addiction Services sampled Southington Production Well No. 5, located west and north of the Study Site, on several occasions between December, 1978 and March 1979. Analyses of the water samples collected indicated the presence of chlorinated volatile organic compounds (VOC). As a result of those findings, Well No. 5 was closed in August, 1979. In February, 1980, EPA authorized a hydrogeologic investigation aimed at defining the nature and extent of contamination in groundwater in the area around Well No. 5. Analysis of groundwater samples collected from two monitoring wells installed between the Study Site and Well No. 5 indicated the presence of chlorinated VOC (Warzyn Engineering, Inc., 1980). In November, 1980, the Connecticut Department of



SOURCE: *U.S.G.S. TOPOGRAPHIC MAP, SOUTHINGTON, CONNECTICUT QUADRANGLE, 7.5 MINUTE SERIES, PHOTOREVISED 1984.*

N

1:24000

0 ½ 1

SCALE IN MILES

ESE Environmental Science & Engineering, Inc.
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 1–1

SITE LOCUS

DRAWING NAME: SOULOC.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93

Environmental Protection (DEP) collected soil samples from a manhole excavation within the industrial park located on land that had previously been part of the landfill. Analysis of those soil samples indicated presence of chlorinated and non-chlorinated VOC.

Based on the above findings and a hazard ranking performed in 1982, EPA, on September 8, 1983, proposed that the Old Turnpike Landfill be placed on the National Priorities List (NPL), pursuant to Section 105(8)(b) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9605(8)(b). On September 21, 1984, the Old Turnpike Landfill was listed on the NPL as the Old Southington Landfill Superfund Site.

In conformance with CERCLA, the September 1987 Order sets forth the requirements for the preparation and performance of the RI/FS. Work plans were submitted and approved by EPA, as required for each phase of the RI/FS. Following completion of the Phase 1A and 1B field investigations, a Site Characterization Report (SCR) was submitted to EPA in December, 1990, and approved in April, 1991. Following this submittal, the PRP obtained information regarding the possibility that specific areas may have been used for disposal of semi-solid wastes. Because this information could affect the selection of potential remedial alternatives, it was agreed with EPA and DEP that a post-screening investigation be performed.

The Post-Screening Investigation Task I activities were performed by GZA GeoEnvironmental, Inc. (GZA) in accordance with a work plan submitted to EPA on September 20, 1991, as supplemented by PRP Technical Coordinator by letter dated October 1, 1991, and approved by EPA on October 3, 1991. The results of the Post-Screening Investigation Task I activities were provided to EPA in the Post-Screening Investigation Task 1 Report and Task 2 Work Plan, submitted on March 26, 1992, as revised May 22, 1992. Based on the results of the Task 1 investigation, additional field investigations were performed during 1992 and early 1993, as set forth in the Task 2 Work Plan and altered by discussions with EPA. Additional investigations were performed during 1993 (Task 3) to assist in final development of the FS. This document summarizes the results presented in previous reports submitted to the EPA/DEP as well as the results of the Post-Screening Task 2 and Task 3 Investigations. Because it incorporates and synthesizes all of the information collected about the Study Site to date, this Report documents the most complete understanding of the Study Area.

1.2 ORGANIZATION OF THIS REPORT

This RI Report is one of three components to the RI/FS. The other two components are the Human Health/Ecological Risk Assessments and the Feasibility Study. The RI is presented in multiple volumes, as follows:

Volume lA	RI Report
Volume lB	Figures, Tables, and Plates
Volume lC	Appendices A and B
Volume lD	Appendices C through I
Volume lE	Appendices J through M

The RI Report is presented in six sections, each meant to build on the previous sections, until a full understanding of the RI is developed. This format is consistent with the procession of knowledge gained at the Study Area.

Section 1 provides an introduction, including the purpose of the RI Report, a description of the Study Area, a brief operational history, and a discussion of relevant studies conducted prior to the RI.

Section 2 discusses the different tasks performed during the RI. Section 2 is meant to provide the reader a concise review of what was done, where it was done, and when it was done. Discussions of results, interpretation of data, or presentation of conclusions are not provided in Section 2.

Section 3 provides a discussion of the physical characteristics of the Study Area, as developed based on the studies described in Section 2. Section 3 presents the interpretation of the geology and hydrogeology within the Study Area.

Section 4 provides a detailed discussion of the-results of analytical testing of multimedia environmental samples collected during the RI, as described in Section 2. Based on those analytical results, Section 4 presents the nature and distribution of contaminants within the Study Area.

Section 5, relying on the data presented in Sections 3 and 4, discusses the migration of contaminants within the groundwater. Section 5 discusses fate and transport considerations and migration pathways.

Finally, Section 6 presents the conceptual model of the Study Area. The conceptual model is essentially a multimedia interpretation of the Study Area, as a whole.

1.3 BACKGROUND

1.3.1 Area Description

The Study Area is located in Southington, Connecticut and lies within the Quinnipiac River Valley. Since the mid 1800s the area of the Quinnipiac River Valley has been industrialized. Since the 1950s, the Quinnipiac River Valley has experienced increased development for industrial, commercial, and residential uses. The Study Area includes various industrial/ commercial facilities ranging from warehousing to industrial manufacturing to scrap and salvage operations.

The Study Site (see Figure 1-2) has also been developed for industrial, commercial, and residential purposes. Residential development of the Study Site is limited to the northern portion. The topography of the Study Site is continuous with other portions of the Study Area. The Study Site is relatively flat with a gradual decrease in grade from the southern portion (elevation approximately 180 feet above mean sea level) toward the northern portion (elevation around 150 feet). Black Pond (surface elevation about 147 feet) is located adjacent to the eastern boundary of the Study Site.

West of Old Turnpike Road, the Study Area ground surface slopes north (elevation 180 MSL) to south (elevation 150 MSL). Water discharges from Black Pond, north and west, through a

LEGEND

EXTENT OF STUDY SITE

WETLAND/POORLY DRAINED AREA

NOTES

1. FROM PLANS PREPARED BY GZA GEOENVIRONMENTAL, INC., AND GEOMAP, INC., AND DATA COLLECTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE).
2. GROUND SURFACE ELEVATION CONTOURS FROM GEOMAP, INC. (1989) REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. CONTOUR INTERVAL 2 FEET.

0 300 600

SCALE IN FEET

Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 1-2

SITE PLAN

DRAWING NAME: BSEPLN.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=300'	REVISION: 1	DRAWN BY: PAD	DATE: 10/11/93

culvert under Old Turnpike Road, resulting in a stream flowing through the western portion of the Study Area and ultimately discharging into the Quinnipiac River, about eight-tenths of a mile west of Black Pond. A stormwater culvert flows into Black Pond from the residential area north of Rejean Road.

Residences and commercial facilities located on the Study Site, and in the Study Area, are serviced by Town of Southington (Town)water and sewer. A groundwater receptors study was completed in December, 1992, and is discussed in detail in Section 1.2.4.

There are currently three private residences located on the northern portion of the Study Site; they are the Pallato, Barnes, and Simone residences (shown on Figure 1-2). Prior to the summer of 1993 a fourth residence (Sliker) was also located on the northern portion of the Study Site. There are four commercial businesses and one town facility located on, or partially on, the southern portion of the Study Site. The businesses are: R.V. & Sons Welding, Northeast Machine, Southington Metal Fabricators (three buildings), and Solomon Casket Company (shown on Figure 1-2). The town facility is known as the Town of Southington Parks & Recreation Building. The commercial businesses are involved in the following general activities:

R. V. & Sons Welding

The building was constructed in 1974 and initially occupied by Federal Incorporated as a screw machine shop. R.V. & Sons began operations in the building in 1985, including fabricating, repairing, and painting of truck frames, general welding, and specialty welding. Hazardous materials known to be used at the facility include welding gases, paints, and paint thinners.

Northeast Machine

The Northeast Machine building was constructed in 1974. Northeast Machine manufactures small plastic, brass, steel, and aluminum machine parts. The processes involve the milling and cutting of stock material, using a variety of precision cutting machines. Hazardous materials known to be used at the facility include cutting oils and cleaning solvents (e.g. mineral spirits). According to Connecticut DEP records, Paramount Industrial Products, a tool and machine shop, was formerly located in the Northeast Machine building. Waste oil and solvents reportedly were stored inside the facility.

Southington Metal Fabricators

Southington Metal Fabricators operates from three buildings located on the Study Site. The three buildings were built in 1972, 1980, and 1982. The facilities are involved in metal cutting, fabricating, welding, and painting. Metal finishing operations, such as sanding and sand blasting, and spray painting are conducted outside in the yards behind the buildings. Large metal products are also stored outside. Hazardous materials known to be used at the facilities include cleaning solvents, welding gases, cutting oils, paints, and paint thinners. No other companies have occupied the buildings.

Solomon Casket Company

The Solomon Casket facility built in 1967 is used for the warehousing and distribution of completed caskets. No other companies have occupied the building. No hazardous materials are known to be used at the facility. One underground 500 gallon steel tank is present on the south side of the building. The tank, installed in 1967, is used to store fuel oil.

Parks and Recreation Building

The Town of Southington Parks & Recreation Building (since 1990) is used for the storage of equipment and as a maintenance and repair facility for mowers, tractors, etc. The building was built in 1980 and was formerly occupied by Construction Unlimited (1986 to 1990) and Denmark Lumber (1980 to 1986). Hazardous materials known to be used at the facility include small quantities of fuel (gasoline and diesel), hydraulic fluid, degreasing and cleaning solvents, paints, and paint thinners.

1.3.2 Operational History

The operational history of the landfill is based on interviews with former and current Town employees and users of the landfill, information obtained from Town officials and Town and State records, and aerial photographs. As discussed in subsequent sections of this report, the operational history pieced together from these sources is consistent with, and bolstered by data generated during the RI.

No documents exist which pinpoint the period of time during which property on the Study Site was used to dispose of waste. However, it is known that the area received waste prior to 1949 when the Town of Southington acquired some of the properties which comprise the southern portion of the Study Site. The southern portion is that area of the Study Site south of the boundary between the Pallatto's property and RV & Sons' property. Commercial, industrial, and household waste were disposed of throughout the southern portion until October, 1967. Historically, most of the northern portion of the Study Site was wetland. Via an oral agreement between the Town and the property owners, the northern portion received wood, stumps, debris from clearing operations, and other construction debris, i.e., it operated as a "stump dump".

Metal products with scrap value, tires, glass, and other recyclables were segregated out of incoming wastestreams in the vicinity of the quonset hut where heavy equipment was housed. The hut was located approximately where the Northeast Machine building currently stands. Based on interviews with previous and current Town employees and information available in public documents, it appears that two areas were excavated for use for disposal of aqueous, semi-solid, and semi-liquid wastes. These areas were used for a short time, between 1964 and 1967. These two areas are located in the southern portion of the Study Site just east of Old Turnpike Road.

Beginning in the mid 1960's, sanitary landfilling was practiced. Cells were excavated as needed and soil stockpiled for use as cover. Operation of the landfill continued in this manner until its closure in October, 1967. Closure of the landfill and the northern portion of the Study Site was accomplished by compacting loose refuse, grading of the surface with concomitant movement of refuse, capping with at least two feet of clean fill, and seeding to reduce or prevent erosion.

1.3.3 Previous Investigations

This section discusses investigations performed prior to the Order (September 29, 1987). Investigations in the Study Area, which provide information useful to the RI, include studies performed at Lori Corporation and studies related to former Municipal Well No. 5. In addition to formal investigations, DEP Waste Management files, concerning visits to facilities within the Study Area, identify material handling practices (outside drum storage, stained soils) which would have resulted in adverse impact to the environment. Investigations within the Study Site have been conducted by various parties, as detailed below. The results of the RI/FS have shown that the following reports were brief and frequently predicated on incorrect or incomplete historical information. They are, therefore, subject to inaccuracies and misinterpretations. These reports were utilized to prepare the initial understanding of the Study Area and were consulted throughout the performance of the RI/FS.

1.3.3.1 Study Area

Former Municipal Well No. 5

Geraghty & Miller (G&M) provided technical engineering support for the siting of Municipal Well No. 5 (MW5) as a public water supply source for the Southington Water Board. G&M performed a 48-hour pump test at a test well (8-inch well) located near where MW5 was ultimately located in July 1965. The test well was pumped at a constant rate of 380 gallons per minute. This initial test indicated transmissivities of greater than 150,000 gallons/day/foot (200 cm2/s). These results are discussed further in Section 3 of this report. G&M recommended a production pumping rate of 700 to 800 gallons per minute. According to the Town Water Works department, MW5 was operated at an average rate of 650 gpm.

Following the installation of MW5, G&M performed an additional pump test in 1970. G&M also collected a groundwater sample from the well and a surface water sample from the nearby stream. Samples were analyzed for standard water quality parameters.

Lori Corporation

On April 12, 1979, the Lori Corporation was issued Order No. 2455 from the DEP's Water Compliance Unit requiring the abatement of discharges of volatile organic compounds into an unlined surface impoundment located on their property. The order required the Lori Corporation to remove all waste material from that impoundment.

Soil from the unlined surface impoundment, located west of the former main Lori building, was tested by the DEP on May 21, 1979. Both volatile organic compounds and volatile aromatic hydrocarbons were detected in soils from the impoundment. Analyses of a shallow soil sample (0-0.5 feet below grade) taken from the impoundment was found to contain 380 parts per billion (ppb) of 1,1,1-trichloroethane and 500 ppb trichloroethylene. Analysis of other samples (0 to 2.5 feet below grade) measured concentrations of xylenes, isopropyl alcohol, methyl and ethyl acetate, acetone, toluene, and ethyl benzene, ranging from 20 ppb to 70 ppb. Traces of at least eight oil components were also detected. Soil samples in which waste solvents were measured were collected from within 300 feet of former Municipal Well No. 5.

On July 12, 1979, groundwater samples were collected from test pits near the impoundment, in areas reportedly contaminated with waste solvents. Volatile organic compounds measured in the groundwater samples included 1,1-dichloroethane (3.6 to 22.4 ppb), 1,2-dichloroethylene (0.4 to 48 ppb), 1,1,2-trichloroethane (0.3 to 1480 ppb), and 1,1,1-trichloroethane (3.8 ppb; one sample). Waste material from the impoundment was reportedly removed from the site.

Lori Corporation investigated the presence of one oil and two "industrial solvent" spill areas west of the southernmost Lori Corporation building. Laboratory analyses were performed for volatile hydrocarbon concentrations in soil samples from a depth of 0.5 feet below ground surface adjacent to the industrial solvent spill areas. Reports indicated that approximately 100 gallons of solvent (Safe-Solv #2; 1,1,1-trichloroethane >90%) may have been spilled over time (Consulting Environmental Engineers, September and December, 1979). Both the solvent contaminated soil and the soil in a 25 x 30 foot hydrocarbon (lubricating oil) stained area, located adjacent to the solvent spills area, were reportedly removed from the site.

1.3.3.2 Study Site

Ecology and Environment

In December 1980, Ecology and Environment Inc. completed a draft report entitled "Preliminary Investigation of the Abandoned Landfill, Old Turnpike Road, Southington, Connecticut. The report was prepared under contact with the U.S. EPA Region I (FIT Project TDD #F1-8011-03). The purpose of the study was to preliminarily assess the hazardous waste disposal practices at the landfill, and included:

- discussion of the hydrogeology within the Study Area;
- a brief history of the abandoned sanitary landfill; and
- an analysis of the generators and the disposers of the hazardous waste suspected to exist at the abandoned sanitary landfill, including an estimate of the volume of solvent waste.

Industries located in Southington were summarized and their products listed for years 1956, 1963, and 1966. A summary of hazardous waste generators was prepared in tabular form. Volume calculations of disposed solvent wastes were based on estimates and defined assumptions and are not substantiated. The report concluded that solvents are present in the abandoned landfill and that additional data should be gathered to assess the volume, concentration, distribution and impact of contamination emanating from the landfill.

Warzyn Engineering, Inc.

A more in-depth study of the landfill vicinity was conducted by Warzyn Engineering, Inc., as a subcontractor to JRB Associates who were under contract to US EPA, and reported in "Hydrogeologic Investigations, Town of Southington, Connecticut" dated November 12, 1980.

The stated objective of the report was to more clearly define contamination sources and impacts contributing to the contamination and eventual shutdown of three municipal wells (including Municipal Well No. 5). Monitoring wells (TW and CW series) were installed, and soil, groundwater, and surface water samples were collected. Of the wells installed or tested by Warzyn Engineering Inc., only monitoring wells TW-17, TW-18, CW-15, and CW-20 still exist. Municipal Well No. 5 was not sampled, nor were hydrologic conditions evaluated by Warzyn under pumping conditions.

The report concluded, relative to Municipal Well No. 5, that:

- during non-pumping periods, the landfill constituted a source of volatile organic contamination to the groundwater, but not to Municipal Well No. 5.

- Lori Engineering Company and Mitchell Auto Parts, Inc. (now Chuck & Eddie's) do not appear to significantly contribute to volatile organic contamination when Municipal Well No. 5 is not pumped.

- under pumping conditions at Municipal Well No. 5, it is likely that the landfill site would have a much greater potential as a contaminant source to that well.

Bionetics Corporation

Bionetics Corporation, under contract to EPA, performed a site analysis of the Old Southington Landfill Study Area using environmental photographic interpretation. The report was based on aerial photographs of the Study Area from 1941 to 1986. The Bionetics report concluded that landfilling activity was most prevalent on the Study Site from 1951 to 1967. After landfilling activity ceased, light industrial/commercial and residential buildings were constructed on the Study Site. Earth moving across the Study Area is apparent in the photos. Filling activity, on and around the Study Site, occurred mostly in wetland areas and was noted throughout the study period (1941 to 1984 photos). The progression of photos over time clearly shows the limits of the landfill.

The Bionetics report describes "possible" features when only a few characteristics are discernable or those characteristics are not unique to a signature. When incrementally more characteristics, or stronger characteristics, of a signature are discernable, Bionetics calls these "probable features". No qualifying terms are used when the characteristics of a signature allow for a definite feature identification. A chronological summary of interpretations made by the Bionetics Corporation follows:

1941

The 1941 air photo is not in clear focus. However, the landfill appears as a small cleared area along Old Turnpike Road, west-southwest of Black Pond. "Possible" debris is noted along the eastern edge of the cleared area. Most of the Study Area is covered with vegetation; the area of the auto junkyard appears as a cleared field. One building in the area of the Menard residence appears to be present. No other buildings are noted on the Study Site or in the Study Area. Two additional ponds (to Black Pond) are also noted, about 300 feet east and 500 feet southeast of Black Pond.

1951

Active landfilling is evident at the Study Site. The landfill appears to occupy areas slightly further to the north and east than in 1941. A small building has been constructed on-site adjacent to the access road. A trench, potentially containing standing liquid, was noted south of the landfill, which may have been related to the surface water drainage system. A fourth pond, not reported on the 1941 photograph is present, southeast of the trench. The auto junkyard is visible west of the landfill.

1957

The landfill has expanded slightly northward, as well as southward and eastward, since 1951. Debris is visible southwest of Black Pond. Two buildings are present at the landfill, a new quonset hut located immediately north of the access road and due west of the first building, noted in 1951. An area of active excavation and filling is evident toward the southern end of the Study Site. "Probable" and "possible" staining are noted in the fill area. The pond noted on the 1951 photo appears in the landfill area as standing liquid; the trench is no longer visible. Excavations are visible in the present day location of the Lori Corporation.

1965

The landfill has continued to expand to the north, east and south. Material identified as debris is evident northwest of Black Pond in the vicinity of the outlet stream that drains to the west. A "probable" pit and area of debris are noted in the southern part of the landfill along Old Turnpike Road. The initial building (1951) is no longer present on the site. The auto junkyard has greatly expanded since 1957. The initial Lori Corporation building is visible northwest of the Study Site.

1967

The landfill has reached its maximum extent. Clearing for the sewer line along the future location of Rejean Road has started outside the northern edge of the landfill. The Solomon Casket building is visible just south of the landfill. Both Lori Corporation buildings are evident, northwest of the Study Site. Probable soil staining and open materials storage is noted west of the main Lori building.

1970

The landfill is closed and covered. Two areas of debris and drum storage are evident just west of the main Lori building; soil staining is also noted in this area.

1975

The Barnes and Pallato residences are evident in the northern portion of the Study Site. The southernmost Southington Metal Fabricators building is present, at the southern end of the Study Site. The main Lori building has expanded to the west. Debris, drum storage and soil staining are noted on the Lori property, as is a "probable" impoundment. Municipal Well No. 5 is evident northwest of Lori Corporation. Drum storage, soil staining, and debris are evident on the Waterbury Centerless Grinding (a.k.a. Nu-Dyne) property, approximately 600 feet south-southwest of the Study Site. The pond, previously indicated as present southeast of Black Pond, is listed by Bionetics as standing liquid on this 1975 photograph.

1979

The Sliker residence, Simone residence, R.V. and Sons, Northeast Machine, and the central Southington Metal Fabricators buildings are evident on the Study Site. The Meriden Box Company building is present east of the landfill. Three areas of discolored standing liquid are noted west of Meriden Box (on the southeast edge of Black Pond, in the drainage feature south of Black Pond, and east of this drainage feature). Mounded material and a "probable" impoundment are noted west of Lori Corporation. Debris and staining are noted north of Lori Corporation behind the Brophy Metals building. Drums and staining are still evident behind Waterbury Centerless grinding.

1984

The Construction Unlimited and northernmost Southington Metal Fabricators building are present on the Study Site. Two areas of discolored standing liquid are still visible south of Black Pond. "Open" storage and a "possible" impoundment are noted north of Meriden Box. Staining is visible behind Southington Metal Fabricators and southwest of Meriden Box. Drums and debris are present west of Lori Corporation and west of Brophy Metals. Drum storage and soil staining are still evident east of Waterbury Centerless Grinding.

GZA Geoenvironmental, Inc.

Based upon a proposal submitted to the Town of Southington on June 13, 1984, the team of Greiner Engineering/GZA GeoEnvironmental & Associates, Inc. (formerly Goldberg-Zoino &

Associates, Inc.) was retained by the Town to perform a hydrogeologic investigation of the Old Turnpike Landfill, Southington, Connecticut. Although the initial scope of the investigation was defined within a request for proposals prepared by the Town of Southington, the actual scope of work performed was prepared by the Department of Environmental Protection (DEP). Greiner Engineers performed some initial Study Area topographic survey and background review. Field activities included hydrogeological investigations, installation of 22 monitoring wells, at locations either selected by DEP or as replacement for previous wells, and analysis of three rounds of groundwater samples collected from 21 monitoring wells in 13 locations, three surface-water monitoring points, the Lori Corporation supply well, and Municipal Well No. 5. Locations of monitoring wells are shown on Plate 1-1.

A 72-hour pump test was conducted at former Municipal Well No. 5 during the period from April 29, 1987 through May 2, 1987 to determined aquifer flow characteristics within the Study Area. This pump test was conducted at a flow rate of approximately 650 gpm. Water level measurements were collected from existing wells within the Study Area throughout the pump test. Although this data precedes the RI, it is the only complete pump test data available. Therefore, this data has been incorporated with individual well permeability test data and water level measurements collected during the RI to develop the conceptual hydrogeological model of the Study Area. This pump test data is discussed in detail in Section 3.5.1.

Three discrete rounds of groundwater samples were collected for laboratory analysis from existing monitoring wells at the following times:

Round 1:	Collected between 2/17/87 and 2/24/87 (List A parameters) and on 4/06/87 (List B parameters)
Round 2:	Collected between 4/20/87 and 4/23/87
Round 3:	Collected between 5/01/87 and 5/04/87

Table 1-1 lists sample locations and analyses performed. List A compounds are generally volatile organic compounds, selected metals, and indicator compounds. List B compounds included semi-volatiles, pesticides, PCBs, selected metals, coliform, and volatile organic compounds. In accordance with the scope of work developed by Connecticut DEP and the Town of Southington, List B parameters were analyzed at four locations only (i.e., Municipal Well No. 5, B-3, GZ-4S, and GZ-4D).

The greatest concentration and variety of VOC were measured during the February, 1987, sampling round. Many of the VOC compounds detected in February, 1987, were not detected at the same location during subsequent 1987 testing. The highest levels of VOC in February, 1987, were detected within or adjacent to the landfill; specifically in groundwater samples taken from monitor wells B-3, GZ4S, and the Lori Corporation supply well. The highest total concentration of VOC, 813 ppb, was noted in the B-3 groundwater sample. Detected VOC in the B-3 sample included benzene, chloroethane, ethylbenzene, toluene, vinyl chloride, and xylene. Groundwater samples taken from B-3 appeared dark black, silty, and had a slight petroleum odor. No other groundwater samples exhibited unusual visible characteristics. 1,1,1-trichloroethane, whose detection in MW5 was responsible for the shutdown of that well, was not detected in any sample in the landfill or adjacent to it.

With the exception of isolated occurrences of phthalates, no acid/base neutral extractable compounds, pesticides, or polychlorinated biphenyls (PCB) were measured in any groundwater sample at levels exceeding the contract required quantitation limit (CRQL).

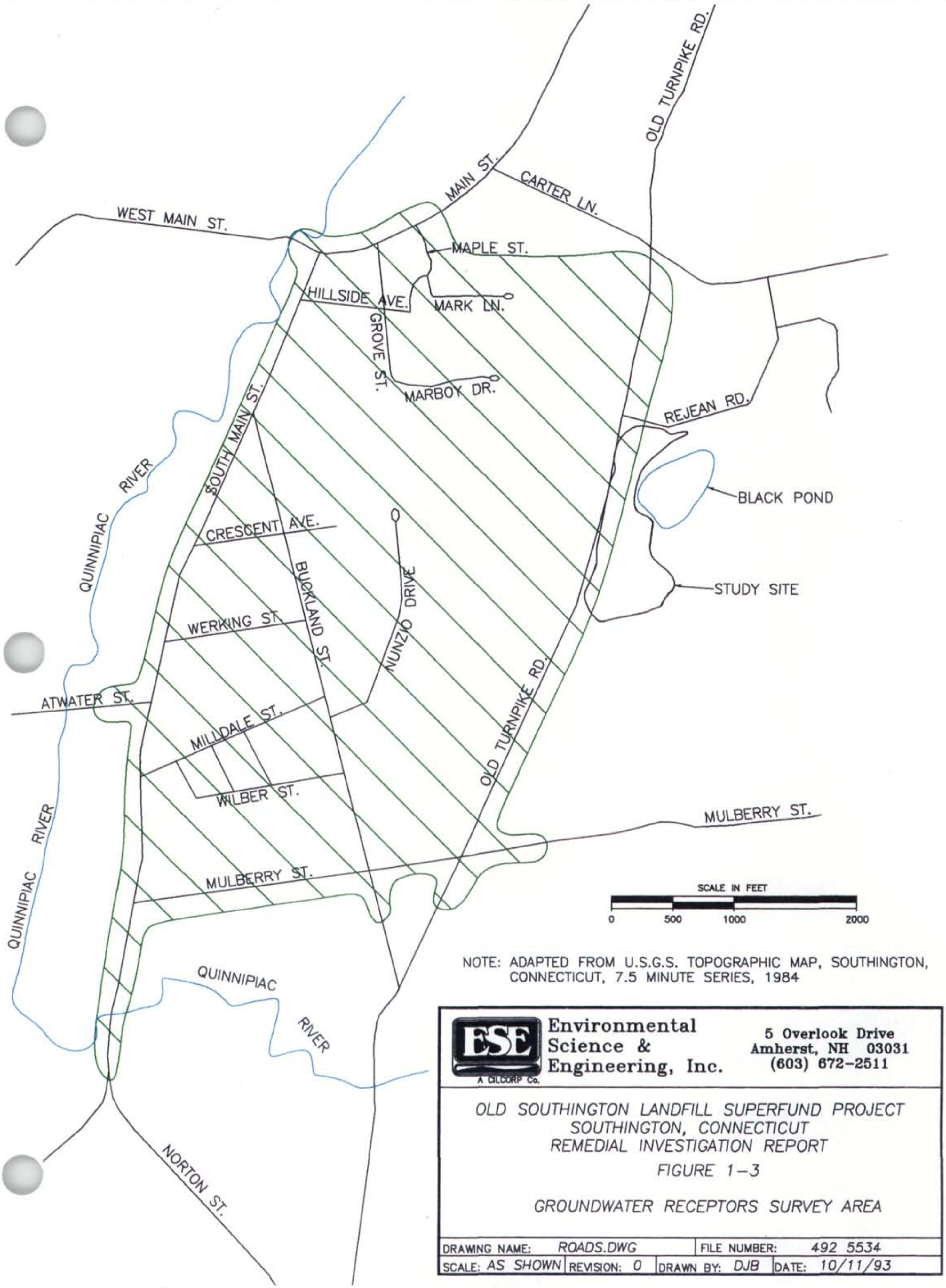
Metals are naturally present in groundwater, often at concentrations that exceed analytical detection limits. The significance of metals present in any particular location requires a comparison of upgradient/cross gradient groundwater metals concentrations (monitoring wells GZ-1, GZ-2, GZ-3) with downgradient (Study Area) groundwater metals concentrations. Metals which were measured at higher levels than in background samples, include cyanide, barium, iron, magnesium, sodium, lead, and mercury. Levels of lead and mercury above detection levels were reported during only one sampling round at any location. Mercury (0.0004 ppm or less) was measured in groundwater samples from wells LW-15M, LW-lSD, LW-103D and from surface water samples SW-1 and SW-3. Lead was measured in four groundwater samples (LW-15D, GZ-4M, MW-5, and CW-20) at 0.113 ppm or less and in all three surface water samples, in the same round, at 0.67 ppm or less. Lead and mercury were not detected in other sample rounds.

1.3.4 Groundwater Receptors Study

During December 1992, ESE conducted a survey of properties located down hydraulic gradient of the Study Site, between the Study Site and the Quinnipiac River, to determine whether any properties were not serviced by Town drinking water. The survey area (Figure 1-3) is bounded on the east by Old Turnpike Road, beginning at the intersection with Carter Lane and extending south to the intersection with Mulberry Street. The southern boundary extends west on Mulberry Street, (but includes a portion of Mulberry Street east of Old Turnpike Road) to South Main Street. The western boundary parallels the Quinnipiac River north on South Main Street to the intersection of West Main Street and Main Street. The northern survey boundary extends east on Main Street to the intersection with Maple Street. The survey included properties on both sides of the boundary streets indicated above. In addition, the survey included all properties on the following streets, located within the area formed by the survey boundary:

Buckland Street
Nunzio Drive
Mildale Avenue
Barr Street
Cummings Street
Franklin Street
Wilbur Street
Werking Street
Crescent Avenue
Hillside Avenue
Grove Street
Marboy Drive
Mark Drive

Tax maps for the area of interest were obtained from the Town Assessor's Office. Individual properties were identified by lot and street number and marked on the tax maps. Town Water Department records were searched to determine whether a water usage card existed, indicating connection to Town water for each property. Any property for which a water usage card was not found was highlighted. Individual tax assessment cards for highlighted properties were requested, from the Tax Assessor's Office . In this way undeveloped properties were eliminated. The tax assessment cards make note of whether a property has Town supplied water and sewer. Using this as a backup check on the water usage cards, it was determined that the remaining developed properties were in fact on Town water supply, with one exception. The home at 117 Crescent Avenue, registered in the name Barbara C. Gugliotti, was serviced by a



NOTE: ADAPTED FROM U.S.G.S. TOPOGRAPHIC MAP, SOUTHINGTON, CONNECTICUT, 7.5 MINUTE SERIES, 1984

Environmental Science & Engineering, Inc.
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 1–3

GROUNDWATER RECEPTORS SURVEY AREA

DRAWING NAME: ROADS.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93

private drinking water well installed in 1957. The home is located west of the Study Site, approximately half way between the Study Site and the Quinnipiac River. The well was installed prior to Town regulations requiring to connection to Town water. By agreement with the Town Water Department the home has been connected to Town water and the private well taken out of service.

2.0 RI FIELD INVESTIGATIONS

The RI investigations were structured in a phased approach in an effort to build on previous data. Initially the RI was developed in 2 phases, Phase 1A and 1B. Phase 1A was structured based on the information collected during previous investigations, as described in Section 1 of this report. As the previous information was based on limited subsurface knowledge and on preliminary assessments performed in the early 1980s, Phase 1A concentrated on the collection of non-intrusive data. Phase 1B investigations were designed based on the results of the Phase 1A investigations, including an analysis of the Phase 1A data as compared to previous data. Phase 1B investigations were comprised mainly of intrusive testing. The following table summarizes the work performed, objectives, who performed the work, and reports produced:

TASKS PERFORMED	DATES PERFORMED	PERFORMED BY	OBJECTIVES	REPORTS
PHASE 1A				
Air Quality Survey[1]	November 1988 April 1989 September 1990	GZA	Provide general overall understanding of Study Area, potential contaminant pathways, potential source areas, and potential receptors.	Memo of Existing Data Evaluation (May 1989) Phase IA Technical Memo (June 1989, revised October 1989)
Soil Gas Survey	November 1988 March/April 1989	GZA		
Ecological Survey[2]	November 1988	GZA		
Geophysical Survey[3]	November 1988 April 1989	GZA		

1 Included ambient air monitoring, meteorological measurements, and VOC site walkover.
2 Included bathymetric survey and species identification.
3 Included seismic refraction, resistivity, and terrain conductivity.

TASKS PERFORMED	DATES PERFORMED	PERFORMED BY	BASED ON PHASE 1A RESULTS	REPORTS
PHASE 1B				
Test Borings [4]	January-July 1990	GZA	Provide data on nature and extent of contaminants in air surface/subsurface soils, groundwater, and surface water/sediment. Provide data on site geology/ hydrogeology.	Draft Remedial Investigation Site Characterization Analysis Report (December 1990, revised April 1991).
Monitoring Wells[4]	January-July 1990	GZA		
Surface Water/ Sediment[4]	July 1990	GZA		
Hydrologic Testing[5]	January-July 1990	GZA		

[4] Included analytical testing.
[5] Included in-site slug tests and water level measurements.

During the period that the draft Site Characterization Report was being reviewed and changed per EPA/DEP comments, additional information regarding the operational history of the landfill was discovered in depositions of individuals, deposed in connection with the Solvents Recovery Service (SRS) Superfund site also located in Southington, CT. The PRPs compiled this and other information and presented it to the EPA/DEP during the summer of 1991. The information suggested the presence of two areas where semi-solid material may have been placed. Given the new information on these potential areas and the results of the Phase 1A and 1B programs, it was mutually agreed by PRPs, EPA and DEP, that additional investigations were warranted. These investigations were termed the Post-Screening Investigation (PSI) Tasks 1 and 2. During the development of the FS, and through discussions with EPA and DEP, it was mutually agreed that additional subsurface investigations in one of the semi-solid disposal areas would be beneficial to the understanding of the significance of this area relative to the remainder of the Study Site. These investigations were termed the Post-Screening Investigations Task 3. The following table summarizes the work performed, objectives, who performed the work, and the reports produced:

TASKS PERFORMED	DATES PERFORMED	PERFORMED BY	OBJECTIVES	REPORTS
Post-Screening Field Investigation				
TASK 1				
GPR Survey	November 1991 January 1992	GZA, report by ESE	Investigate inferred SSDA.	Post-Screening Investigation Task 1 Report and Task 2 Work Plan (March 1992, revised May 1992).
Test Borings	October/ November 1991	GZA, report by ESE		
TASK 2				
Soil Gas Survey[1]	July 1992	ESE	Provide data for air pathways for HRA.	Draft Remedial Investigation/ Feasibility Study (April, 1993).
Ambient Air Modeling	August 1992	ESE		
Ecological Assessment[2]	June/July 1992	ESE	Provide data for ERA.	
Surface Water/Sediment[3]	June 1992	ESE	Provide data for ERA and HRA.	
Study Site Delineation	July-October 1992	ESE	Provide further data on delineation of southern boundary and eastern boundary (along Black Pond of landfill).	
Test Borings[3,4]	July-October 1992	ESE	Provide additional data on contaminant nature and extent, on GW migration of contaminants, and on hydrogeology.	
Monitoring Wells[3,5]	July-October 1992 January 1993	ESE		
Hydrologic Testing[6]	July 1992 - January 1993	ESE		
Percolation Testing	August-October 1992	ESE	Provide data on cover permeability.	
Surface Soil Testing[3,7]	June 1992 October 1992	ESE	Provide data for HRA.	
TASK 3				
Test Borings[3]	October 1993	ESE	Provide additional data for FS.	

1 Included preliminary survey, combustible gas survey, analytical soil gas sampling.
2 Included wetlands delineation, WET II, and species identification.
3 Included analytical testing.
4 Included borings for installation of wells and for characterization of southern portion.
5 Included all 300 series wells, installed in three phases.
6 Included water level measurements (multiple rounds) and permeability testing.
7 Included two rounds of sampling/analysis in northern portion and a round of sampling in southern portion.

This section provides the details of each field activity performed during the Phase 1A, 1B, and the Task 1 and 2 Post-Screening Field Investigations. The activities are presented by discipline (air, source characterization (surface/subsurface), and groundwater) and chronologically within each discipline. The level of detail provided for Task 2 activities is greater than may be provided for previous work, as this document presents the Task 2 activities for the first time.

2.1 SURVEY AND SECURITY

2.1.1 Base Map and Survey

In the spring of 1989, Geomaps International of Mineola, New York performed aerial photogrametric mapping services for a 325-acre area, including the Study Area and Study Site. This topographic survey was required to document drainage and erosional features and to identify current topographic features. A base map of the site was prepared with a 1" = 100' scale and two-foot elevation contours. Physical features present as of Spring 1989 were included on the map. The elevations of sampling locations, including monitoring wells, well points and stakes installed at surface water sampling locations were determined by Greiner Engineers in July 1990. Elevations were based upon the National Geodetic Vertical Datum of (NGVD) 1929.

The original base map was used for work performed during 1992. The Study Area was surveyed by Fuss & O'Neill in August 1992. Locations were surveyed with an accuracy of 0.5 foot with respect to the North American Datum (NAD) of 1927, using the State Plane Coordinate System, Town of Southington Townwide Control. Elevations are accurate to 0.015 foot based on the National Geodetic Vertical Datum (NGVD) of 1929. The survey included location elevation for all wells on-site at the time of the survey, surficial soil and sediment sampling points, soil gas sampling points, hand augering locations around the pond, soil boring locations, piezometers, two corners of each building on the Study Site, and general topography.

Fuss & O'Neill surveyed again on October 1992 to add seven additional wells and additional surficial soil sampling points completed in October 1992. Figure 1-2 shows the site plan, and Plate 1-1 shows the base map with all test borings and wells.

2.1.2 Site Security

Portions of the Study Site are occupied by residences and businesses, therefore access was limited only in the areas immediately surrounding the ongoing work. Restricted work areas, such as the vicinity of a drilling rig during the boring program, were indicated with yellow caution tape to restrict unauthorized access, and monitored per the Health & Safety Plan (HASP) to determine if adequate to protect individuals inside and outside of the restricted area. The remaining areas of the Study Site were open and business continued as usual.

2.2 SOIL GAS SURVEY

During November, 1988 and March/April, 1989, GZA conducted a soil gas survey across the Study Area. This survey was performed in order to evaluate the potential distribution of VOC in soil gas. The limits of the survey were defined by the then current understanding of the landfill and adjacent operations. Soil gas surveys provide preliminary assessment of VOC in soil and/or shallow groundwater. Information from the soil gas survey was to be used to plan subsurface investigations.

A total of 118 soil gas probe locations were tested during the survey. Sample points were arranged on an approximate 200-foot grid pattern across the Study Site. Additional soil gas points were installed in areas where VOC were detected and in select areas outside the grid to provide QA/QC information.

The soil gas survey was conducted by driving a 0.5-inch hollow stainless steel probe approximately three feet below grade. Soil vapors were withdrawn using a portable air pump. The pump was allowed to operate for 30 to 45 seconds. Soil vapors extracted by the pump were field screened using an HNu Model PI-101 photoionization detector equipped with an 11.7eV lamp until PID readings stabilized or started to decline. Using a syringe, a soil gas sample was obtained, then was injected into a Photovac 10S10 gas chromatograph (GC). The GC was equipped with a heated oven and a CPSIL-5 capillary column. The PID and GC were calibrated at the beginning and throughout each day in accordance with the GZA (1988) Work Plan. The

GC was calibrated to detect vinyl chloride, 1,1-dichloroethane, trans 1,2-dichloroethene, trichloroethylene, 1,1,1-trichloroethane, benzene, toluene, ethyl benzene, and total xylenes. Data were reported as parts per billion of the compounds in air. Results of the GZA soil gas survey are discussed in Section 4.2.1.

2.3 AIR QUALITY INVESTIGATIONS

2.3.1 Ambient Air Monitoring

Between November 1988 and September 1990, GZA collected meteorologic data at the Study Site (wind speed, direction, temperature, barometric pressure) with a Peet Brothers Ultimeter. Breathing zone volatile organic compound readings were taken with either an HNu (10.2 eV lamp) or a TIP II (10.6 eV lamp) field photoionization detector. Readings were taken every two weeks at five locations, but were discontinued due to lack of any positive readings. The results of the ambient air monitoring are discussed in Section 4.1.1 of this report. Ambient air monitoring was performed to evaluate potential risks to human health from any airborne contaminants. Collection of meteorologic data was required for assessing downwind locations and the effect temperature and barometric pressure may have on potential offgasing of landfill gases.

2.3.2 Air Quality Monitoring Survey

On April 10-11, 1989, an air quality monitoring survey was performed. The goal of this survey was to identify areas of the landfill which may contain measurable concentrations of potentially explosive or toxic landfill gas. The survey provided a broad-based assessment of the presence, or absence thereof, of gases across the Study Area.

The survey consisted of a walkover and collection of field measurements for VOC, % LEL, and oxygen. Air quality was monitored using an HNu Model PI-101 Photoionization Detector (PID) equipped with an 11.7 eV energy source and an MSA Model 260 combustible gas indicator. The PID responds to most organic vapors but not the natural components of air such as oxygen, nitrogen, carbon dioxide, and methane. Readings obtained with the PID represent total VOCs in air, referenced to an isobutylene standard; individual compounds are not identified. The Model 260 combustible gas indicator (CGI) is designed to measure combustible gas (referenced to a pentane standard) and oxygen content. Combustible gas content is expressed as a percentage of the lower explosive limit (LEL); oxygen content is expressed as a percentage of air. Air samples were screened at the base of Study Site and Study Area structures (10 ± foot intervals) and at the ground surface of manholes, catch basins, and drains; 220 locations were screened.

Five air samples were obtained using a syringe and screened for VOCs using a Photovac 10S10 gas chromatograph, equipped with a photoionization detector and a CPIC-5 capillary column. These air samples, AS-1 through AS-5, were obtained from the breathing zone in areas where HNu readings above background were noted. Air sample AS-1 was obtained from the Lori Corporation loading dock area, AS-2 was taken in the area of AM-182 (southwest of the former 493 Associates building), AS-3 was taken near Meriden Box Company, AS-4 was taken at the Chuck & Eddie's property, and AS-5 was taken in an area east of Solomon Casket.

The gas chromatograph was calibrated to identify specific compounds including:

Vinyl Chloride	Benzene
1,1-dichloroethane	Toluene
trans 1,2-dichloroethane	Ethyl Benzene
1,1,1-trichloroethane	Total Xylenes

The photoionization detector (PID) has varying sensitivity to compounds, depending on their ionization potentials. Typically, the PID has higher sensitivity to double-bonded compounds such as dichloroethenes, trichloroethene, and vinyl chloride. Likewise, the PID has good sensitivity to aromatic compounds such as benzene, toluene, ethyl benzene, and xylenes. The PID has relatively low sensitivity to single-bonded compounds such as dichloroethanes and trichloroethanes.

The results of the Air Quality Monitoring Survey are discussed in Section 4.1.2.

2.3.3 Analytical Soil Gas Sampling

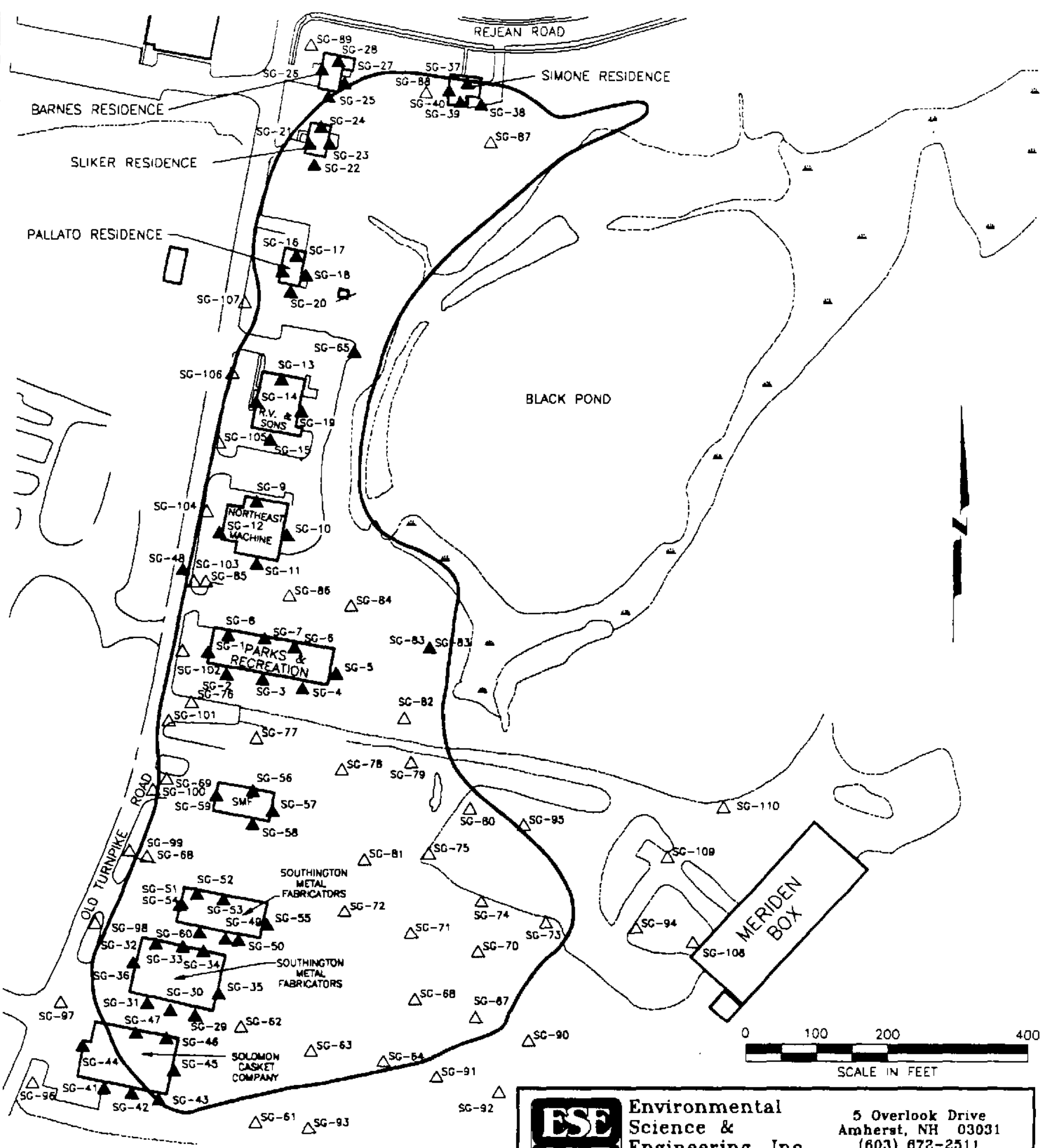
An analytical soil gas survey was completed in three phases during 1992. The purpose of the analytical soil gas survey was to provide analytical data on potential air emissions for the human health risk assessment. The initial phase, conducted in July 1992, was a Screening Soil Gas Survey to determine optimal locations for placement of sampling probes for the analytical soil gas survey. This survey was conducted around the foundations of the Study Site buildings to screen for VOC, combustible gas, oxygen and hydrogen sulfide, using field screening techniques.

Based on the levels of combustible gas found in the soil gas on the southern portion of the Study Site (R.V. and Sons and south), the program was modified in July 1992 to include a second phase of measurements for combustible gas to further evaluate the extent of combustible gas across the entire Study Site. During this phase, a combustible gas sampling grid was laid out on the southern portion of the site and additional samples were field screened for methane, oxygen, hydrogen sulfide, and hydrogen cyanide.

The third phase, conducted in August 1992, involved collecting soil vapor samples for laboratory analysis using the EPA Method T-02. Locations for these samples were selected based on the information obtained from the screening soil gas survey. The results obtained from EPA Method T-02 analyses were modeled and used to estimate the ambient and indoor air concentrations of VOC used in the health risk assessment. The results are discussed in Section 4.1.3.

2.3.3.1 Screening Soil Gas Sampling

Fifty-nine soil gas points, numbered SG-1 through SG-59, were sampled around the foundations of the buildings on the Study Site (see Figure 2-1 for sample locations) during July, 1992. At least one sample was collected from each side of each building. For buildings more than 100 feet in length, one sample was collected every 50 feet. Sampling probes were inserted to a depth of approximately 80% of the distance from the ground surface to the water table, or a maximum of eight feet. It was not always possible to drive the probe to the desired depth, due



LEGEND

▲ SG-92 ESE SOIL GAS SURVEY POINT-VOC AND METHANE

△ SG-93 ESE SOIL GAS SURVEY POINT-METHANE ONLY

EXTENT OF STUDY SITE

NOTE

GROUND SURFACE ELEVATIONS PROVIDED BY GEOMAP, INC. (1989), AND REFER TO 1929 NATIONAL GEODETIC VERTICAL DATUM. SURVEYING OF ESE SOIL GAS SURVEY POINTS COMPLETED BY FUSS & O'NEIL ENGINEERS.

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-1

ESE SOIL GAS SURVEY POINT LOCATIONS
JULY 1992

DRAWING NAME: ESESG.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=200'	REVISION: 0	DRAWN BY: PAD	DATE: 10/11/93

to obstructions in the soil. The probe was moved up to eight times in an attempt to place the probe at the desired depth. When that could not be done, the sample was taken from as deep as possible. The probes were placed as near as possible to the building foundations, the distance varying from 0.2 feet to 8.7 feet depending on accessibility and soil conditions. Section 5.1.1.1 of the Task 2 Work Plan specified that the probe should never be placed greater than two meters from the foundation. This was adhered to, with two exceptions due to accessibility problems. Sample SG-5 was eight feet, and SG-12 was 8.7 feet from the building foundation.

Soil vapor samples were extracted from the probe using a portable air pump. The probe was connected via a reducing nipple and silicone or polyethylene tubing to a 283 ml glass bomb, followed by the air pump. The air pump outlet was attached via silicon tubing to an MSA 361 Combustible Gas Indicator (CGI). The CGI was used to screen for methane, oxygen and hydrogen sulfide at the time of sample collection. The glass bomb was used to collect a sample for subsequent VOC screening using a portable Photovac 10S50 (PID) Gas Chromatograph (GC) set up in the field office. The field GC was calibrated, as described in the Task 2 Work Plan, with standards for benzene, toluene, trans-1,2-dichloroethylene, and trichloroethylene to a concentration of 1 ppm in air. Detection limits were 0.1 ppm. These compounds were selected as representative of compounds previously detected at the Study Site.

At sample locations SG3, SG33 and SG59 groundwater was encountered and water was pulled up into the glass sampling bomb. At these locations, a second bomb was connected in series. The gas sample was then collected into the second bomb, while the groundwater accumulated in the first bomb.

It was also noted that the combustible gas readings might be skewed due to the pump forcing air into the CGI. Therefore, the air pump outlet was directed into a 3-liter tedlar bag, and the CGI readings were taken from the bag rather than off the pump discharge. The CGI was calibrated with combustible gas to read percent of the LEL. Some of the samples contained greater than 100% of the LEL, resulting in a meter reading of "OVER". In these cases, a 10 to 1 dilutor was installed inline and the reading was retaken. If the reading was still "OVER", a 20 to 1 dilutor was installed and the reading retaken. The instrument calibration was rechecked when a dilutor was installed to insure that the readings were accurate.

The samples for VOC analysis were collected by running the air pump for approximately two minutes with both stop cocks on the glass bomb in the open position to allow soil vapors to be pulled through. The stop cocks were then closed and the bomb was removed from the sampling apparatus.

The sample was first run using a 250 μl sample size, extracted from the bomb with an air-tight glass syringe. The sample was injected into the GC for analysis. If the analysis resulted in a peak with an area beyond the integration capabilities of the GC, a second sample at a smaller volume (typically 25 μl) was run.

Sampling probes were decontaminated between each sample. The silicon and/or polyethylene tubing was changed between each use, and the glass bombs and tedlar bag were purged with nitrogen gas between samples. Appropriate measures were followed to prevent cross-contamination as specified in the Task 2 Work Plan. Results of the screening soil gas sampling are discussed in Section 4.1.3.1.

2.3.3.2 Combustible Gas Sampling Grid

The screening soil gas survey indicated several instances of elevated combustible gas on the southern portion of the Study Site. To further evaluate the concentration and lateral extent of this combustible gas in soil, a 100-foot-square grid was laid out across the southern portion of the Study Site. Fifty-one additional soil gas points, numbered SG-61 through SG-111, (no sample SG-60) were sampled in this grid between July 22 and August 20, 1992. These included points along Old Turnpike road over the natural gas utility line, to determine the potential for combustible gases to travel along the utility line trench. Where the utility line ran adjacent to the southern portion, combustible gas was detected, similar to levels within the southern portion. However, further north along the utility trench, combustible gas was not detected. Therefore, it is evident that combustible gases, are not preferentially moving north along the utility line. Figure 2-1 shows this grid, with the sampling points indicated.

In addition, screening soil gas points SG-1 through SG-8 were resampled. These were originally sampled without the dilutors described in Section 2.2.2.1 of this report and the readings were recorded as greater than 100% of the LEL. Resampling allowed further quantification of the combustible gas levels at these points.

The protocol for the grid sampling included driving the probe to a depth of five feet (or as close as possible to that depth) at each point. An air pump was attached to the probe via silicon tubing and the pump outlet was directed into a tedlar bag. The bag was filled and emptied twice. The third volume was collected and analyzed with the MSA CGI, with dilutors as necessary. Combustible gas, oxygen and hydrogen sulfide gas levels were recorded. The bag was then refilled and hydrogen cyanide (HCN) levels were recorded using an Interscan 4000 series HCN meter. Results of combustible gas sampling program are discussed in Section 4.1.3.1.

2.3.3.3 Analytical Soil Gas Sampling

The screening soil gas data was reviewed by ESE and EPA/DEP to determine the optimal locations and appropriate sampling volumes to be used for collection of the analytical soil gas samples for analysis by EPA Method T-02. The analytical samples were collected at the location of the highest screening soil gas measurement for each building.

The analytical soil gas determinations were conducted using the same soil gas probes driven to the same depth as during the screening soil gas survey. The probe was purged and either 2,4, or 6 Carbotrap 300 Multi-bed Thermal Desorption sampling tubes were attached in parallel to the probe with inert tubing and tubing connecting tees. The tubes were then connected to the air pump. The soil gas was passed through the Carbotrap tubes pulled by a vacuum pump downstream of the tube.

The pump used for the sampling train consisted of a high volume vacuum pump with a limiting orifice or needle valve in line with each tube, or consisted of one or more Dupont Alpha I pumps. The soil gas volumes collected on each tube were optimized by determining the flow rate with the rotameter periodically during the sampling period and adjusting the sampling times accordingly. The flow rates were maintained between 30 and 50 ml/min and were collected over a period of 3 to 4 hours.

The screening soil gas measurement results were used to establish flow rates and/or sampling times, based on VOC levels. To obtain the sensitivities necessary for the Risk Assessment in areas where low concentrations of VOC were found, 8 to 10 liters of soil gas were collected on each T-02 tube. A maximum air volume of 10 liters was sampled. This volume was selected based upon the retention volume of the most volatile constituent being measured (vinyl chloride).

To avoid overload of the tube and VOC breakthrough in areas where high VOC levels were indicated by screening soil gas measurements, the sampling flow rate was reduced to a minimum of 10 ml/min and, as necessary, the sampling duration was reduced to no less than 10 minutes. This allowed for a minimum volume of 0.1 liters (10 minutes x 10 ml/min), providing a 1:100 dilution factor.

The Carbotrap tubes were heat desorbed individually in the laboratory prior to sampling in order to remove any residual VOC. The tubes were stored prior to use in Teflon-capped culture tubes or in the original inert containers supplied by Supelco. The storage tube contained a glass wool plug to prevent breakage of the fragile quartz sampling tube.

The tubes were carefully handled with lint free gloves or cloth to prevent contamination and used immediately after removing from the storage tube. The quartz sampling tube was not labeled directly on the tube, but had an adhesive label on the storage container. After sampling, the tube was immediately returned to the labeled storage tube. The tubes were packed in a cooler with ice for transport to the laboratory.

Prior to shipping the clean tubes, the laboratory added surrogates to each tube. The exposed tubes were submitted to Aquatec for analysis of the following VOC, using EPA Method T-02:

vinyl chloride	benzene
methylene chloride	ethyl benzene
1,2-dichloroethane	toluene
1,2-dichloroethene (cis and trans)	xylenes
1,1,1-trichloroethane	styrene
trichloroethene	MEK

tetrachloroethene

A field blank was prepared each sampling day and submitted to the laboratory for analysis in the same manner as the samples. The field blank consisted of a sealed tube, taken into the field and opened for a period of approximately 30 seconds and then re-sealed. For each 20 samples collected one co-located sample was collected. The co-located sample consisted of a second sample tube being installed in-line, and parallel to, an existing sample. The co-located sample was submitted to the laboratory for analysis in the same manner as the samples. One matrix spike and one matrix spike duplicate was sampled and analyzed. The matrix spikes consisted of tubes fortified at the laboratory, prior to shipment to the field, with 30-50 ng of each analyte. Barometric pressure, ambient temperature, and wind direction were recorded at the start, middle, and end of the sampling period. Results of the analytical soil gas sampling are discussed in Section 4.1.3.2.

2.4 SURFACE CHARACTERIZATION

Section 5.1.4 of ESE's Task 2 Work Plan proposed collecting 19 surficial soil samples for laboratory analysis to provide data for assessing the chemical composition of the landfill cover and for use in the HRA. Five samples were to be collected in the northern portion of the Study Site. Previous site work identified polynuclear aromatic hydrocarbons (PAHs) at depth in this area. These samples were to assess the potential for PAHs to be present in the surficial soil.

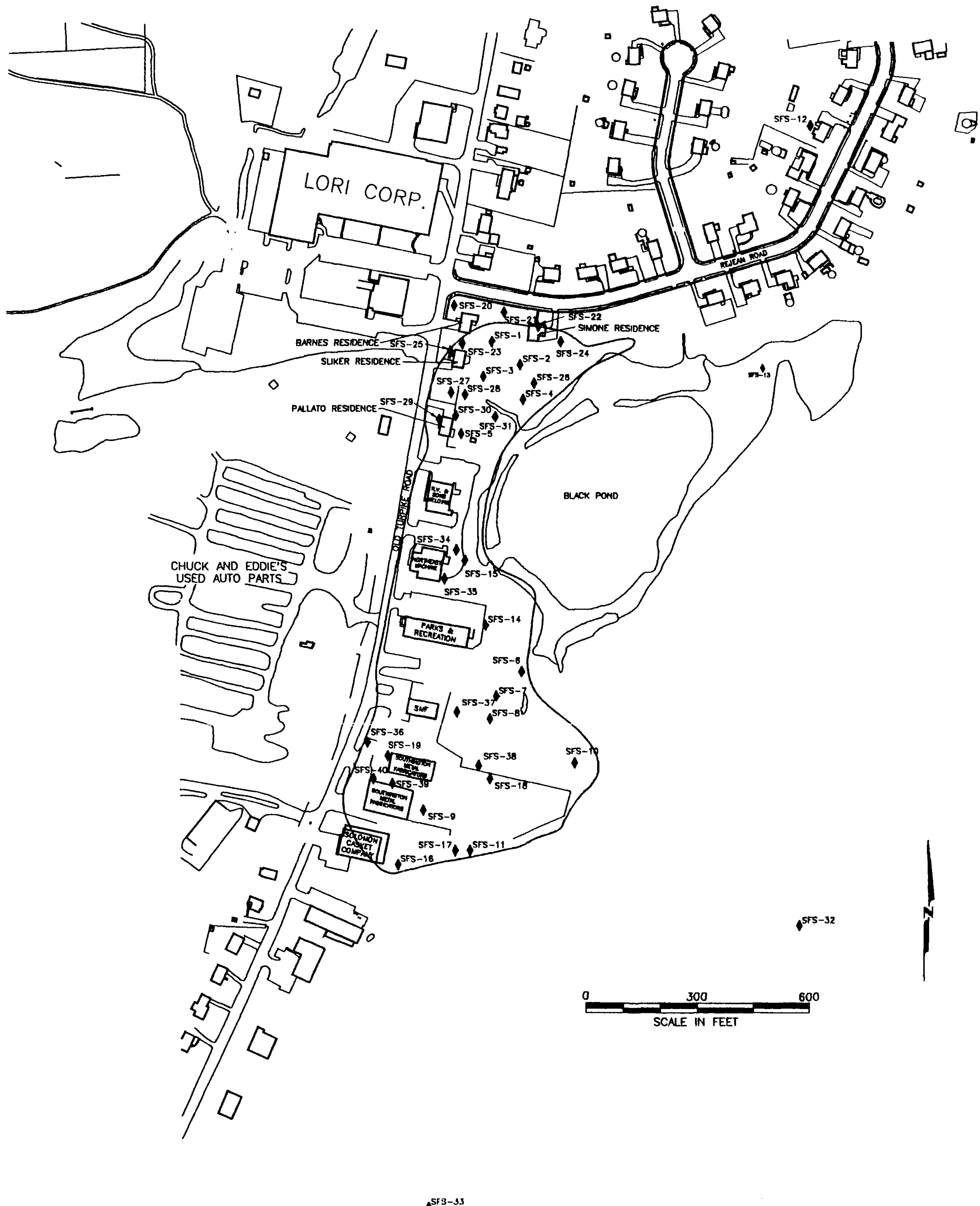
Twelve soil samples were proposed on the southern portion of the Study Site, six from visibly stained areas, and six located randomly across this portion of the Study Site. This work was completed in June 1992. Based on the analytical results, 21 additional surficial soil samples were collected in October 1992 to augment the June data. Results of the surficial soil sampling are discussed in Section 4.2.

2.4.1 Surficial Soil Samples, Round 1

The first round of surficial soil sampling took place June 9 through 11, 1992. Samples were collected from 19 locations across the Study Area (SFS-1 through SFS-19) in accordance with the Task 2 Work Plan. Surface soil samples were analyzed for full TCL/TAL analyses to characterize the types of compounds present, if any. At EPA's request selected samples were also analyzed for dioxin/furans, using the CLP SAS method. Sample locations are indicated on Figure 2-2. Samples were collected from two to 12 inches in depth, using a stainless steel hand auger. The soil was composited in a stainless-steel bowl, using a stainless-steel spoon, and collected in the appropriate containers for analysis for TCL-SVOC, TCL-Pesticides/PCBs and TAL-Metals plus cyanide. Samples were also collected for dioxin/furan analysis at four of the sampling locations on the northern portion of the Study Site. The auger holes were deepened. and a sample was collected directly from the auger at a depth of 18 to 24 inches in each hole. These samples were submitted for TCL-VOC analysis. Table 2-1 indicates the sample numbers and parameters.

All sampling equipment was decontaminated in the field between each location in accordance with the Task 2 Work Plan. Soil samples were labelled and placed in a cooler on ice, or transferred to the refrigerator located in the field office, until shipment to Aquatec, Inc. of Burlington, Vermont (Aquatec). One duplicate was obtained to provide QA/QC for the study. Duplicates were obtained by collecting a second sample for VOC immediately after collecting the first sample. Duplicates for the other analyses were collected from the mixing bowl, as for the original sample. One aqueous trip blank, a rinsate blank, a matrix spike, and a matrix spike duplicate were analyzed for the same parameters as the samples.

Five samples were collected from the residential properties on the northern portion of the Study Site (SFS-1 through SFS-5). Locations SFS-1 and SFS-5 included samples for dioxin/furan. Two background samples were collected, one from a residential property located north of Rejean Road (SFS-12) and one from the undeveloped wetland area east of Black Pond (SFS-13). These were sampled for the same parameters, including dioxin/furan.



LEGEND

SFS-17 ESE SURFICIAL SOIL SAMPLING LOCATION

EXTENT OF STUDY SITE

NOTE

GROUND SURFACE ELEVATIONS PROVIDED BY GEOMAP, INC. (1989), AND REFER TO 1929 NATIONAL GEODETIC VERTICAL DATUM. SURVEYING OF ESE SURFCIAL SOIL SAMPLING LOCATIONS COMPLETED BY FUSS & O'NEILL ENGINEERS.

ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-2

ESE SURFICIAL SOIL SAMPLING LOCATIONS

DRAWING NAME: ESESFS.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93

Six randomly selected areas on the southern portion of the Study Site were sampled (SFS-6 through SFS-11). ESE personnel walked the Study Site with EPA oversight contractor (EBASCO) personnel and identified six stained areas to be sampled (SFS-14 through SFS-19). Samples were collected from a depth of two to 12 inches for TCL-SVOC, TCL-Pesticide/PCBs and TAL/Metals analysis. TCL-VOC samples were collected from 18 to 24 inches in depth, with the exception of samples SFS-10, SFS-11, SFS-16, SFS-17, and SFS-18 where the VOC samples were collected from a shallower depth (between 12 and 18 inches) due to an obstruction in the auger hole precluding the collection of a deeper sample.

2.4.2 Surficial Soil Samples, Round 2

A second round of surficial soil samples was collected on October 14, 16 and 28, 1992. This round of sampling was not anticipated in the Task 2 Work Plan. These were collected to augment the data from the first round of samples and were the results of discussions with, and requests made by, EPA and DEP. Fourteen samples were collected from the residential properties on the northern portion of the Study Site. Twelve of these were collected from two to 12 inches in depth. Two deeper samples were collected at EPA's request, from a depth of two to 2.5 feet (SFS-24-2) and 1.5 to two feet (SFS-30-2). Figure 2-2 shows the sampling locations. All were submitted for TCL-SVOC, TCL-Pesticides/PCBs and TAL-Metals (SFS-20 through SFS-31). The two deeper samples were submitted for TCL-VOC as well. Table 2-1 indicates the sample numbers and parameters.

Three background samples were also collected. Sample SFS-32 was collected from the location of monitoring well GZ-1, SFS-33 from the area of GZ-2, and SFS-12-2 from the same location as SFS-12. These were collected from a depth of two to 12 inches and submitted for TCL-SVOC and TAL-Metals.

In addition, seven stained soil samples were collected from the southern portion of the Study Site (SFS-34 through SFS-40). Stained areas were sampled at R.V. and Sons, Northeast Machine, and Southington Metal Fabricators. These were sampled from two to 12 inches in depth. VOC samples were collected directly from the auger in the deeper part of the hole. The remaining auger contents were composited and sampled for TCL-SVOC, TCL-Pesticides/PCBs and TAL-

Metals including cyanide. The same QA/QC procedures were followed during the Round 2 sampling program as for the Round 1 sampling program. Results of the Round 2 sampling program are discussed in Section 4.2.

2.5 SURFACE GEOPHYSICS

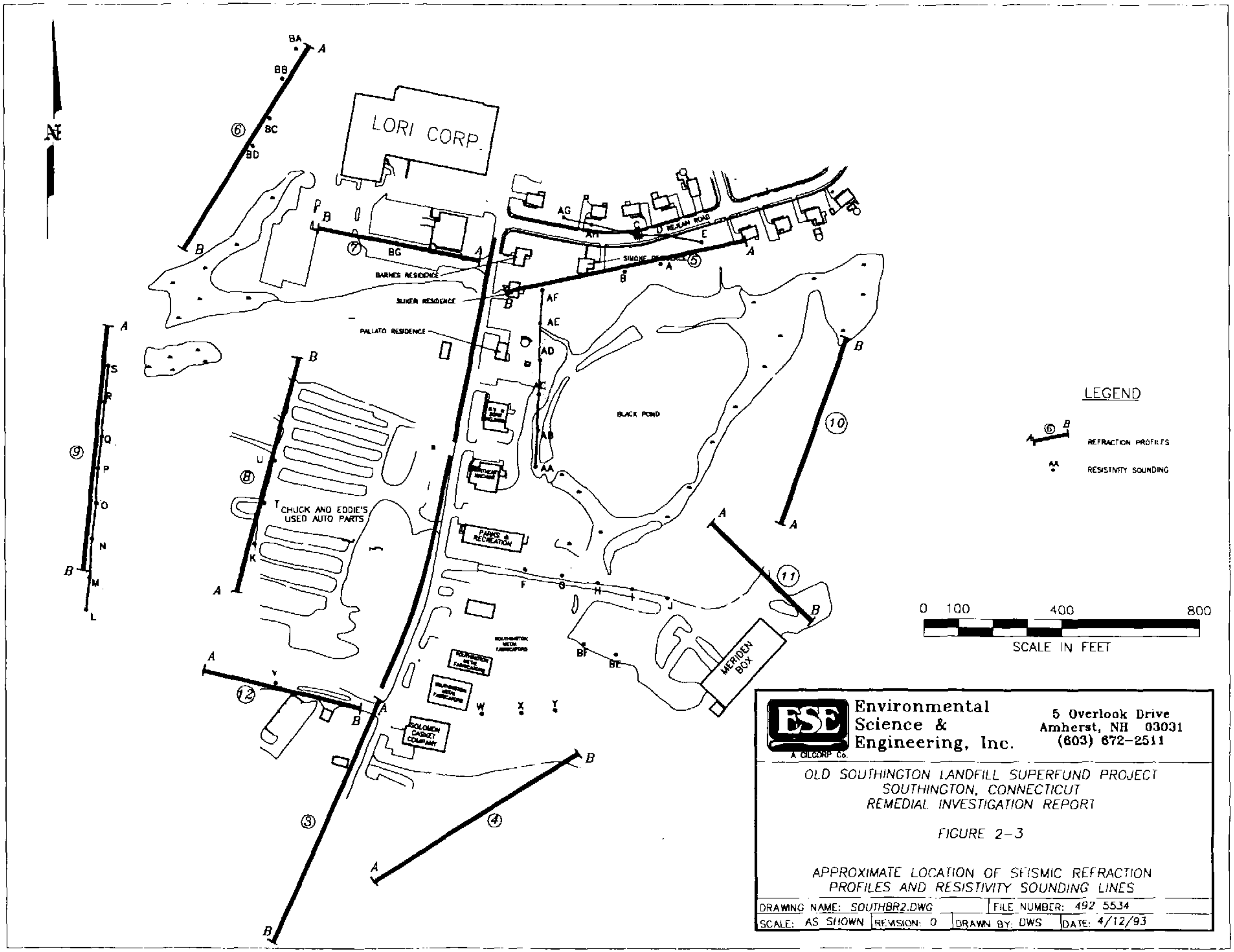
In November, 1988 and April, 1989, Geoscience Services Associates, Inc. (GSA) of Acton, Massachusetts completed geophysical surveys of the Study Area. The geophysical surveys included seismic refraction profiling, resistivity soundings, and terrain conductivity surveys.

2.5.1 Seismic Refraction Profiling

The seismic refraction survey involved profiling along 12 seismic lines located around the perimeter of the Study Area and along Old Turnpike Road. The seismic survey was completed to provide a basis for determining bedrock topography and general geologic conditions beneath the Study Area. This information was used to locate monitoring wells and borings to define potential migration pathways and groundwater flow characteristics. The approximate locations of the seismic lines are shown on Figure 2-3.

The survey used an ABEM Terraloc Model 3 Signal Enhancement Seismograph (lines 1 through 8), and a Bison 9000 instantaneous floating point amplifier signal enhancement seismograph (lines 9 through 12). The energy source consisted of 1/3 to 3/4 pound charges of 75% Atlas Power Primer explosive set at a depth of approximately three to four feet below grade. Geosonics, Inc. of Cheshire, Connecticut monitored ground and air movements using a Safe Guard Seismic Unit 1000D, portable velocity-recording seismograph as requested by the Town of Southington Building Department.

GSA presented the initial results of the profiling and Weston Geophysical (EPA's oversight contractor) re-interpretated seismic lines 2, 3, 4, 8, 9 and 12. The location of the seismic lines were not surveyed. Because the seismic lines were only approximately located, the



Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-3

APPROXIMATE LOCATION OF SEISMIC REFRACTION PROFILES AND RESISTIVITY SOUNDING LINES

DRAWING NAME: SOUTHBR2.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DWS	DATE: 4/12/93

interpretation of the geological information derived from the geophysical data was preliminary in nature.

2.5.2 Conductivity/Resistivity Testing

The resistivity survey conducted by GSA involved the completion of resistivity soundings at 40 locations along five linear alignments of sounding locations to assess the stratigraphy of the area. The approximate resistivity sounding locations are shown on Figure 2-3. This type of survey utilizes the natural sensitivity of differing soil types to determine the presence of any variations which may offset contaminant transport. In addition, the method will detect variations of resistivity in groundwater, which may be due to contaminants. The resultant data was utilized to place borings and monitoring wells.

The resistivity soundings were performed utilizing a Schlumberger electrode configuration and an ABEM Tetrameter. Five linear alignments of these soundings were taken and iso-resistivity values were contoured as a function of depth beneath these lines. The maximum depth of penetration was 120 feet. Linear alignments of the soundings were used to generate five pseudo-sections of the resistivities versus depth. The resistivity values utilized were "partially-corrected", apparent resistivity values. A discussion of the data collected during the resistivity survey is presented in Section 3.7 of this report.

A terrain conductivity survey was performed by GSA around the perimeter of Black Pond and in the vicinity of Lori Corporation to further define the landfill perimeter and to evaluate potential shallow leachate plumes and other potential near surface contaminant sources, including buried metallic masses (which would identify drum disposal areas) if any. This data was used to locate borings and monitoring wells.

A Geonics EM-31 was used for the survey, which allowed a depth penetration for the survey of 15 feet. Measurements of conductivity (in millimhos/meter) were positioned at the appropriate location along traverses. Iso-conductivity values were contoured and an illustration depicting the areal extension of near surface conductivity values was produced. A discussion of the results of the survey is included in Section 3.7 of this report.

2.5.3 Ground Penetrating Radar Surveys

A ground penetrating radar (GPR) survey of a limited portion of the Study Site was conducted by Hager-Richter Geoscience, Inc. in November, 1991 and January, 1992. This survey was performed in order to evaluate suspected semi-solid disposal areas (based on discussions with persons familiar with previous practices, including former or present Town employees). Ground penetrating radar was selected to provide information regarding disturbed ground in these areas and to determine whether they contained any buried metallic objects (such as drums). The areas addressed by the survey are identified as Area 1 and Area 2 in the Hager-Richter report provided in Appendix A. Area 1 is located between Old Turnpike Road and the front of the R. V. and Sons Welding shop at 455 Old Turnpike Road. Area 2 is located between Old Turnpike Road and the Southington Parks and Recreation Maintenance Facility. The results of the GPR survey were used to locate borings and monitoring wells.

The survey was completed using a Geophysical Survey Systems, Inc. Model SIR-3:VDU-38 ground penetrating radar system with a 300 MHz antenna. This antenna can provide a good size and depth resolution for targets buried less than 25 feet below the ground surface. Trial GPR traverses were also made at the Study Site with a 150 MHz antenna in an attempt to increase the depth of penetration of the GPR signal. However, the depth of penetration was not improved and general radar record quality was judged to be inferior to those acquired with the 300 MHz antenna. Therefore, the 300 MHz antenna was used to complete the entire survey.

The survey of each area was completed on a 10-foot grid system with GPR traverses oriented north-south and east-west. The GPR antenna was pulled manually along all the traverses. The GPR data was recorded with a 100 nanosecond time window on November 15, 1991 and a 140 nanosecond time window on January 10, 1992. Using a handbook time-to-depth conversion of six to seven nanoseconds per foot for unsaturated soil, the depth of signal penetration was calculated to be 14 to 16 feet and 20 to 23 feet, respectively. The actual depth of exploration is a function of the electrical properties of the soil and fill material and the depth to the water table. GPR signal velocity decreases below the water table.

The survey consisted of 124 GPR traverses for a total length of 9,250 feet. The results of the survey are discussed in Section 3.4 and are summarized in the Hager-Richter report ((Appendix A).

2.6 SUBSURFACE INVESTIGATIONS

2.6.1 Phase 1B

Test borings and other subsurface explorations were not completed during the Phase 1A investigation. The Phase 1B investigation included the completion of 32 test borings, designated as BP-3, through BP-9 and TB-1 through TB-26. Utilizing the results of the Phase 1A program, these borings were drilled in order to characterize the subsurface geology and landfill materials, to evaluate contaminant distribution, and to facilitate monitoring well installation. These test borings were drilled by Clarence Welti Associates, Inc. (CWA) during the periods January 17 through 19 and 23 through 27, 1990. Borings labeled BP-3 through BP-9 were installed specifically by Greiner Engineering, Inc. for Town of Southington pavement construction design. Test boring and groundwater monitoring well locations are shown on Plate 1-1. Soil samples were obtained continuously or on a five-foot sampling interval using 24 inch long by two inch diameter split-spoon soil samplers or a Christansen Sampler.

2.6.2 Post-Screening Investigations Task 1

Borings were installed in three general areas during the Task 1 Post-Screening Field Investigation: the northern portion of the Study Site, on or near residences (17 borings); in the southern portion of the Study Site, generally north of the Meriden Box access Road and west of Black Pond (10 borings); and near the two suspected semi-solid disposal areas (19 borings), based on GPR results and information obtained through interviews with persons familiar with previous disposal practices . These borings were generally advanced to a depth of at least 15 feet below ground surface, or to a depth of 5 feet below debris and/or disturbed soil, whichever was deeper.

The 46 test borings (designated TB101 through TB142) were drilled by CWA over the period from October 15 to November 21, 1991. Borings were drilled using hollow stem augers. Soil samples were collected continuously in each boring, using either two or five foot split-spoons. The soil samples collected during Phase 1B and Task 1 drilling programs were placed in glass jars and headspace screened for the presence of detectable VOC using a photoionization detector (PID) with a 11.7 eV lamp. The PID screening results are presented in Section 3, Table 3-1 of this report. Boring logs are contained in Appendix B. The depths and drilling methods for each test boring are summarized on Table 2-2. Table 2-3 presents a list of the borings, the depths sampled, and the analyses performed. Analyses were performed using EPA SW-846 methods: VOC by Method 8240, SVOC by Method 8270, pesticides/PCB by Method 8080, metals by Methods 7000 series, and cyanide by Method 9010. Analytical results are presented in Section 4.2 of this report.

2.6.3 Post-Screening Investigations - Task 2

During Task 2 post-screening investigations, ESE conducted subsurface investigations, in accordance with the RI/FS Work Plan, as modified as appropriate in Task 2 Work Plan. The Task 2 work included hand auger exploration around the southern end of Black Pond, and shallow soil borings around the southern end of the former landfill (200 series borings) to delineate the extent of the debris mass. In addition, the Task 2 Work Plan proposed six test borings which would be completed as ground water monitoring wells (300 series borings). This work was completed in August 1992 and, based on the results of preliminary laboratory data from the six 300 series borings, three additional locations, not included in the Task 2 Work Plan, were added in October 1992 with EPA approval. All drilling was completed by CWA.

2.6.3.1 Hand Auger Explorations

A hand auger investigation was conducted around the southern and western sides of Black Pond to determine the proximity of buried waste/debris to the pond. This investigation was conducted between July 22 and August 10, 1992, in accordance with Section 5.1.5.1 of the Task 2 Work Plan. Thirty-eight locations were tested, around the south and west shoreline of the pond.

Augering was performed, at the locations, to depths ranging between 2 and 4 feet. Auger spoils were examined for the presence of any debris.

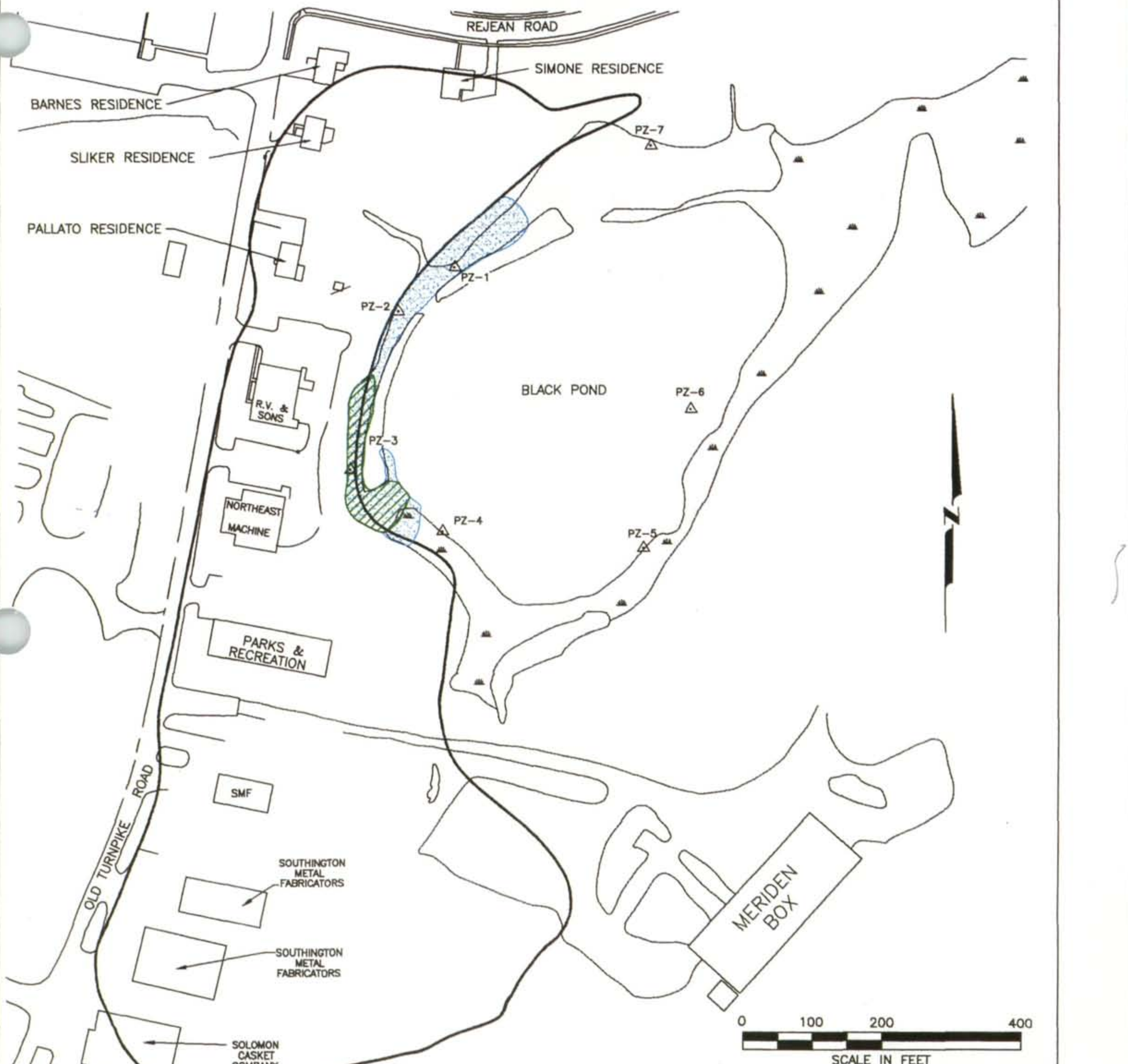
In addition, eight near-shore locations were tested from a rowboat by hand driving a split-spoon sampler into the pond bottom to look for debris. Six additional near shore locations were tested by hand augering into the pond bottom while wading in the pond. Figure 2-4 shows the area where the hand augering was performed. Section 4.2.4.2 discusses the results of the hand auger explorations.

2.6.3.2 Landfill Boundary Delineation (Shallow Test Borings)

Shallow test borings were completed around the southern end, from the southeast around to the southwest, of the Study Site to characterize the debris mass and determine the lateral and vertical extent of the debris mass. Borings B201 through B206 were used to define the limit of the former landfill. Borings B207 through B209 were completed within the debris mass to further characterize the waste material. These boring locations are shown on Plate 1-1.

The first boring at each location, designated with the suffix A (i.e. B201A) was advanced in a location estimated to be the edge of the debris mass. If debris was not encountered, a second boring, designated with the suffix B, was advanced approximately 30 feet closer to the former landfill. If debris was encountered in the first boring, the second boring was moved 30 feet away from the former landfill. If the edge was not bracketed by the first two borings, a third was done, designated with the suffix C. All edge locations were found within three borings. Borings 207, 208 and 209 were completed to characterize the debris mass. Section 3.3.2 summarizes the results of the delineation program.

Borings completed outside the former landfill limits were terminated 5 feet below the water table to confirm true saturation and aquifer geology. Borings emplaced within the former landfill limits were terminated 5 feet below the debris mass bottom to evaluate vertical extent of debris and verify native sediment. Boring B204A, outside the former landfill limit, was terminated 10 feet below the water table and completed as an observation well. Boring logs, and a generalized well completion log are attached in Appendix B.



LEGEND

EXTENT OF STUDY SITE

IDENTIFIED LIMIT OF REFUSE

AREA PROBED WITH HAND AUGER TO DETERMINE LIMIT OF REFUSE AROUND POND.

PZ-2 LOCATION OF PIEZOMETER

NOTE

SURVEYING OF ESE PIEZOMETER LOCATIONS COMPLETED BY FUSS & O'NEILL ENGINEERS.

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-4

AREA EXPLORED BY HAND AUGER

DRAWING NAME: 5534EXCV.DWG	FILE NUMBER: 492 5534
SCALE: 1"=200'	REVISION: 1
DRAWN BY: PAD	DATE: 10/11/93

The 200 series borings were completed with a track-mounted Mobile B-53 drill-rig using 4¼-inch hollow stem augers. Continuous split-spoon soil samples were logged by the on-site geologist to document encountered materials. Soil samples were screened with a PID (HNU with an 11.7 eV lamp) immediately upon opening each split-spoon. If PID readings were greater than three ppm over background, a soil sample was collected into a four ounce soil jar with a screw-on Teflon® septa lid and stored on ice in a cooler for possible laboratory analysis. Any subsequent sample from that boring with a higher PID reading was also collected for possible analysis. Also, 40ml VOA vial was filled two-thirds full each time a sample was taken for field GC headspace screening. This data was used to select which sample from the boring to submit for laboratory analysis. A maximum of one soil sample from each boring was submitted for TCL-VOC analysis.

Three samples from boring B207, one sample from boring B208, and two samples from boring B209 were submitted for the full TAL/TCL suite (TAL-Metals including cyanide, TCL-SVOC, TCL-Pesticides/PCBs and TCL-VOC). Soils samples for TCL-VOC analysis were each immediately collected from a discrete split-spoon and placed directly into a sample bottle. Soil collected from 2 to 4 feet below ground level was selected from boring B207, whereas soils obtained from 8 to 10 feet below ground level were chosen from borings B208 and B209.

Soil samples B207A and B208 were collected from a composite of four consecutive split-spoon samples to provide a representative soil column between 2 and 10 feet below grade as specified in the Task 2 Work Plan (ESE, 1992) and to provide sufficient soil volume for analysis. Because of low sampler recoveries, soil sample B209A was composited from eight split-spoon samples, four obtained from an initial boring, and four collected from a second boring emplaced 2 feet away from the initial boring.

Boring B204A was completed as a groundwater observation well. This 2-inch (inside diameter) well was constructed of 15 feet of PVC wire-wound, continuous 0.02 slot well screen attached to Schedule 40 PVC casing. This monitoring well was installed with 10 feet of screen into groundwater and five feet above. A silica sand filter pack with 0.25 inch nominal grain size was installed in the annulus around the well to a height of two feet above the screen. A two-foot thick seal of bentonite chips was added above the sand and hydrated in place. The remainder of the annular space was tremie grouted with bentonite and cement slurry grout. A 5-foot long, 6-inch diameter steel protective cover was placed over the PVC riser and fixed in place with a 3-foot diameter by 8-inch deep concrete pad. The protective casing was secured with a padlock and the well identification number (B204) was permanently stamped into the well cap. A ¼-inch diameter weep hole was drilled into the protective casing near ground level to allow any water which might enter the casing to drain away.

2.6.3.3 300 Series Borings

Six text borings, B301 through B306 (Plate 1-1), were completed during summer, 1992, to examine soil quality and to facilitate monitoring well installations. Five of these borings (B301 through B305) were emplaced proximal to inferred semi-solid disposal areas, as determined by previous borings and the GPR survey, and the sixth boring (B306) was completed near the southern Study Site limit.

Three additional borings were completed in October, 1992 (Plate 1-1). Boring B307 was positioned in the location of shallow test boring B202A to investigate groundwater in the area of elevated VOC in soil. Borings B308 and B309 were emplaced west of Chuck & Eddie's Used Auto Parts, further down hydraulic gradient from the inferred semi-solid disposal area than borings B302, B303, and B304, to evaluate downgradient migration of contaminants, if any.

Borings B301, B305, and B307 were advanced to 10 feet below the water table (at time of drilling) using hollow stem auger techniques. The other six borings (B302, B303, B304, B306, B308, and B309) were advanced to bedrock. The boreholes drilled to bedrock were started using hollow stem augers and, when heaving sands were encountered, completed with drive-and-wash methods. Five feet of bedrock was cored in each bedrock boring to confirm that competent bedrock had been encountered and to evaluate that bedrock. Complete boring logs are contained in Appendix B.

Split-spoon soil samples were collected at continuous 2-foot intervals from each boring. Each soil sample was screened with a PID (HNU with an 11.7eV lamp) immediately upon opening each split-spoon. Soil samples initially yielding a PID reading greater than 3 ppm over background were collected for possible submission as TCL-VOC samples. An additionally, a 40 ml VOA vial, two-thirds full, was collected for field GC screening. Field GC screening was conducted in accordance with ESE's Task 2 Work Plan.All soil samples obtained from deeper than 20 feet below the water table were screened with the field GC to identify possible zones of VOC contamination. This information was used when selecting the intermediate well screen intervals described in Section 2.6.2 below. Composite soil samples were collected for each screened interval and were submitted to the laboratory for total organic carbon and grain size analysis. Table 2-3 is a list of the samples collected.

Soil samples were preserved by storing them in a cooler on ice or in the field refrigerator designated for sample storage, until shipment to the laboratory. Duplicates, field rinsate blanks, matrix spike and matrix spike duplicates were collected on a one-in-twenty basis throughout the soil sampling program. A trip blank was carried into the field in the sample cooler each day, and one trip blank was sent with each cooler of samples shipped to the laboratory (see Table 2-3).

All wastes generated during the drilling process (soil, drilling water from the drive and wash technique, decontamination water, decontamination methanol) were drummed and labelled. The drill rig and all drilling tools were completely decontaminated by steam cleaning between borings. All steam cleaning was done on a specially prepared decontamination pad and all water was collected and containerized in drums per requirements of the Connecticut Department of Environmental Protection (DEP).

2.6.4 Post-Screening Investigations - Task 3

During Task 3 investigations, ESE conducted subsurface investigations within the area of the inferred location of the northern-most semi-solid disposal area, pursuant to the Task 3 Work Plan submitted to EPA on October 7, 1993. The purpose of the Task 3 investigations was to better delineate the nature and extent of contaminants within this area. Fourteen test borings (401, 402, 404-415) were installed between October 12 and 15, 1993 at the locations shown on the inset on Plate 1-1. The borings were installed using a track-mounted Mobile B-53 drill-rig equipped with 4 ¼-inch hollow stem augers. Continuous split-spoon soil samples were logged by the on-site geologist to document encountered materials. Boring logs are included in Appendix B. Depths for each boring are shown on Table 2-2.

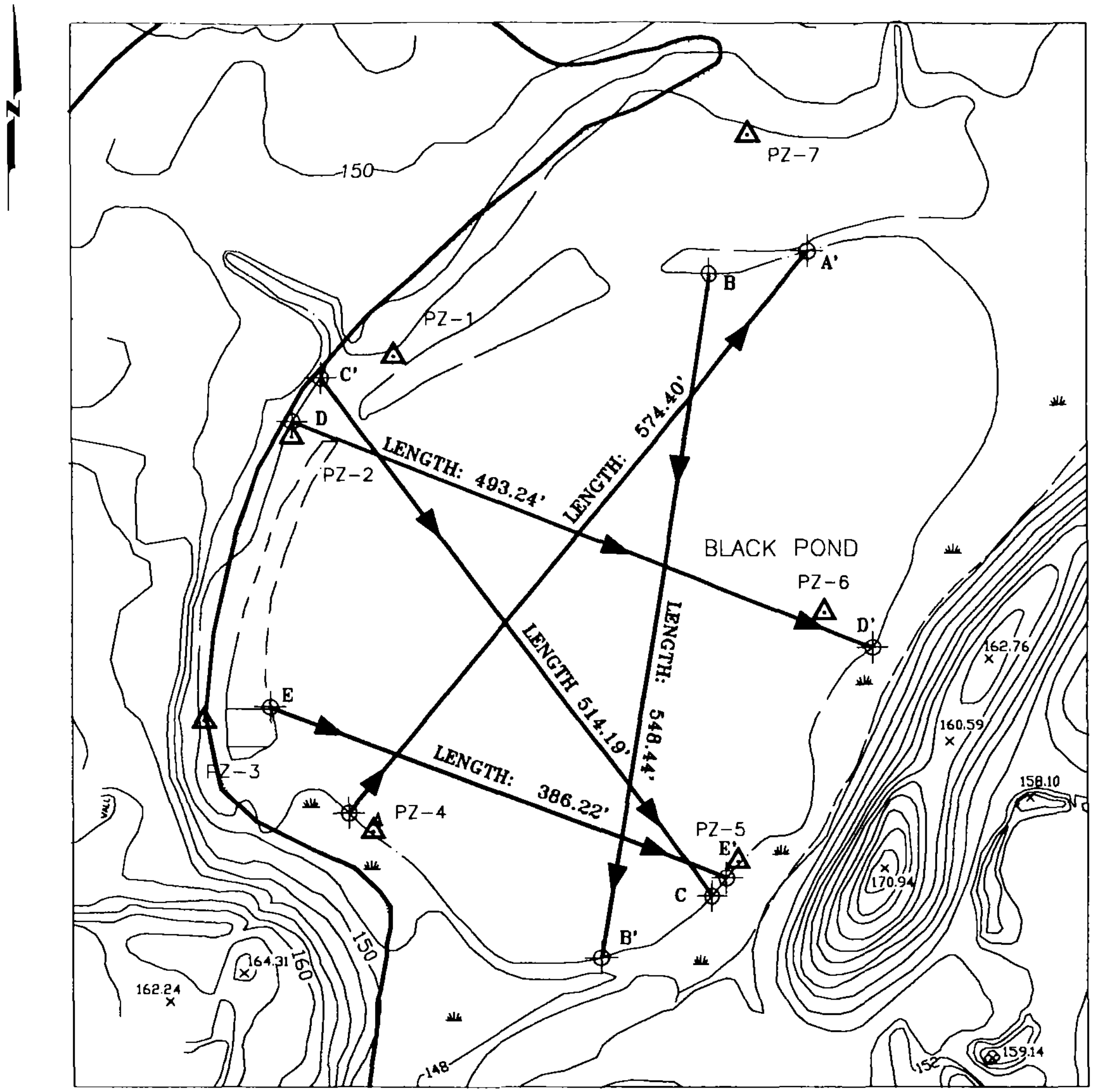
Borings were advanced to the water table, or native soil, if not encountered prior to the water table. Soil samples were screened with a PID (HNu with an 11.7 eV lamp) immediately upon opening each split-spoon. Based on the PID screening, one sample of soil from the unsaturated zone, with the highest HNu reading, was submitted to the laboratory for TCL-VOC analysis. The first sample from within the saturated zone and the first sample from native soil were also submitted to the laboratory for TCL-VOC analysis. If native soil was encountered prior to the water table, the saturated zone sample was not submitted to the laboratory. At borings 401, 402, 405, 408, 411, and 414, the soil sample from the saturated zone was also analyzed for TAL-metals/cyanide and TCL-SVOC. Additional soil samples were submitted to the laboratory based on field observations and discussions with EPA representatives. Table 2-3 shows the depths sampled and the analyses performed.

2.7 HYDROGEOLOGIC INVESTIGATIONS

2.7.1 Bathymetric Study

A bathymetric survey of Black Pond was completed on November 29, 1988 to determine the general morphology of the bottom of the pond and to determine the volume of water in the pond. A Raytheon Survey Fathometer was mounted on an inflatable boat and bathymetric data was collected along five transects of the pond. Transects extended to within several feet of opposite shores in approximately three to four feet of water. A bathymetric profile was generated using the fathometer while motoring at approximately 1.0 to 1.5 knots across the pond. The approximate locations of the transects (A/A' - E/E') are shown on Figure 2-5.

The results of the bathymetric survey and a discussion of the hydrologic setting of Black Pond are included in Section 3.7.4. The bathymetric data are presented in Appendix C.



LEGEND

D — D' BATHYMETRIC TRANSECT LINE. ARROWHEADS INDICATE DIRECTION OF MOVEMENT ALONG TRANSECT.

STUDY SITE BOUNDRY

0 150 300
SCALE IN FEET

NOTES

1. BATHYMETRIC TRANSECT LOCATIONS FROM GZA PLAN ENTITLED "BATHYMETRIC TRANSECTS AND PH AND CONDUCTIVITY SURVEY LOCATIONS", OLD SOUTHINGTON LANDFILL, SOUTHINGTION, CT., PROJECT H-50 124, FIGURE NO. 8, DATED 11/25/90.

2. GROUND SURFACE ELEVATIONS PROVIDED BY GEOMAP, INC. (1989), AND REFER TO 1929 NATIONAL GEODETIC VERTICAL DATUM.

3. TRANSECT LINE LOCATIONS ARE APPROXIMATE AND WERE LOCATED BY SIGHTING DISTANCES FROM EXISTING STRUCTURES AND TOPOGRAPHIC FEATURES.

ESE — A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON SUPERFUND LANDFILL
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-5

BLACK POND
BATHYMETRIC TRANSECT LINES

DRAWING NAME: BATHCON.DWG	FILE NUMBER: 492 5534

SCALE: AS SHOWN	REVISION: 0	DRAWN BY: PAD	DATE: 04/12/93

2.7.2 Well Installation

2.7.2.1 Phase 1B Well Installation

Seventeen groundwater monitoring wells were installed in 1990 for the Phase IB investigation, by Clarence Welti Associates, Inc. The wells were given a GZ-# or TB-# (MW) designation (TB indicating a test boring had also been performed). The wells were given an S, M, or D label depending on whether the well depth was shallow, medium (intermediate), or deep. Five shallow well points (WP-1 through WP-5) were installed adjacent to surface water sampling locations to allow comparison of surface water and wetland groundwater quality. The locations of these points were based on the results of the Phase 1A program and installed in areas likely to be impacted by the Study Site.

Table 2-4 provides a list of the wells installed during the RI and summarizes well construction details, screen locations, screened geologic units and ground elevations, and depth to bedrock (if encountered). The locations of all monitoring wells and well points are shown on Plate 1-1. Former municipal well No. 5 is no longer a viable sampling location. The well has been abandoned and grouted, and all diversion rights to the use of the well have been forfeited.

2.7.2.2 Task 2 Well Installation

Section 5.1.5.3 of the Task 2 Work Plan proposed installation of 14 groundwater monitoring wells in six locations (B301 through B306) to further evaluate hydraulic gradients and groundwater quality throughout the overburden. The proposed wells, plus one additional well in the B304 cluster were installed between June 22 and August 20, 1992. Seven additional wells, not proposed in the Task 2 Work Plan (ESE, 1992), were installed at three locations between October 12 and 27, 1992, per oral agreement with EPA. Well locations are shown on Plate 1-1. These locations were selected based on the review of previously collected data, as well as an understanding of potential contaminant migration.

Borings B302, B303, B304, B306, B308 and B309 were drilled to bedrock and completed as top of rock (TOR) wells. In addition, a bridging well (the screen bridging the water table) and an intermediate well were completed at each of these six locations. One additional well was installed in the B304 cluster due to saturated overburden thickness, and discovery of several possible contaminant layers based on field GC screening results. The borings/wells were numbered with boring location (i.e. B306) and a letter suffix, with increasing letters indicating increasing depth at each location. Therefore, "A" indicates bridging well, "B" indicates intermediate well, and "C" indicates deep well. In the B302, B303, B306, B308 and B309 clusters, the "C" well is the TOR well. In B304, two intermediate wells were installed, designated as B304B and B304C. The top of rock well is designated B304D. Borings B301, B305 and B307 were drilled 10 feet into the water table, and completed as bridging wells. Tables 2-1 and 2-4 summarize the boring and well installation depths.

Intermediate well screen placements were determined based on field GC screening results. If a zone of contamination was identified, the well screen was placed to sample that zone (for example, monitoring wells B304B and B304C). In absence of contamination, an intermediate well screen was placed half way between the bridging well screen and the TOR well screen.

The TOR wells were constructed by first backfilling the rock-core holes. These holes were filled with one foot of silica filter sand, followed by two feet of bentonite chips and an additional one foot of filter sand. The well was then installed with its bottom set one foot below the top of rock surface.

All monitoring wells were completed using two-inch well materials. The TOR wells were constructed using, wire-wound stainless steel screen with a slot width of 0.02 inches. Stainless steel screens were used due to the depths of the TOR wells, to insure that the weight of the well materials above the screen would not damage it.

All other monitoring wells were constructed with 0.02-inch slot size, wire-wound PVC screens. All riser material was Schedule 40 PVC. The TOR and intermediate wells were installed with 10 foot well screens. Bridging wells have 15 foot well screens, with approximately 10 feet of screen below and 5 feet above the water table.

Silica sand filter pack with a nominal grain size of 0.025 inches was installed in the borehole annulus around the well screens to a height of two feet above the screen. For bridging wells, a two-foot thick bentonite chip seal was installed above the filter pack and hydrated in place. The remaining borehole annulus was tremie grouted to ground level with cement/bentonite grout. In intermediate and TOR wells, a two foot thick layer of very fine sand was installed immediately above the filter sand. A two-foot layer of bentonite chips was then installed above this very fine sand. The depths of the intermediate and TOR wells precluded the use of a bentonite cement slurry due to concerns that the weight of a thick column of standard bentonite/cement grout could cause grout intrusion into the screened interval and possibly deform well casings. Instead, the saturated interval of the borehole annulus was tremie grouted with only bentonite grout (Enviroseal®). The unsaturated interval of the borehole annulus was then tremie grouted to ground level with cement/bentonite grout.

Each well, except B301 and B307, is protected at the surface with a 6-inch diameter by 5-foot long steel protective cover, secured in place by a 3-foot diameter by 8-inch deep concrete pad. Each well cover is secured with a padlock. The well identification number is stamped into the cap of the well, and a weep hole was drilled in the cover near ground level to allow the escape of any water that might enter the protective cover. Highway-type guardrail was installed around monitoring well clusters B304 and B306 to prevent damage. Additionally, bumpers (steel posts filled with concrete) were placed around well clusters B302 and B303 and monitoring well B305.

Monitoring wells B301 and B307 are protected at ground level with 8-inch diameter, flush-mount protective boxes. These are secured in place with 3-foot diameter by 8-inch deep concrete pads labelled with respective the well number.

Table 2-4 is a list of the 300 monitoring series wells that summarizes well construction details. Generalized well completion diagrams are included in Appendix B.

2.7.2.3 Task 2 Well Development

Monitoring well development was performed between July 28 and August 27, and October 30 and November 6, 1992. Prior to development, all installed wells were undisturbed for at least one week after installation. The wells were then developed by overpumping, using the methods described below. Water turbidity, temperature, pH and specific conductance were recorded at the start of pumping and after removal of each well volume, or, if that was not practical, periodically during pumping, and at completion of pumping. Pumping was continued until these indicator parameters stabilized with less than 10% change between readings and the turbidity was below 25 nephelometer units (with several exceptions). Table 2-5 contains a summary of well development details.

Five methods of pumping were used to develop the wells. The selected method depended on individual well characteristics. Mechanical surge pumping (using an electric motor to operate a Brainard-Kilman pump) was used to develop several of the bridging wells with depth to water greater than 25 feet, and when suspended sediments precluded use of a submersible pump. Hand surge pumping was employed on bridging wells that exhibited slow recharge. Hand-surge pumping utilized a length of 3/4-inch, semi-rigid, polyethylene hose, fitted with a brass foot valve. The hose was raised and lowered by hand to remove water from the well. When the depth to water was less than 25 feet and the flow rate was sufficient to supply the pump, an electric centrifugal pump connected to semirigid, polyethylene hose, was used. This method was not sensitive to silt content and was very effective in the high yield wells with a shallow depth to water. A Grundfos, 2-inch submersible pump was used in deeper wells low in suspended sediments. An Arch® air lift pump was used on deeper wells when fine sediments prevented use of a submersible pump.

All development water was contained in drums. These drums were then pumped into a 5,500 gallon tanker, which was located near the Parks and Recreation building until transported off-site for treatment/disposal.

2.7.3 Groundwater Sampling Programs

2.7.3.1 Phase IB Groundwater Sampling

Groundwater samples from 43 monitoring wells were collected and analyzed during June and July, 1990 to characterize Study Area groundwater quality. Table 2-6 lists the wells sampled and analyses performed. Analytical results for groundwater samples are discussed in Section 4-3. Groundwater samples were analyzed using EPA SW-846 methods: VOC by Method 8240, SVOC by Method 8270, pesticides/PCB by Method 8080, metals by Methods 7000 series, and cyanide by Method 9010. Metals analyses were performed on filtered samples and then selected unfiltered groundwater samples were also analyzed. Analyses were performed by NET Laboratory, Bedford, MA.

2.7.3.2 Groundwater Sampling Programs

A round of groundwater sampling was conducted on September 14 through 18, 1992, including sampling of the 15 newly installed 300 series wells and 29 previously existing wells. The seven additional 300 series wells, installed in October, were subsequently sampled on November 18 through 20, 1992. All 300 series wells were sampled for TCL-VOC, TCL-SVOC, TCL-Pesticides/PCBs and TAL-Metals including cyanide. The 29 previously existing wells were sampled for VOC only. Samples were submitted to Aquatec, Inc. in Burlington, Vermont for analysis.

The Task 2 groundwater sampling was completed in accordance with GZA's Work Plan (GZA, 1988), modified as appropriate in Task 2 Work Plan (ESE, 1992). Water level and total depth measurements were taken prior to sampling, and the purge volume was calculated. Prior to purging each of the newly installed bridging wells, a clear, acrylic bailer was partially submerged to obtain a sample of the upper six inches of groundwater to check for any presence of light non-aqueous phase liquids (LNAPL). A minimum of three well volumes were purged from each well using either a bailer, centrifugal pump or a submersible pump, depending on well conditions and the volume of water to be purged. During pre-sample purging, temperature, pH and specific conductance measurements were recorded after each well volume. Specific conductance and pH measurements were made using a Pocket Pal DspH-3 pH and conductivity meter. Temperature readings were obtained using a partially encased pocket thermometer. These indicator parameters were measured to ensure that subsequent groundwater samples were representative of formation water (i.e., verification of adequate purge volume).

All samples were collected using either a Teflon® or a stainless steel bailer. VOC samples were collected first, followed by any other parameters in order of decreasing volatility.

A second round of Task 2 groundwater sampling was conducted on January 5 through 8, 1993. A complete round of water level readings was taken on January 4, 1993, prior to the start of groundwater sampling. Sampling was conducted in the same manner as the first round of sampling. All 22 of the 300 series wells plus 29 existing wells were sampled for TCL-VOCs. Duplicates, matrix spikes, and matrix spike duplicates were collected on a one-in-twenty basis. One field rinsate blank was submitted each day of sampling. Trip blanks were prepared and shipped with each cooler shipped to the laboratory. All samples were submitted to the laboratory for analysis. The wells sampled and analyses performed are identified in Table 2-6.

2.7.4 Local Hydrogeology

Investigations to evaluate Study Area hydrogeology included measurement of piezometers installed around Black Pond, to determine the relationship between that surface water and groundwater. Water level data from the monitoring and observation wells was used to determine the groundwater flow direction in the Study Area. Slug tests and constant flow pumping tests on monitoring wells provided data regarding the permeability and hydraulic conductivity of overburden material.

2.7.4.1 Piezometers

Seven piezometers equipped with staff gages were installed at locations around the shore of Black Pond, to determine the hydraulic relationship between the groundwater and surface water in the pond. This relationship is crucial to determining if landfill leachate, if any, could discharge to the Pond. The piezometer locations are identified as PZ-1 through PZ-7 on Plate 1-1. The piezometers originally consisted of five-foot lengths of one and one-quarter inch diameter Schedule 80 metal pipe, with a one-foot stainless steel screen and well point mounted on the bottom of the pipe, as specified in Section 5.1.5.7 of the Task 2 Work Plan. Each piezometer is equipped with a threaded metal cap.

The piezometers were driven by hand, using a slide hammer, to a depth of two feet below the bottom of the pond. It was observed, after initial installation, that the pond bottom was too soft to hold the piezometers securely. Therefore, the piezometers were removed, additional three or five foot sections were added, and the pipe was reinstalled. Piezometer depths below the pond bottom are presented in Table 2-7.

The piezometers were installed within ten feet of shore on the north, west and south sides of the pond. They were installed at the edge of open water on the east side of the pond, abutting vegetation, due to limited access through wetlands on the east side of the pond. They were installed from a boat on Black Pond and are more than ten feet from the shoreline (the distance specified in the Task 2 Work Plan). Three and one-third foot-long staff gages are attached to the outside of each piezometer to show surface water elevation. All piezometer locations and elevation to top of piezometer pipe and staff gage were surveyed.

2.7.4.2 Groundwater and Surface Water Level Readings

Groundwater and surface water elevations were measured to determine groundwater flow directions and the impacts, if any, surface water has on groundwater. Two partial rounds of water level measurement data, for 16 wells, were collected in 1988. Beginning in 1989, monthly water level measurements were recorded, for 22 wells, although not all wells were measured each time. In addition, limited water level data are available from three surface water sampling locations (SW-1, SW-2, and SW-6) and five well points located around Black Pond (WP-1 through WP-5). Monthly monitoring continued through October of 1990. A discussion of water level measurement data is presented in Section 3.7.2 of this report.

During Task 2 investigations, groundwater and surface water level readings were obtained from each existing and new groundwater monitoring well and piezometer. All water level readings were obtained using an electronic water level indicator. Section 5.1.5.8 of the Task 2 Work Plan specified that water level readings were to be taken every two weeks during the drilling program. A partial round of water level measurements was conducted on July 20, 1992. At this time many of the pre-existing wells could not be opened because the rusted locks would not open. On August 12, 1992, all old locks were replaced with keyed-alike American Lock

Company locks. At that time the identifying well number was stamped into each well cap and the PVC well-casing was cut down, if necessary, to allow the well to close easily. Each well casing was marked with a black mark to indicate the point from which to measure the depth to water and also to indicate the point to be surveyed. All water level data following this date are referenced to these newly established points. Correlation of previous depth measurements with these new elevations may lack reliability. However, sufficient data were collected during Task 2 investigations to provide the necessary information for hydrogeologic analyses.

On August 13, 1992 a complete round of water level readings was taken. As mentioned in Section 2.7.4.1, some of the piezometers were not securely placed at this time and were subsequently replaced on August 26, 1992. Therefore this round of piezometer and staff gage data cannot be directly compared with later data.

Additional rounds of water level readings were completed on September 18, October 16, and November 18, 1992, and January 4, 1993. Water level readings, as they pertain to the local hydrogeology, are discussed in Section 3.7.2.

2.7.4.3 Percolation Testing

Percolation tests were conducted between August 11 and October 30, 1992. The tests were conducted at 13 locations, randomly spaced across the Study Site, to determine the permeability of the landfill cover material. This information was used to determine the effectiveness of the existing cap and to estimate leachate generation rates. The tests were completed using a double ring infiltrometer, in accordance with American Society for Testing and Materials Method D-3385 (1984). Locations tested are shown on Figure 2-6.

The double ring infiltrometer was set up as directed in the standard test method, when possible. Each selected test site was relatively level and was cleared of debris (dead vegetation, surface stones, etc.) before the setup. Two metal rings were driven into the ground using a sledge hammer. The outer ring (24-inch diameter) was driven to a depth of approximately four inches. The inner ring (12-inch diameter) was centered inside the outer ring and driven to a depth of 2 inches. Water level gauges were installed inside the inner ring and between the inner and outer

LEGEND

● INFILTROMETER LOCATION

0 300 600
SCALE IN FEET

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-6

DOUBLE RING INFILTROMETER TEST LOCATIONS

DRAWING NAME: INF.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: PAD	DATE: 4/12/93

rings. Water was carefully poured into both rings, to the same height, generally 7 to 8 centimeters, commencing the test. These water levels were maintained using graduated tubes filled with water, one connected to each ring. The tube supplying the inner ring held 3 liters, graduated in 0.01 liter increments. The tube supplying the outer ring held 10 liters, graduated in 0.1 liter increments. Water flow was controlled by a valve on each tube. A constant head of water was maintained in both rings through out the test. The amount of water used per time was recorded.

In practice, it was not always possible to drive the rings to the desired depth. Compact soil and/or cobbles prevented the rings from being installed at the optimal depth. When the ring was shallower than optimal, water tended to bleed out from the outer ring and resurface. This may affect the data, so it was noted on the field data sheets.

When the test was run over a period of hours, and required infrequent water additions, a sheet of plastic was placed over the infiltrometer to slow evaporation from the rings. When the water levels dropped too quickly for the tube to refill, water was added by hand using a 12 liter bucket, graduated in 0.5 liter increments. This allowed the measurement of faster percolation rates, but with a decreased sensitivity in the water measurements. Results of the percolation tests are discussed in Section 3.7.1.4.

2.7.4.4 Hydraulic Conductivity of the Overburden

Hydraulic conductivity testing estimates the ease at which groundwater flows. This information is utilized in determining flow rates and contaminant transport. In 1990, individual slug testing of screened portions of the aquifer at four well clusters (GZ-4, GZ-5, GZ-13, and LW-15) was performed to evaluate hydraulic conductivity. Falling-head tests were conducted by instantaneously adding a quantity slug of water to the screened interval of the monitoring well, while simultaneously measuring the change in water level with time. Water levels were measured with an electronic pressure transducer and data logger. Rising head tests were performed by instantaneously removing a quantity of water from the well. Slug testing results are discussed in Section 3.7.1.3.

During Task 2 investigations, the hydraulic conductivity of the overburden material was evaluated using constant-flow tests and slug tests. Constant-flow tests were conducted on all wells which could be pumped at a steady rate during the first round of Task 2 groundwater sampling. These tests were conducted concurrently with well purging. Prior to purging, the initial water level was recorded. The pump was then started, and drawdown and pump discharge rates were recorded. The B308 and B309 well clusters were tested using an electronic pressure transducer and a data logger to record drawdown in all three wells in each cluster. Slug tests were conducted on the shallow wells when pumping was not feasible. These included both rising-head and falling-head tests when possible. Table 2-8 outlines the constant flow tests and slug tests performed.

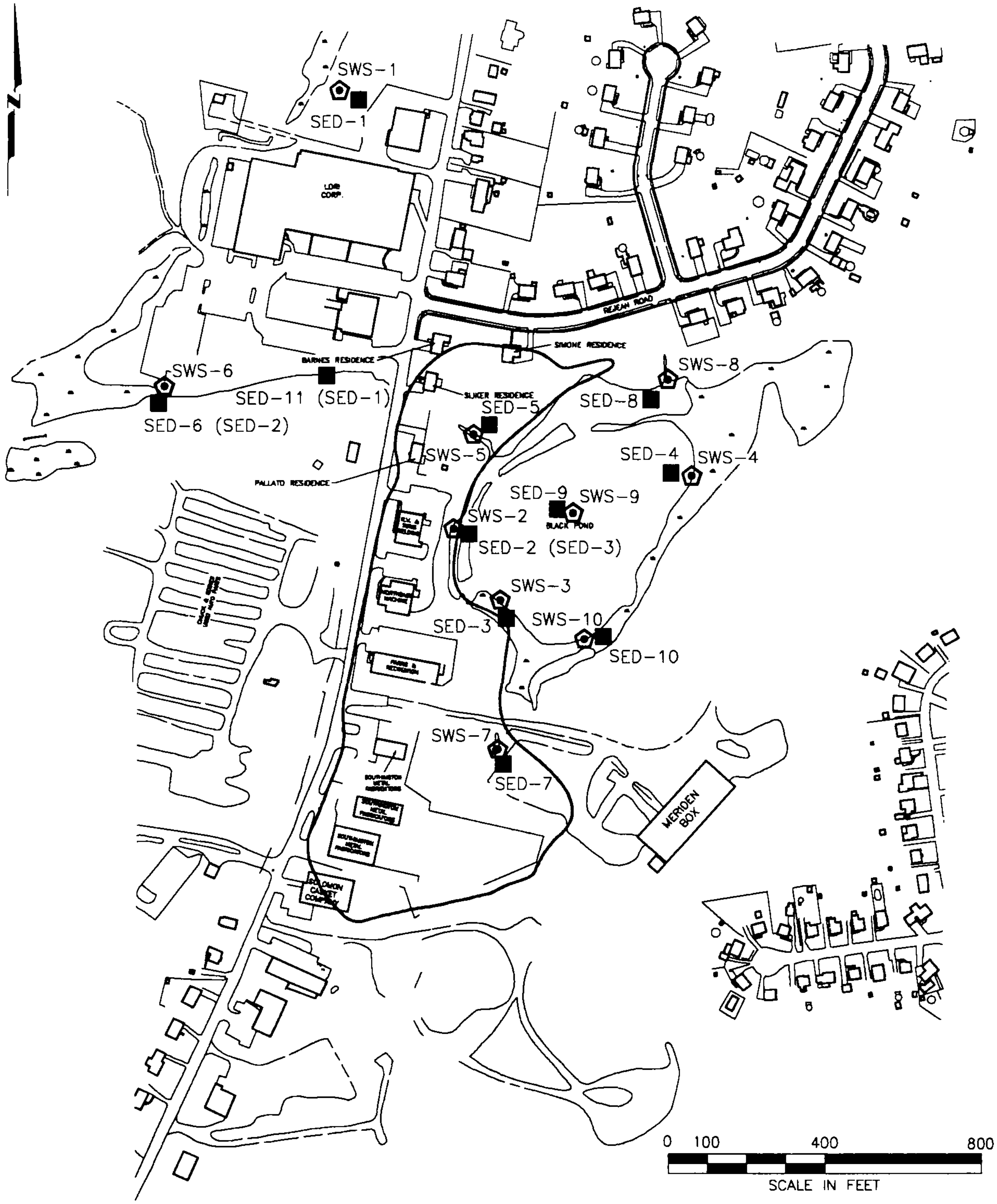
2.8 SURFACE WATER AND SEDIMENT INVESTIGATION

2.8.1 Phase 1 Surface Water and Sediment Investigation

In April 1989, a field survey of pH and specific conductance was performed at 39 surface water locations within the Study Area. The data provided general information concerning the condition of surface water, but did not identify potential impact areas. During June and July, 1990, environmental samples were collected from six surface water locations (identified as "SW"), six sediment locations (identified as "SED"), and five shallow well points (identified as "WP"). Sample locations are shown on Figure 2-7.

The samples were submitted to the laboratory for selected analyses using SW-846 methods: VOC by Method 8240, SVOC by Method 8270, pesticides/PCB by Method 8080, metals by Methods 7000 series, and cyanide by Method 9010. Table 2-9 lists the samples collected and the analyses performed. Analytical results are presented in Section 4-4 of this Report.

Water quality parameters were measured during Phase 1, on samples collected from surface water and groundwater during June and July, 1990. The parameters, identified as "Indicator Parameters" in previous studies, were analyzed because they were indicative of landfill leachate, and included the following analytes:



LEGEND:

SWS-1	APPROXIMATE LOCATION OF SURFACE WATER SAMPLING POINT
SED-1	APPROXIMATE LOCATION OF SEDIMENT SAMPLING POINT
(SED-1)	FORMER GZA SAMPLING LOCATION

NOTE: BASE MAP TAKEN FROM "SURFACE WATER, WELL POINT AND SEDIMENT RESULTS, pH, SPECIFIC CONDUCTANCE, PAH's, OLD SOUTHINGTON LANDFILL, SOUTHINGTON, CONNECTICUT", DATED DECEMBER, 1990, BY GOLDBERG-ZOINO AND ASSOC., INC.

Environmental Science & Engineering, Inc.

OLD SOUTINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 2-7

SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

DRAWING NAME:	SURFSAMP			FILE NUMBER:	492 5534		
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: PAD	DATE: 10/11/93				

Total Hardness	Total Calcium
Total Alkalinity	Total Magnesium
Chemical Oxygen Demand	Total Sodium
Total Chloride	Total Dissolved Solids
Total Ammonia	Specific Conductance
Total Nitrate	pH

Results of these analyses are discussed in Section 4.4.

2.8.2 Post-Screening Surface Water and Sediment Investigation

Surface water and sediment sampling was conducted on June 11 and 12, 1992, during the Task 2 investigations, to further characterize surface water/sediment, to provide data for the human health risk assessment, and to support the ecological risk assessment. The sampling was conducted in accordance with the RI/FS Work Plan, modified as appropriate in the Task 2 Work Plan. Surface water and sediment sampling stations were co-located and were designed to aid in understanding how compounds, if present, might reach surface water or sediments, and how they might migrate in drainage channels to or from Black Pond. Figure 2-7, shows the surface water and sediment sampling locations. The sampling locations were determined with EPA/DEP staff and utilized the former sampling locations, with the following exceptions: SED-3 location became SED-2, SED-1 became SED-11, and SED-2 became SED-6. Also, the location of SED-11 (SED-1) was moved upgradient slightly, after discussions with EPA, to avoid impacts from runoff from Old Turnpike Road and to move beyond the stagnant pooling area near the road.

Sampling was started at the most downstream location and continued in an upstream direction, to minimize the effects of disturbance of the sediment on subsequent samples. At each sampling location, field water quality parameters were measured first (pH, temperature, specific conductance, Eh, and dissolved oxygen). Surface water samples were then collected, followed by the sediment samples. Table 2-10 lists the samples collected and the analyses performed.

All surface water samples were collected directly into the appropriate containers by dipping the containers into the water and allowing them to slowly fill. Samples were collected and analyzed for TCL-VOC, TCL-SVOC, TCL-Pesticides/PCBs, Ammonia/Nitrate/Nitrite, Total Phosphorus, Hardness, Sulfate, Alkalinity, Chemical Oxygen Demand, Total Suspended Solids, and TAL Metals (filtered and unfiltered as specified in the Task 2 Work Plan, ESE, 1992)) plus cyanide. The filtered metals samples were field filtered using a single-use, 0.45 micron filter apparatus and a peristaltic pump. The pump was first used to pull water from the stream or pond into the upper chamber of the filter apparatus. The pump lines were then switched to pull the water through the filter into the bottom chamber. The first water through the filter was used to condition the filter and was discarded. The process was then repeated until a sufficient volume of filtered water was collected for analysis. All samples were preserved as specified in Task 2 Work Plan.

Sediment samples were collected from the stream locations using a stainless steel spoon. Sediment samples from within Black Pond were collected using a stainless steel Ponar. VOC samples were collected directly from the sampling device. Samples for the remaining parameters (full TCL/TAL, total organic carbon, grain size analysis, pH and Eh) were collected into a stainless steel bowl and homogenized prior to collection into the appropriate sampling containers. The sampling and mixing equipment were decontaminated between sampling locations, according to Task 2 Work Plan.

QA/QC samples included one aqueous field blank, one duplicate sample, one matrix spike and one matrix spike duplicate, and trip blanks to accompany all shipments of VOC samples (see Table 2-10). A trip blank was carried into the field in the cooler at all times when VOC samples were to be collected.

The Task 2 Work Plan specified that surface water turbidity measurements were to be taken at the time of the surface water sampling. The turbidimeter was not functioning properly at the time of the sampling, therefore these readings were collected at a later time. A full round of turbidity measurements was taken on August 21, 1992. Results of the surface water and sediment sampling are discussed in Section 4-4.

2.9 ECOLOGICAL ASSESSMENT

The Ecological Assessment (EA) consisted of four tasks:

1) a complete delineation of wetlands within the Study Area;

2) an evaluation of wetland function within the Study Area using the U.S.Army Corps of Engineers Wetland Evaluation Technique II (WET II) methodology;

3) a qualitative animal survey within the Study Area; and

4) an ecological hazard assessment of the Study Area.

2.9.1 Wetlands Delineation

Because the methodologies used by the State (Connecticut DEP) and Federal agencies differ, ESE established a single wetland-upland boundary line at the site. The line used the most conservative criteria of the aforementioned methodologies. The Federal standard is the most comprehensive delineation procedure (as documented in the Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1, Environmental Laboratory, 1987). The State standard uses the list of poorly drained and/or very poorly drained hydric soils as delineated by the Soil Conservation Service (see Soil Survey for Hartford County, Connecticut, 1971; Hydric Soils of the United States 1990; County-based list of hydric soils) and the Town of Southington. Each sample point was evaluated using both sets of criteria; the wetland boundary was established where a point meets either one of the two sets of criteria (i.e., the most conservative wetland boundary). Uplands were those areas that were exclusive of the latter criteria.

2.9.1.1 Background Investigation

ESE obtained copies of existing information for the project site, including the following:

- U.S.G.S. 7.5 minute topographic series maps, Southington, CT; Meriden, CT quadrangle;

- USFWS National Wetland Inventory (NWI) map (Southington and Meriden, CT quadrangle);
- Inland Wetland Mapping on the Topographic Map of the Town of Southington, CT (Fuss & O'Neill, 1979);
- Soil Survey for Hartford County, CT including the County-based list of hydric mapping units and applicable SOI-5 sheets;
- Federal Emergency Management Agency Flood Insurance Rate Maps and Studies;
- Aerial Photography obtained from the Town of Southington Planning Board, the Agricultural Stabilization Service, the U.S. Forest Service, and any other public or private source;
- Site Analysis - Old Southington Landfill, Southington, CT (EPA photo-document, 1988).

These data were reviewed and evaluated to provide a preliminary estimate of the location and extent of wetlands in the Study Area. This preliminary estimate was used to determine the sampling protocol, to estimate the number of sample locations that would be required to thoroughly document the delineation, and to estimate the time required to complete the delineation. Site logbooks were used to document conditions at each delineation point and sample documentation sheets were used to log each individual sample.

Requests for information on the documented presence of Federally or State listed rare, threatened, or endangered species or habitats on or adjacent to the site were sent to the Connecticut Natural Heritage Program, the Connecticut Department of Environmental Protection, the Hartford County Environmental Commission, and to the Town of Southington.

2.9.1.2 Delineation Protocol

Based upon the preliminary wetland boundary estimates, the field survey examined soil, vegetation, and hydrology in the vicinity of the wetland-upland boundary. Shallow (12 to 14 inches deep) soil borings were used to examine the soil profile and to determine if the hydric soil criteria is met at each point. Different plant species in the vicinity of the point were identified, the wetland indicator value of each was determined, and a visual estimate of the abundance of facultative (FAC), facultative wet (FACW), and obligate (OBL) wetland species was made to assess whether the area meets the hydrophytic vegetation criteria. Wetland hydrology was estimated either directly, as standing water or saturation in the borehole, or indirectly by reference to physical features in the area or by soil characteristics. If a point met all three of the criteria, it was considered a wetland under the U.S. Army Corp of Engineers (USACOE) criteria; if a point only exhibits hydric soils, it was considered wetland under Connecticut criteria, irrespective of whether it exhibited the hydrological or vegetational characteristics of a wetland.

Based on these criteria, a determination of where the wetland-upland boundary was located was made and the point was marked with survey flagging or, where appropriate, painted wooden stakes and flagging. Each point was uniquely identified by a letter and sequential number combination. This procedure was repeated along the wetland edge until either the limits of the project area were reached or, in the case of a closed depressional wetland, the wetland area was considered isolated. In areas of dense vegetation, points were marked every 20 to 50 feet, whereas in sparse vegetation, point spacing did not exceed 100± feet.

For each point, the rationale for determining the wetland-upland position at that point was entered in the site logbook. Any additional observations made at or adjacent to the point were also recorded. A sketch map was made that showed the bearing and distance between successive points and the relationship of the delineation line to any physical features in the Study Area. This map was prepared using a hand compass, inclinometer, range finder, and tape measure. This map is not, nor is it represented to be, a survey of the wetland delineation line. This map is to be used only to aid in the interpretation of the field notes and to give a general indication of the location and extent of the wetlands and waters on the site.

2.9.1.3 Documentation

To thoroughly document the delineation, detailed examination of the soil, vegetation, and hydrology was made in the vicinity of every 20th point marked. At these points, representative wetland and upland areas were sampled and the data recorded on respective forms. Sample points were chosen as being representative of the range of conditions found on the site. Additional soil and vegetation (unlogged) observations were gathered as necessary to ensure adequate coverage of the study area.

Soil borings were taken with a 3-inch diameter, hand-held soil auger. Profile descriptions were made following the guidelines established in Soil Taxonomy, Agricultural Handbook 436 (USDA/SCS, 1975) and the Soil Survey Manual (USDA, 1951); assignment of samples to series and drainage class were made following consultation with the Soil Survey of Hartford County, Connecticut (1971).

Vascular plant species were identified using appropriate botanical works for the region, but with nomenclature that conformed to the National List of Scientific Plant Names (USDA/SCS, 1982). Species abundances in both upland and wetland communities were visually estimated as cover classes of the Braun-Blanquet scale (see Mueller-Dombois and Ellenberg (1974) or Barbour, Burk, and Pitts (1980) for details), in quadrants properly scaled to the community structure.

Site hydrology was estimated from soil properties, surface features, depth to soil saturation, or depth to standing water as such characters were available. Photographs were taken to illustrate both the most representative wetlands and waters on the site and to show any unusual or atypical locations.

2.9.2 Wetlands Evaluation Technique (WET II)

2.9.2.1 General

After the completion of the tasks outlined in Sections 2.9.1, the data from these studies was combined with additional Study Site data to form the data set used in the WET analysis. The

WET analysis include a Level 1 Social Significance Evaluation, a complete Level 1 and 2 Effectiveness and Opportunity assessment, and incorporated all available Level 3 Effectiveness and Opportunity criteria. The assessment area(s) AA, input zones (IZ), service areas (SA) and the watershed boundaries were determined from the existing wetland delineation.

2.9.2.2 Methodology

The methodology used was that developed in the Wetland Evaluation Technique (WET), Volume II (Adamus and others, 1987) with the additions and corrections supplied by the Waterways Experiment Station (WES, 1992).

All analyses were done with the aid of the WET software, Version 2.1 with supplemental analysis utilities (WES, 1992). The final analyses include all program corrections as detailed in the User's Guide to WET.

It must be recognized that WET II methodology is not applicable to determining the social significance, effectiveness, or opportunity for several of the above-listed functions and values. The Wet II results are to be used in conjunction with site specific data to reach conclusions regarding the wetland functions and values.

2.9.3 Qualitative Animal Survey

2.9.3.1 General

The animal survey is divided into two parts, 1) semi-quantitative bird observations, and 2) non-intensive observation of all other vertebrates. Appendix C of the GZA Initial Site Characterization Report (1991) was used as the baseline data for the site.

2.9.3.2 Bird Observations

Several hours of bird observations were conducted during the field survey. The first observation period was conducted in the early morning (within one hour after dawn) and the second observation period was in the early evening (approximately one hour before sunset). Observations were also made during the course of the wetland delineation.

Six to twelve observation points were established around the Study Site. Each sample unit consisted of a 50-foot radius cylinder which extended from the ground. All birds observed within the sample cylinder were tallied by species and activity during each sample period.

2.9.3.3 Aquatic Macroinvertebrate Observations

Samples of aquatic insects were taken using a D-net (littoral vegetation) or a dredge (benthos). Samples were washed in a screened (0.5 mm) bucket, then placed into a clean plastic observation tray. Insect abundance was ranked as rare (<3), common (3-9), abundant (>10), and dominant (>50). The presence of periphyton, filamentous algae, macrophytes, slimes, and fish were also recorded in a similar fashion.

2.9.3.4 Other Animal Observations

A record of all other vertebrates observed either directly or indirectly (i.e., scat, tracks) were also made. However, no directed searches for particular species or species guilds were conducted.

2.9.4 Ecological Hazard Assessment

Guidance for the Ecological Risk Assessment (ERA) was taken from USEPA documentation (USEPA, 1973; USEPA, 1982; USEPA, 1986; USEPA, 1987; USEPA, 1989a,b,c,d) and other well known publications (Standard Methods, 1980; ORNL, 1988). Other toxicity information was taken from computer or microfiche based toxicity files (USEPA, Ambient Water Quality Criteria; USEPA, 1987; RTECS). Availability of information is considered before adopting assumption based values cited by the agencies. The ERA is discussed in detail in Volume 2 of this RI/FS. Section 18.00 of Volume IV of the Draft Remedial Investigation (GZA, 1991) presents a preliminary ecological risk assessment (1991 ERA), which was performed to determine the degree of impact that the Study Site may have on ecological receptors. Pertinent data included in the 1991 ERA was incorporated into the current ERA.

2.10 OTHER STUDIES

In response to concerns, which arose in the summer 1992, about the presence of combustible gases within the landfill and their potential release into buildings or residences on the Study Site, work was undertaken to measure combustible gas in and around buildings and residences on the Study Site, and, as necessary, to take measures to prevent migration of combustible gas into buildings or residences.

The following activities have been undertaken by the PRPs to address the presence/migration of combustible gas:

- A Methane Monitoring Plan was developed and submitted to DEP and EPA in July 1992, which described ongoing activities and future activities conducted by PRPs. PRPs commitment to perform the activities was formally memorialized in a letter from DEP, dated August 14, 1992.

- Since February 1992, all buildings and residences on the Study Site, for which access can be obtained, have been monitored for combustible gas approximately twice a month by the Town of Southington Fire Department (SFD).

- Since June 1992, ESE has conducted monitoring for combustible gas from numerous locations within the Town of Southington Parks and Recreation building.

- In October 1992, a permanent monitoring probe was installed in the yard of the Barnes residence and in the yard of the Simone residence. These two probes have been monitored weekly since October 1992.

- Combustible gas monitors were installed in each building and residence on the Study Site, on or before September 1992. Monitors are checked by the SFD during their regular monitoring and calibrated by ESE on a regular basis, or as required when SFD inspections indicate the need.

- Passive venting systems were installed in the Parks and Recreation building prior to November 1991 and in two of the Southington Metal Fabricators buildings in August 1992.

- Since August 1992, floor cracks, detected during the monitoring programs at which LEL measurements have approached or exceeded 20% LEL, have been sealed.

In addition to work performed by the PRPs, EPA, in cooperation with DEP, has conducted air monitoring surveys within the Study Site. The following reports have been prepared by, or on behalf of, EPA:

- "Indoor Air Toxics Study Final Report, Old Southington Landfill, Southington, Connecticut." September 25, 1990. USEPA, Region I, Environmental Services Division, Ambient Air Section. On September 25, 1990 indoor air was sampled for VOC, at two residences located at 413 and 425 Old Turnpike Road. The report concludes that the few compounds detected in the homes at low concentrations have sources apart from the landfill and are common in a household environment.

- "Air Monitoring Survey, Old Southington Landfill Site, Southington, Connecticut". December 1991. Roy F. Weston, Inc., Technical Assistance Team, Region I. On December 12, 1991 three residential and nine commercial buildings were screened for methane and non-methane volatile organics, using CGI, OVA, and HNu. No VOC above background were reported in any residential buildings and in only one commercial building (Northeast Machine, in the machine room). The report concluded that there was no fire or explosion hazard from methane in the buildings at that time.

- "Air Monitoring Investigation for Old Southington Municipal Landfill, Southington, Connecticut." June 1992. Roy F. Weston, Inc., Technical Assistance Team, Region I. On June 25, 1992, buildings on the Study Site were screened for methane and VOC using CGI, OVA, and HNu. The report concluded that VOC were generally not present in buildings on the Study Site. Methane was detected in floor cracks in some commercial buildings in the southern portion of the Study Site.

- "Air Monitoring Survey Summary Report for Old Southington Landfill Site, Southington, Connecticut." January 1993. Roy F. Weston, Inc., Technical Assistance Team, Region I; Roy F. Weston, Inc., Response Engineering and Analytical Contract; USEPA Emergency Response Team; USEPA, Region I, Environmental Services Division, Ambient Air Section. On November 24, 1992 four residential and six commercial buildings were screened for methane and VOC using CGI, OVA, and HNu. Additionally, air canister samples were collected at seven commercial buildings. VOC and methane were not detected in residences. Only VOC which could be attributed to material used in the facility were detected in any commercial buildings. Methane was detected in floor cracks at some commercial buildings.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 SURFICIAL GEOLOGY

3.1.1 Regional Physiography

Terrain around the Town of Southington, in the Connecticut Valley Lowland section of the New England physiographic province in west-central Connecticut, is characterized by moderately broad valleys separated by low north-northeastward-trending ridges. This north-south trending lowland section, also known as the Triassic Basin, is about 17 miles wide and is flanked by uplands consisting of crystalline igneous and metamorphic rock complexes. Southington is on the western flank of the lowland, approximately 3 miles east of the Western Upland (New England Upland section) boundary.

The Lowland section is further subdivided into a wide (Connecticut River) lowland on the east and a narrower (Quinnipiac-Farmington) lowland to the west. The Quinnipiac-Farmington Lowland is separated at Plainville (about 4 miles north of the center of the Town of Southington) where the Farmington River watershed is divided from the Quinnipiac River drainage basin. The Study Area is within the Quinnipiac Lowland.

The Quinnipiac Lowland is underlain by Triassic sediments which comprise the New Haven Arkose, a red sandstone (Krynine, 1950). Locally, the igneous West Rock Diabase intrudes the New Haven Arkose, coring the north-northeast trending hills (eg. Peck Mountain) south of the Study Site. Generally subdued pre-glacial bedrock features were produced by weathering and stream erosion.

Glacial erosion further smoothed bedrock and reduced vertical relief by depositing a veneer of sediment on hills while partially infilling bedrock valleys. Glacial sediments of this area are correlative to Wisconsinan time, the most recent glaciation. Postglacial erosion has only slightly modified these drift deposits (La Sala, 1961).

Southington region topography can be termed kame and kettle, sag and swell, or hummocky because it is comprised of mounded hills amongst flat-bottomed valleys containing swamps, ponds, and lakes. This surface is a complex area of kames, composed primarily of gravel and sand, interspersed with kettle lakes. Unconsolidated deposits associated with glacial, glaciolacustrine, and glaciofluvial sedimentation (commonly called drift), in addition to fluvial sediments, overlay bedrock throughout the Study Area.

About 4 miles south-southwest of the Study Area, Peck Mountain, the highest hill in the Quinnipiac lowland rises to 431 feet above mean sea level (msl). The lowest elevation in the Quinnipiac lowland, proximal to the Study Area, is 110 feet msl, located about 3 miles south of the Study Area at the confluence of Honeypot Brook and Quinnipiac River.

Vegetation and wooded areas cover the undeveloped regions of land. Lougee (1938) reported that natural soils within this lowland were unfavorable for extensive agriculture and that much of the population was concentrated around manufacturing centers such as Southington. Present demographics are reasonably similar.

Study Area regional climate classification is humid continental. Annual temperature average is 50.1°F (28.9°F in winter, 47.9°F in spring, 70.4°F in summer, and 53.1°F in autumn). Recorded temperature extremes range from -17°F in January to 101°F in August (Shearin and Hill, 1962).

Precipitation annually averages 42.7 inches, uniformly distributed. Historically, however, February and October are months of least precipitation. Monthly precipitation averages from 2.5 to 4 inches, but fluctuations often occur from month to month or for the same month in different years. Monthly totals ranging from less than 1.5 to more than 7.0 inches have been recorded in all seasons. Precipitation in excess of 3 inches in 24 hours has been recorded. Annual precipitation extremes range from 30 to 55 inches (Shearin and Hill, 1962). The 25-year 24-hour rainfall in this area is 5 inches (Hersefield, 1961).

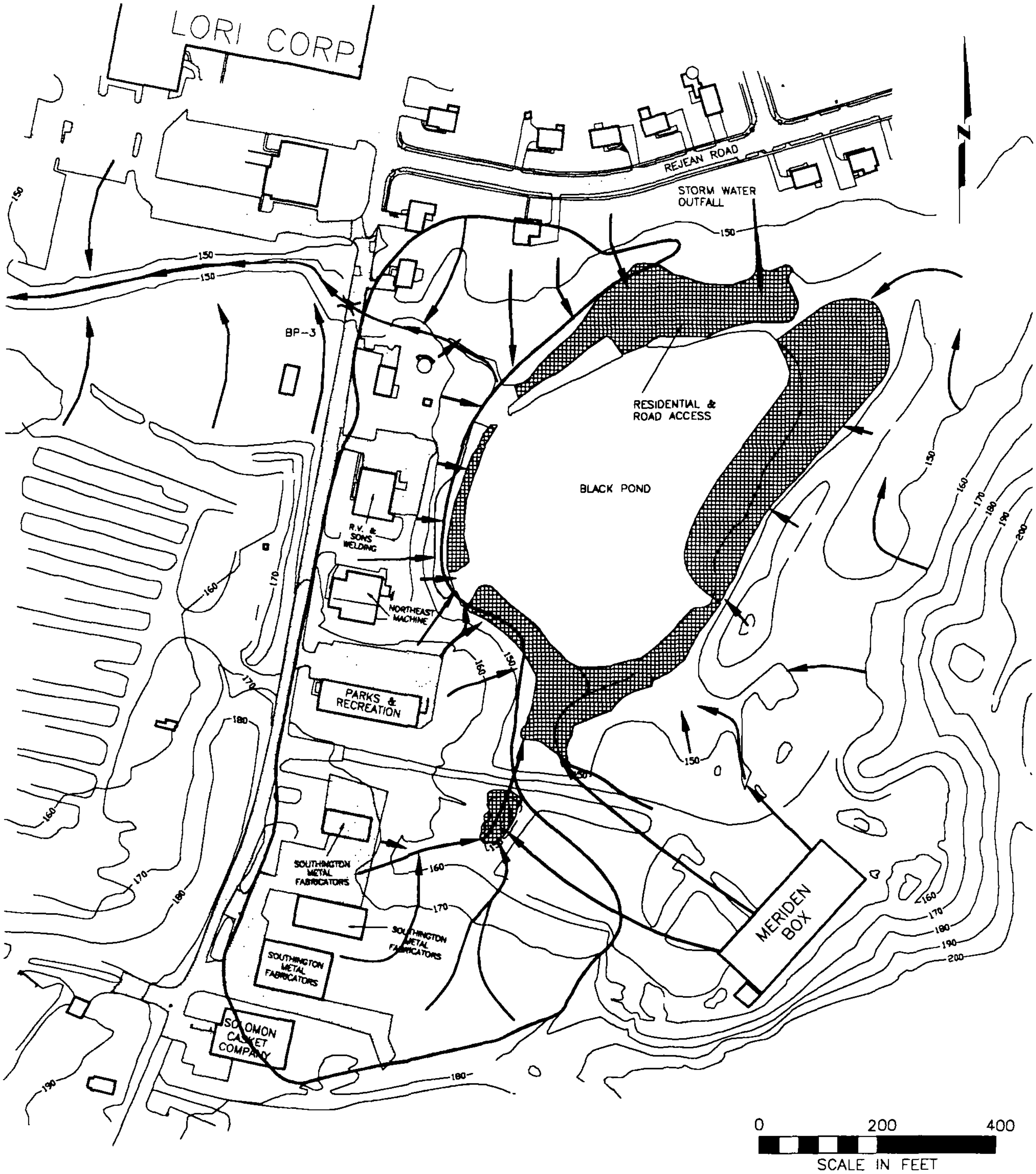
First frost in autumn occurs in early to mid-October. Minimum temperatures below freezing do not occur beyond mid-April, on average. Snowfall has been recorded from October through April, averaging 40.7 inches per year (Shearin and Hill, 1962).

3.1.2 Surface Water and Groundwater Characteristics

The Quinnipiac River Valley drainage basin extends from the Southington/Plainville town line to Long Island Sound. The Study Area is within the upper portion of the drainage basin. Regionally, Quinnipiac River Valley surface drainage exhibits disordered and irregular patterns associated with drainage that is not well integrated on a geologically youthful surface. Subsequent infilling of pond areas and interconnection of streams indicates a somewhat-aged ponded or kettle-hole drainage system characteristic of moraine terrain. Deranged drainage, quite characteristic of glaciated areas, in which short streams flow in and out of lakes, ponds, and swamp areas is also exhibited. The southward flowing Quinnipiac River, classification Bc, is approximately 0.8 mile west of the Study Site, measured from near-center of Black Pond.

Tributaries to the southerly flowing Quinnipiac River often exhibit backhand drainage (northerly flowing tributaries in a southward flowing drainage basin) in the northern portion of the Quinnipiac basin. This drainage is characteristic of glaciated terrains in which stream capture occurs during post-glacial drainage development.

Precipitation run-off of the subwatershed (inclusive of the Study Area) flows centripetally to the lowland surrounding Black Pond, as shown on Figure 3-1. Any sediments transported by overland flow in this vicinity could potentially migrate to depressions around Black Pond, (as shown on Figure 3-1). Black Pond and surrounding wetlands could potentially be impacted by surface water runoff from large paved surfaces in the nearby industrial areas, runoff from outdoor industrial activities, residential neighborhood, and by roadway runoff. From Black Pond, surface water flows west-northwest through a culvert beneath Old Turnpike Road into a stream system that surficially drains into a wetland west of the Study Area. For an in depth discussion of wetland topography and characteristics, the reader is advised to review Appendix L, WET II Analysis.



LEGEND

AREA OF LIKELY SEDIMENT ACCUMULATION FROM DRAINAGE RUNOFF

PAVED AREAS

SURFACE DRAINAGE FLOW DIRECTION

NOTE: ELEVATION CONTOURS FROM GEOMAP, INC. (1989) RELATIVE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

Environmental Science & Engineering, Inc.

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-1

SURFACE DRAINAGE/RUNOFF

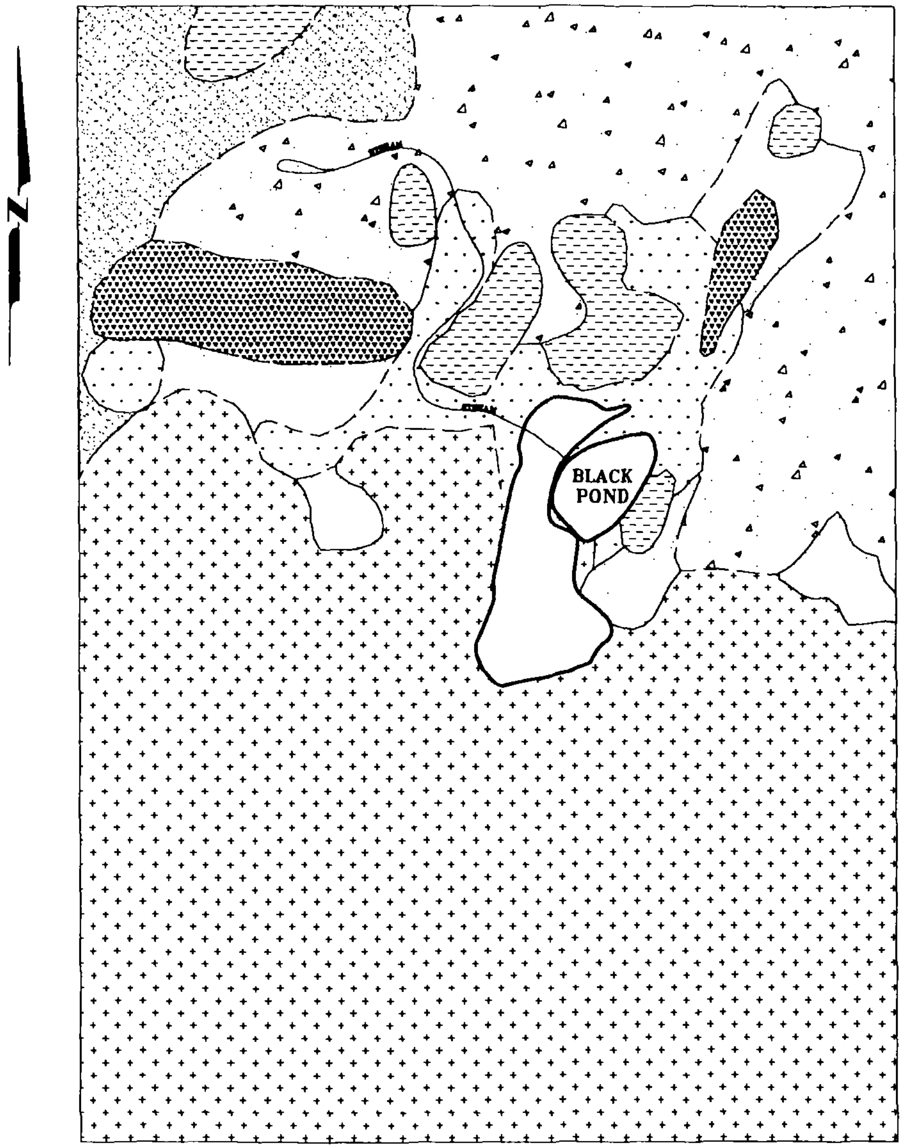
DRAWING NAME: PWSDROF.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93

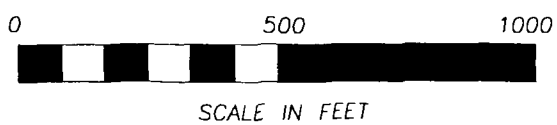
Regional groundwater flow in the unconsolidated deposits within the Quinnipiac River Valley basin generally follows topography and ultimately discharges to the Quinnipiac River (Mazzaferro, 1979). The "Leachate and Wastewater Discharge Sources Inventory" map for the Quinnipiac River Valley, published by DEP, identifies approximate locations of facilities where known or potential releases of oil, toxic, or hazardous substances to the ground, groundwater, or surface water have occurred. The DEP has classified several areas within the upper portion of the Quinnipiac River Valley drainage basin as GB, reflecting the overall condition of groundwater within this area of the Quinnipiac River Valley. A classification of GB is given to groundwater which is known or presumed to be contaminated and not fit for human consumption without treatment. Groundwater in the vicinity of the Study Area has also been classified as GB by DEP.

3.1.3 Regional Surficial Geology

Several interpretations of Quinnipiac Lowland development near Southington have been presented in published geological literature (Hanshaw, 1962; La Sala, 1961; Lougee, 1938; Flint, 1934, 1933, and 1930, and Rice, 1927). Various geomorphic and geological terms have been used by these workers to describe unconsolidated gravel, sand, silt, and clay (sediments) proximal to the Study Area. Ground moraine, unsorted sediments called till deposited directly beneath glacial ice, have been observed on hills with elevations exceeding 200 feet above msl (Hanshaw, 1962 and La Sala, 1961). Ground moraine till has been mapped about 1 mile west and north-northwest of the Study Site, west of the Quinnipiac River. Tills buried by other glacial, glaciofluvial, and glaciolacustrine deposits are likely in this region.

Proximal to the Study Area is a highly complex area of kames and flat-topped gravel plateaus (at 200 feet above msl) interspersed with kettles and large unfilled and filled swamp areas (see Figure 3-2). Lougee (1938) and Rice (1927) describe the area as generally morainal. Lougee (1938) described a large proglacial delta which La Sala (1961) and Hanshaw (1962) termed kame delta. Either description (proglacial or kame) indicates deposition of sand and gravel into a proglacial lake along an ice margin. This distinctly lobate deposit underlays most of the Study Site, extending about 0.5 miles south of Black Pond (see Figure 3-3). South of this kame delta





LEGEND

- ICE CHANNEL FILLING: SAND AND GRAVEL, INCLUDING ESKER-LIKE DEPOSITS AND CREVASSE FILLINGS.
- UNDIFFERENTIATED SAND AND GRAVEL
- SWAMP DEPOSITS: PLANT DEBRIS MIXED WITH SILT AND SAND
- KAME TERRACE DEPOSITS: SAND AND GRAVEL
- KAME DELTA DEPOSITS
- VALLEY-TRAIN DEPOSITS: STRATIFIED SAND AND GRAVEL FILLING VALLEY FLOORS.
- KAME: HILLS AND MOUNDS OF POORLY SORTED SAND AND GRAVEL.
- EXTENT OF STUDY SITE

ESE Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

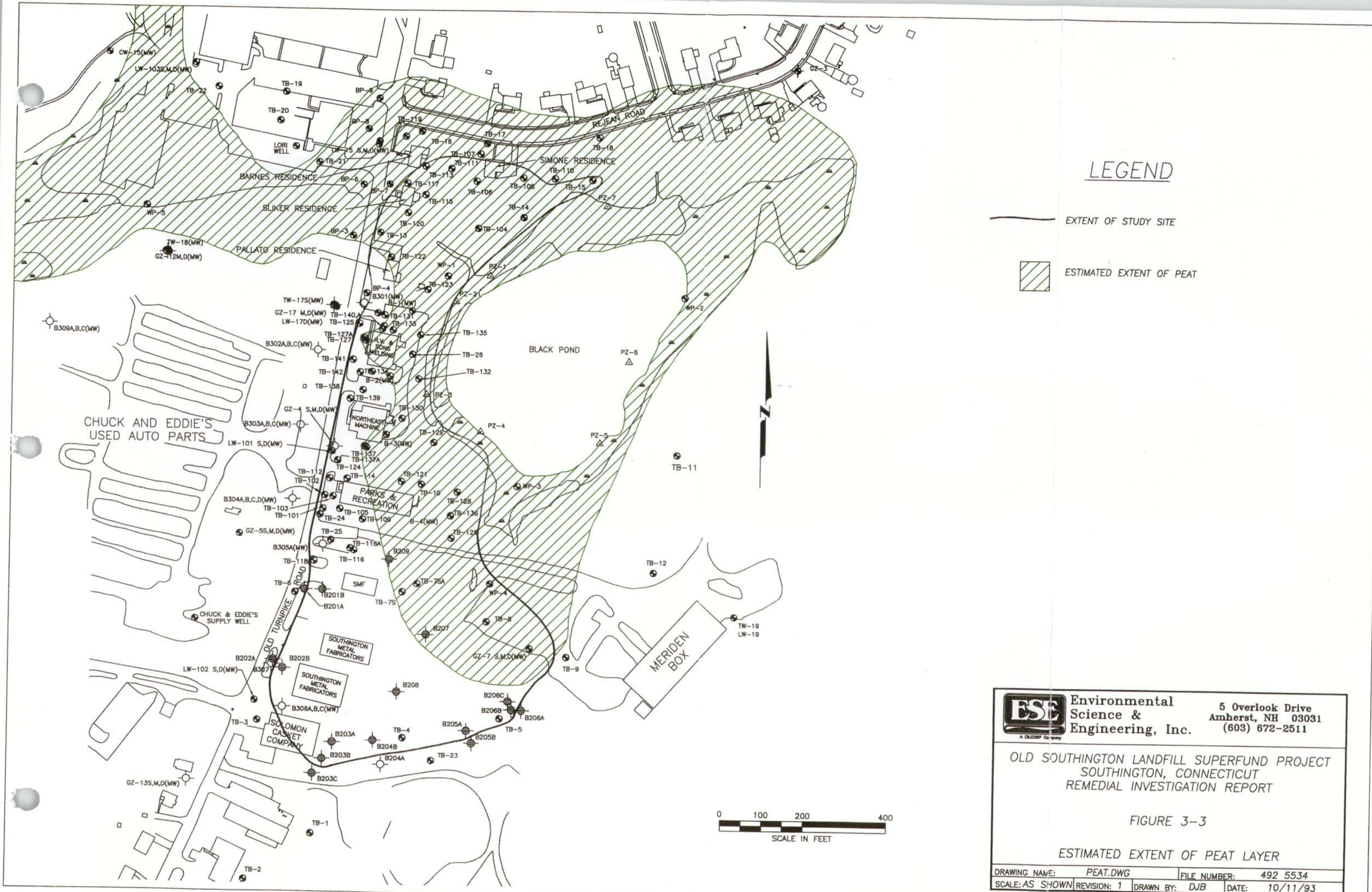
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-2

SURFICIAL GEOLOGIC MAP

DRAWING NAME: GEOLOC.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: PAD	DATE: 10/11/93

From LaSala, A.M., 1961, Surficial Geology Southington Quadrangle, Connecticut, U.S.G.S. Map GQ-146.


LEGEND
EXTENT OF STUDY SITE
ESTIMATED EXTENT OF PEAT
BLACK POND
REJEAN ROAD
OLD TURNPIKE ROAD
CHUCK AND EDDIE'S USED AUTO PARTS
CHUCK & EDDIE'S SUPPLY WELL
BARNES RESIDENCE
SLIKER RESIDENCE
PALLATO RESIDENCE
SIMONE RESIDENCE
LORI WELL
R.V. & SONS WELDING
NORTHEAST MACHINE
PARKS & RECREATION
SMF
SOUTHINGTON METAL FABRICATORS
SOLOMON CASKET COMPANY
MERIDEN BOX
N
0 100 200 400
SCALE IN FEET
Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT
FIGURE 3-3
ESTIMATED EXTENT OF PEAT LAYER
DRAWING NAME: PEAT.DWG
FILE NUMBER: 492 5534
SCALE: AS SHOWN
REVISION: 1
DRAWN BY: DJB
DATE: 10/11/93

are lake-bottom deposits, corroborating a glaciolacustrine sedimentary environment attributed to glacial Southington Lake (Lougee, 1938) whose level is represented by the 200 feet above msl terrace system (La Sala, 1961; Lougee, 1938; Flint, 1930) proximal to the Study Area.

North of the kame delta deposits, glacial sediments include various kame forms, ice channel fillings, and outwash. These sediments consist primarily of sand and gravel deposited in glacial and glaciofluvial environments. Most kame forms north and east of the Study Area, are mapped as kame terrace (La Sala, 1961) as shown on Figure 3-2; whereas, Hanshaw (1962) mapped abutting surficial sediments approximately 1500 feet east of the Study Site as outwash plain deposits. Geomorphologically, these two contiguous units appear similar enough to have been deposited within the same sedimentary environment.

Holmes (1947) critically reviewed usage of the term kame, concluding that an ideal kame is a mound composed chiefly of well to poorly size-sorted (poorly to well graded) silt, sand, and gravel, whose resultant form indicates original deposition modified by any slumping incident to later melting of glacial ice against or upon which the deposit accumulated. Holmes recognized that postulated modes of kame origin included a large element of glacial hypothesis (Sugden and John, 1976). Hence, from an ideal conceptual kame, all gradations to flat-topped kame-complex, including ice channel fill deposits forming aligned kames (grading to esker forms) and kame terraces which may grade into outwash plains, may indicate a variety of depositional origins correlative to the same glacial event.

Silt, sand, gravel, and diminutive amounts of clay were transported across an ice surface (subaerially or englacially) at a level at least as high as the top of the kames by water having adequate flow to account for the observed size-sorting. At that time, the position of glacial ice with respect to the kames allowed continued sediment accumulation. These unconsolidated deposits were then modified by post-depositional slumping and collapse associated with melting of buried ice. Finer-grained sand and silt may have been winnowed from resultant hummocks and preferentially deposited into collapse features in which kettle lakes and subsequent swamps formed. Additionally, occurrences of till, sediments relatively unsorted and unstratified, are likely to co-exist within stratified kame deposits.

Glacial drift deposits around Southington range in thickness from 4 feet to 180 feet (La Sala and Meikle, 1964), averaging 62 feet. Variability of drift thickness is attributed to diverse glacial erosional and depositional environments which occurred during glaciation of west-central Connecticut. North of the Study Area, drift thickness ranges from 9 feet to 143 feet, averaging 38 feet. West and south of the Study Area and west of the Quinnipiac River, drift thickness ranges from 4 to 150 feet and averaging 72 feet. East of the Study Area, drift thickness averages 23 feet, ranging from 10 to 55 feet. Unconsolidated drift sediment thickness within the Study Area ranges from 6 to 180 feet, having an average thickness of 99 feet. Drift thickness generally increases in a westerly direction with distance from the west rock diabase cored highland bordering the eastern margin of the Study Area. Average drift thickness values may be skewed because data is available only from well and boring records (La Sala and Meikle, 1964) and this investigation, representing preferentially localized sample populations having non-correlative frequency distributions.

3.1.4 Local Surficial Geology

A considerable number of soil borings have been emplaced throughout the Study Area in order to evaluate local geology and soil quality (see Plate 1-1). Unconsolidated sediments within the Study Area have attributes of glacial drift deposits discussed in Section 3.1.3. Plate 3-1 shows the location of eight-cross sections constructed across the Study Area. Plates 3-2 through 3-9 present cross-section A-A' through H-H', respectively.

As illustrated in the cross-sections, bedrock beneath the Study Site is overlain by undifferentiated sand and gravel. This sand and gravel has varying amounts of silt and cobbles and is generally more compact than overlying deposits; therefore, it probably is glacial till, which has been deposited directly by glacial ice. The hydraulic conductivity of this sandy, gravely till is relatively low, due to its heterogeneous nature and its silt content (see Section 3.5.1).

Overlying the sandy, gravelly till are interfingering deposits of fine sand (primarily in the north), laminated fine sand and silt, and/or undifferentiated sand. The laminated fine sand and silt is indicative of sediments deposited in standing water.

Above the interfingering deposit is an upper sand and gravel unit which contains relatively less silt than the lower sand and gravel unit. This upper sand and gravel locally may extend to the ground surface, or may be overlain by solid waste or peat. The peat is overlain by either solid waste or sand and gravel, which extend to the ground surface. Where solid waste is encountered, a 0.5 to 4 feet thick sand and gravel layer covers this waste.

A locally extensive peat deposit, associated with Black Pond and its unnamed/discharge stream, underlies the majority of the Study Site, as shown on Figure 3-3. The inferred limits of the peat deposit shown on Figure 3-3 are based on previous and current test boring data, U.S. Soil Conservation Service data, aerial photo review and wetlands mapping data provided by the Town of Southington. Test boring data indicate the peat layer varies in depth of occurrence and depth below the groundwater table.

Peat unit thickness ranges from three to at least nine feet in the southern portion of the Study Site. Peat is present at depths ranging from 15 to 54 feet (top) to 18 to 60 feet (bottom) below existing the ground surface. Groundwater levels in the area of the Study Site, as determined in the test borings during drilling, ranged from three to 15 feet below the ground surface. Therefore, peat present within the limits of the southern portion of the Study Site is located approximately 2 to 40 feet below the groundwater table. Surficial peat and muck soils have been mapped along the south and southeastern edges of Black Pond (Sherin and Hill, 1962), east of the Study Site boundary. These peat and muck soils are above the water table.

In the northern area of the Study Site, the peat unit is located at a depth ranging from four to 14 feet (top) to 7 to 26 feet (bottom) and ranges in thickness from 0.3 to 14 feet. Groundwater levels in this portion of the Study Site range from 2.5 to 12 feet below the ground surface. Therefore, the peat in this portion of the Study Site is located from approximately 4 ft. above to 9 feet below the groundwater table.

Resistivity soundings and a conductivity survey were performed in late 1988 and early 1989, as discussed in Section 2.5.2, to further define the surficial geology of the Study Area. Preliminary results from these surveys were presented in the Initial Site Characterization Report (April 1991). Based on additional field investigations and further understanding of the geology of the

Study Area (resulting from additional borings and hydrogeologic measurements) the resistivity and conductivity data was reassessed for presentation in the RI.

Figure 2-3 shows the locations of the resistivity profiles. The resistivity anomalies detected along resistivity profile lines BA-BD and AG-E have been interpreted to be indicative of buried utilities or variations in grain size distribution and sorting within the subsurface soil deposits. The resistivity survey profiles for resistivity lines F-J, AF-A'A, and L-S (Figure 2-3) indicate potential geological units of inferred varying permeabilities and degree of sorting oriented in a general east-west direction. Resistivity profile line AF-AA is oriented in a north-south direction and is located along the axis of the Study Site. Comparison of resistivity data and test boring data indicate the presence of solid waste, peat, and well sorted fine to medium sand, which are likely, when saturated, to exhibit low resistivity values. Resistivity survey line L-S is located west of Chuck & Eddie's Used Auto Parts. Resistivity data for this line indicate the probable existence of a large surficial gravel deposit across the full length of the survey line.

A terrain conductivity survey was conducted around the perimeter of Black Pond and in the vicinity of the Lori facilities to further delineate the area of solid waste and subsurface contamination. Increased conductance may indicate subsurface contamination or the presence of solid waste. In general, the extent of conductive solid waste materials indicated by this technique agreed with landfill limits defined by the borings. One notable area of disagreement is at monitor well locations GZ-7. Solid waste was encountered in the GZ-7 borings at a depth of about 10 feet. Linear conductivity surveys along seismic lines 4, 9, 10, and 12 indicated background conditions.

3.2 BEDROCK GEOLOGY

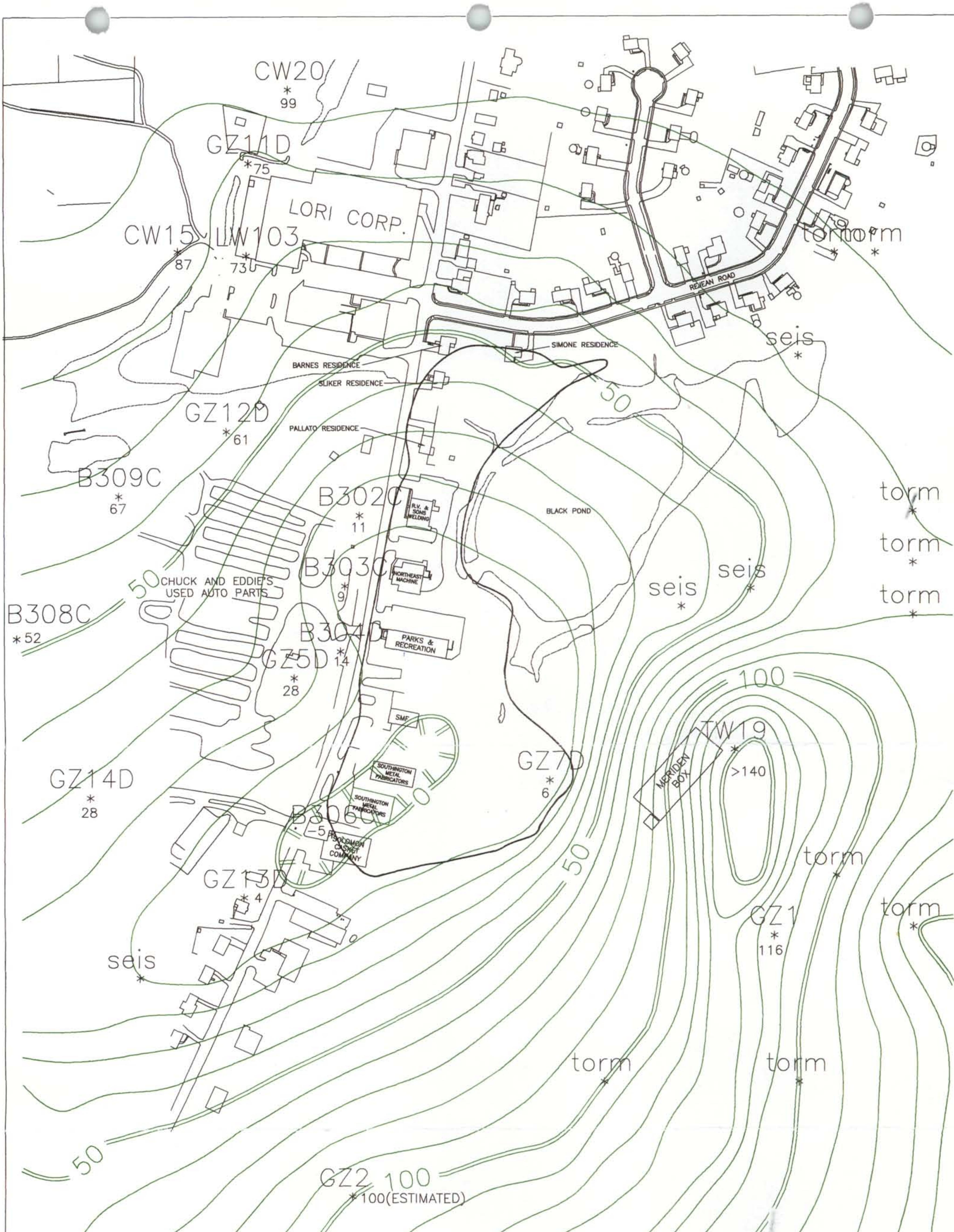
Published literature (Fritts, 1963, and Rodgers, 1985) indicates that the entire Study Area is underlain by bedrock mapped as the New Haven Arkose (a potassic feldspar rich sandstone). This bedrock is sedimentary in origin and consists of grayish-orange-pink to very pale orange arkose with interbedded subordinate grayish red to dark-reddish-brown micaceous siltstone of Triassic age. Bedding within this unit generally strikes north-south direction and dips eastward, the average dip being around 15 degrees (Krynine, 1950). All previous test borings completed in the Study Area that were terminated at the bedrock surface encountered arkosic bedrock, with the exception of boring LW19 located northeast of the Meriden Box building, which encountered a diabase dike. The test boring data and published data indicate the entire Study Area west of the eastern shore of Black Pond is underlain by arkosic bedrock.

A regionally extensive igneous rock intrusion known as the West Rock Diabase trends in a north-northeasterly direction across the extreme south and eastern portions of the Study Area. Published geologic data (Fritts, 1963 and Rogers, 1985) indicates that the West Rock Diabase has been interpreted to terminate south of the Study Area. However, diabase bedrock exposed during site preparation of the Meriden Box property indicates that the diabase dike extends into the Study Area. Aeromagnetic data (USGS, 1973) identifies a large magnetic anomaly (low) trending in a northeasterly direction across the Study Area. The trend of this magnetic anomaly is in close agreement with the trend of the previously mapped dike, location of the diabase exposure, and location and trend of a narrow topographic high south east of the Study Site. This topographic high is currently interpreted as a West Rock Diabase-bedrock cored ridge.

Boring data, seismic data, and reference to Mazzaferro's (1975) top-of-rock map were used to develop a bedrock surface contour map (Figure 3-4). Top-of-rock elevations of the New Haven Arkose within the Study Area range from about 5 feet below mean sea level (MSL) at boring B306C to 100 feet above MSL at boring CW20. Depth to this arkosic bedrock (overburden thickness) ranges from 83 feet at boring B309C to 180 feet at boring B306C.

A L-shaped bedrock basin lays beneath the Study Area (Figure 3-4). This basin's deepest measured point is at boring B306C (5 feet below MSL). The rock surface exhibits approximately a 0.06 slope toward the southwest beneath Black Pond, leveling off beneath the Study Site. The north and west flanks of this basin slope toward the south and southeast with about a 0.06 slope, leveling off beneath the Study Site. The western boundary of this basin is located west of Chuck & Eddie's Used Auto Parts

The bedrock basin is bounded on the east and south by a ridge composed of West Rock Diabase intrusive. At boring TW19, diabase bedrock was reportedly encountered at 7.5 feet below



LEGEND

EXTENT OF STUDY SITE

GZ7D * 100 ELEVATION BASED ON BORING

seis * ELEVATION BASED ON GZA SEISMIC

torm * ELEVATION BASED ON USGS TOP OF ROCK MAP

0 300 600
SCALE IN FEET

NOTE: CONTOUR INTERVAL 10 FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-4

BEDROCK SURFACE

DRAWING NAME: BEDR.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93

ground level. However, rock was not encountered to at least 16 feet below surface at boring LW19, which was emplaced adjacent to boring TW19. This indicates that the intrusive ridge has an erratic outline. Inferred top-of-rock elevation for the diabase intrusive is about 140 feet above MSL. East of the Study Site, the bedrock has a 0.26 slope toward the west into the basin (from this diabase ridge), and a 0.12 slope toward the north-northwest from the diabase ridge south of the Study Site.

3.3 DELINEATION OF SOLID WASTE

Through detailed analysis of aerial photographs, Bionetics (1988) described the various stages of development and activities at the landfill (Study Site). These interpretations are detailed in Section 1.3.3.2 of this report. Test borings installed during Phase 1B provided physical evidence of solid waste within the Study Site. This information was used to delineate the boundary of the Study Site. During the Post-Screening Task 2 field investigations three studies were performed to further refine the delineation of the nature and extent of solid waste within the Study Site. First, a ground penetrating radar (GPR) survey was conducted to locate and define two potential semi-solid disposal areas referred to in interviews with persons familiar with the operation of the landfill. Second, a hand-auger survey was conducted along the western shoreline of Black Pond to determine the presence, if any, and extent of solid waste within Black Pond. Third, additional test borings were drilled along the south and southwestern boundary of the Study Site to more accurately depict the Study Site boundary in those areas. These investigations have defined the extent of solid waste within the landfill and have provided information as to the inferred location of the SSDAs. As discussed in more detail in Sections 3.4.2.1 and 4.2.4.2, the SSDAs are not significantly different in materials or appearance from the rest of the southern portion of the Study Site, with the exception of two small areas of discrete material encountered in SSDA 1.

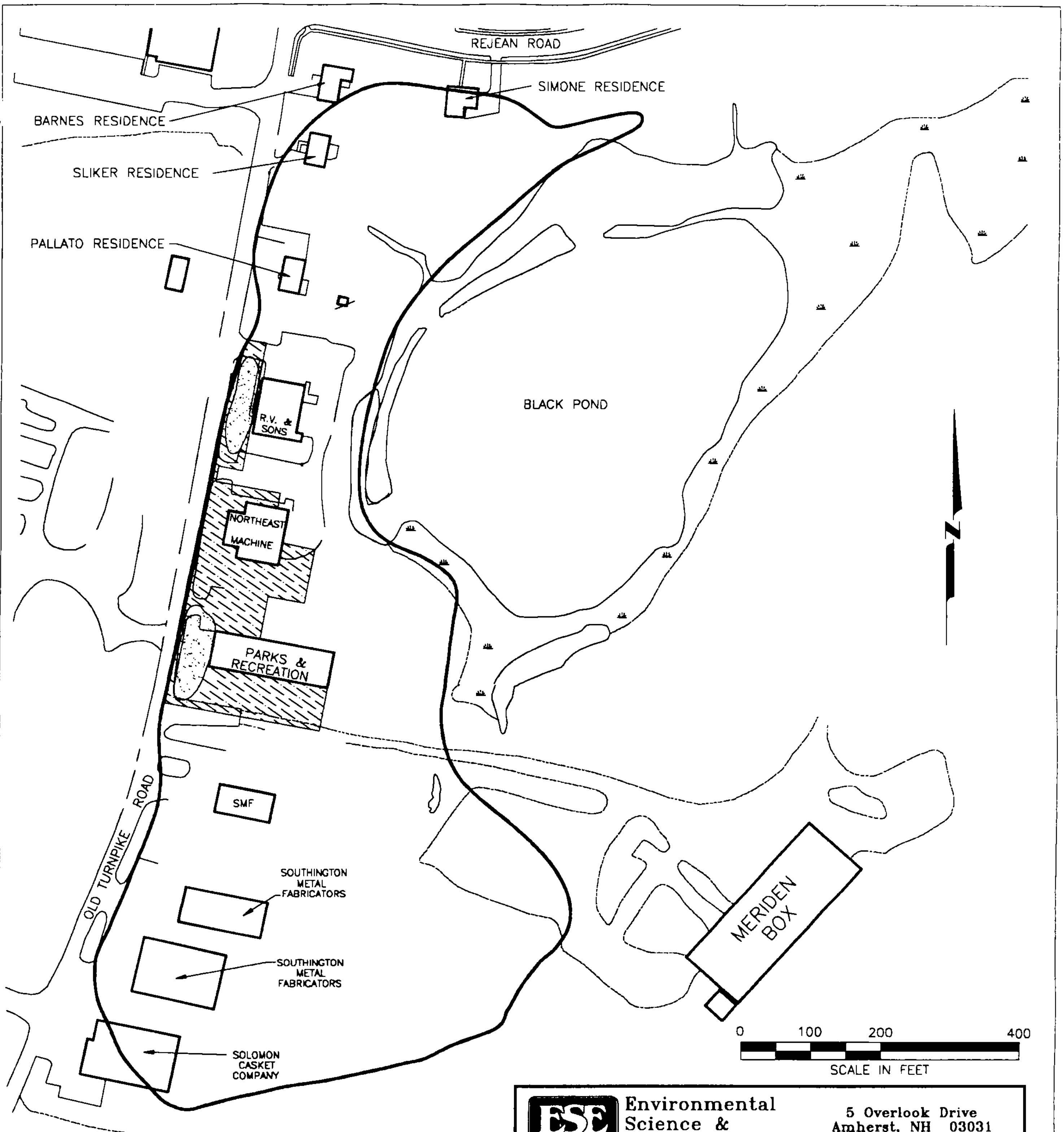
3.3.1 Ground Penetrating Radar Survey

As discussed in Section 2.5.3, a ground penetrating radar (GPR) survey was conducted during the Task 1 field investigations. Figure 3-5 shows the area of the Study Site investigated during the GPR survey.

Three disturbed areas were identified during completion of the GPR survey. Two of the locations correlated closely with semi-solid disposal area locations identified in interviews with persons familiar with past disposal practices. The first area (SSDA 1), is located immediately west of the R.V. & Sons Welding building, as indicated on Figure 3-5. This area is irregular in shape and is interpreted to be approximately 40 feet wide and 200 feet long and 15 feet deep. The north, south, and west limits have been approximately defined by the GPR survey. The eastern boundary could not be absolutely determined by GPR because the natural soil is disturbed in this area by the normal operations of the former landfill and building construction. However, given the curves apparent at each end from GPR data, and the operational history describing how the SSDAs were constructed, the eastern area boundary can be interpreted to be as shown.

The second area, SSDA 2, is located immediately west of the Parks and Recreation Building, as indicted on Figure 3-5. Based upon GPR data, the area is interpreted to be irregular in shape and approximately 120 feet long and of variable width. The north, south, and west boundaries of the area have been approximately defined by GPR data. The eastern boundary of the area could not be absolutely defined because the soil is disturbed in this area by the normal operations of the former landfill and building construction. However, given the curves apparent at each end of the GPR demarcation, and the operational history, the eastern area boundary can be interpreted to be as shown. Test boring and GPR data indicate the area is approximately 21 feet deep with groundwater at a depth of 23 feet. The GPR data indicate buried objects are located within a few feet of the ground surface and have dimensions generally smaller than drums. The location and dimensions of this area generally agree with information gathered in interviews.

The GPR survey indicates an area of disturbed ground on the southside of the Northeast Machine building (Appendix A, Plate 2). This disturbed ground is likely a result of structural changes



LEGEND

- EXTENT OF STUDY SITE
- AREA COVERED BY SURVEY
- INFERRED LOCATED SEMI-SOLID OF DISPOSAL AREAS

ESE
A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-5

GPR SURVEY AREA

DRAWING NAME: GPRSA.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=200'	REVISION: 0	DRAWN BY: DWS	DATE: 12/10/93

in this vicinity. During operation of the landfill, a quonset hut was located there and an access road passed this area. Subsequent disturbance occurred during construction of the Northeast Machine building. Test boring data (TB137A) indicates that the disturbed soil zone extends to a depth of approximately 28 feet; groundwater at time of drilling was 12 feet below ground level.

3.3.2 Delineation of Extent of Solid Waste

Data generated during the Phase 1A and Phase 1B investigations was used to delineate the extent of the debris mass within the Study Site. This data includes historical records, interviews with current and previous Town employees, information available in the public documents, and test borings. The western boundary is fixed by Old Turnpike Road. As discussed below, the northern boundary is just south of Rejean Road. During the Post-Screening Task 2 Investigation two studies were conducted to further define the limits of the debris mass boundary in the southern portion of the Study Site. The first investigation was designed to delineate the boundary of the debris mass along and east of Old Turnpike Road and along the southern end of the Study Site. The second investigation was designed to determine the extent of the debris mass along the southwestern perimeter of Black Pond.

3.3.2.1 Southern Boundary Delineation

Test borings B201 through B206 were installed to further determine the southern and southeastern extent of the debris mass. Plate 1-1 shows the boring locations. At each location an initial boring was completed (designated "A"). If no solid waste was encountered, a second boring (designated "B") was completed 50 feet away and toward the landfill. If solid waste was encountered, the second boring was completed away from the landfill. In two cases (B203 and B206) a third boring (designated "C") was needed to confirm or complete the delineation.

3.3.2.2 Northern Boundary Delineation

Aerial photographs taken in 1965-1967 clearly show the northern extent of the Study Site. Construction of the sewer line (1965-1967), evident in the photographs, encountered no evidence of landfilled material or contaminants down to depths well below the water table. Investigations by EPA of subsurface soils beneath residential property north of Regean Road, conducted in 1993, confirmed the absence of waste materials anywhere north of Rejean Road.

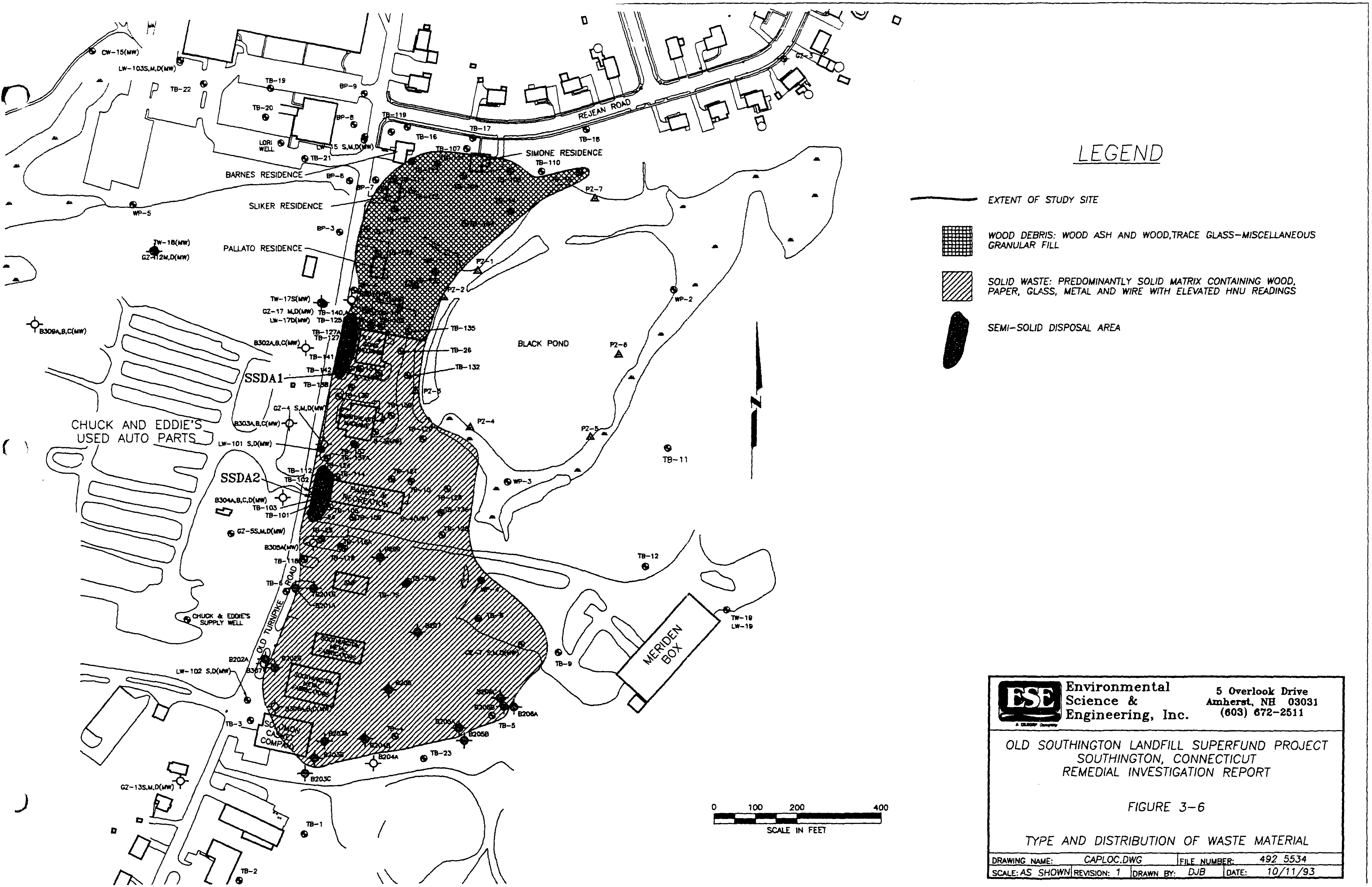
During Phase 1A and Phase 1B a series of investigations were undertaken, including geophysical testing and test boring installation. Additional work performed during the Post-Screening Task 1 investigations, which included numerous additional borings and analytical testing, confirmed the delineation established by the previous investigations. Based on the data generated throughout the RI, the northern boundary of the Study Site has been well established as delineated on figures and plates presented in the RI/FS.

3.3.2.3 Delineation Along Black Pond

Hand auger borings were installed along the southwestern perimeter of Black Pond to determine the potential of solid waste placement into Black Pond. Figure 2-4 shows the area over which the borings were installed. Solid waste material was encountered generally between the existing shore and the long sand bar between piezometers PZ-2 and PZ-3. No solid waste material was found beyond the sand bar. In the small inlet between PZ-3 and PZ-4, an area of black soil was encountered beneath a shallow layer (6-8 inches) of sediment. The soil appeared to be mixed with petroleum-like materials and had a noticeable petroleum odor. A sample of the soil was collected (designated P-7B) and submitted for laboratory analysis. The analytical results for this sample are provided on Tables 4-17, 4-18, and 4-19.

3.4 CHARACTERIZATION OF NATURAL SOILS AND WASTE MATRICES

This section summarizes the distribution of natural material and waste matrices across the Study Site, based on the test borings, delineation studies, and information obtained from interviews with persons familiar with the operation of the landfill and presents evidence of the distinctions between the northern and southern portions of the Study Site. Figure 3-6 shows a delineation of the northern/southern portion of the Study Site. This delineation is based on test borings installed across the Study Site during the Task 1 field investigations. The delineation shown is



Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3–6

TYPE AND DISTRIBUTION OF WASTE MATERIAL

DRAWING NAME: CAPLOC.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93

consistent with evidence of the historic usage and ownership of the Site. For example, in the northern portion generally wood debris (including stumps, trees, brush, wood construction debris) was discovered; this was the material permitted by the agreement between the Town and the owner from whom the land was leased.

Cross-sections have been developed to assist in visualizing the lithology of the Study Area and the distribution of wood debris and solid waste. Plate 3-1 shows the positions of eleven cross-section lines. The eleven cross-sections indicated on Plate 3-1 (A-K) are presented on Plates 3-2 through 3-10.

3.4.1 Northern Portion of Study Site

The northern portion of the Study Site is generally underlain by a thin layer (zero to nine feet) of wood ash and timber fill consisting of black coarse to fine sand with wood ash, wood, wood cinders, and trace amounts of glass and metal debris as well as demolition debris consisting of wood, glass, brick, and asphalt. The lateral extent of this fill is shown on Figure 3-6. Interviews with people knowledgeable of past disposal practices indicate this area was used as a stump dump associated with the landfill. Clean fill encountered across the northern most portion of this area was reportedly associated with construction of Rejean Road and development along Rejean Road.

The wood fill is underlain by a peat unit ranging in thickness from 0.5 feet at boring TB18 to 14 feet at boring BP6. Areal extent of this peat unit is depicted in Figure 3-3. This peat formed after glacial ice retreated from this area (around 10,000 years ago) and Black Pond was much larger than it is today. Shallower portions of the Pond filled with sediments and became peat bogs (swamps). Since this infilling occurs in successive stages (and continues today, see Figure 3-1), the peat does not form one continuous layer at one measurable elevation. Peat soils at ground level have been mapped east of the Study Site around Black Pond (Shearin and Hill, 1962), demonstrating the variability of depth for this deposit. The peat unit is generally associated with silt and is underlain by stratified drift deposits consisting of fine to coarse sand with variable gravel content.

A photoionization detector (PID) was used to determine the relative degree of VOC concentration in the soil. The PID is calibrated to a benzene analog (isobutylene) and detects VOC in the air as they evaporate from the soil. It gives an indication of the relative, not absolute, level of VOC in the soil, is non-compound specific, and is sensitive to moisture. PID screening of soil and fill samples obtained in test borings across this area primarily ranged from 0 ppm to 7 ppm and were predominantly below 1 ppm. These PID values are interpreted as insignificant and are not inconsistent with PID data typically collected within residentially developed and undeveloped areas. The majority of soil samples screened yielded PID readings of less than 1 ppm. However, elevated readings of 15 to 42 ppm were obtained from several soil samples from borings TB131, TB140, and TB140A. All of these soil samples yielding elevated readings were obtained at or below the groundwater table. Additionally, borings TB131, TB140, and TB140A are located along the interpreted southern boundary of the northern area of the Study Site and are in close proximity to the northern limit of inferred SSDA 1. The results of the PID screening are summarized in Table 3-1. Analytical results for selected soil samples are presented in Section 4.2.2.2.

With the exception of borings TB104 and TB111, all of the samples yielding PID readings greater than or equal to 5 ppm are located near the southern boundary of this area. Furthermore, all of the soil samples yielding elevated PID readings (greater than 5 ppm) were obtained at or near the groundwater table and/or in close proximity to the peat layer.

Cross-section A-A' (Plate 3-2) shows solid waste thinning out and ending near boring TB123. No solid waste extending into the northern portion was found. The thin layer of solid waste at boring B1 that extends around boring TB123 is likely a result of the regrading activities associated with closure of the landfill and/or construction of the on-site structures. This waste is composed of glass and metal mixed with wood ash (ash is characteristic of northern portion).

Cross-section F-F' (Plate 3-7) shows wood debris from the vicinity of TB106 to TB15. This is consistent with the operational history of the stump dump, which describes the main area of wood disposal to coincide with the area formed by borings TB106, TB104, TB114, and TB108, extending eastward toward the area of TB15. This is further supported by the available aerial photographs.

Cross-section G-G' (Plate 3-8) is just north of the limit of the Study Site and south of Rejean Road. As shown on Plate 3-8, no wood debris or solid waste was encountered in any of the borings along this section. Additionally, the 1974 subdivision plan for land development north of Rejean Road shows significant (16-40 feet) excavation of soil. This soil was excavated because the toe of a hill there had extended to south of and along the current location of Rejean Road (Southington Quadrangle, 1968). Therefore, because of the location of this hill during operation of the Study Site, and evidence from borings along Rejean Road (Plate 3-8), the northern limit of the Study Site is well confirmed, as discussed in Section 3.3.2.2.

3.4.2 Southern Portion of Study Site

The southern portion of the Study Site is primarily underlain by approximately 5 to 50 feet of solid waste fill consisting predominantly of a coarse to fine sand matrix containing variable proportions of paper, glass, plastic, metal, metal shavings, cloth, and other materials typically associated with municipal solid waste. The solid waste is covered with a thin veneer of sandy fill ranging from less than one to four feet in thickness.

The peat unit identified beneath the northern portion of the Study Site (Section 3.1.4) intermittently underlies a portion of the southern portion of the Study Site (Figure 3-3). Since this peat unit fluctuates in thickness and depth below ground level, shallow borings may not have penetrated deep enough to encounter it. Figure 3-3 indicates where peat is likely to be encountered at some depth; however, lateral continuity is unlikely.

The peat unit in the southern portion of the Study Site was encountered at depths ranging from 15 feet at TB127A to 54 feet below ground surface (at B209). Where present, this peat unit ranges from three to nine feet thick, averaging approximately six feet. Groundwater was encountered in test borings at reported depths of three to 28 feet (averaging 10 feet) below ground surface. The top of the peat unit ranges from two to 40 feet below the groundwater table in the southern portion of the Study Site.

PID screening data for test boring soil samples detected low level VOC contamination (less than 5 ppm) of unsaturated soils throughout this area. PID readings for saturated soil samples ranged from 1.9 to 320 ppm at boring TB126 (Table 3-1). However, the majority of saturated soil PID readings were less than or equal to 10 ppm. The PID data indicates that where silt and peaty-silt are present at or slightly below the groundwater table, it may retard vertical VOC migration.

3.4.2.1 SSDAs

Interviews with previous and current Town employees and information available in public documents indicated that two areas had been excavated for the disposal of semi-solid waste. This information indicates use of such areas during the period of approximately 1964-1967. The approximate locations of these semi-solid disposal areas (Figure 3-6) have been determined through these interviews, review of aerial photographs, GPR data, and boring logs. The information available, however, does not describe a practice of total segregation of liquid or semi-solid wastes nor of segregation of particular types of materials (i.e., volatile organics). On the contrary, the information provided detail on specific short-term use of these areas for disposal of materials similar to those disposed of throughout the southern portion prior to and during that time period. Except for isolated discrete material, discussed below, the types of materials encountered in these areas are similar to those found throughout the southern portion of the Study Site, providing further confirmation of the similar nature of these areas.

Nineteen borings (TB125, TB127, TB127A, TB141, TB142, B401, B402, and B404-415) have been advanced into the area deduced as SSDA 1, and five borings (TB24, TB101, TB102, TB103, and TB112) have been emplaced in the area concluded to be SSDA 2. Boring logs show that various materials typically associated with solid waste landfills are contained within the areas demarcated as SSDAs. Extent of solid waste fill has been used to determine the depth of these SSDAs because the semi-solid materials are indistinguishable from the solid waste. Logs of borings emplaced in SSDA 1 denote a varied list of solid waste materials (ash, asphalt, cinders, glass, metal, paper, plastic, slag, and wood). Likewise, material encountered in SSDA 2 borings are similar (brick, glass, hair, metal, paper, plastic, refuse, and wood).

Cross-section H-H′ (Plate 3-9) is located along and east of Old Turnpike Road (Plate 3-1). Plate 3-9 shows approximately defined areas for SSDAs 1 and 2. The two SSDA are not easily distinguishable from the adjacent solid waste mass. SSDA 2 contains solid waste similar in appearance to waste discovered throughout the southern portion of the Study Site. SSDA 1, with the exception of two areas of discrete material (discussed below), contains materials similar in appearance and composition to materials encountered throughout the southern portion of the Study Site. Unconsolidated sediment beneath these SSDA areas is generally undifferentiated sand and gravel. However, a three feet thick peat and silt unit was encountered beneath a portion of SSDA 1 at boring location TB127A, 15 feet below ground surface. Lateral extent of this peat unit is shown on Figure 3-3 and is discussed in Sections 3.4.1 and 3.4.2 of this report.

Cross-sections I-I′, J-J′, and K-K′, shown on Plate 3-10, are located north-south through SSDA 1. Two areas of discrete material are indicated on cross-section J-J′. The largest (Discrete Material B) is a white putty-like material which extends from B401 to just beyond B408 (it's not present in B402). This material averages eight feet in thickness and is not present in the eastern (K-K′) or western (I-I′) cross-sections. As shown on Plate 3-10, Discrete Material B extends just to the water table in one small area, but is generally 2-6 feet above the water table, as measured during Task 3 field investigations.

The other area of discrete material (Discrete Material A) is much smaller and more localized, and was found in only B402 at a thickness of about eight inches. This material was medium brown in color, with homogeneous, peanut butter like consistency. This material was not encountered in any of the other 14 borings within SSDA 1. As shown on Plate 3-10, Discrete Material A is located 5 feet above the water table, as measured during Task 3 field investigations.

3.5 HYDROGEOLOGY

This section describes the hydrogeologic setting at the Southington site based on geologic interpretations, hydraulic parameter analysis, and monitoring well water level measurements.

3.5.1 Hydraulic Conductivity

The unconfined overburden aquifer of the Study Area is comprised of layers of permeable glacial drift which overlays a less permeable sandstone bedrock. There are no significant confining layers with the exception of the landfill itself and sediments associated with Black Pond. The confining nature of the solid waste is likely due to the degradation and consolidation which has occurred due to the age of the landfill. Section 3.5.1.3 discusses tests performed on wells to determine hydraulic conductivity. The significant permeability differences between wells screened in solid waste and those screened in natural soils provided strong support for the concept of the solid waste as a potential confining layer.

Aquifer parameters for the Study Area were derived from a number of different field tests. The former Municipal Well 5 pumping test data collected by GZA was re-analyzed. In addition, a comprehensive set of flow test and slug test-derived hydraulic conductivities were obtained from the Task 2 field tests.

3.5.1.1 Pumping Test Horizontal Hydraulic Conductivity

The Study Area overburden aquifer is best characterized in the area of MW5. Originally installed as an 8-inch diameter test boring in 1965, MW5 was redrilled as a 16-inch diameter production well in 1970. Two aquifer pumping tests were performed on the well; a 48-hour variable discharge test with one observation well, performed by Geraghty and Miller in 1970, and a 72-hour constant flow test with 17 observation wells, performed by GZA in 1987.

The 1970 pumping test found the transmissivity to be "in the range of 100,000 gpd/ft" as reported in the text of their results. The 100,000 gpd/ft was only an order of magnitude result, however, and in examining their data for Observation Well 20 (Geraghty and Miller, 1970), a value of 150,000 to 230,000 gpd/ft was calculated using the Cooper-Jacob method (described later in this report).

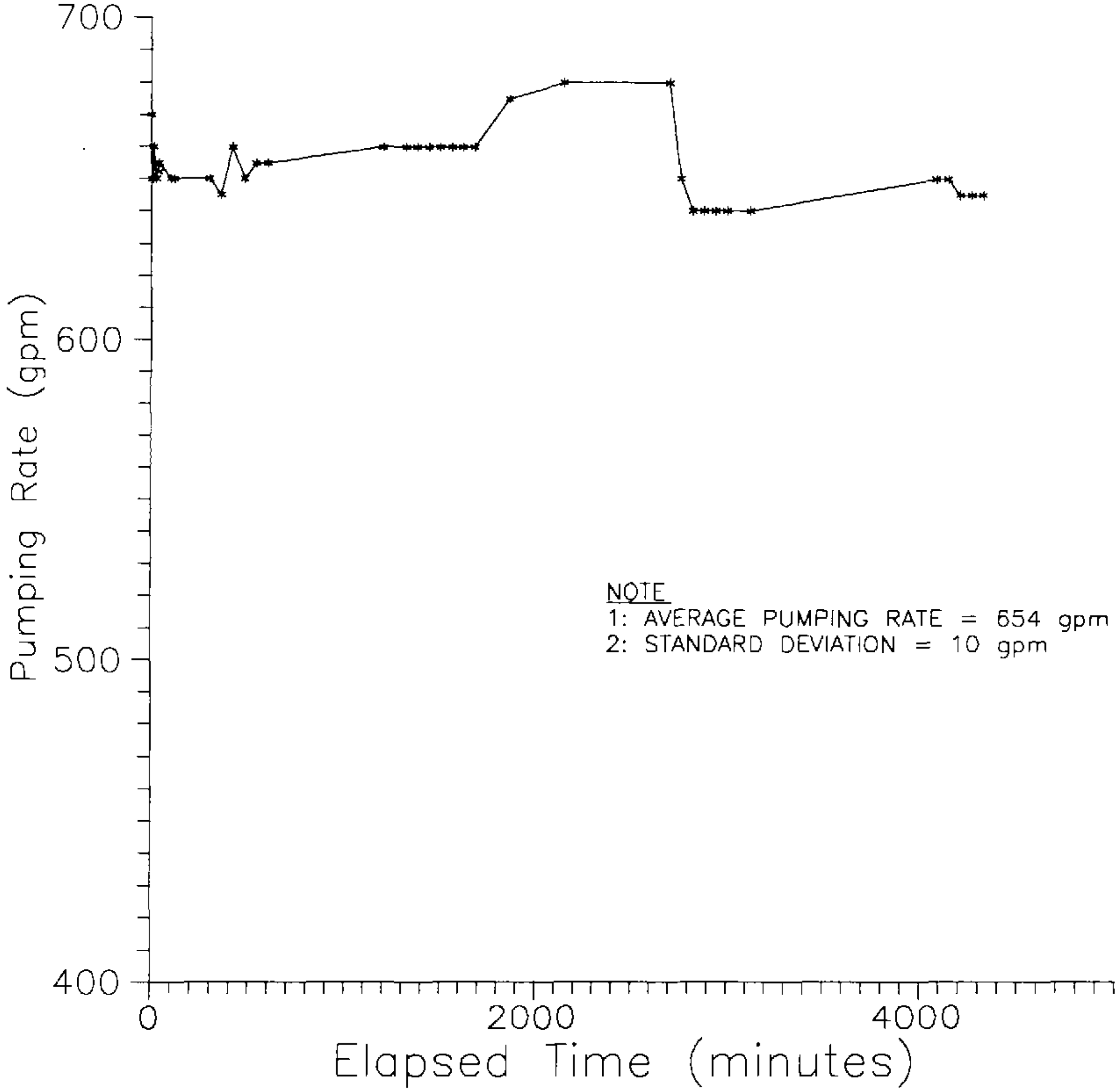
The 1987 GZA pumping test yielded hydraulic information over a larger part of the Study Area. The pumping well (MW5) was pumped for 3 days at a constant rate that averaged 650 gpm.

Hourly water level measurements were taken in the 17 observation wells during the test. The data from the GZA MW5 pumping test was reanalyzed for the RI using the program SUPRPUMP (Bohling and McElwee, 1992). SUPRPUMP uses the Gauss-Newton, or linearization, method to solve the nonlinear parameter estimation problem. SUPRPUMP analyzes multiple observation wells to obtain aquifer parameters that represent the whole data set. The methodology employs a matrix of sensitivities of the calculated drawdown at all observation points and times to the pumping test function parameters. This allows for the analysis of several observation wells at once. The monitoring wells within the Study Area intersect hydrogeologically similar material with depth, with the exception of isolated clay/silty clay lenses and the landfill solid waste.

The extraction pumping rate during the pump test was measured periodically and ranged between 640 and 680 gpm, as shown on Figure 3-7. The pumping rate was acceptably constant, without major fluctuations considering the magnitude of the pumping rate. The spatial (Cartesian) coordinates of each monitoring well relative to the pumping well were calculated using the most recent survey information available. The saturated thickness of the aquifer varies across the pumping test area. The pumping well is screened to the base of the glacial drift aquifer, approximately 60 feet below ground surface. In contrast, the depth to bedrock at GZ4D is approximately 140 feet below ground surface. The saturated thickness of the unconsolidated aquifer is given in Figure 3-8.

The time versus drawdown data measured during the pumping test is presented in Table 3-2, which shows data was collected generally every hour for a total of 3 days. The length of the pumping test provided an excellent approximation to steady state equilibrium by the end of the test, as shown in Table 3-2.

Additional wells screened in the landfill material itself were also monitored during the MW5 pumping test. Figure 3-9 shows a comparison of shallow wells B1 and B2 (which are screened in the solid waste) to shallow wells TW17S and GZ4S, approximately the same radial distance from the pumped well, respectively. Figure 3-9 shows that while there is hydraulic connection between the solid waste material and the aquifer at large, there is also significantly less hydraulic connection between wells screened in the landfill material and wells screened in the main

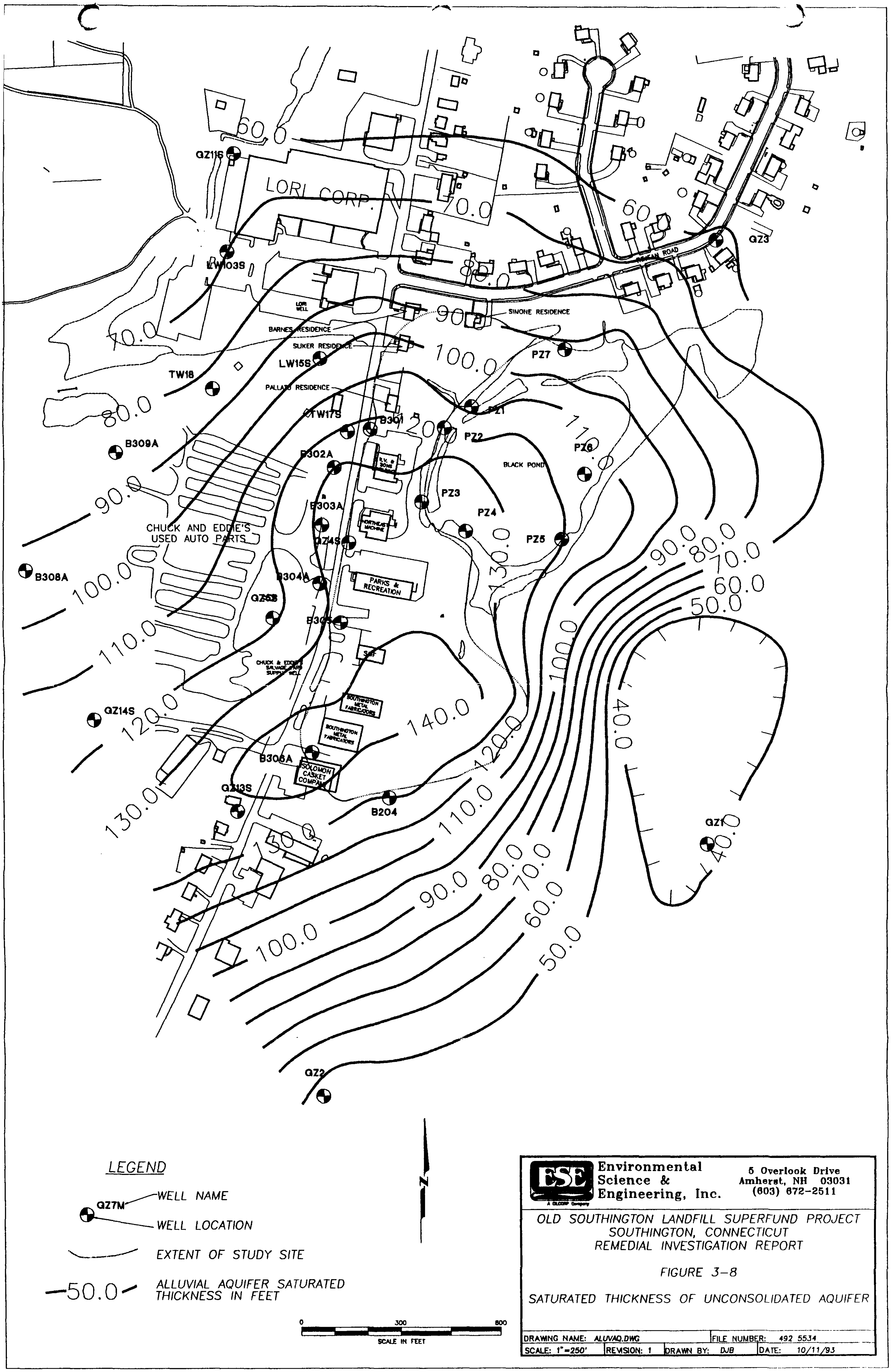


Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-7
PUMPING RATE VERSUS TIME
MW5 PUMPING TEST

DRAWING NAME: MW5TEST.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4/12/93



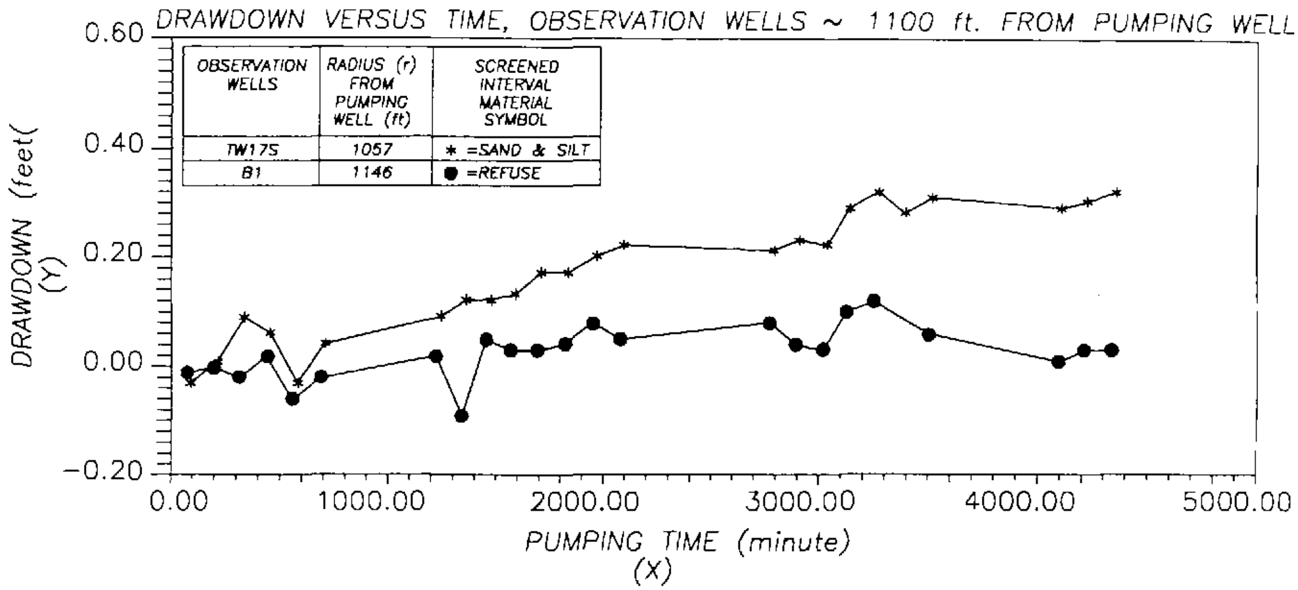
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

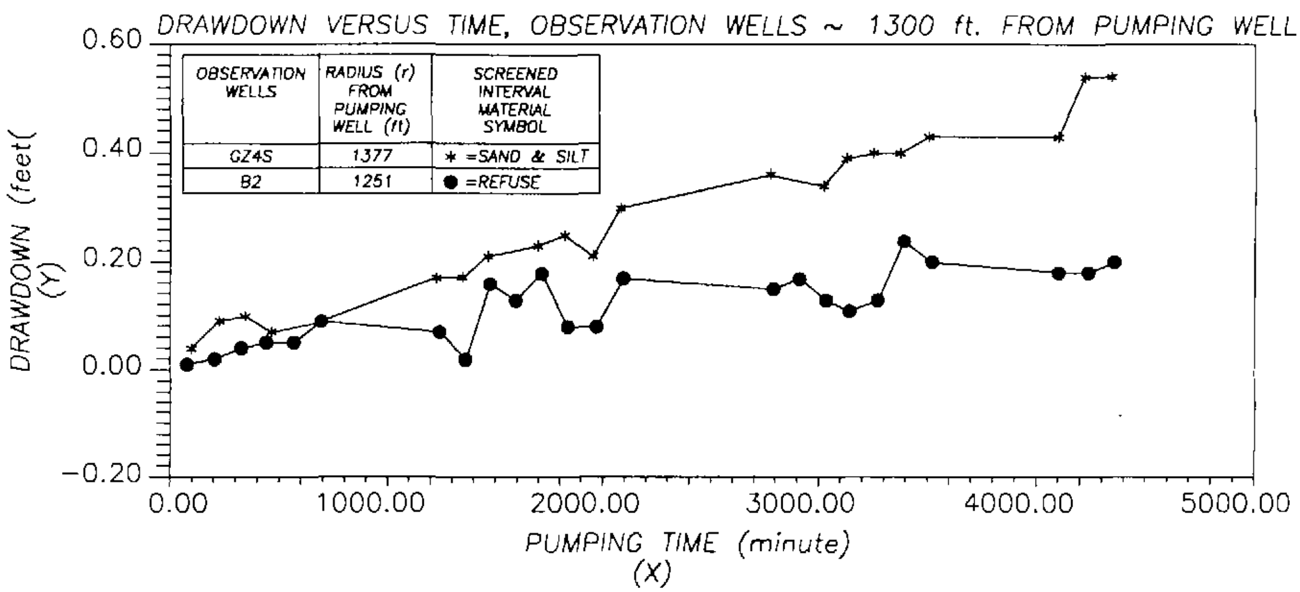
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-8

SATURATED THICKNESS OF UNCONSOLIDATED AQUIFER

DRAWING NAME: ALUVAQ.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=250'	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93





ESE
A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3–9
LANDFILL & NATURAL SEDIMENTS WELLS–DRAWDOWN VERSUS TIME DURING PUMPING TEST MW5

DRAWING NAME: Z.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93

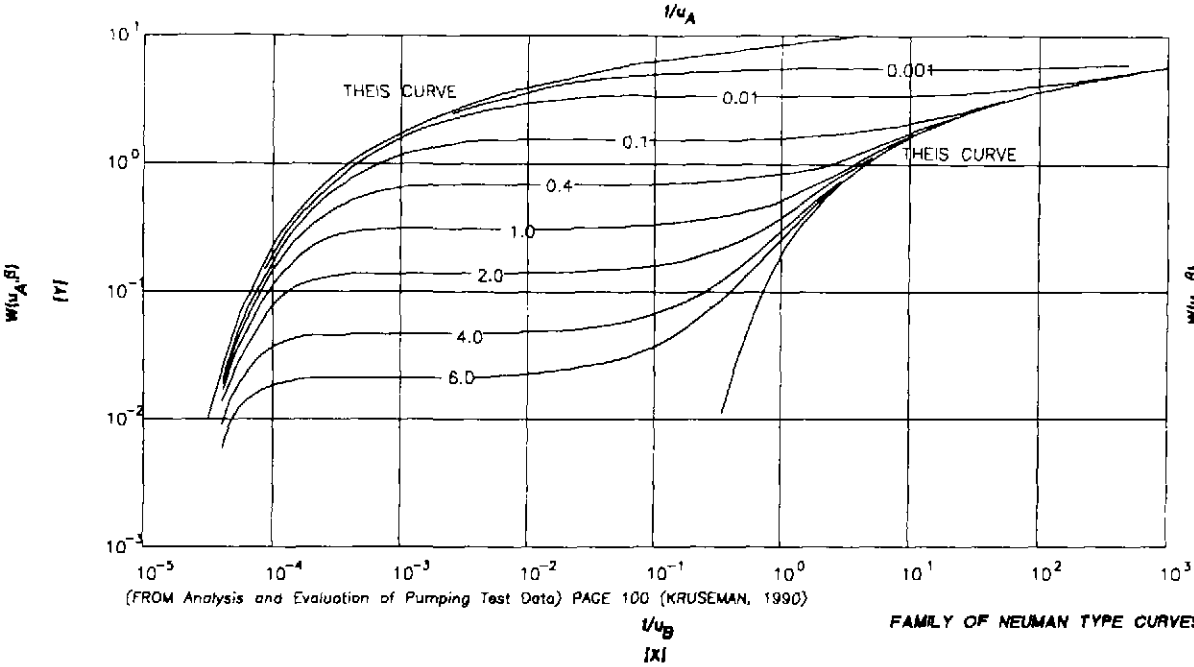
aquifer. Beneath the landfill the aquifer can therefore be conceptualized as having a confining layer as an upper boundary (the landfill with varying permeability, though the landfill is of limited lateral extent). Wells B1, B2 and B3 were therefore not included in the pumping test parameter analysis, since they are not as hydraulically connected to the main unconsolidated aquifer as the other observation wells shown in Figure 3-9.

The result of interpolating the water level measurements of all the observation wells used in the pumping test analysis to averaged measurement times is shown in Table 3-3. The water levels shown in Table 3-3 are almost exactly the same as those shown in Table 3-2. This is because the water level measurements for the measured wells were taken at approximately the same time for each water level round (within 1 hour of each other). Table 3-3 also provides a better comparison of the time-drawdown data during the MW5 pumping test.

There are no significant natural confining layers in the unconsolidated aquifer shown in the cross sections in the Study Area (with the exception of the landfill and Black Pond bottom sediments), so that the parameter analysis was performed assuming the aquifer is unconfined. Figure 3-10 shows two representative drawdown versus time plots from monitoring wells LW15D and LW103D, which are 760 and 390 feet from the pumped well, respectively. Also shown in Figure 3-10 are a set of Neuman type curves used for matching, with unconfined drawdown versus time data.

The S-shaped Neuman type curves show 3 distinct segments; a steep early-time segment (often just the first few minutes of the pumping test), a flat intermediate-time segment caused by the effects of dewatering that accompanies the falling water table, and a relatively steep late-time segment that shows the change to horizontal flow and conformance to the Theis curve as in the early time segment (Kruseman and de Ridder, 1990).

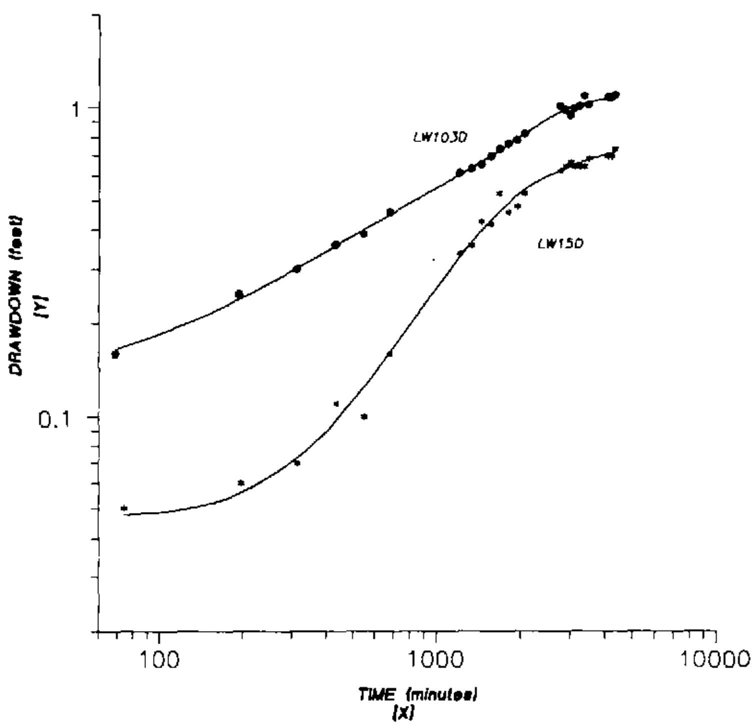
All of the first, and much of the second segments, of the time-drawdown curves are missing, as shown from the plots of LW15D and LW103D in Figure 3-10. This is because the first water level measurements were taken over one hour after the start of pumping, when most of the first and second segments of the curve would have been recorded.



(FROM Analysis and Evaluation of Pumping Test Data) PAGE 100 (KRUSEMAN, 1990)

FAMILY OF NEUMAN TYPE CURVES

DRAWDOWN VERSUS TIME
LW103D AND LW15D
PUMPING TEST MW-5



LEGEND

● OBSERVATION WELL LW103D

* OBSERVATION WELL LW15D

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-10
COMPARISON OF DRAWDOWN VERSUS TIME DATA
WITH FAMILY OF NEUMAN TYPE CURVES

DRAWING NAME: X.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4-12-93

Consequently just the late-time segment of the curve is available for analysis. The late time curves of LW15D and LW103D conform closely with The Theis curve, after approximately 1000 minutes into the pumping test, as shown in Figure 3-10. This enabled the late-time drawdown data to be analyzed by the Theis equation, yielding the transmissivity T and specific yield Sy of the aquifer (Kruseman and de Ridder, 1990).

The following correction (discussed in Kruseman and de Ridder, 1990) can be performed on the late-time drawdown data from fully screened observation wells that conform to the Theis curve:

$$s' = s - (s^2/2D) \qquad (1)$$

where

s' = corrected drawdown

s = observed drawdown

D = original saturated thickness of aquifer at the observation well.

Because there is essentially no vertical difference in the drawdown observed at the well clusters, an approximation to the fully screened constraint was met. This correction takes into account the decrease in aquifer thickness caused by drawdown in an unconfined aquifer. Table 3-4 shows the late-time drawdown data after this correction was applied for the aquifer thickness at each observation well. The correction made very little difference (less than 0.01 foot drawdown), as shown in Table 3-4.

As discussed in Murray et al. (1974), many authors have made criteria for determining the validity of analyzing unconfined data with the Theis method. If the observation wells meet the criteria, the results from using the Theis method for the analysis are indistinguishable from more exact analyses (as described by the Dupuit-Forcheimer equation, which accounts for the free surface, or unconfined water table). The general conclusion is that the Theis method should not be used on observation wells "close" to the pumped well, where "close" is defined as $r/h_o < 2$, where r is the distance of the observation well from the pumped well and h_o is the initial saturated thickness of the aquifer. Observation well CW-20 violates this criteria. Table 3-4 shows that observation well CW-20 was omitted.

A last consideration of partial penetration must be considered. The partial penetration of a pumping well influences the distribution of head in its vicinity, affecting the drawdown in nearby observation wells (Walton, 1962). The approximate distance r_{pp} from the pumped well, beyond which the effects of partial penetration are negligible, is given by (Walton, 1962):

$$r_{pp} = 2b\ (K_h/K_v)^{1/2} \tag{2}$$

where

K_h and K_v =	horizontal and vertical hydraulic conductivities, respectively, and
b =	aquifer thickness in feet.

The ratio of K_h/K_v is discussed in Section 3.5.1. Since the closest observation well to MW5 used in the analysis is 400 feet away (CW15), the effects of partial penetration will be negligible assuming K_h/K_v is less than 10.

The Theis method was then used to analyze the data set as a whole in the stochastic pumping test analysis program SUPRPUMP (Bohling et. al, 1991). Boundary conditions are implemented in SUPRPUMP using image well theory as discussed in Freeze and Cherry (1979). The unconfined aquifer was also represented in the SUPRPUMP analysis both with and without constant head boundary conditions 2000 feet from the pumped well. Constant head boundary conditions would provide a close approximation to what was observed during the test (GZ4S, GZ4M and GZ4D had just 0.20 feet of drawdown at the end of the test at approximately 1300 feet from pumped well MW5).

An effective radius of 1.0 foot was used to take the gravel pack of production well MW5 into account (the borehole size was 2 feet in diameter). All 13 monitoring wells shown in Table 3-4 were analyzed at once in SUPRPUMP, to obtain the best common value of T and S (Storage Coefficient). The constant flow pumping rate used in the analysis was the average 654 gpm, as shown in Figure 3-7. The observation well distances from MW5 were calculated from the surveyed coordinates of the wells.

Black Pond was considered a possible constant head boundary at approximately 2000 feet from pumped well MW5. Constant head boundaries were included at 2000 feet from the pumping well in the analysis as presented in Appendix D. The constant head boundaries made very little difference in the solution, however. Consequently, constant head boundaries are not considered in the final results.

The final results of the parameter values T and S, with approximate 95% confidence intervals are:

	Value	Upper Bound	Lower Bound
T (gpd/ft)	196,000	209,000	183,000
K (ft/day)	260	280	240
S	.050	.053	.046

where K, the hydraulic conductivity, was calculated assuming an average aquifer thickness of 100 feet. The storage coefficient S is essentially the specific yield of the unconfined aquifer, assuming a small storage coefficient from the missing early time data (Kruseman, 1990). The monitoring well drawdown data is in good agreement based on the relatively tight confidence intervals listed above. The SUPRPUMP output file shown in Appendix D, uses a length unit in feet and a time unit in days.

Hydraulic conductivity for the Study Area based on this analysis, can be estimated using an average alluvial aquifer thickness. Figure 3-8 shows that a good representative alluvial aquifer thickness would be 100 feet, hence the pumping test K is approximately 260 feet/day.

Distance drawdown analysis was also performed using the last round of drawdown measurements (collected just before the pump was shut off), along with the distance of each monitoring well from pumped well MW5. The distance drawdown method is presented in Driscoll (1986) and is based on the Cooper and Jacob (1946) modification to the Theis (1935) equation. The method is also called the Cooper-Jacob method.

Distance drawdown analysis assumes a homogeneous aquifer, which is a good assumption for the wells used in the analysis of the Study Area. The procedure involves a semilog plot of simultaneous drawdown measured at various distances from the pumping well. The drawdown data should plot as a straight line. The slope of the line and the intercept with the zero drawdown axis are used in the calculation of T and S according to the following equations (Driscoll, 1986):

$$T = \frac{528Q}{\Delta s} \quad and \quad S = \frac{0.3Tt}{r_0^2} \qquad (3)$$

where

T =	transmissivity (gpd/ft.)
Q =	pumping rate (gpm)
Δs =	change in drawdown (slope of the line) over 1 log cycle (ft)
S =	storage coefficient (dimensionless)
t =	time since pumping started (days)
r_0^2 =	intercept of line with zero drawdown axis (ft)

This method is strictly applicable in situations where the value of u from the Theis equation is less than approximately 0.05, according to the following equation (Driscoll, 1986):

$$u = \frac{1.87\ r^2\ S}{Tt} \qquad (4)$$

where: r=radial distance from pumping well to observation well (feet), and S,T and t are as stated previously. Monitoring wells GZ4S, GZ4M, and GZ4D are over 1300 feet from the pumped well, which violates equation (4), so they were not included in the analysis.

Figure 3-11 shows the distance-drawdown plot for the MW5 pumping test. Linear regression was used to fit the line through the data. Calculations for T and S by the Cooper-Jacob method are presented on Figure 3-11. The value of T and S from this method are 138,000 gpd/ft and 0.062, respectively, which is in good agreement with the results of the Theis analysis.

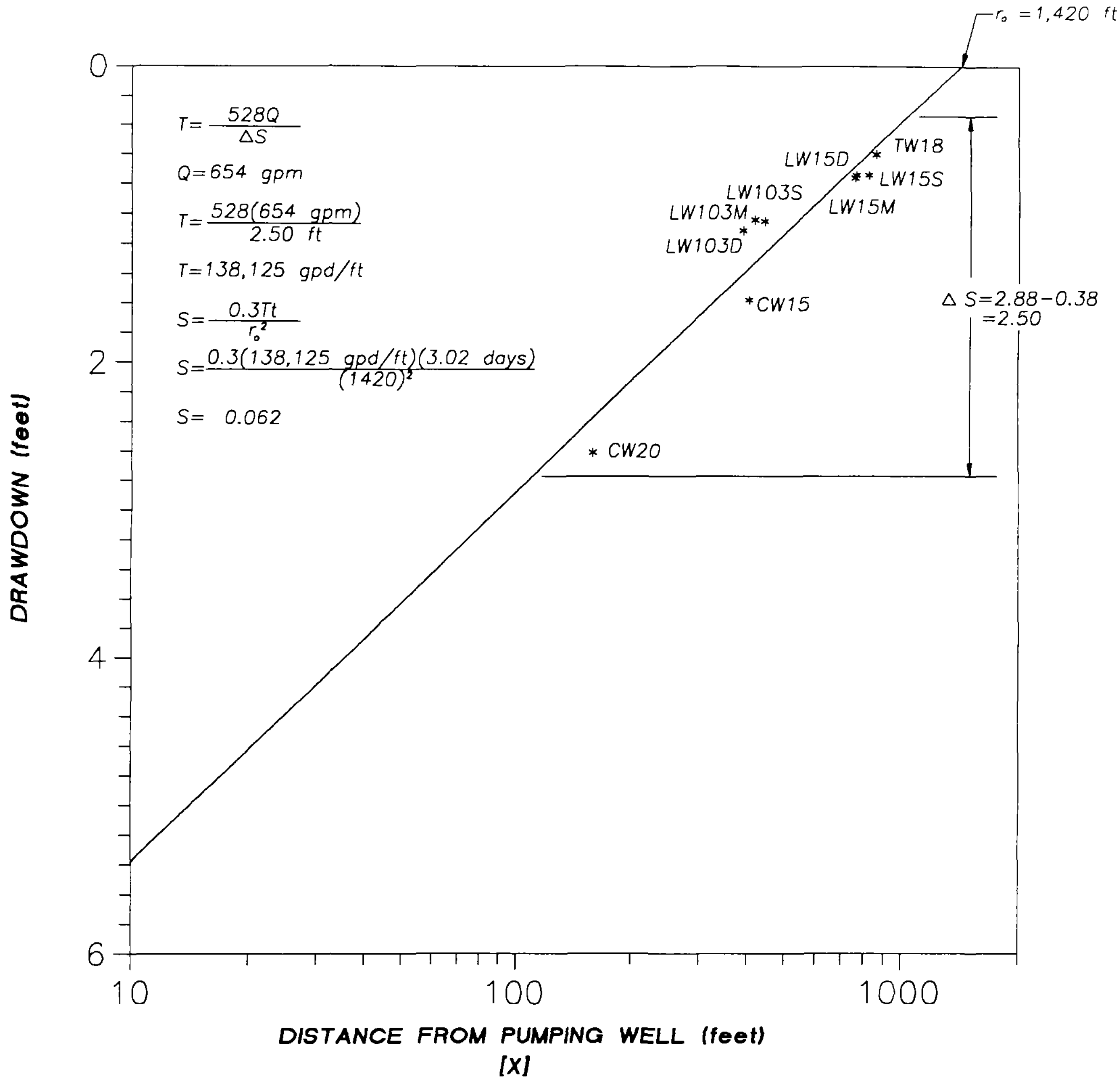
3.5.1.2 Flow Test Horizontal Hydraulic Conductivity

Hydraulic conductivity values were also calculated for the medium and deep monitoring wells using data collected during monitoring well purging, just prior to sampling of the wells.

The field procedure for collecting this data, termed flow test data, began with measuring the static water level in the well to be purged, submerging a pump at least several feet into the well water, and waiting for the water level to re-equilibrate.

After the water level recovered to its static level, the pump was started, and measurements of pumped well water level and pumping rate were taken at regular time intervals (though only a few measurements are necessary for the analysis, near the end of the purging). The pumping rate was adjusted for the falling head above the pump to maintain a constant flow rate.

The pumped well water levels generally ceased to drop at what is termed an approximate steady state condition (Kruseman and de Ridder, 1990). A sample flow test plot of drawdown versus time for well B309C is shown in Figure 3-12. The well achieved a good approximation to



LEGEND

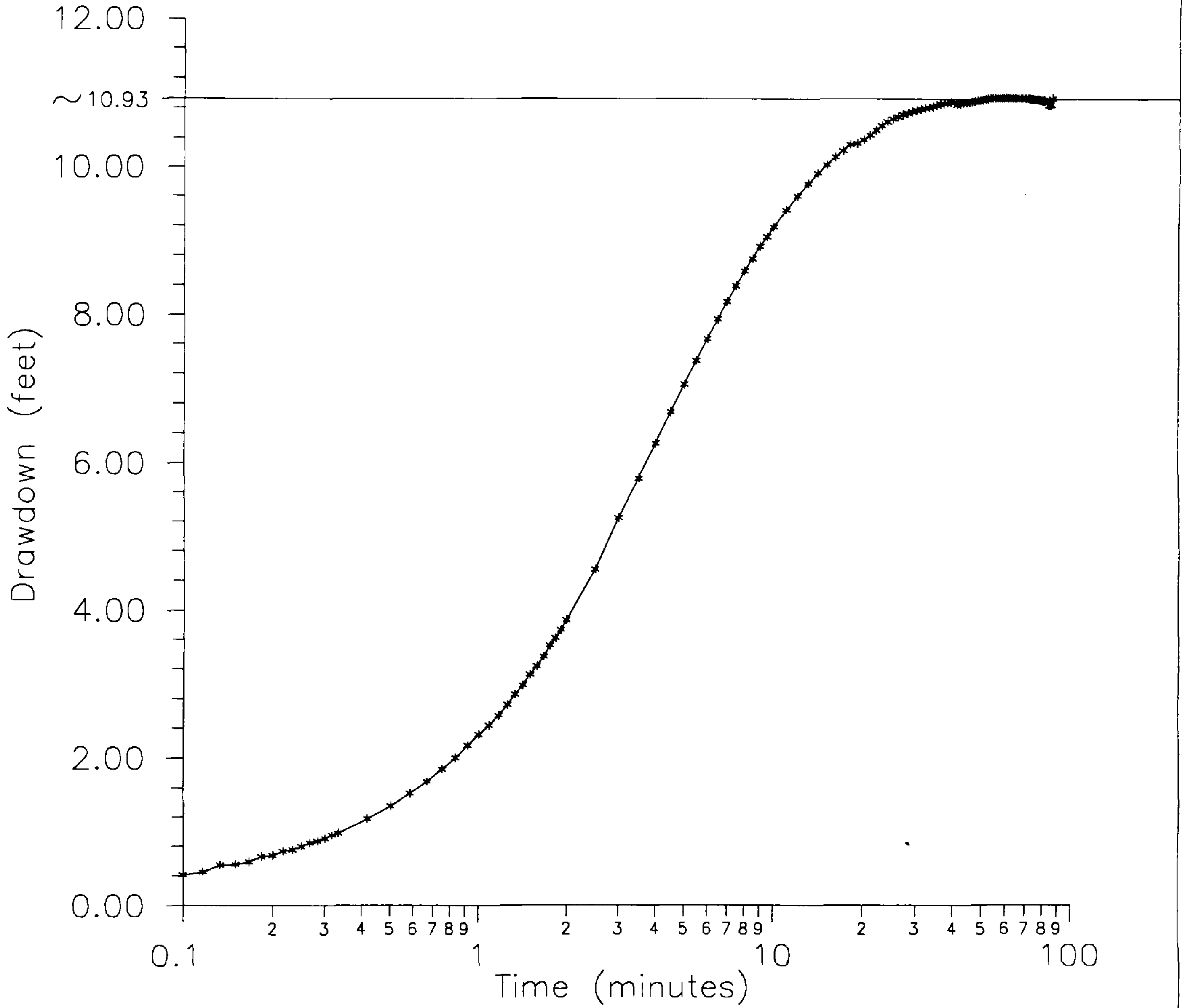
* LW20 OBSERVATION WELL
MW5 PUMPING TEST (GZA)

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-11
DISTANCE VERSUS DRAWDOWN PLOT
MW5 PUMPING TEST

DRAWING NAME: DIST.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4-12-93



ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-12
B309C PUMPED WELL DRAWDOWN VERSUS TIME
SHOWING ATTAINMENT OF STEADY STATE CONDITIONS

DRAWING NAME: B309C.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4/12/93

equilibrium (approximate steady state) after 50 minutes of pumping. Typically approximate steady state was achieved much sooner, after 10 to 20 minutes of pumping. The data for the flow tests is tabulated in Appendix E.

The steady state pumped well drawdown allows the hydraulic conductivity to be derived from the solution to the boundary value problem of steady flow to a partially penetrating well, as described in Hantush (1964). The solution to this case was implemented by an in-house computer program, WELFLO.

The correction to the data resulting from unconfined flow for fully penetrating wells was presented in equation (1). The corrected drawdown, $\acute{S}$, for the partially penetrating wells screened in the unconfined aquifer is given by (Hantush, 1964):

$$\acute{S} = S - \frac{S^2}{2L} \tag{5}$$

where S = uncorrected drawdown
L = depth to bottom of screened interval, measured from the water table.

This correction was applied to the flow test data prior to analysis. The results of the steady state WELFLO analysis are presented in Table 3-5.

The radius of influence of each flow test is also presented in Table 3-5. This was calculated using a formula developed by Streltsova (1988), as discussed in Butler (1990):

$$R = \sqrt{(14.8)\ Tt/S} \tag{6}$$

R was calculated using S = 0.05 from the pumping test results, and time of pumping (t) and T from each flow test result as shown in Table 3-5.

The hydraulic conductivity values for the wells analyzed from the flow test data almost invariably have lower K than the pumping test-derived K. The main exception to this is MW5, which was analyzed with the WELFLO solution. This exception can be explained best by the much larger area of influence developed by pumping test MW5 as shown by R in Table 3-5.

The MW5 pumping test stressed the measured extent of the alluvial aquifer from the pumped well, approximately 2000 feet, though the theoretical (Streltsova, 1988) value listed in Table 3-5 is 5000 feet. Groundwater probably flows along preferred bands of alluvial material only averaged into each specific flow test K, which would explain the differences in K between the pumping test and the flow tests.

A second explanation for the large differences in K between the pumping test value and the flow test values could be ascribed to presence of a well skin at the monitoring wells (differences in well screen, well construction and well development), which can greatly influence the pumped well drawdown (Butler, 1990). Greater pumped well drawdown due to a well skin would cause a smaller K value.

In any case, the trends in hydraulic conductivity calculated from the flow test data show that K decreases with depth. This fact is best seen by examining the cross-sections where K is placed by each screened interval where a flow test was performed. The most likely explanation for this decrease in K is an increase in compaction of the glacial drift with depth.

There were some cases where steady-state flow to the pumped well was not achieved during purging. In these cases the transient data was analyzed using the Cooper-Jacob (or modified

Theis) method. This method is a variation of the distance drawdown method discussed in Section 3.5.1.1, with the same constraints that $u < .05$.

The Cooper-Jacob method of analysis is a function of the transmissivity of material in the front of the cone of depression caused by the flow test. The transmissivity calculation is independent of the material between the radius of the cone front and the pumping well when the Cooper-Jacob method is used. The Cooper-Jacob method has the advantage of being independent of a well skin or any well losses (Butler, 1990). A sample pumping well drawdown versus time graph is shown in Figure 3-13 for monitoring well B306B, along with the calculations for T. Well storage effects are shown in the earlier portions of the time-drawdown plot.

The transmissivities analyzed in this way are shown in Table 3-5 under the heading Tcj (Cooper-Jacob T). The remaining Cooper-Jacob plots and calculations are presented in Appendix E.

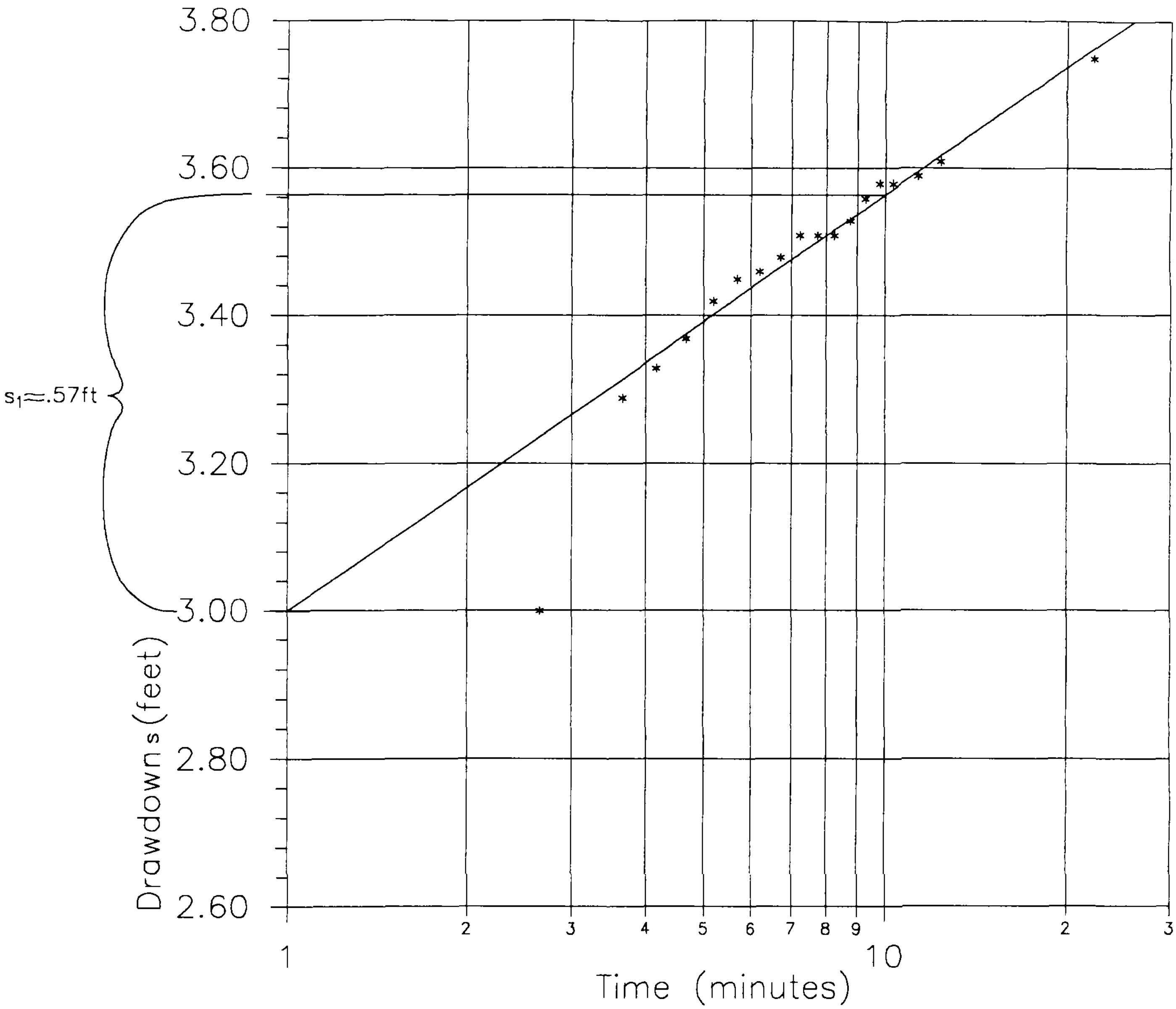
3.5.1.3 Slug Test Horizontal Hydraulic Conductivity

Bouwer and Rice (1976) developed an analysis for slug tests in partially penetrating wells screened in unconfined aquifers such as the shallow monitoring wells in the Study Area. The equation for hydraulic conductivity K is given by

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2L} \frac{1}{t} \ln \frac{y_o}{y_t} \qquad (7)$$

where

K =	hydraulic conductivity
r_c =	well radius
R_e =	extent of cone of depression
r_w =	borehole radius



$$T_{cj} = \frac{264Q}{s_1}$$, where Q = pumping rate in gpm
s_1 = drawdown in feet for one log cycle

$$T = \frac{264\ (3.5)}{.57\ \text{ft}} = 1620\ \text{gpd/ft}$$

ESE Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT
FIGURE 3-13
DETERMINATION OF T FROM PUMPING WELL DRAWDOWN VERSUS TIME DATA USING THE COOPER-JACOB METHOD: PUMPED WELL B306B

DRAWING NAME:	B306B.DWG			FILE NUMBER:	492 5534		
SCALE:	N.T.S.	REVISION:	0	DRAWN BY:	DJB	DATE:	4-12-93

y_o = water level displaced by slug
y_t = water level at time t
t = elapsed time
l = saturated length of screened interval

The term ln(Re/rw) relates to the well geometry by the empirical equation

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B \ln\left[(D-H)/r_w\right]}{L/r_w} \right]^{-1} \qquad (8)$$

where

A = dimensionless empirical coefficient
B = dimensionless empirical coefficient
D = aquifer thickness
H = depth to base of screened interval measured from water table and other variables are as previously defined

where H is the depth of the bottom of the screened interval below the water table, D is the initial estimated thickness of the aquifer. The well geometry (screen length and borehole radius) is accounted for by dimensionless coefficients A and B, presented as empirical plots in Bouwer and Rice, 1976.

Slug tests were performed on the shallow observation wells that contained minimal amounts of water and could not be adequately pumped for the steady-state flow test approach. The data collection procedure for the Bouwer and Rice analysis is to lower a slug (in this case a length of metal pipe) into the well and allow the water level to equilibrate to its previously measured static level. The slug is removed and water level rise is rapidly measured with a pressure transducer.

An example of the data from this procedure is shown in Figure 3-14. The straight-line portion of the plot represents the aquifer response of interest. The straight-line intercept with the drawdown axis represents the initial water level displaced by the slug (y_o). After choosing a point t, y_t along the line, as shown in Figure 3-14, K is calculated from equation (6).

Table 3-6 shows the results of the Bouwer and Rice slug test analysis calculated from the shallow-well slug test data in the Study Area, along with the parameters used in the calculations. The K values derived in this way are also shown on the geologic cross-sections (Plates 3-2 through 3-9).

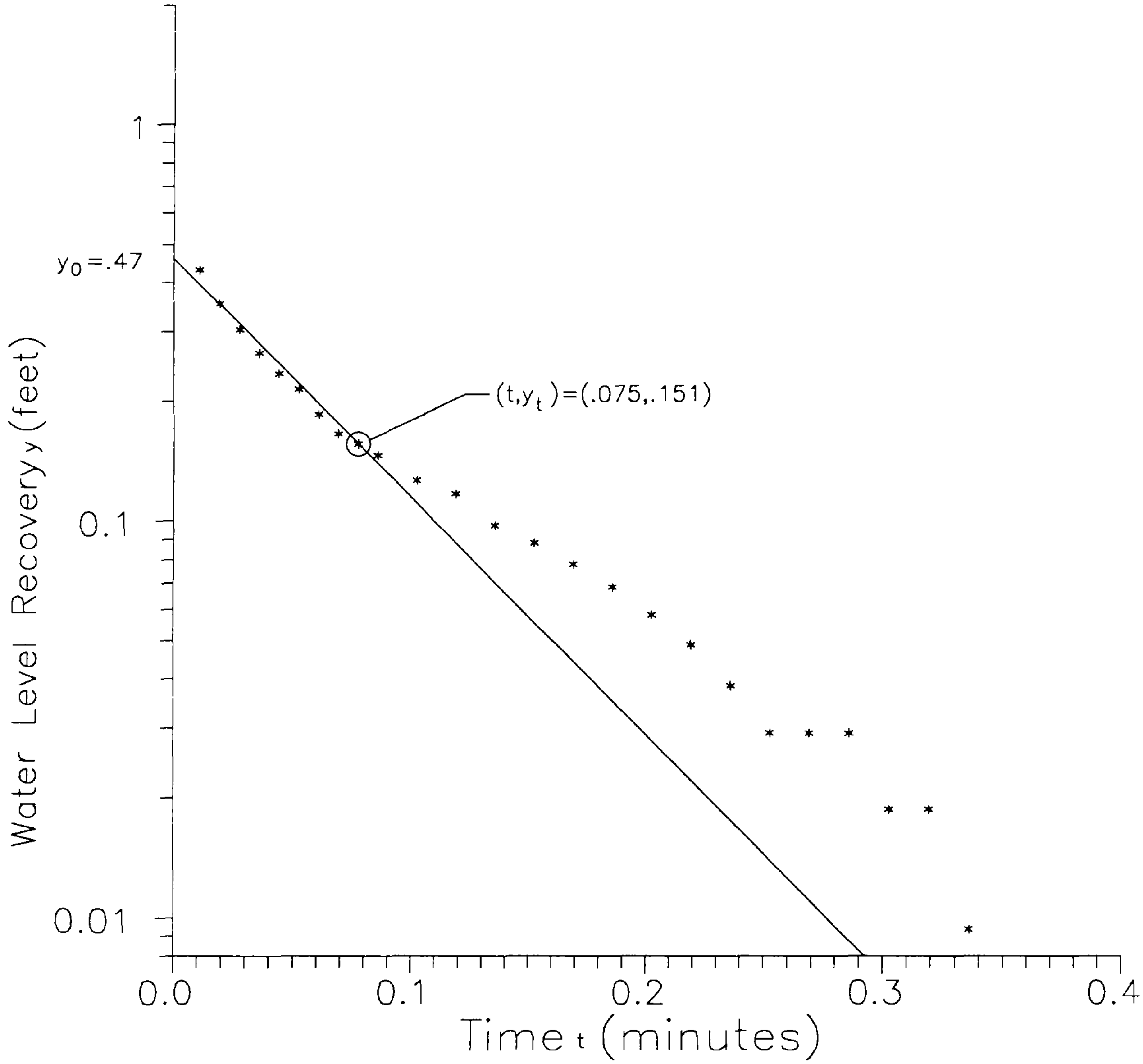
The results show that the two wells with the lowest K values, B2 and B4, are both screened in the solid waste.

The remainder of the plots used to derive K values for the Bouwer and Rice method are presented in Appendix F.

3.5.1.4 Vertical Hydraulic Conductivity

Vertical hydraulic conductivity, calculated from pumping tests conducted in Wisconsin glacial drift, is discussed by Weeks (1969). Although the field data required for this analysis was not available for the Study Area, the stratified glacial drift analyzed in the Weeks (1969) paper is probably similar to the stratified glacial drift in the Study Area. Transmissivity in the Weeks (1969) paper ranged from 11,000 to 180,000 gpd/ft, which is comparable to the values calculated above for the Southington site. Weeks cites ratios of horizontal to vertical permeability from 5 aquifer tests that range from 2 to 20.

An approximate saturated-induced vertical flow rate for the unsaturated surficial sediments was provided by the steady-state infiltration rates of the double-ring infiltrometer tests. Although these tests do not allow the calculation of unsaturated hydraulic conductivity, which varies with soil moisture content, a reasonable idea of the variation in vertical flow rates of the alluvial material is shown by the inner ring of this apparatus. The details of the double ring infiltrometer are described in the ASTM Standards, 1984.



Environmental Science & Engineering, Inc.
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-14
GZ14S SLUG TEST WATER LEVEL RECOVERY VERSUS TIME: BOUWER AND RICE METHOD

DRAWING NAME: GZ14S.DWG		FILE NUMBER: 492 5534	
SCALE: NONE	REVISION: 0	DRAWN BY: DJB	DATE: 4-12-93

Figure 3-15 shows the range of inner ring infiltration rates. If the outer ring is assumed to provide sufficient saturation so that the inner ring is not influenced by horizontal flow into the soil, Darcy's law can be written for the vertical infiltration of water from the inner ring.

Because gradient is not measured in this procedure, saturated K cannot be calculated. This procedure does, however, give reasonable saturated infiltration rate ranges for estimating groundwater recharge. The infiltrometer test results are presented in Appendix G.

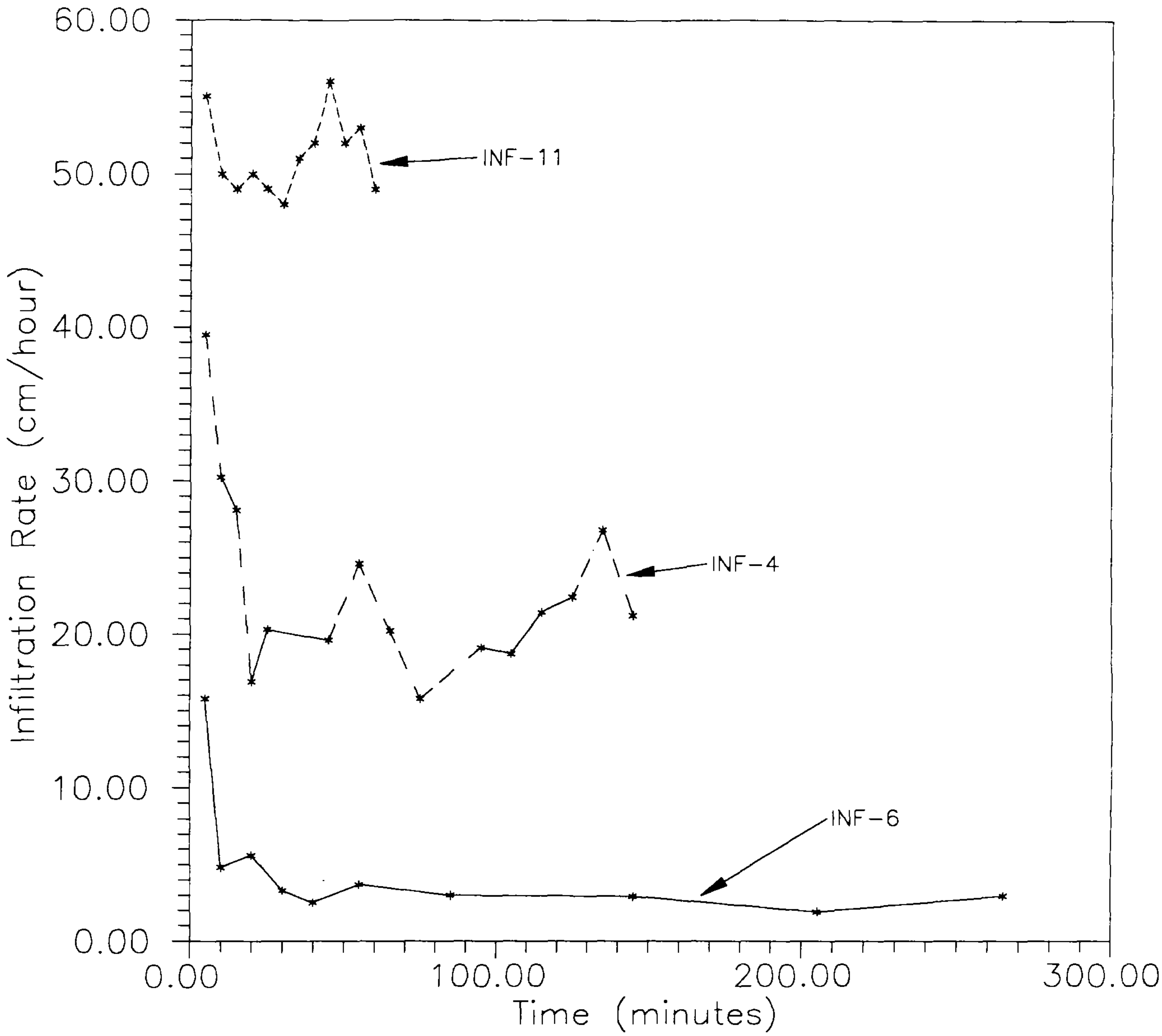
3.5.2 Groundwater Flow

The groundwater flow patterns in the Study Area were analyzed for both horizontal and vertical flow. Groundwater flow in the Study Area is best defined by the 1992 and 1993 (recent) water level data. Greater numbers of wells, in particular the additions of well clusters B308 and B309, allow for a more accurate depiction of the potentiometric surface (water level surface).

To further augment the monitor well water level data, a plot of depth to water (below land surface) versus ground surface elevation was made, as shown in Figure 3-16. This plot relates the terrain features to water level, so that some of the ground surface contours could be used in determining the potentiometric surface at the boundaries.

As is shown in Figure 3-16, the terrain elevation is closely related to 11/18/92 water level elevation, with the exception of monitoring wells screened in the solid waste. These wells describe the perched water table above the landfill and were not included in the fitted function for determining water level from land surface elevation. In addition, this function only applies to land surface contours in the immediate vicinity of the Study Site.

Figures 3-17, 3-18 and 3-19 show the potentiometric surfaces derived from the shallow, medium and deep monitoring well water levels for 11/18/92. The horizontal groundwater flow direction is indicated on these plots with bold face flow lines.



Environmental Science & Engineering, Inc.

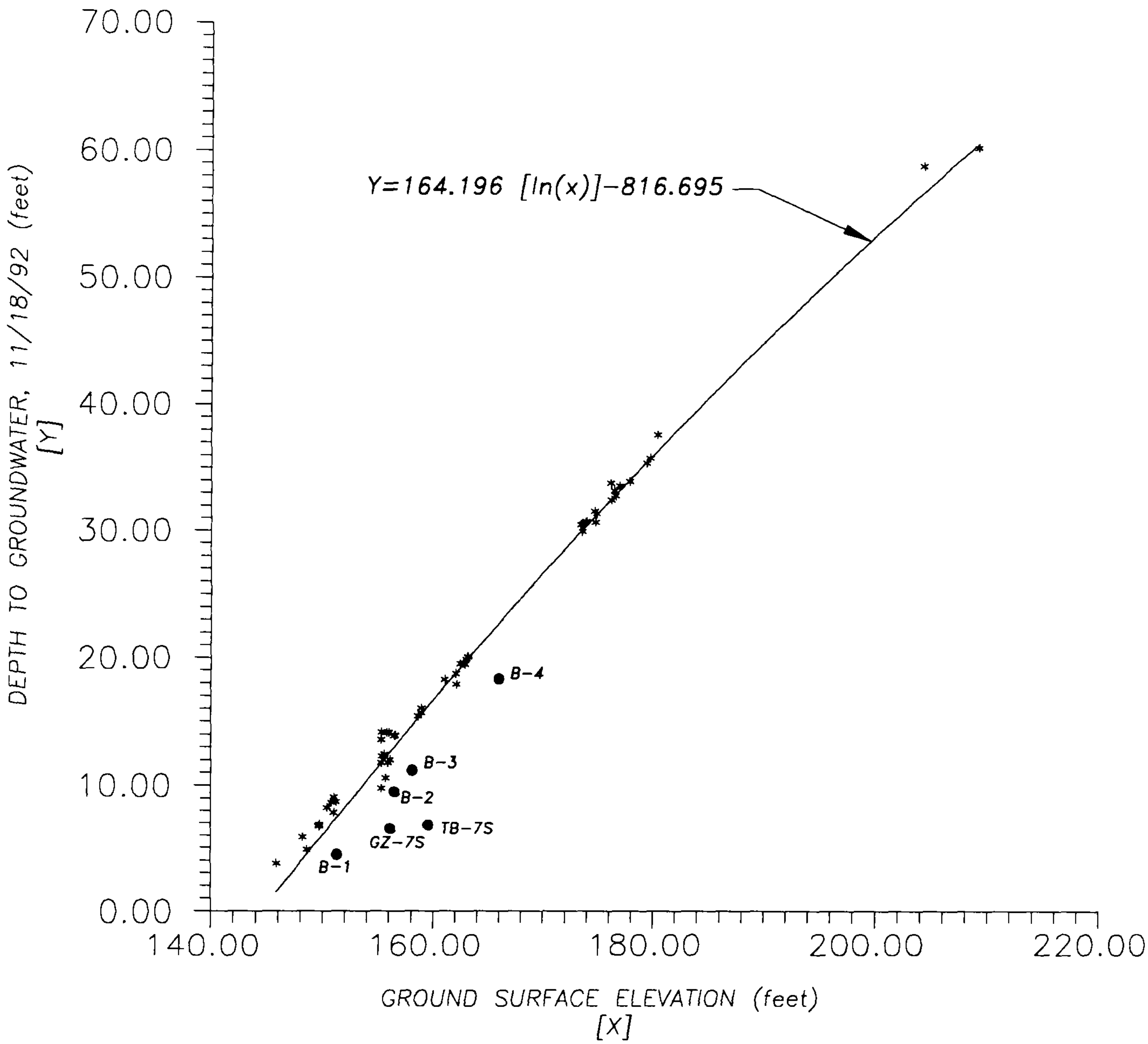
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-15
DOUBLE RING INFILTROMETER RESULTS:
INNER RING INFILTRATION VERSUS TIME

DRAWING NAME: RINGRATE.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4/12/93



LEGEND

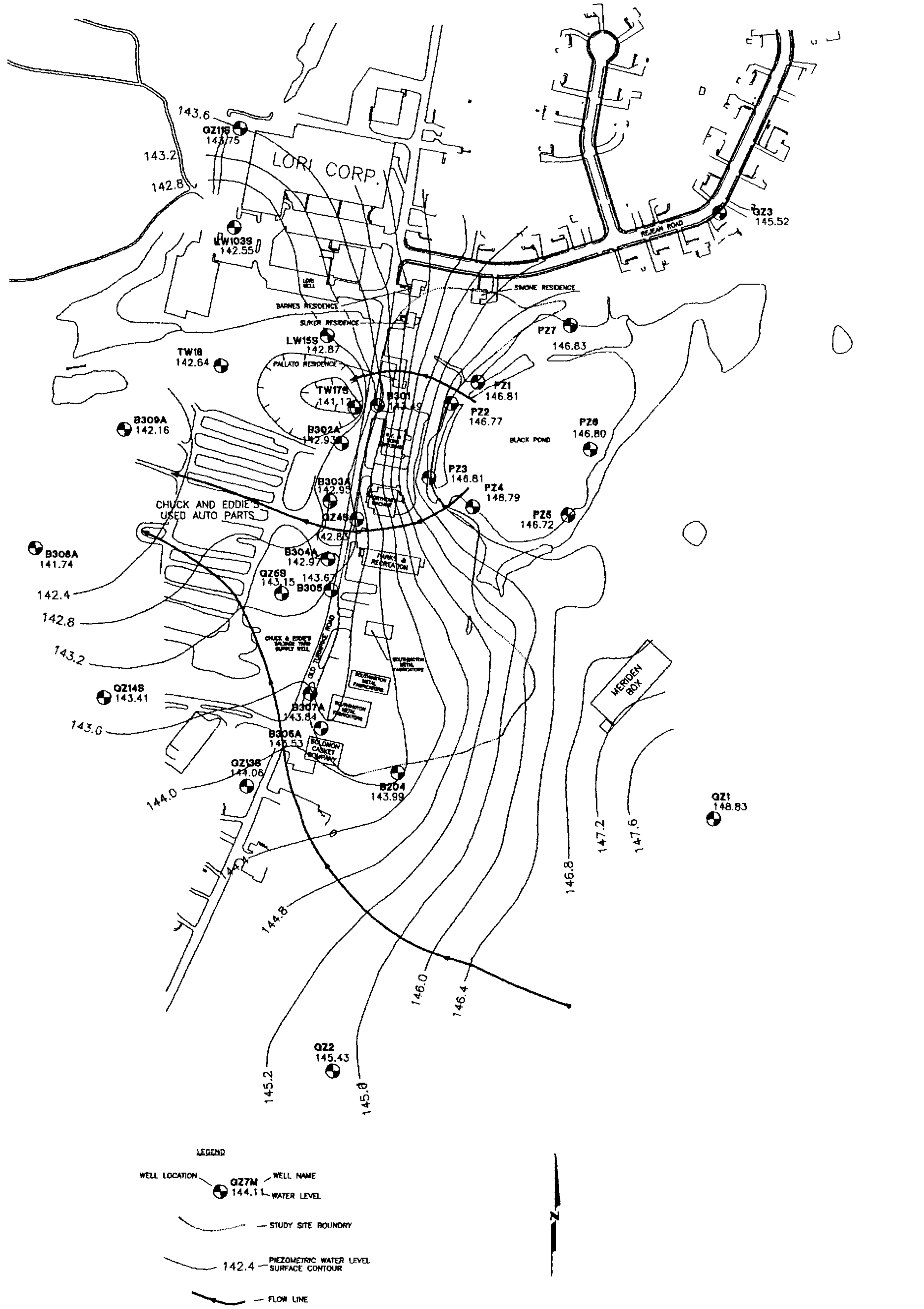
● B-4	MONITORING WELL SCREENED IN THE LANDFILL
*	MONITORING WELL

ESE A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-16
CALIBRATION OF GROUND SURFACE TO GROUNDWATER ELEVATION IN SITE AREA

DRAWING NAME: G.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4-12-93



Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

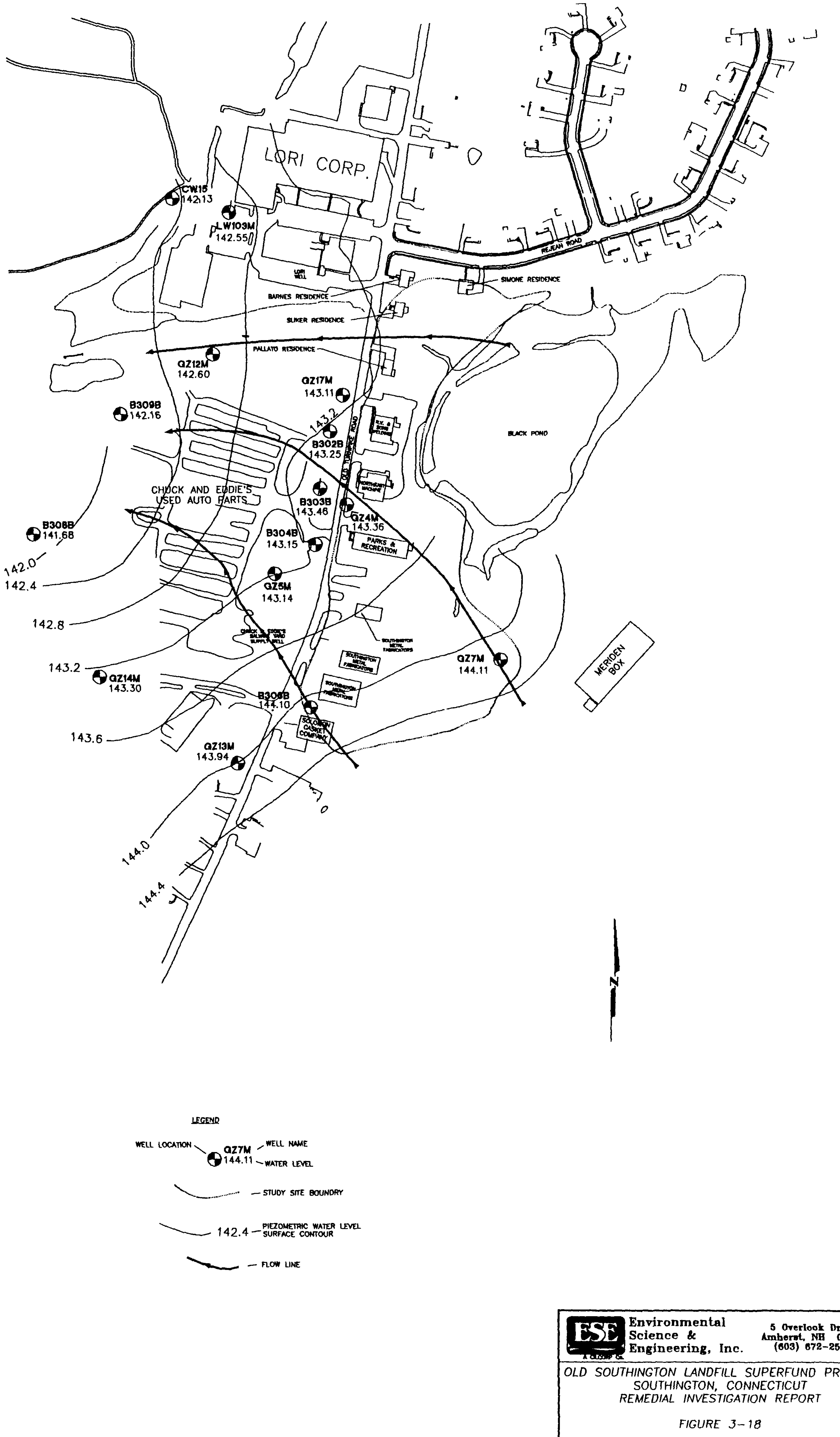
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-17

SHALLOW GROUNDWATER LEVEL CONTOURS

DRAWING NAME: SHAL-B.DWG	FILE NUMBER: 492 5534		
SCALE: 1"=300'	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/91

0 50 200 400
SCALE IN FEET



ESE Environmental Science & Engineering, Inc.
A CILCORP Co.

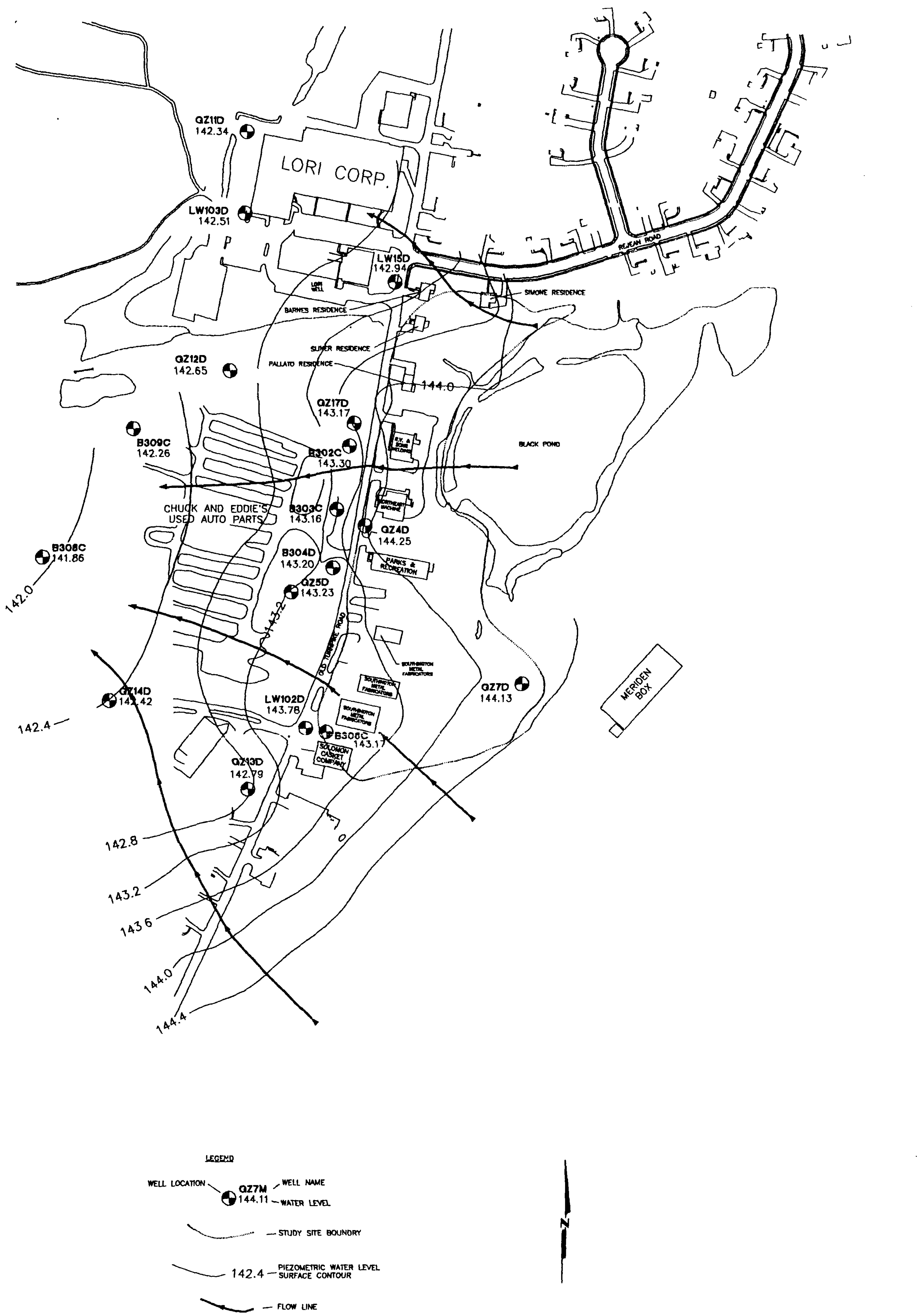
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

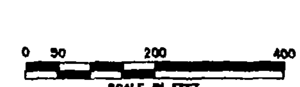
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-18

MEDIUM GROUNDWATER LEVEL CONTOURS

DRAWING NAME: MEDI-B.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=300'	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93





ESE Environmental Science & Engineering, Inc.
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3–19

DEEP GROUNDWATER LEVEL CONTOURS

DRAWING NAME:	DEEP-B.DWG		FILE NUMBER:	492 5534
SCALE: 1"=300'	REVISION: 1	DRAWN BY: DJB	DATE:	10/11/93

The medium and deep potentiometric surfaces show a more gradual horizontal gradient, whereas the shallow water levels are dominated by Black Pond and its lower conductivity sediments, as is discussed later in Section 3.5.4.

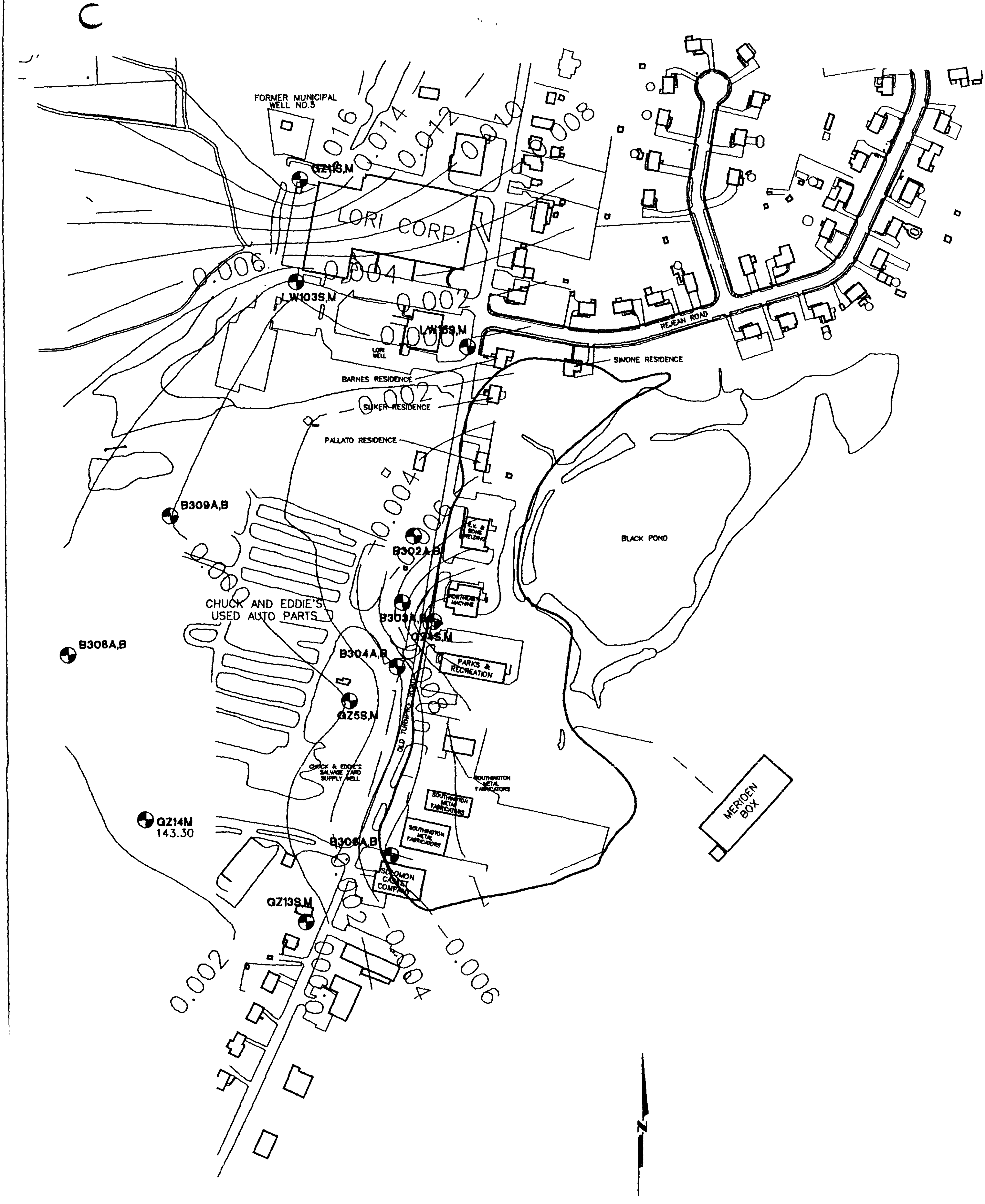
Vertical gradient was obtained and averaged for the 3 water level measurement dates shown in Table 3-7. Because the observation well clusters are generally separated into 3 depth zones (shallow, medium and deep), two gradient maps were created from Table 3-7. The shallow-to-medium gradient plot is presented in Figure 3-20 and the medium-to-deep gradients are presented in Figure 3-21. Positive gradient contours indicate downward flow.

There were no significant changes in the vertical head difference from the comparison of the 3 sets of water level measurements, usually less than 0.1 foot. Most of the well clusters maintained the gradient flow direction throughout the data sets, so that upward flowing and downward flowing areas usually persisted throughout the measurements. The averaged vertical gradients, therefore, give a good indication of the natural vertical gradients in the Study Area.

The shallow-to-medium vertical gradient plot (Figure 3-20) shows an upward gradient just west of Old Turnpike Road. This can be explained by shallow groundwater flowing under the landfill, a small confining layer, and discharging just west of the Study Site. The two-dimensional, vertical groundwater flow model developed as part of the FS shows similar upward flow at the downgradient end of the Study Site. The upland areas show downward gradients, as would be expected.

In contrast, the medium-to-deep vertical gradient plot (Figure 3-21) does not have the upwelling feature just west of Old Turnpike road. A large downward gradient exists near the southern portion of the Study Site. This gradient reduces toward the northwest and represents the more regional flow pattern, which shows only a slightly downward gradient in this region. The vertical gradients near the well clusters B308 and B309 are essentially zero.

C



LEGEND:

EXTENT OF STUDY SITE

NOTE:

1: POSITIVE GRADIENT INDICATES DOWNWARD FLOW

2: NEGATIVE GRADIENT INDICATES UPWARD FLOW

0 50 200 400
SCALE IN FEET

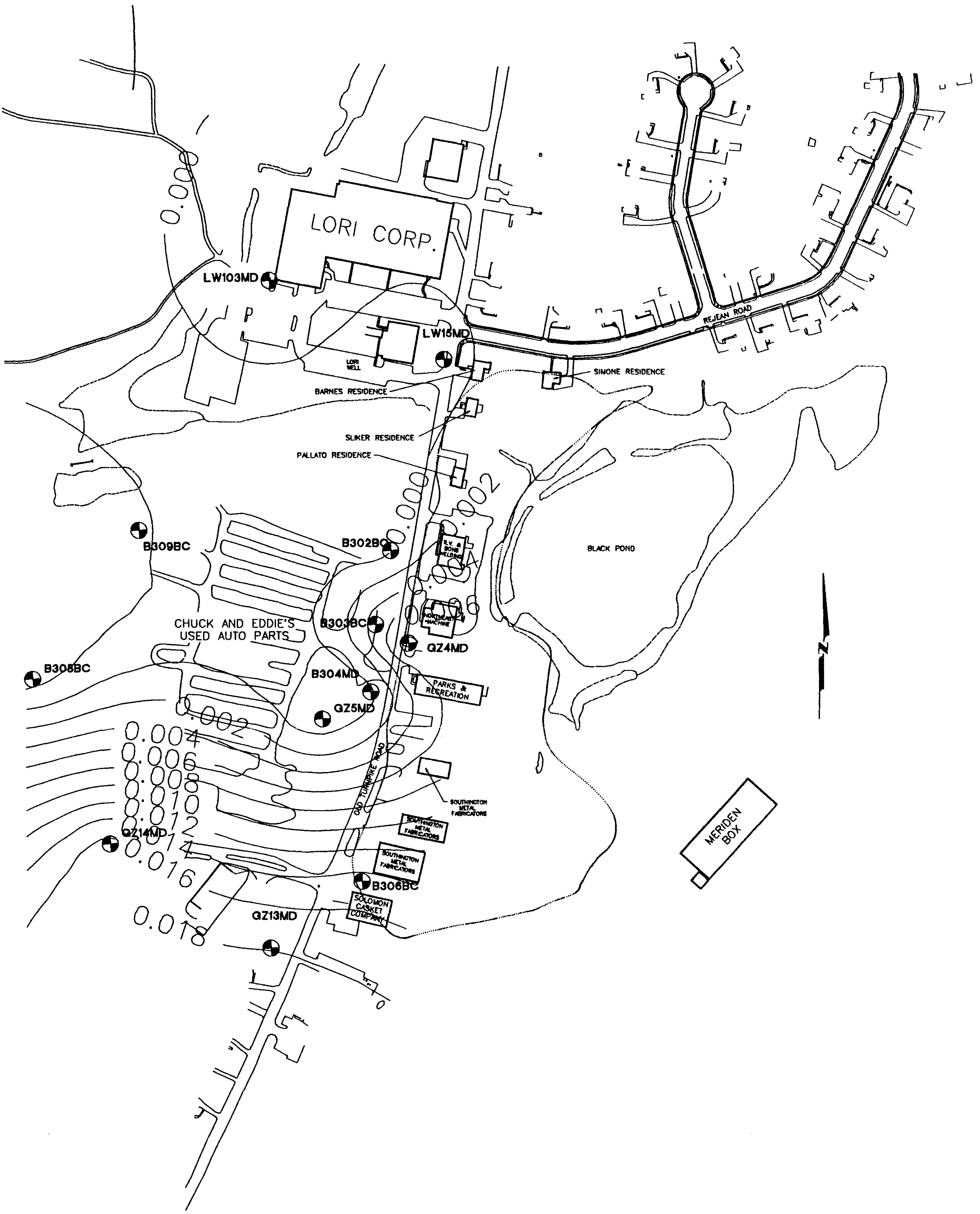
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-20

AVERAGE VERTICAL GRADIENT (9/18/92, 11/18/92, 1/04/93)
SHALLOW TO MEDIUM WELL CLUSTERS

DRAWING NAME:	S-MWELL.DWG			FILE NUMBER:	492 5534		
SCALE:	1"=250'	REVISION:	0	DRAWN BY:	DJB	DATE:	4/12/93



LEGEND:

EXTENT OF STUDY SITE

NOTE:

1: POSITIVE GRADIENT INDICATES DOWNWARD FLOW

2: NEGATIVE GRADIENT INDICATES UPWARD FLOW

0 50 200 400

SCALE IN FEET

ESE Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-21

AVERAGE VERTICAL GRADIENT (9/18/92, 11/18/92, 1/04/93)
MEDIUM TO DEEP WELL CLUSTERS

DRAWING NAME:	M-DWELL.DWG	FILE NUMBER:	492 5534
SCALE: 1"=250'	REVISION: 0	DRAWN BY: DJB	DATE: 4-12-93

3.5.3 Long-Term Groundwater Fluctuation

Water levels have been recorded from certain wells in the Study Area, beginning as early as 12/28/84. This water level data is presented in Appendix H, and the more recent data is presented in Table 3-7.

Two sets of well clusters were selected to illustrate the long-term water level trends. Figure 3-22 shows the LW15S, LW15M and LW15D water level elevations with time from 12/28/84 to 1/4/93, and Figure 3-23 shows the water level fluctuations for LW103S, LW103M and LW103D from 2/28/85 to 1/4/93.

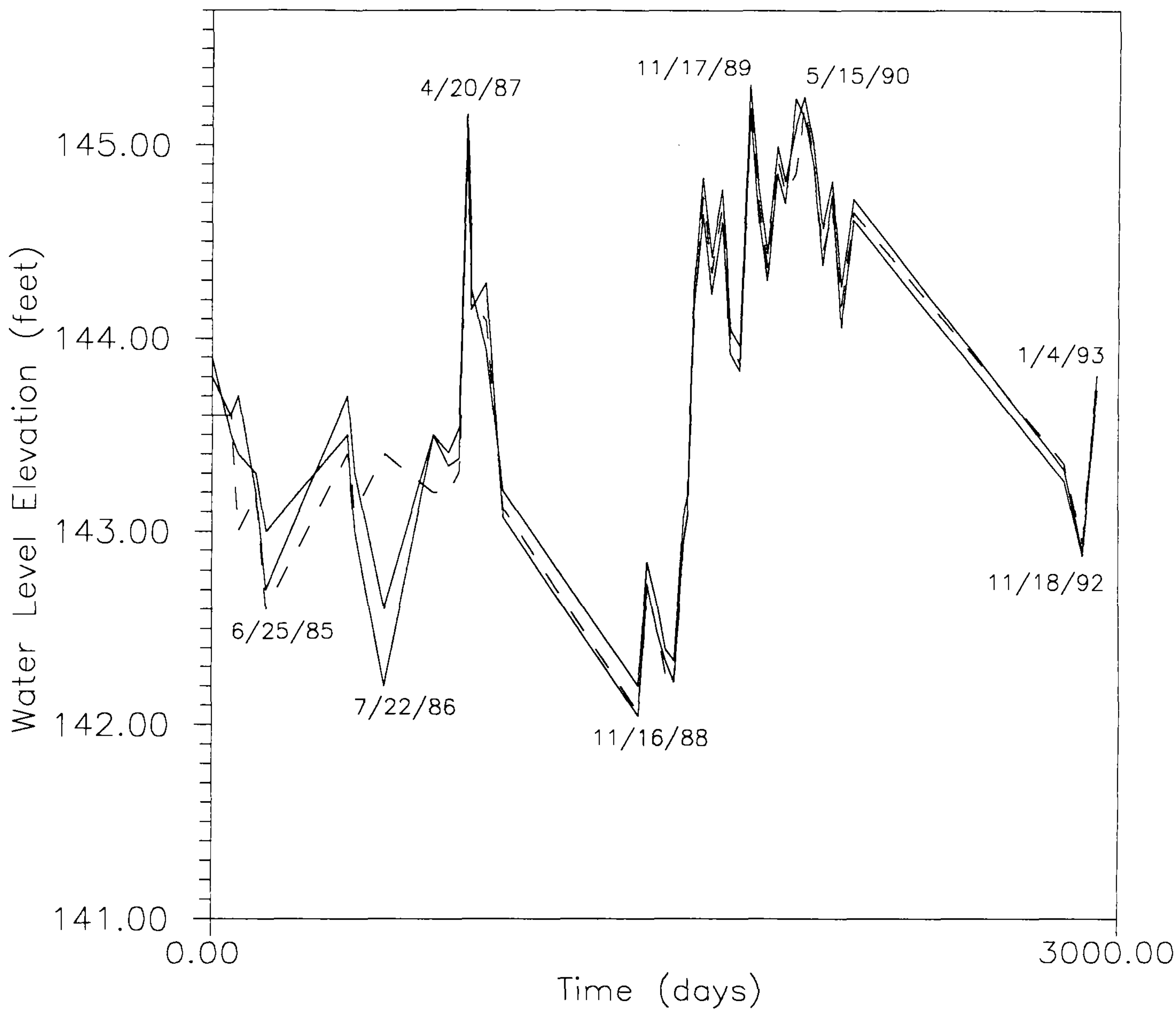
Figures 3-22 and 3-23 both show that, while water levels fluctuated 3 to 5 feet over the 8-year period of measurement, there was very little vertical difference in water levels at each well cluster. This provides further evidence of an alluvial aquifer devoid of any significant homogeneity.

Figures 3-22 and 3-23 also show that water levels are at an average level in January, 1993. Water levels have been over 2 feet higher from 1989 to 1990, as well as 1 to 2 feet lower from 1985 to 1986.

3.5.4 Groundwater-Surface Water Relationship

The principle surface water feature of the Study Area is Black Pond. Other surface water features include a stream that drains Black Pond as well as marshy areas in the western edge of the Study Area.

Black Pond collects surface water runoff as well as shallow groundwater inflow and is essentially a representation of the shallow water table in that area of the Study Area. Seven shallow piezometers were installed around the periphery of the pond, in the locations shown in Figure 3-24. The piezometers were installed 2 to 6.5 feet into the pond bed sediments, as listed in Table 3-8.

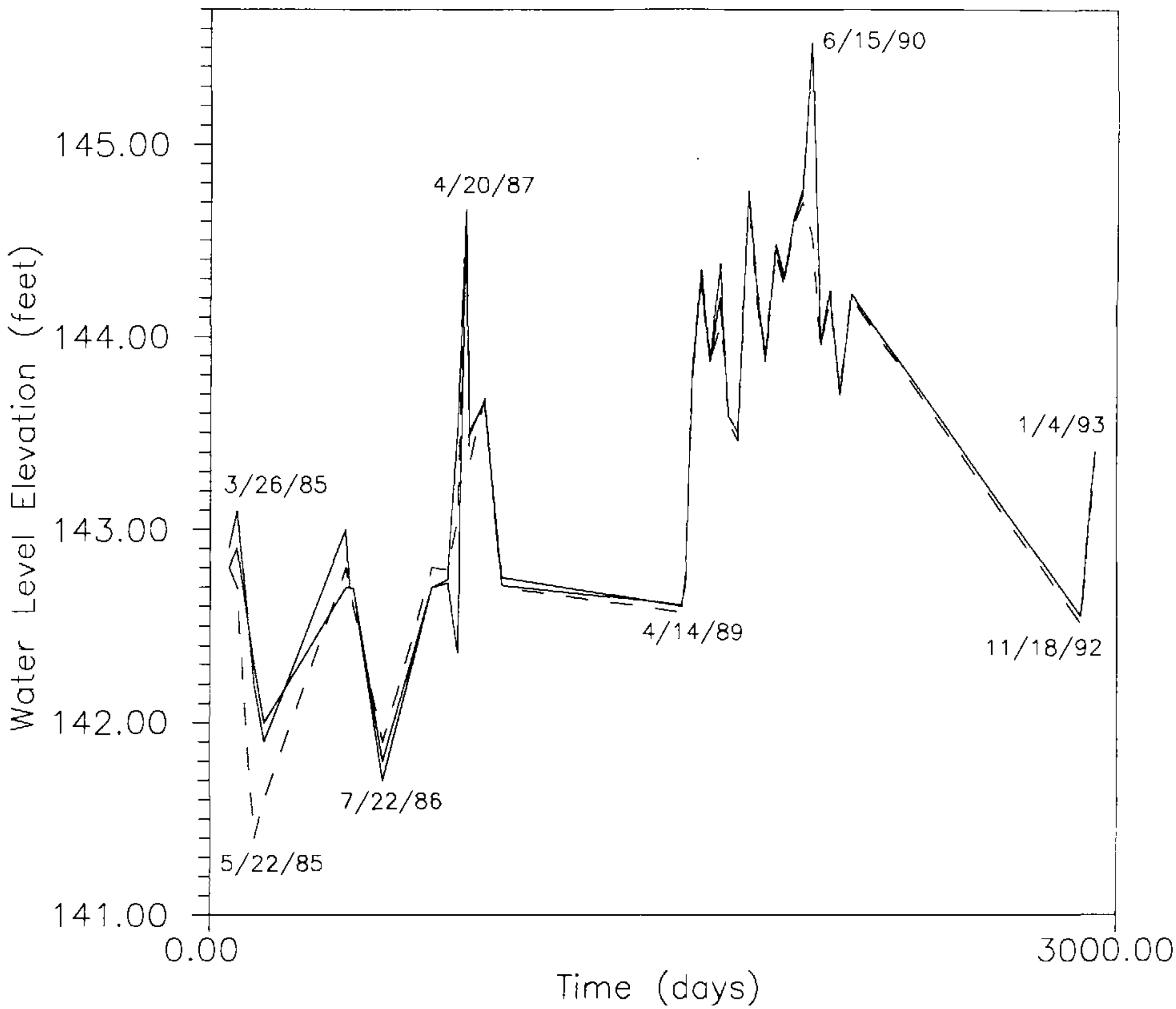


Environmental Science & Engineering, Inc.
A CILCORP Co.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-22
LONG-TERM WATER LEVEL ELEVATION FLUCTUATIONS
LW15S, LW15M, LW15D

DRAWING NAME: LW15.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4/12/93



ESE
A GILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-23
LONG-TERM WATER LEVEL ELEVATION FLUCTUATIONS
LW103S, LW103M, LW103D

DRAWING NAME: LW103SMD.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: DJB	DATE: 4/12/93

PIEZOMETER PZ-7

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↓	↓	↓	↑	↓

PIEZOMETER PZ-1

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↓	↓	↑	↑	↓

PIEZOMETER PZ-6

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↑	↓	↑	↑	↑

PIEZOMETER PZ-3

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↑	↑	↓	↑	↓

PIEZOMETER PZ-5

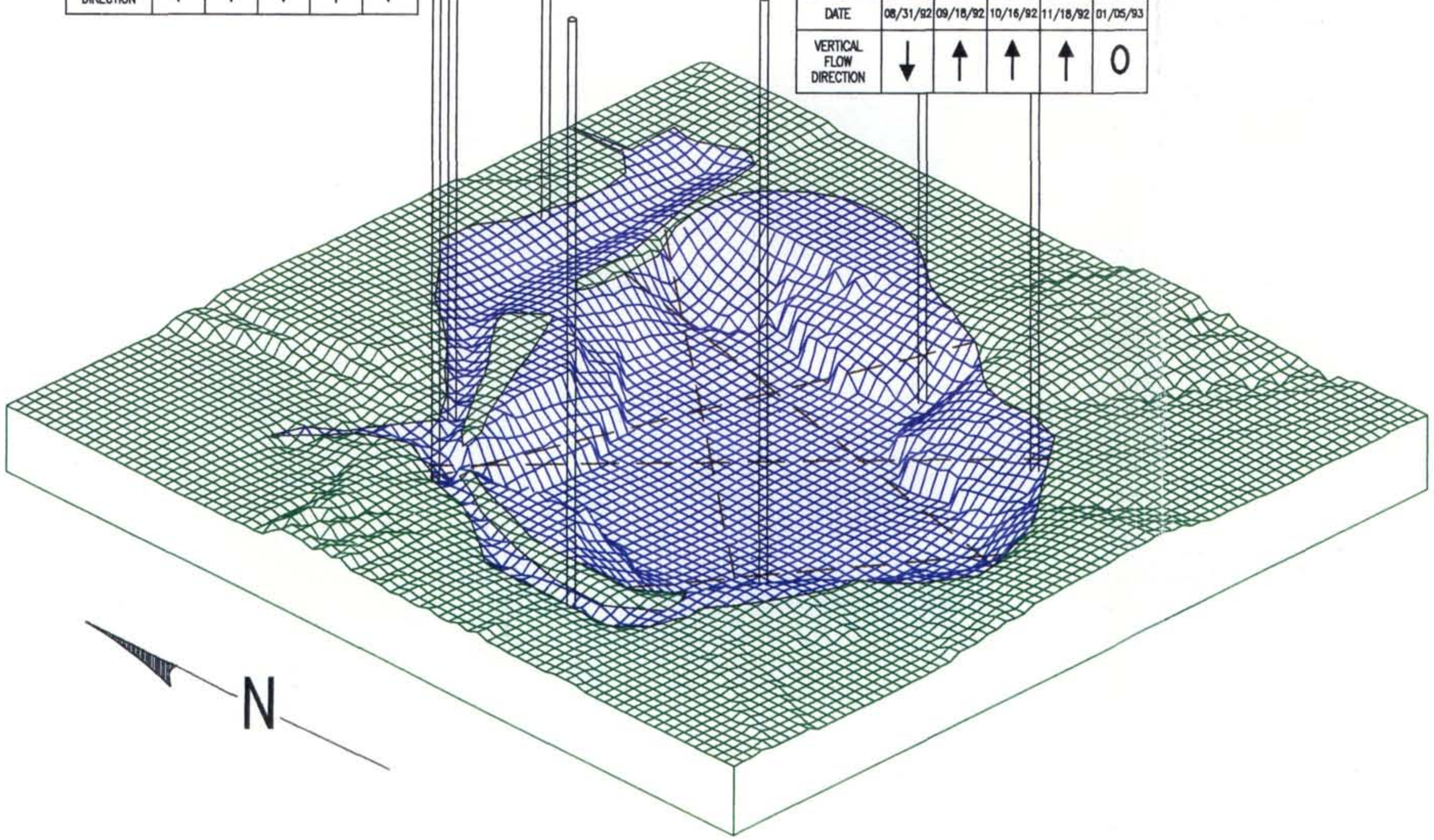
DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↑	↑	↑	↑	↓

PIEZOMETER PZ-2

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↓	↓	↓	↑	↓

PIEZOMETER PZ-4

DATE	08/31/92	09/18/92	10/16/92	11/18/92	01/05/93
VERTICAL FLOW DIRECTION	↓	↑	↑	↑	O



LEGEND

↑ ↓ VERTICAL FLOW DIRECTION. ARROWS INDICATE DIRECTION OF FLOW.

— — — BATHYMETRIC TRANSECT LOCATION

NOTE

BLACK POND VOLUME: 18 X 10^6 GALLONS.

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3-24

BLACK POND BATHYMETRY AND SHALLOW PIEZOMETER DATA

DRAWING NAME: APALL.DWG		FILE NUMBER: 492 5534	
SCALE: N.T.S.	REVISION: 0	DRAWN BY: PAD	DATE: 04/12/93

Table 3-8 also shows the water level elevations measured in the piezometers for 4 measurement dates and the corresponding surface water elevations beside each piezometer. The vertical flow direction is shown by the arrows in Table 3-8.

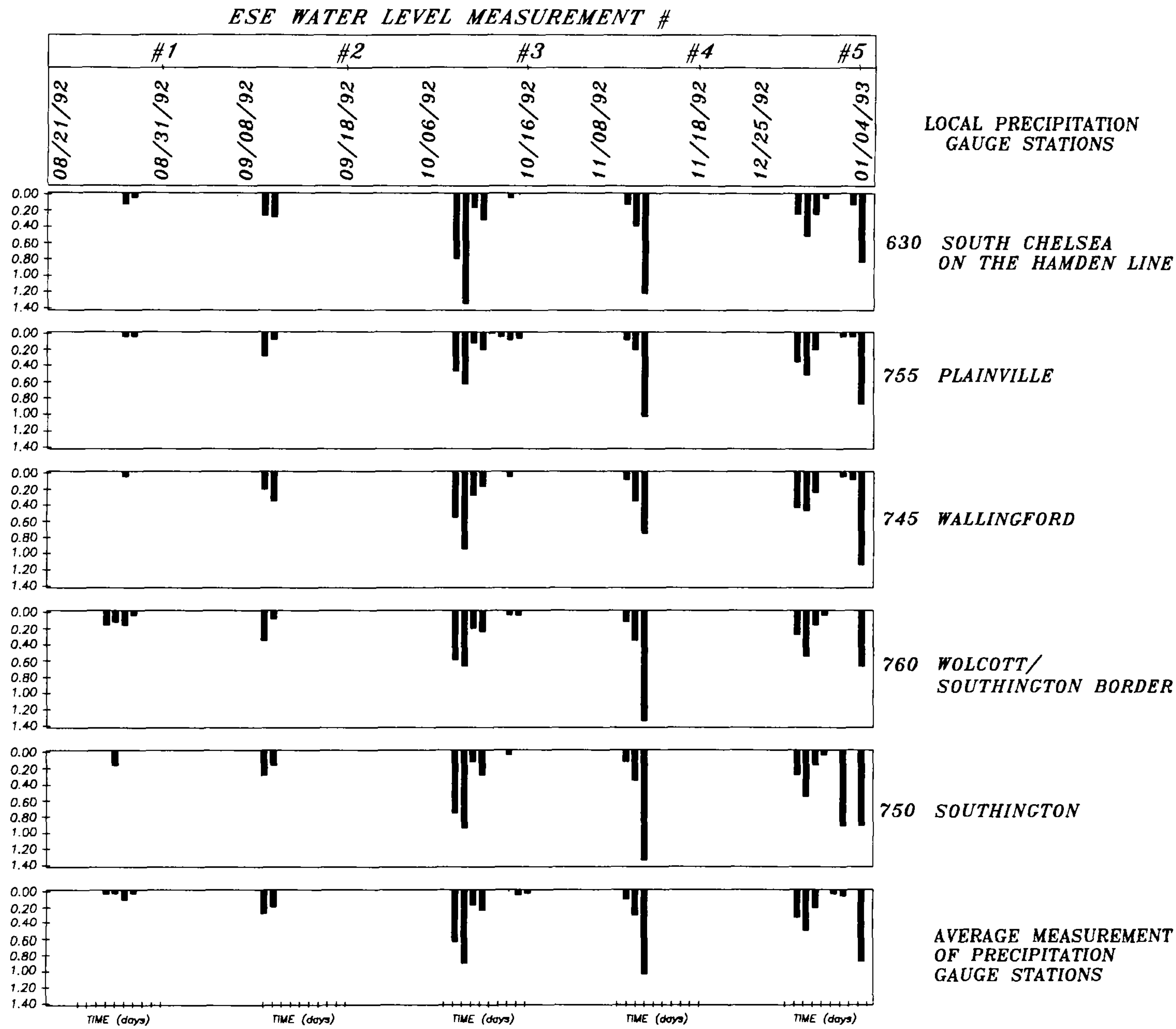
Bathymetric data from Black Pond was collected as described in Section 2. This data was processed using inferred coordinates of the beginning and ending points of the fathometer transects. The pond bathymetry was taken off of the strip charts provided for each transect. These strip charts showed the pond was over 21 feet deep, with a large area in the center of the pond averaging 20 feet deep.

By digitizing the strip charts and including the surveyed boundaries of Black Pond in one data file, a three-dimensional profile of Black Pond was created as shown in Figure 3-24. From this profile the total volume of water in Black Pond was calculated to be approximately 18 million gallons.

The piezometer locations and inferred vertical flow direction are also included in Figure 3-24. Figure 3-25 shows the precipitation from the Study Area precipitation gauges 10 days preceding and including each piezometric measurement. By comparing the rainfall events of Figure 3-25 with Table 3-8, it is evident that the surface water level in Black Pond has increased due to precipitation from 10/06/92 to 1/05/93.

The increase in the water level of Black Pond from 9/18/92 to 1/05/93 is 0.4 to 0.5 feet as shown in Table 3-8. This corresponds to a rise of approximately 0.2 feet in the shallow water table west of the Old Turnpike Road during this period, as presented in Table 3-7. This could indicate that the hydraulic connection between Black Pond and the shallow water table is impeded by a less permeable layer typical of pond bottom sediments.

The most compelling evidence for the relatively low hydraulic conductivity of pond-bottom sediments is shown by comparing water level elevations of shallow wells listed in Table 3-7 with the Black Pond water levels listed in Table 3-8. The water levels in Black Pond are approximately 4 feet higher than the shallow water levels west of the Old Turnpike Road. This large drop in head can be best explained by less permeable sediments lining (and deposited by)



Environmental Science & Engineering, Inc.
A CILCORP Co.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION

FIGURE 3-25
PRECIPITATION EVENTS
BEFORE WATER LEVEL MEASUREMENTS

DRAWING NAME: ESEPE.DWG	FILE NUMBER: 492 5534
SCALE: NTS	REVISION: 0
DRAWN BY: DWS	DATE: 4/12/93

Black Pond. It is expected that closer to the center of Black Pond, where the surface water depth is in excess of 20 feet, the vertical head differences between groundwater and surface water are much smaller.

In contrast, the edges of Black Pond do not have the surface water depth and are more susceptible to a larger contrast in head with depth, as is observed. Therefore the inferred lower conductivity of the pond bottom sediments would cause the larger contrast in head with depth at the margins of Black Pond, but not nearer the center of Black Pond.

A detailed evaluation of the effects of flow through the Black Pond bed sediments on Study Site groundwater flow is included with the vertical groundwater flow model simulation results presented in the FS report.

4.0 NATURE AND EXTENT OF CONTAMINATION

This section presents the results of the environmental sampling and analyses performed during the RI and is structured in the same manner as Section 2.0, which presented the procedures employed in conducting the field investigation by media. The nature and extent of contamination discussions are presented by activity and media type. That is, all data associated with soils, regardless of when collected, is discussed in Section 4.2. As with Section 2, the review of the results has included the review of data from past studies within the Study Area. The continuous review of data refines the Study Area characteristics, as detailed in Sections 5 and 6 of this report.

Section 4.1 discusses the results of air quality investigations. Section 4.2 discusses results of the contaminant source investigation. Section 4.3 discusses the results of the groundwater investigations. Section 4.4 discusses the results of the surface water/sediment investigations. Section 4.5 discusses the results of the ecological investigation. Generally, summary tables are referred to herein and used for discussion of the data. Complete data report tables are provided in Appendix I. Figures presented in Section 2.0, showing sampling locations, are duplicated within this section, whenever it would help the reader's understanding.

Data validation was performed on all Level 4 data, according to the requirements of EPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (February 1, 1988, as modified November 1, 1988) and Inorganic Analyses (June 13, 1988 as modified February 1989). Data generated through 1991 was data validated by the engineering firm EChem and is presented in the Site Characterization Report. Data generated during 1992 and 1993 was data validated by David MacLean, an independent data validator. Summaries of Mr. MacLean's data validation results are presented in Appendix J. In addition, EPA collected duplicates of selected samples, from various media, throughout the RI, for independent analyses and data validation. The results of these split analyses have not been transmitted to PRPs and, therefore, are not included in this report.

Data tables presented in Appendix I include qualifiers generated during the data validation process. The final data qualifiers, indicated on the analytical data tables, have the following meanings:

VOC and SVOC Data

- U Undetected at the concentration shown.
- J Estimated concentration, because analyte was detected below the EPA contract required quantitation limit (CRQL), but above the instrument detection limit, or because the value was estimated during data validation.

Pesticides and PCBs

- U Undetected at the concentration shown.
- J Estimated concentration, because analyte was detected below the EPA contract required quantitation limit (CRQL), but above the instrument detection limit, or because the value was estimated during data validation.
- P Greater than 25% difference between the quantitation on the initial column and the confirmation column. All positive hits are confirmed by a second analysis.

Metals

- U Undetected at the concentration shown.
- B Analyte detected below the EPA contract required detection limit (CRDL), but above the instrument detection limit.
- J Estimated concentration.

Much of the data was generated from Contract Laboratory Program (CLP) methods for organics and inorganics. Organics analyses, performed through 1991, included the EPA hazard substance list (HSL) compounds, HSL-VOC, HSL-A/BN, and HSL-Pesticides/PCB, with analyses conducted pursuant to the requirements of the CLP Statement of Work for Organics, dated February 1988. Inorganic analyses included HSL-Metals and cyanide, with analyses conducted pursuant to the requirements of the CLP Statement of Work for Inorganics, dated July 1988.

During discussions relative to the Task 2 Work Plan, EPA and DEP requested that analytical work be performed according to the latest CPL protocols. Therefore, organics analyses, performed during 1992 and 1993, included the target compound list (TCL) compounds, TCL-VOC, TCL-A/BN, and TCL-Pesticides/PCB, with analyses conducted pursuant to the requirements of the CLP Statement of Work for Organics, Multimedia/Multiconcentrations. Document OLM 01.8. Inorganic analyses included the target analyte list (TAL) compounds, TAL-Metals and cyanide, with analyses conducted pursuant to the requirements of the CLP Statement of Work for Inorganics, Multimedia/Multiconcentrations, Document ILM 01.2.

4.1 AIR QUALITY

Air quality investigations have included bi-weekly ambient air monitoring (field VOC and meteorological), an air quality monitoring survey of the Study Area, and analytical soil gas sampling with modeling of potential ambient and indoor air quality.

4.1.1 Ambient Air Monitoring

Between November 1988 and September 1990, field measurements were taken every two weeks, at five locations across the Study Site, for wind speed, wind direction, temperature, barometric pressure, and total VOC. Monitoring locations are shown on Plate 4-1. Predominant wind direction was determined to be north/northeast. Field measurements for VOC were generally at or below background (0-1 ppm PID).

Wind speed data was averaged for points 2 and 3, for use in the air modeling of soil gas data (see Section 4.1.3.3). Locations 2 and 3 were chosen because they are representative of the southern and northern portions of the Study Site, respectively. An average wind speed of 3.4 mph, calculated from data at Location 2, was used for southern portion modeling. An average wind speed of 2.3 mph, calculated from data at Location 3, was used for northern portion modeling.

4.1.2 Air Quality Monitoring Survey

On April 10-11, 1989, an air quality monitoring survey was conducted across the Study Area. The survey consisted of a walkover and field measurements for VOC (PID), %LEL, and % oxygen. Field measurement locations are shown on Plate 4-1. Table 4-1 provides a summary of the measurement results. Meteorological measurements were not recorded during the survey. Measurements were taken just above ground surface or at the base of structures (e.g. buildings). PID measurement results were low (<4 ppm above background) in all locations.

Five air samples (AS-1 through AS-5) were collected, from the breathing zone, for analysis for selected VOC using a field gas chromatograph. These locations were selected to provide a spatial distribution across the Study Area. Toluene (0.1 ug/L) and methyl ethyl ketone (0.22 ug/L) were detected in the sample from AS-1, located at the northwest corner of Lori Corporation. VOC were not detected in the other four samples.

4.1.3 Analytical Soil Gas Sampling

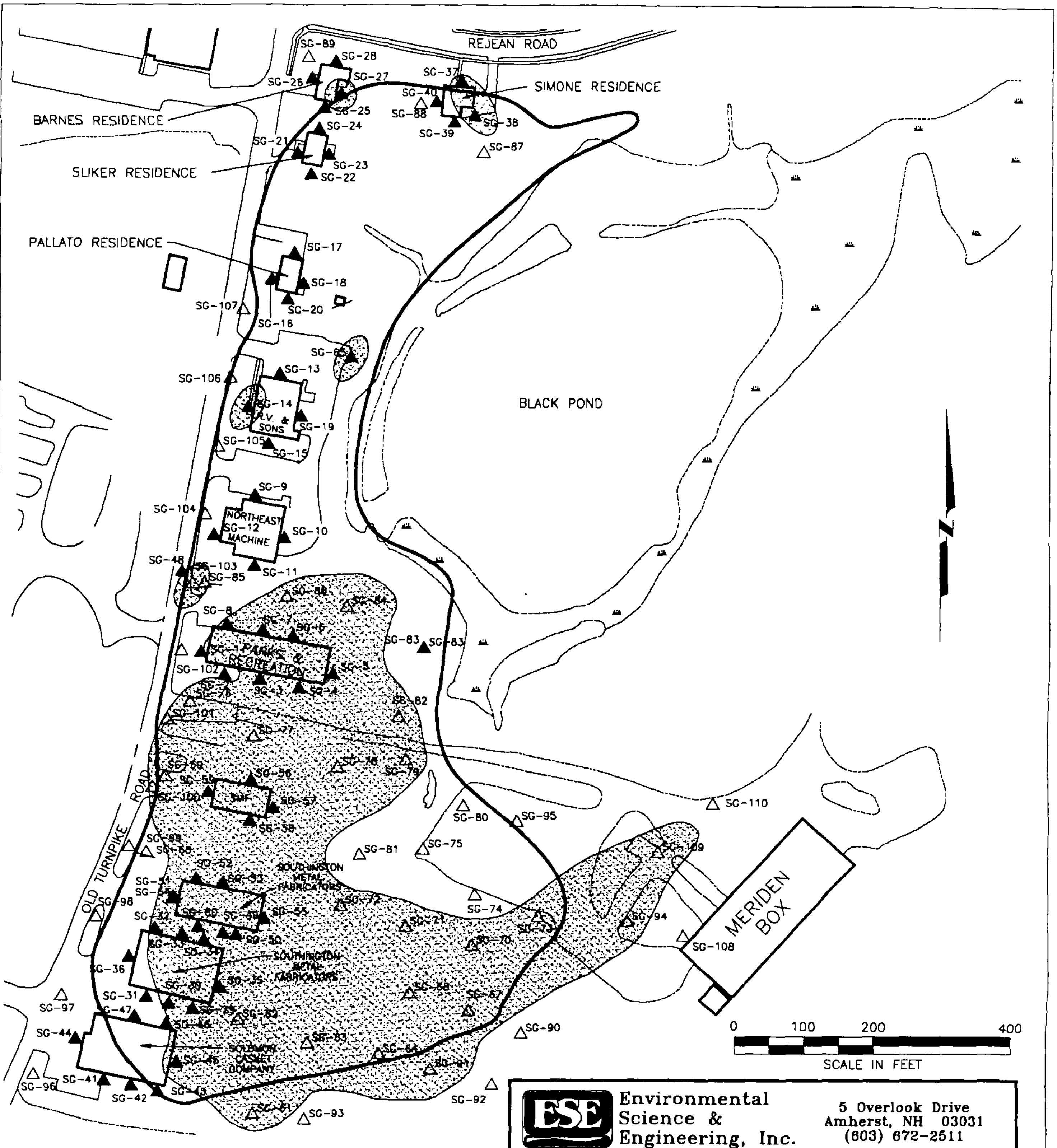
During the Task 2 Field Investigations, an analytical soil gas sampling and analysis was performed. A preliminary soil gas survey, using field instrumentation, was performed to assist in determining the best locations for subsequent collection of soil gas for laboratory analysis. Results from the laboratory analysis were used to model potential worst-case ambient and indoor airborne contaminant concentrations. The ambient and indoor contaminant concentrations, determined from the modeling effort, were used for the human health risk assessment, as described in Volume 2.

4.1.3.1 Preliminary Soil Gas Survey

During July 1992, a preliminary soil gas survey was conducted across the Study Site to provide data for the selection of optimal locations for collection of analytical soil gas samples. Soil gas samples were collected from 60 locations around structures on the Study Site and analyzed for VOC using field gas chromatography (GC). Combustible gas measurements (% LEL) were also taken at each of the 60 locations. Combustible gas measurements were taken at an additional 51 locations across the Study Site and along utilities. Figure 2-1 shows the soil gas sampling locations. Table 4-2 presents the results of combustible gas measurements. Figure 4-1 shows the distribution of combustible gas, at levels exceeding 25% LEL, across the Study Site.

Table 4-3 presents the results of the field GC measurements. The field GC was calibrated using the four most common and widespread VOC at the site: benzene, toluene, 1,2-dichloroethene (DCE), and trichloroethene (TCE). Calibration standards were prepared at concentrations of approximately 1 ppm in air. The instrument detection limit was maintained at 0.5 mV, which corresponds to approximately 0.1 ppm in air for each of the four compounds measured. Results are reported, on Table 4-3, as a ratio of the area count measured for each compound in the sample (A_s) to the area count measured for each compound in the standard (A_n) corresponding to that sample. In several cases, the appearance of multiple peaks made identification of the specific compounds of interest very difficult. Identification was based on retention time windows developed from standard runs. Identification was made in a conservative manner, such that the occurrence of any peak within the retention time window was interpreted as the particular compound of interest.

Table 4-3 presents the results of the field GC measurements. The levels of VOC detected in the northern portion of the Study Site were at or very near the detection limit. None of the four samples collected around the outside of Sliker residence detected any VOC. One of the four samples (SG16) collected around the outside of the Pallato residence detected very low level VOC. Two of the four samples (SG25, SG28) collected around the outside of the Barnes residence detected very low level VOC. One of the four samples (SG37) collected around the outside of the Simone residence detected VOC. An additional sample from the outside of the Simone residence measured levels of VOC above the detection limit (SG38). This sample location is at the end of the driveway and there is evidence of recent petroleum staining, both on the driveway and in the area just off the driveway where the sample was collected. A total of eight sample locations, from the northern portion, were included in the analytical soil gas



LEGEND

▲ SG-92 ESE SOIL GAS SURVEY POINT–VOC AND METHANE

△ SG-93 ESE SOIL GAS SURVEY POINT–METHANE ONLY

——— EXTENT OF STUDY SITE

COMBUSTIBLE GAS LOCATIONS EXCEEDING 25% LEL

NOTE

GROUND SURFACE ELEVATIONS PROVIDED BY GEOMAP, INC. (1989), AND REFER TO 1929 NATIONAL GEODETIC VERTICAL DATUM. SURVEYING OF ESE SOIL GAS SURVEY POINTS COMPLETED BY FUSS & O'NEIL ENGINEERS.

ESE
A CILCORP Co.
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4–1

COMBUSTIBLE GAS DISTRIBUTION
LOCATIONS EXCEEDING 25% LEL

DRAWING NAME: ESEMD.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=200'	REVISION: 1	DRAWN BY: PAD	DATE: 12/10/93

sampling and analysis, to verify the general absence of VOC in soil gas beneath the northern portion.

None of the four samples collected around the outside of the Northeast Machine building nor the four samples collected around the outside of the Solomon Casket building detected any VOC. Two of four samples (SG13, SG14) collected from the north and west sides of the outside of the R.V. and Sons building detected VOC. Likewise, six of the seven samples (SG1, SG4-8) collected around the outside of the Parks & Recreation building detected VOC. Samples collected around the outside of the three Southington Metal Fabricators buildings detected varying levels of VOC.

4.1.3.2 Analytical Soil Gas Sampling and Analysis

Based on the results of the preliminary soil gas survey, 23 sampling locations were selected by ESE and EPA for collection of soil gas for laboratory analysis. At least one sample was collected from around each residence or structure on the Study Site, even where no VOC were detected during the preliminary soil gas survey. EPA requested that an additional 5 locations be selected from the southern portion of the Study Site, in the area east of the commercial buildings. This brought to 28 the total number of locations included in the analytical soil gas sampling. Table 4-4 provides a list of the sampling locations, the probe depth, the date sampled, and the volume sampled. Sample location identifiers are the same as for the preliminary soil gas survey, as shown on Figure 2-1.

Sample air volumes were determined based on the anticipated concentration of VOC at each location. A maximum air volume of 10 L was used to assure that the most volume sensitive compound (vinyl chloride) would be retained on the sampling tube. Lower air volumes were selected for sample locations where one or more of the compounds being measured was expected to be present at elevated concentration. Collection of lower air volumes results in a higher detection limit for all compounds for that tube. Therefore, multiple, co-located tubes were collected, at different air volumes, at several locations where lower volume was being used for primary tube. This was an attempt to get the lowest detection limit possible for those compounds not present at elevated concentration. At locations where elevated levels of VOC were expected, a backup tube was placed downstream of the sample tube, to determine if overload of the sample tube had occurred.

Co-located tubes were collected at locations SG-1, SG-3, SG-14, SG-16, SG-30, SG-56, and SG-64. Backup tubes were collected at locations SG-1, SG-5, SG-14, SG-16, SG-30, SG-32, SG-38, SG-51, and SG-56. Results of backup tube analyses indicated that breakthrough was not a significant problem, as the primary compound detected in backup tubes (methylene chloride) is a probable laboratory contaminant. Methylene chloride was measured in the backup tube for the co-located sample at SG-1 (170 ppb), although methylene chloride was not measured in either the sample or the co-located sample. Styrene was measured in the backup tube for the primary sample at SG-14 (350 ppb), although styrene was not measured in either the primary sample or the co-located sample. Methylene chloride was measured in the backup sample for the co-located sample at SG-16 (15 ppb) and in the co-located sample (15 ppb). Methylene chloride was measured in the backup sample for the primary sample at SG-30 (22 ppb), but was not detected in the primary sample. Methylene chloride (900 ppb) and toluene (370 ppb) were measured in the backup sample at SG-32. Methylene chloride (330 ppb) and toluene (660 ppb) were measured in the primary sample. Methylene chloride (3.1 ppb) was detected in the backup sample at SG-51, but was not detected in the primary sample. Methylene chloride was measured in the backup samples for the primary sample (120 ppb) and the replicate co-located sample (95 ppb) at SG-56, but not in the backup sample for the co-located sample. Methylene chloride was measured in the primary sample (120 ppb), the co-located sample (14 ppb), and the co-located replicate sample (90 ppb). No other compounds were detected in the backup samples.

Tables 4-5 and 4-6 provide summaries of the compounds detected in the analytical soil gas samples, in the northern portion and southern portion, respectively, and provides minimum, maximum, and average values for each compound. Data presented in Tables 4-5 and 4-6 are provided in ug/M^3. Data has been presented in ug/M^3 to be consistent with the model output and the data requirements for the HRA. The conversion equation for ppb (v/v) to ug/M^3 is as follows:

$$ug/M^3 = \frac{ppb\ (v/v) \times MW}{24.45}$$

where,

24.45 = molar volume

MW = molecular weight of the compound

As shown on Table 4-5, only very low levels of chlorinated VOC were detected in sporadic locations in the northern portion of the Study Site. The compounds measured at slightly higher concentrations are primarily petroleum-related (benzene, ethyl benzene, toluene, xylene). These types of compounds would be expected to be found in areas where trucks or automobiles are operating or in areas affected by roadway runoff. The presence of these compounds is consistent with the use of heavy equipment during operation of the stump dump, the development of the area and construction of homes, the presence of adjacent paved roadways and driveways, and the operation, maintenance and parking of automobiles. Sampling point SG-38, located just off the end of the driveway of the Simone residence near areas of oil-stained pavement and soil, had elevated levels of VOC, consistent with evident activities of the homeowner.

As shown on Table 4-6, VOC were detected in soil gas throughout the southern portion of the Study Site. The highest chlorinated VOC (vinyl chloride) concentration was detected at SG-32, in front of SMF-1, near boring 202B and well 307. This is consistent with the analytical results measured in soil and groundwater in that area. Chlorinated VOC were also detected at every sampling location in the southern portion, except SG-14 and SG-51. Non-chlorinated VOC (primarily benzene, toluene, ethyl benzene, or xylenes) were detected at every sampling location throughout the southern portion of the Study Site.

Complete data tables, presented in ppb (v/v) as received from the laboratory, are provided in Appendix I.

4.1.3.3 Air Quality Modeling

Calculation of ambient and indoor concentrations of the VOC's analyzed for in the T-02 sampling was performed using a diffusive flux model. The details of the model are presented with the input parameters in Appendix K. The model is similar to the one developed by Jury et al. (1991) as discussed in the Task 2 Work Plan. In brief, the model simulates one-dimensional, steady state diffusion of VOC constituents vertically through the unsaturated zone to a zero concentration boundary (ground surface). Indoor concentrations are then computed by mixing the areal surface flux over a unit volume for a given building height for a specified building ventilation rate. For outdoor concentrations, the flux is mixed within a boundary layer for a specified wind speed. The source of the constituents for the model is the T-02 sample at a known probe depth. The constituents are assumed to partition linearly between the vapor, water and solid compartments of the soil matrix under equilibrium conditions.

For the purpose of this study, the northern and southern portions of the Study Site were modeled separately at EPA's request. Average and maximum soil-vapor concentrations of each of the T-02 analytes, presented in Tables 4-5 and 4-6, were used as source concentrations of soil gas for input values. The average concentrations were computed by taking an arithmetic mean of soil-vapor concentrations across the respective areas.

For indoor exposure in the northern end, it was assumed that there were 16 vertical feet of living space (two-story), based on observations made during visits to the Barnes and Simone residences. Due to the relatively new construction of the homes, a ventilation rate of one volume every two hours was used (Nazaroff et al., 1987). A building height of 15 feet was used for the southern area, based on conservative estimates of the average building height in the southern area. A ventilation rate of one hour was assumed for the southern end based on the industrial nature of the buildings and the large potential for air exchange (Nazaroff et al., 1987). In all cases, the concrete floor of the building is assumed to be as permeable as the underlying soils. This is a conservative approach since concrete is not in actuality as permeable as soil, across the entire floor area.

For outdoor exposure, wind speed and direction data from previous studies were used along with an assumed vertical mixing height of approximately 6.6 feet (200 cm) to simulate a breathing zone. This is a conservative approach in that it assumes that all of the vapor is trapped within this boundary layer. A summary of salient parameters and assumptions are presented with the model development in Appendix K.

Table 4-7 presents the results of the air quality modeling. As shown on Table 4-7, in the northern portion the compound modeled to be present at the highest average concentration, in both indoor and ambient air, is toluene (0.61 ug/m^3 indoor, 0.04 ug/m^3 ambient). The average values, in general, are 5-10 times lower in the northern portion as compared to the southern portion. Chlorinated VOC average indoor or ambient concentrations are very low in the northern portion and do not exceed 0.02 ug/m^3.

In the southern portion, the compound modeled to be present at the highest average concentration, in both indoor and ambient air, is vinyl chloride (0.9 ug/m^3 indoor, 0.16 ug/m^3 ambient). Chlorinated VOC, other than vinyl chloride, are generally 10 times lower than non-chlorinated VOC.

The concentration values modeled for maximum and average, for indoor and for ambient, for both the northern and southern portions, were evaluated to determine risk to human health or the environment in the HRA, as detailed in Volume 2.

4.2 CONTAMINANT SOURCE INVESTIGATION

4.2.1 Study Area Soil Gas Assessment

During November 1988 and April 1989, a soil gas survey was conducted, across the Study Area, to estimate the distribution of VOC in the subsurface soils and to assist in planning future field activities. A total of 118 locations were measured during the survey. The soil gas measurement locations are shown on Plate 4-2. Soil gas samples were screened with a field PID and analyzed, using a field GC, for the following compounds:

benzene	1,1,1-trichloroethane
ethyl benzene	trichloroethene
1,1-dichloroethane	vinyl chloride
trans 1,2-dichloroethene	xylenes, total
toluene	

Table 4-8 presents a summary of the PID readings detected above background at any location. Table 4-9 presents a summary of the compounds detected during the field GC analysis. Sample locations not listed on Tables 4-8 or 4-9 had no measurements above the detection limit.

The distribution of VOC compounds detected during the soil gas survey is shown on Plate 4-2. The survey detected only trace levels of chlorinated VOC within the Study Site (SG-69). Non-chlorinated VOC were detected across the southern portion of the Study Site. The highest concentration of VOC was measured in soil gas from Chuck & Eddie's Used Auto Parts yard (SG-27).

The soil gas survey played only a minor role in future field program planning, due to the general lack of detectable VOC in soil gas across much of the Study Area. There is little correlation between these soil gas measurement results and subsequent soil and groundwater analytical results. Soil gas measurement, at this site, was not an effective screening method for determining site contamination. This may be due to the heterogeneous nature and variable permeability of the solid waste in areas where higher soil gas VOC measurements would have been expected (i.e., southern portion of Study Site, SSDA's).

4.2.2 Northern Portion of the Study Site

Based on the operational history, a review of the boring logs generated during the installation of borings across the Study Site, and the analytical results of soil testing, ESE concluded, in the Task 1 Post-Screening Investigations Report submitted March 26, 1992, that the Study Site should be addressed as two different areas: the northern portion and the southern portion. A review of the Study Site geology, supporting this delineation, was provided in Section 3.6 of this report. Figure 3-6 shows the areas delineated as northern and southern. This section discusses

LEGEND

EXTENT OF STUDY SITE

WOOD DEBRIS: WOOD ASH AND WOOD,TRACE GLASS–MISCELLANEOUS GRANULAR FILL

SOLID WASTE: PREDOMINANTLY SOLID MATRIX CONTAINING WOOD, PAPER, GLASS, METAL AND WIRE WITH ELEVATED HNU READINGS

SEMI–SOLID DISPOSAL AREA

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 3–6

TYPE AND DISTRIBUTION OF WASTE MATERIAL

DRAWING NAME: CAPLOC.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93

results of investigations conducted in the northern portion of the Study Site; an area beginning north of R.V. & Sons and extending to the northern boundary of the Study Site. Section 4.2.3 discusses results of investigations conducted in the southern portion of the Study Site. Section 4.2.4 provides a summary overview of the distribution of contaminants throughout the Study Site.

4.2.2.1 Surficial Soil Sampling

On June 9 and 10, 1992, five surficial soil samples (SFS-1-5) were collected in the northern portion of the Study Site. A background sample (SFS-12) was collected from the residential area north of Rejean Road. On October 14-16, 1992, an additional 12 surficial soil samples (SFS-20-31) were collected. Three background samples were also collected; SFS-12, SFS-32 (near GZ-1), and SFS-33 (near GZ-2). Sample locations were selected to provide a spatial distribution across the northern portion. Figure 2-2 shows surficial soil sampling locations. Tables 4-10 and 4-11 present summaries of organic and inorganic compounds, respectively, detected in surficial soil samples collected from the northern portion. Complete analytical tables are provided in Appendix I.

The column marked "background" on Tables 4-10 and 4-11 provides the range of concentrations measured in the three background samples. Compounds not shown were not detected in any sample. A blank in Tables 4-10 or 4-11 indicates that the compound was not detected in that particular sample. Not all samples were analyzed for all TCL/TAL compounds. Refer to Section 2.4 and Table 2-1 for details as to analyses conducted on each sample.

Analytical data for phenolic compounds for the twelve additional northern portion surficial soils was rejected by the data validator. The laboratory notified ESE of a problem with their GPC cleanup procedure, as documented by poor recovery of phenolic fraction surrogates. Base neutral compounds (including PAH compounds) were not affected by the laboratory problem. ESE, therefore, instructed the laboratory to continue with the analyses, despite the loss of valid phenolic data. Upon agreement with EPA, the objective of the second surficial soil sampling round in the northern portion was to further characterize PAH compound concentrations. Other semivolatile organics (including phenolics) were not detected in previous samples collected in the northern portion and therefore were excluded from the second round. The CLP TCL SVOC method was used in order to provide consistent data for the PAH. Other SVOC data generated during the analysis was extraneous to the objective of the analysis. Therefore, the loss of phenolic data has no impact whatsoever on the objective of the sampling/analysis event nor on the PAH data generated.

No VOC were detected in surficial soil samples collected from the northern portion. Metals measured in surficial soil samples from the northern portion were generally within the range measured in designated background samples. Except for the isolated occurrence of pesticides at low concentrations (SFS-1, SFS-3, SFS-4, SFS-5), the semivolatile compounds measured in surficial samples from the northern portion were PAH. PAH, at concentrations significantly above the concentration range measured in the designated background samples, were measured at sample locations SFS2, SFS4, SFS20, SFS22, SFS26, SFS27, SFS28, and SFS31. Analytical results of testing of surficial soil samples collected from the northern portion are used in the HRA, as detailed in Volume 2. Additional discussion of the overall distribution of compounds in surficial soils is provided in Section 4.2.4.1.

4.2.2.2 Test Borings

Soil samples were collected from thirteen test borings installed across the northern portion of the Study Site. Boring TB20 is included in this discussion, although it is located outside the boundary of the Study Site, across Old Turnpike Road. Tables 4-12, 4-13, and 4-14 provide summaries of the compounds detected, for VOC, SVOC/PEST/PCB, and metals, respectively. Soil samples were collected from three additional borings (TB2, TB11, and TB18), designated as background locations. Plate 1-1 shows the test boring locations. Complete analytical tables are provided in Appendix I.

The column marked "background" on Tables 4-12, 4-13, and 4-14 provides the range of concentrations measured in the three background test boring samples. Compounds not shown were not detected in any sample. A blank in Tables 4-12, 4-13, or 4-14 indicates that the compound was not detected in that particular sample. Not all samples were analyzed for all

TCL/TAL compounds. Refer to Section 2.6 and Table 2-3 for details as to analyses conducted on each sample.

As shown on Table 4-12, only VOC at levels near the detection limit were measured in test borings in the northern portion of the Study Site, with the exception of the soil sample taken from the saturated zone at boring location TB133 (410 ug/kg (ppb, parts per billion) dichloroethene and 230 ug/kg (ppb) vinyl chloride). This boring location is close to the boundary between the northern and southern portions of the Study Site.

Low levels of pesticides (.002-.019 ppm) and PCB (1.5-3.8 ppm) were detected in a few samples. However, the primary semivolatile constituents measured, as shown on Table 4-13, are PAH. The highest levels occur in the center of the northern portion (TB104, TB106, TB111, TB115, TB120), with levels decreasing significantly south toward the southern portion or north toward the northern boundary of the Study Site. The highest PAH concentrations were measured at TB106 and TB111, where total PAH concentrations are 11,149 parts per million and 1748 parts per million, respectively.

As shown on Table 4-14, metals concentrations vary considerably across the northern portion. Values range above and below background, although there is no apparent pattern of metals distribution across the area. Arsenic, barium, beryllium, and cobalt were detected in most samples, but not in the background samples. Selenium and silver were detected in 1 or 2 samples, but not in the background. Heavy metals detected in samples, at greater than twice the concentration found in background samples included cadmium (TB123 and TB135), chromium (TB106, TB111, TB120, TB123, and TB135), lead (TB104, TB106, TB111, TB113, TB115, TB120, TB122, TB123, and TB135), nickel (TB106, TB123, and TB135), and zinc (TB106, TB111, TB115, TB120, TB123, and TB135).

Additional discussion of the overall distribution of compounds in subsurface soils is provided in Section 4.2.4.2.

4.2.3 Southern Portion of the Study Site

This section discusses results of investigations conducted in the southern portion of the Study Site; an area beginning just north of R.V. & Sons and extending south to the southern boundary of the Study Site, as delineated on Figure 3-6.

4.2.3.1 Surficial Soil Sampling

On June 9 and 10, 1992, thirteen surficial soil samples (SFS-6-19) were collected across the southern portion of the Study Site. On October 28, 1992, an additional seven surficial soil samples (SFS-34-40) were collected around buildings in the southern portion. Sample locations SFS-6-15 were selected to provide a spatial distribution across the southern portion. Sample locations SFS-16-19 and SFS-34-40 were selected based on visual evidence of surface staining. Figure 2-2 shows surficial soil sampling locations. Tables 4-15 and 4-16 present summaries of organic and inorganic compounds, respectively, detected in surficial soil samples collected from the southern portion. Complete analytical tables are provided in Appendix I.

The column marked "background" on Tables 4-15 and 4-16 provides the range of concentrations measured in the three background samples (SFS-12, 32, and 33). Compounds not shown were not detected in any sample. A blank in Table 4-15 or 4-16 indicates that the compound was not detected in that particular sample. Not all samples were analyzed for all TCL/TAL compounds. Refer to Section 2.4 and Table 2-1 for details as to analyses conducted on each sample.

In general, only trace levels of VOC were detected in surficial soil samples collected from the southern portion. Xylene (540 ug/kg) was measured at location SFS-38, one of the samples collected from stained areas. Trace levels of pesticides were detected at several locations across the southern portion. PCB were detected at SFS-6 (25 ug/kg), SFS-16 (48 ug/kg), SFS-34 (160 ug/kg), and SFS-37 (570 ug/kg). Other semivolatile compounds measured across the southern portion consisted primarily of PAH. PAH were measured above background at locations SFS-7, SFS-8, SFS-31, and SFS-37. Metals concentration were generally within 1-2 times the background concentrations.

Analytical results of testing of surficial soil samples collected from the southern portion are used in the HRA, as detailed in Volume 2. Additional discussion of the overall distribution of compounds in surficial soils is provided in Section 4.2.4, below.

4.2.3.2 Test Borings

Eighty-one soil samples were collected from 53 test borings installed across, or around the perimeter of, the southern portion of the Study Site. Of these, 38 samples were collected from 17 borings located within SSDA 1. Tables 4-17, 4-18, and 4-19 provide summaries of the compounds detected, for VOC, SVOC/PEST/PCB, and metals, respectively. Tables 4-17A, 4-18A, and 4-19A provide summaries of the compounds detected, for VOC, SVOC, and metals, respectively, for the Task 3 borings at SSDA 1 (400 series). Soil samples were collected from three additional borings (TB2, TB11, and TB18), designated as background locations. Plate 1-1 shows the test boring locations. Complete analytical tables are provided in Appendix I.

The column marked "background" on Tables 4-17, 4-18, and 4-19 provides the range of concentrations measured in the three background test boring samples. Compounds not shown were not detected in any sample. A blank in Tables 4-17, 4-17A, 4-18, 4-18A, 4-19 or 4-19A indicates that the compound was not detected in that particular sample. Not all samples were analyzed for all TCL/TAL compounds. Refer to Section 2.6 and Table 2-3 for details as to analyses conducted on each sample.

VOC are present in subsurface soils from throughout the southern portion. As detailed on Tables 4-17 and 4-17A, chlorinated VOC consist mainly of chlorobenzene and trichloroethene and its breakdown products (dichloroethene and vinyl chloride). Non-chlorinated VOC consist of either petroleum-related VOC (benzene, toluene, ethyl benzene, or xylene), or ketones (2-butanone and 4-methyl-2-pentanone).

Other than the discrete material, the highest levels of chlorinated VOC were detected at sample locations B202B (120 ppm dichloroethene (DCE), 240 ppm trichloroethene (TCE), and 2.8 ppm vinyl chloride (VC)) TB127 (140-7300 ppm TCE), B402 (9.5 ppm tetrachloroethene (PERC), 140 ppm DCE, and 1100 ppm TCE), and B412 (19 ppm PERC, 380 ppm DCE, and 220 ppm

TCE). Boring TB103, contained 25 ppm DCE, but no TCE or VC. A sample of discrete material (Discrete Material A), approximately eight inches thick, at B402 measured 2000 ppm PERC, 2300 ppm DCE, and 43,000 ppm TCE. This material was not soil-based nor mixed with soil, but was a discrete homogeneous material. A second area of discrete material (Discrete Material B) was encountered in borings B401, B405, and B408. This material was white, putty-like, and mixed with soil. A representative sample of this discrete material was collected from boring B408 (408-2). The only chlorinated VOC detected in this sample was methylene chloride (26 ppm).

The highest levels of non-chlorinated VOC were detected at sample locations B304 (733-1640 ppm total BTEX), TB105 (881 ppm total BTEX), TB127 (1126-26,400 ppm total BTEX and 1180-24,700 ppm total ketones), B405 (350-610 ppm toluene, 240-600 ppm xylenes, 110-510 ppm 2-butanone), and B409 (250 ppm acetone, 300 ppm 4-methyl-2-pentanone, 2000 ppm 2-butanone). The Discrete Material A, encountered at B402, contained 440 ppm toluene. Discrete Material B, sampled at B408, contained 56 ppm acetone, 130 ppm ethylbenzene, 120 ppm toluene, and 1000 ppm xylenes.

As shown on Tables 4-18 and 4-18A, the primary SVOC constituents measured in the southern portion are PAH, at various concentrations across the area. The highest total PAH concentrations in subsurface soil within the southern portion were detected at B207B (226 ppm) and TB129C (189 ppm). Various pesticides, phthalates, and phenols were measured with less frequency. Significant concentrations of phenolics and phthalates were detected at TB127 (490 ppm phenolics, 2837 ppm total phthalates), B402 (141 ppm total phthalates), B405 (262 ppm total phthalates and 70 ppm phenolics), and B406 (1063 ppm total phthalates). PCB were measured at boring locations B207, (0.37-11 ppm), B208, (0.09 ppm), B209, (.23-1.2 ppm), TB7SA, (2 ppm), TB26B, (1.1 ppm), TB103, (.51-.74 ppm), TB116A, (5.1 ppm), TB121, (.30 ppm), TB127, (ND to 30 ppm), and TB136, (80 ppm).

As shown on Tables 4-19 and 4-19A, metals concentrations in subsurface soils vary considerably across the southern portion. Values range above and below background. There is no apparent pattern of metals distribution across the area.

Additional discussion of the overall distribution of compounds in subsurface soils is provided in Section 4.2.4.2.

4.2.4 Summary of Contaminant Source Distribution

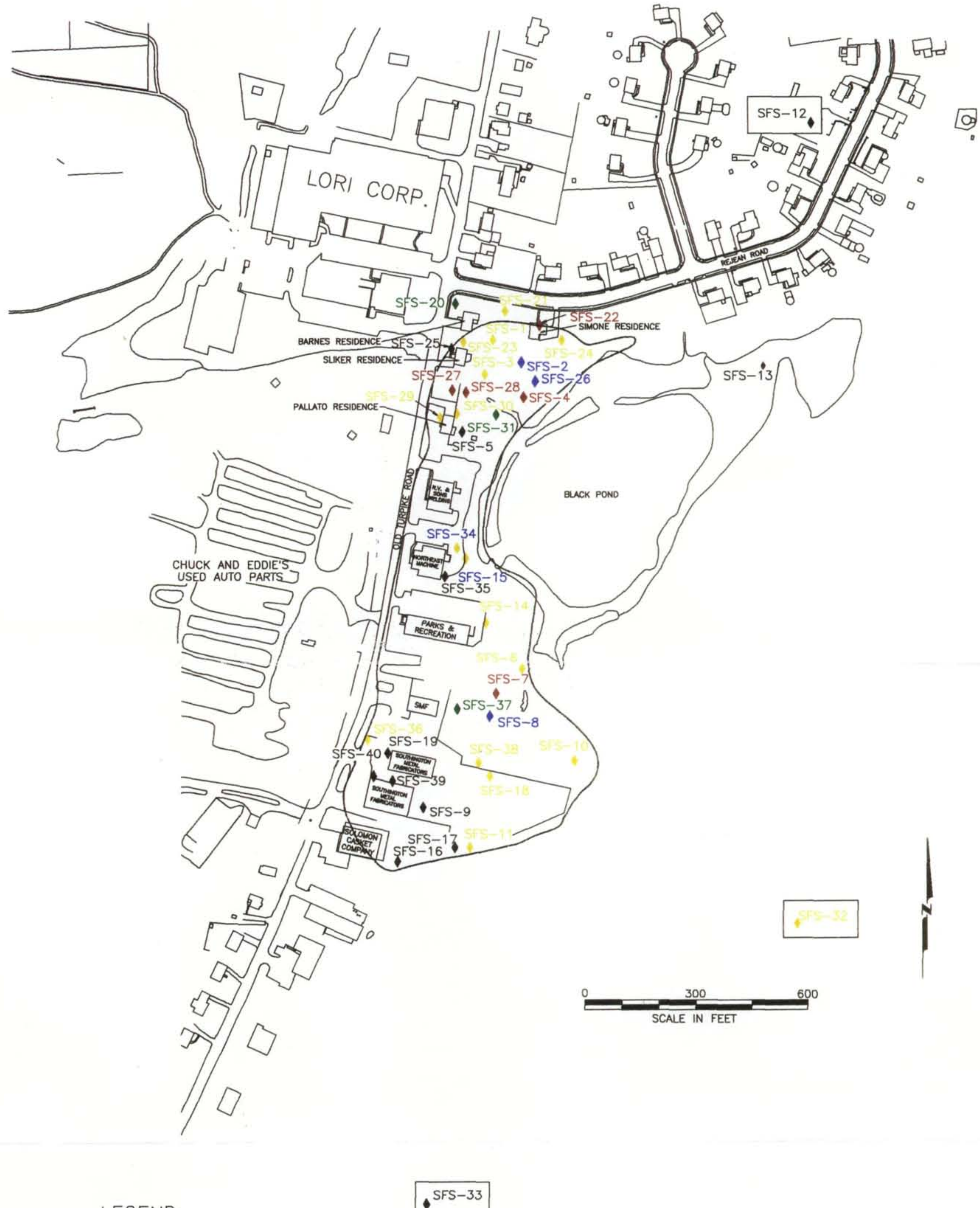
This section provides a summary of the data obtained from investigations of surface and subsurface soils and a discussion of the distribution of contaminants across the Study Site. Based on the data, this section also looks at the distribution of contaminants and how the analytical data correlates with and supports other types of data collected during the RI. Sections 5 and 6 will combine this information with geological and hydrogeological data to provide a complete picture of the Study Area.

4.2.4.1 Distribution of Contaminants At the Surface

The distribution of contaminants at the surface, across the Study Site, may be more a function of current activities on the Study Site, than an indication of impacts from the operation of the landfill. This hypothesis is reasonable, considering that a soil cover has been placed over the entire Study Site and that numerous activities, as discussed in Section 1, which could result in contaminant deposition at the surface, have occurred across the Study Site since the landfill closure in 1967.

As discussed in Sections 4.2.2 and 4.2.3, there is no significant presence of VOC in the surficial soil anywhere in the Study Site. Although metals are present in surficial soils across the Study Site, the levels measured are in most cases at or near background levels. The data does present some levels above background, however, only for specific metals and in isolated samples. The data does not indicate a pattern of elevated concentrations for any specific metal or group of metals. The HRA, presented in Volume 2, addresses potential risks, if any, associated with the metals detected.

Semivolatile compounds (SVOC) are present in surface soils across the Study Site at levels above background. The primary SVOC present in the surficial soil samples are PAH, pesticides, and PCB. Figure 4-2 shows the distribution of total PAH, at levels above the EPA CLP contract



LEGEND

SFS-17 ♦ SURFICIAL SOIL SAMPLING LOCATION

EXTENT OF STUDY SITE

SURFICAL SOIL CONTAINING PAH COMPOUNDS WITHIN THE FOLLOWING CONCENTRATION RANGES:

- SFS-4 ♦ NOT DETECTED ABOVE CRQL
- SFS-4 ♦ 330-5000 ug/Kg
- SFS-4 ♦ 5001-10,000 ug/Kg
- SFS-4 ♦ 10,001-15,000 ug/Kg
- SFS-4 ♦ >15,000 ug/Kg

NOTE

ANALYTICAL DATA WAS COLLECTED FOR ALL LOCATIONS SHOWN.

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-2

DISTRIBUTION OF PAH
SURFICIAL SOIL ABOVE CRQL

DRAWING NAME: SOIL2.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93

required quantitation limit (CRQL), throughout the Study Site. The concentration of total PAH ranged from 708 to 2566 ug/kg in the three background samples. Figure 4-3 shows the distribution of total pesticides and PCB, above the CRQL, throughout the Study Site.

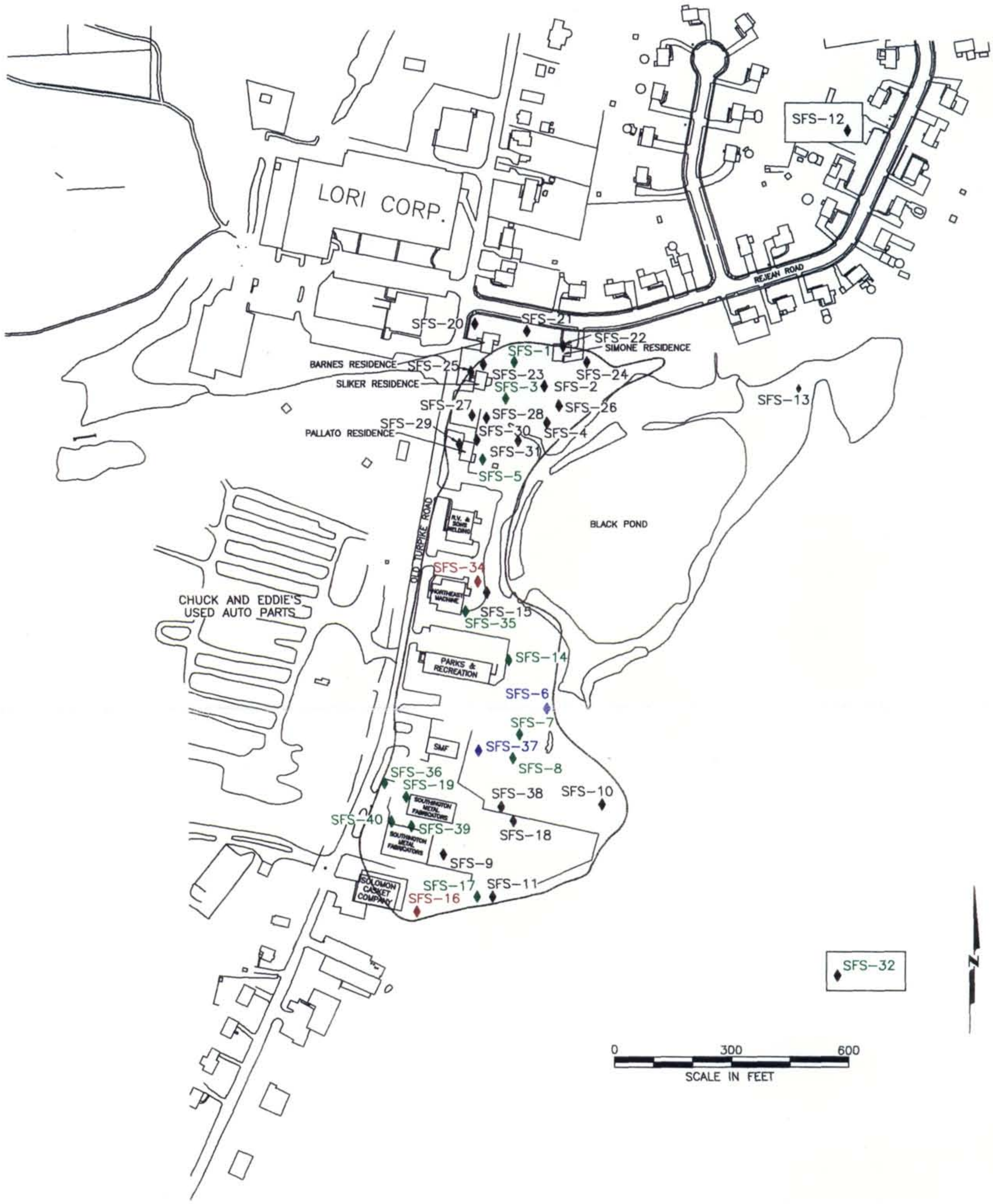
PAH in the surficial soils from the northern portion may be the result of mixing of subsurface soils, known to contain significant levels of PAH, with the soil cap during installation and/or subsequent on-site development. However, other activities, consistent with residential properties, such as wood burning stoves, oil residue from vehicles, or filling prior to construction, could also result in the PAH levels measured in surficial soils from the northern portion. PAH in surface soil in the southern portion could, likewise, be the result of the industrial activities which are occurring now, or have occurred in the past. The HRA, presented in Volume 2, addresses the potential risks, if any, which may be associated with PAH in surficial soils.

4.2.4.2 Distribution of Contaminants in Subsurface Soils

Volatile Organics

Figures 4-4 and 4-5 show the distribution, in plan view, of chlorinated and non-chlorinated VOC, respectively. Plates 4-3, 4-4, 4-5, 4-6, and 4-7, show the distribution of VOC, plotted on cross-sections A-A', B-B', F-F', H-H', and I-I', J-J', K-K', respectively. Chlorinated VOC are not present in subsurface soils in the northern portion. The levels of non-chlorinated VOC that were detected in subsurface soil in the northern portion, and the types of compounds (primarily petroleum-related), could be expected to be present in soil from any suburban urban area. The general absence of VOC in the northern portion is consistent with the operational history of the Study Site.

VOC were measured in subsurface soils from throughout the southern portion which is consistent with accounts of landfill practices. As discussed previously, the VOC measured were primarily chlorinated ethenes (TCE and its degradation products) or petroleum-related (ethyl benzene, toluene, xylenes), or a mixture of both. Two potential semi-solid disposal areas (SSDA 1 and SSDA 2) were identified during the RI, based on information from interviews with past and



LEGEND

SFS-17 SURFICIAL SOIL SAMPLING LOCATION

EXTENT OF STUDY SITE

SURFICAL SOIL CONTAINING PAH COMPOUNDS WITHIN THE FOLLOWING CONCENTRATION RANGES:

- SFS-4 NOT DETECTED ABOVE CRQL
- SFS-4 PESTICIDES MEASURED ABOVE 5 ug/Kg
- SFS-4 PCB MEASURED ABOVE 50 ug/Kg
- SFS-4 PESTICIDES AND PCB MEASURED ABOVE RESPECTIVE CONCENTRATIONS SHOWN ABOVE

NOTE

ANALYTICAL DATA WAS COLLECTED FOR ALL LOCATIONS SHOWN.

ESE Environmental Science & Engineering, Inc.
A CILCORP Company

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-3

DISTRIBUTION OF PESTICIDES & PCB SURFICIAL SOIL ABOVE CRQL

DRAWING NAME: SOIL3.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93

ESE Environmental Science & Engineering, Inc.
A CILCORP Company

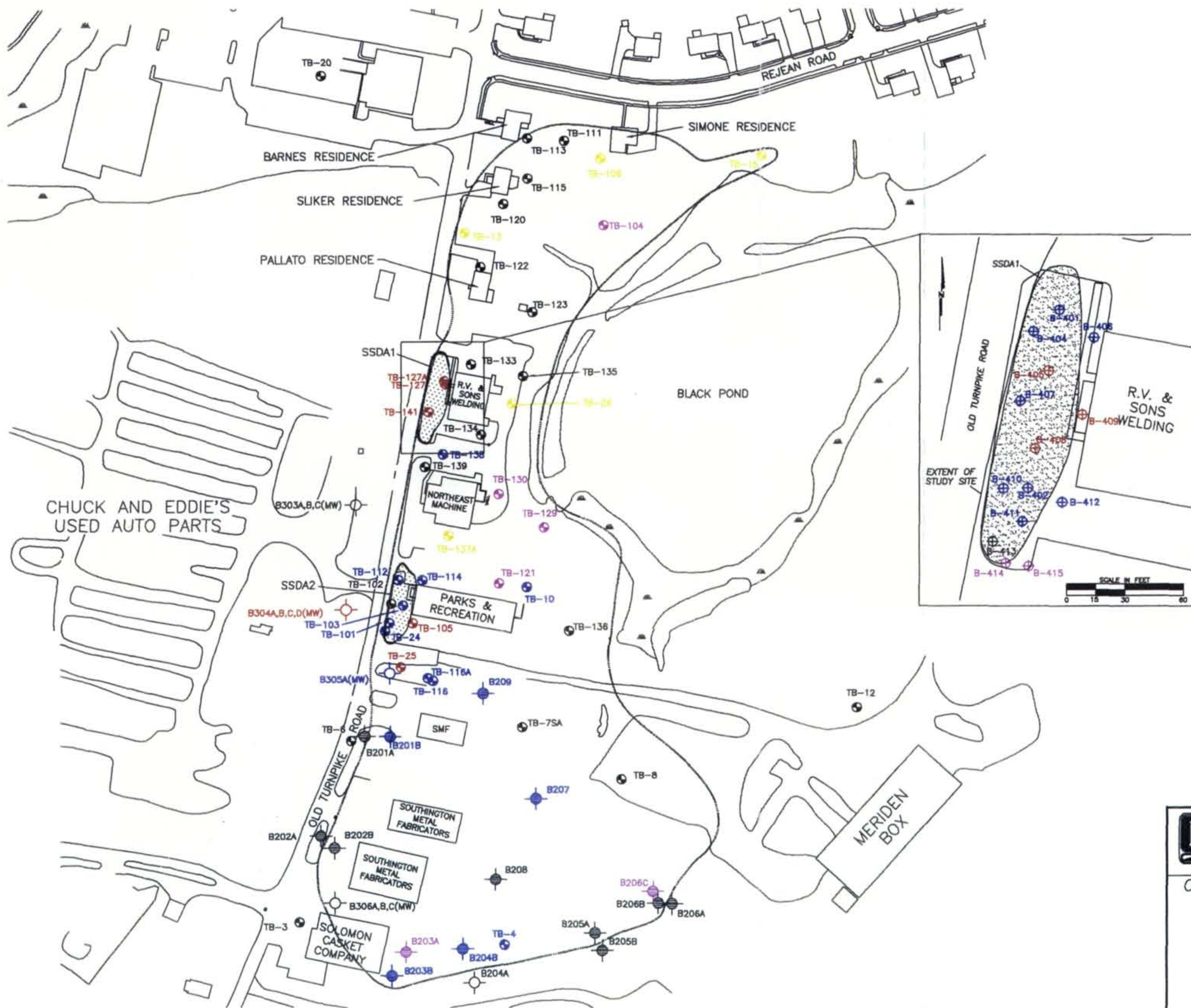
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-4

DISTRIBUTION OF CHLORINATED VOC
SUBSURFACE SOIL
ABOVE CRQL

DRAWING NAME: CLORSUB.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 12/10/93



LEGEND

ESTIMATED EXTENT OF STUDY SITE

SOIL CONTAINING NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS AT THE FOLLOWING RANGES OF CONCENTRATIONS:

TB-104	NOT DETECTED ABOVE CRQL
TB-108	10-50 ug/Kg
TB-104	51-500 ug/Kg
TB-10	501-50,000 ug/Kg
TB-116	50,001-500,000 ug/Kg
TB-141	> 500,000 ug/Kg

NOTE: ANALYTICAL DATA WAS COLLECTED FOR ALL BORINGS SHOWN.

SEMI-SOLID DISPOSAL AREA

0 100 200 400
SCALE IN FEET

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-5

DISTRIBUTION OF NON-CHLORINATED VOC SUBSURFACE SOIL ABOVE CRQL

DRAWING NAME: NCSUB.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 12/10/93

current Town employees, information contained in public documents, boring data, and the results of a GPR survey.

Disposal practices throughout the operation of the landfill involved non-specific disposition of materials. Materials were generally disposed based on the area currently in use, not based on segregation of waste types. SSDA 1 and SSDA 2 have been identified as specific areas where some semi-solid wastes were disposed for a short part of the operational life of the landfill (approximately 1964-1967).

As shown on Tables 4-17 through 4-19 the levels of contamination detected in SSDA 2 are similar to levels detected elsewhere in the southern portion of the Study Site. The average VOC concentrations detected in SSDA 2 are 79 ppm for non-chlorinated VOC and 7 ppm for chlorinated VOC. This compares to the average concentrations, for all areas outside either SSDA, of 60 ppm for non-chlorinated VOC and 12 ppm for chlorinated VOC.

The Task 3 field investigations provided significant additional subsurface analytical data, with the objective of assessing the significance of SSDA 1 as a source of contaminants to groundwater. The majority of soil within SSDA 1 is similar in types of contaminants and concentrations to the remainder of the southern portion of the Study Site. With the exception of two samples associated with the discrete materials (TB-127-C and B402-5), out of 38 collected in SSDA 1 the average VOC concentration for subsurface soil samples are 361 ppm for non-chlorinated VOC and 80 ppm for chlorinated VOC, which in not significantly different from the averages for the remainder of the southern portion of the Study Site.

Semivolatile Organic Compounds

The distribution of semivolatile organic contaminants in subsurface soils is consistent with the operational history of the landfill and supports the north-south delineation, which is apparent from the subsurface geology. Figure 4-6 shows the distribution, in plan view, of PAH compounds, at levels above the CLP contract required detection limit (CRQL), across the Study Site. Plates 4-3, 4-4, 4-5, 4-6, and 4-7 show the distribution of PAH, plotted on cross-sections A-A′, B-B′, F-F′, H-H′, and I-I′, J-J′, K-K′, respectively. The highest levels of PAH are

LEGEND

ESTIMATED EXTENT OF STUDY SITE

SUBSURFACE SOIL CONTAINING NON-PAH COMPOUNDS WITHIN THE FOLLOWING CONCENTRATION RANGES:

TB-104	NOT DETECTED ABOVE CRQL
TB-106	330–2500 ug/Kg
TB-104	2501–10,000 ug/Kg
TB-10	10,001–100,000 ug/Kg
TB-116	100,000–250,000 ug/Kg
TB-141	> 250,000 ug/Kg

NOTE: ANALYTICAL DATA WAS COLLECTED FOR ALL BORINGS SHOWN.

SEMI-SOLID DISPOSAL AREA

0 100 200 400
SCALE IN FEET

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4–6

DISTRIBUTION OF PAH COMPOUNDS
SUBSURFACE SOIL
ABOVE CRQL

DRAWING NAME: FIG4-4.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 12/10/93

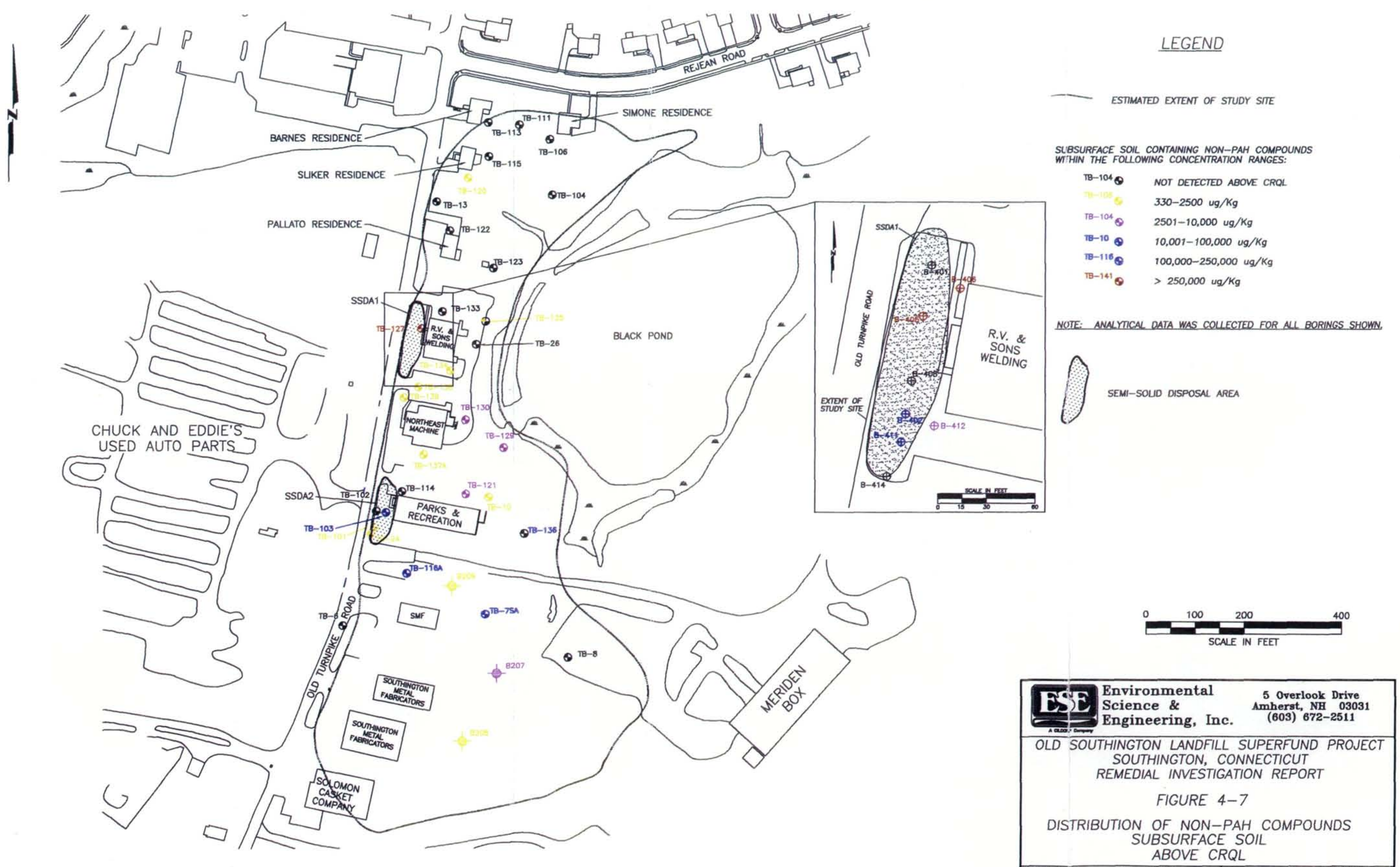
located in the subsurface soils from the northern portion of the Study Site. PAH are a normal byproduct of low temperature combustion of wood materials. The operational history of the landfill indicates that the northern area of the Study Site was used for wood and construction debris. Occasional fires were also reported in this area. The presence of PAH, therefore, is consistent with the operational history. Likewise, the test borings from this area indicated significant amounts of wood ash and black silty sands, consistent with the supposition that the area was used as a "stump dump".

Figure 4-7 shows the distribution, in plan view, of non-PAH SVOC compounds (plasticizers and phenolics), at levels above the CRQL, across the Study Site. Plates 4-3, 4-4, 4-5, 4-6, and 4-7 show the distribution of non-PAH SVOC, plotted on cross-sections A-A′, B-B′, F-F′, H-H′, and I-I′, J-J′, K-K′, respectively. As shown, non-PAH SVOC compounds are primarily located in the southern portion of the Study Site, where solid waste materials were disposed. Only low levels of non-PAH SVOC compounds are located in soils from the northern portion of the Study Site, such levels being expected and typical in any developed area. This distribution of non-PAH SVOC compounds is consistent with operational history and with the results obtained, from test borings, on material types.

The non-PAH SVOC are primarily phthalates or phenols. Both of these classes of compounds are frequent byproducts of solid waste degradation, but may also be associated with industrial waste streams. The level detected at TB127 can not be explained based solely on solid waste degradation. Levels of non-PAH SVOC detected across the remainder of the southern portion are similar and are consistent with levels which could be expected from a solid waste landfill.

Pesticides/PCB

Pesticides and PCB are present, sporadically, across the Study Site. Figure 4-8 shows the distribution, in plan view, of pesticides and PCB, at levels above the CRQL, in both the northern and southern portions. Plates 4-3, 4-4, 4-5, and 4-6, show the distribution of pesticides and PCB, plotted on cross-sections A-A′, B-B′, F-F′, and H-H′, respectively. Except for one isolated occurrence, PCB were measured only in the southern portion of the Study Site. The levels of pesticide and PCB, anywhere in the Study Site, are not indicative of significant PCB



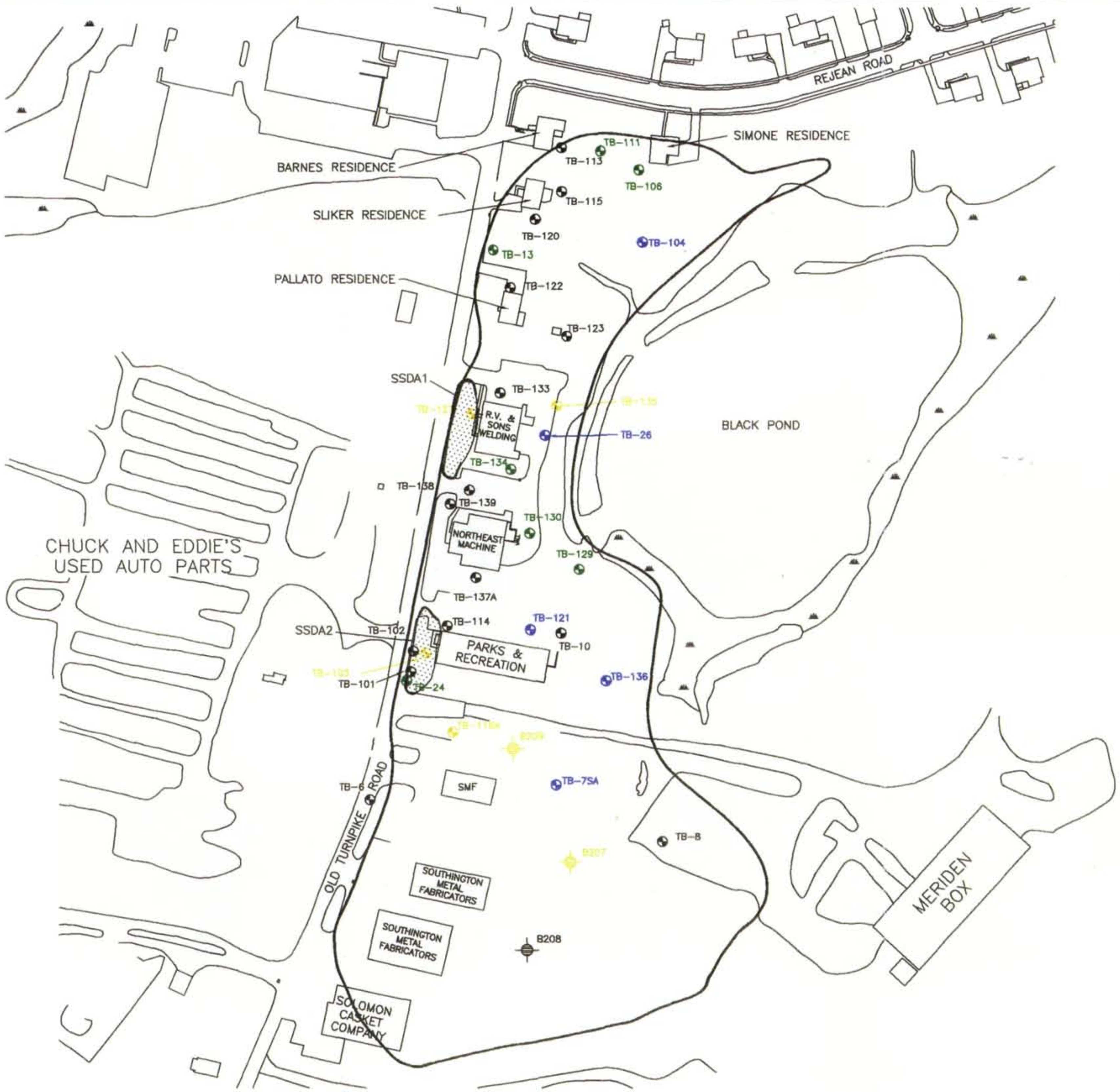
ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-7

DISTRIBUTION OF NON-PAH COMPOUNDS
SUBSURFACE SOIL
ABOVE CRQL

DRAWING NAME: FIG4-5.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE: 12/10/93



LEGEND

EXTENT OF STUDY SITE

TB-26 PESTICIDES MEASURED ABOVE 10 ug/Kg

TB-26 PCB MEASURED ABOVE 100ug/Kg

TB-26 PESTICIDES AND PCB MEASURED ABOVE RESPECTIVE CONCENTRATIONS SHOWN ABOVE

NOTE: ANALYTICAL DATA WAS COLLECTED FOR ALL BORINGS SHOWN.

SEMI-SOLID DISPOSAL AREA

0 100 200 400
SCALE IN FEET

N

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-8

DISTRIBUTION OF PESTICIDES AND PCB SUBSURFACE SOILS

DRAWING NAME: FIG4-6.DWG		FILE NUMBER:	492 5534
SCALE: 1"=200'	REVISION: 0	DRAWN BY: BRJ	DATE: 12/10/93

disposal activities, but could result from disposal of typical household waste or typical pesticide-use practices.

Metals

Figure 4-9 shows the distribution, in plan view, of selected heavy metals, at concentration levels above background, across the Study Site. Plates 4-3, 4-4, 4-5, 4-6, and 4-7 show the distribution of the selected heavy metals, plotted on cross-sections A-A′, B-B′, F-F′, H-H′, and I-I′, J-J′, K-K′, respectively. The distribution is random and is not indicative of significant metals disposal activities. The calculation of total heavy metals includes the following metals: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, vanadium, and zinc. The background concentration used for total heavy metals is calculated as the median of the range for total heavy metals in the designated background borings. In general, higher levels of heavy metals are present in the southern portion of the Study Site.

4.3 GROUNDWATER

This section discusses the contaminants found in groundwater. Sections 5 and 6 will combine all data collected during the RI to discuss fate and transport and present the conceptual model for the Study Area. Tables 4-20, 4-21, and 4-22, presents the compounds detected in groundwater, for VOC, SVOC and PEST/PCB, and metals, respectively. The number of rounds of groundwater samples collected at each location, during the RI, is indicated. When only a single round of data has been collected for a well location, the date collected is provided. Three well locations were chosen as upgradient/background: GZ-1, GZ-2, and GZ-3. All three locations have been analyzed for VOC and metals. Only location GZ-1 was sampled for SVOC. The column labelled "BKGRD" provides a range of values measured in the three designated background wells. The specific analytes detected in each designated background well are provided at the end of each table. Complete analytical data tables for groundwater are provided in Appendix I.

LEGEND

ESTIMATED EXTENT OF STUDY SITE

SUBSURFACE SOIL CONTAINING HEAVY METALS WITHIN THE FOLLOWING RANGES:

- TB-100 — 124–500 ug/Kg
- TB-10 — 501–1,500 ug/Kg
- TB-115 — 1,501–5,000 ug/Kg
- TB-141 — > 5,000 ug/Kg

NOTE: ANALYTICAL DATA WAS COLLECTED FOR ALL BORINGS SHOWN.

SEMI-SOLID DISPOSAL AREA

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4–9

DISTRIBUTION OF HEAVY METALS
SUBSURFACE SOIL

DRAWING NAME:	FIG4–7.DWG		FILE NUMBER:	492 5534
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DJB	DATE:	12/10/93

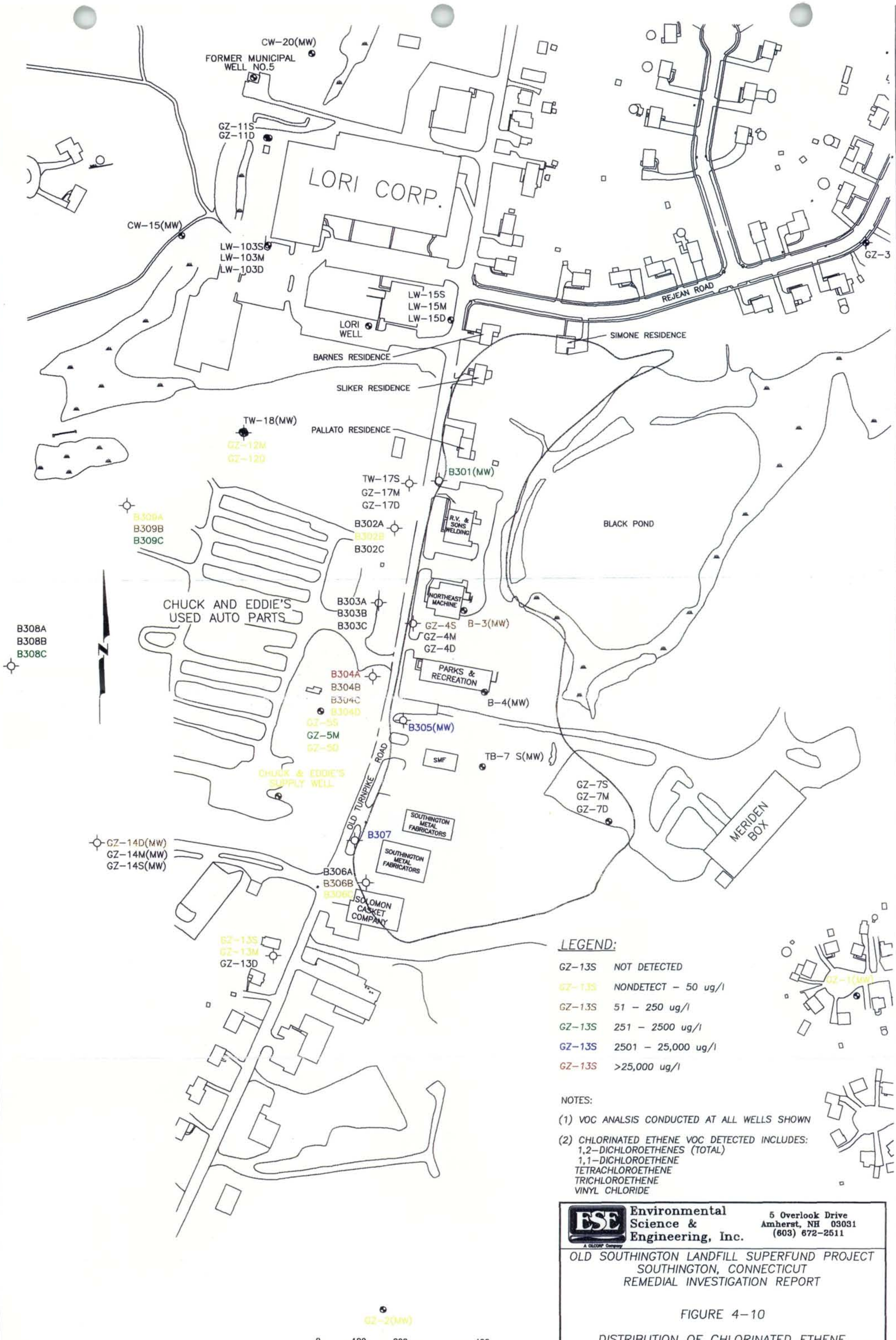
4.3.1 Distribution of Semivolatile Organic Compounds, Pesticides, and PCB

As shown on Table 4-21, only sporadic, low levels of SVOC compounds, pesticides, or PCB were measured in groundwater. Phenolics and phthalates, common landfill constituents, were measured at well locations 304, 305, and 306. Low levels of PAH compounds were measured at well location GZ-7 in the shallow portion of the aquifer. Although SVOC were detected in SSDA 1, as discussed in Section 4.2.3.2, significant levels of SVOC were not detected in groundwater from wells located downgradient of SSDA 1 (GZ17, TW-17, B302, B309) nor in B301, immediately adjacent and north of SSDA 1 (cross gradient).

4.3.2 Distribution of Volatile Organic Compounds

Figures 4-10 through 4-13 show the distribution of VOC contaminants in groundwater throughout the Study Area. For purposes of presenting the analytical data, the following subsets of VOC were used:

Chlorinated ethene VOC:	1,2-dichloroethenes (total)
	1,1-dichloroethene
	tetrachloroethene (PCE)
	trichloroethene (TCE)
	vinyl chloride (VC)
Chlorinated ethane VOC:	methylene chloride
	chloroethane
	1,1-dichloroethane
	1,1,1-trichloroethane (TCA)
Other chlorinated VOC:	bromodichloromethane
	chlorobenzene
	chloroform



Environmental Science & Engineering, Inc.
A CILCORP Company

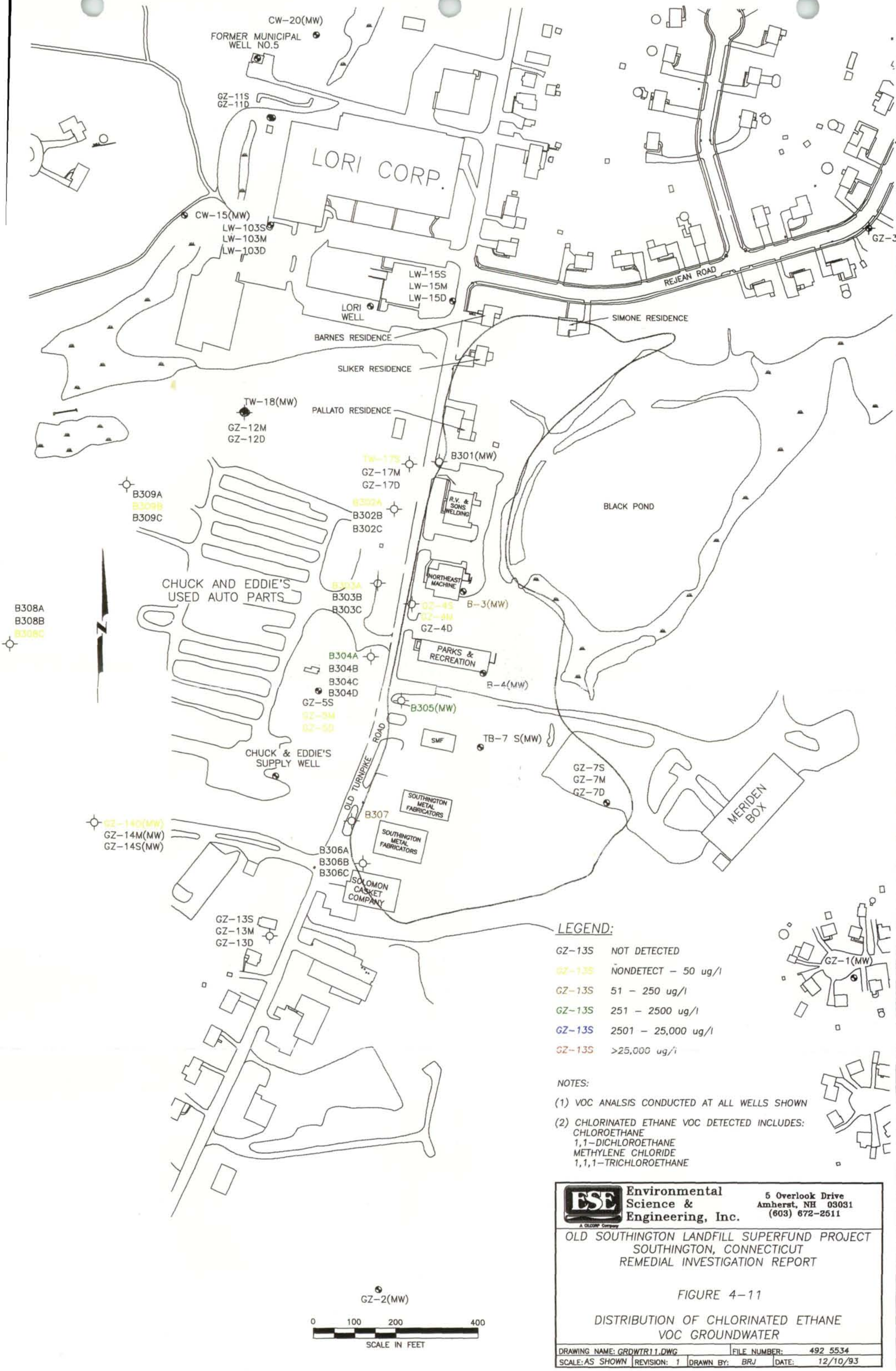
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-10

DISTRIBUTION OF CHLORINATED ETHENE VOC GROUNDWATER

DRAWING NAME: GRDWTR10.DWG		FILE NUMBER:	492 5534
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: BRJ	DATE: 12/10/93



LEGEND:

GZ-13S NOT DETECTED
GZ-13S NONDETECT – 50 ug/l
GZ-13S 51 – 250 ug/l
GZ-13S 251 – 2500 ug/l
GZ-13S 2501 – 25,000 ug/l
GZ-13S >25,000 ug/l

NOTES:

(1) VOC ANALSIS CONDUCTED AT ALL WELLS SHOWN

(2) CHLORINATED ETHANE VOC DETECTED INCLUDES:
CHLOROETHANE
1,1-DICHLOROETHANE
METHYLENE CHLORIDE
1,1,1-TRICHLOROETHANE

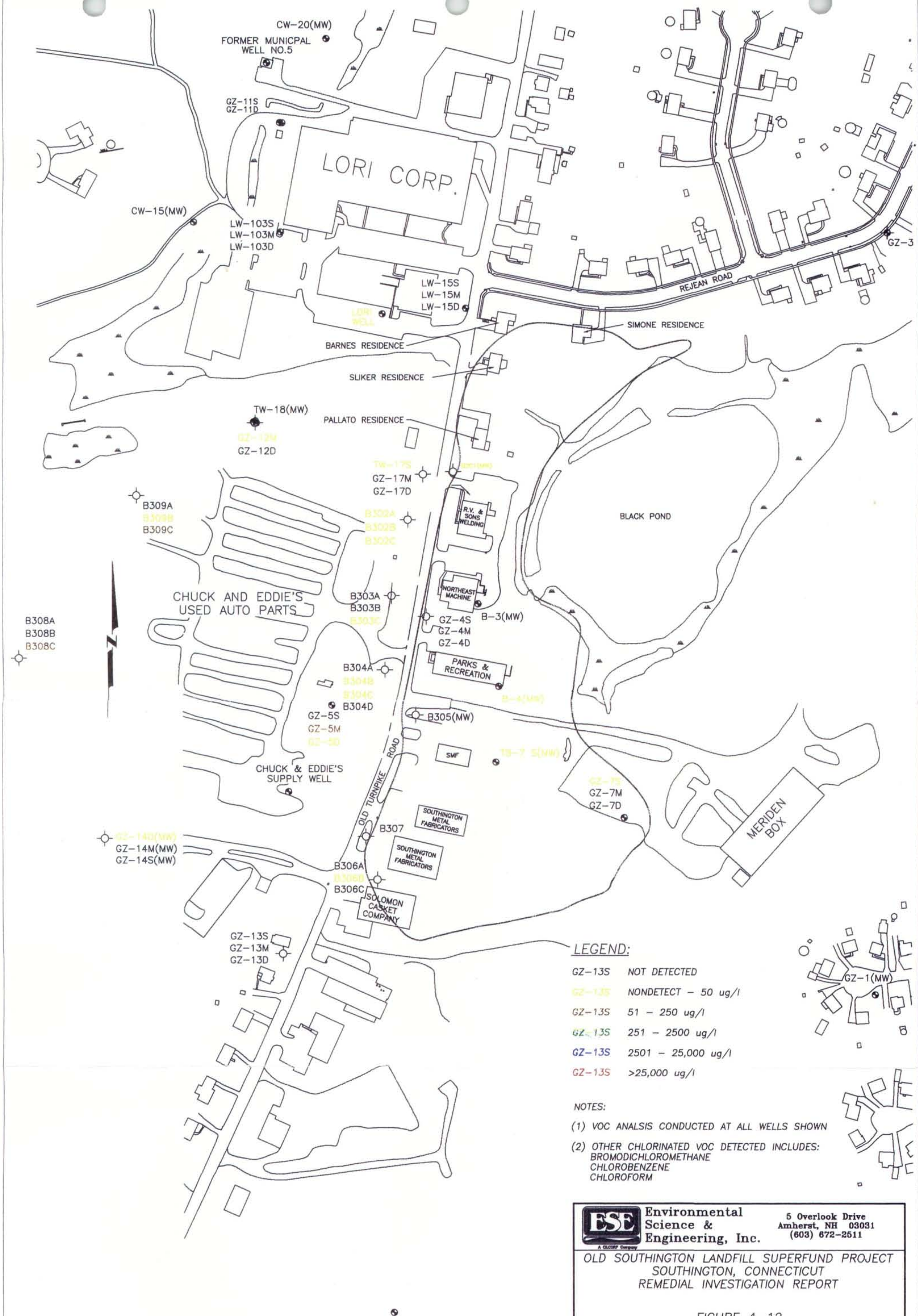
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-11

DISTRIBUTION OF CHLORINATED ETHANE VOC GROUNDWATER

DRAWING NAME: GRDWTR11.DWG			FILE NUMBER:	492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: BRJ	DATE:	12/10/93	



ESE Environmental Science & Engineering, Inc. — A CILCORP Company

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-12

DISTRIBUTION OF OTHER CHLORINATED VOC GROUNDWATER

DRAWING NAME: GRDWTR12.DWG			FILE NUMBER:	492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: BRJ	DATE:	12/10/93	

FIGURE 4-13

DISTRIBUTION OF NON-CHLORINATED VOC GROUNDWATER

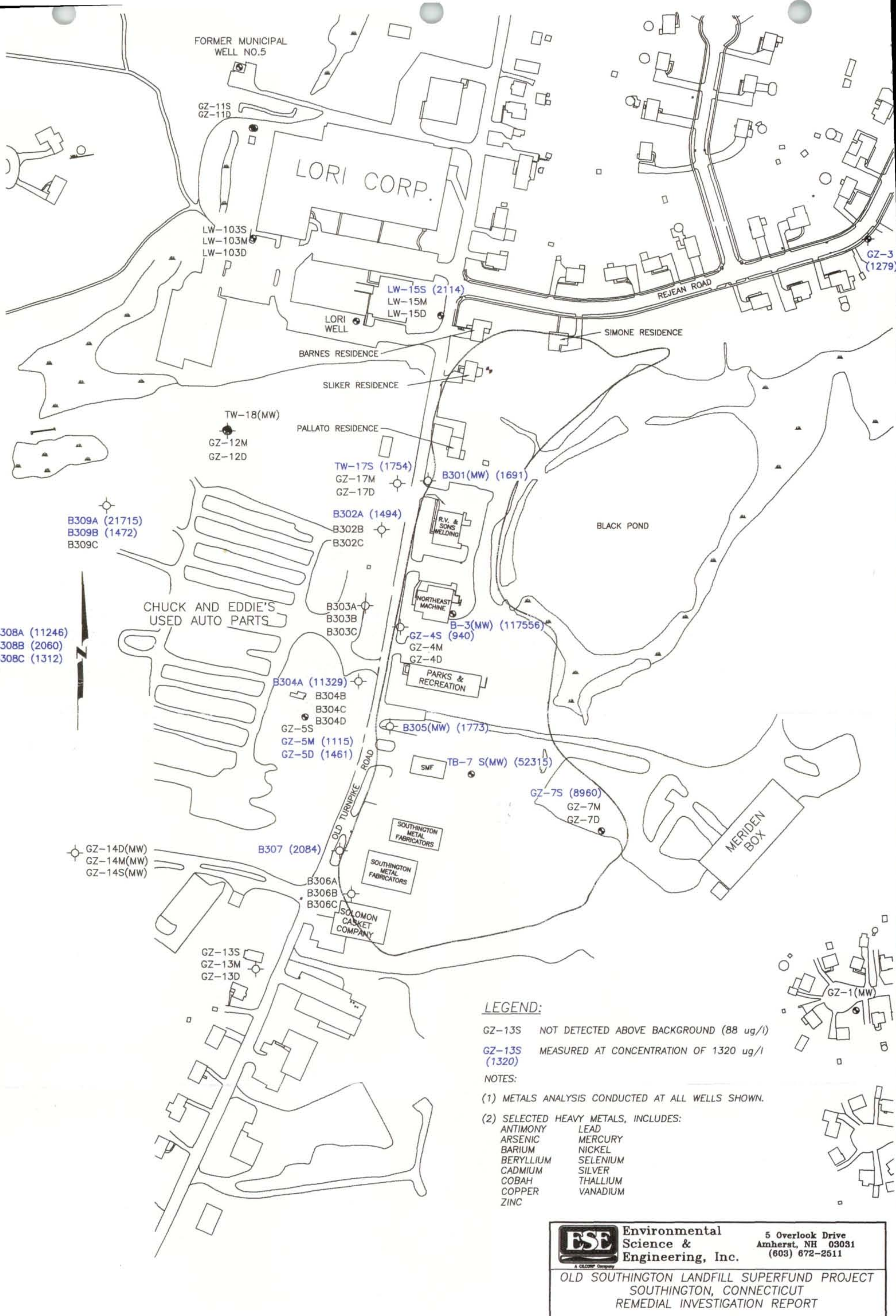
Non-chlorinated VOC:	acetone
	benzene
	carbon disulfide
	ethyl benzene
	4-methyl-2-pentanone
	toluene
	xylenes (total)

The chlorinated ethenes represent TCE and its impurities and degradation products. Chlorinated ethanes represent TCA and its impurities and degradation products. The presence of other chlorinated compounds may reflect disposal of other industrial wastes or may result from the disposal of typical household wastes. The other chlorinated compounds measured in groundwater in the Study Area are common in many household products. The non-chlorinated VOC represent petroleum-related VOC and ketones (also common in household products). Many of the VOC measured in groundwater are in use, or are components of products in use, by industries currently operating on the Study Site and within the Study Area.

4.3.3 Distribution of Metal Compounds

Figure 4-14 shows the distribution of metal contaminants in groundwater throughout the Study Area. For purposes of presenting the analytical data, a subset of heavy metals, for which EPA or DEP have stringent requirements, were selected. The following subset of metals was used:

Selected heavy metals:	antimony	lead
	arsenic	mercury
	barium	nickel
	beryllium	selenium
	cadmium	silver
	chromium	thallium
	cobalt	vanadium
	copper	zinc



ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-14

DISTRIBUTION OF SELECTED HEAVY METALS ABOVE GROUNDWATER BACKGROUND

DRAWING NAME: GRDWTR14.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: BRJ	DATE: 12/10/93

Total selected heavy metals were measured in the designated background wells at levels ranging from 437 to 1322 ug/l. Figure 4-14 shows values measured in excess of a median background concentration of 880 ug/l. The concentration of total selected heavy metals measured at each location is shown in parentheses.

As shown on Figure 4-14, heavy metals concentration increases, in the shallow portion of the aquifer, downgradient, as groundwater moves west beneath Chuck & Eddies Used Auto Parts. Given the nature of an automobile salvage yard, this increase in metals is likely to be a result of contribution of metals to groundwater from the salvage yard operation.
At many of the locations where metals were measured above the average background the levels are not significantly higher than at GZ-3 (one of the background wells). GZ-3 is upgradient, as demonstrated by empirical data collected on groundwater movement, and not impacted by the Study Site.

4.3.4 Comparison of Groundwater Contaminant Concentrations to Maximum Contaminant Levels

Table 4-23 shows wells which have concentrations of any measured analyte in excess of either the Federal or State of Connecticut maximum contaminant level (MCL). The analytes listed on Table 4-23 were measured in at least one well sample in excess of its MCL. The respective MCLs are listed on the table with an indication of whether the MCL is Federal (F) or State of Connecticut (CT). The table shows the lowest MCL for each analyte. Wells not shown on Table 4-23 did not exceed the MCL for any compound measured.

The only SVOC compounds for which the MCL was exceeded are phthalates, in wells within the Study Site or immediately downgradient (G304A). No wells exceeded the MCL for any pesticide. Three wells exceeded the MCL for PCB (G304A, GZ-7S, and TB-7S), all of which are within the Study Site or immediately downgradient. VOC and metals are responsible for the most frequent exceedences of MCLs. Two of the three designated upgradient/background wells (GZ-1 and GZ-3) exceed the MCL for several metals.

Plate 4-8 shows the wells, outside the Study Site, for which any MCL was exceeded, shows what compounds were in exceedence, and provides the standard and the measured concentration. Figures 4-15, 4-16, and 4-17 show MCL exceedence plumes in groundwater for SVOC, VOC, and metals, in shallow, medium, and deep groundwater monitoring wells, respectively.

Metals exceeding the MCL in Study Area groundwater monitoring wells vary from well to well, and by depth (as shown on Plate 4-8), and include antimony, barium, beryllium, chromium, lead, manganese, nickel, thallium, cadmium, copper, and mercury. Metals exceeding MCL (cadmium, beryllium, lead, chromium, manganese) are present in the groundwater upgradient of the Study Site, in the shallow portion of the aquifer. In the medium and deep portions of the aquifer the zone in which metals exceeding MCL matches that for VOC compounds. As discussed earlier, metals concentrations increase as the groundwater goes west, passing beneath Chuck & Eddies Used Auto Parts.

SVOC exceeding MCL include butyl benzene phthalate, bis(2-ethylhexyl) phthalate, and PCB. SVOC exceeding MCL are present in the shallow and medium portions of the aquifer within the Study Site or along the western edge of the Study Site. Only an isolated spot of SVOC exceeding MCL was detected in the deep portion of the aquifer (B306C, bis(2-ethylhexyl phthalate). No downgradient migration of SVOC above MCL was detected in any portion of the aquifer.

VOC exceeding MCL include benzene, chloroform, dichloroethane, dichloroethene, ethyl benzene, methylene chloride, tetrachloroethene, toluene, trichloroethane, trichloroethene, vinyl chloride, and xylenes. VOC at concentrations exceeding MCL were not detected downgradient of the Study Site, in the shallow portion (top 10-20 feet) of the aquifer. The zone in which VOC exceeding MCL begins to be detected downgradient in the medium portion of the aquifer and is clearly detected downgradient in the deep portion (bottom 10-20 feet) of the aquifer. This distribution of VOC is consistent with the hydraulic gradients demonstrated during the RI, as discussed in Section 3. The VOC constituents resulting in exceedances of the MCL downgradient are tetrachloroethene, trichloroethane, dichloroethene, dichloroethane, benzene, vinyl chloride, and trichloroethene.

LEGEND
- METALS
- VOC
- SVOC

0 100 200 400
SCALE IN FEET

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-15
GROUNDWATER CONCENTRATIONS
EXCEEDING FEDERAL OR STATE MCL
SHALLOW DEPTH

DRAWING NAME: MCL-S.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=300'	REVISION: 0	DRAWN BY: DJB	DATE: 12/10/93

LEGEND
- METALS
- VOC
- SVOC

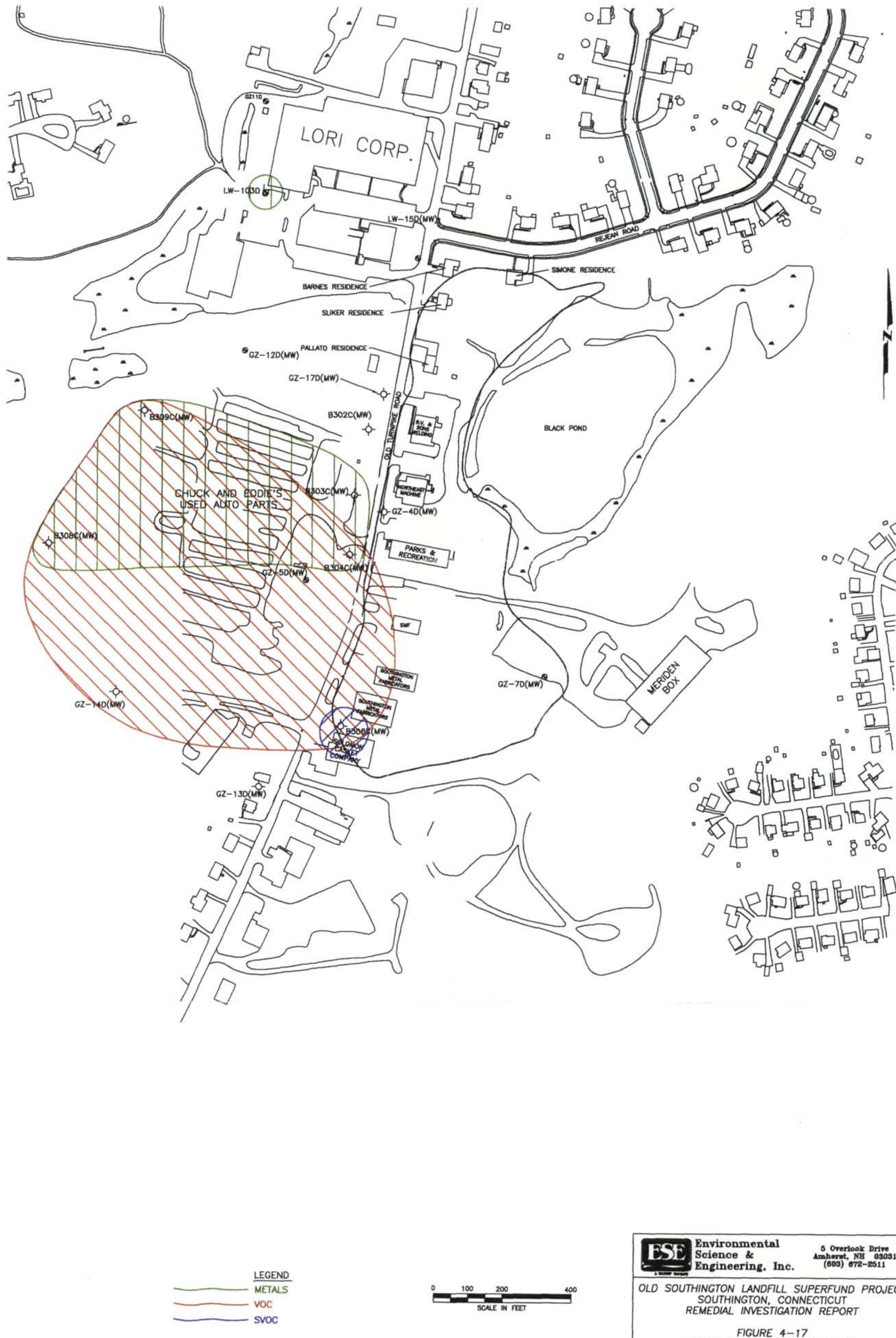
0 100 200 400
SCALE IN FEET

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-16
GROUNDWATER CONCENTRATIONS
EXCEEDING FEDERAL OR STATE MCL
MEDIUM DEPTH

DRAWING NAME: MCL-M.DWG		FILE NUMBER:	492 5534
SCALE: 1"=300'	REVISION: 0	DRAWN BY: DJB	DATE: 12/10/93



Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 4-17
GROUNDWATER CONCENTRATION
EXCEEDING FEDERAL AND STATE MCL
DEEP DEPTH

DRAWING NAME: MCL-D.DWG				FILE NUMBER:	492 5534
SCALE: 1"=300'	REVISION: 0	DRAWN BY:	DJB	DATE:	12/10/93

The impact of contaminants in groundwater is addressed in detail in the Human Health Risk Assessment, in Volume 2 of the RI\FS.

4.4 SURFACE WATER AND SEDIMENT

Surface water and sediment samples were collected in July 1990 and June 1992, from in and around Black Pond and the discharge stream from Black Pond. The June 1992 sampling round included the July 1990 sampling points plus additional sampling points. Sampling locations are shown on Figure 2-7. The July 1990 sampling round did not include a uniform set of analyses for both surface water and sediments. The June 1992 round was designed to provide a complete and uniform database on surface water and sediments. Data for both rounds is presented and discussed in this section. Because the 1992 data set provides a more current and complete database, the Human Health and Ecological Risk Assessments were conducted using only the 1992 data.

4.4.1 Sediment

Tables 4-24, 4-25, and 4-26 present the analytical results for compounds detected in sediment samples, for VOC, SVOC and pesticides/PCB, and metals, respectively. Complete analytical data tables are provided in Appendix I. As discussed in Section 2.8.2, a more consistent numbering of sampling locations was used during the June 1992 investigations, with all surface water and sediment samples co-located. On the data tables, if a sampling location identifier was renumbered, the July 1990 identifier is shown in parentheses.

In general, the occurrence of VOC in sediments is at low levels and sporadic. Chlorinated ethenes were measured at four sampling locations. Petroleum-related VOC (benzene, toluene, xylene) were detected at several locations. Runoff to Black Pond from industrial activities on the Study Site, from parking areas, and from Old Turnpike Road would contribute to the presence of petroleum-related VOC compounds. The primary SVOC detected in sediment samples were the PAH compounds, which occur frequently at varying concentrations. PCB were measured at four sampling locations.

Metals were detected uniformly in all sediment samples, as would be expected. Analysis of the occurrence of metals and comparison to background metals concentrations is discussed as part of the Ecological Risk Assessment.

The impact, if any, from contaminants in sediments is addressed in detail in the Human Health and Ecological Risk Assessments, presented in Volume 2 of the RI/FS.

4.4.2 Surface Water

Tables 4-27 and 4-28 present the analytical results for compounds detected in surface water samples for organics and metals, respectively. Complete analytical data tables are provided in Appendix I. As discussed in Section 2.8.2, a more consistent numbering of sampling locations was used during the June 1992 investigations, with all surface water and sediment samples co-located. On the data tables, if a sampling location identifier was renumbered, the July 1990 identifier is shown in parentheses. Surface water was also analyzed for a selected list of water quality parameters, as presented on Table 4-29.

Only trace levels of organic compounds were detected in any surface water sample. During the June 1992 sampling round, metals analyses were performed on filtered and unfiltered samples. Filtered samples were typically lower in metals concentrations, but significant differences were not noted.

The potential risks, if any, from contaminants in surface water is addressed in detail in the Human Health and Ecological Risk Assessments, presented in Volume 2 of the RI/FS.

4.5 ECOLOGICAL ASSESSMENT

As discussed in Section 2.9, a comprehensive ecological investigation was performed throughout the Study Area, in the summer of 1992. Field surveys and investigations were performed by ESE field personnel, in conjunction with personnel from Fugro McClelland, Plainsboro, NJ. The basic wetlands delineation was prepared by ESE, based upon field investigations. The wetlands delineation was then incorporated into the WET II analysis prepared by Fugro McClelland. The WET II analysis report is provided in Appendix L.

The ecological investigation results are analyzed and discussed in detail in the Ecological Risk Assessment, presented in Volume 2 of the RI/FS.

5.0 CONTAMINANT FATE AND TRANSPORT

This section discusses the environmental fate and transport parameters associated with the compounds detected during the Remedial Investigation. The potential transport mechanisms are air, surface water, sediment, or groundwater. Contaminants in soil, if transported at all, are most likely transported through erosion, air entrainment of particulates, or direct dissolution into the air or water. Studies were performed during the RI which indicate that contaminants are unlikely to have been transported from the Study Site in either the air or surface water. Therefore, the significant potential contaminant transport mechanism is in groundwater. The subsections which follow discuss the transport of contaminants in groundwater.

Section 5.1 details the theoretical basis for the evaluation of fate and transport characteristics and Section 5.2 summarizes the site-specific fate and transport values. Section 5.3 discusses the migration of the contaminants in the Study Area. Section 5.4 provides a summary.

5.1 THEORY

Contaminant migration and distribution between air, water, sediment, and soil depend on both hydrogeologic and compound-specific parameters. Hydrogeologic factors determine how groundwater flows through the aquifer. Contaminants within the groundwater will follow groundwater flow patterns. However, contaminant migration will be retarded by interaction of the contaminants with the soil particles within the aquifer. The extent of contaminant retardation is a function of several variables including the physical-chemical character of the contaminant and the associated soil. The following discussion addresses each of these parameters as they may affect behavior of compounds within the Study Area.

5.1.1 Advection Component of Contaminant Transport

Advection describes groundwater movement through the aquifer. Within a saturated porous medium, such as the unconsolidated aquifer in the Study Area, the advection rate of dissolved or aqueous-phase compounds under transient conditions is given by Darcy's law (e.g., Bear and Verruijt, 1987):

$$v = \frac{-Ki}{n_e R_d} \qquad (9)$$

where,

v = apparent pore velocity (length/time)

K = hydraulic conductivity of the soil (length/time)

i = hydraulic gradient (dimensionless), which equals the piezometric head difference between two points on a groundwater pathline divided by the distance between the two points.

n_e = effective or drainable porosity (dimensionless) of the soil, approximately equal to the specific yield.

R_d = retardation factor ($R_d \geq 1$), a dimensionless parameter that represents the ratio of groundwater pore velocity to the actual advection rate in a sorbing (onto immobile soil grains) porous medium under transient conditions.

These equations describe groundwater movement. Contaminants within the groundwater, although following groundwater movement, will be retarded by interaction with soil particles within the aquifer (typically by adsorption, the attraction of contaminants onto soil particles).

The rate at which a specific contaminant plume migrates relative to the groundwater in an aquifer can be expressed by the retardation factor, R_d. R_d accounts for the temporary storage of a contaminant on immobile soil particles which causes the attenuation of a plume's downgradient advance. Typical analyses for which retardation must be considered include calculation of the time required for contamination to reach a given downgradient location at a specific concentration, and determination of the remediation time required to bring an aquifer contaminant below a specified concentration. Plume attenuation only affects transport at locations in the aquifer where concentrations have not reached a steady-state level and are changing with time.

The retardation factor is defined by the following relationship (Bear and Verruijt, 1987):

$$R_d = 1 + bK_d/n_e \qquad (10)$$

where

b = the bulk dry density of the soil (g/cm^3)

n_e = the effective porosity of the soil (which accounts for the total volume of saturated soil available for sorption)

K_d = the soil-water partition coefficient or the distribution coefficient (cm^3/g)

The soil-water partition coefficient K_d (cm^3/g) is derived from what is known as the Freundlich linear equilibrium adsorption isotherm (Bear and Verruijt, 1987). An adsorption isotherm (isotherm meaning at a given and constant groundwater temperature) describes the phenomenon of increase of a contaminant concentration on soil particles at a fluid-soil interface as a function of the pore water concentration. The attraction of contaminants to soil particles comes mainly from electrostatic attraction and chemical interactions between the soil particles and the dissolved contaminant. For nonionic, organic compounds such as VOC and SVOC sorption to soil is primarily caused by chemical binding to the organic carbon fraction of the soil matrix unless the organic carbon content of the soil is very low (e.g., < 0.1%).

An equilibrium isotherm is based on the assumption that the contaminant component sorbed onto the soil particles and in the adjacent solution are continuously at equilibrium. The soil-water partition coefficient, K_d, describes the concentrations of a contaminant sorbed onto soil particles at equilibrium with the concentration of that contaminant in the pore water, for a particular soil and for a particular contaminant (Javandel et al., 1984):

$$\bar{c} = K_d \, c_w \qquad \textbf{(11)}$$

where

$\bar{c}$ = soil concentration (mass chemical/bulk dry mass soil; g/g)

c_w = pore water concentration (g/cm^3)

One approach for obtaining the distribution coefficient is to measure the concentrations of the contaminant in the saturated soil and the surrounding pore fluid separately, then calculate K_d from the linear equilibrium isotherm given in Equation (11) (assuming the data approximate a linear variation). For metals, this is the only approach available.

A second approach relies on the tendency of organic compounds to be adsorbed by organic matter within the aquifer. This tendency is proportional to the organic carbon content of the sediments and to the degree of hydrophobicity of the contaminant, as measured by the organic carbon partition coefficient, K_{oc}. The empirical relationship is given by the linear equilibrium isotherm (Walton, 1985):

$$K_d = f_{oc} K_{oc} \qquad (12)$$

where:

K_{oc} = organic carbon partition coefficient

f_{oc} = organic carbon content of soil as a fraction

Each contaminant has a unique K_{oc}, and the organic carbon content of an aquifer can be measured.

5.1.2 Dispersion

Concentrations of contaminants migrating within the groundwater are also greatly affected by dilution as the groundwater containing the contaminants is mixed with large volumes of groundwater not containing the contaminants. Dispersion is a dilution process by which an initial volume of aqueous solution continually mixes with increasing portions of the flow system. Dispersion occurs on both small and large scales. Dispersion of contaminants on a microscopic scale occurs because of the nonuniform velocity distributions within the pore spaces, and because of the tortuosity of the microscopic flowlines that groundwater follows during movement between aquifer pores of different shapes and sizes. On a macroscopic scale, dispersion occurs as a result of contaminant transport in areas of geologic and man-made heterogeneities (e.g., less permeable obstructions, such as clay lenses). The higher permeable zones generally control the distances over which dissolved constituents will migrate from the source area. Macroscopic dispersion tends to dominate in most field situations. Dispersion caused by the above factors is called mechanical dispersion.

With respect to chemical migration from a source area to an arbitrary downgradient location, mechanical dispersion will cause contaminants to arrive in a shorter time interval than the travel time based on the mean groundwater pore velocity. This reduced travel time associated with dispersion is due to advection in the higher permeability zones of the aquifer that causes the concentration distribution in the longitudinal (flow) direction to spread out or disperse. The *additional length, L_d, that a chemical may migrate due to dispersion can be estimated from the* following relationship (Bear, 1979):

$$L_d = \sqrt{2 \frac{D_L}{R_d} t} \qquad (13)$$

where,

t = total time of groundwater travel

R_d = retardation factor

D_L = longitudinal dispersion coefficient (length^2/time)

In a porous medium, the longitudinal dispersion coefficient can be estimated as (Bear and Verruijt, 1987):

$$D_L = a_L \cdot v_p \qquad (14)$$

where,

v_p = groundwater pore velocity
a_L = longitudinal dispersivity of the aquifer (length)

Molecular diffusion, the process through which contaminants seek to move from higher to lower concentration within the groundwater, also contributes to dispersion. The coefficient of hydrodynamic dispersion is a combination of molecular diffusion and mechanical dispersion. Molecular diffusion is only important for low-permeability soils such as clays and has much less effect on hydrodynamic dispersion than does mechanical dispersion. Molecular diffusion would not be a significant factor in soil types within the Study Area (high permeability sands and gravels).

5.2 AREA-SPECIFIC CHARACTERISTICS

As discussed above, although there may be a variety of pathways for contaminant transport, the Study Site has matured to where contaminant releases are likely confined to the groundwater system. Overall groundwater contaminant transport in the Study Area aquifer was studied through the selection of indicator contaminants and then by following their migration patterns. The migration patterns can be distinguished by the analytical chemistry results for each monitoring well, combined with the potentiometric surface maps, groundwater flow lines, and vertical hydraulic gradient maps presented in Section 3.

VOC and metals are the primary contaminants detected in groundwater downgradient of the Study Site. Most VOC are more mobile than most metals and better literature data is available for transport parameters for VOC. Therefore, VOC were used as indicator parameters. The VOC selected were trichloroethene (TCE), total 1,2-dichloroethene (DCE), vinyl chloride, benzene, toluene, ethylbenzene, and total xylenes. These contaminants were selected because their migration patterns are representative of the class of VOC and these specific compounds are the primary VOC detected in the Study Site. Metals transport is discussed in Section 5.3.4. Despite the presence of SVOC on the Study Site, significant SVOC have not been detected downgradient of the Study Site, which is to be expected given their generally low solubility and attraction to soil particles. A brief discussion of SVOC contaminant transport is, nonetheless, provided in Section 5.3.3.

The equilibrium isotherm presented in Equation (12) was used to calculate K_d values for the VOC indicator contaminants. The range of organic carbon content (f_{oc}) is presented in Table 5-1 for several saturated (aquifer) and unsaturated soil samples. The value of 0.001 was chosen for f_{oc} predicated upon empirical data collected during the RI on organic carbon content (see Table 5-1). This value was used in the calculations of K_d for each contaminant. The calculations are presented in Appendix M.

R_d was calculated for each indicator contaminant from literature values of K_{oc} and the site-specific f_{oc} values using Equation (10). A range of indicator contaminant velocities was then calculated as presented in Appendix M using a range of horizontal gradients observed in the medium and deep monitoring wells, and the average site hydraulic conductivity derived from the pumping test at well MW5 presented in Section 3. The following evaluations use the numbers generated in this manner.

5.3 GROUNDWATER CONTAMINANT TRANSPORT

A thorough review of the Study Area geology and groundwater flow system is provided in Section 3. Section 5.3 incorporates this information to provide an accurate picture of the groundwater contaminant transport in the Study Area aquifer.

5.3.1 Mechanisms Controlling Study Area Contaminant Concentration and Distribution in Groundwater

The following factors/mechanisms control the contaminant concentration and distribution in the Study Area aquifer:

- The areal distribution of soil contamination within the Study Site;

- The mechanisms by which constituents are released from the solid waste and transferred into groundwater;
- The horizontal and vertical locations of contaminants within the Study Site solid waste;
- Characteristics (e.g., mobility) of specific contaminants detected in the Study Site;
- The peat which exists at variable depths and thickness beneath the solid waste;
- Movement of groundwater through the solid waste;
- The much lower characteristic permeability of the solid waste relative to the aquifer;
- The permeability differences between the shallow and deep portions of the aquifer;
- The large downward groundwater flow component which is present in the southern portion of the Study Site; and
- The general east to west horizontal flow of groundwater that occurs throughout the Study Area.

Contaminants are released to the groundwater by a variety of mechanisms in the Study Site. Infiltration from precipitation causes contaminants in the unsaturated zone to leach into the groundwater. To a smaller degree, vapor-phase diffusion is also an unsaturated zone transport mechanism which contributes to groundwater contamination. In addition, some of the solid waste areas are intersected by the water table at depth, so that contaminants can dissolve directly into the groundwater. This mechanism of contaminant release varies seasonally due to natural fluctuations in the water table elevation and the associated variations in the saturated solid waste thickness.

Considerations separate from the contaminant release mechanisms are the variety of depths and locations where contaminants are released in the Study Site. The current groundwater concentration distribution has been greatly affected by the distribution of contaminant release areas within the Study Site, as discussed in Section 5.3.2.

Volatile organic compounds can exhibit a high adsorption to peat, because peat has a very high organic carbon content (high f_{oc}). The peat deposits would, therefore, potentially cause local areas of high organics contaminant adsorption at locations where they underlie VOC sources. This sorption would significantly retard the release of dissolved constituents into the Study Site groundwater flow system, resulting in a slow continual release. Some isolated occurrences of peat exist in the southern portion, where VOC are present throughout, as shown in two north-south cross-sections through the Study Site (A-A′, Plate 3-2 and H-H′, Plate 3-9).

Mechanisms which significantly reduce, or dilute, shallow-depth Study Site groundwater concentrations are also very important. A primary reason that the shallow-depth groundwater concentrations become significantly reduced in the Study Site vicinity is the low characteristic permeability of the solid waste which is less than the mean Study Area aquifer permeability by a factor of from 10 to 100. The slug test results for wells screened in solid waste (Section 3) demonstrate this permeability difference. Further support of the low permeability of the solid waste is provided by the fact that the water table is perched several feet above the solid waste in some locations, as discussed in Section 3. The concentrations in groundwater discharging from the solid waste zones are significantly reduced by the much larger horizontal flow rate in the Study Area aquifer.

Finally, both vertical and horizontal groundwater flow in the Study Area aquifer have influenced the present distribution of contaminants in groundwater. Vertical groundwater flow is very important relative to horizontal flow, especially in the southern portion of the Study Site, for three reasons: (1) increased groundwater recharge rates associated with neighboring wetlands and ponding of surface water runoff in local depressions during rainfall events, (2) groundwater recharge from Black Pond, and (3) the presence of higher permeability zones at depth in the southern portion of the Study Site (refer to monitoring well permeability test data in Section 3). Downward flow in the Study Site also appears to be enhanced because of the shallow, lower-permeability soils in the wetlands and the low-permeability solid waste which promote vertical drainage into permeable aquifer soils. Evidence of the importance of vertical flow in the vicinity of the southern portion of the Study Site is provided by the large vertical hydraulic gradients measured in the mid to lower portion of the aquifer which are approximately ten times greater than the horizontal Study Area gradient. Downgradient from the Study Site, the vertical hydraulic gradient becomes very small throughout the entire aquifer thickness, and horizontal flow is the predominant transport mechanism.

5.3.2 Contaminant Transport in Groundwater

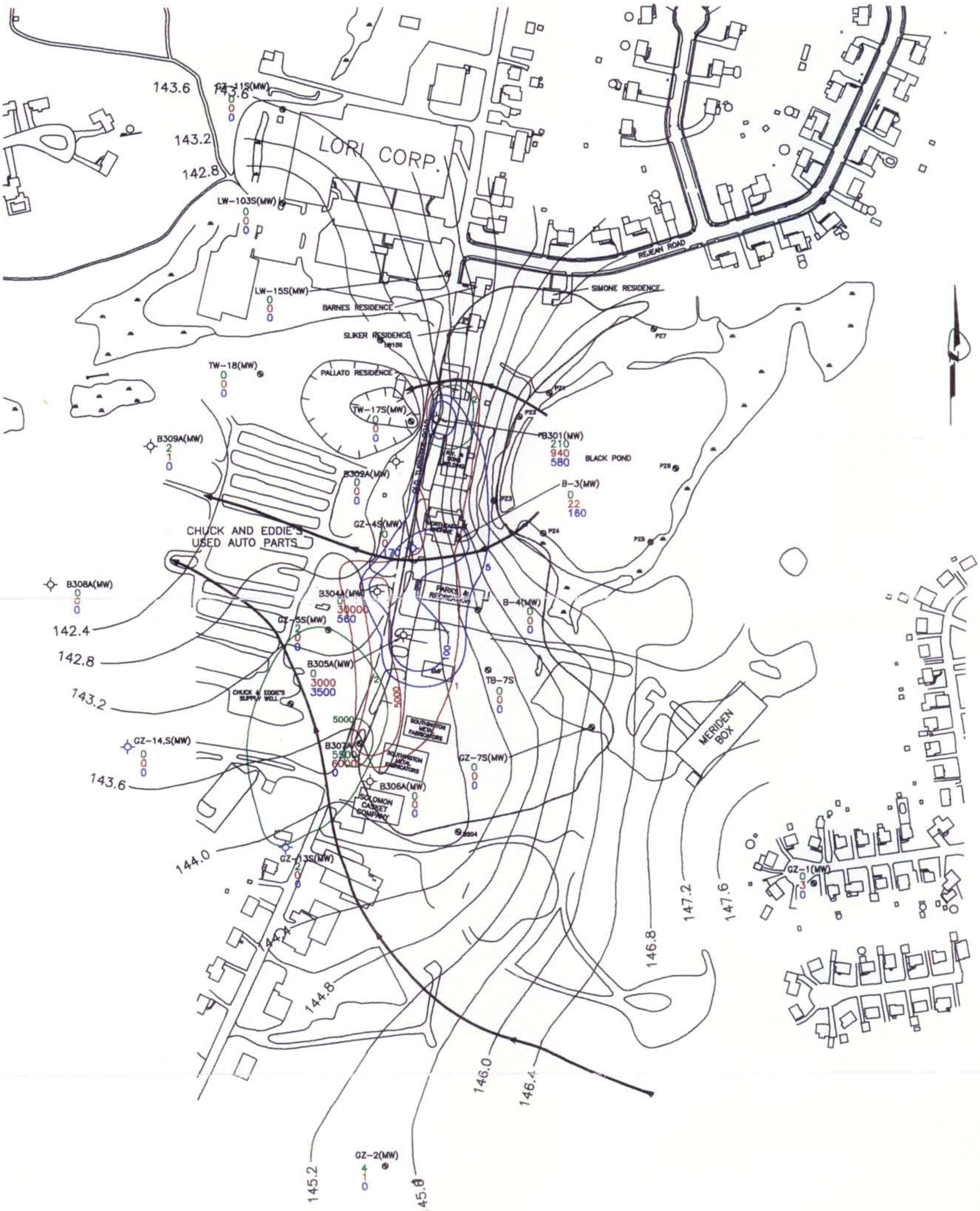
The section discusses contaminant transport in groundwater. VOC concentrations measured throughout the Study Area are used to characterize contaminant transport and distribution. Sections 5.3.3 and 5.3.4 discuss, specifically, SVOC and metals transport, respectively.

In order to further evaluate transport in the Study Area, indicator VOC contaminants were interpreted and plotted as plumes as shown in Figures 5-1 through 5-6 for the shallow, medium, and deep well analytical data for selected chlorinated ethenes and BTEX, respectively. The potentiometric surface (groundwater table elevation) map and groundwater flow lines are superimposed on Figures 5-1 through 5-6 for ease of interpretation (also reference the vertical hydraulic gradient plots presented in Section 3 and analytical results presented in Section 4).

5.3.2.1 Comparison of Contaminant Transport and Hydrogeologic Findings

Contaminant transport in groundwater is consistent with the groundwater flow patterns detailed in Section 3. The distribution of VOC contaminants in groundwater indicate the following:

- A "down-and-out" pattern of groundwater transport exists, where constituents released in the Study Site move downward with the medium-to-deep vertical hydraulic gradients while moving westward away from the Study Site. This pattern is consistent with the measured groundwater flow directions summarized in the previous section. Analytical data from the monitoring wells at location B304 located along the downgradient (western) edge of the Study Site, indicate

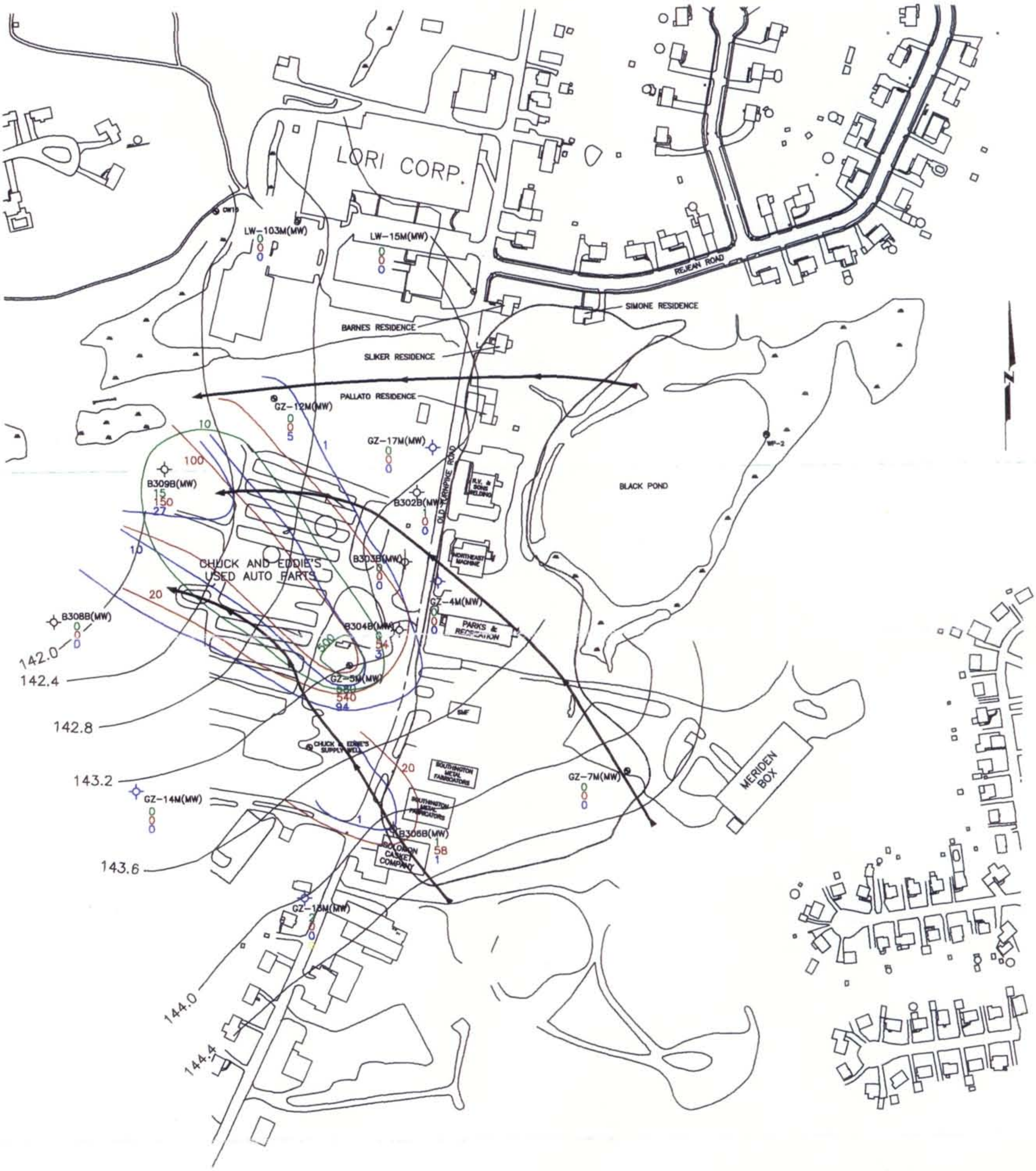


ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5-1
SHALLOW TCE, DCE & VC MAXIMUM CONCENTRATIONS (ppb) (01/05/93 to 01/08/93) AND POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME: SHAL-W.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=300"	REVISION: 0	DRAWN BY: DJB	DATE: 10/11/93



LEGEND

- TCE
- TOTAL DCE
- VINYL CHLORIDE
- POTENTIOMETRIC SURFACE

0 100 200 400
SCALE IN FEET

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5–2
MEDIUM TCE, DCE & VC MAXIMUM CONCENTRATIONS (ppb) (1/5/93 TO 1/8/93) AND POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME:	MEDI-W.DWG			FILE NUMBER:	492 5534		
SCALE:	1"=300'	REVISION:	1	DRAWN BY:	DJB	DATE:	10/11/93

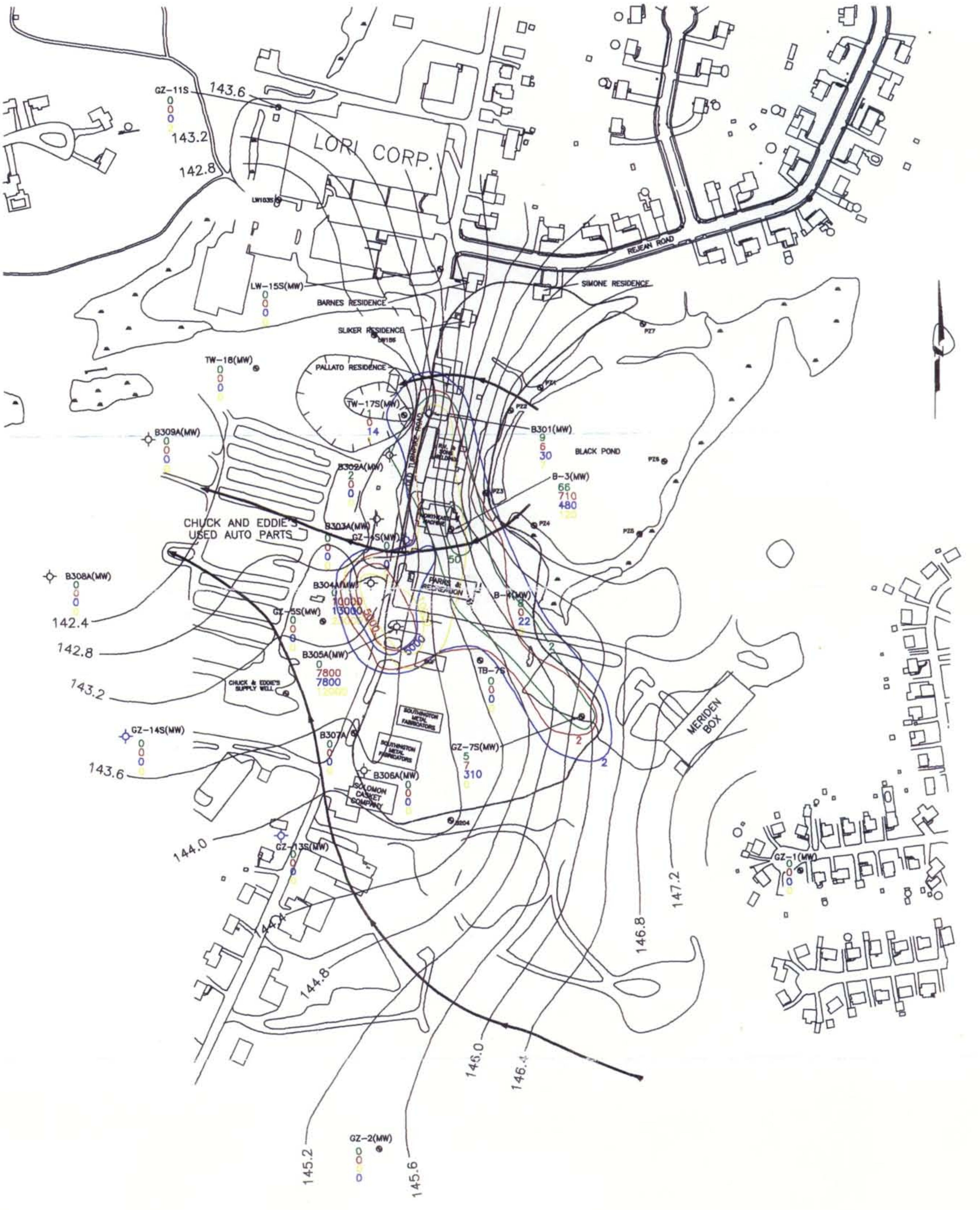
ESE Environmental Science & Engineering, Inc.

5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5–3
DEEP TCE, DCE & VC MAXIMUM
CONCENTRATIONS (ppb) (01/05/93 to 01/08/93)
AND POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME:	DEEP-W.DWG			FILE NUMBER:	492 5534		
SCALE:	1"=300'	REVISION:	1	DRAWN BY:	DJB	DATE:	10/11/93



LEGEND

- BENZENE
- ETHYL BENZENE
- XYLENES, TOTAL
- TOLUENE
- POTENTIOMETRIC SURFACE

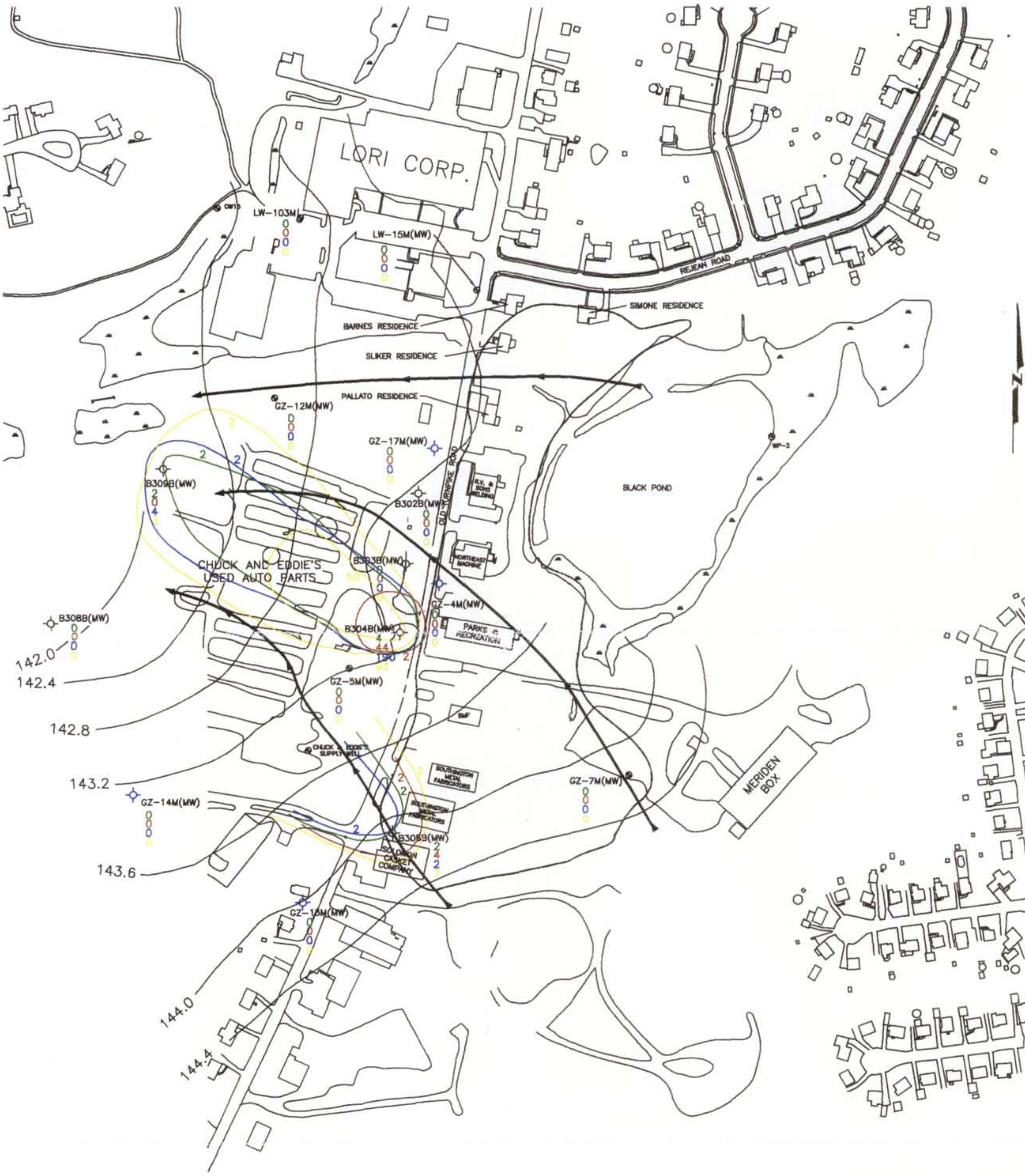
0 100 200 400
SCALE IN FEET

ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5-4
SHALLOW BTEX MAXIMUM CONCENTRATIONS (ppb)
(06/90 to 01/93) AND
POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME: SHAL-T.DWG		FILE NUMBER: 492 5534	
SCALE: 1" =300'	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93



LEGEND

- BENZENE
- ETHYL BENZENE
- XYLENES, TOTAL
- TOLUENE
- POTENTIOMETRIC SURFACE

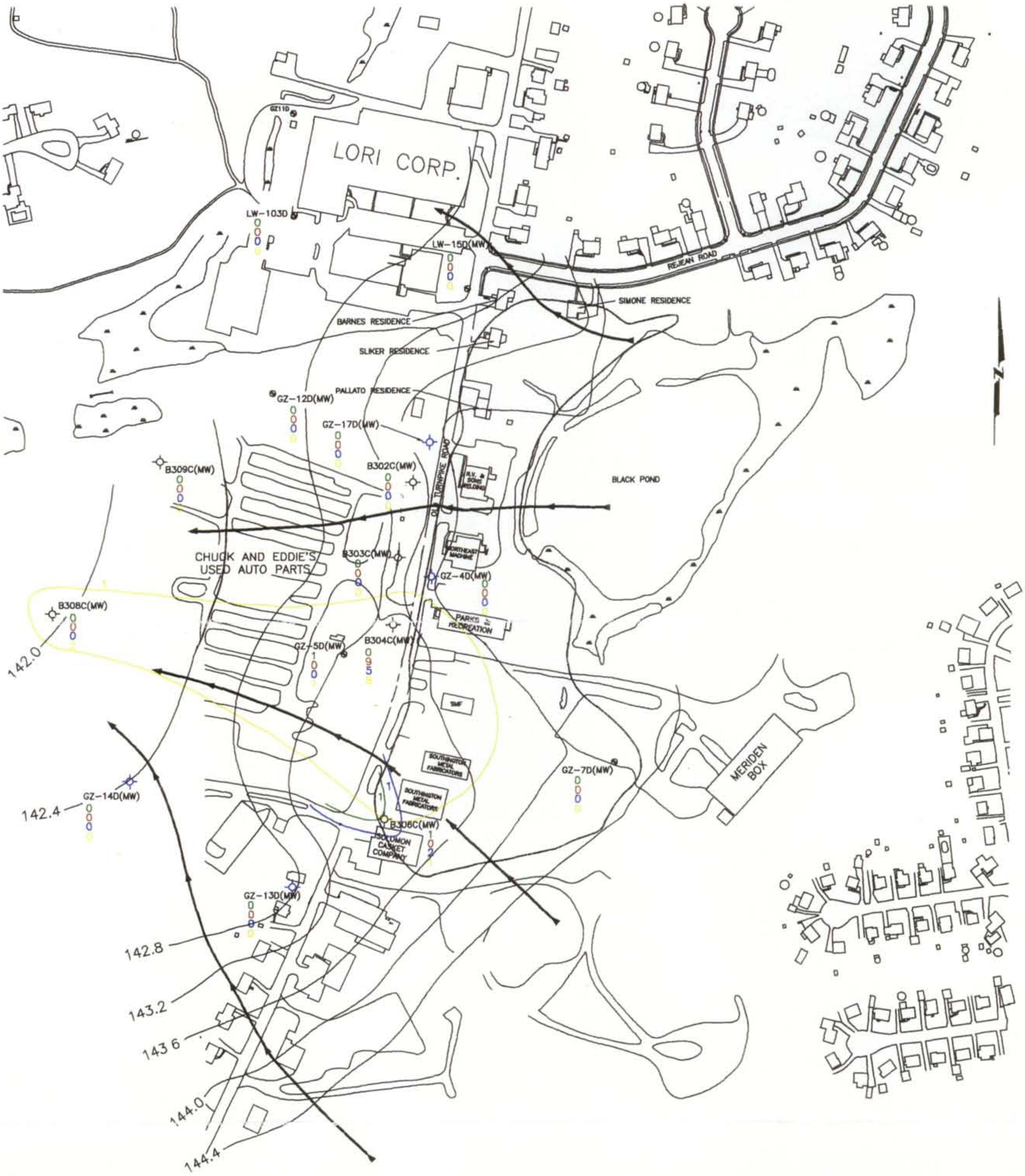
0 100 200 400
SCALE IN FEET

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5-5
MEDIUM BTEX MAXIMUM CONCENTRATIONS (ppb)
(6/90 TO 1/93) AND
POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME: MEDI-T.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=300'	REVISION: 1	DRAWN BY: DJB	DATE: 10/11/93



LEGEND
- BENZENE
- ETHYL BENZENE
- XYLENES, TOTAL
- TOLUENE
- POTENTIOMETRIC SURFACE

0 100 200 400
SCALE IN FEET

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

FIGURE 5–6
DEEP BTEX MAXIMUM CONCENTRATIONS (ppb)
(6/90 to 1/93) AND
POTENTIOMETRIC SURFACE (11/18/92)

DRAWING NAME:	DEEP-T.DWG			FILE NUMBER:	492 5534		
SCALE:	1"=300'	REVISION:	1	DRAWN BY:	DJB	DATE:	10/11/93

elevated groundwater concentrations in shallow wells, lower concentrations in medium wells, and only trace amounts in deep locations in the aquifer. However, further downgradient at wells B308 and B309 constituents were measured primarily in the deep portion of the aquifer and not at shallow depths.

- TCE was found in shallow wells B307 (5500 ppb) and B301 (210 ppb). TCE was absent from the medium-depth monitoring wells, with the exception of 14 ppb in B309B. The large downward groundwater flow component in the southern portion of the Study Site appears to have transported the TCE to the deep section of the aquifer within an area between B304 and the B308/B309 well clusters.

- Within the Study Site, DCE was detected in the shallow portion of the aquifer in wells B301, B305A, and B307A (660, 3500 and 5000 ppb, respectively). Downgradient, DCE was measured in well B309B at 150 ppb. The deep downgradient wells also show DCE contamination at B308C and B309C (49 ppb and 70 ppb, respectively).

5.3.2.2 Impact of Dilution

Significant dilution occurs as contaminants move into the aquifer. Groundwater analytical data support the reduction or dilution of Study Site concentrations by mixing with the large Study Area aquifer flow rates. From the permeability differences (factor of 10 to 100) between saturated waste debris and the aquifer soils, referenced in Section 5.3.1, shallow groundwater concentrations measured in the solid waste would be expected to be reduced by a factor of at least ten upon mixing with a large portion of the aquifer. Groundwater concentration data are consistent with these estimated dilution rates: the highest detected TCE concentration in the Study Site, 5,500 ppb in shallow well B307, located on the western edge of the southern portion of the Study Site is approximately 25 to 30 times higher than the concentrations in the deep wells B308C and B309C (190 ppb and 230 ppb, respectively) which are located at the furthest downgradient extent of the Study Area.

5.3.2.3 Distribution of Sources to Groundwater

The distribution of VOC in groundwater, especially downgradient of the Study Site, was interpreted in view of potential source areas within the Study Site. VOC were detected in subsurface soils throughout the southern portion of the Study Site. Concentrations of constituents in groundwater generally indicate that the southern portion of the Study Site is acting as a diffuse source. The groundwater data do not indicate any particular area of the Study Site as a predominant source. The data support the following findings:

- Contaminants were detected at highly variable concentrations in wells located near the western (downgradient) boundary of the Study Site. However, contaminants were not detected in wells immediately downgradient of SSDA 1.

- Concentrations in wells closer to source areas are expected to be variable and highly sensitive to well placement, given the highly nonuniform horizontal and vertical solid waste concentration distribution, the variable depths at which solid wastes are present below the water table, and the high variability of aquifer and solid waste permeabilities in the upper portion of the Study Site aquifer. Because detections in wells close to the source areas are highly variable and sensitive to well placement, the concentrations detected at downgradient sampling points are a more reliable indicator of the general areal distribution of sources of groundwater constituents in the Study Site. The distribution of VOC in downgradient groundwater, bounded north/south by GZ14 and GZ12, is generally uniform between B308 and B309. Detections of contaminants in well B309, which is downgradient of SSDA 1 and in well B308, which is downgradient of the center of the southern portion of the Study Site, are very similar. These groundwater data indicate that the southern portion of the Study Site is acting as a diffuse source of groundwater constituents. This is consistent with the detection of contaminants in soils throughout the southern portion of the Study Site during the RI. This is not consistent with the groundwater contaminant distribution that would be expected if SSDA 1 or another localized area were the predominant source of these constituents.

5.3.2.4 Miscellaneous Transport Issues

The data support the following observations relative to the migration of contaminants in groundwater within the Study Area:

- Degradation (transformation of an organic compounds into a daughter compound) occurs naturally in the subsurface through biochemical processes. These transformations can make it difficult to correlate groundwater contamination with particular sources. Smith and Dragun (1984) have shown degradation pathways for various chlorinated VOC:

  →1,1,-dichloroethene
  PERC →TCE →cis-1,2-dichloroethene→vinyl chloride
  →trans-1,2-dichloroethene

  TCA→1,1-dichloroethane→chloroethane

  The complexity of this degradation process can be seen in the above transformations. These processes can be modeled in the laboratory under controlled conditions (Wood and others, 1980), but prediction of biotransformation rates in the field is tenuous. The presence of particular species at different locations is likely due to variations in degradation at different areas throughout the Study Site. For example, some groundwater wells contain TCE and PCE, others contain DCE and VC but no TCE, etc. This distribution is likely the result of various degrees of degradation at each location. However, given the complexity of the site, the varied occurrence of peat, the varying age of deposited contaminants, the wide distribution of VOC contaminants across the southern portion of the Study Site, and the presence of municipal solid waste, predicting particular species at a particular location is not possible, nor is it necessary to the development of remedial alternatives.

- Chloroform was detected in groundwater samples from monitoring wells B308C (110 ppb) and B309C (100 ppb) and in very low concentrations from monitoring well B309B (6 ppb). Chloroform may form as a result of degradation of trichloroethenes. Since chloroform is not found in higher concentrations in Study Site groundwater samples and was not detected in any soil samples, it is likely a results of degradation or alternative sources located between the Study Site and the B308/B309 well clusters.

- Tetrachloroethene (PERC) was reported in two groundwater sample rounds from monitoring wells GZ5M (3 ppb; 62 ppb), GZ14D (5 ppb; 22 ppb), B308C (23 ppb; 34 ppb) and B309C (11 ppb; 28 ppb). Each of these groundwater sampling locations is west of the Study Site. Numerous subsurface soil samples from the southern portion of the Study Site detected concentrations of PERC. However, no PERC was detected in any on-site wells or B302, B303, or B304. The presence of PERC downgradient may be the result of migration from the Study Site, but may also be the result of other sources from activities west of the Study Site.

5.3.3 SVOC Transport

Significant migration of SVOC in groundwater has not been indicated downgradient of the Study Site. Many SVOC typically have high affinity for soils and distribution coefficients which limit their transport in groundwater. The lack of SVOC in groundwater downgradient of the Study Site, despite the occurrence of SVOC in soil within the Study Site, is consistent with these general SVOC transport characteristics. The hydrologic path of transport for SVOC would follow that shown on Figures 5-1 through 5-6 for VOC, as the flow path is not dependent upon contaminant type. Another reason that SVOC may not have been detected in downgradient wells may be the factor of ten to 100 reduction in Study Site concentrations that occurs upon mixing of shallow groundwater with the entire aquifer thickness (Section 5.3.1). Based on the representative magnitudes of most SVOC concentrations in Study Site wells, if SVOC are moving at all, this magnitude of dilution would likely reduce most of the SVOC concentrations to below detection before reaching wells B308 and B309.

5.3.4 Metals Transport

Metals transport is more complicated to analyze than organic contaminant transport because the geochemical reactions that control their fate and transport in the subsurface are not as well established. Furthermore, predictive models, such as the f_{oc} - K_{oc} model for organic compounds, are generally not available for estimating metals retardation rates .

Walton (1985) presents K_d values as a function of pH for certain metals in alluvial deposits. In this study lead had a range of K_d that varied from 1,500 to 4,000 ml/gm over a pH range of 5.5 to 7.5 (metals contaminants are generally less retarded under more acidic conditions). The retardation factor for this range of K_d values would vary from 15,000 to 40,000 (Equation 10). From a literature review of numerous sites (Battelle, 1984), the K_d for lead was found to range from 5 to 8,000, with a median value of K_d = 100 (R_d = 1,000) from 125 observations. Also from the EPRI study (Battelle, 1984), the K_d for cadmium was found to range from 1.3 to 27 with a median of 7 (R_d = 70).

The metals detected in the Study Area generally exhibit very low mobilities with characteristic retardation factors ranging from 100 to 1,000,000. In comparison with tetrachloroethene, which is one of the least mobile VOC (R_d = 3 to 4), the most mobile metals would migrate almost 100 times slower. Therefore, the extent of metals migration beyond the Study Site boundary is expected to be very limited.

A more accurate technique for determining metals migration rates is to examine the observed metals concentrations in the Study Area aquifer. The distribution of metals contaminants is very different than the distribution of organic contaminants within the Study Area. A variety of heavy metals are present in groundwater both upgradient and downgradient of the Study Site at levels in excess of the MCL. Metals in excess of MCL were measured in two of three upgradient wells. Concentrations of metals downgradient of the Study Site are not reasonably explainable based on only sources within the Study Site. Since it has been demonstrated that other contaminants (such as VOC) have travelled toward deep monitoring wells B308C and B309C after being influenced by the strong downward gradient between the Study Site and these wells (B308C and B309C), it is reasonable to infer that metals would follow this transport mechanism. However, metals exhibit a strong affinity to soil, and actual migration of metals should be very limited. Heavy metals detected in groundwater from monitoring wells B304, B308, and B309 have greater concentrations in the shallow well samples (B304A, B308A, and B309A) than in intermediate (B304B, B308B, and B309B) and deep well (B304C, B308C, and B309C) samples (Table 4-22). Concentrations of iron and aluminum follow this same trend. These concentrations generally exceed concentrations detected in groundwater samples from within the Study Site. These data do not support the expected metals transport mechanism discussed above (i.e., down and out). It is likely, therefore, that another source exists for the shallow metals contamination found in monitoring wells B308 and B309. Since very high concentrations of aluminum and iron are associated with this shallow groundwater contamination, this source area may include the area between the Study Site and monitoring wells B308 and B309 where these and other metals are abundant on the ground surface.

5.4 SUMMARY

In the Study Site, vertical groundwater flow is very important relative to horizontal flow. Downward flow in the Study Site also appears to be enhanced because shallow, low-permeability soils in the wetlands and low-permeability waste debris in the landfill promote vertical drainage into permeable aquifer soils. Evidence of the importance of vertical flow in the vicinity of the southern portion of the Study Site is provided by the large vertical hydraulic gradients measured in the mid to lower portion of the aquifer, which are approximately ten times greater than the horizontal Study Area gradient (horizontal groundwater flow is generally east to west in the Study Area). Downgradient from the Study Site, the vertical hydraulic gradient becomes very small throughout the entire aquifer thickness. Further evidence of vertical flow is provided by the vertical distribution of contaminants in groundwater which shows that downgradient from the Study Site the constituents are generally confined to the lower portion of the aquifer; shallow groundwater contamination within or immediately downgradient of the Study Site is confined to the shallow portion of the aquifer.

In addition, mechanisms which significantly reduce, or dilute, shallow-depth Study Site groundwater concentrations are also very important. The concentrations in the shallow monitoring wells are the highest because they are located adjacent to both saturated and unsaturated solid waste/soil containing contaminants. These groundwater concentrations may be the result of either rainwater percolation through unsaturated zone solid waste, with subsequent mixing in shallow groundwater, or direct dissolution from saturated solid wastes into groundwater or both.

The wide-spread distribution of VOC and metals contaminants (SVOC were not detected above the CRQL in downgradient groundwater) downgradient of the Study Site (wells B308 and B309) indicates that contaminants are introduced into groundwater from across the southern portion of the Study Site. Given the groundwater flow conditions, the distribution determined is due to a wide-spread source. In contrast, narrow or well-defined source would, given the groundwater flow paths, produce very limited zones of impacted groundwater downgradient. This analysis is strongly supported by the distribution of contaminants in soils (see Section 4.2).

A variety of heavy metals are present in groundwater both upgradient and downgradient of the Study Site at levels in excess of the MCL. Concentrations of metals downgradient of the Study Site are not reasonably explainable based on only sources within the Study Site. Since it has been demonstrated that other contaminants (such as VOC) have travelled toward deep monitoring wells B308C and B309C after being influenced by the strong downward gradient between the Study Site and these wells (B308C and B309C), it is reasonable to infer that metals would follow this transport mechanism. Groundwater data do not support the expected metals transport mechanism discussed above (i.e., down and out). It is likely, therefore that another source exists, between the Study Site and wells B308 and B309, for the shallow metals contamination found in those monitoring wells.

6.0 CONCEPTUAL MODEL

This Section presents a conceptual model for the Study Area. The conceptual model integrates data collected from all RI investigations and historic knowledge to develop an overall picture of the distribution, nature, extent, and migration of constituents, and forms, in conjunction with analyses of health and ecological risk assessments, the basis for the selection of remedial alternatives and the development of the feasibility study. For that reason, the conceptual model focuses primarily on the media most likely, as determined by the constituent type and its behavior, to impact the remedial process. As detailed in the previous sections groundwater is the primary contaminant transport medium and, as such, current groundwater contamination and sources to groundwater contamination are the media which will be impacted by the remedial process. Studies performed during the RI have confirmed that significant contaminants are unlikely to be transported from the Study Site via air or surface water.

Groundwater within the Study Area is impacted by contaminants which are leaching from waste materials present in the landfill materials and soils in the Study Site. Section 6.1 discusses delineation of the extent of the Study Site. Section 6.2 discusses distribution of contaminants within the Study Site that may be sources to groundwater. Section 6.3 discusses the transport and distribution of contaminants in groundwater. Section 6.4 provides a summary of the conceptual model.

6.1 DELINEATION OF STUDY SITE BOUNDARY

Aggressive studies were performed to definitively delineate the boundaries of the Study Site. These studies included information obtained from interviews, historical information, from numerous aerial photographs which depict the extent of the Study Site over time, and from the installation of over 90 soil borings and collection of over 75 analytical soil samples. As shown on Figure 1-2, the Study Site is bounded on the west by Old Turnpike Road, on the east by Black Pond (features which have existed throughout the active existence of the landfill) on the north by Rejean Road (actual extent is south of Rejean Road), and extends to the south to the current property of Solomon Casket Company. Cross-sections presented in Section 3.0 illustrate and confirm the delineation shown.

Studies performed during the RI have further delineated the extent of encroachment of solid waste into Black Pond, along the eastern Study Site boundary (Section 2.6.3.1). As shown on Figure 2-4, solid waste extends no further than out to one of the reef-like islands on the west shore of Black Pond. These islands reflect the original shoreline of Black Pond. Raised water level in Black Pond, probably due to clogging of the effluent culvert beneath Old Turnpike Road and changes in land topography west of the Pond, due to development of this area, have likely resulted in water covering solid waste along a shoreline which was once exposed. The solid waste along this shoreline extends to the northern edge of the southern portion, but not into the northern portion of the Study Site (Figure 2-4).

6.2 NATURE AND DISTRIBUTION OF MATERIALS WITHIN THE STUDY SITE

As discussed in Section 3, the data obtained from the RI investigations, when considered in light of the information contained in public documents concerning operational history of the landfill and from interviews with current and previous Town employees, provides a consistent and reasonable characterization of the distribution of materials within the subsurface soils across the Study Site. The characterization is strongly supported by the close correlation between different types of data (i.e., soil, groundwater, air, and surface water). The physical character of the subsurface materials, obtained from boring logs, provides a delineation between the different types of materials in the northern portion of the Study Site (wood, stumps, construction debris) and those in the southern portion of the Study Site (municipal and industrial waste). The types of materials found in each portion are consistent with the reported operational history of the landfill and with past property boundaries. Materials found in the northern portion are typical for an area where woody debris that has burned is deposited, but are not the types of materials expected to be produced by degradation of solid waste. Likewise, the materials found in the southern portion are typical of solid waste and solid waste by product, and include significant amounts of glass, paper, plastics, etc.

6.2.1 Distribution of Waste Materials

6.2.1.1 Northern Portion of the Study Site

The northern portion of the Study Site is generally underlain by a thin layer (zero to nine feet) of wood ash and timber fill consisting of black coarse to fine sand with wood ash, wood, wood cinders, and trace amounts of glass and metal debris, as well as demolition debris consisting of wood, glass, brick and asphalt. The lateral extent of this fill is shown on Figure 3-6. Interviews with current and previous Town employees knowledgeable about past disposal practices, and information contained in public documents which detail operation of the landfill, verify the southern-most section of the northern portion was used as a stump dump. Clean fill encountered across the northern perimeter of the northern portion was reportedly associated with construction of, and development along, Rejean Road. Presence of this clean fill between Rejean Road and the northern delineation of the Study Site provides further, strong support of the validity of the delineation.

6.2.1.2 Southern Portion of Study Site

The southern portion of the Study Site (Figure 3-6) is primarily underlain by approximately 5 to 50 feet of solid waste fill consisting predominantly of a coarse to fine sand matrix containing variable proportions of paper, glass, plastic, metal, metal shavings, cloth, and other materials typically associated with municipal and commercial solid waste, as well as sporadic occurrences of solvents. The solid waste is covered with a thin veneer of sandy fill ranging from one to four feet in thickness. Groundwater was encountered in the test borings at depths of 3 to 28 feet below the ground surface. The average depth to groundwater was approximately ten feet.

A peat layer underlies much of the southern portion and was encountered at depths ranging from 15 to 54 feet below the ground surface. It is 3 to 9 feet thick with an average thickness of approximately six feet. The peat ranges from 2 to 40 feet below the groundwater table in the southern portion of the Study Site and is underlain by stratified drift deposits.

The locations of two semi-solid disposal areas (SSDA 1 and SSDA 2) have been inferred as a result of interviews with former and current Town employees, and information contained in public documents on disposal practices, as well as geophysical testing (ground penetrating radar) and test borings drilled within the inferred areas. This information confirms use of such areas during the period of approximately 1964-1967. The Post-Screening Task 1 field investigation determined the existence of two areas, whose locations were consistent with the information described above. Although disposal practices throughout the operation of the landfill involved non-specific disposition of material, and, as EPA guidance has recognized, landfills typically contain a significant mixture of waste types, resulting in a broad-based distribution of potential sources, an extensive investigatory program was performed to assess the significance of the SSDAs. The investigations determined the following:

- SSDA 2 contains solid waste similar in appearance to the waste discovered throughout the southern portion of the Study Site. The levels of contaminants detected in SSDA 2 are similar to levels detected elsewhere in the southern portion of the Study Site.

- SSDA 1 is not significantly different in materials or appearance from the rest of the southern portion of the Study Site, except for two areas of discrete material. The largest (Discrete Material B) is a white putty-like material. Discrete Material B averages eight feet in thickness and extends approximately 80-90 feet in a north-south direction and not more than 20-25 feet in the east-west direction. Discrete Material A is much smaller and more localized. It was found in only one boring (B402) at a thickness of about 8 inches. This material is medium brown in color, with a homogeneous, peanut-butter-like consistency. Material A was not encountered in any of the other 14 borings within SSDA 1. Based on locations of borings around B402, the material would extend no more than a fifteen foot diameter around B402.

- The majority of soil within SSDA 1 is similar in type of contaminants and concentrations to the remainder of the southern portion. Two exceptions are the sample of Discrete Material A, which contained high levels of VOC (440 ppm non-chlorinated VOC; 430,000 ppm chlorinated VOC) and TB-127-C (cuttings sample) which contained 52,200 ppm non-chlorinated VOC and 7790 ppm chlorinated VOC.

- Discrete Material A is located well above the water table. A sample from just below the water table is the same boring did not contain chlorinated VOC in detectable quantities; evidence that vertical leaching from Discrete Material A to the water table is minimal. Similarly, Discrete Material B is located almost entirely in the unsaturated zone. The bottom 1-2 feet may come in contact with the groundwater due to seasonal water table fluctuations.

6.2.2 Distribution of Contaminants

6.2.2.1 Northern Portion of Study Site

PAH compounds constitute the primary contaminants present in either surface or subsurface soils in the northern portion. The presence of PAH in surface and subsurface soils is likely a result of occasional combustion of materials in the stump dump. PAH in surface soils is also likely the result of construction activities and residential activities occurring since closure of the landfill.

6.2.2.2 Southern Portion of the Study Site

Only isolated, low level concentrations of VOC were detected in the surficial soil throughout the southern portion. Although metals were measured at concentrations above the levels found in designated background samples, these measurements could be explained based on existing industrial activities in the southern portion, including outdoor operations such as painting, welding, and metal finishing. PAH was identified in surficial soil behind the northern SMF building (SFS-7, SFS-8, and SFS-37), and PCB were detected in surficial soil around some of the buildings in the southern portion. These measurements could be explained based on existing industrial activities, mixing of subsurface soils with cover material during closure, and/or the condition of the fill material used for cover.

Varying concentration of VOC are present in subsurface soils throughout the southern portion. Analytical results for subsurface soil samples show that the VOC are distributed throughout the southern portion of the Study Site. Semi-volatile organics, pesticides, and PCB were detected infrequently but throughout subsurface soils in the southern portion. Detected SVOC are typical landfill degradation constituents: phenolics, phthalates, and PAH. Some SVOC levels detected at SSDA 1 are likely a result of disposal of industrial wastes. Various metals were detected above background in subsurface soils throughout the southern portion. However, the distribution is random and is not indicative of significant metals disposal activities.

6.3 NATURE AND DISTRIBUTION OF CONTAMINANTS IN GROUNDWATER

This section describes contaminant transport in groundwater, which is controlled by factors such as aquifer permeability, groundwater recharge/infiltration, and dilution capacity. Groundwater flow is generally east to west throughout the Study Area. Black Pond, located east and upgradient of the Study Site, provides a constant head boundary and recharge zone for groundwater beneath the Study Site. The presence of Black Pond and its associated wetlands results in a stable shallow depth to groundwater, provides shallow groundwater flow through portions of the solid waste deposited throughout the southern portion of the Study Site, and facilitates the downward vertical gradients measured within the Study Site.

The groundwater aquifer within the Study Area is generally highly permeable. This results in a significant dilution capacity once contaminants from the debris mass enter the groundwater. This dilution capacity in conjunction with the hydrologic influence of Black Pond (significant source of recharge to groundwater) plays a significant role in the distribution and concentrations of contaminants in groundwater downgradient of the Study Site.

6.3.1 Transport of Contaminants in Groundwater

In the Study Site, vertical groundwater flow is very important relative to horizontal flow for three reasons: (1) increased groundwater recharge rates associated with neighboring wetlands and ponding of surface water runoff in local depressions during rainfall events, (2) groundwater recharge from Black Pond, and (3) higher aquifer permeability with depth in the southern portion of the Study Site. Downward flow in the Study Site also appears to be enhanced because shallow, low-permeability soils in the wetlands and low-permeability waste debris in the landfill promote vertical drainage into permeable aquifer soils. Evidence of the importance of vertical flow in the vicinity of the southern portion of the Study Site is provided by the large vertical hydraulic gradients measured in the mid to lower portion of the aquifer, which are approximately ten times greater than the horizontal Study Area gradient (horizontal groundwater flow is generally east to west in the Study Area).

Downgradient from the Study Site, the vertical hydraulic gradient becomes very small throughout the entire aquifer thickness. Further evidence of vertical flow is provided by the vertical distribution of contaminants in groundwater which shows that downgradient from the Study Site the constituents are generally confined to the lower portion of the aquifer (groundwater contamination within or immediately downgradient of the Study Site is confined to the shallow portion of the aquifer). Analytical data from the monitoring well cluster at B304, located along the downgradient (western) edge of the Study Site, indicate elevated groundwater concentrations in the shallow well, lower in medium wells, and only trace in the deep well. However, further downgradient, at well clusters B308 and B309, contaminants were measured in the deeper portion of the aquifer and not in shallow wells. Since the known areas of elevated soil concentrations are located either above the water table or within the upper ten to 20 feet of the saturated zone, downward groundwater flow clearly is an important transport mechanism in the Study Area to achieve the contaminant distribution.

In addition to the above factors which determine the concentration distribution in the Study Area aquifer, mechanisms which significantly reduce, or dilute, shallow-depth Study Site groundwater concentrations are also very important. The concentrations in the shallow monitoring wells are the highest because they are located adjacent to both saturated and unsaturated solid waste/soil containing contaminants. These groundwater concentrations may be the result of either rainwater percolation through unsaturated zone solid waste, with subsequent mixing in shallow groundwater, or direct dissolution from saturated solid wastes into groundwater or both.

A primary reason that the shallow-depth groundwater concentrations become significantly reduced deeper in the aquifer, in the Study Site vicinity, is the low characteristic permeability of the solid waste. Solid waste permeability is less than the mean Study Area aquifer permeability by a factor of from 10 to 100. Analogous to the mixing of surface water constituents in a tributary with the much larger flow rate in a large stream, the concentrations within the vertical and horizontal flow of groundwater from the solid waste debris areas are significantly reduced by the much larger horizontal flow rate of groundwater in the deeper Study Area aquifer. The magnitude of this concentration reduction for solid waste located above the water table is estimated to be approximately 20 times. From the above-referenced permeability differences between saturated solid waste and the aquifer soils, shallow groundwater concentrations in the waste zone would be expected to be reduced by a factor of at least ten upon moving deeper and mixing with a large portion of the aquifer, as is demonstrated by well location 304.

A second cause of Study Site groundwater concentration reductions may be the occurrence of peat. Peat is characterized by a very large natural organic carbon content which tends to retard, or stop, the vertical migration of contaminants into regional groundwater by adsorption processes. The existence of peat and its thickness varies significantly across the Study Site. Therefore, it is difficult to predict the influence peat will have on groundwater contaminant flow in an overall sense. The presence of peat in certain areas of the Study Site is a likely explanation for why specific VOC are or are not detected in groundwater in certain areas of the Study Site.

6.3.2 Distribution of Contaminants in Groundwater

Semi-volatile organics, pesticides and PCB are not present in groundwater within the Study Site or Study Area at levels significantly above the detection limit. VOC and metals are the primary contaminants measured in groundwater. Groundwater flow in the Study Area has been thoroughly studied, as discussed above. No VOC have been detected in groundwater downgradient from the northern portion, which is consistent with the types of materials deposited there and with the analytical results for soil samples. The distribution of VOC and groundwater flow patterns do not indicate contaminant migration toward or beneath the northern portion of the Study Site.

The wide-spread distribution of contaminants downgradient of the Study Site (wells B308 and B309) indicates that contaminants are introduced into groundwater from across the southern portion of the Study Site. Given the groundwater flow conditions, the distribution determined is the product of a wide-spread source. This analysis is strongly supported by the distribution of contaminants in soils. A narrow or well-defined source would, given the groundwater flow paths, produce very limited zones of impacted groundwater downgradient. The primary VOC constituents present in groundwater are chlorinated ethenes and petroleum related VOC (benzene, toluene, xylenes). Chlorinated ethanes, although present at elevated levels at locations B-3, B307, B305 and B304, were detected at only trace levels outside the Study Site. VOC are present in groundwater in an area west of the Study Site, to locations B308 and B309 and bounded on the north by location GZ-12 and on the south by GZ-14.

A variety of heavy metals are present in groundwater both upgradient and downgradient of the Study Site at levels in excess of the MCL. Metals in excess of MCL were measured in two of three upgradient wells. Concentrations of metals downgradient of the Study Site are not reasonably explainable based on only sources within the Study Site. Since it has been demonstrated that other contaminants (such as VOC) have travelled toward deep monitoring wells B308C and B309C after being influenced by the strong downward gradient between the Study Site and these wells (B308C and B309C), it is reasonable to infer that metals would follow this transport mechanism. However, metals exhibit a strong affinity to soil, and actual migration of metals should be very limited. Heavy metals detected in groundwater from monitoring wells B304, B308, and B309 have greater concentrations in the shallow well samples (B304A, B308A, and B309A) than in intermediate (B304B, B308B, and B309B) and deep well (B304C, B308C, and B309C) samples (Table 4-22). Concentrations of iron and aluminum follow this same trend. These concentrations generally exceed concentrations detected in groundwater samples from within the Study Site. These data do not support the expected metals transport mechanism discussed above (i.e., down and out). It is likely, therefore that another source exists for the shallow metals contamination found in monitoring wells B308 and B309. Since very high concentrations of aluminum and iron are associated with this shallow groundwater contamination, this source area may include the area between the Study Site and monitoring wells B308 and B309 where these and other metals are abundant on the ground surface.

REFERENCES

Adamus, P.R., Chairain, E.J., Jr., Smith, R.D., and Yound, R.E., 1987, Wetland evaluation technique (WET): volume II: methodology: Wetlands research program, U.S. Army Corps of Engineers, Environmental Laboratory, operational draft, USACOE/USDOT, Washington, D.C

American Society for Testing and Materials, 1984, Standard test method for infiltration rate of soils in field using double-ring infiltrometer, Annual Book of Standards, vol. 04.08, p. 407-412.

Battelle Pacific Northwest Laboratories, February 1984, Chemical attenuation rates, coefficients, and constants in leachate migration volume 1: A Critical Review: Electric Power Research Institute report EA - 3356.

Bear, Jacob, and Verruijt, Arnold, 1987, Theory and applications of transport in porous media: modeling groundwater flow and pollution, Dordrecht, Holland, D. Reidal Publishing.

Bohling, G. C., and McElwee, C. D., 1992, SUPRPUMP: an interactive program for well test analysis and design: Groundwater, vol. 30, no. 2, p. 262-268.

Bouwer, Herman, and Rice, R.C., 1976, A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells: Water Resources Research, vol. 12, no. 3, p. 423-428.

Butler, J. J., 1990, The role of pumping tests in site characterization: some theoretical considerations: Groundwater, vol. 28, no. 3, p. 394-401.

Consulting Environmental Engineers, December, 1979, Letter Report Abatement of Operations Discharges: to Water Compliance Unit of the Connecticut Department of Environmental Protection.

Consulting Environmental Engineers, September, 1979, Investigation of contaminated soil on the Lori Corporation property: letter report from CEE to the Water Compliance Unit of the Connecticut Department of Protection.

DeGraaf, R.M., and Rudis, D.D., 1987, New England wildlife: habitat, natural history, and distribution: U.S. Department of Agriculture, Forest Service, general technical report NE-108.

Driscoll, F.G., 1986, Groundwater and Wells: St. Paul, MN, Johnson Filtration Systems, Inc.

Eyles, Nicholas, Eyles, C. H., and Miall, A. D., 1983, Lithofacies types and vertical profile models; an alternative approach to the description and environmental interpretation of glacial diamict and diamictite sequences: Sedimentology, v 30, p 393-410.

Fennstra, Stanley, Mackay, D.M., and Cherry, J.A., 1991, Presence of residual NAPL based on organic chemical concentrations in soil samples: Groundwater Monitoring Review. v. 11, no. 2 p. 128-136.

Federal Interagency Committee for Wetland Delineation, 1989, Federal manual for identifying and delineating, jurisdictional wetlands: U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S. D.A. Soil Conservation Service, Washington, D.C. Cooperative technical publication, p. 76 plus appendices.

Flint, R. F., 1930, The glacial geology of Connecticut: Connecticut Geological and Natural History Survey Bulletin, no. 47, Hartford, 294 p.

________, 1933, Late Pleistocene sequences in the Connecticut valley. Geological Society of America Bulletin, v. 44, p. 965-88.

________, 1934, Late-glacial features of the Quinnipiac-Farmington Lowland in Connecticut: American Journal of Science, v. 27, no. 158, p 81-91.

Freeze, R.A., and J.A. Cherry, 1979, Groundwater: Englewood Cliffs, Prentice-Hall, Inc., New Jersey, 604 p.

Fritts, Crawford E., 1963; Bedrock Geology of the Southington Quadrangle, Connecticut, U.S.Geological Survey Bedrock Map GQ-200, scale 1:24,000.

Green, R.H., 1979, Sampling design and statistical methods for environmental biologists: New York, John Wiley and Sons.

Greenberg, A.E, Connors, J.J., and Jenkins, D., 1980, Standard methods for the examination of water and wastewater: American Public Health Association, American Water Work Association, Water Pollution Control Federation.

Goldberg-Zoino Associates, 1987, Attachment B to the program operations plan. Sampling and analysis plan.

__________, September, 1988, Workplan for remedial investigation/feasibility study at the Old Southington Landfill Superfund Site, Old Turnpike Road, Southington, Connecticut.

__________, May, 1989, "Memo: assessment of existing information, previous site studies, Old Southington Landfill, Southington, Connecticut.

__________, October, 1989, "Phase IA data summary, Old Southington Landfill, Southington, Connecticut. "

__________, 1991, Draft remedial Investigation site characterization analysis, Old Southington Landfill, Southington, Connecticut.

__________, 1991, Remedial investigation work plan. December 1990, revised April, 1991.

Hanshaw, Penelope M., 1962, Geologic map of the Southington quadrangle, Connecticut, surficial geology: U.S. Geological Survey Surficial Map GO-150, scale 1:24,000.

Hantush, Mahdi, 1964, Advances in hydroscience, volume 1, New York, Academic Press.

Hersefield, David M. 1961, Rainfall frequency atlas of the United States ***: U.S. Department of Agriculture, Technical Paper, no. 40.

Hillel, Daniel, 1971, Soil and water: physical principles and processes: New York, Academic Press.

Holmes, C. D., 1947, Karnes: American Journal of Science, v. 245, no. 4, p 240-249.

Javandel, I., Doughty, C. and Tsang, C.F., 1984, Groundwater transport: handbook of mathematical models: American Geophysical Union Water Resources Monograph 10, Washington, D.C.

Jury, W.A., Nazaroff, W.N., and Rodgers, V.C., 1991, Enclosed space vapor models technical panel report: Prepared for Department of the Army, Rocky Mountain Arsenal and Shell Oil.

Korin, B.P., 1977, Introduction to statistical methods: Cambridge, Massachusetts, Winthrop, p. 34-39.

Kruseman, G.P., and de Ridder, N.A., 1990, Analysis and evaluation of pumping test data: The Netherlands, International Institute for Land Reclamation and Improvement.

Kruseman, G.P. and N.A. de Ridder, 1991, Analysis and evaluation of pumping test data: International Institute for Land Reclamation and Improvement Publication 47, page 21.

Krynine, P. D., 1950, Petrography, stratigraphy, and origin of the Triassic sedimentary rocks of Connecticut: Connecticut Geological and Natural History Survey, Bulletin No. 73, Hartford, 264 p.

La Sala, A. M., Jr., 1961, Geologic map of the Southington quadrangle, Connecticut: U.S.Geological Survey, surficial geology: Map GQ-146, 1:24,000.

La Sala, A. M., Jr. and Meikle, R. L., 1964, Records and logs of selected wells and test borings and chemical analyses of water in the Bristol-Plainville-Southington area, Connecticut: Connecticut Water Resources, Bulletin No. 5, 18 p.

Lee, G.F. and Jones, R.A., 1986, Water quality hazard assessment for domestic wastewater, in Environmental hazard assessment of effluents, Bergman, H.L., Kimerle, R.A., and Maki, A.W., eds. Society of Environmental Toxicology and Chemistry, New York, Pergamon Press.

Lougee, R. J., 1938, Physiography of the Quinnipiac-Farmington lowland in Connecticut. Colby College Monograph No. 7, Waterville, Maine, 64 p.

McIntire, David, 1991, Memo to Dennis Gagne, Chief of the Connecticut Superfund Section, reporting on Removal Site Assessment air sampling at the Old Southington Landfill. Memo dated December 18, 1991.

Mazzaferro, D.L., 1973, Hydrogeologic data for the Quinnipiac River Basin: Connecticut Water Resources Bulletin No. 26, Connecticut Geological and Natural History Survey.

__________, 1975, Contour map of the bedrock surface, Southington Quadrangle, Connecticut: U. S. Geological Survey Map MP-660A, 1:24,000.

__________, Handman, E.H., and Thomas, M.P., 1979. Water resources inventory of Connecticut, part 8, Quinnipiac River Basin: Connecticut Water Resources Bulletin No. 27, Connecticut Geological and Natural History Survey.

__________, 1986, Groundwater yields for selected Stratified drift areas in Connecticut: U.S. Geological Survey Map, scale 1:125,000.

Meade, Daniel, 1978, Groundwater availability in Connecticut: Connecticut Geological and Natural History Survey. Map, scale 1:125,000.

Murphy, J. E., 1987, Water quality classifications map of Connecticut: Connecticut Department of Environmental Protection. Map, scale 1:125,000.

Murray, W. A., and Monkmeyer, P. L., 1973, Validity of Dupuit-Forchheimer Equation, Journal of the Hydraulics Division, American Society of Civil Engineers, p 1573-1583.

Nazaroff, W.W., Doyle, S.M., Nero, A.V., and Sextro, R.G., 1987, Potable water as a source of airborne radon-222 in U.S. dwellings: a review and assessment: Health Physics, v. 52, p. 281-295.

Oak Ridge National Laboratory, 1986, User's Manual for Ecological Risk Assessment: Oak Ridge National Laboratory Publication No. 2679, Environmental Sciences Division, Oak Ridge, Tennessee.

Parsons, F., Wood, P.R., and DeMarco, J., 1984, Transformations of trichloroethene in microcosms and groundwater: Journal of the American Water Well Association, February, p. 56-59.

Rice, W. N., and Foye, W. G., 1927, Guide to the geology of Middletown, Connecticut, and vicinity: Connecticut Geological and Natural History Survey Bulletin No. 41, Hartford, 137 p.

Roy F. Weston, Inc., 1991, Removal program preliminary assessment/site investigation for the Old Southington Landfill: TAT 01-N 00952. November, 1991.

Schaeffer, R.L., Mendenhall, W., and Ott, L., 1979, Elementary survey sampling: North Scituate, MA, Duxbury Press.

Shearin, A. E., and Hill, D. E., 1962, Soil survey of Hartford County, Connecticut: U.S. Department of Agriculture, Soil Conservation Service.

Sitton, Mary D., 1988, Site analysis, Old Southington Landfill. Southington, Connecticut: Bionetics Corporation, U.S. Environmental Protection Agency TS-PIC-88031.

Smith, L.R., and Dragun, J., 1984, Degradation of volatile chlorinated aliphatic priority pollutants in groundwater: Environment International, v. 10, p. 291-298.

Sugden, D. E., and John, B. S., 1976, Glaciers and landscape: London, Edward Arnold, 376 p.

Telford, W.M., Geldart, L.P., Sheriff, R.E., and Keys, D.A., 1982, Applied geophysics: New York, New York, Cambridge University Press.

USEPA, 1973, Biological field and laboratory methods for measuring the quality of surface waters and effluents. National Environmental Research Center, Office of Research and Development, Cincinnati, Ohio, EPA 670/4-73-001.

USEPA, 1982, Water quality assessment: a screening procedure for toxic and conventional pollutants (3 part volume): U.S. Environmental Protection Agency, 600/6-82/004a,b,c. Office of Research and Development, Environmental Research Laboratory, Athens, GA.

USEPA, 1986, quality criteria for water: Office of Water Regulations and Standards, Washington, D.C. EPA 440/5-86 001 (NTIS# PB87-226759).

USEPA, 1987, Toxicity of 3400 chemicals to fish (Part 1 & 2). Office of Toxic Substances, Washington, D.C. EPA/560/6-87/002 (NTIS# PB87-200275).

USEPA, 1989a, Risk assessment guidance for superfund. Volume II: Environmental Evaluation Manual (Interim Final): Office of Emergency and Remedial Response, Washington, D.C. USEPA/540/1-89/001.

USEPA, 1989b, Supplemental risk assessment guidance for the superfund program, part 1 and 2: Final Draft, U.S. Environmental Protection Agency Region I Risk Assessment Work Group. USEPA 901/5-89 001.

USEPA, 1989c, Ecological assessment of hazardous waste sites: a field and laboratory reference: Corvallis Environmental Research Laboratory, Corvallis, OR. USEPA 600/3-89/013.

USEPA, 1989d, Rapid bioassessment protocols for use in streams and rivers, benthic macroinvertebrates and fish: Office of Water *(WH-553),* Assessment and Watershed Protection Division. EPA/444/4-89-001.

USFWS; 1988, National list of plant species that occur in wetlands: 1988, Northeast (Region 1).

Wagner, C.P., 1987. Industrial source complex (ISC) user's guide, Volume I: U.S. Environmental Protection Agency SW/MT-88/041C.

Walton, W.C., 1962, Selected analytical methods for well and aquifer analysis: Illinois State Water Survey Bulletin No. 49, 81 p.

Walton, W.C., 1985, Practical aspects of groundwater modeling: Worthington, Ohio, National Water Well Association.

Warzyn Engineering, Inc., November, 1980, Hydrogeologic investigation, Town of Southington, Connecticut.

Weeks, E. P., 1969. Determining the ratio of horizontal to vertical permeability by aquifer-test analysis: Water Resources Research, v. 5, no. 1, p. 196-214.

Wood, P.R., Lang, R.F., and Payan, I.L., 1980, Anaerobic transformation, transport, and removal of volatile chlorinated organics in groundwater, in, Groundwater quality, Ward, C.H., Giger, W., and McCarty, P.L., eds., New York, Wiley, p. 493-511.

1 Tables

TABLE 1-1
GROUNDWATER SAMPLES ANALYSES
1987
Old Southington Landfill Project
Southington, Connecticut

SAMPLE ID	DATE SAMPLED	ANALYSES PERFORMED
B-3-R1	2/17/87	VOC, SVOC, PEST/PCB, METALS
B-3-R2	4/20/87	VOC, SVOC, PEST/PCB, METALS
B-3-R3	5/1/87	VOC, SVOC, PEST/PCB, METALS
CW-15-R1	2/17/87	VOC, METALS
CW-15-R2	4/20/87	VOC, METALS
CW-15-R3	5/1/87	VOC, METALS
CW-20-R1	2/17/87	VOC, METALS
CW-20-R2	4/20/87	VOC, METALS
CW-20-R3	5/1/87	VOC, METALS
GZ-1-R1	2/17/87	VOC, METALS
GZ-1-R2	4/20/87	VOC, METALS
GZ-1-R3	5/1/87	VOC, METALS
GZ-2-R1	2/17/87	VOC, METALS
GZ-2-R2	4/20/87	VOC, METALS
GZ-2-R3	5/1/87	VOC, METALS
GZ-3-R1	2/17/87	VOC, METALS
GZ-3-R2	4/20/87	VOC, METALS
GZ-3-R3	5/1/87	VOC, METALS
GZ-4S-R1	2/17/87	VOC, SVOC, PEST/PCB, METALS
GZ-4S-R2	4/20/87	VOC, SVOC, PEST/PCB, METALS
GZ-4S-R3	5/1/87	VOC, SVOC, PEST/PCB, METALS
GZ-4M-R1	2/17/87	VOC, METALS
GZ-4M-R2	4/20/87	VOC, METALS
GZ-4M-R3	5/1/87	VOC, METALS
GZ-4D-R1	2/17/87	VOC, SVOC, PEST/PCB, METALS
GZ-4D-R2	4/20/87	VOC, SVOC, PEST/PCB, METALS
GZ-4D-R3	5/1/87	VOC, SVOC, PEST/PCB, METALS
LW-103S-R1	2/17/87	VOC, METALS
LW-103S-R2	4/20/87	VOC, METALS
LW-103S-R3	5/1/87	VOC, METALS
LW-103M-R1	2/17/87	VOC, METALS
LW-103M-R2	4/20/87	VOC, METALS
LW-103M-R3	5/1/87	VOC, METALS
LW-103D-R1	2/17/87	VOC, METALS
LW-103D-R2	4/20/87	VOC, METALS
LW-103D-R3	5/1/87	VOC, METALS

TABLE 1-1
GROUNDWATER SAMPLES ANALYSES
1987
Old Southington Landfill Project
Southington, Connecticut

SAMPLE ID	DATE SAMPLED	ANALYSES PERFORMED
LW-102S-R1	2/17/87	VOC, METALS
LW-102S-R2	4/20/87	VOC, METALS
LW-102S-R3	5/1/87	VOC, METALS
LW-102D-R1	2/17/87	VOC, METALS
LW-102D-R2	4/20/87	VOC, METALS
LW-102D-R3	5/1/87	VOC, METALS
LW-15S-R1	2/17/87	VOC, METALS
LW-15S-R2	4/20/87	VOC, METALS
LW-15S-R3	5/1/87	VOC, METALS
LW-15M-R1	2/17/87	VOC, METALS
LW-15M-R2	4/20/87	VOC, METALS
LW-15M-R3	5/1/87	VOC, METALS
LW-15D-R1	2/17/87	VOC, METALS
LW-15D-R2	4/20/87	VOC, METALS
LW-15D-R3	5/1/87	VOC, METALS
LW-17D-R1	2/17/87	VOC, METALS
LW-17D-R2	4/20/87	VOC, METALS
LW-17D-R3	5/1/87	VOC, METALS
TW-17-R1	2/17/87	VOC, METALS
TW-17-R2	4/20/87	VOC, METALS
TW-17-R3	5/1/87	VOC, METALS
TW-18-R1	2/17/87	VOC, METALS
TW-18-R2	4/20/87	VOC, METALS
TW-18-R3	5/1/87	VOC, METALS
LORI-R1	2/17/87	VOC, METALS
LORI-R2	4/20/87	VOC, METALS
LORI-R3	5/1/87	VOC, METALS
MW-5-R1	2/17/87	VOC, SVOC, PEST/PCB, METALS
MW-5-R2	4/20/87	VOC, SVOC, PEST/PCB, METALS
MW-5-R3	5/1/87	VOC, SVOC, PEST/PCB, METALS

TABLE 2-1
SURFICIAL SOIL SAMPLES COLLECTED
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample ID	Date Sampled	Analyses
SFS-1	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, DIOXIN/FURAN
SFS-2	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-3	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-4	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-5	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, DIOXIN/FURAN
SFS-6	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-7	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-8	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-9	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-10	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-11	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-12	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, DIOXIN/FURAN
SFS-12-2	10/16/92	TCL-SVOC, TAL-METALS
SFS-13	6/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, DIOXIN/FURAN
SFS-14	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-15	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-16	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-17	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-18	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-19	6/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-20	10/14/92	TCL-SVOC
SFS-21	10/14/92	TCL-SVOC
SFS-22	10/14/92	TCL-SVOC
SFS-23	10/14/92	TCL-SVOC
SFS-24	10/14/92	TCL-SVOC, TAL-METALS
SFS-24-2	10/14/92	TCL-VOC
SFS-25	10/16/92	TCL-SVOC, TAL-METALS
SFS-26	10/16/92	TCL-SVOC, TAL-METALS
SFS-27	10/16/92	TCL-SVOC, TAL-METALS

VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compounds
PEST/PCB = Pesticides and PCB
File:pratt\ritab\surfsoil.wr1

TABLE 2-1
SURFICIAL SOIL SAMPLES COLLECTED
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample ID	Date Sampled	Analyses
SFS-28	10/16/92	TCL-SVOC, TAL-METALS
SFS-29	10/16/92	TCL-SVOC, TAL-METALS
SFS-30	10/14/92	TCL-SVOC, TAL-METALS
SFS-30B	10/14/92	TCL-VOC, SVOC, TAL-METALS
SFS-30-2	10/28/92	TCL-VOC, SVOC, TAL-METALS
SFS-31	10/16/92	TCL-SVOC, TAL-METALS
SFS-32	10/16/92	TCL-SVOC, TAL-METALS
SFS-33	10/16/92	TCL-SVOC, TAL-METALS
SFS-34	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-35	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-36	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-37	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-38	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-38-B	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-39	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
SFS-40	10/28/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
QA/QC Samples		
SFS-1-I	6/09/92	MS/MSD - DIOXIN/FURAN
SFS-5-I	6/10/92	MS/MSD - FULL TAL/TCL
SFS-14-B	6/10/92	RINSATE BLANK - FULL TAL/TCL
SFS-6-R	6/10/92	DUPLICATE - FULL TAL/TCL
SFS-20-I	10/14/92	MS/MSD - FULL TAL/TCL
SFS-30-B	10/14/92	RINSATE BLANK - FULL TAL/TCL
SFS-30-R	10/14/92	DUPLICATE - FULL TAL/TCL
T921015-1	10/15/92	TRIP BLANK - TCL-VOC
SFS-37-I	10/28/92	MS/MSD - FULL TAL/TCL
SFS-39-R	10/28/92	DUPLICATE - FULL TAL/TCL
SFS-38-B	10/28/92	RINSATE BLANK - FULL TAL/TCL
TB1	10/20/92	TRIP BLANK - TCL-VOC

VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compounds
PEST/PCB = Pesticides and PCB
File:pratt\ritab\surfsoil.wr1

TABLE 2-2
SUMMARY OF TEST BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

TEST BORING	DRILLING METHOD	DATE COMPLETED	DEPTH OF TERMINATION (FT)	DEPTH TO GROUNDWATER (FT)	DEPTH TO BEDROCK (FT)
NORTHERN AREA					
BP-4	HSA	1/18/90	12	10	NA
BP-7	HSA	1/18/90	26.5	7	NA
B-1	HSA	3/20/86	8	5	NA
TB13	HSA	1/18/90	27	3	NA
TB14	HSA	1/19/90	12	1	NA
TB15	HSA	1/19/90	12	5	NA
TB16	HSA	1/23/90	12	9	NA
TB17	HSA	1/19/90	12	10	NA
TB18	HSA	1/19/90	11	5	NA
TB20	HSA	1/19/90	11.5	9	NA
TB104	HSA	10/16/91	16	1.5	NA
TB106	HSA	10/17/91	16	4.5	NA
TB107	HSA	10/17/91	15	NE	NA
TB108	HSA	10/18/91	12	NE	NA
TB110	HSA	10/18/91	12	20	NA
TB111	HSA	10/21/91	16	NE	NA
TB113	HSA	10/21/91	15	NE	NA
TB115	HSA	10/22/91	16	3.5	NA
TB117	HSA	10/22/91	16	3.5	NA
TB120	HSA	10/24/91	16	3	NA
TB122	HSA	10/25/91	16	4	NA
TB123	HSA	10/25/91	20	4	NA
TB131	HSA	10/31/91	30	8	NA
TB133	HSA	10/31/91	24	3.5	NA
TB135	HSA	11/01/91	38	8	NA
TB140	HSA	11/18/91	12	8	NA
TB140A	HSA	11/19/91	28	10	NA
SOUTHERN AREA					
B201A	HSA	7/01/92	36	31.5	NA
B201B	HSA	7/01/92	22	31	NA
B202A	HSA	6/30/92	36	31	NA
B202B	HSA	6/30/92	27	31	NA
B203A	HSA	6/25/92	28	33	NA
B203B	HSA	6/26/92	40	33	NA
B203C	HSA	6/29/92	38	34.5	NA
B204A	HSA	7/02/92	42	32	NA
B204B	HSA	7/06/92	26	32	NA
B205A	HSA	6/24/92	22	32	NA
B205B	HSA	6/25/92	38	31.8	NA
B206A	HSA	6/23/92	36	31.5	NA
B206B	HSA	6/23/92	34	29.5	NA
B206C	HSA	6/24/92	26		NA
B207	HSA	7/08/92	36	24	NA
B208	HSA	7/09/92	36		NA
B209	HSA	7/10/92	60	14 (perched)	NA
B301	HSA	7/14/92	19.5	11	NA
B302	HSA/Casing	7/06/92	152.5	17.5	147.5
B303	HSA/Casing	8/05/92	159	17.5	154
B304	HSA/Casing	7/30/92	165	32	160
B305	HSA	7/13/92	41	32.5	NA
B306	HSA/Casing	7/14/92	184	33	179

TABLE 2-2
SUMMARY OF TEST BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

TEST BORING	DRILLING METHOD	DATE COMPLETED	DEPTH OF TERMINATION (FT)	DEPTH TO GROUNDWATER (FT)	DEPTH TO BEDROCK (FT)
B307	HSA	10/27/92	42	32.5	NA
B308	HSA/Casing	10/22/92	108.5	15.7	103.5
B309	HSA/Casing	10/19/92	94.55	9.5	NA
B401	HSA	10/13/93	18	16	NA
B402	HSA	10/15/93	19	15	NA
B404	HSA	10/13/93	16	14	NA
B405	HSA	10/13/93	18	14	NA
B406	HSA	10/15/93	18	12	NA
B407	HSA	10/13/93	16	14	NA
B408	HSA	10/14/93	23	18	NA
B409	HSA	10/14/93	21	13	NA
B410	HSA	10/13/93	16	15	NA
B411	HSA	10/15/93	19	15	NA
B412	HSA	10/15/93	19	17	NA
B413	HSA	10/12/93	19	17	NA
B414	HSA	10/12/93	18	16	NA
B415	HSA	10/12/93	20	16	NA
B-2	HSA	3/20/86	13	9.3	NA
B-3	HSA	3/20/86	23	18	NA
B-4	HSA	3/20/86	23	20	NA
BP-3	HSA	1/18/90	21.5	6	NA
BP-4	HSA	1/18/90	12	10	NA
BP-6	HSA	1/17/90	37	8	NA
BP-8	HSA	1/17/90	21.5	4	NA
BP-9	HSA	1/17/90	21.5	9	NA
TB1	HSA	1/24/90	12	NE	NA
TB2	HSA	1/24/90	12	NE	NA
TB3	HSA	1/24/90	11	NE	NA
TB4	HSA	1/24/90	17	NE	NA
TB5	HSA	1/24/90	22	NE	NA
TB-6	HSA	1/24/90	14	NE	NA
TB7	HSA	1/26/90	17	NE	NA
TB7A	HSA	1/27/90	47	8	NA
TB8	HSA	1/23/90	14	NE	NA
TB9	HSA	1/23/90	12	7.5	NA
TB10	HSA	1/26/90	27	15	NA
TB11	HSA	1/23/90	12	7	NA
TB12	HSA	1/19/90	12	6	NA
TB19	HSA	1/19/90	12	7	NA
TB21	HSA	1/19/90	12	5	NA
TB21A	HSA	1/19/90	9	5	NA
TB22	HSA	1/19/90	12	6.5	NA
TB23	HSA	1/23/90	12	NE	NA
TB24	HSA	1/25/90	13	6	NA
TB25	HSA	1/27/90	24	NE	NA
TB26	HSA	1/25/90	27	4	NA
TB26A	HSA	1/25/90	13	NE	NA
TB101	HSA	10/15/91	20	3	NA
TB102	HSA	10/15/91	15	8	NA
TB103	HSA	10/16/91	25	23	NA
TB105	HSA	10/16/91	32	23.5	NA
TB109	HSA	10/21/91	39	20	NA

TABLE 2-2
SUMMARY OF TEST BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

TEST BORING	DRILLING METHOD	DATE COMPLETED	DEPTH OF TERMINATION (FT)	DEPTH TO GROUNDWATER (FT)	DEPTH TO BEDROCK (FT)
TB112	HSA	10/21/91	20	NE	NA
TB114	HSA	10/21/91	30	24	NA
TB116	HSA	10/22/91	25	NE	NA
TB116A	HSA	10/23/91	40	28	NA
TB118	HSA	10/24/91	23	NE	NA
TB119	HSA	10/24/91	16	8	NA
TB121	HSA	10/25/91	40	14	NA
TB124	HSA	10/25/91	32	22.5	NA
TB125	HSA	10/28/91	20	NE	NA
TB126	HSA	10/28/91	32	13.5	NA
TB127	HSA	10/15/91	12	NE	NA
TB127A	HSA	11/20/91	28	10	NA
TB128	HSA	10/29/91	25	12.5	NA
TB129	HSA	10/27/91	40	8.5	NA
TB130	HSA	10/31/91	40	10	NA
TB132	HSA	10/31/91	35	8.5	NA
TB134	HSA	11/01/91	50	15	NA
TB136	HSA	11/04/91	30	13	NA
TB137	HSA	11/04/91	5	NE	NA
TB137A	HSA	11/14/91	38	12	NA
TB138	HSA	11/15/91	28	10	NA
TB139	HSA	11/18/91	30	14	NA
TB141	HSA	11/19/91	24	11	NA
TB142	HSA	11/21/91	24	9	NA

TABLE 2-3
TEST BORING SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

SAMPLE ID	DEPTH (ft.)	DATE SAMPLED	ANALYSES
TB101	2.5-5.0	10/15/91	VOC, SVOC, PEST/PCB, METALS/CN
TB102	7.5-10.0	10/15/91	VOC, SVOC, PEST/PCB, METALS/CN
TB103-A	15 (auger spoils)	10/16/91	VOC, SVOC, PEST/PCB, METALS/CN
TB103-B	20-25	10/16/91	VOC, SVOC, PEST/PCB, METALS/CN
TB104-A	4-8	10/16/91	VOC, SVOC, PEST/PCB, METALS/CN
TB104-B	8-12	10/16/91	VOC, SVOC, PEST/PCB, METALS/CN
TB105	15-20	10/17/91	VOC
TB106	4-8	10/17/91	VOC, SVOC, PEST/PCB, METALS/CN
TB111	2-4	10/21/91	VOC, SVOC, PEST/PCB, METALS/CN
TB112	10-15	10/21/91	VOC
TB113	5-7.8	10/21/91	VOC, SVOC, PEST/PCB, METALS/CN
TB114	20-23.8	10/21/91	VOC, SVOC, PEST/PCB, METALS/CN
TB115	4-8	10/21/91	VOC, SVOC, PEST/PCB, METALS/CN
TB116	20-25	10/23/91	VOC
TB116-A	25-29	10/23/91	VOC, SVOC, PEST/PCB, METALS/CN
TB120	4-8	10/23/91	VOC, SVOC, PEST/PCB, METALS/CN
TB121-A	1-10	10/23/91	SVOC, PEST/PCB, METALS/CN
TB121-B	5-10	10/23/91	VOC
TB122	8-12	10/29/91	VOC, SVOC, PEST/PCB, METALS/CN
TB123	0-4	10/29/91	VOC, SVOC, PEST/PCB, METALS/CN
TB127-A	4-8	10/28/91	VOC, SVOC, PEST/PCB, METALS/CN
TB127-B	8-10.3	10/28/91	VOC, SVOC, PEST/PCB, METALS/CN
TB127-C	10 (auger spoils)	10/29/91	VOC, SVOC, PEST/PCB, METALS/CN
TB127A-A	8-9.5	10/20/91	VOC
TB127A-B	8-14	10/20/91	SVOC, PEST/PCB, METALS/CN
TB129-A	7-10	10/29/91	VOC
TB129-B	5-10	10/29/91	SVOC, PEST/PCB, METALS/CN
TB129-C	15-20	10/29/91	VOC, SVOC, PEST/PCB, METALS/CN
TB129-D	30-35	10/29/91	VOC, SVOC, PEST/PCB, METALS/CN
TB130-A	15-20	10/30/91	VOC
TB130-B	20-25	10/30/91	SVOC, PEST/PCB, METALS/CN
TB133	20-24	10/31/91	VOC, SVOC, PEST/PCB, METALS/CN
TB134	30-36	11/01/91	VOC, SVOC, PEST/PCB, METALS/CN
TB135	8-12	11/01/91	VOC, SVOC, PEST/PCB, METALS/CN
TB136-A	5-10	11/01/91	VOC
TB136-B	5-13.5	11/01/91	SVOC, PEST/PCB, METALS/CN
TB137A-A	12-16	11/14/91	VOC
TB137A-B	12-20	11/14/91	SVOC, PEST/PCB, METALS/CN
TB138-A	10-14	11/15/91	VOC
TB138-B	10-16	11/15/91	SVOC, PEST/PCB, METALS/CN
TB139	4-8	11/18/91	VOC, SVOC, PEST/PCB, METALS/CN
TB141	12-13.5	11/19/91	VOC
B201A	32-34	7/01/92	TCL-VOC
B201B	4-6	7/01/92	TCL-VOC
B202A	10-12	6/29/92	TCL-VOC
B202B	14-16	6/30/92	TCL-VOC
B203A	8-10	6/25/92	TCL-VOC
B203B	20-22	6/26/92	TCL-VOC

File:pratt\ritab\testbor.wr1

TABLE 2-3
TEST BORING SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

SAMPLE ID	DEPTH (ft.)	DATE SAMPLED	ANALYSES
B204A	14-16	7/02/92	TCL-VOC
B204A	31.5-42	7/06/92	TOC/GRAIN SIZE
B204B	10-12	7/02/92	TCL-VOC
B205A	18-20	6/29/92	TCL-VOC
B205B	14-16	6/25/92	TCL-VOC
B206A	18-20	6/22/92	TCL-VOC
B206B	14-16	6/23/92	TCL-VOC
B206C	14-16	6/24/92	TCL-VOC
B207A	2-10	7/07/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B207B	16-18	7/07/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B207C	30-32	7/07/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B208	2-10	7/08/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B209A	2-10	7/09/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B209B	16-18	7/09/92	TCL-VOC
B209C	42-44	7/10/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN
B301	10-19.5	7/14/92	TOC/GRAIN SIZE
B302	138-140.9	7/15/92	TOC/GRAIN SIZE
B302	130-140	7/13/92	TOC/GRAIN SIZE
B302B-TOC	83-88	8/14/92	TOC/GRAIN SIZE
B302C	15-25	7/06/92	TOC/GRAIN SIZE
B303	6-8	7/22/92	TCL-VOC
B303	17-27	7/23/92	TOC/GRAIN SIZE
B303	79-90	7/27/92	TOC/GRAIN SIZE
B303	143.5-153	7/31/92	TCL-TOC
B304-C	110-120	8/06/92	TOC/GRAIN SIZE
B304D	30-40	7/17/92	TOC/GRAIN SIZE
B304D	70-80	7/20/92	TOC/GRAIN SIZE
B304D	145-155	7/22/92	TOC/GRAIN SIZE
B304D	155-159	7/24/92	GRAIN SIZE
B304-1	13-15	7/17/92	TCL-VOC
B304-2	30-35	8/12/92	TCL-VOC
B305	31-33	7/13/92	TCL-VOC
B305	29-41	7/13/92	TOC/GRAIN SIZE
B306A	14-16	6/22/92	TCL-VOC
B306B	122-124	7/01/92	TCL-VOC
B306C	38-40	6/23/92	TOC/GRAIN SIZE
B306C	168-178	7/08/92	TCL-VOC
B306-COMP		6/23/92	GRAIN SIZE
B306-61	122-124	7/01/92	TCL-VOC
B307	26-41	10/26/92	TOC/GRAIN SIZE
B308B	50-60	10/26/92	TOC/GRAIN SIZE
B308C	15-25	10/13/92	TOC/GRAIN SIZE
B308C	95-104	10/15/92	TOC/GRAIN SIZE
B309B	44-54	10/21/92	TOC/GRAIN SIZE
B309C	3-16	10/12/92	TOC/GRAIN SIZE
B309C	85-90	10/20/92	TOC/GRAIN SIZE
P-7B	3.5	7/30/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN

File:pratt\ritab\testbor.wr1

TABLE 2-3
TEST BORING SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

SAMPLE ID	DEPTH (ft.)	DATE SAMPLED	ANALYSES
B401-3	6-8	10/13/93	TCL-VOC
B401-6	12-14	10/13/93	TCL-VOC
B401-8	16-18	10/13/93	VOC, SVOC, METALS
B402-5	9-11	10/15/93	VOC, SVOC, METALS
B402-6	11-13	10/15/93	TCL-VOC
B402-8	15-17	10/15/93	VOC, SVOC, METALS
B404-3	6-8	10/13/93	TCL-VOC
B404-5	10-12	10/13/93	TCL-VOC
B405-6	12-14	10/13/93	TCL-VOC
B405-7	14-16	10/13/93	VOC, SVOC, METALS
B406-5	10-12	10/15/93	VOC, SVOC, METALS
B406-7	14-16	10/15/93	TCL-VOC
B407-5	10-12	10/13/93	TCL-VOC
B407-6B	12-14	10/13/93	TCL-VOC
B408-2	5-7	10/14/93	VOC, SVOC, METALS
B408-9	19-24	10/14/93	VOC, SVOC, METALS
B409-5	10-12	10/14/93	TCL-VOC
B409-6	12-14	10/14/93	TCL-VOC
B409-10	19-21	10/14/93	TCL-VOC
B410-2	4-6	10/13/93	TCL-VOC
B410-4	8-10	10/13/93	TCL-VOC
B410-7	14-16	10/13/93	TCL-VOC
B411-6	12-14	10/15/93	VOC, SVOC, METALS
B411-8	15-17	10/15/93	VOC, SVOC, METALS
B412-4	9-11	10/15/93	VOC, SVOC, METALS
B412-6	13-15	10/15/93	TCL-VOC
B413-2	4-6	10/12/93	TCL-VOC
B413-5	10-12	10/12/93	TCL-VOC
B414-6	12-14	10/12/93	TCL-VOC
B414-8	16-18	10/12/93	VOC, SVOC, METALS
B415-5	10-12	10/12/93	TCL-VOC
B415-6	12-14	10/12/93	TCL-VOC
B415-8	16-18	10/12/93	TCL-VOC
QA/QC SAMPLES			
B203-BR	Rinsate Blank	6/26/92	TCL-VOC
TRIP BLANK	Trip Blank	6/05/92	TCL-VOC
B306-66-B	Rinsate Blank	7/02/92	TCL-VOC
TB-1	Trip Blank	6/05/92	TCL-VOC
TRIP BLANK	Trip Blank	7/07/92	TCL-VOC
B209-12	Rinsate Blank	7/09/92	FULL TCL/TAL
B209-D	Duplicate	7/09/92	FULL TCL/TAL
B209-MS	Matrix Spike	7/09/92	FULL TCL/TAL
B209-MSD	Matrix Spike Duplicate	7/09/92	FULL TCL/TAL
B304B	Rinsate Blank	7/20/92	TCL-VOC

File:pratt\ritab\testbor.wr1

TABLE 2-3
TEST BORING SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

SAMPLE ID	DEPTH (ft.)	DATE SAMPLED	ANALYSES
TRIP BLANK	Trip Blank	6/19/92	TCL-VOC
TRIP BLANK	Trip Blank	7/08/92	TCL-VOC
B304-R	Duplicate	8/12/92	TCL-VOC
B304-I	MS/MSD	8/12/92	TCL-VOC
TRIP BLANK	Trip Blank	7/07/92	TCL-VOC
FIELD BLANK	Rinsate Blank	10/12/93	VOC, SVOC, METALS
TRIP BLANK	Trip Blank	10/12/93	TCL-VOC
FIELD BLANK	Rinsate Blank	10/13/93	VOC, SVOC, METALS
TRIP BLANK	Trip Blank	10/13/93	TCL-VOC
FIELD BLANK	Rinsate Blank	10/14/93	TCL-VOC
FIELD BLANK	Rinsate Blank	10/15/93	TCL-VOC
TRIP BLANK	Trip Blank	10/15/93	TCL-VOC

File:pratt\ritab\testbor.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
B204	ESE/Welti	Monitor Well	HSA	7/02/92	PVC	27 to 42	35.5	Fine to coarse SAND, trace gravel	-
B301	ESE/Welti	Monitor Well	HSA	7/14/92	PVC	6 to 21	11	Fine to coarse SAND, little fine gravel	-
B302A	ESE/Welti	Monitor Well	HSA	7/27/92	PVC	12 to 27	17.5	Fine to coarse SAND, little gravel	
B302B	ESE/Welti	Monitor Well	Casing	8/14/92	PVC	77 to 87	16.5	Fine SAND, little to trace Silt	-
B302C	ESE/Welti	Monitor Well	Casing	7/06/92	PVC/Stainless	137.5 to 147.5	17.5	Very dense SAND & SILT	147.5
B303A	ESE/Welti	Monitor Well	HSA		PVC	14 to 29	20.5	Fine SAND, little Silt, trace Gravel	-
B303B	ESE/Welti	Monitor Well	Casing	8/12/92	PVC	77 to 87	21	Fine to coarse SAND, some Gravel, trace Silt	-
B303C	ESE/Welti	Monitor Well	Casing	8/05/92	PVC/Stainless	144 to 154	17.5	Very dense fine SAND, little clay	154
B304A	ESE/Welti	Monitor Well	HSA	8/13/92	PVC	25 to 40	31.5	Fine to coarse SAND, trace Gravel	-
B304B	ESE/Welti	Monitor Well	Casing	8/11/92	PVC	69.5 to 79.5	31	Very fine to medium SAND, trace Silt	-
B304C	ESE/Welti	Monitor Well	Casing	8/06/92	PVC	110 to 120	31.5	Very fine to coarse SAND, trace Gravel, Silt	-
B304D	ESE/Welti	Monitor Well	Casing	7/30/92	PVC/Stainless	151 to 161	32	Very fine to coarse SAND, some Silt	160

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
B305	ESE/Welti	Monitor Well	HSA	7/13/92	PVC	26 to 41	32.5	Fine to medium SAND	–
B306A	ESE/Welti	Monitor Well	HSA		PVC	26 to 41	33	Fine to coarse SAND, trace Gravel, Silt	–
B306B	ESE/Welti	Monitor Well	Casing	8/19/92	PVC	107 to 117	32	Very fine to fine SAND trace Silt	–
B306C	ESE/Welti	Monitor Well	Casing	7/14/92	PVC/Stainless	170 to 180	33	Fine to coarse SAND and Gravel, little Silt trace Clay, weathered bedrock	179
B307	ESE/Welti	Monitor Well	Casing	10/27/92	PVC	26 to 41	32.5	Fine to medium SAND	–
B308A	ESE/Welti	Monitor Well	HSA	10/27/92	PVC	10.5 to 25.5	15	Very fine to coarse SAND, little f–c Gravel	–
B308B	ESE/Welti	Monitor Well	Casing	10/26/92	PVC	51.5 to 61.5	15.7	Fine to medium SAND and Gravel	–
B308C	ESE/Welti	Monitor Well	Casing	10/22/92	PVC/Stainless	94.7 to 104.7	15.7	Very fine to coarse SAND little Gravel, trace Silt	103.5
B309A	ESE/Welti	Monitor Well	HSA	10/22/92	PVC	5.5 to 15.5	9.5	Fine to coarse SAND, little Gravel, trace Silt	–
B309B	ESE/Welti	Monitor Well	HSA	10/22/92	PVC	44.5 to 54.5	9.5	Fine to medium SAND, little Silt & Clay	–
B309C	ESE/Welti	Monitor Well	Casing	10/19/92	PVC/Stainless	81.5 to 91.5	9.5	SILT, some Clay, little fine to coarse Sand weathered Sandstone	90

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
Solomon Casket	–	Industrial	Cable Percussion	1967	6" Dia. steel Casing	Open End ± 110 feet	± 28	Stratified Drift	–
Municipal Well No. 5	Layne-New England	Public Water Supply	Cable Tool	7/15/65	8" Dia. steel Casing	± 49 to ± 58 105 slot	± 5	Red fine to Medium SAND and GRAVEL, some silt	63
TB7S	Welti	Monitor Well	Hollow Stem Auger	4/2/90	2" PVC	5.5 to 15.5 10 slot	6.8	SAND & Solid Waste	–
TW-16	General Borings	Monitor Well	Hollow Stem Auger	3/6/80	2" PVC	Est. 5-70	± 58.5	Sand & Gravel	–
TW-17	General Borings	Monitor Well	Hollow Stem Auger	2/27/80	2" PVC	Est. 5-30	± 14.5	Stratified drift	–
TW-18	General Borings	Monitor Well	Hollow Stem Auger	3/7/80	2" PVC	Est. 4.92-24.92	± 13.9	Stratified drift	–
TW-19	General Borings	Monitor Well	Hollow Stem Auger/ Rock Core	2/19/80	2" PVC	Unknown	± 7.5	Stratified drift	6.08
TW-20	General Borings	Monitor Well	Hollow Stem Auger	2/18/80	2" PVC	Unknown	± 8	Unknown	–
CW-20	Layne, New York	Observation Well	–	1965	2 1/2" Dia. steel	± 48.5-50.5	± 3.2	SAND & GRAVEL	50.5
CW-17	Layne, New York	Observation Well	–	1965	2 1/2" Dia. steel	± 47-49	± 8.2	SAND & GRAVEL	49
CW-16	Layne, New York	Observation Well	–	1965	2 1/2" Dia. steel	± 57-59	–	Red, fine SAND and CLAY	59
CW-15	Layne, New York	Observation Well	–	1965	2 1/2" Dia. steel	± 49.9-51.9	± 5.1	Fine SAND and GRAVEL, trace Clay	59
CW-14	Layne, New York	Observation Well	–	1965	2 1/2" Dia. steel	± 56.7-58.7	± 10.3	Red SAND and GRAVEL, trace Clay	58.7

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
CW-13	Layne, New York	Observation Well	-	1965	2 1/2" Dia. steel	± 53.55	± 6.5	Red SAND, GRAVEL and Clay	55
B-1	East Coast Drilling, Inc.	Monitor Well (Methane)	Hollow Stem Auger	3/20/86	2" PVC	± 3-8	± 5	Refuse	-
B-2	East Coast Drilling, Inc.	Monitor Well (Methane)	Hollow Stem Auger Auger	3/20/86	2" PVC	± 3-13	± 9.5	Refuse	-
B-3	East Coast Drilling, Inc.	Monitor Well (Methane)	Hollow Stem Auger Auger	3/20/86	2" PVC	± 3-23	± 18	Refuse	-
B-4	East Coast Drilling, Inc.	Monitor Well (Methane)	Hollow Stem Auger	3/20/86	2" PVC	± 3-23	± 20	Refuse	-
GZ-1	General Borings	Monitor Well	Mud Rotary (Revert)	1/14/87	2" PVC	± 66.5-86.5 20 slot	± 58	Fine to coarse SAND	89
GZ-2	General Borings	Monitor Well	Mud Rotary (Revert)	1/16/87	2" PVC	± 70-90 20 slot	± 57	Fine SAND	-
GZ-3	General Borings	Monitor Well	Hollow Stem Auger	1/19/87	2" PVC	± 9-24 20 slot	± 6	Fine to coarse SAND	-
GZ-4S	General Borings	Monitor Well	Mud Rotary (Revert)	1/30/87	2" PVC	± 25-45 20 slot	± 17	Fine SAND and silt	-
GZ-4M	General Borings	Monitor Well	Mud Rotary (Revert)	1/30/87	2" PVC	± 65-85 20 slot	± 18	Fine Sand/fine to coarse SAND and GRAVEL	-
GZ-4D	General Borings	Monitor Well	Mud Rotary (Revert)	1/30/87	2" PVC	± 112-132 20 slot	± 18	BOULDERS/fine to coarse Sand, Gravel and Silt	-

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
GZ-5S	Welti	Monitor Well	Hollow Stem Auger	5/17/90	2" PVC	± 14-24 10 slot	± 17	Fine SAND	-
GZ-5M	Welti	Monitor Well	Hollow Stem Auger	5/17/90	2" PVC	± 52-62 10 slot	± 17	Fine to coarse SAND and GRAVEL	-
GZ-5D	Welti	Monitor Well	Drive Casing	5/10/90	2" PVC	± 117-127 10 slot	± 17	Fine to medium SAND	135
GZ-7S	Welti	Monitor Well	Hollow Stem Auger	5/10/90	2" PVC	± 4.5-14.5 10 slot	± 5	GRAVEL, SAND and REFUSE	-
GZ-7M	Welti	Monitor Well	Hollow Stem Auger	4/27/90	2" PVC	± 65.5-75.5 10 slot	± 9	Fine to coarse SAND and GRAVEL	-
GZ-7D	Welti	Monitor Well	Drive Casing	4/4/90	2" PVC	± 135-145 10 slot	± 8	GRAVEL	150
GZ-11S	Welti	Monitor Well	Hollow Stem Auger	4/25/90	2" PVC	± 13-23	± 5.5	Fine to medium SAND	-
GZ-11D	Welti	Monitor Well	Hollow Stem Auger	4/25/90	2" PVC	± 50-60	± 4	Fine to medium SAND	73
GZ-12M	Welti	Monitor Well	Hollow Stem Auger	4/11/90	2" PVC	± 52-62	± 11	GRAVEL and fine to coarse SAND	-
GZ-12D	Welti	Monitor Well	Hollow Stem Auger	4/10/90	2" PVC	± 79-89	± 11	Fine to coarse SAND	96
GZ-13S	Welti	Monitor Well	Hollow Stem Auger	4/20/90	2" PVC	± 28-38	± 33	Fine to coarse SAND	-

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
GZ-13M	Welti	Monitor Well	Hollow Stem Auger	4/19/90	2" PVC	± 98-108	± 33	Fine to coarse SAND	-
GZ-13D	Welti	Monitor Well	Drive Casing	4/18/90	2" PVC	± 162-172	± 35	Fine to coarse SAND, COBBLES	174
GZ-14S	Welti	Monitor Well	Hollow Stem Auger	5/4/90	2" PVC	± 26-36	± 33	Fine to coarse SAND	-
GZ-14M	Welti	Monitor Well	Spin, Drive Casing	5/4/90	2" PVC	± 85-95	± 30	Fine SAND and SILT	-
GZ-14D	Welti	Monitor Well	Spin Casing	5/1/90	2" PVC	± 135-145	± 31	Fine SAND and SILT	148
GZ-17M	Welti	Monitor Well	Hollow Stem Auger	4/5/90	2" PVC	± 49-59	± 10	Fine SAND	-
GZ-17D	Welti	Monitor Well	Hollow Stem Auger	4/4/90	2" PVC	± 89-99	± 10	Fine SAND	-
LW-19	GZA Drilling	Monitor Well	Hollow Stem Auger	11/16/84	2" PVC	± 6-16	± 9	Fine SAND/ Cobbles and Silt	-
LW-102S	GZA Drilling	Monitor Well	Hollow Stem Auger	11/7/84	2" PVC	± 30-50	± 30	Fine SAND	-
LW-102D	GZA Drilling	Monitor Well	Mud rotary (Revert)	11/7/84	2.5" PVC	± 51-81	± 32	Fine SAND, some Gravel layers	-
LW-17D	GZA Drilling	Monitor Well	Hollow Stem Auger Mud Rotary (Revert)	11/12/84	2" PVC	± 40-100	± 14	Fine SAND, some Gravel layers	-
LW-15D	GZA Drilling	Monitor Well	Hollow Stem Auger Mud Rotary (Revert)	11/21/84	2" PVC	± 49-99	± 6.4	Fine to coarse SAND	-

File:pratt\ritab\wellcons.wr1

TABLE 2-4
TABULATION OF WELL CONSTRUCTION DATA FOR EXISTING WELLS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well Designation	Installed By	Intended Use	Drilling Method	Date of Installation	Construction Materials	Screened Interval (ft)	Average Depth to Water (ft)	Screened Material	Approximate Depth to Bedrock (ft)
LW-15M	GZA Drilling	Monitor Well	Hollow Stem Auger	11/26/84	2" PVC	± 29-59	± 6.4	Fine to coarse SAND	-
LW-15S	GZA Drilling	Monitor Well	Hollow Stem Auger	11/27/84	2" PVC	± 7.5-27.5	± 6.6	Silt/fine to coarse SAND	-
LW-101D	GZA Drilling	Monitor Well	Hollow Stem Auger Mud Rotary (Revert)	11/15/84	2" PVC	± 51-101	± 18	Fine to coarse SAND, some Gravel layers	-
LW-101S	GZA Drilling	Monitor Well	Hollow Stem Auger	11/8/84	2" PVC	± 18-48	± 17.5	Fine to coarse SAND	-
LW-103D	East Coast Drilling, Inc.	Monitor Well	Hollow Stem Auger	1/17/85	1 1/2" PVC Filter Fabric	± 34.5-54.5	± 10	Fine to coarse SAND	78.2
LW-103S	East Coast Drilling, Inc.	Monitor Well	Hollow Stem Auger	1/17/85	1 1/2" PVC Filter Fabric	± 6-31	± 10	Fine to coarse SAND	-

File:pratt\ritab\wellcons.wr1

TABLE 2-5
SUMMARY OF WELL DEVELOPMENT DETAILS
Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Dates Purged	Gallon(s) Removed (Approximated)	Method of Purging (pump)	Final Readings			
				pH	temp F	conductivity*	turbidity (NTU)
B204	7/28-7/29	205	mechanical surge	5.81	63	343	29.9
B301	7/29-7/30	165	hand surge	5.95	60	1210	18
B305	8/05-8/06	200	air lift	6.17	73	1910	60
B306A	7/31-8/04	N/A	mechanical surge	5.86	62	187	23.6
B306C	7/31-8/04	N/A	air lift pump/submersible	7.58	60	297	41
B302C	8/10	450	centrifugal	8.24	58	271	4.9
B302A	8/10	205	centrifugal	5.85	62	878	7.25
B303A	8/13	160	centrifugal	6.33	58.5	535	2.05
B303C	8/13	410	centrifugal	7.81	62.5	214	20
B304D	8/17	N/A	submersible	7.54	62	275	73
B304C	8/18	N/A	air lift	7.51	62	299	27
B303B	8/19	200	centifugal	7.05	58	320	7.1
B304B	8/19	N/A	air lift	6.80	59	440	12
B302B	8/24	165	centrifugal	7.66	57	280	8
B304A	8/25	165	air lift	6.25	64	750	29
B306B	8/27	200	air lift	7.21	64	333	13
B309C	10/30	N/A	centrifugal	7.53	58	215	N/A
B309B	10/30	N/A	centrifugal	7.64	55	328	N/A
B309A	11/02	495	centrifugal	6.70	57	475	N/A
B308A	11/04	165	centrifugal	5.69	56	89	N/A
B308B	11/04	220	centrifugal	8.34	54	198	N/A
B308C	11/04-11/06	400	air lift	6.90	51	163	N/A
B307	11/06	295	air lift	6.36	58	1379	N/A

* Conductivity measured in micromhos/cm (umhos/cm)
NA = Not Available
File:pratt\ritab\devdet.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 2-6
GROUNDWATER SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

WELL ID	DATE SAMPLED	ANALYSES PERFORMED	ROUND 1		ROUND 2		ROUND 3	
			DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED
B-3	6-28-90	FULL HSL, UF	NS	NS	NS	NS	1/08/93	TCL-VOC
B-4	NS	NS	NS	NS	NS	NS	1/07/93	TCL-VOC
CW-15	6-13-90	VOC	NS	NS	NS	NS	NS	NS
CW-20	6-13-90	VOC	NS	NS	NS	NS	NS	NS
GZ-1	6-12-90	FULL HSL, UF	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-2	6-12-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-3	6-13-90	VOC, METALS, UF	NS	NS	NS	NS	NS	NS
GZ-4D	6-26-90	FULL HSL, UF	9/16/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
GZ-4M	6-26-90	FULL HSL, UF	9/16/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
GZ-4S	6-26-90	FULL HSL, UF	9/16/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
GZ-5D	6-25-90	FULL HSL, UF	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-5M	6-25-90	FULL HSL, UF	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-5S	6-25-90	FULL HSL, UF	NS	NS	NS	NS	1/06/93	TCL-VOC
GZ-7D	6-27-90	FULL HSL, UF	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-7M	6-27-90	FULL HSL, UF	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-7S	6-27-90	FULL HSL, UF	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-11D	6-14-90	VOC, METALS	NS	NS	NS	NS	NS	NS
GZ-11S	6-14-90	VOC, METALS	NS	NS	NS	NS	NS	NS
GZ-12D	6-20-90	VOC, METALS	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-12M	6-20-90	VOC, METALS	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-13D	6-18-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-13M	6-18-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-13S	6-18-90	VOC, METALS	NS	NS	NS	NS	1/07/93	TCL-VOC
GZ-14D	6-19-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC

UF = unfiltered sample for metals analysis

NS = Not Sampled

File:pratt\ritab\gwsamp.wr1

TABLE 2-6
GROUNDWATER SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

WELL ID	DATE SAMPLED	ANALYSES PERFORMED	ROUND 1		ROUND 2		ROUND 3	
			DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED
GZ-14M	6-19-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-14S	6-19-90	VOC, METALS	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-17D (LW)	6-22-90	FULL HSL, UF	NS	NS	NS	NS	1/08/93	TCL-VOC
GZ-17M (LW)	6-22-90	FULL HSL, UF	NS	NS	NS	NS	1/08/93	TCL-VOC
LW-103D	6-15-90	VOC, METALS	NS	NS	NS	NS	NS	NS
LW-103M	6-15-90	VOC, METALS	NS	NS	NS	NS	NS	NS
LW-103S	6-15-90	VOC, METALS	NS	NS	NS	NS	NS	NS
LW-15D	6-21-90	FULL HSL, UF	9/15/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
LW-15M	6-21-90	FULL HSL, UF	9/15/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
LW-15S	6-21-90	FULL HSL, UF	9/15/92	TCL-VOC	NS	NS	1/06/93	TCL-VOC
TB-7S	6-28-90	FULL HSL, UF	NS	NS	NS	NS	1/06/93	TCL-VOC
TW-17S	6-22-90	FULL HSL, UF	NS	NS	NS	NS	1/08/93	TCL-VOC
TW-18	6-20-90	VOC, METALS	9/15/92	TCL-VOC	NS	NS	1/07/92	TCL-VOC
LORI	7-5-90	VOC, METALS	NS	NS	NS	NS	NS	NS
M (MENARD)	6-8-90	FULL HSL	NS	NS	NS	NS	NS	NS
CE	6-25-90	VOC	NS	NS	NS	NS	NS	NS
B-13	6-28-90	FULL HSL, UF	NS	NS	NS	NS	NS	NS
B301			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/06/93	TCL-VOC
B202A			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/05/93	TCL-VOC
B302B			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/05/93	TCL-VOC
B302C			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/05/93	TCL-VOC
B303A			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/05/93	TCL-VOC
B303B			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/06/93	TCL-VOC
B030C			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/05/93	TCL-VOC

UF = unfiltered sample for metals analysis

NS = Not Sampled

File:pratt\ritab\gwsamp.wr1

TABLE 2-6
GROUNDWATER SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

WELL ID	DATE SAMPLED	ANALYSES PERFORMED	ROUND 1		ROUND 2		ROUND 3	
			DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED	DATE SAMPLED	ANALYSES PERFORMED
B304A			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/07/93	TCL-VOC
B304B			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/07/93	TCL-VOC
B304C			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/07/93	TCL-VOC
B304D			9/15/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/07/93	TCL-VOC
B305			9/16/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/08/93	TCL-VOC
B306A			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/06/93	TCL-VOC
B306B			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/06/93	TCL-VOC
B306C			9/14/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	NS	NS	1/06/93	TCL-VOC
B307			NS	NS	11/20/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	1/07/93	TCL-VOC
B308A			NS	NS	11/19/92	TCL-SVOC, PEST/PCB, TAL-METALS/CN	1/06/93	TCL-VOC
B308B			NS	NS	11/19/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	1/06/93	TCL-VOC
B308C			NS	NS	11/20/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	1/06/93	TCL-VOC
B309A			NS	NS	11/18/92	TCL-SVOC, PEST/PCB, TAL-METALS/CN	1/07/93	TCL-VOC
B309B			NS	NS	11/19/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	1/07/93	TCL-VOC
B309C			NS	NS	11/19/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN	1/07/93	TCL-VOC

UF = unfiltered sample for metals analysis

NS = Not Sampled

File:pratt\ritab\gwsamp.wr1

TABLE 2-6
GROUNDWATER SAMPLES ANALYSES
Old Southington Landfill Superfund Project
Southington, Connecticut

WELL ID QA/QC SAMPLES	DATE SAMPLED	ANALYSES PERFORMED	PURPOSE
GZ7S-R	9/17/92	TCL-VOC	DUPLICATE
GZ5M-B	9/16/92	TCL-VOC	RINSATE BLANK
920917-1	9/17/92	TCL-VOC	TRIP BLANK
B3-R	9/18/92	TCL-VOC	DUPLICATE
GZ17D-B	9/17/92	TCL-VOC	RINSATE BLANK
920918-1	9/18/92	TCL-VOC	TRIP BLANK
G306C-I	9/14/92	TCL-VOC	MS/MSD
G306-B	9/14/92	FULL TCL/TAL	RINSATE BLANK
920915-1	9/15/92	TCL-VOC	TRIP BLANK
G305R	9/16/92	FULL TCL/TAL	DUPLICATE
920916-1	9/16/92	TCL-VOC	TRIP BLANK
G309C-I	11/19/92	FULL TCL/TAL	MS/MSD
G307-B	11/20/92	FULL TCL/TAL	RINSATE BLANK
TB-1	11/11/92	TCL-VOC	TRIP BLANK
G307-R	11/20/92	FULL TCL/TAL	DUPLICATE
TB7S-B	1/06/93	TCL-VOC	RINSATE BLANK
G306C-I	1/06/93	TCL-VOC	MS/MSD
TB010693	1/06/93	TCL-VOC	TRIP BLANK
G307-R	1/07/93	TCL-VOC	DUPLICATE
TB010793	1/07/93	TCL-VOC	TRIP BLANK
G304A-B	1/07/93	TCL-VOC	RINSATE BLANK
GZ5M-R	1/07/93	TCL-VOC	DUPLICATE
G309C-I	1/07/93	TCL-VOC	MS/MSD
TW17S-B	1/08/93	TCL-VOC	RINSATE BLANK
TB010893-1	1/08/93	TCL-VOC	TRIP BLANK
G305-R	1/08/93	TCL-VOC	DUPLICATE
GZ12D-I	1/08/93	TCL-VOC	MS/MSD

File:pratt\ritab\gwsamp.wr1

TABLE 2-7
ESTIMATED FINAL PIEZOMETER LENGTHS/
DEPTHS BELOW POND BOTTOM
Old Southington Landfill Superfund Project
Southington, Connecticut

RI
Revision: 0
Date: 4/12/93

Piezometer No.	Installed	Total Length (feet)	Approximate depth (feet below pond bottom)
PZ1	8/26/92	9.2	5
PZ2	8/26/92	9.2	5
PZ3	8/26/92	9.2	5
PZ4	7/16/92	11.2	2.2
PZ5	7/16/92	11.2	6.5
PZ6	7/16/92	11.2	6.5
PZ7	8/26/92	9.2	4

File:pratt\ritab\finalpie.wr1

TABLE 2-8
WELLS USED FOR CONSTANT FLOW AND SLUG TESTS
Old Southington Landfill Superfund Project
Southington, Connecticut

Constant Flow Tests	Pumping Method	Date
GZ1	Submersible	9/16
GZ2	Submersible	9/16
GZ4S	Centrifugal	9/16
GZ4M	Centrifugal	9/16
GZ4D	Centrifugal	9/16
GZ5M	Submersible	9/16
GZ5D	Submersible	9/16
GZ7S	Centrifugal	9/17
GZ7M	Centrifugal	9/17
GZ7D	Centrifugal	9/17
GZ-12M	Submersible	9/17
GZ-12D	Centrifugal	9/17
GZ13M	Submersible	9/16
GZ13D	Submersible	9/16
GZ14M	Submersible	9/17
GZ14D	Submersible	9/17
GZ17M	Centrifugal	9/17
GZ17D	Centrifugal	9/17
TW-17S	Centrifugal	9/17
LW-15S	Centrifugal	9/15
LW-15M	Centrifugal	9/15
LW-15D	Submersible	9/15
B302B	Submersible	9/15
B302C	Centrifugal	9/15
B303B	Centrifugal	9/14
B303C	Centrifugal	9/14
B304B	Submersible	9/15
B304C	Submersible	9/14
B304D	Submersible	9/15
B306B	Submersible	9/14
B306C	Submersible	9/14
B308A	Centrifugal	1/15
B308B	Centrifugal	1/15
B308C	Submersible	1/15
B309A	Centrifugal	11/18*
B309B	Centrifugal	11/19*
B309C	Centrifugal	11/19*

* Done with transducers as a cluster.

File:pratt\ritab\consflow.wr1

TABLE 2-8
WELLS USED FOR CONSTANT FLOW
AND SLUG TESTS
Old Southington Landfill Superfund Project
Southington, Connecticut

January 13 & 14, 1993

Slug Tests	Rising head	Falling head
B1	X	
B2	X	
B3	X	X
B4	X	X
GZ5S	X	
GZ7S	X	X
GZ13S	X	
GZ14S	X	
TB7S	X	X
B301	X	X
B302A	X	X
B303A	X	X
B304A	X	X
B305	X	X
B306A	X	X
B307	X	X

File:pratt\ritab\consflow.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 2-9
GZA SURFACE WATER AND SEDIMENT
SAMPLES COLLECTED AND ANALYSES PERFORMED
Old Southington Landfill Superfund Project
Southington, Connecticut

June and July, 1990

Sample ID	ANALYSES
SW-1	VOC, METALS
SW-2	VOC, SVOC, PEST/PCB, METALS
SW-3	DELETED FROM STUDY
SW-4	VOC, SVOC, PEST/PCB, METALS
SW-5	VOC, SVOC, PEST/PCB, METALS
SW-6	VOC, METALS
SW-7	VOC, SVOC, PEST/PCB, METALS
SED-1	VOC, METALS
SED-2	VOC, METALS
SED-3	VOC, SVOC, PEST/PCB, METALS
SED-4	VOC, SVOC, PEST/PCB, METALS
SED-5	VOC, SVOC, PEST/PCB, METALS
SED-6	DELETED FROM STUDY
SED-7	VOC, SVOC, PEST/PCB, METALS

File:pratt\ritab\gzaswsed.wr1

TABLE 2-10
ESE SURFACE WATER AND SEDIMENT SAMPLES COLLECTED AND ANALYSES PERFORMED
Old Southington Landfill Superfund Project
Southington, Connecticut

Surface Water Sample ID	Date	Analyses
SWS-1	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-2	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-3	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-4	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-5	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-6	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-7	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-7B	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-8	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-9	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-10	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SWS-11	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
SED-1	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, PH/EH, GRAIN SIZE
SED-2	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, PH/EH, GRAIN SIZE
SED-3	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-4	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-5	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, PH/EH, GRAIN SIZE
SED-6	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, PH/EH, GRAIN SIZE
SED-7	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-8	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-9	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-10	6/12/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, GRAIN SIZE
SED-11	6/11/92	TCL-VOC, SVOC, PEST/PCB, TAL-METALS/CN, TOC, PH/EH, GRAIN SIZE
QA/QC SAMPLES		
SWS-5-I	6/11/92	MS/MSD - FULL TCL/TAL, AMMONIA, NITRATE, NITRITE, ALKALINITY, SULFATE, COD, TSS, PHOSPHOROUS, HARDNESS
TRIP BLANK	6/11/92	TRIP BLANK - TCL-VOC
SWS-7-B	6/12/92	RINSATE BLANK - FULL TCL/TAL, TOC

File:pratt\ritab\esesursd.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
NORTHERN AREA				
TB104	S-1	0-4.0	0.1	Wood fill at 1.0'; water at 1.5'
	S-2	4.0-8.0	5	Wood fill
	S-3	8.0-12.0	ND	Peat 8' to 11'
	S-4	12.0-16.0	ND	Sand
TB106	S-1	0-4.0	ND	Cinder debris at 1.5'; water at 4.5'
	S-2	4.0-8.0	0.7	Sand at 6'
	S-3	8.0-12.0	0.5	Sand
	S-4	12.0-16.0	0.5	Sand
TB107	S-1	0-4.0	ND	Sand; no water
	S-2	4.0-5.3	1.2	Sand
	S-3	6.0-9.8	ND	Sand
	S-4	10.0-14.0	--	Sand
	S-5	14.0-15.0	--	Sand
TB108	S-1	0-4.0	0.5	Sand; no water
	S-2	4.0-8.0	ND	Fill 4-6'
	S-3	8.0-12.0	ND	Peat 8'-10'; Silt
TB110	S-1	0-4.0	ND	Sand with organics
	S-2	4.0-8.0	2.2	Sand with organics
	S-3	8.0-12.0	ND	Sand
TB111	S-1	0-4.0	5.2	1.5'-4' Cinders
	S-2	4.0-8.0	7	Peat 4'-16'
	S-3	8.0-12.0	ND	
	S-4	12.0-16.0	0.8	
TB113	S-1	0-0.8	1.8	Sand
	S-2	2.0-5.0	2.4	Sand/cinders
	S-3	5.0-7.8	ND	Sand
	S-4	9.0-13.0	ND	Sand
	S-5	13.0-15.0	ND	Sand
TB115	S-1	0-4.0	ND	Sand; water at 3.5'
	S-2	4.0-8.0	ND	Silt/peat
	S-3	8.0-12.0	0.8/0.3	Sand
	S-4	12.0-16.0	0.6/0	Sand
TB117	S-1	0-4.0	1.6/0	Sand, possible ash (3"); water at 3.5'
	S-2	4.0-8.0	ND	Peat 5'-9'
	S-3	8.0-12.0	1.3/0.8	Sand
	S-4	12.0-16.0	0	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB119	S-1	0-4.0	ND	Sand; water at 8'
	S-2	4.0-8.0	ND	Peat 5'-7'
	S-3	8.0-12.0	ND	Sand
	S-4	12.0-16.0	ND	Sand
TB120	S-1	0-4.0	ND	Ash layers 1'-8'; water at 3'
	S-2	4.0-8.0	ND	Peat at 8'
	S-3	8.0-12.0	ND	Peat
	S-4	12.0-16.0	ND	Silt at 15'
TB122	S-1	0-4.0	0.5	Refuse at 1.5'; water at 4'
	S-2	4.0-8.0	ND	Refuse
	S-3	8.0-12.0	ND	Sand at 10'
	S-4	12.0-16.0	ND	Sand
TB123	S-1	0-4.0	0.2	Refuse at 0.5'
	S-2	4.0-8.0	1	Refuse
	S-3	8.0-12.0	ND	Peat at 8'-11.2'
	S-4	12.0-16.0	ND	Sand, trace wood fill to 14'; possible auger dragdown
	S-5	16.0-20.0	ND	Sand
TB131	S-1	0-4.0	7/0.2	Wood fill at 3'; water at 8'
	S-2	4.0-8.0	16.5/1.2	Wood fill
	S-3	8.0-8.5	42	Wood fill; slight odor
	S-4	10.0-14.0	25	Wood fill; petroulum sheen
	S-5	14.0-18.0	25	Wood fill; petroleum sheen
	S-6	18.0-22.0	7/0.3	Sand at 20'
	S-7	22.0-26.0	19.5/0.5	Sand
	S-8	26.0-30.0	15/0.5	Sand
TB135	S-1	0-4.0	ND	Wood fill at 2'; water at 8'
	S-2	4.0-8.0	1.4/0.4	Wood fill/cinders
	S-3	8.0-12.0	--	Wood fill/ash
	S-4	12.0-12.9	ND	Wood fill/ash
	S-5	14.0-15.0	ND	Wood fill to 15'
	S-6	16.0-20.0	--	Peat
	S-7	20.0-24.0	ND	Sand at 21'
	S-8	24.0-28.0	3.8/1.2	Sand at 27'
	S-9	28.0-32.0	5/0.4	Sand
	S-10	32.0-36.0	1.2/0.8	Sand
	S-11	36.0-38.0	ND	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB140	S-1	0-4.0	1.2	Wood fill at 2.5'; water at 8'
	S-2	4.0-7.8	3.8	Wood fill
	S-3	8.0-8.9	28	Wood fill
	S-4	10.0-12.0	--	Wood fill
TB140A	S-1	10.0-10.7	29	Wood fill; petroleum sheen
	S-2	14.0-14.5	31	Wood fill
	S-3	18.0-21.0	5.2	Sand/gravel
	S-4	22.0-26.0	3.2	Gravel
	S-5	26.0-28.0	0.4	Gravel/sand
INFERRED SEMI-SOLID DISPOSAL AREA 1				
TB125	S-1	0-4.0	ND	Solid waste at 2'
	S-2	4.0-8.0	3/1.2	Sand at 7'
	S-3	8.0-12.0	0.9/0.4	Sand
	S-4	12.0-12.8	1.4/0.9	Sand
	S-5	13.0-16.0	2/1	Sand
	S-6	16.0-20.0	ND	Sand
TB127	S-1	0-4.0	ND	Solid waste at 2'; no water
	S-2	4.0-8.0	20/2	Solid waste
	S-3	8.0-10.3	400/0.2	Solvent odors
		10 (Auger spoil)		Oily sludge
TB127A	S-1	0-3.5	0.2	Solid waste at 2.5'; water at 10'
	S-2	4.0-8.0	34	Fill/solid waste
	S-3	8.0-9.5	220	Fill/solid waste
	S-4	10.0-14.0	220	Sand; oily
	S-5	14.0-18.0	120	Oily organics (peat)
	S-6	18.0-22.0	112	Sand; oily
	S-7	22.0-26.0	110	Sand
	S-8	26.0-28.0	42	Sand
TB134	S-1	0-5.0	ND	Sand
	S-2	5.0-10.0	0.5	Solid waste
	S-3	10.0-15.0	ND	Solid waste
	S-4	15.0-20.0	0.5	Solid waste; oily odor
	S-5	20.0-25.0	0.5	Solid waste; oily odor
	S-6	25.0-30.0	0.5	Peat at 26'
	S-7	30.0-36.0	30	Peat, sand, trace solid waste at 31'
	S-8	36.0-40.0	25	Silt/sand at 37'
	S-9	40.0-45.0	12	Sand/silt
	S-10	45.0-50.0	ND	Sand/silt

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB138	S-1	0-3.0	ND	Sand
	S-2	4.0-6.8	4.2	Solid waste
	S-3	8.0-8.5	15	Solid waste
	S-4	10.0-14.0	380	Sand; solvent odor
	S-5	14.0-18.0	32	Sand
	S-6	18.0-22.0	3.2	Sand
	S-7	22.0-26.0	0.4	Sand
	S-8	26.0-28.0	3.4	Sand
TB139	S-1	0-4.0	0.6	Solid waste at 0.3'; water at 14'
	S-2	4.0-8.0	0.8	Solid waste/ash
	S-3	8.0-12.0	32	Solid waste/ash
	S-4	12.0-14.0	2.5	Solid waste/ash
	S-5	16.0-16.8	2.8	Solid waste/ash
	S-6	20.0-24.0	1.8	Sand
	S-7	24.0-28.0	0.8	Sand
	S-8	28.0-30.0	0.8	Sand
TB141	S-1	0-4.0	1	Solid waste at 0.1'; water at 11'
	S-2	4.0-7.5	27	Solid waste
	S-3	8.0-8.1	36	Solid waste
	S-4	10.0-10.1	22	Solid waste
	S-5	12.0-13.5	300	Solid waste
	S-6	14.0-18.0	150	Sand/gravel
	S-7	18.0-20.0	27	Sand/gravel
	S-8	22.0-24.0	28	Sand
TB-142	S-1	0-4.0	0	Solid waste at 0.2'; water at 9'
	S-2	4.0-8.0	3.2	Solid waste
	S-3	8.0-9.9	18	Solid waste
	S-4	10.0-14.0	20	Solid waste; petroleum odor
	S-5	14.0-17.0	58	Sand at 15'; petroleum odor
	S-6	18.0-21.5	28	Sand
	S-7	22.0-24.0	30	Gravel
INFERRED SEMI-SOLID DISPOSAL AREA 2				
TB101	S-1	0-2.5	9	No water
	S-2	2.5-5.0	80	Solvent odor 2.5-20'; solid waste
	S-3	5.0-7.5	21	Solid waste
	S-4	7.5-10.0	32	Solid waste to 9'
	S-5	10.0-12.5	75	Sand
	S-6	12.5-15.0	25	Sand
	S-7	15.0-17.5	28	Sand
	S-8	17.5-20.0	10	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB102	S-1	0-2.5	ND	Sand to 1.5'; no water
	S-2	2.5-5.0	0.8	Solid waste
	S-3	5.0-7.5	11.4	Petroleum odor; sand
	S-4	7.5-10.0	20	Sand
	S-5	10.0-10.5	5.5	Sand
	S-6	12.5-15.0	14	Sand
TB103	S-1	0-5.0	0.8	Solid waste at 0.7'; water at 23'
	S-2	5.0-10.0	10.5	Solid waste
	S-3	10.0-15.0	16.4	Solid waste
	S-3A	15.0 Auger Spoils	--	Sand
	S-4	15.0-20.0	6.5	Sand
	S-5	20.0-25.0	22	Sand
TB105	S-1	0-5.0	0.2	Solid waste at 0.2'; water at 23.5'
	S-2	5.0-7.1	--	Solid waste
	S-3	8.0-10.0	120	Solid waste
	S-4	10.0-15.0	100	Solid waste
	S-5	15.0-20.0	190	Solid waste
	S-6	20.0-25.0	280	Sand at 21'
	S-7	25.0-30.0	340	Sand
	S-8	30.0-32.0	240	Sand
TB109	S-1	0-5.0	3	Solid waste at 2'; water at 20'
	S-2	5.0-7.8	6/1	Solid waste
	S-3	9.0-11.0	12.5	Solid waste
	S-4	11.0-15.0	7.8	Solid waste
	S-5	15.0-20.0	11.5	Solid waste
	S-6	20.0-25.0	178	Solid waste
	S-7	25.0-30.0	122/0.5	Sand/silt at 28.5'
	S-8	30.0-33.0	6.5	Sand
	S-9	35.0-39.0	0.4	Sand
TB112	S-1	0-5.0	0/3.5	Solid waste at 1.2'; no water
	S-2	5.0-10.0	28	Solid waste, oily
	S-3	10.5-15.0	34	Sand
	S-4	15.0-20.0	24	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB114	S-1	1.0-1.8	0.2	Fill; water at 24'
	S-2	3.0-5.0	2.2	Solid waste
	S-3	5.0-5.7	2.5	Solid waste
	S-4	7.0-10.0	4.5	Solid waste
	S-5	10.0-15.0	5.0	Solid waste
	S-6	15.0-20.0	13	Solid waste
	S-7	20.0-23.9	32	Solid waste/sand; petroleum odor
	S-8	25.0-30.0	0.6	Sand
TB116	S-1	0-5.0	0.1	Solid waste at 2'; water at 14'
	S-2	5.0-5.7	13.4	Solid waste
	S-3	7.0-7.8	15	Solid waste
	S-4	8.0-8.4	4	Solid waste
	S-5	10.0-10.4	38	Solid waste
	S-6	13.0-15.0	60	Solid waste
	S-7	15.0-20.0	118	Solid waste; solvent odor
	S-8	20.0-25.0	130	Solid waste; solvent odor
TB116A	S-1	20.0-25.0	10	Solid waste; water at 28'
	S-2	25.0-29.1	72	Solid waste at 27'
	S-3	30.0-30.7	25	Sand
	S-4	32.0-35.0	15	Sand
	S-5	35.0-40.0	ND	Sand
TB118	S-1	0-5.0	1.2	Solid waste at 1.5'; no water
	S-2	5.0-10.0	6	Solid waste
	S-3	10.0-15.0	1.5	Sand at 12.5'
	S-4	15.0-20.0	0.9	Sand
	S-5	20.0-23.0	1.4	Sand; no water
TB124	S-1	0-5.0	ND	Water at 22.5'; sand
	S-2	5.0-6.2	ND	Solid waste
	S-3	7.0-10.0	54	Solid waste; slight petroleum odor
	S-4	10.0-15.0	9	Solid waste; slight petroleum odor
	S-5	15.0-20.0	7.2	Solid waste
	S-6	20.0-21.4	0.2	Sand at 20.5'
	S-7	23.0-25.0	ND	Sand
	S-8	25.0-30.0	0.3	Sand
	S-9	30.0-32.0	--	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
SOUTHERN AREA				
TB121	S-1	1.0-4.3	2	Fill
	S-2	5.0-10.0	5.5	Solid waste
	S-3	10.0-11.5	1.2	Solid waste
	S-4	12.0-14.3	2.6	Solid waste
	S-5	15.0-16.4	1	Solid waste
	S-6	17.0-19.1	3.6	Solid waste
	S-7	20.0-25.0	20/20	Solid waste
	S-8	25.0-30.0	4.8	Solid waste
	S-9	30.0-35.0	1	Sand
	S-10	35.0-40.0	0.6	Sand
TB126	S-1	0-5.0	0.1/2.2	Solid waste at 3.5'; water at 13.5'
	S-2	5.0-5.1	--	Solid waste
	S-3	6.0-10.0	--	Solid waste
	S-4	10.0-13.3	11.6	Solid waste
	S-5	15.0-15.7	65	Solid waste
	S-6	17.0-20.0	--	Solid waste
	S-7	20.0-22.9	320	Silt at 22'
	S-8	24.0-29.0	4	Sand at 25'
	S-9	29.0-32.0	6.5	Sand
TB128	S-1	0-5.0	1	Solid waste at 3'; water at 12.5'
	S-2	5.0-10.0	32	Solid waste
	S-3	10.0-15.0	12	Sand at 14.5'
	S-4	15.0-17.1	3	Sand
	S-5	18.0-18.7	1.5	Sand
	S-6	20.0-25.0	1.5	Sand
TB129	S-1	0-5.0	1	Solid waste at 4'; water at 8.5'
	S-2	5.0-6.3	3	Solid waste
	S-3	7.0-10.0	7.2	Solid waste
	S-4	10.0-10.3	8.5	Sand fill
	S-5	15.0-20.0	11	Solid waste
	S-6	20.0-25.0	16	Solid waste
	S-7	25.0-30.0	20/12	Peat at 29'
	S-8	30.0-35.0	0.2	Peat
	S-9	35.0-40.0	0.4	Silt

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-1
PID HEADSPACE SCREENING
POST-SCREENING TASK 1 BORINGS
Old Southington Landfill Superfund Project
Southington, Connecticut

BORING NO.	SAMPLE NO.	DEPTH (feet)	PID READING (ppm)	COMMENTS
TB130	S-1	0-5.0	3	Solid waste at 3.5'; water at 10'
	S-2	5.0-8.3	7	Solid waste
	S-3	10.0-15.0	3.8	Solid waste
	S-4	15.0-20.0	--	Solid waste
	S-5	20.0-25.0	5	Solid waste
	S-6	25.0-28.8	1.9	Peat at 28.8'
	S-7	30.0-35.0	1.9	Peat
	S-8	35.0-40.0	--	Sand
TB132	S-1	0-5.0	ND	Solid waste at 2.5'; water at 8.5'
	S-2	5.0-6.3	0.6	Solid waste
	S-3	8.0-10.0	ND	Solid waste; petroleum-like odor
	S-4	10.0-15.0	8.1	Solid waste; petroleum-like odor
	S-5	15.0-20.0	2	Solid waste; petroleum-like odor
	S-6	20.0-25.0	1	Solid waste; petroleum-like odor
	S-7	25.0-30.0	ND	Peat
	S-8	30.0-35.0	ND	Sand
TB133	S-1	0-4.0	ND	Sand; water at 3'
	S-2	4.0-8.0	2.8/0.4	Solid waste at 5'
	S-3	8.0-8.8	1.5/0.2	Solid waste
	S-4	10.0-10.5	--	Solid waste
	S-5	12.0-16.0	0.5	Peat at 14-17'
	S-6	16.0-20.0	2	Sand
	S-7	20.0-24.0	3.8-0.2	Sand/silt
TB136	S-1	0-4.7	2.2/0.2	Solid waste at 3'; water at 13'
	S-2	5.0-10.0	--	Solid waste
	S-3	10.0-13.5	3.5	Solid waste
	S-4	15.0-19.3	3/0.2	Peat, trace solid waste to 18'
	S-5	20.0-25.0	3.4	Sand
	S-6	25.0-30.0	4	Sand
TB137	S-1	0-5.0	ND	Solid waste at 3'; no water
TB137A	S-1	4.0-8.0	10.8	Solid waste; water at 12'
	S-2	8.0-12.0	22	Solid waste
	S-3	12.0-16.0	48	Sand; petroleum odor
	S-4	16.0-20.0	7	Sand; petroleum odor
	S-5	20.0-24.0	22	Sand
TB137A	S-6	24.0-28.0	10.3	Peat
	S-7	28.0-32.0	3.2	Sand
	S-8	32.0-36.0	4.8	Sand
	S-9	36.0-38.0	2.3	Sand

Note:
ND = Not Detected

File:pratt\ritab\tbl3-1.wr1

TABLE 3-2
ACTUAL TIME- DRAWDOWN DATA, MW-5 PUMPING TEST
Old Southington Landfill Superfund Project
Southington, Connecticut

The measurement history is:

Msmt.#	Elapsed Time (min's)	CW20 drawdown(1) (feet)	Elapsed Time (min's)	CW15 drawdown(2) (feet)	Elapsed Time (min's)	LW103S drawdown(3) (feet)	Elapsed Time (min's)	LW103M drawdown(4) (feet)	Elapsed Time (min's)	LW103D drawdown(5) (feet)	Elapsed Time (min's)	LW15M drawdown(6) (feet)	Elapsed Time (min's)	LW15D drawdown(7) (feet)	Elapsed Time (min's)	LW15S drawdown(8) (feet)	Elapsed Time (min's)	TW18 drawdown(9) (feet)
1	63.00	1.53	63	0.58	68	0.08	68	0.10	69	0.16	74	0.04	74	0.05	75	0.04	79	0.01
2	186.00	1.69	187	0.56	192	0.17	192	0.18	194	0.25	197	0.07	197	0.06	198	0.07	202	0.02
3	300.00	1.78	313	0.29	313	0.25	312	0.27	313	0.30	315	0.10	315	0.07	316	0.06	322	0.04
4	425.00	1.87	439	0.81	432	0.31	432	0.28	433	0.36	438	0.12	437	0.11	439	0.13	444	0.12
5	540.00	1.84	551	0.63	545	0.30	545	0.31	546	0.39	551	0.12	551	0.10	553	0.12	564	0.12
6	666.00	1.95	670	0.15	673	0.38	674	0.37	677	0.46	682	0.16	681	0.16	683	0.14	688	0.12
7	1208.00	2.03	1211	0.61	1212	0.54	1214	0.52	1215	0.62	1220	0.36	1219	0.34	1220	0.34	1225	0.22
8	1325.00	2.03	1333	1.06	1335	0.56	1336	0.57	1336	0.64	1340	0.38	1340	0.36	1341	0.40	1346	0.24
9	1438.00	2.18	1445	1.12	1447	0.60	1447	0.59	1448	0.66	1452	0.41	1451	0.43	1453	0.40	1457	0.27
10	1561.00	2.23	1564	1.07	1566	0.63	1566	0.62	1568	0.70	1573	0.44	1571	0.42	1574	0.44	1579	0.27
11	1681.00	2.16	1683	1.10	1684	0.66	1684	0.66	1685	0.74	1687	0.55	1687	0.53	1688	0.48	1695	0.32
12	1800.00	2.28	1803	1.14	1805	0.67	1806	0.71	1809	0.77	1812	0.48	1811	0.46	1814	0.45	1818	0.35
13	1934.00	2.33	1937	0.98	1940	0.73	1940	0.73	1940	0.79	1945	0.50	1945	0.48	1947	0.45	1952	0.41
14	2060.00	2.39	2065	1.31	2068	0.78	2068	0.76	2069	0.83	2073	0.55	2073	0.53	2075	0.58	2079	0.38
15	2760.00	2.28	2762	1.43	2764	0.89	2765	0.89	2766	1.02	2769	0.64	2768	0.63	2770	0.67	2775	0.60
16	2881.00	2.37	2884	1.47	2886	0.91	2887	0.89	2888	0.99	2891	0.66	2890	0.65	2892	0.68	2896	0.48
17	3006.00	2.33	3009	1.41	3011	0.90	3011	0.92	3012	0.95	3015	0.67	3015	0.67	3016	0.70	3020	0.48
18	3112.00	2.35	3115	1.26	3117	0.93	3118	0.95	3119	1.00	3122	0.69	3121	0.65	3122	0.70	3126	0.48
19	3241.00	2.38	3244	1.42	3245	0.93	3251	0.96	3252	1.02	3251	0.70	3250	0.65	3252	0.67	3257	0.51
20	3361.00	2.51	3364	1.55	3366	0.96	3367	1.01	3368	1.10	3372	0.68	3371	0.65	3372	0.80	3377	0.58
21	3487.00	2.52	3490	1.47	3493	1.00	3493	0.99	3495	1.03	3498	0.71	3498	0.69	3499	0.72	3504	0.54
22	4083.00	2.32	4087	1.27	4089	1.02	4089	1.02	4090	1.09	4094	0.72	4093	0.70	4095	0.74	4099	0.58
23	4202.00	2.35	4205	1.56	4207	1.04	4208	1.01	4209	1.09	4213	0.73	4212	0.70	4214	0.75	4217	0.60
24	4322.00	2.61	4326	1.58	4328	1.05	4329	1.04	4331	1.11	4335	0.76	4334	0.74	4335	0.74	4341	0.60

File:pratt\ritab\actime.wr1

TABLE 3-2
ACTUAL TIME– DRAWDOWN DATA, MW–5 PUMPING TEST
Old Southington Landfill Superfund Project
Southington, Connecticut

The measurement history is:

Msmt.#	Elapsed Time (min's)	TW17 drawdown(10) (feet)	Elapsed Time (min's)	LW17D drawdown(11) (feet)	Elapsed Time (min's)	GZ4S drawdown(12) (feet)	Elapsed Time (min's)	GZ4M drawdown(13) (feet)	Elapsed Time (min's)	GZ4D drawdown(14) (feet)
1	82	0.01	83	0.01	91	–0.03	92	–0.05	93	–0.04
2	205	0.02	206	0.03	214	0.01	216	0.00	218	0.01
3	326	0.04	327	0.02	337	0.09	339	0.02	340	0.04
4	446	0.05	448	0.05	457	0.06	458	0.00	459	0.05
5	568	0.05	564	0.07	580	–0.03	582	0.02	585	0.03
6	693	0.09	693	0.05	705	0.04	707	0.02	707	0.07
7	1227	0.17	1229	0.14	1236	0.09	1237	0.06	1238	0.09
8	1349	0.17	1350	0.14	1358	0.12	1358	0.08	1359	0.09
9	1460	0.21	1461	0.18	1469	0.12	1470	0.12	1471	0.14
10	1581	0.22	1582	0.19	1589	0.13	1590	0.11	1591	0.12
11	1697	0.23	1698	0.20	1708	0.17	1709	0.15	1709	0.20
12	1822	0.25	1824	0.25	1834	0.17	1835	0.13	1835	0.17
13	1954	0.21	1956	0.26	1965	0.20	1965	0.20	1967	0.20
14	2082	0.30	2083	0.26	2094	0.22	2095	0.15	2096	0.21
15	2777	0.36	2778	0.34	2784	0.21	2785	0.20	2786	0.18
16	2898	0.35	2900	0.30	2907	0.23	2908	0.22	2909	0.24
17	3023	0.34	3024	0.32	3032	0.22	3033	0.19	3034	0.21
18	3130	0.39	3131	0.35	3139	0.29	3140	0.19	3141	0.21
19	3260	0.40	3261	0.37	3269	0.32	3270	0.24	3271	0.24
20	3380	0.40	3381	0.41	3390	0.28	3391	0.21	3391	0.31
21	3507	0.43	3508	0.38	3516	0.31	3517	0.28	3518	0.30
22	4101	0.43	4102	0.39	4108	0.29	4110	0.27	4110	0.30
23	4220	0.54	4221	0.40						
24	4340	0.54	4340	0.40	4353	0.32	4354	0.28	4355	0.29

File:pratt\rtab\actime.wr1

TABLE 3-3
INTERPOLATED DRAWDOWN, MW5 PUMPING TEST
Old Southington Landfill Superfund Project
Southington, Connecticut

RI
Revision: 0
Date: 4/12/93

The measurement history is:

Msmt.#	Elapsed Time (min's)	CW20 drawdown(1) (feet)	CW15 drawdown(2) (feet)	LW103S drawdown(3) (feet)	LW103M drawdown(4) (feet)	LW103D drawdown(5) (feet)	LW15M drawdown(6) (feet)	LW15D drawdown(7) (feet)	LW15S drawdown(8) (feet)	TW18 drawdown(9) (feet)	TW17 drawdown(10) (feet)	LW17D drawdown(11) (feet)	GZ4S drawdown(12) (feet)	GZ4M drawdown(13) (feet)	GZ4D drawdown(14) (feet)
1	76.71	1.55	0.58	0.09	0.11	0.17	0.04	0.05	0.04	0.01	0.01	0.01	-0.03	-0.04	-0.03
2	200.30	1.70	0.53	0.18	0.19	0.25	0.07	0.06	0.07	0.02	0.02	0.03	0.01	-0.01	0.00
3	320.60	1.79	0.32	0.25	0.27	0.30	0.10	0.07	0.06	0.04	0.04	0.02	0.08	0.02	0.04
4	441.90	1.87	0.81	0.31	0.28	0.36	0.12	0.11	0.13	0.12	0.05	0.05	0.06	0.00	0.05
5	558.90	1.86	0.60	0.31	0.32	0.40	0.12	0.10	0.12	0.12	0.05	0.07	-0.01	0.02	0.03
6	685.60	1.95	0.16	0.38	0.37	0.46	0.18	0.16	0.14	0.12	0.09	0.05	0.03	0.02	0.06
7	1222.00	2.03	0.65	0.54	0.52	0.62	0.36	0.34	0.34	0.22	0.17	0.14	0.09	0.06	0.09
8	1343.00	2.05	1.07	0.56	0.57	0.64	0.38	0.36	0.40	0.24	0.17	0.14	0.12	0.08	0.09
9	1455.00	2.19	1.12	0.60	0.59	0.66	0.41	0.43	0.40	0.27	0.21	0.18	0.12	0.11	0.13
10	1575.00	2.22	1.07	0.63	0.62	0.70	0.44	0.42	0.44	0.27	0.22	0.19	0.13	0.11	0.12
11	1693.00	2.17	1.10	0.66	0.66	0.74	0.55	0.53	0.48	0.32	0.23	0.20	0.16	0.14	0.19
12	1816.00	2.29	1.12	0.68	0.71	0.77	0.48	0.46	0.45	0.35	0.25	0.25	0.17	0.13	0.17
13	1949.00	2.34	1.01	0.73	0.73	0.79	0.50	0.48	0.45	0.41	0.21	0.26	0.20	0.19	0.20
14	2077.00	2.39	1.31	0.78	0.76	0.83	0.55	0.53	0.58	0.38	0.30	0.26	0.22	0.16	0.21
15	2772.00	2.29	1.43	0.89	0.89	1.02	0.64	0.63	0.67	0.60	0.36	0.34	0.21	0.20	0.18
16	2894.00	2.37	1.47	0.91	0.89	0.99	0.66	0.65	0.68	0.48	0.35	0.30	0.23	0.22	0.23
17	3019.00	2.33	1.40	0.90	0.92	0.95	0.67	0.67	0.70	0.48	0.34	0.32	0.22	0.19	0.21
18	3125.00	2.35	1.27	0.93	0.95	1.00	0.69	0.65	0.70	0.48	0.39	0.35	0.28	0.19	0.24
19	3255.00	2.40	1.43	0.93	0.96	1.02	0.70	0.65	0.67	0.51	0.40	0.37	0.32	0.23	0.30
20	3375.00	2.51	1.54	0.96	1.01	1.10	0.68	0.65	0.80	0.58	0.40	0.41	0.28	0.21	0.30
21	3502.00	2.52	1.47	1.00	0.99	1.03	0.71	0.69	0.72	0.54	0.43	0.38	0.31	0.27	0.30
22	4096.00	2.32	1.29	1.02	1.02	1.09	0.72	0.70	0.74	0.58	0.43	0.39	0.29	0.27	0.30
23	4212.00	2.37	1.56	1.04	1.01	1.09	0.73	0.70	0.75	0.60	0.53	0.40	0.30	0.28	0.30
24	4337.00	2.61	1.58	1.05	1.04	1.11	0.76	0.74	0.74	0.60	0.54	0.40	0.32	0.28	0.29

File:pratt\ritab\meashist.wr1

TABLE 3-4
CORRECTED INTERPOLATED LATE-TIME DRAWDOWN, MW5 PUMPING TEST
Southington Landfill Superfund Project
Southington, Connecticut

RI
Revision: 0
Date: 4/12/93

The measurement history is:

Msmt.#	Elapsed Time (min's)	b=60 ft. CW15 drawdown(2) (feet)	b=70 ft. LW103S drawdown(3) (feet)	b=70 ft. LW103M drawdown(4) (feet)	b=70 ft. LW103D drawdown(5) (feet)	b=100 ft. LW15M drawdown(6) (feet)	b=100 ft. LW15D drawdown(7) (feet)	b=100 ft. LW15S drawdown(8) (feet)	b=85 ft. TW18 drawdown(9) (feet)	b=120 ft. TW17 drawdown(10) (feet)	b=120 ft. LW17D drawdown(11) (feet)	b=135 ft. GZ4S drawdown(12) (feet)	b=135 ft. GZ4M drawdown(13) (feet)	b=135 ft. GZ4D drawdown(14) (feet)
7	1222.21	0.65	0.54	0.52	0.62	0.36	0.34	0.34	0.22	0.17	0.14	0.09	0.06	0.09
8	1343.29	1.06	0.56	0.57	0.64	0.38	0.36	0.40	0.24	0.17	0.14	0.12	0.08	0.09
9	1454.93	1.11	0.60	0.59	0.66	0.41	0.43	0.40	0.27	0.21	0.18	0.12	0.11	0.13
10	1575.36	1.06	0.63	0.62	0.70	0.44	0.42	0.44	0.27	0.22	0.19	0.13	0.11	0.12
11	1692.50	1.09	0.66	0.66	0.74	0.55	0.53	0.48	0.32	0.23	0.20	0.16	0.14	0.19
12	1816.29	1.11	0.68	0.71	0.77	0.48	0.46	0.45	0.35	0.25	0.25	0.17	0.13	0.17
13	1949.07	1.00	0.73	0.73	0.79	0.50	0.48	0.45	0.41	0.21	0.26	0.20	0.19	0.20
14	2077.14	1.30	0.78	0.76	0.83	0.55	0.53	0.58	0.38	0.30	0.26	0.22	0.16	0.21
15	2772.07	1.41	0.88	0.88	1.01	0.64	0.63	0.67	0.60	0.36	0.34	0.21	0.20	0.18
16	2894.07	1.45	0.90	0.88	0.98	0.66	0.65	0.68	0.48	0.35	0.30	0.23	0.22	0.23
17	3018.64	1.38	0.89	0.91	0.94	0.67	0.67	0.70	0.48	0.34	0.32	0.22	0.19	0.21
18	3125.21	1.26	0.92	0.94	0.99	0.69	0.65	0.70	0.48	0.39	0.35	0.28	0.19	0.21
19	3255.29	1.41	0.92	0.95	1.01	0.70	0.65	0.67	0.51	0.40	0.37	0.32	0.23	0.24
20	3375.07	1.52	0.95	1.00	1.09	0.68	0.65	0.80	0.58	0.40	0.41	0.28	0.21	0.30
21	3501.64	1.45	0.99	0.98	1.02	0.71	0.69	0.72	0.54	0.43	0.38	0.31	0.27	0.30
22	4096.43	1.28	1.01	1.01	1.08	0.72	0.70	0.74	0.58	0.43	0.39	0.29	0.27	0.30
23	4212.29	1.54	1.03	1.00	1.08	0.73	0.70	0.75	0.60	0.53	0.40	0.30	0.28	0.30
24	4337.36	1.56	1.04	1.03	1.10	0.76	0.74	0.74	0.60	0.54	0.40	0.32	0.28	0.29

b = aquifer thickness
File:pratt\rltab\corrhist.wr1

TABLE 3-5
FLOW TEST HYDRAULIC CONDUCTIVITY AND TRANSMISSIVITY
Old Southington Landfill Superfund Project
Southington, Connecticut

WELL	z (feet)	t (min)	t (days)	Q (gpm)	Q(ft3/day)	B (feet)	D(feet)	L (feet)	s (feet)	s* (feet)	K (ft/day)	R (feet)	T (gpd/ft)	Tcj (gpd/ft
302B	60.40	20	0.01389	2.3	433	130	55.40	65.40	1.91	1.88	12.7	82	12	5400
302C	124.80	13	0.00903	6.0	1155	130	119.80	129.80	9.62	9.26	7.3	50	7100	6600
303B	60.88	5	0.00347	6.5	1251	130	55.88	65.88	1.18	1.17	59.3	89	58000	
303C	127.56	9	0.00625	3.0	578	130	122.56	132.56	8.61	8.33	3.8	30	3700	
304B	43.35	18	0.01250	4.0	770	130	38.35	48.35	1.27	1.25	34.5	129	34000	
304C	82.98	7	0.00486	4.0	770	130	77.98	87.98	4.37	4.26	9.6	42	9300	
304D	123.58	27	0.01875	2.7	520	130	118.58	128.58	3.49	3.44	9	80	8700	
306B	79.45	21.7	0.01507	3.5	674	140	74.45	84.45	3.74	3.66	10.2	80	11000	1620
306C	142.00	20	0.01389	3.0	578	140	137.00	147.00	0.52	0.52	71.7	203	75000	
308A	5.70	10	0.00694	4.6	886	95	0.00	11.40	0.30	0.30	173	184	123000	
308B	40.42	3.5	0.00243	2.6	501	95	35.42	45.42	0.30	0.30	92.2	79	66000	
308C	83.67	48	0.03333	0.4	77	95	78.67	88.67	8.47	8.07	4.7	66	3300	
309A	2.62	13	0.00903	12.5	2406	85	0.00	5.24	1.51	1.29	195.4	211	124000	13800
309B	39.54	10	0.00694	7.0	1348	85	34.29	44.29	0.89	0.88	85.7	122	54000	
309C	76.43	86	0.05972	0.6	120	85	71.43	81.43	10.93	10.20	0.61	30	390	
GZ1	17.48	11	0.00764	2.0	385	40	7.48	27.48	0.32	0.32	38	59	114000	
GZ2	22.21	9	0.00625	1.7	327	50	12.21	32.21	1.08	1.06	8.6	28	3200	
GZ4S	15.40	5	0.00347	6.0	1155	135	5.40	25.40	2.23	2.13	16.6	48	17000	
GZ4M	56.71	13	0.00903	9.0	1733	135	46.71	66.71	1.40	1.39	40.9	122	41000	
GZ4D	101.59	61	0.04236	2.0	385	135	91.59	111.59	26.64	23.46	0.46	28	460	150
GZ5M	35.56	13	0.00903	2.8	529	120	30.56	40.56	1.78	1.74	16.7	73	15000	
GZ5D	101.21	72	0.05000	3.0	578	120	96.21	106.21	33.41	28.16	1.1	44	980	
GZ7M	57.60	14	0.00972	9.0	1733	100	52.60	62.60	9.90	9.12	10.4	55	7800	750
GZ7D	127.09	7	0.00486	12.0	2310	100	122.09	132.09	0.65	0.65	231	182	173000	
GZ12M	42.05	24	0.01667	1.5	289	85	37.05	47.05	0.23	0.23	71.3	173	45000	
GZ12D	68.49	11	0.00764	2.5	481	85	63.49	73.49	13.77	12.48	1.9	19	1200	13500
GZ13M	65.75	14	0.00972	2.0	385	135	60.75	70.75	0.57	0.57	37.9	121	38000	
GZ13D	128.03	17	0.01181	3.0	578	135	123.03	133.03	0.91	0.91	38.6	135	39000	9900
GZ14M	55.85	9	0.00625	2.0	385	115	50.85	60.85	2.09	2.05	10	46	8600	
GZ14D	105.07	24	0.01667	2.0	385	115	100.07	110.07	5.33	5.20	4	48	3500	
GZ17M	40.35	9	0.00625	9.0	1733	120	35.35	45.35	6.44	5.98	15.7	59	14000	
GZ17D	80.30	12	0.00833	3.5	674	120	75.30	85.30	6.08	5.86	6.1	43	5500	
LW15D	67.62	18	0.01250	3.0	578	100	42.62	92.62	0.28	0.28	31.2	107	23000	
LW15S	10.88	13	0.00903	9.0	1733	100	0.88	20.88	3.78	3.44	16.7	67	12000	
MW5	44.70	4320	3.00000	654.0	125904	52.2	37.20	52.20	12.73	11.18	482	4730	188000	

File:pratt\rtab\new.wr1

TABLE 3-6
BOUWER AND RICE SLUG TEST ANALYSIS RESULTS AND PARAMETERS
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	L (ft)	H (ft)	D (ft)	A	B	t (min)	y_o (ft)	y_t (ft)	K (ft/day)
B1	2.90	2.90	120.00	1.80	0.25	0.130	0.45	0.066	33.0
B2	2.88	2.88	130.00	1.80	0.25	9.500	0.55	0.141	0.32
B3	10.22	10.22	135.00	2.60	0.50	0.117	0.12	0.009	24.0
B4	4.76	4.76	135.00	2.10	0.35	30.000	0.86	0.170	0.09
B301	6.99	6.99	120.00	2.25	0.40	0.167	1.80	0.340	13.8
B302A	8.88	8.88	130.00	2.50	0.40	0.330	1.30	0.274	5.7
B303A	8.36	8.36	130.00	2.50	0.40	0.100	1.10	0.028	45.8
B304A	9.13	9.13	130.00	2.50	0.40	0.083	1.10	0.198	24.7
B305	6.19	6.19	130.00	2.20	0.40	0.330	01.20	0.302	6.1
B306A	5.87	5.87	140.00	2.20	0.40	0.083	0.93	0.009	83.5
B307	5.45	5.45	140.00	2.20	0.40	0.033	0.90	0.122	93.4
GZ5S	4.47	4.47	120.00	2.10	0.35	2.500	0.70	0.094	1.4
GZ7S	9.59	9.59	100.00	2.50	0.40	0.042	0.81	0.198	39.3
GZ13S	3.48	3.48	135.00	1.90	0.30	0.050	0.39	0.018	123.0
GZ14S	3.70	3.70	115.00	1.90	0.30	0.075	0.47	0.151	29.6
TB7S	9.77	9.77	140.00	2.60	0.50	0.083	0.60	0.066	29.5

RI
Revision: 0
Date: 4/12/93

TABLE 3-7
WATER LEVEL ELEVATION DATA
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Depth S = Shallow M = Medium D = Deep	Easting	Northing	Ground Elevation (ft)	Top of PVC/Gauge Well Casing Elevation (ft)	Screened Interval: Elevation (ft)	Screen Interval in feet below land surface	Depth to Water (ft) 9/18/92	Water Level Elevation (ft) 9/18/92	Depth to Water (ft) 11/18/92	Water Level Elevation (ft) 11/18/92	Depth to Water (ft) 1/04/93	Water Level Elevation (ft) 1/04/93
B-1	S	563765.54	272992.35	153.31	153.31	145.31 - 150.31	3.00 - 8.00			6.45	146.86	6.38	146.93
B-2	S	563677.67	272832.32	158.55	158.55	145.55 - 155.55	3.00 - 13.00			11.54	147.01	11.45	147.10
B-3	S	563706.74	272692.36	160.03	160.03	137.03 - 157.03	3.00 - 23.00			13.10	146.93	12.60	147.43
B-4	S	563757.98	272493.77	167.95	167.95	147.95 - 164.95	3.00 - 20.00	19.98	147.97	20.26	147.69	18.98	148.97
B204	S	563704.16	271895.65	177.88	179.64	135.88 - 150.88	27.00 - 42.00			36.65	142.99	34.99	144.65
B301	S	563648.69	273009.84	155.29	154.99	134.29 - 149.29	6.00 - 21.00	11.02	143.97	11.50	143.49	10.77	144.22
B302A	S	563539.46	272894.65	158.95	160.67	131.95 - 146.95	12.00 - 27.00	17.25	143.42	17.74	142.93	16.89	143.78
B302B	M	563531.69	272890.85	158.65	160.20	71.65 - 81.65	77.00 - 87.00	16.46	143.74	16.95	143.25	16.14	144.06
B302C	D	563537.14	272898.78	158.95	161.17	11.45 - 21.45	137.50 - 147.50	17.39	143.78	17.87	143.30	17.05	144.12
B303A	S	563502.68	272720.18	162.45	164.21	133.45 - 148.45	14.00 - 29.00	20.78	143.43	21.26	142.95	20.41	143.80
B303B	M	563500.41	272713.27	162.90	164.98	75.90 - 85.90	77.00 - 87.00	21.00	143.98	21.52	143.46	20.72	144.26
B303C	D	563497.17	272707.20	163.00	164.81	9.00 - 19.00	144.00 - 154.00	21.13	143.68	21.65	143.16	20.87	143.94
B304A	S	563495.62	272544.43	173.40	174.91	133.40 - 148.40	25.00 - 40.00	31.32	143.59	31.94	142.97	31.12	143.79
B304B	M	563484.77	272540.02	173.60	174.76	93.60 - 103.60	70.00 - 80.00	31.06	143.70	31.61	143.15	30.80	143.96
B304C	D	563484.04	272534.52	173.80	175.05	53.80 - 63.80	110.00 - 120.00	31.29	143.76	31.84	143.21	31.05	144.00

File:pratt\ritab\geoff.wr1

TABLE 3-7
WATER LEVEL ELEVATION DATA
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Depth S = Shallow M = Medium D = Deep	Easting	Northing	Ground Elevation (ft)	Top of PVC/Gauge Well Casing Elevation (ft)	Screened Interval: Elevation (ft)	Screen Interval in feet below land surface	Depth to Water (ft) 9/18/92	Water Level Elevation (ft) 9/18/92	Depth to Water (ft) 11/18/92	Water Level Elevation (ft) 11/18/92	Depth to Water (ft) 1/04/93	Water Level Elevation (ft) 1/04/93
B304D	D	563484.25	272531.29	173.90	175.61	12.90 - 22.90	151.00 - 161.00	31.85	143.76	32.40	143.21	31.61	144.00
B305	S	563503.99	272450.58	173.55	176.13	132.55 - 147.55	26.00 - 41.00	32.24	143.89	32.96	143.17	32.16	143.97
B306A	S	563471.90	272030.35	174.86	176.71	133.86 - 148.86	26.00 - 41.00	32.40	144.31	33.18	143.53	32.46	144.25
B306B	M	563466.27	272031.89	174.74	176.95	57.74 - 67.74	107.00 - 117.00	32.12	144.83	32.85	144.10	32.21	144.74
B306C	D	563460.74	272034.23	174.69	176.42	-5.31 - 4.69	170.00 - 180.00	32.63	143.79	33.25	143.17	32.53	143.89
B307	S	563438.80	272134.84	176.59	176.59	135.59 - 151.09	25.50 41.00			32.75	143.84	32.07	144.52
B308A	S	562609.12	272581.09	155.30	157.28	129.80 - 144.80	10.50 25.50			15.54	141.74	14.69	142.59
B308B	M	562608.18	272573.54	155.80	157.75	94.30 - 104.30	51.50 61.50			16.07	141.68	15.22	142.53
B308C	D	562607.75	272565.42	156.00	157.89	51.30 - 61.30	94.70 104.70			16.03	141.86	15.22	142.67
B309A	S	562881.80	272938.12	150.80	152.41	135.30 - 145.30	5.50 15.50			10.25	142.16	9.37	143.04
B309B	M	562881.80	272945.67	150.40	152.34	95.40 - 105.90	44.50 55.00			10.18	142.16	9.31	143.03
B309C	D	562884.79	272952.02	150.10	152.42	58.10 - 68.60	81.50 92.00			10.16	142.26	9.33	143.09
CW15	M	563046.26	273615.01	145.90	146.65	94.00 - 96.00	49.90 51.90			4.52	142.13	3.80	142.85
GZ-1	S	564661.74	271755.93	209.05	208.57	122.55 - 142.55	66.50 - 86.50	58.74	149.83	59.47	149.10	59.67	148.90
GZ-2	S	563505.34	270995.39	204.19	204.07	114.19 - 134.19	70.00 - 90.00	57.81	146.26	58.64	145.43	58.57	145.50

File:pratt\ritab\geofl.wr1

TABLE 3-7
WATER LEVEL ELEVATION DATA
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Depth S = Shallow M = Medium D = Deep	Easting	Northing	Ground Elevation (ft)	Top of PVC/Gauge Well Casing Elevation (ft)	Screened Interval: Elevation (ft)	Screen Interval in feet below land surface	Depth to Water (ft) 9/18/92	Water Level Elevation (ft) 9/18/92	Depth to Water (ft) 11/18/92	Water Level Elevation (ft) 11/18/92	Depth to Water (ft) 1/04/93	Water Level Elevation (ft) 1/04/93
GZ-3	S	564590.22	273586.26	155.31	155.01	130.31 - 145.31	10.00 - 25.00			9.49	145.52	8.67	146.34
GZ-4S	S	563583.47	272666.51	161.07	161.01	118.07 - 138.07	23.00 - 43.00	17.62	143.39	18.13	142.88	17.31	143.70
GZ-4M	M	563582.74	272662.46	162.08	162.08	77.08 - 97.08	65.00 - 85.00	17.55	144.53	18.72	143.36	17.94	144.14
GZ-4D	D	563582.26	272658.86	162.14	161.65	32.14 - 52.14	110.00 - 130.00	17.86	143.79	17.40	144.25	18.04	143.61
GZ-5S	S	563354.64	272439.95	163.15	165.13	139.15 - 149.15	14.00 - 24.00	21.35	143.78	21.98	143.15	21.21	143.92
GZ-5M	M	563357.23	272449.15	163.20	164.82	101.20 - 111.20	52.00 - 62.00	21.06	143.76	21.68	143.14	20.91	143.91
GZ-5D	D	563358.19	272459.22	162.75	164.61	35.75 - 45.75	117.00 - 127.00	20.80	143.81	21.38	143.23	20.61	144.00
GZ-7S	S	564063.97	272178.96	156.10	157.67	141.60 - 151.60	4.50 - 14.50	8.04	149.63	8.10	149.57	6.98	150.69
GZ-7M	M	564059.17	272179.86	156.10	157.65	80.60 - 90.60	65.50 - 75.50	12.92	144.73	13.54	144.11	12.81	144.84
GZ-7D	D	564053.31	272180.08	155.90	157.66	10.90 - 20.90	135.00 - 145.00	12.92	144.74	13.53	144.13	12.80	144.86
GZ-11S	S	563237.70	273844.81	148.60	150.77	125.60 - 135.60	13.00 - 23.00			7.02	143.75	7.68	143.09
GZ-11D	M	563232.30	273845.38	148.20	149.76	88.20 - 98.20	50.00 - 60.00			7.42	142.34	6.57	143.19
GZ-12M	M	563169.20	273129.68	156.45	157.97	94.45 - 104.45	52.00 - 62.00	14.97	143.00	15.37	142.60	14.50	143.47
GZ-12D	D	563176.79	273127.09	156.55	158.43	67.55 - 77.55	79.00 - 89.00	15.40	143.03	15.78	142.65	14.94	143.49
GZ-13S	S	563246.70	271853.94	179.40	181.44	141.40 - 151.40	28.00 - 38.00	36.58	144.86	37.38	144.06	37.87	143.57

s:\pratt\ritab\geoff.wr1

TABLE 3-7
WATER LEVEL ELEVATION DATA
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Depth S = Shallow M = Medium D = Deep	Easting	Northing	Ground Elevation (ft)	Top of PVC/Gauge Well Casing Elevation (ft)	Screened Interval: Elevation (ft)	Screen Interval in feet below land surface	Depth to Water (ft) 9/18/92	Water Level Elevation (ft) 9/18/92	Depth to Water (ft) 11/18/92	Water Level Elevation (ft) 11/18/92	Depth to Water (ft) 1/04/93	Water Level Elevation (ft) 1/04/93
GZ-13M	M	563238.73	271855.45	179.70	181.99	71.70 - 81.70	98.00 - 108.00	37.25	144.74	38.05	143.94	38.50	143.49
GZ-13D	D	563223.26	271859.43	180.40	182.40	8.40 - 18.40	162.00 - 172.00	38.97	143.43	39.61	142.79	38.88	143.52
GZ14S	S	562814.95	272126.05	176.95	178.29	140.95 - 150.95	26.00 - 36.00	34.10	144.19	34.88	143.41	34.33	143.96
GZ14M	M	562811.72	272128.92	176.45	178.21	81.45 - 91.45	85.00 - 95.00	34.15	144.06	34.91	143.30	34.31	143.90
GZ14D	D	562807.12	272131.75	176.15	178.00	31.15 - 41.15	135.00 - 145.00	34.94	143.06	35.58	142.42	34.82	143.18
GZ-17M	M	563572.97	273002.90	155.40	157.21	96.40 - 106.40	49.00 - 59.00	13.67	143.54	14.10	143.11	13.30	143.91
GZ-17D	D	563580.26	273001.16	155.60	157.34	56.60 - 66.60	89.00 - 99.00	13.73	143.61	14.17	143.17	13.37	143.97
LW-15S	S	563497.91	273222.39	149.71	149.71	122.21 - 142.21	7.50 - 27.50	6.45	143.26	6.84	142.87	5.98	143.73
LW-15M	M	563680.21	273401.66	149.57	149.57	90.57 - 120.57	29.00 - 59.00	6.25	143.32	6.68	142.89	5.76	143.81
LW-15D	D	563678.25	273393.79	149.73	149.61	50.73 - 100.73	49.00 - 99.00	6.26	143.35	6.67	142.94	5.79	143.82
LW-17D	D	563583.21	272999.47	155.70	158.12	55.70 - 115.70	40.00 - 100.00	13.73	144.39	12.98	145.14	12.19	145.93
LW-102D	D	563398.96	272047.01	176.20	175.91	95.20 - 125.20	51.00 81.00			32.13	143.78	31.92	143.99
LW-103S	S	563217.52	273546.71	151.00	153.50	119.70 - 144.90	6.10 31.30			10.95	142.55	10.09	143.41
LW-103M	M	563222.33	273571.85	151.00	152.88	96.50 - 116.20	34.80 54.50			10.33	142.55	9.48	143.40
LW-103D	D	563225.62	273600.14	142.51	153.32	62.31 - 81.51	61.00 80.20			10.81	142.51	9.95	143.37

File:pratt\rltab\gsoff.wr1

TABLE 3-7
WATER LEVEL ELEVATION DATA
Old Southington Landfill Superfund Project
Southington, Connecticut

Well No.	Depth S = Shallow M = Medium D = Deep	Easting	Northing	Ground Elevation (ft)	Top of PVC/Gauge Well Casing Elevation (ft)	Screened Interval: Elevation (ft)	Screen Interval in feet below land surface	Depth to Water (ft) 9/18/92	Water Level Elevation (ft) 9/18/92	Depth to Water (ft) 11/18/92	Water Level Elevation (ft) 11/18/92	Depth to Water (ft) 1/04/93	Water Level Elevation (ft) 1/04/93
TB-7S	S	563785.80	272332.67		161.28		5.50 - 15.50	9.06	152.22	8.57	152.71	7.97	153.31
TW17S	S	563580.41	273003.04	155.30	156.08	-- - 32.50		14.51	141.57	14.96	141.12	14.15	141.93
TW18	S	563174.36	273131.67	156.55	158.71	-- - 26.00		15.72	142.99	16.07	142.64	15.19	143.52

File:pratt\ritab\geoff.wr1

TABLE 3-8
BLACK POND PIEZOMETER WATER LEVEL AND SURFACE WATER ELEVATIONS
Old Southington Landfill Superfund Project
Southington, Connecticut

Piezometer Staff Gauge	Water Level Measurement	Easting	Northing	Pond Bottom Elevation (ft)	Elev. PVC	Screened Interval Elevation (ft)	Piezometer (Well Point) depth Below Pond Bottom	Depth to Water (ft) 8/31/92	Water Level Elevation 8/31/92	Ver. Flow Dir.	Depth to Water (ft) 9/18/92	Water Level Elevation 9/18/92	Ver. Flow Dir.	Depth to Water (ft) 10/16/92	Water Level Elevation 10/16/92	Ver. Flow Dir.	Depth to Water (ft) 11/18/92	Water Level Elevation 11/18/92	Ver. Flow Dir.	Depth to Water* (ft) 1/05/93	Water* Level Elevation 1/05/93	Ver. Flow Dir.
PZ-1	Groundwater	563953.27	273078.72	144.81	149.41	141.03 - 139.86	5.00	1.72	146.69	↓	2.80	146.61	↓	2.65	146.76	↑	2.60	146.81	↑	2.35	147.06	↓
PZO-1	Surface Water	563953.27	273078.72	144.81	149.41	—	-	1.83	146.58		1.81	146.60		2.63	146.78		2.50	146.91		2.36	147.05	
PZ-2	Groundwater	563871.57	273015.73	144.07	148.57	140.19 - 139.02	5.00	1.82	146.75	↓	1.85	146.72	↓	1.70	146.87	↓	1.80	146.77	↑	1.26	147.31	↓
PZO-2	Surface Water	563871.57	273015.73	144.07	148.57	—	-	2.01	146.56		1.97	146.60		1.82	146.75		1.64	146.93		1.51	147.06	
PZ-3	Groundwater	563803.26	272790.63	144.46	148.86	140.48 - 139.31	5.00	2.30	146.56	↑	2.28	146.58	↑	2.10	146.76	↓	2.05	146.81	↑	1.80	147.06	↓
PZO-3	Surface Water	563803.26	272790.63	144.46	148.86	—	-	2.08	146.78		2.26	146.60		2.12	146.74		1.85	147.01		1.81	147.05	
PZ-4	Groundwater	563935.37	272702.12	143.81	148.12	142.74 - 141.57	2.20	1.52	146.60	↓	1.57	146.55	↑	1.38	146.74	↑	1.33	146.79	↑	1.02	147.10	o
PZO-4	Surface Water	563935.37	272702.12	143.81	148.12	—	-	1.54	146.58		1.54	146.58		0.82	147.30		1.19	146.93		1.02	147.10	
PZ-5	Groundwater	564224.41	272678.15	144.89	148.34	138.34 - 137.17	6.50	1.81	146.53	↑	1.80	146.54	↑	1.65	146.69	↑	1.62	146.72	↑	1.30	147.04	↓
PZO-5	Surface Water	564224.41	272678.15	144.89	148.34	—	-	1.75	146.59		1.73	146.61		1.55	146.79		1.40	146.94		1.80	146.54	
PZ-6	Groundwater	564292.77	272876.02	144.85	148.03	138.03 - 136.86	6.50	1.42	146.61	↑	1.29	146.74	↓	1.20	146.83	↑	1.23	146.80	↑	0.61	147.42	↑
PZO-6	Surface Water	564292.77	272876.02	144.85	148.03	—	-	1.28	146.75		1.40	146.63		1.18	146.85		0.95	147.08		0.58	147.45	
PZ-7	Groundwater	564234.33	273251.65	145.68	150.18	141.80 - 140.63	4.00	3.34	146.84	↓	3.56	146.62	↓	3.35	146.83	↓	3.35	146.83	↑	2.98	147.20	↓
PZO-7	Surface Water	564234.33	273251.65	145.68	150.18	—	-	3.50	146.68		3.59	146.59		3.43	146.75		3.25	146.93		3.10	147.08	

* = Measurements taken when Black Pond was partially frozen.

wp51\pratt\ri\piezomet

TABLE 4-1
AIR QUALITY MONITORING SURVEY
MEASUREMENT RESULTS
Old Southington Landfill Superfund Project
Southington, Connecticut

LOCATION	PID (1)	CGI (2)	
		%LEL	%OXYGEN
AM-98	0.4	0	21
AM-99	ND	0	21
AM-100	ND	0	21
AM-101	0.8	0	21
AM-102	3.2	0	21
AM-103	1.0	0	21
AM-104	0.2	0	21
AM-105	0.6	0	21
AM-106	2.6	0	21
AM-107	1.0	0	21
AM-108	ND	0	21
AM-109	1.6	0	21
AM-110	1.0	0	21
AM-111	1.4	0	21
AM-112	0.6	0	21
AM-113	ND	0	21
AM-114	ND	0	21
AM-115	2.6	0	21
AM-116	3.0	0	21
AM-118	0.6	0	21
AM-119	0.2	0	21
AM-120	3.5	0	21
AM-121	ND	0	21
AM-122	1.4	0	21
AM-123	0.4	0	21
AM-124	0.2	0	21
AM-125	0.2	0	21
AM-126	ND	0	21
AM-127	ND	0	21
AM-128	ND	0	21
AM-129	ND	0	21
AM-130	ND	0	21
AM-131	0.5	0	21
AM-132	2.2	0	21
AM-133	3.2	0	21
AM-134	ND	0	21
AM-135	ND	0	21
AM-136	ND	0	21
AM-137	1.2	0	21
AM-138	3.0	0	21
AM-139	ND	0	21
AM-140	0.6	0	21
AM-141	ND	0	21
AM-142	0.6	0	21
AM-143	0.8	0	21
AM-144	ND	0	21
AM-145	1.4	0	21
AM-146	ND	0	21

File:pratt\ritab\table4-1.wr1

TABLE 4-1
AIR QUALITY MONITORING SURVEY
MEASUREMENT RESULTS
Old Southington Landfill Superfund Project
Southington, Connecticut

LOCATION	PID (1)	CGI (2) %LEL	CGI (2) %OXYGEN
AM-147	0.4	0	21
AM-148	0.4	0	21
AM-149	0.8	0	21
AM-150	ND	0	21
AM-151	ND	0	21
AM-152	3.8	0	21
AM-153	1.8	0	21
AM-154	ND	0	21
AM-155	ND	0	21
AM-156	0.4	0	21
AM-157	ND	0	21
AM-158	0.2	0	21
AM-159	ND	0	21
AM-160	2.2	0	21
AM-163	1.8	0	21
AM-164	0.6	0	21
AM-165	2.2	0	21
AM-166	ND	0	21
AM-167	ND	0	21
AM-168	2.8	0	21
AM-169	2.4	0	21
AM-170	2.0	0	21
AM-171	1.8	0	21
AM-172	1.0	0	21
AM-173	0.4	0	21
AM-174	0.4	0	21
AM-175	1.4	0	21
AM-176	2.4	0	21
AM-177	1.2	0	21
AM-178	ND	0	21
AM-179	ND	0	21
AM-180	0.4	0	21
AM-181	ND	0	21
AM-182	3.1	0	21
AM-183	1.2	0	21
AM-184	ND	0	21
AM-185	ND	0	21
AM-186	ND	0	21
AM-187	0.6	0	21
AM-188	2.2	0	21
AM-189	0.3	0	21
AM-190	ND	0	21
AM-191	0.2	0	21
AM-192	1.4	0	21
AM-193	ND	0	21
AM-194	1.8	0	21
AM-195	ND	0	21
AM-196	2.6	0	21

File:pratt\ritab\table4-1.wr1

TABLE 4-1
AIR QUALITY MONITORING SURVEY MEASUREMENT RESULTS
Old Southington Landfill Superfund Project
Southington, Connecticut

LOCATION	PID (1)	CGI (2)	
		%LEL	%OXYGEN
AM-197	1.2	0	21
AM-198	0.2	0	21
AM-199	0.2	0	21
AM-200	0.4	0	21
AM-201	0.4	0	21
AM-202	0.2	0	21
AM-203	2.0	0	21
AM-204	2.4	0	21
AM-205	2.4	0	21
AM-206	3.2	0	21
AM-207	1.2	0	21
AM-208	2.4	0	21
AM-209	1.2	0	21
AM-210	2.6	0	21
AM-212	ND	0	21
AM-213	ND	0	21
AM-214	2.0	0	21
AM-215	ND	0	21
AM-216	1.6	0	21
AM-217	0.4	0	21
AM-218	0.4	0	21
AM-219	0.4	0	21
AM-220	0.8	0	21
AM-221	3.6	0	21

File:pratt\ritab\table4-1.wr1

TABLE 4-2
SOIL GAS SURVEY RESULTS
COMBUSTIBLE GAS MEASUREMENTS
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample Number	Sample Date	Probe Depth (feet)	LEL%
SG1	7/8/92	8	>100
SG2	7/8/92	Refusal	--
SG3	7/8/92	6.5	>100
SG4	7/8/92	8	94
SG5	7/8/92	7.5	>100
SG6	7/9/92	8	>100
SG7	7/9/92	8	>100
SG8	7/9/92	6	>100
SG9	7/9/92	4.5	2
SG10	7/10/92	4.9	0
SG11	7/10/92	8	0
SG12	7/10/92	8	2
SG13	7/13/92	5	0
SG14	7/13/92	4	50
SG15	7/13/92	4	0
SG16	7/13/92	3.3	2
SG17	7/13/92	1.5	0
SG18	7/13/92	1.5	0
SG19	7/13/92	1.5	0
SG20	7/14/92	1.5	0
SG21	7/14/92	5	0
SG22	7/14/92	2.5	0
SG23	7/14/92	2.5	0
SG24	7/14/92	2.5	0
SG25	7/14/92	4.5	0
SG26	7/14/92	4.5	0
SG27	7/14/92	4.5	>100
SG28	7/14/92	4.5	6
SG29	7/14/92	8	>190
SG30	7/14/92	8	>200
SG31	7/14/92	8	10
SG32	7/15/92	8	>1000
SG33	7/15/92	8	>1000
SG34	7/15/92	6	>1000
SG35	7/15/92	8	1050
SG36	7/15/92	8	7
SG37	7/15/92	6.5	510
SG38	7/15/92	3.5	>1000
SG39	7/15/92	4	2
SG40	7/15/92	4	2
SG41	7/16/92	8	3

File:pratt\ritab\table4-2.wr1

TABLE 4-2
SOIL GAS SURVEY RESULTS
COMBUSTIBLE GAS MEASUREMENTS
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample Number	Sample Date	Probe Depth (feet)	LEL%
SG42	7/16/92	8	1
SG43	7/16/92	8	1
SG44	7/16/92	8	3
SG45	7/16/92	8	>2000
SG46	7/21/92	7.5	0
SG47	7/21/92	5.2	9
SG48	7/21/92	8	4
SG49	7/21/92	8	600
SG50	7/21/92	2.5	500
SG51	7/21/92	8	1080
SG52	7/21/92	3	68
SG53	7/21/92	8	360
SG54	7/21/92	8	250
SG55	7/21/92	8	240
SG56	7/21/92	8	1060
SG57	7/21/92	8	420
SG58	7/21/92	8	600
SG59	7/21/92	8	96
SG60	7/21/92	Refusal	--
SG61	7/22/92	5	110
SG62	7/22/92	5	256
SG63	7/22/92	5	1140
SG64	7/22/92	5	620
SG65	7/22/92	5	740
SG66	7/22/92	5	680
SG67	7/22/92	5	780
SG68	7/22/92	5	6
SG69	7/22/92	5	480
SG70	7/24/92	5	1100
SG71	7/24/92	5	300
SG72	7/24/92	5	340
SG73	7/24/92	5	37
SG74	7/24/92	5	0
SG75	7/24/92	5	140
SG76	7/24/92	5	340
SG77	7/24/92	5	800
SG78	7/24/92	5	540
SG79	7/24/92	5	520
SG80	7/27/92	5	10
SG81	7/27/92	5	1
SG82	7/27/92	5	80

File:pratt\ritab\table4-2.wr1

TABLE 4-2
SOIL GAS SURVEY RESULTS
COMBUSTIBLE GAS MEASUREMENTS
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample Number	Sample Date	Probe Depth (feet)	LEL%
SG83	7/27/92	5	14
SG84	7/27/92	5	100
SG85	7/27/92	5	1
SG86	7/27/92	5	100
SG87	7/27/92	2	1
SG88	7/27/92	2	1
SG89	7/27/92	1.5	1
SG90	8/12/92	5	0
SG91	8/12/92	5	97
SG92	8/12/92	5	1
SG93	8/12/92	5	1
SG94	8/13/92	5	310
SG95	8/13/92	2.5	0
SG96	8/20/92	5	2
SG97	8/20/92	5	1
SG98	8/20/92	5	1
SG99	8/20/92	5	1
SG100	8/20/92	5	240
SG101	8/20/92	5	460
SG102	8/20/92	5	5
SG103	8/20/92	5	27
SG104	8/20/92	5	3
SG105	8/20/92	5	1
SG106	8/20/92	5	0
SG107	8/20/92	5	0
SG108	8/20/92	5	0
SG109	8/20/92	5	460
SG110	8/20/92	5	1
SG111	8/20/92	5	35

File:pratt\ritab\table4-2.wr1

TABLE 4-3
SOIL GAS SURVEY RESULTS
VOC
Old Southington Landfill Superfund Project
Southington, Connecticut

SAMPLE #	1,2-DCE A(S)/A(ST)	BENZENE A(S)/A(ST)	TCE A(S)/A(ST)	TOLUENE A(S)/A(ST)
SG1	0.0	1.0	0.0	1.3
SG2	REFUSAL			
SG3	0.0	0.0	0.0	0.0
SG4	0.0	0.0	0.0	0.0
SG5	0.0	1.7	2.0	0.0
SG6	0.0	0.1	0.0	0.0
SG7	0.0	1.2	1.3	1.6
SG8	0.0	1.4	1.1	0.0
SG9	0.0	0.0	0.0	0.0
SG10	0.0	0.0	0.0	0.0
SG11	0.0	0.0	0.0	0.0
SG12	0.0	0.0	0.0	0.0
SG13	1.4	2.5	0.0	0.0
SG14	1.8	1.1	0.1	0.1
SG15	0.0	0.0	0.0	0.0
SG16	0.6	0.0	0.4	0.0
SG17	0.0	0.0	0.0	0.0
SG18	0.0	0.0	0.0	0.0
SG19	0.0	0.0	0.0	0.0
SG20	0.0	0.0	0.0	0.0
SG21	0.0	0.0	0.0	0.0
SG22	0.0	0.0	0.0	0.0
SG23	0.0	0.0	0.0	0.0
SG24	0.0	0.0	0.0	0.0
SG25	0.1	0.0	0.0	0.0
SG26	0.0	0.0	0.0	0.0
SG27	0.0	0.0	0.0	0.0
SG28	0.1	0.0	0.0	0.0
SG29	0.0	0.6	0.1	0.1
SG30	0.2	7.1	0.0	0.0
SG31	0.0	0.1	0.1	0.0
SG32	0.0	0.0	7.3	9.0
SG33	0.0	0.1	0.1	0.2
SG34	0.0	0.6	0.7	1.1
SG35	0.0	0.0	0.0	0.0
SG36	0.0	0.0	0.0	0.0
SG37	0.1	0.0	0.0	0.0
SG38	0.3	0.1	2.0	0.2
SG39	0.0	0.0	0.0	0.0
SG40	0.0	0.0	0.0	0.0
SG41	0.0	0.0	0.0	0.0
SG42	0.0	0.0	0.0	0.0
SG43	0.0	0.0	0.0	0.0
SG44	0.0	0.0	0.0	0.0
SG45	0.0	0.0	0.0	0.0
SG46	0.0	0.0	0.0	0.0
SG47	0.0	0.0	0.0	0.0
SG48	0.0	0.0	0.0	0.0
SG49	0.0	0.0	0.0	0.0
SG50	0.0	0.0	0.0	0.0
SG51	0.0	0.2	0.0	0.0
SG52	0.0	0.1	0.1	0.1
SG53	0.0	0.0	0.0	0.0
SG54	0.0	0.0	0.0	0.0
SG55	0.0	0.1	0.0	0.0
SG56	0.0	0.8	0.1	0.0
SG57	0.0	0.0	0.0	0.0
SG58	0.0	0.0	0.0	0.0
SG59	0.0	0.0	0.0	0.0
SG60	REFUSAL			

A(S)/A(ST) = AREA OF SAMPLE/AREA OF STANDARD = APPROXIMATELY PPM IN A
0.0 = NOT DETECTED DETECTION LIMIT: VOC = 0.5 mVS (~ 0.1 PPM)
File:pratt\ritab\table4-3.wr1

TABLE 4-4
ANALYTICAL SOIL GAS
SAMPLE LOCATIONS AND SAMPLING CONDITIONS
Old Southington Landfill Superfund Project
Southington, Connecticut

Sample No.	Probe Depth	Date Sampled	Sample Volume, ml (Co-Located Volume)
SG-1	6	8/24/92	180 (21)
SG-3	3.3	8/25/92	9,460 (9,840)
SG-5	6	8/24/92	20
SG-7	5.4	8/25/92	170
SG-10	2.6	8/24/92	9,820
SG-14	3.5	8/26/92	16 (160)
SG-16	2	8/26/92	15 (210)
SG-20	1.5	8/25/92	10,690
SG-22	2.5	8/28/92	8,660
SG-25	1.5	8/27/92	9,530
SG-27	1.5	8/27/92	9,860
SG-28	2.4	8/27/92	8,540
SG-30	5.6	8/28/92	160 (15)
SG-32	8	8/26/92	10
SG-35	8	9/10/92	790
SG-37	6.5	8/27/92	7,970
SG-38	2.4	8/25/92	180
SG-45	8	9/11/92	1,380
SG-49	8	9/10/92	1,710
SG-51	2.4	8/28/92	1,080
SG-53	8	9/10/92	1,460
SG-56	3.5	8/27/92	29 (420) (35)
SG-58	8	9/11/92	910
SG-61	5	9/10/92	1160
SG-64	5	8/25/92	9740 (10,150)
SG-71	4	8/27/92	8,930
SG-79	5	8/26/92	10,160
SG-84	5	9/10/92	1,040

File:pratt\ritab\table4-4.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-5
VOLATILE COMPOUNDS DETECTED
ANALYTICAL SOIL GAS - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Results in ug/M^3

Analyte	SG-20 08/26/92	SG-22 08/26/92	SG-25 08/27/92	SG-27 08/27/92	SG-28 08/27/92	SG-37 08/27/92	SG-38 08/25/92	NO OF HITS	MAX	MIN	AVG
Benzene	22.8	35.8	1.6	8.1	13.0	27.3	198.3	7	198.3	1.6	43.8
Ethyl Benzene	52.9	79.4	11.5	57.3	48.5	66.2	172.0	7	172.0	11.5	69.7
Styrene			1.7				95.3	2	95.3	1.7	48.5
Tetrachloroethene			1.4					1	1.4	1.4	1.4
Toluene	149.4	249.0	38.3	168.5	149.4	199.2	2643	7	2643	38.3	513.8
1,1,1-Trichloroethane	2.8	6.1	6.7	6.7	7.2	1.7	83.3	7	83.3	1.7	16.3
Trichloroethene				4.4	1.1	1.6		3	4.4	1.1	2.4
Xylene, Total	295.5	414.5	66.2	326.3	251.4	370.4	1058	7	1058	66.2	397.5

File:pratt\ritab\sgmnmxno.wr1

TABLE 4-6
VOLATILE COMPOUNDS DETECTED
ANALYTICAL SOIL GAS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Results in ug/M^3

ANALYTE	SG-1 08/24/92	SG-3 08/25/92	SG-5 08/24/92	SG-7 08/25/92	SG-10 08/24/92	SG-14 08/26/92	SG-16 08/26/92	SG-30 08/28/92	SG-32 08/26/92	SG-35 09/10/92	SG-45 09/11/92
Benzene	357.5	289.3	520.0	204.8	18.8			178.8		487.5	159.3
1,2-Trans-Dichloroethene											8.1
Cis-1,2-Dichloroethene		17.7									20.6
Ethyl Benzene	61.7	75.0		136.7	44.1	88.2	61.7	119.1		185.2	19.0
Methylene Chloride		1.1	917.8	74.1			52.9		1164.9		18.0
Styrene	562.9		519.6								
Toluene	1341	766.0	2949	1685	310.2	651.1	421.3	1034	2528	222.1	134.1
1,1,1-Trichloroethane	122.1		516.2	94.4	3.3					19.4	39.4
Trichloroethene					1.6						
Vinyl Chloride								494.0	5980		
Xylene, Total	529.2	529.2		705.6	295.5	485.1	330.8	617.4		485.1	97.0

ANALYTE	SG-49 09/10/92	SG-51 08/28/92	SG-53 09/10/92	SG-56 08/27/92	SG-58 09/11/92	SG-61 09/10/92	SG-64 08/25/92	SG-71 08/27/92	SG-79 08/26/92	SG-84 09/10/92	NO OF HITS	MIN	MAX	AVG
Benzene	780.0	61.8	8.8	30.2	308.8	390.0	2698	2860	48.8	318.5	18	8.8	2860	540.0
1,2-Trans-Dichloroethene						23.8	1.6				3	1.6	23.8	11.1
Cis-1,2-Dichloroethene	20.2					197.5	27.8	21.0	2.8	14.1	8	2.8	197.5	40.2
Ethyl Benzene	485.1	83.8	23.4	29.1	321.9	43.2	5292	2734	37.5	37.5	19	19.0	5292	519.9
Methylene Chloride			9.2	423.6		17.3					9	1.1	1165	297.7
Styrene											2	519.6	562.9	541.3
Toluene	218.3	459.6	145.5	134.1	134.1	176.2	1111	325.6	218.3	294.9	21	134.1	2949	726.6
1,1,1-Trichloroethane			12.2		32.2					77.7	9	3.3	516.2	101.9
Trichloroethene							114.7				2	1.6	114.7	58.1
Vinyl Chloride					114.4	132.6					4	114.4	5980	1680
Xylene, Total	1014	441.0	123.5	149.9	529.2	238.1	21609	3748.5	441.0	242.6	19	97.0	21609	1716

File:pratt\ritab\sgmnmxso.wr1

TABLE 4-7
MODELING RESULTS
ANALYTICAL SOIL GAS
Old Southington Landfill Superfund Project
Southington, Connecticut

Results in ug/M^3

ANALYTE	NORTHERN PORTION					
	INDOOR			AMBIENT		
	MIN	MAX	AVG	MIN	MAX	AVG
Benzene	0.0021	0.0336	0.0568	0.00014	0.0219	0.0037
Ethyl Benzene	0.0125	0.2452	0.0758	0.00081	0.016	0.0049
Styrene	0.0019	0.1376	0.0535	0.00012	0.009	0.0035
Tetrachloroethene	0.0024	0.0032	0.0024	0.00016	0.00021	0.00016
Toluene	0.0451	1.072	0.6053	0.0029	0.2653	0.0394
1,1,1-Trichloroethane	0.0022	0.1405	0.0207	0.00014	0.0092	0.0014
Trichloroethene	0.0014	0.0075	0.0029	0.000093	0.00049	0.00019
Xylene, Total	0.072	1.511	0.432	0.0047	0.0984	0.0281

ANALYTE	SOUTHERN PORTION					
	INDOOR			AMBIENT		
	MIN	MAX	AVG	MIN	MAX	AVG
Benzene	0.0035	1.146	0.2164	0.00064	0.2089	0.0394
1,2-Trans-Dichloroethene	0.00073	0.0109	0.0052	0.00013	0.00198	0.00094
Cis-1,2-Dichloroethene	0.0013	0.0899	0.0184	0.00023	0.0164	0.0034
Ethyl Benzene	0.0064	1.783	0.1753	0.0012	0.3249	0.0319
Methylene Chloride	0.00054	0.5925	0.1522	0.0001	0.108	0.0277
Styrene	0.1776	0.1922	0.1847	0.0324	0.035	0.0337
Toluene	0.0489	1.076	0.2652	0.0089	0.1961	0.0483
1,1,1-Trichloroethane	0.0013	0.2058	0.0407	0.00024	0.0375	0.0074
Trichloroethene	0.00067	0.0467	0.0237	0.00012	0.0085	0.0043
Vinyl Chloride	0.061	3.2	0.8989	0.0111	0.5831	0.1638
Xylene, Total	0.0327	7.281	0.5798	0.00595	1.327	0.1057

FILE:pratt\ritab\sgmodel.wr1

TABLE 4-8
STUDY AREA SOIL GAS SURVEY
FIELD PID MEASUREMENTS ABOVE BACKGROUND
Old Southington Landfill Superfund Project
Southington, Connecticut

PROBE LOCATION	PID READING, ppm
SG-1	4.8
SG-1A (Duplicate)	1.2
SG-2	1.2
SG-14	1.6
SG-23	0.6
SG-31	5.2
SG-35	5
SG-36	5.6
SG-38	3.6
SG-39	2
SG-43	0.2
SG-45	0.6
SG-57	5
SG-62	2
SG-63	3
SG-64	4.5
SG-65	2
SG-66	4
SG-67	1.5
SG-68	1.2
SG-69	15
SG-69A (Replicate)	50
SG-69C (Replicate)	25
SG-69.25	5
SG-69.50	20
SG-70	50
SG-71	5
SG-72	1
SG-74	10
SG-75	2
SG-76	2
SG-78	8

File:pratt\ritab\table4-8.wr1

TABLE 4-9
STUDY AREA SOIL GAS SURVEY
FIELD GC RESULTS
Old Southington Landfill Superfund Project
Southington, Connecticut

Results in ug/L in Air

Analyte	Detection Limits, ug/L	SG-1	SG-1A Duplicate	SG-1B Replicate	SG-1C Replicate	SG-3	SG-3B Duplicate	SG-4	SG-5	SG-6	SG-9	SG-11	SG-18	SG-18A Duplicate
Benzene	0.5	1.3	1.1	0.09(1)	0.47	0.81	0.22(1)	5.6	0.3(1)	0.72	0.5	ND	ND	ND
Toluene	0.5	2	3.3	0.36(1)	0.5	1.7	0.59	0.52	ND	0.96	1.8	ND	ND	ND
Ethyl Benzene	2	5.1	2	0.13(1)	1.2(1)	0.44(1)	0.68	4	0.19(1)	ND	ND	ND	ND	ND
M,P Xylene	2	23	6.8	ND	2.3	0.22(1)	0.14(1)	11	1.9(1)	ND	ND	ND	ND	ND
O-Xylene	2	7.9	2.3	0.54(1)	3.5	0.45(1)	1.3(1)	0.75	2.1	ND	ND	ND	ND	ND
Trichloroethene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.9(1)	0.01(1)	0.09(1)
1,1,1-Trichloroethane	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.3(1)	ND	ND
Trans 1,2-Dichloroethylene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Analyte	Detection Limits, ug/L	SG-20	SG-27	SG-34	SG-68	SG-68.5	SG-69	SG-69A	SG-69B Replicate	SG-69C Replicate	SG-70 Replicate	SG-71	SG-78
Benzene	0.5	ND	12	0.08(1)	ND	6.1	2.4	7.8	3.3	1.8	0.2(1)	ND	ND
Toluene	0.5	ND	640	0.13(1)	ND	4.8	6.9	210	310	230	43	0.47	4.1
Ethyl Benzene	2	ND	ND	ND	ND	64	35	340	220	160	30	0.9	2.2
M,P Xylene	2	ND	16	ND	ND	20	38	190	180	160	29	0.58	2.4
O-Xylene	2	ND	16	ND	ND	21	5.1	45	70	66	9.5	0.19	3.6
Trichloroethene	1	0.05(1)	210	ND	0.1(1)	ND	0.8(1)	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	50	ND	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trans 1,2-Dichloroethylene	5	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	2	ND	ND	ND	0.34(1)	ND	1.9(1)	ND	ND	ND	ND	ND	ND

Notes:
ND = Not Detected
(1) = Trace, just below detection limit; the identification and quantification are less certain

File:pratt\ritab\table4-9.wr1

TABLE 4-10
ORGANIC COMPOUNDS DETECTED
SURFACE SOIL - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	SFS-1-I 06/09/92 UG/KG	SFS-2-I 06/09/92 UG/KG	SFS-3-I 06/10/92 UG/KG	SFS-4-I 06/10/92 UG/KG	SFS-5-I 06/10/92 UG/KG	SFS-20-I 10/14/92 UG/KG	SFS-21-I 10/14/92 UG/KG	SFS-22-I 10/14/92 UG/KG
Acenaphthene			220	35	540		480	35	1000
Acenaphthylene	25-55				34		40		
Anthracene	28		250	45	460		410	37	1100
Benzo(a)Anthracene	19-170	54	780	150	2400	20	1200	130	3400
Dibenzo(a,h)Anthracene	75		110	49	320		260		690
Carbazole			160	30	250		320	28	810
Chrysene	29-270	65	610	140	2100	22	1100	120	2900
Dibenzofuran			73		200		270		390
Fluoranthene	51-360	120	1500	310	2500	38	2500	260	6800
Benzo(b)Fluoranthene	23-220	57	590	240	2200	23	970	110	2700
Benzo(k)Fluoranthene	27-230	53	580	190	1400	25	740	110	2300
Fluorene			120	26			390	23	710
2-Methylnaphthalene			24		76		130		120
Naphthalene			67		240		460		320
Benzo(g,h,i)Perylene	150	39	230	88	620		110		530
Phenanthrene	32-240	72	1100	220	2600	28	2300	230	5500
Pyrene	50-470	110	1300	250	4500	44		240	4800
Benzo(a)Pyrene	21-120	39	530	140	1300		500	68	2000
Indeno(1,2,3,cd)Pyrene	180	32	270	90	630		500	69	1400
alpha-Chlordane		18				18			
gamma-Chlordane		14			4.2	9.6			
4,4'-DDE	1.9	2.5		8.7					
Heptachlor Epoxide		4.3				4.9			

File:pratt\ritab\sfsorgno.wr1

TABLE 4-10
ORGANIC COMPOUNDS DETECTED
SURFACE SOIL - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	SFS-23-I 10/14/92 UG/KG	SFS-24-I 10/14/92 UG/KG	SFS-25-I 10/16/92 UG/KG	SFS-26-I 10/16/92 UG/KG	SFS-27-I 10/16/92 UG/KG	SFS-28-I 10/16/92 UG/KG	SFS-29-I 10/16/92 UG/KG	SFS-30-I 10/14/92 UG/KG	SFS-31-I 10/10/92 UG/KG
Acenaphthene		61			120	330	680		30	58
Acenaphthylene	25-55	34			25	1300	830		54	180
Anthracene	26	77			100	820	1000		33	170
Benzo(a)Anthracene	19-170	420	78		490	4600	4500	70	230	1000
Dibenzo(a,h)Anthracene	75	120			210	1300	880		72	420
Carbazole		65			110	450	560			97
Chrysene	29-270	430	110		510	4100	4100	98	290	1100
Dibenzofuran		26			50	260	360			40
Fluoranthene	51-360	900	170	29	1100	7600	7100	120	410	1900
Benzo(b)Fluoranthene	23-220	390	110		510	5700	4100	71	320	1200
Benzo(k)Fluoranthene	27-230	310	100		490	2900	3000	110	260	940
Fluorene		45			84	600	790			170
2-Methylnaphthalene						87	120			
Naphthalene					42	150	290			
Benzo(g,h,i)Perylene	150	140			170	1200	980	150	72	420
Phenanthrene	32-240	450	99		720	4300	5500	59	230	1300
Pyrene	50-470	720	160	37	880	8100	8200	160	410	2000
Benzo(a)Pyrene	21-120	190	40		180	3500	2600	60	110	450
Indeno(1,2,3,cd)Pyrene	180	240	61		340	2800	2100	77	190	550
alpha-Chlordane										
gamma-Chlordane										
4,4'-DDE	1.9									
Heptachlor Epoxide										

File:pratt\ritab\sfsorgno.wr1

TABLE 4-11
METALS DETECTED
SURFACE SOIL - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND MG/KG	SFS-1-I 06/09/92 MG/KG	SFS-2-I 06/09/92 MG/KG	SFS-3-I 06/10/92 MG/KG	SFS-4-I 06/10/92 MG/KG	SFS-5-I 06/10/92 MG/KG	SFS24-I 10/14/92 MG/KG	SFS28-I 10/16/92 MG/KG	SFS30-I 10/14/92 MG/KG
Aluminium	10700-17300	10100	3810	4110	9670	8940	12700	7000	9620
Arsenic	2.3-3.1			0.83		1.2	2.3	2.6	2.6
Barium	35.8-63.4	56.4	20.1	23.8	63.2	42.5	51.8	63.5	84.6
Beryllium	0.64-0.82	0.59	0.24	0.27	0.55	0.48	0.66	0.43	0.53
Cadmium								1.1	0.36
Calcium	695-1800	1320	686	1620	1170	894	1320	1730	4330
Chromium	11.9-22.6	14.4	5.5	7.4	17.7	12.6	14.3	12.1	14.8
Cobalt	5.8-9.4	7.1	2.5	3.3	8.9	6.4	6.4	6.3	7.2
Copper	8.8-11.8	14.6	5.3	5.5	16.1	9.4	12.3	67.7	16.7
Iron	11300-21200	16200	5390	7300	15500	12900	14200	13500	13800
Lead	6.4-16.6	13.6	7.1	7.6	12	6.8	19.5	177	24
Magnesium	3420-5810	3700	1460	1850	4870	3280	3340	3320	4260
Manganese	294-490	342	186	172	408	301	404	389	395
Mercury	0.03-0.04			0.07			0.05	0.1	0.05
Nickel	10.8-19.2	12.2	5.4	6.2	15	11.3	12.8	15.8	13.8
Potassium	1760	1090	390		1250	843			
Sodium	73	71.2	23.6	57.5	77.8	63.2			
Vanadium	23.8-42	36.4	13	16.1	35.6	25.7	31.7	26	28.2
Zinc	30.3-44.6	38.1	19.6	27.6	53.2	24.5	38	117	65

File:pratt\ritab\sfsmtnor.wr1

TABLE 4-12
VOLATILE COMPOUNDS DETECTED
SOIL BORINGS - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	TB13 01/18/90 1-4 CAP UG/KG	TB15 01/19/90 5-7 SAT UG/KG	TB20 01/19/90 7-9 CAP UG/KG	TB104-A 10/16/91 4'-8' CAP UG/KG	TB104-B 10/16/91 8'-12' SAT UG/KG	TB106 10/17/91 4'-8' SAT UG/KG	TB111 10/21/91 2'-4' CAP UG/KG	TB113 10/21/91 5'-7.8' SAT UG/KG	TB115 10/21/91 4'-8' SAT UG/KG	TB120 10/23/91 4'-8' SAT UG/KG	TB122 10/29/91 8'-12' SAT UG/KG	TB123 10/29/91 0'-4' CAP UG/KG	TB133 10/31/91 20'-24' SAT UG/KG	TB135 11/01/91 8'-12' SAT UG/KG
Benzene							4								
2-Butanone		14	17				18								
Carbondisulfide							2								2
Chlorobenzene							2								
1,2-Dichloroethene (total)														410	
Ethyl Benzene					14						3				
Tetrachloroethene													2		
Toluene	2	4	11		4								2		
Trichloroethene		1													
Vinyl Chloride		3												230	
Xylenes, Total					46						4				

Note:
UNSAT = unsaturated zone
SAT = saturated zone
CAP = capillary fringe

File:pratt\ritab\sbrvocno.wr1

TABLE 4-13
SEMIVOLATILE COMPOUNDS AND PESTICIDES/PCB DETECTED
SOIL BORINGS - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	TB13 01/18/90 1-4 CAP UG/KG	TB104-A 10/16/91 4'-8' CAP UG/KG	TB104-B 10/16/91 8'-12' SAT UG/KG	TB106 10/17/91 4'-8' SAT UG/KG	TB111 10/21/91 2'-4' CAP UG/KG	TB113 10/21/91 5'-7.8' SAT UG/KG	TB115 10/21/91 4'-8' SAT UG/KG	TB120 10/23/91 4'-8' SAT UG/KG	TB122 10/29/91 8'-12' SAT UG/KG	TB123 10/29/91 0'-4' CAP UG/KG	TB133 10/31/91 20'-24' SAT UG/KG	TB135 11/01/91 8'-12' SAT UG/KG
Acenaphthene			11000	250	430000	57000		1400	20000	240			
Acenaphthylene		160	9800							710	140		220
Aldrin									4.5				7.6
Anthracene		120	17000	370	600000	76000		2200	25000	860	98		250
Benzo(a)Anthracene		660	28000	610	830000	130000		4400	40000	2500	600		990
Dibenzo(a,h)Anthracene			3800		99000	35000			10000	160	190		280
Aroclor-1260			3800										1500
Benzoic Acid				330			100				41		
Beta-BHC								8					
Delta-BHC													5.8
alpha-Chlordane		15											
gamma-Chlordane		19							3.1				
Chrysene		730	31000	710	730000	130000		4500	34000	2200	820		1400
Dibenzofuran			8500		220000	27000			11000	370			76
Endosulfan I					3300	1700							
Endrin Ketone		5.5											
Fluoranthene		1400	47000	930	1700000	210000		9400	88000	2800	670		1500
Benzo(b)Fluoranthene		440	16000		480000	99000		3500	32000	1500	840		990
Benzo(k)Fluoranthene		850	17000		610000	92000		2900	22000	960	680		1100
Fluorene		70	27000	580	350000	44000		1300	16000	1100			210
Heptachlor												1.5	8.3
Heptachlor Epoxide		8											
2-Methylnaphthalene			31000	710	130000	13000			6800	580			71
4-Methylphenol													46
Naphthalene			36000	720	460000	44000		1000	14000	460			100
Benzo(g,h,i)Perylene		500	12000		310000	60000			16000	800	730		700
Phenanthrene		750	98000	2300	1700000	250000		8700	90000	5100	500		1200
Bis (2-Ethylhexyl) Phthalate							45		1300	230	200	85	850
di-n-Butyl Phthalate	60										44		510
Pyrene		1200	63000	1200	1400000	290000		8400	73000	5000	1000		1600
Benzo(a)Pyrene		720	23000	480	690000	120000		4100	32000	1500	870		980
Indeno(1,2,3,cd)Pyrene		560	12000		410000	71000		2100	18000	900	760		690
1,2,4-Trichlorobenzene													72

Note:
UNSAT = unsaturated zone
SAT = saturated zone
CAP = capillary fringe
File:pratt\ritab\sbrsemno.wr1

TABLE 4-14
METALS DETECTED
SOIL BORINGS - NORTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD MG/KG	TB15 01/19/90 5-7 SAT MG/KG	TB20 01/19/90 7-9 CAP MG/KG	TB104-A 10/16/91 4'-8' CAP MG/KG	TB104-B 10/16/91 8'-12' SAT MG/KG	TB106 10/17/91 4'-8' SAT MG/KG	TB111 10/21/91 2'-4' CAP MG/KG	TB113 10/21/91 5'-7.8' SAT MG/KG	TB115 10/21/91 4'-8' SAT MG/KG	TB120 10/23/91 4'-8' SAT MG/KG	TB122 10/29/91 8'-12' SAT MG/KG	TB123 10/29/91 0'-4' CAP MG/KG	TB133 10/31/91 20'-24' SAT MG/KG	TB135 11/01/91 8'-12' SAT MG/KG
Aluminium	4420-8050	10100	8030	7190	10900	9030	5120	8400	4940	6550	5760	7170	6110	6280
Antimony	24-71.5		57.7											
Arsenic				1.4		4.9	4.5	0.86	2.6	1.3		6.4		4.1
Barium		46	79.4	54.4	32.8	231	72.6	38.5	103	100	49.7	177	25.6	181
Beryllium				0.45		0.43	0.26			0.35		0.24		
Cadmium	2.5-3.5	4.2	4.4	1.3		2.2	2.6		2.2	1.8	0.86	11.1	0.96	18.2
Calcium	1450-1970		2220	1880	1450	2940	1460	2140	2800	3790	12700	4730	1070	13500
Chromium	7.2-12.2	14	16.1	13.2	17.1	105	63.1	11	11.8	29.7	8.9	53	9.2	68.4
Cobalt				4.9	7.5	9.5	6.1	3.7	3.6	5.2	3.9	9.1	4.4	13.5
Copper	7.2-10.1	9.1	13	27.8	11.1	41.7	37.9	6.3	47.9	439	10.9	340	9.2	1060
Iron	6630-9590	10600	11600	9490	5910	13200	18000	6760	7240	10400	8620	29900	6080	41700
Lead	2.4-4.1	6.4	2.4	23.5	6.8	166	227	17.3	348	43.7	21.4	330	4	357
Magnesium	1770-3140	3000	4730	2580	2430	9140	3350	2010	1740	4210	2550	2700	2300	3030
Manganese	131-229	229	299	262	68.7	205	227	146	169	333	189	359	63.3	418
Nickel	10-12.4	14.6	17.9	13.6	10.9	38.06	23.6	9.5	14.2	13.2	9	68.6	8.1	213
Potassium	846-1290		1660	1020	900	3390	959	743	747	1550	895	1160	1140	623
Selenium						0.64								
Silver												2.3		8 9
Vanadium	14.2-20.7	24.5	26.6	25.5	35.9	47.9	32.2	24.2	16.1	24.8	16.1	26.4	17.3	27.1
Zinc	16.7-28.3	33.5	39.8	60.9	40.5	247	422		2268	354	27.6	457		1300

Note:
UNSAT = unsaturated zone
SAT = saturated zone
CAP = capillary fringe

File:pratt\ritab\sbrmetno.wr1

TABLE 4-15
ORGANIC COMPOUNDS DETECTED
SURFACE SOIL - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	SFS-6-I 06/10/92 UG/KG	SFS-7-I 06/09/92 UG/KG	SFS-8-I 06/09/92 UG/KG	SFS-9-I 06/10/92 UG/KG	SFS-10-I 06/10/92 UG/KG	SFS-11-I 06/10/92 UG/KG	SFS-13-I 06/09/92 UG/KG
Acetone								110
Chlorobenzene		2						
Chloroform								
Ethyl Benzene		1						
Methylene Chloride								33
Xylenes, Total								
Acenaphthene			67	31				
Acenaphthylene	25-55	33	310	74				
Anthracene	26		300	86				
Benzo(a)Anthracene	19-170	130	1600	720		68	57	
Dibenzo(a,h)Anthracene	75	38	230	120		20		
Carbazole			110	93				
Chrysene	29-270	160	1800	780		80	69	
Dibenzofuran			49	21				
2,4-Dinitrotoluene								
Fluoranthene	51-360	210	2800	1500		130	110	120
Benzo(b)Fluoranthene	23-220	230	1400	880		84	80	
Benzo(k)Fluoranthene	27-230	180	1200	750		77	76	
Fluorene			240	46				
2-Methylnaphthalene			53					
Naphthalene			71	28				
Benzo(g,h,i)Perylene	150	220	510	360		46	48	
Phenanthrene	32-240	74	2000	750		54	41	
Phenol		120	62					300
Benzyl Butyl Phthalate			80	25				
Bis (2-Ethylhexyl) Phthalate			190	250				160
Diethyl Phthalate								
di-n-Butyl Phthalate				21		19		
Pyrene	50-470	270	4500	1600	28	140	100	160
Benzo(a)Pyrene	21-120	110	1000	490		65	61	
Indeno(1,2,3,cd)Pyrene	180	120	500	310		46	47	
Aldrin								
Aroclor-1254								
Aroclor-1260		25						
Beta-BHC								
alpha-Chlordane						2		
gamma-Chlordane			9.3	14		1.1		
4,4'-DDD			15					
4,4'-DDE	1.9		140			1.8		
4,4'-DDT			310	2.5				
Endosulfan I								
Endosulfan II				2.1				
Endosulfan Sulfate				4.5				
Endrin								
Endrin Aldehyde								
Endrin Ketone				6.3				
Heptachlor Epoxide								

File sfsorgso.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-15
ORGANIC COMPOUNDS DETECTED
SURFACE SOIL - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	SFS-14-I 06/10/92 UG/KG	SFS-15-I 06/10/92 UG/KG	SFS-16-I 06/11/92 UG/KG	SFS-17-I 06/10/92 UG/KG	SFS-18-I 06/10/92 UG/KG	SFS-19-I 06/10/92 UG/KG	SFS-34-I 10/28/92 UG/KG
Acetone								
Chlorobenzene					22			
Chloroform								
Ethyl Benzene								
Methylene Chloride								
Xylenes, Total				6				
Acenaphthene								
Acenaphthylene	25–55							25
Anthracene	26							17
Benzo(a)Anthracene	19–170	40				30		60
Dibenzo(a,h)Anthracene	75							
Carbazole								
Chrysene	29–270	58				65		95
Dibenzofuran								
2,4-Dinitrotoluene								410
Fluoranthene	51–360	76	450			97		130
Benzo(b)Fluoranthene	23–220	70				75		85
Benzo(k)Fluoranthene	27–230	57				68		86
Fluorene								
2-Methylnaphthalene								
Naphthalene								
Benzo(g,h,i)Perylene	150	41						
Phenanthrene	32–240	33			35	39		77
Phenol						100		
Benzyl Butyl Phthalate						140		
Bis (2-Ethylhexyl) Phthalate			1400		400	570	3400	
Diethyl Phthalate								25
di-n-Butyl Phthalate						22		
Pyrene	50–470	81	390		77	61		160
Benzo(a)Pyrene	21–120	39				31		27
Indeno(1,2,3,cd)Pyrene	180	32				22		67
Aldrin							2.1	
Aroclor-1254				48				
Aroclor-1260								160
Beta-BHC								
alpha-Chlordane			1.7					14
gamma-Chlordane								10
4,4'-DDD								
4,4'-DDE	1.9							3.4
4,4'-DDT								
Endosulfan I								
Endosulfan II								
Endosulfan Sulfate		2						
Endrin								3.2
Endrin Aldehyde		2.2		7.5	16		13	
Endrin Ketone		6.2						
Heptachlor Epoxide			2.3					

File:sfsorgso.wr1

TABLE 4-15
ORGANIC COMPOUNDS DETECTED
SURFACE SOIL - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/KG	SFS-35-I 10/28/92 UG/KG	SFS-36-I 10/28/92 UG/KG	SFS-37-I 10/28/92 UG/KG	SFS-38-I 10/28/92 UG/KG	SFS-39-I 10/28/92 UG/KG	SFS-40-I 10/28/92 UG/KG
Acetone							
Chlorobenzene							
Chloroform		1		1			
Ethyl Benzene							
Methylene Chloride							
Xylenes, Total					540		
Acenaphthene							
Acenaphthylene	25-55			420			
Anthracene	26			410			
Benzo(a)Anthracene	19-170			1300			
Dibenzo(a,h)Anthracene	75			390			
Carbazole							
Chrysene	29-270			1200			
Dibenzofuran							
2,4-Dinitrotoluene		350		350			
Fluoranthene	51-360			1600	38		
Benzo(b)Fluoranthene	23-220			2100			
Benzo(k)Fluoranthene	27-230			1200			
Fluorene							
2-Methylnaphthalene					200		
Naphthalene				51	90		
Benzo(g,h,i)Perylene	150			1200			
Phenanthrene	32-240			280			
Phenol							
Benzyl Butyl Phthalate		550					
Bis (2-Ethylhexyl) Phthalate							
Diethyl Phthalate				46			
di-n-Butyl Phthalate							
Pyrene	50-470		390	1900	40		
Benzo(a)Pyrene	21-120			740			
Indeno(1,2,3,cd)Pyrene	180			1200			
Aldrin							
Aroclor-1254				440			
Aroclor-1260				130			
Beta-BHC			28				
alpha-Chlordane							
gamma-Chlordane							
4,4'-DDD							
4,4'-DDE	1.9						
4,4'-DDT		9.2	84			6.1	
Endosulfan I			9.3				
Endosulfan II							
Endosulfan Sulfate							
Endrin			15				13
Endrin Aldehyde							
Endrin Ketone							
Heptachlor Epoxide		6.5					

File:sfsorgso.wr1

TABLE 4-16
METALS DETECTED
SURFACE SOIL - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND MG/KG	SFS-6-I 06/10/92 MG/KG	SFS-7-I 06/09/92 MG/KG	SFS-8-I 06/09/92 MG/KG	SFS-9-I 06/10/92 MG/KG	SFS-10-I 06/10/92 MG/KG	SFS-11-I 06/10/92 MG/KG	SFS-13-I 06/09/92 MG/KG	SFS-14-I 06/10/92 MG/KG	SFS-15-I 06/10/92 MG/KG	SFS-16-I 06/11/92 MG/KG
Aluminium	10700-17300	3900	4140	5860	7980	5540	8830	3030	16400	7010	8290
Arsenic	2.3-3.1	0.73			0.86	0.93			2.5	2.1	1.9
Barium	35.8-63.4	23.8	21.1	29.8	88.6	50.9	40.6	76.5	60.4	57.2	49.1
Beryllium	0.64-0.82	0.24	0.28	0.29	2.1	0.4	0.54		0.66	0.45	0.49
Calcium	695-1800	1170	1400	1350	3820	1720	335	9390	965	1380	764
Chromium	11.9-22.6	10.3	8.8	11.6	19.1	9.4	15.3	3.9	15.4	26.9	11.8
Cobalt	5.8-9.4	3.1	3.7	4.1	8.5	5.4	7.3		5	5.6	6
Copper	8.8-11.8	26.7	24.3	13.3	36.4	10.2	12.9	9.1	8.8	61.6	11.8
Iron	11300-21200	9090	9130	10600	16700	10200	15300	1970	15300	20600	13300
Lead	8.4-16.6	13.9	57.2	78.2	29.6	11.7	8	23.3	14.8	48.8	14.4
Magnesium	3420-5810	1800	1980	2220	4440	2700	4350	1560	2750	2420	2980
Manganese	294-490	172	133	162	283	272	319	29.8	356	327	418
Mercury	0.03-0.04		0.11	0.06						0.08	
Nickel	10.8-19.2	8.4	12.7	10.3	21.1	8.9	13.5		9.7	15.1	10.5
Potassium	1760		411	597	846	684	1250			577	1090
Silver	9.1	1.1									
Sodium	73	87.4	244	76.8	191	65.6	69.8		95.3	71.3	58.3
Thallium											
Vanadium	23.8-42	16.1	26.4	21.8	31.2	22.7	36.3	10.3	34.4	29.5	28.7
Zinc	30.3-44.6	43.1	42.5	47.8	150	26.6	35.4	35	39.2	49.4	47.7

File:sfsmlsou.wr1

TABLE 4-16
METALS DETECTED
SURFACE SOIL - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND MG/KG	SFS-17-I 06/10/92 MG/KG	SFS-18-I 06/10/92 MG/KG	SFS-19-I 06/10/92 MG/KG	SFS-34-I 10/28/92 MG/KG	SFS-35-I 10/28/92 MG/KG	SFS-36-I 10/28/92 MG/KG	SFS-37-I 10/28/92 MG/KG	SFS-38-I 10/28/92 MG/KG	SFS-39-I 10/28/92 MG/KG	SFS-40-I 10/28/92 MG/KG
Aluminium	10700-17300	8930	11400	6570	6270	7140	14100	7220	12600	7820	11000
Arsenic	2.3-3.1		2.3	2.7	2	1.7	2.5	1.6	1.5	1.6	1.7
Barium	35.8-63.4	80.9	166	51.9	39.1	40.5	57.8	26.9	121	49.9	31.9
Beryllium	0.64-0.82	1	2.9	0.36							
Calcium	695-1800	2760	2610	1940	1740	1440	2700	2420	3290	2810	5030
Chromium	11.9-22.6	34.4	88.3	11.4	15	19.8	15.9	344	38.8	22.7	12.3
Cobalt	5.8-9.4	9.4	19.5	7.6	6.1	13.8	8.1	10.8	9	8.1	11.2
Copper	8.8-11.8	112	285	22.8	44.8	429	32.4	182	72.5	51.1	39.7
Iron	11300-21200	18000	23000	13800	12900	16400	17400	17700	17600	33600	22400
Lead	8.4-16.6	91.4	372	25.8	79.2	39.8	36.2	29.8	178	30.8	17
Magnesium	3420-5810	3680	2560	3650	2570	3300	3820	3340	2860	3760	5010
Manganese	294-490	344	272	285	187	278	279	245	239	375	321
Mercury	0.03-0.04			0.09	0.1		0.07	0.04		0.03	
Nickel	10.8-19.2	47.4	136	11.9	16.2	48.9	12.4	65.6	38.7	18.1	11.9
Potassium	1760	1100	1190	1280	801	1100	1210	547	1200	1160	894
Silver	9.1										
Sodium	73	205	480	167	170	117	555	304	523	333	887
Thallium							0.34	0.33		0.2	
Vanadium	23.8-42	29	28.4	27.4	28.7	24.3	40.9	28.5	31.1	31.8	58.5
Zinc	30.3-44.6	382	1160	95.3	169	220	79.8	95.4	521	101	61.9

File:sfsmtsou.wr1

TABLE 4-17
VOLATILE ORGANIC COMPOUNDS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	B201A 07/01/92 32-34 CAP UG/KG	B201B 07/01/92 4-6 UNSAT UG/KG	B202A 06/29/92 10-12 UNSAT UG/KG	B202B 06/30/92 14-16 UNSAT UG/KG	B203A 06/25/92 8-10 UNSAT UG/KG	B203B 06/26/92 20-22 UNSAT UG/KG	B204A 07/02/92 14-16 UNSAT UG/KG	B204B 07/02/92 10-12 UNSAT UG/KG	B205A 06/29/92 18-20 UNSAT UG/KG	B205B 06/25/92 14-16 UNSAT UG/KG	B206A 06/22/92 18-20 UNSAT UG/KG
Acetone							56					
Benzene			1				18					
2-Butanone						14						
Carbondisulfide												
Chlorobenzene			45			6	120		1500			
Chloroethane												
Chloroform	1											
1,1-Dichloroethane	1											
1,2-Dichloroethene (total)					120000		300					
Ethyl Benzene			150			140	170		8800			
Methylene Chloride												
4-Methyl-2-Pentanone												
Styrene												
1,1,2,2-Tetrachloroethane												
Tetrachloroethene				2			61					
Toluene	2						350					
1,1,1-Trichloroethane												
1,1,2-Trichloroethane												
Trichloroethene				41	240000		260					
Vinyl Chloride					2800							
Xylenes, Total			1500			84	920		39000			

File:pratt\ritab\bsothph.wr1

TABLE 4-17
VOLATILE ORGANIC COMPOUNDS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	B206B 06/23/92 14-16 UNSAT UG/KG	B206C 06/24/92 14-16 UNSAT UG/KG	B207-A 07/07/92 2-10 UNSAT UG/KG	B207-B 07/07/92 16-18 UNSAT UG/KG	B207-C 07/07/92 30-32 UNSAT UG/KG	B208 07/08/92 2-10 UG/KG	B209-A 07/09/92 2-10 UG/KG	B209-B 07/09/92 16-18 UG/KG	B303 07/22/92 6-8 UNSAT UG/KG	B304-1 07/17/92 13-15 UNSAT UG/KG	B304-2 08/12/92 30-35 SAT UG/KG
Acetone												
Benzene			3									
2-Butanone			20									
Carbondisulfide												
Chlorobenzene			7	17	1500		1	160				
Chloroethane												
Chloroform	1											
1,1-Dichloroethane												
1,2-Dichloroethene (total)						5200						
Ethyl Benzene			73	130	750			10			310000	550000
Methylene Chloride												
4-Methyl-2-Pentanone												
Styrene												
1,1,2,2-Tetrachloroethane												
Tetrachloroethene								2				
Toluene	2										53000	390000
1,1,1-Trichloroethane												3000
1,1,2-Trichloroethane												
Trichloroethene												140
Vinyl Chloride												
Xylenes, Total			210	310	15000		2	15	2000		370000	700000

File:pratt\ritab\bsothph.wr1

TABLE 4-17
VOLATILE ORGANIC COMPOUNDS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	B305 07/13/92 31-33 CAP UG/KG	B306-A 06/22/92 14-16 UNSAT UG/KG	B306-B 07/01/92 122-124 SAT UG/KG	P-7B 07/30/92 SAT UG/KG	TB3 01/24/90 7-9 UNSAT UG/KG	TB4 01/24/90 9-13 UNSAT UG/KG	TB6 01/25/90 10-14 UNSAT UG/KG	TB7SA 01/27/90 15-24 SAT UG/KG	TB8 01/23/90 10-12 SAT UG/KG	TB10 01/26/90 15-27 SAT UG/KG	TB12 01/23/90 5-9 CAP UG/KG
Acetone					320							
Benzene												
2-Butanone		73			100							
Carbondisulfide					6							
Chlorobenzene							2900		2			
Chloroethane												
Chloroform	1											
1,1-Dichloroethane		8										
1,2-Dichloroethene (total)		710							2		1200	
Ethyl Benzene		1500					2900				2400	
Methylene Chloride												
4-Methyl-2-Pentanone		320										
Styrene												
1,1,2,2-Tetrachloroethane												
Tetrachloroethene		16									13000	
Toluene	2	620									1400	
1,1,1-Trichloroethane		77										
1,1,2-Trichloroethane		19										
Trichloroethene						2			1		8900	
Vinyl Chloride												
Xylenes, Total		1900			9		11000		7		10000	

File:pratt\ritab\bsothph.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-17
VOLATILE ORGANIC COMPOUNDS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	TB24 01/25/90 5-11 CAP UG/KG	TB25-A 01/27/90 10-17 UNSAT UG/KG	TB25-B 01/27/90 20-24 UNSAT UG/KG	TB26-A 01/25/90 12-14 UNSAT UG/KG	TB101 10/15/91 2.5'-5.0' UNSAT UG/KG	TB102 10/15/91 7.5'-10.0' UNSAT UG/KG	TB103-A 10/16/91 15' UNSAT UG/KG	TB103-B 10/16/91 20'-25' CAP UG/KG	TB105 10/17/91 15'-20' UNSAT UG/KG	TB112 10/21/91 10'-15' UNSAT UG/KG	TB114 10/21/91 20'-23.8' CAP UG/KG
Acetone												
Benzene					5							620
2-Butanone						15						1400
Carbondisulfide					4							350
Chlorobenzene												
Chloroethane												
Chloroform	1											
1,1-Dichloroethane												
1,2-Dichloroethene (total)					4			25000				140
Ethyl Benzene		3700	15000	310000		350	1	70000	48000	260000	68	2200
Methylene Chloride												
4-Methyl-2-Pentanone												
Styrene				19000	2							
1,1,2,2-Tetrachloroethane												
Tetrachloroethene								2200		14000		
Toluene	2		2400	48000	28	82		110000	3600	91000	8	2000
1,1,1-Trichloroethane								9000				
1,1,2-Trichloroethane												
Trichloroethene					5							
Vinyl Chloride												
Xylenes, Total		7000	18000	210000	7	890	1	100000	62000	530000	500	18000

File:pratt\ritab\bsothph.wr1

TABLE 4-17
VOLATILE ORGANIC COMPOUNDS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	TB116 10/23/91 20'-25' UNSAT UG/KG	TB116A 10/23/91 25'-29' CAP UG/KG	TB121-B 10/23/91 5'-10' UNSAT UG/KG	TB127-A 10/28/91 4'-8' UNSAT UG/KG	TB127-B 10/28/91 8'-10.3' CAP UG/KG	TB127-C 10/29/91 10' CAP UG/KG	B127A-A 11/20/91 8'-9.5' CAP UG/KG	TB129-A 10/29/91 7'-10' CAP UG/KG	TB129-C 10/29/91 15'-20' SAT UG/KG	TB129-D 10/29/91 30'-35' SAT UG/KG	TB130-A 10/30/91 15'-20' SAT UG/KG
Acetone												
Benzene												12
2-Butanone				8		460000	18000000		33	2	89	22
Carbondisulfide				1						19		
Chlorobenzene												25
Chloroethane												6
Chloroform	1											
1,1-Dichloroethane												
1,2-Dichloroethene (total)		9800	1300									36
Ethyl Benzene		310000	50000	7	1300	76000	1400000	87000				37
Methylene Chloride												
4-Methyl-2-Pentanone						130000	6700000	320000	11			
Styrene						45000	1100000	33000				
1,1,2,2-Tetrachloroethane									2			
Tetrachloroethene						23000	490000	30000				
Toluene	2	62000	12000		1200	540000	16000000	840000	2	4		9
1,1,1-Trichloroethane												
1,1,2-Trichloroethane												
Trichloroethene						140000	7300000	310000				42
Vinyl Chloride												22
Xylenes, Total		180000	31000	150	5800	510000	9000000	510000	3	5		170

File:pratt\ritab\bsothph.wr1

TABLE 4-18
SEMIVOLATILE COMPOUNDS AND PESTICIDES/PCB DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	B207-A 07/07/92 2-10 UNSAT UG/KG	B207-B 07/07/92 16-18 UNSAT UG/KG	B207-C 07/07/92 30-32 UNSAT UG/KG	B208 07/08/92 2-10 UG/KG	B209-A 07/09/92 2-10 UG/KG	B209-C 07/10/92 42-44 UG/KG	P-7B 07/30/92 SAT UG/KG	TB6 01/25/90 10-14 UNSAT UG/KG
Acenaphthene		93	3400		190		1600	440	
Acenaphthylene			4000		380			170	
Anthracene			5200		790		3200	220	
Benzo(a)Anthracene		140	20000		2100	610	4900	1100	
Dibenzo(a,h)Anthracene			2900		430	790		280	
Aroclor-1242		210	540		83	420	210	31	
Aroclor-1254		170	11000	37	93	230	1200	69	
Aroclor-1260		160	4800					140	
Benzoic Acid									
Delta-BHC		2.2							
Carbazole			3000		320			87	
alpha-Chlordane						160			
gamma-Chlordane		4.2				200		3.4	
Chrysene		160	23000		2000	780	6100	1300	
4,4'-DDD		21					50	14	
4,4'-DDE		4.1							
4,4'-DDT									
Dibenzofuran			2400		350		1700	140	
1,2-Dichlorobenzene			1800						
1,4-Dichlorobenzene			930		460				
Dieldrin		2.4							
2,4-Dimethylphenol									
Endosulfan I									
Endosulfan II					4.9		16		
Endosulfan Sulfate						21			
Endrin					12				
Endrin Aldehyde					12				
Endrin Ketone								3.8	
Fluoranthene		400	38000	22	4100	1200	16000	2400	
Benzo(b)Fluoranthene			19000		1600	730	3400	1200	
Benzo(k)Fluoranthene			11000		1700	910	4000	790	
Fluorene		110	6400		900		3700	360	
Heptachlor									
Isophorone									
2-Methylnaphthalene		260	3500	42	190		2100	81	
2-Methylphenol									
4-Methylphenol									
Naphthalene		290	5100		560		2300	86	
Pentachlorophenol									
Benzo(g,h,i)Perylene			7900		750	1100	1900	680	
Phenanthrene		470	38000	32	3400	1200	19000	1300	
Phenol									
Benzyl Butyl Phthalate									100
Bis (2-Ethylhexyl) Phthalate								170	
Diethyl Phthalate									
Dimethyl Phthalate									
di-n-Butyl Phthalate	60						1600		
di-n-Octyl Phthalate									
Pyrene		350	39000		3700	1300	17000	2200	
Benzo(a)Pyrene			16000		1600	820	3000	920	
Indeno(1,2,3,cd)Pyrene			7500		910	1100	1900	600	
1,2,4-Trichlorobenzene									

File: pratt\mtab\bsosmph.wr1

TABLE 4-18
SEMIVOLATILE COMPOUNDS AND PESTICIDES/PCB DETECTED
SOIL BORINGS – SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	TB7SA 01/27/90 15-24 SAT UG/KG	TB6 01/23/90 10-12 SAT UG/KG	TB10 01/26/90 15-27 SAT UG/KG	TB24 01/25/90 5-11 CAP UG/KG	TB26B 01/25/90 7-13 SAT UG/KG	TB101 10/15/91 2.5'-5.0' UNSAT UG/KG	TB102 10/15/91 7.5'-10.0' UNSAT UG/KG	TB103-A 10/16/91 15' UNSAT UG/KG
Acenaphthene		950	42			280			
Acenaphthylene		1400	190						
Anthracene		2700	200						400
Benzo(a)Anthracene		4200	630	310	64	540	45		330
Dibenzo(a,h)Anthracene				2000					
Aroclor-1242		2000							
Aroclor-1254		560							740
Aroclor-1260						1100			
Benzoic Acid									
Delta-BHC									
Carbazole									
alpha-Chlordane									
gamma-Chlordane									
Chrysene		5000	690	580	83	710	67	110	550
4,4'-DDD									
4,4'-DDE									
4,4'-DDT					19				
Dibenzofuran		1100	71						370
1,2-Dichlorobenzene									
1,4-Dichlorobenzene									
Dieldrin									
2,4-Dimethylphenol							58		
Endosulfan I									
Endosulfan II									
Endosulfan Sulfate									
Endrin									
Endrin Aldehyde									
Endrin Ketone									
Fluoranthene		11000	1300	910	130	1200	87		370
Benzo(b)Fluoranthene		3300	660	370	54	580	43		
Benzo(k)Fluoranthene		4300	480	480	56	740	46		
Fluorene		2300	170			240			700
Heptachlor									
Isophorone									
2-Methylnaphthalene		2300	45			370			2300
2-Methylphenol							69		
4-Methylphenol							91		
Naphthalene		7100			60	1500	170		4100
Pentachlorophenol									
Benzo(g,h,i)Perylene		2600	430	2000					
Phenanthrene		13000	1100	600	110	740	72	41	3200
Phenol									
Benzyl Butyl Phthalate		960		460	74				2000
Bis (2-Ethylhexyl) Phthalate		36000					120	70	16000
Diethyl Phthalate									570
Dimethyl Phthalate									
di-n-Butyl Phthalate	60								1100
di-n-Octyl Phthalate									
Pyrene		7600	1500	650	130	690	100		500
Benzo(a)Pyrene		4400	610	2000	59	560	47		
Indeno(1,2,3,cd)Pyrene		3000	470	2000					
1,2,4-Trichlorobenzene									

File: pratt\ntab\basmph.wr1

TABLE 4-18
SEMIVOLATILE COMPOUNDS AND PESTICIDES/PCB DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	TB103-B 10/16/91 20'-25' CAP UG/KG	TB114 10/21/91 20'-23.8' CAP UG/KG	TB116A 10/23/91 25'-29' CAP UG/KG	TB121-A 10/23/91 1'-10' S UG/KG	TB127-A 10/28/91 4'-8' UNSAT UG/KG	TB127-B 10/28/91 8'-10.3' CAP UG/KG	TB127-C 10/29/91 10' CAP UG/KG	TB127A-B 11/20/91 8'-14' CAP UG/KG	TB129-B 10/29/91 5-'10' S UG/KG
Acenaphthene		650	2200		62					410
Acenaphthylene										220
Anthracene		1100	3800		52	43	260			350
Benzo(a)Anthracene		1500	3800		120	200	610			1100
Dibenzo(a,h)Anthracene										
Aroclor-1242										
Aroclor-1254		510						30000	24000	
Aroclor-1260				5100	300					
Benzoic Acid										150
Delta-BHC										3.9
Carbazole			0	0	0	0				0
alpha-Chlordane										
gamma-Chlordane										
Chrysene		2100	4700		140	310	630			1500
4,4'-DDD								190		22
4,4'-DDE										
4,4'-DDT										
Dibenzofuran		830	2100		48		170			360
1,2-Dichlorobenzene										
1,4-Dichlorobenzene										240
Dieldrin				41						
2,4-Dimethylphenol								38000	5300	
Endosulfan I			5.4							
Endosulfan II										
Endosulfan Sulfate										
Endrin										
Endrin Aldehyde										
Endrin Ketone		21								
Fluoranthene		3200	6700		200	300	1200			1700
Benzo(b)Fluoranthene		1500	2100		95	220	470			940
Benzo(k)Fluoranthene		1100	1100		92	210	320			1300
Fluorene		1800	2500		91		340			510
Heptachlor			3.3							
Isophorone								280000	31000	
2-Methylnaphthalene		1400	3800	2400	100	50	290	74000	8600	480
2-Methylphenol										
4-Methylphenol						50	820	110000	15000	38
Naphthalene		2900	7200	6300	310	180	560	160000	18000	1100
Pentachlorophenol										
Benzo(g,h,i)Perylene			2000							670
Phenanthrene		6200	17000	730	350	410	1700		2700	1900
Phenol							2700	380000	66000	
Benzyl Butyl Phthalate				3400			1000	740000	100000	52
Bis (2-Ethylhexyl) Phthalate		1800		22000	2900	100	5200	1700000	240000	550
Diethyl Phthalate								60000	9000	
Dimethyl Phthalate			250					27000	3000	
di-n-Butyl Phthalate	60			1500	59		450	310000	40000	150
di-n-Octyl Phthalate					63				2800	
Pyrene		1900	8500		210	390	1600			2000
Benzo(a)Pyrene		1300	2400		120	220	490			1100
Indeno(1,2,3,cd)Pyrene			2400		58	160	180			830
1,2,4-Trichlorobenzene				1900						

File: pratt\rtab\bsosmph.wrt

TABLE 4-18
SEMIVOLATILE COMPOUNDS AND PESTICIDES/PCB DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND UG/KG	TB129-C 10/29/91 15'-20' SAT UG/KG	TB129-D 10/29/91 30'-35' SAT UG/KG	TB130-B 10/30/91 20'-25' S UG/KG	TB134 11/01/91 30'-36' SAT UG/KG	TB136-B 11/01/91 5'-13.5' S UG/KG	TB137A-B 11/14/91 12'-20' S UG/KG	TB138-B 11/15/91 10'-16' T1 UG/KG	TB139 11/18/91 4'-8' UNSAT UG/KG
Acenaphthene		4400					610	1100	
Acenaphthylene		3400		240					
Anthracene		7200		200		990	620	1000	
Benzo(a)Anthracene		10000		1800		2800	1200	1400	
Dibenzo(a,h)Anthracene				620					
Aroclor-1242									
Aroclor-1254									
Aroclor-1260						80000			
Benzoic Acid					200				
Delta-BHC				16	11				
Carbazole		0		0					
alpha-Chlordane									
gamma-Chlordane									
Chrysene		12000		3100		3800	1600	1700	100
4,4'-DDD									
4,4'-DDE									
4,4'-DDT				24					
Dibenzofuran		3900		49			440	700	
1,2-Dichlorobenzene									
1,4-Dichlorobenzene								550	
Dieldrin									
2,4-Dimethylphenol									
Endosulfan I									
Endosulfan II									
Endosulfan Sulfate									
Endrin				14					
Endrin Aldehyde									
Endrin Ketone									
Fluoranthene		23000		1800	110	6700	1600	3600	68
Benzo(b)Fluoranthene		7700		2500		2600	1300	690	
Benzo(k)Fluoranthene		5100		1600		2000	940	870	
Fluorene		9800		85			710	2000	
Heptachlor				2	1.7				
Isophorone									
2-Methylnaphthalene		6800		65			510	20000	
2-Methylphenol									
4-Methylphenol									
Naphthalene		6300		280		2700	520	7800	
Pentachlorophenol				2100					
Benzo(g,h,i)Perylene		5000		1900			720		
Phenanthrene		37000		1500	120		4500	6600	75
Phenol									
Benzyl Butyl Phthalate							890	710	
Bis (2-Ethylhexyl) Phthalate		3500		620	250	71000	170	740	580
Diethyl Phthalate									
Dimethyl Phthalate					110				
di-n-Butyl Phthalate				340					94
di-n-Octyl Phthalate									
Pyrene		34000		3700	140	6500	1400	3800	
Benzo(a)Pyrene		8300		2000		2500	1100	990	79
Indeno(1,2,3,cd)Pyrene		5300		1800		1400	770		
1,2,4-Trichlorobenzene						1200			

File:pratt\ntab\bsosmph.wri

TABLE 4-19
METALS DETECTED
SOIL BORINGS - SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND MG/KG	B207-A 07/07/92 2-10 UNSAT MG/KG	B207-B 07/07/92 16-18 UNSAT MG/KG	B207-C 07/07/92 30-32 UNSAT MG/KG	B208 07/08/92 2-10 MG/KG	B209-A 07/09/92 2-10 MG/KG	B209-C 07/10/92 42-44 MG/KG	P-7B 07/30/92 SAT MG/KG	TB3 01/24/90 7-9 UNSAT MG/KG	TB4 01/24/90 9-13 UNSAT MG/KG	TB6 01/25/90 10-14 UNSAT MG/KG	TB7SA 01/27/90 15-24 SAT MG/KG	TB8 01/23/90 10-12 SAT MG/KG
Aluminium	4420-6050	6750	11000	10600	6450	8370	7420	3160	17400	7140	5260	7260	6520
Antimony	24-71.5								21.6	36.1			
Arsenic		2.2	2.9	2.2	1.9	2.8	23.4	2.6					
Barium		67.9	76.7	44.1	50.6	40.6	196	38.7	107		70.4	94.9	
Beryllium		1.2	0.41	0.44	0.56	0.4	0.59	0.25					
Cadmium	2.5-3.5		3.6		0.54		0.66	0.61	6.6	13.4	4	9.2	3.6
Calcium	1450-1970	1750	1900	934	2170	749	5620	1900		3410	9100	3110	2490
Chromium	7.2-12.2	36.4	83	19.1	20	56.7	100	11.2	17.8	232	11.1	18.3	12.4
Cobalt		11.6	11.2	7.4	7.2	7.6	9.5	3.7		46.7			
Copper	7.2-10.1	137	299	13	137	51.4	77.8	44.3	9.7	61.3	9	25.9	20.5
Cyanide							0.9	0.61					
Iron	6630-9590	23400	17600	11900	12600	13600	58800	6150	15200	16600	9280	22600	9760
Lead	2.4-4.2	141	208	7.3	60.2	37.5	90	32.3	10.5	112	1.9	143	5.9
Magnesium	1770-3140	2680	1960	4250	2020	2650	3640	1330	3770	2200	3470	2860	3610
Manganese	131-229	252	244	129	166	172	299	85.3	939	202	255	330	373
Mercury		0.07	0.26	0.65		0.12	0.26					0.29	
Nickel	10-12.4	63.6	151	16.8	39.7	141	99.2	10.8	16	306			11.2
Potassium	846-1290										1310	1470	
Selenium							1.4						
Silver			2.7				2.7	0.9				2.5	
Sodium		183	64.8	80.1	149	41.3	242	54.8					
Thallium							0.53						
Vanadium	14.2-20.7	25.5	40.5	34.2	18.8	21.4	49.9	10	32.5	17.5	20	20.5	21.3
Zinc	16.7-26.3	530	436	33.4	215	95.7	183	108	409	290	26.5	229	30.8

File: pratt\ritab\bsomiph.wr1

RI
Revision: 1
Date: 12/10/93

TABLE 4-19
METALS DETECTED
SOIL BORINGS – SOUTHERN PORTION
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BACKGROUND MG/KG	TB127-A 10/28/91 4'-8' UNSAT MG/KG	TB127-B 10/28/91 8'-10.3' CAP MG/KG	TB127-C 10/29/91 10' CAP MG/KG	TB127A-B 11/20/91 8'-14' CAP MG/KG	TB129-B 10/29/91 5-'10' S MG/KG	TB129-C 10/29/91 15'-20' SAT MG/KG	TB129-D 10/29/91 30'-35' SAT MG/KG	TB130-B 10/30/91 20'-25' S MG/KG	TB134 11/01/91 30'-36' SAT MG/KG	TB136-B 11/01/91 5'-13.5' S MG/KG	TB137A-B 11/14/91 12'-20' S MG/KG	TB138-B 11/15/91 10'-16' T1 MG/KG	TB139 11/18/91 4'-8' UNSAT MG/KG
Aluminium	4420-8050	8370	4990	7460	5420	4460	7280	12600	5250	4270	6290	10600	3380	9740
Antimony	24-71.5			78.7										
Arsenic		6.7	13.4	14.7	6.6	2	4.9	6.9	7.8		2.8	2 1	4.4	5 7
Barium		502	240	1660	249	47.7	95.8	144	369	30	268	116	133	218
Beryllium										0.27				
Cadmium	2.5-3.5	24.3	70.3	1030	134	10.9	7.8		12.6	1.8	11	5.8	3.6	28
Calcium	1450-1970	5150	4650	10900	4220	2330	3400	2740	8040	843	28800	2240	15200	6850
Chromium	7.2-12.2	399	804	1420	319	131	48.3	31.7	37	10.6	95.1	113	87.5	536
Cobalt		8.5	8.3	42.2	12.3	47.5	14.2	7.1	6.3	4.2	21.6	12.5	79.9	10
Copper	7.2-10.1	386	428	1120	618	430	134	32.7	1370	9.4	318	431	258	278
Cyanide				2.3										
Iron	6630-9590	48500	44400	24600	29400	53200	23900	9620	50300	6010	34900	28200	19100	88200
Lead	2.4-4.2	327	969	5500	918	78.5	180	14.6	364	14.4	115	53.1	321	6170
Magnesium	1770-3140	2850	1380	1560	1440	1540	2470	3690	1680	2550	3350	4750	1880	3110
Manganese	131-229	507	392	216	275	780	385	109	301	67.7	505	365	157	573
Mercury		0.2	0.23	40.5	11.5		0.19		0.64		0.17			0.32
Nickel	10-12.4	88.4	44	52.6	50	190	68.1	20.3	54.5	9.9	64.1	35.2	212	55.8
Potassium	846-1290	1150	575	904	694	653	1180	1180	625	813	615	2070	506	758
Selenium		0.65	0.81	37.7	2.3			2.4						0.98
Silver			1.8	3.2	6.3	2.9	10		2.3			3.4		
Sodium														
Thallium														
Vanadium	14.2-20.7	20.5	11.8	14.5	10.7	40.3	46.3	137	14.7	26.2	34.1	34.2	10.1	29.3
Zinc	16.7-28.3	958	962	4040	846	275	376	90.9	665	32.4	1350	246	267	614

File:pratt\ritab\bsomtph.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-20
VOLATILE ORGANICS COMPOUNDS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	G301-I 2 Rounds UG/L	G302A-I 2 Rounds UG/L	G302B-I 2 Rounds UG/L	G302C-I 2 Rounds UG/L	G303A-I 2 Rounds UG/L	G303B-I 2 Rounds UG/L	G303C-I 2 Rounds UG/L	G304A-I 2 Rounds UG/L	G304B-I 2 Rounds UG/L	G304C-I 2 Rounds UG/L	G304D-I 2 Rounds UG/L	G305-I 2 Rounds UG/L	G306A-I 2 Rounds UG/L
Acetone	4											5		
Benzene		9	2							1-4				
Bromodichloromethane				2				2		1				
Carbondisulfide	32		19	7						18	51-85			
Chlorobenzene		23-26	4-5											
Chloroethane			4-5											
Chloroform				13-22	10			20		4-10	7-16			
1,1-Dichloroethane			2			3-5			160				290-580	
1,2-Dichloroethene (total)	1-3	650-940							15000-30000	23-54	69-70	2-11	2800-3000	
1,1-Dichloroethene	4										1			
Ethyl Benzene		6							9700-10000	5-44	4-9		5700-7800	
Methylene Chloride														
4-Methyl-2-Pentanone									640	8				
Tetrachloroethene														
Toluene		7							19000-23000	20-93	8		8400-12000	
1,1,1-Trichloroethane									1100-1800				1200-1300	
Trichloroethene	4	150-210		1							10-49	4		
Vinyl Chloride		350-580							220-560	2-3	15-52		1500-3500	
Xylenes, Total		21-30							12000-13000	49-190	3-5	1	3500-7800	

File:pratt\ritab\gwvoc.wr1

TABLE 4-20
VOLATILE ORGANICS COMPOUNDS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD	G306B-I	G306C-I	G307-I	G308A-I	G308B-I	G308C-I	G309A-I	G309B-I	G309C-I	GZ-4D	GZ-4M	GZ-4S	GZ-5D
		2 Rounds	2 Rounds	2 Rounds	2 Rounds	2 Rounds	2 Rounds	2 Rounds	2 Rounds	2 Rounds	3 Rounds	3 Rounds	3 Rounds	3 Rounds
	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Acetone	4	5											6	4
Benzene		2	1						2					1
Bromodichloromethane														
Carbondisulfide	32	11	70											
Chlorobenzene														1
Chloroethane									2					4-6
Chloroform		10-12					99-110		4-6	59-100				
1,1-Dichloroethane									3			2	3	2-3
1,2-Dichloroethene (total)	1-3	41-58	6	800-6000			49-56	1	130-150	38-70				4-6
1,1-Dichloroethene	4						2							
Ethyl Benzene		2-4											1	
Methylene Chloride				85-170										
4-Methyl-2-Pentanone														
Tetrachloroethene							23-34		2	11-28				
Toluene		7	1				2		3					1
1,1,1-Trichloroethane							3-4							
Trichloroethene	4	1	11	100-5500			190-260	2	14-15	110-230				1-2
Vinyl Chloride		1							24-27				73-170	2
Xylenes, Total		2	2						4					

File:pratt\ritab\gwvoc.wr1

TABLE 4-20
VOLATILE ORGANICS COMPOUNDS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD	GZ-5M	GZ-5S	GZ-7D	GZ-7M	GZ-7S	GZ-11D	GZ-11S	GZ-12D	GZ-12M	GZ-13D	GZ-13M	GZ-13S	GZ-14D
							06/14/90	06/14/90						
		3 Rounds	3 Rounds	3 Rounds	3 Rounds	3 Rounds	1 Round	1 Round	3 Rounds	3 Rounds	3 Rounds	3 Rounds	3 Rounds	3 Rounds
	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Acetone	4			19			2	16	2					15
Benzene						4-5								
Bromodichloromethane														
Carbondisulfide	32	73	3			2						13		130
Chlorobenzene						19-24				6				
Chloroethane														
Chloroform		5-86												7-18
1,1-Dichloroethane		6												
1,2-Dichloroethene (total)	1-3	60-540							2					2-8
1,1-Dichloroethene	4													
Ethyl Benzene						7								
Methylene Chloride		16												
4-Methyl-2-Pentanone														
Tetrachloroethene		3-62	1											5-22
Toluene								2						
1,1,1-Trichloroethane														2
Trichloroethene	4	35-580	2									2	2	12-49
Vinyl Chloride		9-94								5				
Xylenes, Total						76-310								

File:pratt\ritab\gwvoc.wr1

TABLE 4-20
VOLATILE ORGANICS COMPOUNDS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	GZ-14M 3 Rounds UG/L	GZ-14S 3 Rounds UG/L	GZ-17D 3 Rounds UG/L	GZ-17M 3 Rounds UG/L	B3-I 3 Rounds UG/L	B4-I 2 Rounds UG/L	CE 06/25/90 1 Round UG/L	CW-15 06/13/90 1 Round UG/L	CW-20 06/13/90 1 Round UG/L	LORI 07/05/90 1 Round UG/L	LW-103D 06/15/90 1 Round UG/L	LW-103M 06/15/90 1 Round UG/L	LW-103S 06/15/90 1 Round UG/L
Acetone	4					3-57						24		15
Benzene						10-66	6-8							
Bromodichloromethane														
Carbondisulfide	32	8-16												
Chlorobenzene							18-34				5			
Chloroethane						9-96								
Chloroform														
1,1-Dichloroethane						1-15								
1,2-Dichloroethene (total)	1-3					1-22		8						
1,1-Dichloroethene	4													
Ethyl Benzene						110-710								
Methylene Chloride														
4-Methyl-2-Pentanone														
Tetrachloroethene														
Toluene						9-120								
1,1,1-Trichloroethane														
Trichloroethene	4							2						
Vinyl Chloride						160		3						
Xylenes, Total						63-480	9-22							

File:pratt\rltab\gwvoc.wr1

TABLE 4-20
VOLATILE ORGANICS COMPOUNDS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

									BACKGROUND WELLS		
		LW-15D	LW-15M	LW-15S	M	TB-7S	TW-17S	TW18S-I	GZ1-I	GZ-2	GZ-3
	BKGRD				06/08/90						06/13/90
		3 Rounds	3 Rounds	3 Rounds	1 Round	3 Rounds	3 Rounds	3 Rounds	3 Rounds	3 Rounds	1 Round
Analyte	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
Acetone	4						19			4	
Benzene							1				
Bromodichloromethane											
Carbondisulfide	32					1-5	1			32	
Chlorobenzene						9-11	2				
Chloroethane							3-9				
Chloroform					2						
1,1-Dichloroethane											
1,2-Dichloroethene (total)	1-3				7				3	1	
1,1-Dichloroethene	4									4	
Ethyl Benzene											
Methylene Chloride											
4-Methyl-2-Pentanone											
Tetrachloroethene											
Toluene							1				
1,1,1-Trichloroethane											
Trichloroethene	4				1					4	
Vinyl Chloride											
Xylenes, Total							9-14				

File:pratt\ritab\gwvoc.wr1

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	G301-I 09/15/92 1 Round UG/L	G302A-I 09/15/92 1 Round UG/L	G302B-I 09/15/92 1 Round UG/L	G302C-I 09/15/92 1 Round UG/L	G303A-I 09/14/92 1 Round UG/L	G303B-I 09/14/92 1 Round UG/L	G303C-I 09/14/92 1 Round UG/L	G304A-I 09/15/92 1 Round UG/L	G304B-I 09/15/92 1 Round UG/L
Acenaphthene		0.7								
Anthracene										
Benzo(a)Anthracene										
Benzoic Acid										
Chrysene										
Dibenzofuran										
1,2-Dichlorobenzene		5								
1,3-Dichlorobenzene		12								
1,4-Dichlorobenzene		20								
2,4-Dimethylphenol										
Fluoranthene										
Fluorene										
Isophorone										
2-Methylnaphthalene		1							20	
2-Methylphenol									47	2
4-Methylphenol									83	
Naphthalene	2	14							83	2
n-Nitrosodiphenylamine		2								4
Phenanthrene										
Phenol										
Benzyl Butyl Phthalate									130	5
Bis (2-Ethylhexyl) Phthalate									700	49
Diethyl Phthalate								0.7	170	3
Dimethyl Phthalate										
di-n-Butyl Phthalate									77	48
di-n-Octyl Phthalate									19	
Pyrene										
1,2,4-Trichlorobenzene		2								
Aroclor-1248										
Aroclor-1254									14	
Aroclor-1260									7.5	
Alpha-BHC										
Beta-BHC										
Delta-BHC										
Gamma-BHC (Lindane)				0.11						
gamma-Chlordane		0.12		0.3	0.07		0.12	0.03		
Endrin										0.17
Heptachlor				0.03			0.05	0.06		

File:pratt\ritab\gwsemi.wr1

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	G304C-I 09/15/92 1 Round UG/L	G304D-I 09/15/92 1 Round UG/L	G305-I 09/16/92 1 Round UG/L	G305-R 09/16/92 1 Round UG/L	G306A-B 09/14/92 1 Round UG/L	G306A-I 09/14/92 1 Round UG/L	G306B-I 09/14/92 1 Round UG/L	G306C-I 09/14/92 1 Round UG/L	G307-B 11/20/92 1 Round UG/L
Acenaphthene										
Anthracene										
Benzo(a)Anthracene										
Benzoic Acid										
Chrysene										
Dibenzofuran										
1,2-Dichlorobenzene										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
2,4-Dimethylphenol				20						
Fluoranthene										
Fluorene										
Isophorone								4		
2-Methylnaphthalene				11						
2-Methylphenol				31	98					
4-Methylphenol				110						
Naphthalene	2			98	100					
n-Nitrosodiphenylamine		10						10	5	
Phenanthrene										
Phenol				32						
Benzyl Butyl Phthalate				16						
Bis(2-Ethylhexyl) Phthalate				30				58	78	
Diethyl Phthalate				950	1000			1	2	
Dimethyl Phthalate				16					0.9	
di-n-Butyl Phthalate		73		16				95	40	
di-n-Octyl Phthalate									2	
Pyrene									2	
1,2,4-Trichlorobenzene										
Aroclor-1248										
Aroclor-1254										
Aroclor-1260										
Alpha-BHC				0.05						
Beta-BHC					0.09					
Delta-BHC										
Gamma-BHC (Lindane)										
gamma-Chlordane										
Endrin										
Heptachlor										

File:pratt\ritab\gwseml.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	G307-I 11/20/92 1 Round UG/L	G307-R 11/20/92 1 Round UG/L	G308A-I 11/20/92 1 Round UG/L	G308B-I 11/20/92 1 Round UG/L	G308C-I 11/20/92 1 Round UG/L	G309A-I 11/20/92 1 Round UG/L	G309B-I 11/20/92 1 Round UG/L	G309C-I 11/20/92 1 Round UG/L	GZ-4D 06/26/90 1 Round UG/L
Acenaphthene										
Anthracene										
Benzo(a)Anthracene										
Benzoic Acid										
Chrysene										
Dibenzofuran										
1,2-Dichlorobenzene										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
2,4-Dimethylphenol										
Fluoranthene										
Fluorene										
Isophorone										
2-Methylnaphthalene										
2-Methylphenol										
4-Methylphenol										
Naphthalene	2									
n-Nitrosodiphenylamine										
Phenanthrene										
Phenol										
Benzyl Butyl Phthalate										
Bis (2-Ethylhexyl) Phthalate										
Diethyl Phthalate								0.9		
Dimethyl Phthalate										
di-n-Butyl Phthalate		0.5				0.7	0.4	0.5		
di-n-Octyl Phthalate										
Pyrene										
1,2,4-Trichlorobenzene										
Aroclor-1248										
Aroclor-1254										
Aroclor-1260										
Alpha-BHC										
Beta-BHC										
Delta-BHC										
Gamma-BHC (Lindane)										
gamma-Chlordane										
Endrin										
Heptachlor										

File:pratt\ritab\gwsemi.wr1

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	GZ-4M 06/26/90 1 Round UG/L	GZ-4S 06/26/90 1 Round UG/L	GZ-5D 06/25/90 1 Round UG/L	GZ-5M 06/25/90 1 Round UG/L	GZ-5S 06/25/90 1 Round UG/L	GZ-7D 06/27/90 1 Round UG/L	GZ-7M 06/27/90 1 Round UG/L	GZ-7S 06/27/90 1 Round UG/L	GZ-17D 06/22/90 1 Round UG/L
Acenaphthene									29	
Anthracene									8	
Benzo(a)Anthracene									3	
Benzoic Acid									10	
Chrysene									2	
Dibenzofuran									28	
1,2-Dichlorobenzene										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
2,4-Dimethylphenol									2	
Fluoranthene									13	
Fluorene									30	
Isophorone										
2-Methylnaphthalene									38	
2-Methylphenol										
4-Methylphenol										
Naphthalene	2								110	
n-Nitrosodiphenylamine										
Phenanthrene									50	
Phenol										
Benzyl Butyl Phthalate										
Bis (2-Ethylhexyl) Phthalate										
Diethyl Phthalate									3	
Dimethyl Phthalate										
di-n-Butyl Phthalate										
di-n-Octyl Phthalate										
Pyrene									8	
1,2,4-Trichlorobenzene										
Aroclor-1248										
Aroclor-1254									8.3	
Aroclor-1260										
Alpha-BHC										
Beta-BHC										
Delta-BHC										
Gamma-BHC (Lindane)								0.026		
gamma-Chlordane										
Endrin										
Heptachlor										

File:pratt\ritab\gwsemi.wr1

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	GZ-17M 06/22/90 1 Round UG/L	B-3 06/28/90 1 Round	LW-15D 06/21/90 1 Round UG/L	LW-15M 06/21/90 1 Round UG/L	LW-15S 06/21/90 1 Round UG/L	M 06/08/90 1 Round UG/L	TB-7S 06/28/90 1 Round UG/L	TW-17S 06/22/90 1 Round UG/L
Acenaphthene									
Anthracene									
Benzo(a)Anthracene									
Benzoic Acid									
Chrysene									
Dibenzofuran									
1,2-Dichlorobenzene									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
2,4-Dimethylphenol			5						
Fluoranthene									
Fluorene									
Isophorone									
2-Methylnaphthalene									
2-Methylphenol									
4-Methylphenol									
Naphthalene	2		13						3
n-Nitrosodiphenylamine									
Phenanthrene									
Phenol									
Benzyl Butyl Phthalate									
Bis (2-Ethylhexyl) Phthalate				4					
Diethyl Phthalate									
Dimethyl Phthalate									
di-n-Butyl Phthalate									
di-n-Octyl Phthalate									
Pyrene									
1,2,4-Trichlorobenzene									
Aroclor-1248								1.4	
Aroclor-1254									
Aroclor-1260									
Alpha-BHC									
Beta-BHC									
Delta-BHC									
Gamma-BHC (Lindane)									
gamma-Chlordane									
Endrin									
Heptachlor									

File:pratt\ritab\gwsemi.wr1

TABLE 4-21
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

BACKGROUND WELL

Analyte	BKGRD UG/L	GZ-1 06/12/90 1 Round UG/L
Acenaphthene		
Anthracene		
Benzo(a)Anthracene		
Benzoic Acid		
Chrysene		
Dibenzofuran		
1,2-Dichlorobenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
2,4-Dimethylphenol		
Fluoranthene		
Fluorene		
Isophorone		
2-Methylnaphthalene		
2-Methylphenol		
4-Methylphenol		
Napnthalene	2	2
n-Nitrosodiphenylamine		
Phenanthrene		
Phenol		
Benzyl Butyl Phthalate		
Bis (2-Ethylhexyl) Phthalate		
Diethyl Phthalate		
Dimethyl Phthalate		
di-n-Butyl Phthalate		
di-n-Octyl Phthalate		
Pyrene		
1,2,4-Trichlorobenzene		
Aroclor-1248		
Aroclor-1254		
Aroclor-1260		
Alpha-BHC		
Beta-BHC		
Delta-BHC		
Gamma-BHC (Lindane)		
gamma-Chlordane		
Endrin		
Heptachlor		

File:pratt\ritab\gwsemi.wr1

TABLE 4-22
METALS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	G301-I 09/15/92 1 Round UG/L	G302A-I 09/15/92 1 Round UG/L	G302B-I 09/15/92 1 Round UG/L	G302C-I 09/15/92 1 Round UG/L	G303A-I 09/14/92 1 Round UG/L	G303B-I 09/14/92 1 Round UG/L	G303C-I 09/14/92 1 Round UG/L	G304A-I 09/15/92 1 Round UG/L	G304B-I 09/15/92 1 Round UG/L	G304C-I 09/15/92 1 Round UG/L	G304D-I 09/15/92 1 Round UG/L	G305-I 09/16/92 1 Round UG/L	G306A-I 09/14/92 1 Round UG/L	G306B-I 09/14/92 1 Round UG/L	G306C-I 09/14/92 1 Round UG/L
Aluminium	78.9-27300	51000	49500	178	560	63500		931	381000	3470	2730	27500	42300	27100	1020	498
Antimony									56							
Arsenic	4.3	11.3	5.1		2.1	8.2			23	2.8	2.3	5.3	16.4	3.6		
Barium	136-790	1030	763	72.3	73.1	1020	165	69.2	4100	91.1	31.9	258	1140	351	50.6	64 4
Beryllium	1.9-2	2.2	2.9			6.1			24.6			3.4	3.6	1.9		
Cadmium	5.2-15.4								2.9							
Calcium	22200-55600	62500	75800	29700	19200	88000	44300	16600	96500	41200	18000	41800	60700	28700	23500	47000
Chromium	38.8-51.3	82.1	102			120			1000	9.7	11.8	36.5	81.5	40.4		
Cobalt	25.5	32.6	33.3			58.6			325	4.2		5.9	33.8	26.6		
Copper	6.4-67.6	137	78.3	19.1	119	267	3.8	23.2	1240	26.6	23.7	46.8	74.6	46.2	18.8	15.4
Cyanide																
Iron	70.1-37300	91700	69900	1040	584	144000	262	1900	591000	5030	4920	15400	219000	38800	1690	801
Lead	9.2-47.5	51.3	23.2	5.8	14.2	70.8	1.7	33.3	277	6.1	4.7	17.1	35.2	13.3	4.6	3.1
Magnesium	4900-20200	43300	31200	4060	6520	42100	9070	3160	156000	6010	3010	14300	50500	12900	2870	7670
Manganese	8.9-12800	6490	5250	31.7	77	6310	531	78.3	23200	818	195	435	8610	1280	221	281
Mercury		0.09							0.1		0.1					
Nickel	45.1-61	55.6	66.6	8.1	5.8	98.4			530	7.6	13.8	44.7	66.3	36.8		
Potassium	5000-8320	51400	14200			16300			56000				27900			
Selenium																
Silver																
Sodium	6080-12200	76800	107000	6240	11800	51800	585000	7220	22100	19200	8560	65900	99000	6790	7420	11800
Thallium																
Vanadium	51.8-92.4	136	213		4.2	407	8.3	4.7	2290	11.4	7.4	26.1	212	102		
Zinc	110-165	153	207	58.6	152	241	29.2	55.8	1460	214	237	337	110	116	314	187

File:pratt\ritab\gwmetal.wr1

TABLE 4-22
METALS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	GZ-13M 06/18/90 1 Round UG/L	GZ-13S 06/18/90 1 Round UG/L	GZ-14D 06/19/90 1 Round UG/L	GZ-14M 06/19/90 1 Round UG/L	GZ-14S 06/19/90 1 Round UG/L	GZ-17D 06/22/90 1 Round Filtered UG/L	GZ-17D 06/22/90 1 Round UG/L	GZ-17M 06/22/90 1 Round Filtered UG/L	GZ-17M 06/22/90 1 Round UG/L	B-3 06/28/90 1 Round Filtered UG/L	B-3 06/28/90 1 Round UG/L	LORI 07/05/90 1 Round UG/L	LW-103D 06/15/90 1 Round UG/L	LW-103M 06/15/90 1 Round UG/L	LW-103S 06/15/90 1 Round UG/L
Aluminium	79.9-27300	64.3			65.4			565		13100		150000				
Antimony											60.1	841		65.6		
Arsenic	4.3										7.2	47.4				
Barium	136-790	101	76.9	173	68.4	82.6	141	146	111	272	1720	19400	138	213	191	100
Beryllium	1.9-2		1.6									9.9				
Cadmium	8.2-15.4										6	946				
Calcium	22200-55600	26800	9220	33900	1890	57800	39800	38000	40700	56100	38400	384000	54400	37200	55000	58200
Chromium	38.8-51.3									26.2		1170				
Cobalt	25.5											253				
Copper	6.4-67.6	12.2	6.7	5.8	8.8	11.2				39.1	15.3	35500	5.1	11.6	7.8	13.4
Cyanide											10.1					
Iron	70.1-37300	24.3		63.6	70.6			961		17600	23200	1010000	2200		28.7	22.8
Lead	9.2-47.5	2.1					5			9		15400	7.1	2.2		
Magnesium	4900-20200	2700	2790	4200	1890	6930	7530	7480	7300	14800	38800	97700	8750	6630	7560	7340
Manganese	8.9-12800	3	3.2	3.8		10.8	19.8	47.8	4.3	579	286	9600	214			
Mercury		0.5	0.2	1.1	1.7							0.7		0.3	0.3	0.3
Nickel	45.1-61									39.3	34.1	4390				
Potassium	5000-8320	927								3710	55000	77600	1500	1270		
Selenium												11.6				
Silver		10.8									13.9	902		12.3		
Sodium	6060-12200	6450	8380	9780	4260	5410	7640	7030	7600	8210	61000	73600	12800	8760	8690	8970
Thallium				1.2	16.6											
Vanadium	51.8-92.4									42.4		484		13.5		
Zinc	110-165	51.2	61.3	25.8	20	214	22.1	26.3	65.6	91	25.9	38200	14.5	23.8	35.7	13.7

File:pratt\ritab\gwmetal.wr1

TABLE 4-22
METALS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Analyte	BKGRD UG/L	LW-15D 06/21/90 1 Round Filtered UG/L	LW-15D 06/21/90 1 Round UG/L	LW-15M 06/21/90 1 Round Filtered UG/L	LW-15M 06/21/90 1 Round UG/L	LW-15S 06/21/90 1 Round Filtered UG/L	LW-15S 06/21/90 1 Round UG/L	M 06/08/90 1 Round UG/L	TB-7S 06/28/90 1 Round Filtered UG/L	TB-7S 06/28/90 1 Round UG/L	TW-17S 06/22/90 1 Round Filtered UG/L	TW-17S 06/22/90 1 Round UG/L	TW-18 06/20/90 1 Round UG/L
Aluminium	79.9-27300		7200		16800		69500	435		31700		36400	
Antimony							101			164			
Arsenic	4.3						8.7			5		8.9	
Barium	136-790	237	383	42.3	224	208	776	210	360	888	152	891	138
Beryllium	1.9-2				1.3		4.3			1.8		3	
Cadmium	8.2-15.4				11	7.7	25.3		10.7	95.3		14.8	
Calcium	22200-55600	50800	54600	50500	53200	50700	63300	36200	60700	74800	37200	47400	12600
Chromium	38.8-51.3		15.2		44.7		138			120		82.4	
Cobalt	25.5						51.1			38.8		33.2	
Copper	6.4-67.6		23.3		52	6.3	150	25.9	5.1	306		139	11.5
Cyanide									9.3				
Iron	70.1-37300		15200	28	51800	24300	107000	1800	63800	183000	21400	61400	1200
Lead	9.2-47.5		15		10	2.4	90.6	10.5	3.4	894	24.9	50.6	2.3
Magnesium	4900-20200	8840	12900	8940	18100	14600	43100	9220	5740	13100	9120	23700	4320
Manganese	8.9-12800		359	19.3	979	1660	2860	25.2	1230	2700	584	1230	570
Mercury		1.6	0.7	0.5	0.9	0.7	2.8			6			
Nickel	45.1-61		16		36.8		111		42.8	556		61.1	
Potassium	5000-8320		1690		4410	1670	16100		4030	6850		5410	
Selenium													
Silver										16.9			
Sodium	6080-12200	7930	7930	7840	8420	9670	12000	11600	54700	54400	26700	27200	9920
Thallium													
Vanadium	51.8-92.4		42.3		101		303	15.7		93.4		282	
Zinc	110-165	13.6	64.6	17.4	114	33.5	352	28.3	21.7	2030	193	188	31

File:pratt\ritab\gwmetal.wr1

TABLE 4-22
METALS DETECTED
GROUNDWATER
Old Southington Landfill Superfund Project
Southington, Connecticut

BACKGROUND WELLS

Analyte	BKGRD UG/L	GZ-1 06/12/90 1 Round Filtered UG/L	GZ-1 06/12/90 1 Round UG/L	GZ-2 06/12/90 1 Round UG/L	GZ-3 06/13/90 1 Round Filtered UG/L	GZ-3 06/13/90 1 Round UG/L
Aluminium	79.9-27300	1370	16500	79.9	233	27300
Antimony						
Arsenic	4.3		4.3			
Barium	136-790	268	378	136	173	790
Beryllium	1.9-2		1.9			2
Cadmium	8.2-15.4		8.2			15.4
Calcium	22200-55600	39900	53600	22200	46600	55600
Chromium	38.8-51.3		38.8			51.3
Cobalt	25.5					25.5
Copper	6.4-67.6	9.8	57.5	6.4	6.7	67.6
Cyanide						
Iron	70.1-37300	59.1	18700	70.1	78.1	37300
Lead	9.2-47.5	4.2	35.7	9.2	7.6	47.5
Magnesium	4900-20200	6270	16800	4900	7390	20200
Manganese	8.9-12800	4	706	8.9	15.4	12800
Mercury						
Nickel	45.1-61		45.1			61
Potassium	5000-8320		5000			8320
Selenium						
Silver						
Sodium	6080-12200	7100	8200	6080	10000	12200
Thallium						
Vanadium	51.8-92.4		51.8			92.4
Zinc	110-165	39.7	110	165	66.5	126

File:pratt\ritab\gwmetal.wr1

TABLE 4-23
WELL LOCATIONS EXCEEDING FEDERAL/CONNECTICUT MCL
Old Southington Landfill Superfund Project
Southington, Connecticut

ANALYTES	MCL UG/L	WELL LOCATIONS								
		G301	G302A	G303A	G303C	G304A	G304B	G304C	G304D	G305
VOLATILE ORGANICS										
BENZENE	1 (CT)	X	X				X			
CHLOROFORM	100 (F)									
DICHLOROETHANE, 1,1-	1 (CT)		X	X		X				X
DICHLOROETHENE, 1,2 (TOTAL)	70 (F)	X				X				X
ETHYL BENZENE	700 (F)					X				X
METHYLENE CHLORIDE	5 (F)									
TETRACHLOROETHENE	5 (F)									
TOLUENE	1000 (F)					X				X
TRICHLOROETHANE, 1,1,1-	200 (F)					X				X
TRICHLOROETHENE	5 (F)							X		
VINYL CHLORIDE	2 (F)	X				X	X	X		X
XYLENES, TOTAL	10000 (F)					X				
SEMIVOLATILE ORGANICS										
BENZYL BUTYL PHTHALATE	100 (F)					X				
BIS(2-ETHYLHEXYL) PHTHALATE	4(F)					X	X			X
PESTICIDES/PCB										
AROCLOR-1248	0.5 (F)									
AROCLOR-1254	0.5 (F)					X				
AROCLOR-1260	0.5 (F)					X				
METALS										
ANTIMONY (PROPOSED)	6 (F)					X				
BARIUM	1000 (CT)	X		X		X				X
BERYLLIUM (PROPOSED)	1 (F)	X	X	X		X			X	X
CADMIUM	5 (F)									
CHROMIUM	50 (CT)	X	X	X		X				X
COPPER	1000 (CT)									
LEAD	15 (F)	X	X	X	X	X			X	X
MANGANESE	5000 (CT)	X	X	X		X				X
MERCURY	2 (F)									
NICKEL (PROPOSED)	100 (F)					X				
SELENIUM	10 (CT)									
SILVER	50 (F)									
THALLIUM (PROPOSED)	2 (F)									

File:pratt\ritab\gwmcl.wr1

TABLE 4-23
WELL LOCATIONS EXCEEDING FEDERAL/CONNECTICUT MCL
Old Southington Landfill Superfund Project
Southington, Connecticut

RI
Revision: 0
Date: 4/12/93

ANALYTES	MCL UG/L	WELL LOCATIONS								
		G306A	G306B	G306C	G307	G308A	G308B	G308C	G309A	G309B
VOLATILE ORGANICS										
BENZENE	1 (CT)		X							X
CHLOROFORM	100 (F)							X		
DICHLOROETHANE, 1,1-	1 (CT)									X
DICHLOROETHENE, 1,2 (TOTAL)	70 (F)				X					X
ETHYL BENZENE	700 (F)									
METHYLENE CHLORIDE	5 (F)				X					
TETRACHLOROETHENE	5 (F)							X		
TOLUENE	1000 (F)									
TRICHLOROETHANE, 1,1,1-	200 (F)									
TRICHLOROETHENE	5 (F)			X	X			X		X
VINYL CHLORIDE	2 (F)									X
XYLENES, TOTAL	10000 (F)									
SEMIVOLATILE ORGANICS										
BENZYL BUTYL PHTHALATE	100 (F)									
BIS(2-ETHYLHEXYL) PHTHALATE	4(F)		X	X						
PESTICIDES/PCB										
AROCLOR-1248	0.5 (F)									
AROCLOR-1254	0.5 (F)									
AROCLOR-1260	0.5 (F)									
METALS										
ANTIMONY (PROPOSED)	6 (F)				X	X	X		X	
BARIUM	1000 (CT)				X	X			X	
BERYLLIUM (PROPOSED)	1 (F)	X			X	X	X	X	X	X
CADMIUM	5 (F)									
CHROMIUM	50 (CT)				X	X	X		X	
COPPER	1000 (CT)								X	
LEAD	15 (F)				X	X	X	X	X	X
MANGANESE	5000 (CT)				X				X	
MERCURY	2 (F)									
NICKEL (PROPOSED)	100 (F)				X	X	X		X	
SELENIUM	10 (CT)									
SILVER	50 (F)									
THALLIUM (PROPOSED)	2 (F)									

File:pratt\ritab\gwmcl.wr1

TABLE 4-23
WELL LOCATIONS EXCEEDING FEDERAL/CONNECTICUT MCL
Old Southington Landfill Superfund Project
Southington, Connecticut

ANALYTES	MCL UG/L	WELL LOCATIONS							
		G309C	B3	B4	CE	GZ-1	GZ-3	GZ-4S	GZ-4M
VOLATILE ORGANICS									
BENZENE	1 (CT)		X	X					
CHLOROFORM	100 (F)								
DICHLOROETHANE, 1,1-	1 (CT)		X					X	X
DICHLOROETHENE, 1,2 (TOTAL)	70 (F)								
ETHYL BENZENE	700 (F)		X						
METHYLENE CHLORIDE	5 (F)								
TETRACHLOROETHENE	5 (F)	X							
TOLUENE	1000 (F)								
TRICHLOROETHANE, 1,1,1-	200 (F)								
TRICHLOROETHENE	5 (F)	X							
VINYL CHLORIDE	2 (F)		X		X				
XYLENES, TOTAL	10000 (F)								
SEMIVOLATILE ORGANICS									
BENZYL BUTYL PHTHALATE	100 (F)								
BIS(2-ETHYLHEXYL) PHTHALATE	4(F)								
PESTICIDES/PCB									
AROCLOR-1248	0.5 (F)								
AROCLOR-1254	0.5 (F)								
AROCLOR-1260	0.5 (F)								
METALS									
ANTIMONY (PROPOSED)	6 (F)	X	X						
BARIUM	1000 (CT)		X						
BERYLLIUM (PROPOSED)	1 (F)		X			X		X	
CADMIUM	5 (F)		X				X	X	
CHROMIUM	50 (CT)		X				X	X	
COPPER	1000 (CT)		X						
LEAD	15 (F)	X	X			X	X	X	
MANGANESE	5000 (CT)		X				X		
MERCURY	2 (F)								
NICKEL (PROPOSED)	100 (F)		X						
SELENIUM	10 (CT)		X						
SILVER	50 (F)		X						
THALLIUM (PROPOSED)	2 (F)								

File:pratt\ritab\gwmcl.wr1

TABLE 4-23
WELL LOCATIONS EXCEEDING FEDERAL/CONNECTICUT MCL
Old Southington Landfill Superfund Project
Southington, Connecticut

ANALYTES	MCL UG/L	WELL LOCATIONS							
		GZ-5M	GZ-5D	GZ-7S	GZ-7M	GZ-12M	GZ13S	GZ-14M	GZ-14D
VOLATILE ORGANICS									
BENZENE	1 (CT)			X					
CHLOROFORM	100 (F)								
DICHLOROETHANE, 1,1-	1 (CT)	X	X						
DICHLOROETHENE, 1,2 (TOTAL)	70 (F)	X							
ETHYL BENZENE	700 (F)								
METHYLENE CHLORIDE	5 (F)	X							
TETRACHLOROETHENE	5 (F)	X							X
TOLUENE	1000 (F)								
TRICHLOROETHANE, 1,1,1-	200 (F)								
TRICHLOROETHENE	5 (F)	X							X
VINYL CHLORIDE	2 (F)	X				X			
XYLENES, TOTAL	10000 (F)								
SEMIVOLATILE ORGANICS									
BENZYL BUTYL PHTHALATE	100 (F)								
BIS(2-ETHYLHEXYL) PHTHALATE	4(F)								
PESTICIDES/PCB									
AROCLOR-1248	0.5 (F)								
AROCLOR-1254	0.5 (F)			X					
AROCLOR-1260	0.5 (F)								
METALS									
ANTIMONY (PROPOSED)	6 (F)			X					
BARIUM	1000 (CT)	X							
BERYLLIUM (PROPOSED)	1 (F)			X	X		X		
CADMIUM	5 (F)	X		X	X				
CHROMIUM	50 (CT)			X					
COPPER	1000 (CT)								
LEAD	15 (F)				X				
MANGANESE	5000 (CT)			X					
MERCURY	2 (F)								
NICKEL (PROPOSED)	100 (F)								
SELENIUM	10 (CT)								
SILVER	50 (F)			X					
THALLIUM (PROPOSED)	2 (F)							X	

File:pratt\ritab\gwmcl.wr1

TABLE 4-23
WELL LOCATIONS EXCEEDING FEDERAL/CONNECTICUT MCL
Old Southington Landfill Superfund Project
Southington, Connecticut

ANALYTES	MCL UG/L	WELL LOCATIONS				
		LW-103D	LW-15S	LW-15M	TB-7S	TW-17S
VOLATILE ORGANICS						
BENZENE	1 (CT)					
CHLOROFORM	100 (F)					
DICHLOROETHANE, 1,1-	1 (CT)					
DICHLOROETHENE, 1,2 (TOTAL)	70 (F)					
ETHYL BENZENE	700 (F)					
METHYLENE CHLORIDE	5 (F)					
TETRACHLOROETHENE	5 (F)					
TOLUENE	1000 (F)					
TRICHLOROETHANE, 1,1,1-	200 (F)					
TRICHLOROETHENE	5 (F)					
VINYL CHLORIDE	2 (F)					
XYLENES, TOTAL	10000 (F)					
SEMIVOLATILE ORGANICS						
BENZYL BUTYL PHTHALATE	100 (F)					
BIS(2-ETHYLHEXYL) PHTHALATE	4(F)					
PESTICIDES/PCB						
AROCLOR-1248	0.5 (F)				X	
AROCLOR-1254	0.5 (F)					
AROCLOR-1260	0.5 (F)					
METALS						
ANTIMONY (PROPOSED)	6 (F)	X	X		X	
BARIUM	1000 (CT)					
BERYLLIUM (PROPOSED)	1 (F)		X	X	X	X
CADMIUM	5 (F)		X	X	X	X
CHROMIUM	50 (CT)		X		X	X
COPPER	1000 (CT)					
LEAD	15 (F)		X		X	X
MANGANESE	5000 (CT)					
MERCURY	2 (F)		X		X	
NICKEL (PROPOSED)	100 (F)				X	
SELENIUM	10 (CT)					
SILVER	50 (F)					
THALLIUM (PROPOSED)	2 (F)					

File:pratt\ritab\gwmcl.wr1

TABLE4-24
VOLATILE ORGANIC COMPOUNDS DETECTED
SEDIMENTS
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SED-1-I 06/11/92 UG/KG	SED-2(SED3) 07/03/90 UG/KG	SED-2-I 06/12/92 UG/KG	SED-3-I 06/12/92 UG/KG	SED-4 07/03/90 UG/KG	SED-4-I 06/12/92 UG/KG	SED-5 07/03/90 UG/KG	SED-5-I 06/11/92 UG/KG	SED-6(SED2) 07/03/90 UG/KG	SED-6-I 06/11/92 UG/KG
Acetone	20			240		210		320		39
Benzene										
2-Butanone								100		
Carbondisulfide					210					
Chlorobenzene										
Chloromethane										
1,2-Dichloroethene (total)								38		9
1,1-Dichloroethene										
Methylene Chloride		7		53			2	28		
Toluene								120		
Trichloroethene										
Xylenes, Total										

Analyte	SED-7 07/03/90 UG/KG	SED-7-I 06/12/92 UG/KG	SED-7R(SED8) 07/03/90 Replicate UG/KG	SED-8-I 06/11/92 UG/KG	SED-9-I 06/12/92 UG/KG	SED-10-I 06/12/92 UG/KG	SED-11(SED1) 07/03/90 UG/KG	SED-11-I 06/11/92 UG/KG
Acetone				80	780	170		72
Benzene	9		32		26			
2-Butanone	110			46				
Carbondisulfide					20			
Chlorobenzene	120		370					
Chloromethane			57				4	
1,2-Dichloroethene (total)	8							19
1,1-Dichloroethene	9							
Methylene Chloride					23			
Toluene		4		4300		110		
Trichloroethene								18
Xylenes, Total	360		1500					

File:pratt\ritab\sedvoc.wr1

TABLE 4-25
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
SEDIMENTS
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SED-1 06/11/92 UG/KG	SED-2 06/12/92 UG/KG	SED-2(SED3) 07/03/90 UG/KG	SED-3 06/12/92 UG/KG	SED-4 07/03/90 UG/KG	SED-4 06/12/92 UG/KG	SED-5 07/03/90 UG/KG	SED-5 06/11/92 UG/KG	SED-6 06/11/92 UG/KG	SED-7 07/03/90 UG/KG
Acenaphthene		39					450			120
Acenaphthylene		80					2200	610	480	57
Anthracene		110					3700	390	190	45
Benzo(a)Anthracene	95	480	150		600		8000	2500	1000	220
Dibenzo(a,h)Anthracene		180					890	620		
Carbazole		38						430	110	
Chrysene	92	450	160		490	350	10000	2800	1300	310
Dibenzofuran		39					550			43
1,3-Dichlorobenzene										
Fluoranthene	220	840	240	610	660	650	21000	5900	1800	400
Benzo(b)Fluoranthene	130	810					6700	4300	2200	230
Benzo(k)Fluoranthene	93	340					8500	3200	1700	290
Fluorene		99						220		110
2-Methylnaphthalene										280
4-Methylphenol										
Naphthalene								230		1100
4-Nitroaniline							2000			
Benzo(g,h,i)Perylene		200					5500	1700	900	180
Phenanthrene	88	570	150	460	370	290	18000	2600	570	310
Phenol										
Benzyl Butyl Phthalate							770			
Bis (2-Ethylhexyl) Phthalate	140				890	260	930	2100	1300	160
di-n-Butyl Phthalate										
Pyrene	180	660	260	480	580	520	22000	4800	2100	370
Benzo(a)Pyrene	96	620					9100	2700	1300	240
Indeno(1,2,3,cd)Pyrene	46	280					7800	1700	1100	210
Aroclor-1242	34									
Aroclor-1254	110									
Aroclor-1260	28	38						350	120	
alpha-Chlordane								15	14	

File:pratt\ritab\sedsem.wr1

TABLE 4-25
SEMIVOLATILE COMPOUNDS, PESTICIDES, PCB DETECTED
SEDIMENTS
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SED-7 06/12/92 UG/KG	SED-7R(SED8) 07/03/90 Replicate UG/KG	SED-8 06/11/92 UG/KG	SED-9 06/12/92 UG/KG	SED-10 06/12/92 UG/KG	SED-11 06/11/92 UG/KG
Acenaphthene		410	540			
Acenaphthylene		310	210			45
Anthracene		180	1300			
Benzo(a)Anthracene	62	570	6100			210
Dibenzo(a,h)Anthracene			1500			
Carbazole			1600			
Chrysene	77	910	7800		320	240
Dibenzofuran		160	540			
1,3-Dichlorobenzene						44
Fluoranthene	120	1200	18000		620	470
Benzo(b)Fluoranthene	110	910	8800			310
Benzo(k)Fluoranthene		590	5400			220
Fluorene		370	860			
2-Methylnaphthalene		580				
4-Methylphenol			4700			
Naphthalene		3200				
4-Nitroaniline						
Benzo(g,h,i)Perylene		620	1700			180
Phenanthrene	53	850	9800		360	97
Phenol			460			
Benzyl Butyl Phthalate	46					
Bis (2-Ethylhexyl) Phthalate		320	1700	3300		300
di-n-Butyl Phthalate		3900		3200		
Pyrene	120	1400	14000		570	290
Benzo(a)Pyrene		870	5800			220
Indeno(1,2,3,cd)Pyrene		770	3200			180
Aroclor-1242						
Aroclor-1254						
Aroclor-1260						
alpha-Chlordane			46			2.8

File:pratt\ritab\sedsem.wr1

TABLE 4-26
METAL COMPOUNDS DETECTED
SEDIMENTS
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SED-1-I 06/11/92 MG/KG	SED-2(SED3) 07/03/90 MG/KG	SED-2 06/12/92 MG/KG	SED-3 06/12/92 MG/KG	SED-4 07/03/90 MG/KG	SED-4 06/12/92 MG/KG	SED-5 07/03/90 MG/KG	SED-5 06/11/92 MG/KG	SED-6(SED2) 07/03/90 MG/KG	SED-6 06/11/92 MG/KG
Aluminium	6900	4200	3020	4460	1520	1920	6140	15300	6000	16900
Antimony										
Arsenic	1.7		1.4	10.4		4.7	0.8	7.3		5.6
Barium	78.9	40.7	46.6	279	158	227	36.7	438	75.1	255
Beryllium	0.46	0.27	0.18				0.37	0.89	0.39	1
Cadmium		2.6	0.72				2.7		3.7	
Calcium	1820	834	891	30200	12400	14400	612	5610	1160	4320
Chromium	12.8	7.6	7.7	17.6		4.3	12.4	42.3	13.1	35.3
Cobalt	6.1		3.9	12.8			4.4	20.3		14.4
Copper	89.3	14.5	24	45.7	21.8	26.8	9.5	86.5	21.4	92.5
Iron	12300	5830	8020	28000	8090	13000	10500	42600	12000	37300
Lead	55.1	11.2	133	106		142	3.6	279	33.2	234
Magnesium	3130	1690	1400	2110	1050	1310	2780	5190	2770	5910
Manganese	204	97.8	79.1	2640	1970	1480	176	11900	632	1990
Mercury				0.96				0.58		0.23
Nickel	35.8	9.5	12.6	38.8		20.8	10.3	42.6	13.1	32.4
Potassium		752					966	2850	927	2920
Sodium	95		67	777	533	430		537	162	316
Vanadium	27.6	14.5	12.3	22		14.3	26	57.6	20.7	65.6
Zinc	124	35.1	115	303	60.4	224	32.3	535	79.3	365

File:pratt\ritab\sedmetal.wr1

TABLE 4-26
METAL COMPOUNDS DETECTED
SEDIMENTS
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SED-7 07/03/90 MG/KG	SED-7 06/12/92 MG/KG	SED-7R(SED8) 07/03/90 Replicate MG/KG	SED-8 06/11/92 MG/KG	SED-9 06/12/92 MG/KG	SED-10 06/12/92 MG/KG	SED-11(SED1) 07/03/90 MG/KG	SED-11 06/11/92 MG/KG
Aluminium	6030	5580	8560	5080	13700	5960	3550	5960
Antimony		7.6						
Arsenic	1.2	1.6	1.7	1.9	11.4	5.8		1.8
Barium	118	60.6	156	39.4	249	329	36.1	63.9
Beryllium	0.42	0.4	0.62		1.3			0.37
Cadmium	8.2		13.2				2.7	0.41
Calcium	5880	3390	5250	1840	6480	32200	1510	1820
Chromium	24.1	10.7	35.4	11.6	34	15.3	11	13.1
Cobalt		5.8		4.3	17.5	15.7		5.3
Copper	42.1	13.8	57.2	18.8	88.2	42.4	22.7	32.5
Iron	29200	12300	45000	9010	47400	32200	7980	15300
Lead	83.2	32.3	109	32.8	175	133	67.5	76.3
Magnesium	2260	2880	3180	1840	4380	2760	1700	2930
Manganese	300	195	449	197	1040	3060	145	278
Mercury		0.83			0.68	0.91		0.1
Nickel	22.8	10.7	33.4	7.6	37.1	28.9	7.6	12.6
Potassium	865		1270				652	
Sodium	174	98.7	277	130	512			125
Vanadium	23	21.5	31.4	19	63.8	35.9	15.3	26.3
Zinc	244	63.8	340	59.3	425	365	82.7	148

File:pratt\rltab\sedmetal.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-27
ORGANIC COMPOUNDS DETECTED
SURFACE WATER
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SWS-1 06/29/90 UG/L	SWS-1 06/11/92 UG/L	SWS-2 06/29/90 UG/L	SWS-2 06/12/92 UG/L	SWS-3 06/12/92 UG/L	SWS-4 06/29/90 UG/L	SWS-4 06/12/92 UG/L	SWS-5 06/29/90 UG/L	SWS-5 06/11/92 UG/L	SWS-5R(SW9) 06/29/90 Replicate UG/L	SWS-6 06/29/90 UG/L	SWS-6 06/11/92 UG/L
Carbondisulfide			4	13	1		15	5		23		
Chlorobenzene												
1,2-Dichloroethene (total)									4			6
1,2-Dichloropropane												
Trichloroethene												2
Vinyl Chloride												
Xylenes, Total												
1,3-Dichlorobenzene												1
1,4-Dichlorobenzene												
Naphthalene						3				8		
di-n-Butyl Phthalate				0.7			0.6					

Analyte	SWS-7 06/29/90 UG/L	SWS-7 06/12/92 UG/L	SWS-8 06/11/92 UG/L	SWS-9 06/12/92 UG/L	SWS-10 06/12/92 UG/L	SWS-11 06/11/92 UG/L
Carbondisulfide	12		2			
Chlorobenzene	2					
1,2-Dichloroethene (total)						9
1,2-Dichloropropane						
Trichloroethene						3
Vinyl Chloride						3
Xylenes, Total	3					
1,3-Dichlorobenzene						2
1,4-Dichlorobenzene						0.7
Naphthalene						
di-n-Butyl Phthalate						

File:pratt\ritab\swsvoc.wr1

TABLE 4-28
METALS DETECTED
SURFACE WATER
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SWS-1 06/29/90 UG/L	SWS-1 06/11/92 UG/L	SWS-1 06/11/92 Filtered UG/L	SWS-2 06/29/90 UG/L	SWS-2 06/12/92 UG/L	SWS-2 06/12/92 Filtered UG/L	SWS-3 06/12/92 UG/L	SWS-3 06/12/92 Filtered UG/L	SWS-4 06/29/90 UG/L	SWS-4 06/12/92 UG/L
Aluminium	114				57.5		41.4		111	45.8
Antimony				78.1						
Arsenic										
Barium	311	96.4	92.6	262	57.2	63.5	53.7	77.2	84.5	53.1
Cadmium										
Calcium	67400	21000	20900	22000	14600	14400	14500	14500	20300	14700
Chromium				12.1						
Cobalt										
Copper	16.9			15.2	3.4		3.6	3.6	6.9	
Iron	9620	2800	399	1960	663	481	640	435	666	732
Lead		4.5		3.8						
Magnesium	11200	5060	5010	10100	4290	4300	4170	4120	5870	4130
Manganese	5580	350	336	1000	138	129	129	109	212	186
Mercury	0.9									
Nickel										
Potassium	4670			8340					5370	
Silver				18.1						
Sodium	29700	22000	21900	28900	21300	21400	21600	21600	24900	21600
Thallium		2.8								
Vanadium										
Zinc				17.5						

File:pratt\ritab\swsinor.wr1

TABLE 4-28
METALS DETECTED
SURFACE WATER
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SWS-4 06/12/92 Filtered UG/L	SWS-5 06/29/90 UG/L	SWS-5 06/11/92 UG/L	SWS-5 06/11/92 Filtered UG/L	SWS-5R(SW9) 06/29/90 Replicate UG/L	SWS-6 06/29/90 UG/L	SWS-6 06/11/92 UG/L	SWS-6 06/11/92 Filtered UG/L	SWS-7 06/29/90 UG/L	SWS-7 06/12/92 UG/L
Aluminium		124			256	203			4810	4710
Antimony										
Arsenic										1.9
Barium	82	171	57.9	58.6	185	156	93.3	78.8	583	266
Cadmium									20.7	
Calcium	14200	20600	15100	15100	20900	55400	24300	23500	73900	58200
Chromium									25.9	14.2
Cobalt										11.1
Copper	3	8.5			11.4	11.1			45.6	19.4
Iron	503	2010	823	227	2750	1910	1950	1220	70900	16100
Lead									65.4	52.1
Magnesium	3970	7920	4480	4480	7950	8600	5720	5510	11900	7500
Manganese	104	757	141	111	1050	733	413	383	2200	2210
Mercury										
Nickel									58.2	25.9
Potassium		6880			6940	1780			7110	
Silver										
Sodium	21100	26600	22200	22400	26500	12200	21300	20400	29400	29700
Thallium										
Vanadium									18.2	11.6
Zinc									295	243

File:pratt\ritab\swsinor.wr1

RI
Revision: 0
Date: 4/12/93

TABLE 4-28
METALS DETECTED
SURFACE WATER
Southington Landfill Superfund Project
Southington, Connecticut

Analyte	SWS-7 06/12/92 Filtered UG/L	SWS-8 06/11/92 UG/L	SWS-8 06/11/92 Filtered UG/L	SWS-9 06/12/92 UG/L	SWS-9 06/12/92 Filtered UG/L	SWS-10 06/12/92 UG/L	SWS-10 06/12/92 Filtered UG/L	SWS-11 06/11/92 UG/L	SWS-11 06/11/92 Filtered UG/L
Aluminium		131				210			
Antimony									
Arsenic									
Barium	214	47.8	70.4	47.2	77.2	108	131	86.9	114
Cadmium									
Calcium	54500	20100	19900	14300	14000	27900	27700	24400	24500
Chromium		2.8							
Cobalt	5.3								
Copper		3.2				3.8			
Iron	1510	2580	2000	519	363	5970	719	2640	1760
Lead		1.8				5.3			
Magnesium	6070	4580	4550	4000	3930	4900	4880	5480	5490
Manganese	1770	575	546	100	85.3	1760	1650	290	280
Mercury							0.24		
Nickel	13.1								
Potassium									
Silver									
Sodium	29500	19500	19700	21200	21000	4870	5180	20400	20500
Thallium									
Vanadium									
Zinc	50.8					28.6	24.2		22.8

File:pratt\ritab\swsinor.wr1

TABLE 4-29
WATER QUALITY PARAMETER
SURFACE WATER
Old Southington Landfill Superfund Project
Southington, Connecticut

Parameter	SWS-1 6/29/90	SWS-1 6/11/92	SWS-2 6/29/90	SWS-2 6/11/92	SWS-3 6/11/92	SWS-4 6/29/90	SWS-4 6/11/92	SWS-5 6/29/90	SWS-5R 6/29/90 Replicate	SWS-5 6/11/92	SWS-6 6/29/90	SWS-6 6/11/92	SWS-7 6/29/90	SWS-7 6/11/92	SWS-8 6/11/92	SWS-9 6/11/92	SWS-10 6/11/92	SWS-11 6/11/92
Ammonia-Nitrogen	0.87	1.15	8.4	1.3	1.08	0.73	0.97	4.6	5.1	1.21	0.47	1.6	1	0.02	0.67	0.97	0.86	1.42
Alkalinity (asCaCO3)	190	74	110	56	54	66	53	88	90	56	130	80	210	200	70	53	100	80
Chemical Oxygen Demand	24	22	150	24	21	20	46	28	32	24	8.1	24	77	59	28	22	47	30
Nitrate/Nitrite Nitrogen	0.48	0.07	0.3	0.2	0.19	0.51	0.21	0.89	0.53	0.16	1.1	0.34	0.26	<0.01	0.07	0.18	0.01	0.3
Phosphate, Total as P	NA	0.07	NA	0.04	0.03	NA	0.03	NA	NA	0.03	NA	0.04	NA	0.11	0.1	0.03	0.05	0.04
Total Suspended Solids	NA	2.8	NA	1.6	1.3	NA	2.7	NA	NA	1.6	NA	3.3	NA	120	6.6	1.9	17	4.3
Total Hardness	210	73	88	19	19	69	19	80	82	56	160	84	220	66	25	18	33	84
Sulfate	NA	3.2	NA	3.5	3.3	NA	3.3	NA	NA	3.1	NA	6.7	NA	1.3	3.1	3.4	3.2	7.2
Chloride	38	NA	51	NA	NA	46	NA	42	46	NA	21	NA	33	NA	NA	NA	NA	NA
Total Dissolved Solids	360	NA	230	NA	NA	170	NA	220	220	NA	270	NA	390	NA	NA	NA	NA	NA

NA - Not Analyzed

File: pratt\ritab\watqual.wr1

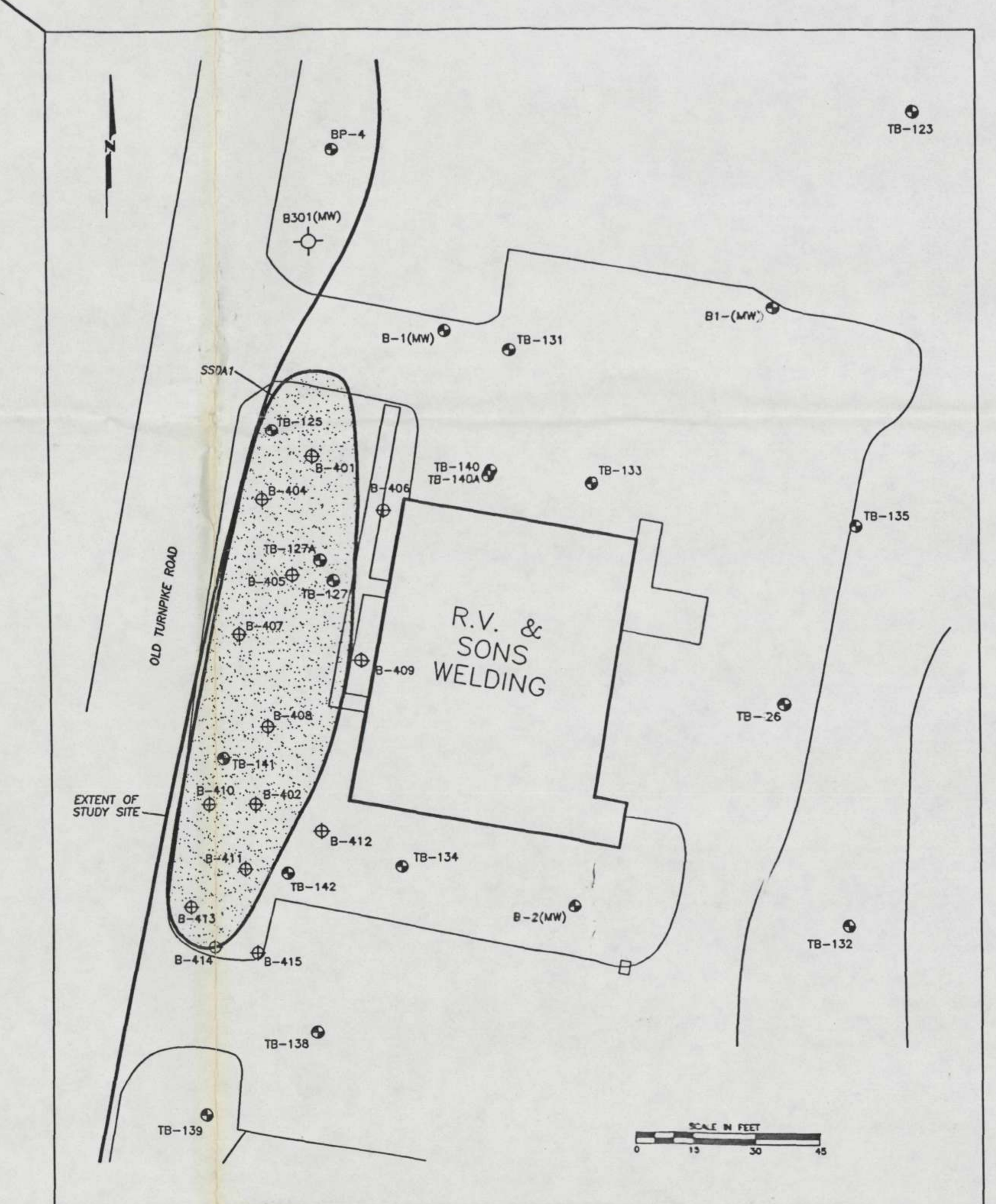
TABLE 5-1
SATURATED AND UNSATURATED SOIL ORGANIC CARBON CONTENT
Old Southington Landfill Superfund Project
Southington, Connecticut

Location	Sample Depth (ft)	TOC (Total Organic Carbon) gm/gm, expressed as %	Relative Soil Moisture Content
B301	10-19.5	0.2	Saturated
B302	33-45	0.3	Saturated
B302B	83-88	<.1	Saturated
B302C	15-25	<.1	Saturated
B303	17-27	<.1	Saturated
B304	30-40	<.1	Saturated
B304	70-80	<.1	Saturated
B304	145-155	<.1	Saturated
B304	155-159	<.1	Saturated
B305	29-41	0.7	Saturated
B306B	110-120	<.1	Saturated
B306C	168-178	<.1	Saturated
B307	26-41	<.1	Saturated
B308	15-25	<.1	Saturated
B308	50-60	<.1	Saturated
B308	95-104	<.1	Saturated
B309	3-16	<.1	Unsaturated
B309	44-54	<.1	Saturated
B309	85-90	<.1	Saturated
GZ-5S	10-12	<.1	Unsaturated
GZ-5S(dup)	10-12	<.1	Unsaturated
GZ-12D	5-10	<.1	Unsaturated
GZ-12D	90-93	<.1	Saturated
GZ-13D	155-160	<.1	Saturated
GZ-14M	80-85	<.1	Saturated
TB-25	20-24	0.1	Unsaturated
TB-26	11-13	0.2	Saturated

File:pratt\ritab\soilphy.wr1

LEGEND

CW15	GROUND WATER MONITORING WELL INSTALLLED FOR THE COMPLETION OF PUMP TEST AT MUNICIPAL WELL MW-5, BY GERAGHTY & MILLER IN JULY 1965.
TW16	LOCATION OF BORINGS AND MONITORING WELLS INSTALLED FOR WARZYN, 1980.
LW-101S	LOCATION OF GROUNDWATER MONITORING WELLS INSTALLED BY GZA DRILLING, INC., AND EAST COAST DRILLING, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., IN NOVEMBER 1984, AND JANUARY 1985. LETTER SUFFIX INDICATES RELATIVE DEPTH OF INDICATED WELL SCREEN WITHIN THE WELL CLUSTER(S-SHALLOW, M-MEDIUM, D-DEEP).
B-1	LOCATION OF GROUNDWATER OBSERVATION WELLS INSTALLED BY EAST COAST DRILLING, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., IN 1986.
GZ-4S, GZ-14	LOCATION OF GROUNDWATER MONITORING WELLS INSTALLED BY GENERAL BORINGS, INC., AND CLARENCE WELTI ASSOCIATES, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., AND GZA GEOENVIRONMENTAL, INC., DURING 1987. LETTER SUFFIX INDICATES RELATIVE DEPTH OF INDICATED WELL SCREEN WITHIN THE WELL CLUSTER (S-SHALLOW, M-MEDIUM, D-DEEP). ✧ INDICATES 1990 INSTALLATIONS.
BP-3	LOCATION OF SOIL BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC (CWA), IN JANUARY 1990, FOR GREINER ENGINEERING, INC., FOR PAVEMENT DESIGN.
TB-1	LOCATION OF TEST BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC., FOR GZA GEOENVIRONMENTAL, INC., IN JANUARY 1990. MW INDICATES INSTALLATION OF A GROUND WATER MONITORING WELL IN THE COMPLETED BOREHOLE.
WP-1	LOCATION OF SHALLOW WELL POINTS INSTALLED BY GZA IN JUNE 1990.
TB-113	LOCATION OF TEST BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC., FOR GZA GEOENVIRONMENTAL, INC., IN 1991.
B305(MW)	LOCATION OF GROUND WATER MONITORING WELLS INSTALLED IN 1992 BY CLARENCE WELTI ASSOCIATES, INC., FOR ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE). LETTER SUFFIX INDICATES INCREASING DEPTH (A-SHALLOW, B, C-DEEPEST).
B206A	LOCATION OF BORINGS COMPLETED IN 1992 BY CLARENCE WELTI ASSOCIATES, INC., FOR ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE).
PZ-6	LOCATION OF PIEZOMETERS INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), DURING SUMMER 1992.
	EXTENT OF STUDY SITE
	WETLAND/POORLY DRAINED AREA
B-404	LOCATION OF TEST BORINGS INSTALLED BY ESE, OCTOBER 1993



0 100 200 400
SCALE IN FEET

NOTES

1. PLAN PREPARED FROM ASSORTED TEST BORING AND SAMPLING LOCATION PLANS PREPARED BY GZA GEOENVIRONMENTAL, INC., GEOMAP, INC.(1989), AND DATA GENERATED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE).
2. SURVEY OF ESE BORINGS AND EXISTING MONITORING WELLS COMPLETED BY FUSS & O'NEILL ENGINEERS. ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM OF 1929. LOCATIONS RELATIVE TO STATE PLANE COORDINATE SYSTEM, TOWN OF SOUTHINGTON TOWNWIDE CONTROL AND NORTH AMERICAN DATUM OF 1927
3. TEST BORING LOCATIONS, WITH THE EXCEPTION OF ESE BORINGS, ARE APPROXIMATE AND WERE DETERMINED BY GZA GEOENVIRONMENTAL, INC.,

SDMS DOC ID 279199

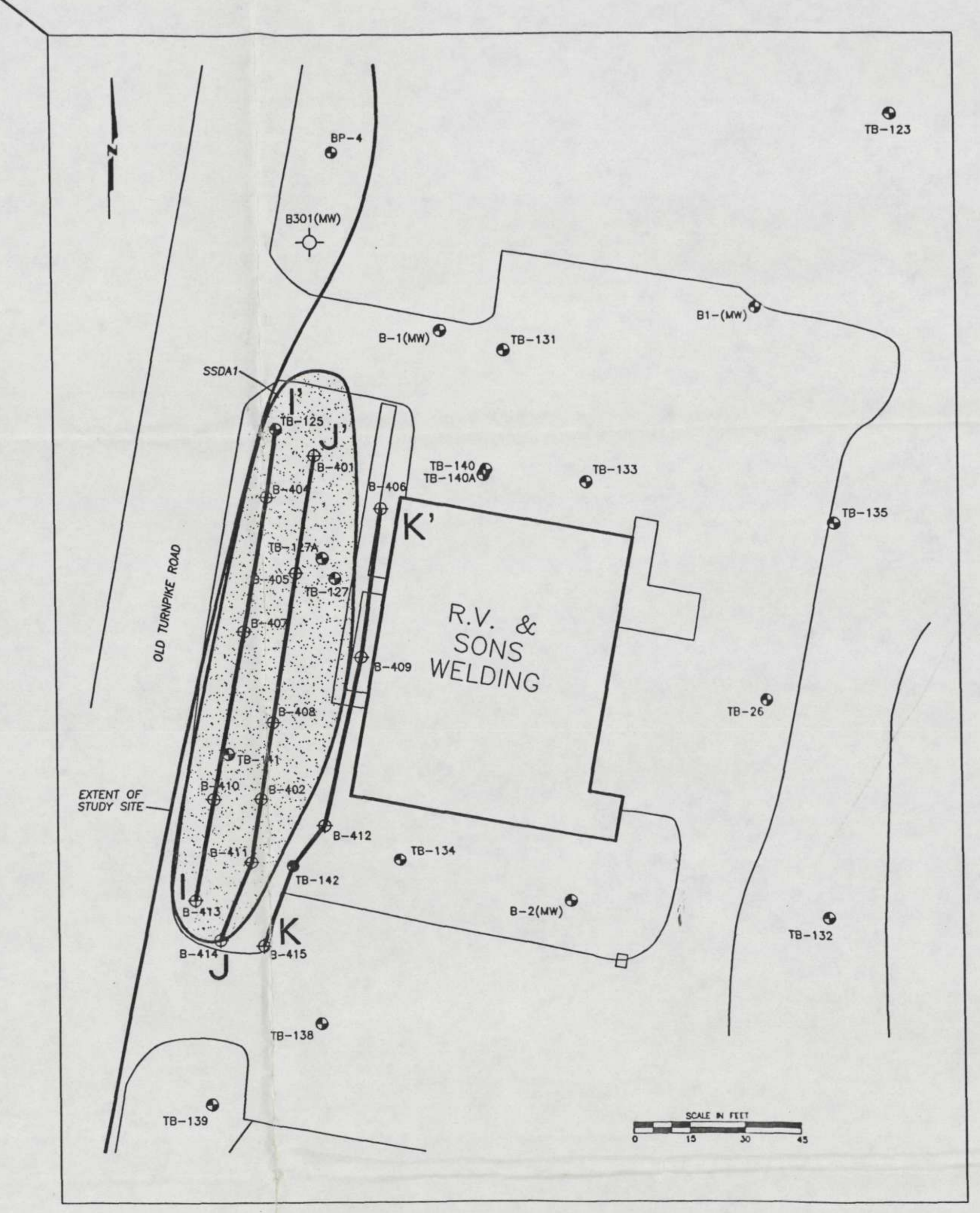
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 1-1

CROSS SECTION LOCATION LINES

DRAWING NAME: SECLINES.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=100'	REVISION: 1	DRAWN BY: BRJ	DATE: 12/10/93



LEGEND

CW15	GROUND WATER MONITORING WELL INSTALLLED FOR THE COMPLETION OF PUMP TEST AT MUNICIPAL WELL MW-5, BY GERAGHTY & MILLER IN JULY 1965.
TW16	LOCATION OF BORINGS AND MONITORING WELLS INSTALLED FOR WARZYN, 1980.
LW-101S	LOCATION OF GROUNDWATER MONITORING WELLS INSTALLED BY GZA DRILLING, INC., AND EAST COAST DRILLING, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., IN NOVEMBER 1984, AND JANUARY 1985. LETTER SUFFIX INDICATES RELATIVE DEPTH OF INDICATED WELL SCREEN WITHIN THE WELL CLUSTER(S-SHALLOW, M-MEDIUM, D-DEEP).
B-1	LOCATION OF GROUNDWATER OBSERVATION WELLS INSTALLED BY EAST COAST DRILLING, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., IN 1986.
GZ-4S, GZ-14	LOCATION OF GROUNDWATER MONITORING WELLS INSTALLED BY GENERAL BORINGS, INC., AND CLARENCE WELTI ASSOCIATES, INC., FOR GOLDBERG-ZOINO & ASSOCIATES, INC., AND GZA GEOENVIRONMENTAL, INC., DURING 1987. LETTER SUFFIX INDICATES RELATIVE DEPTH OF INDICATED WELL SCREEN WITHIN THE WELL CLUSTER (S-SHALLOW, M-MEDIUM, D-DEEP). ✧ INDICATES 1990 INSTALLATIONS.
BP-3	LOCATION OF SOIL BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC (CWA), IN JANUARY 1990, FOR GREINER ENGINEERING, INC., FOR PAVEMENT DESIGN.
TB-1	LOCATION OF TEST BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC., FOR GZA GEOENVIRONMENTAL, INC., IN JANUARY 1990. MW INDICATES INSTALLATION OF A GROUND WATER MONITORING WELL IN THE COMPLETED BOREHOLE.
WP-1	LOCATION OF SHALLOW WELL POINTS INSTALLED BY GZA IN JUNE 1990.
TB-113	LOCATION OF TEST BORINGS COMPLETED BY CLARENCE WELTI ASSOCIATES, INC., FOR GZA GEOENVIRONMENTAL, INC., IN 1991.
B305(MW)	LOCATION OF GROUND WATER MONITORING WELLS INSTALLED IN 1992 BY CLARENCE WELTI ASSOCIATES, INC., FOR ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE). LETTER SUFFIX INDICATES INCREASING DEPTH (A-SHALLOW, B, C-DEEPEST).
B206A	LOCATION OF BORINGS COMPLETED IN 1992 BY CLARENCE WELTI ASSOCIATES, INC., FOR ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE).
PZ-6	LOCATION OF PIEZOMETERS INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), DURING SUMMER 1992.
	EXTENT OF STUDY SITE
	WETLAND/POORLY DRAINED AREA
B-406	LOCATION OF TEST BORINGS INSTALLED BY ESE, OCTOBER 1993

0 100 200 400

SCALE IN FEET

NOTES

1. PLAN PREPARED FROM ASSORTED TEST BORING AND SAMPLING LOCATION PLANS PREPARED BY GZA GEOENVIRONMENTAL, INC., GEOMAP, INC.(1989), AND DATA GENERATED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE).
2. SURVEY OF ESE BORINGS AND EXISTING MONITORING WELLS COMPLETED BY FUSS & O'NEILL ENGINEERS. ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM OF 1929. LOCATIONS RELATIVE TO STATE PLANE COORDINATE SYSTEM, TOWN OF SOUTHINGTON TOWNWIDE CONTROL AND NORTH AMERICAN DATUM OF 1927
3. TEST BORING LOCATIONS, WITH THE EXCEPTION OF ESE BORINGS, ARE APPROXIMATE AND WERE DETERMINED BY GZA GEOENVIRONMENTAL, INC.,

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

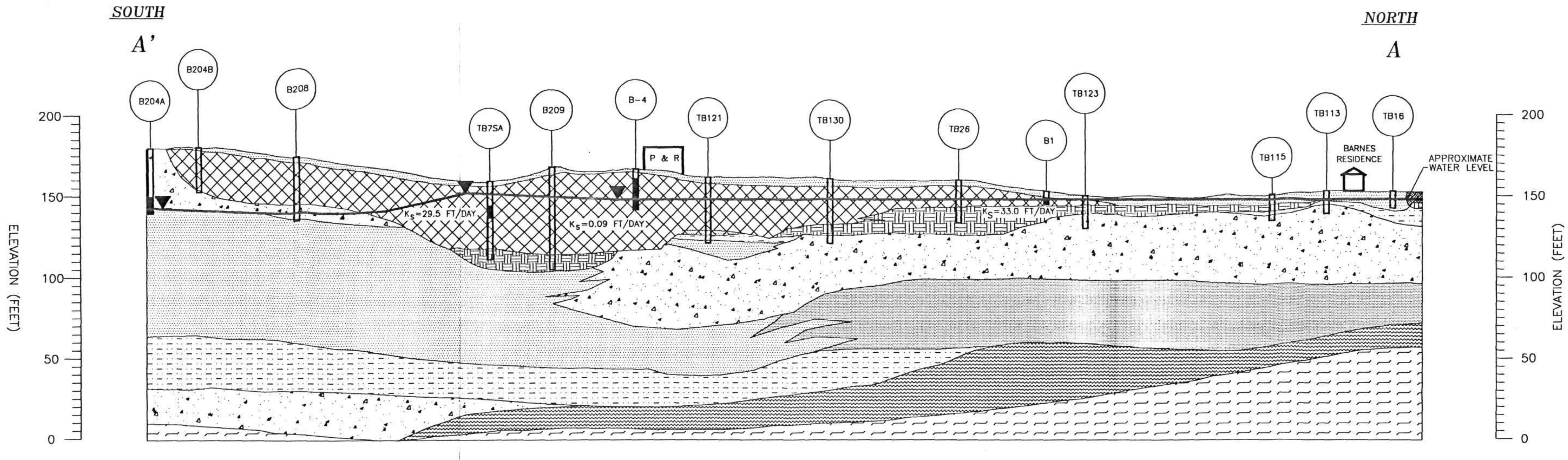
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-1

CROSS SECTION LOCATION LINES

DRAWING NAME: CROSSECL.DWG		FILE NUMBER: 492 5534	
SCALE: 1"=100'	REVISION: 1	DRAWN BY: BRJ	DATE: 12/10/93

279199-3-1



LEGEND:

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

B204 — LOCATION OF BORING

BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTE: GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.

50 FT.

100 FT.

SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

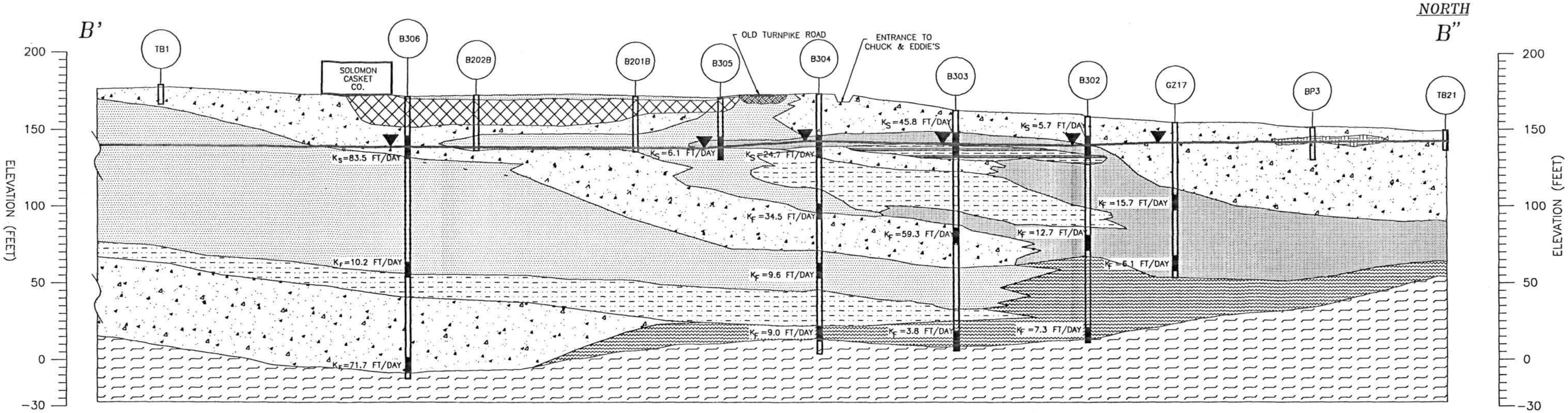
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

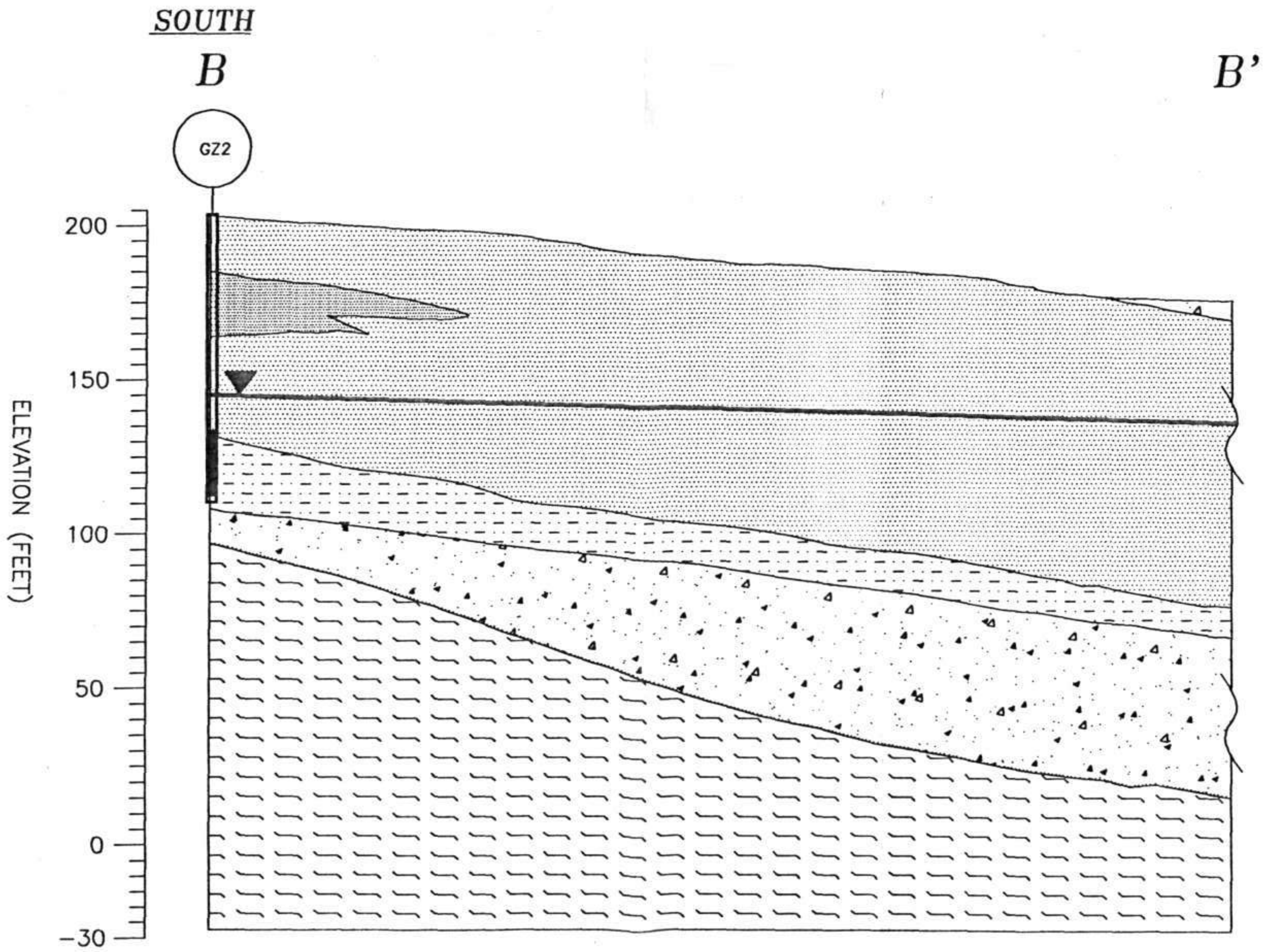
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-2

GEOLOGIC CROSS-SECTION A – A'

DRAWING NAME: SECAA.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93





LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

LOCATION OF BORING

B204 — BORING NUMBER

▼ MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

50 FT.

100 FT.

SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.

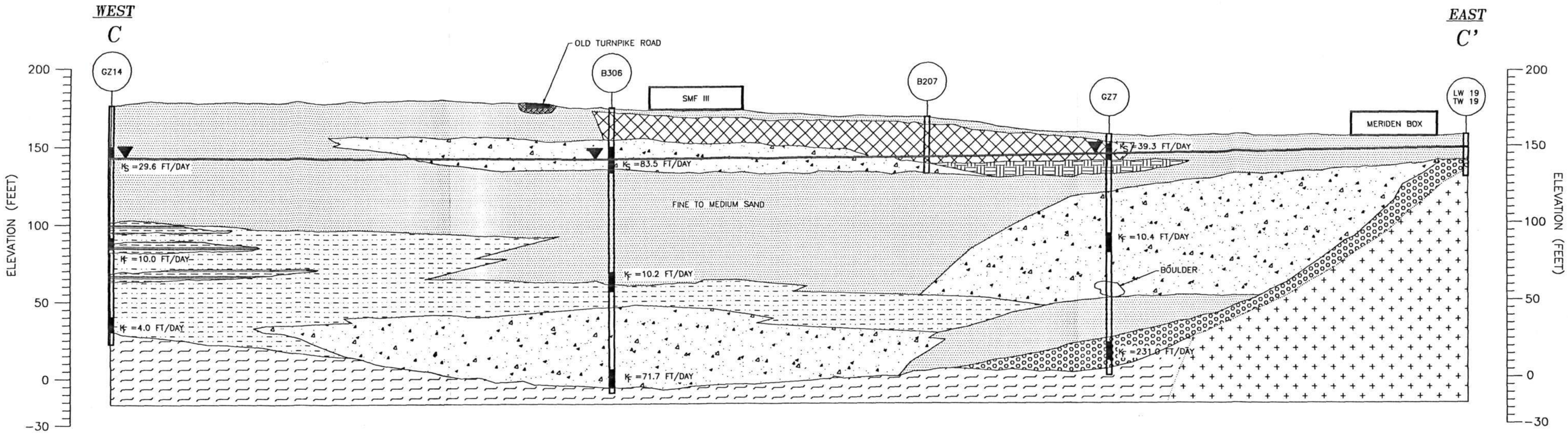
ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3–3

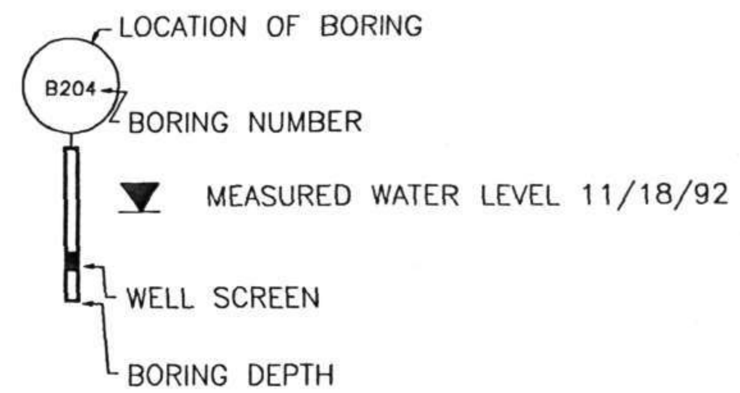
GEOLOGIC CROSS–SECTION B – B"

DRAWING NAME: SECBB.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)



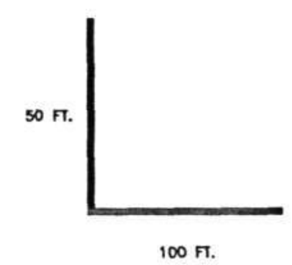
HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

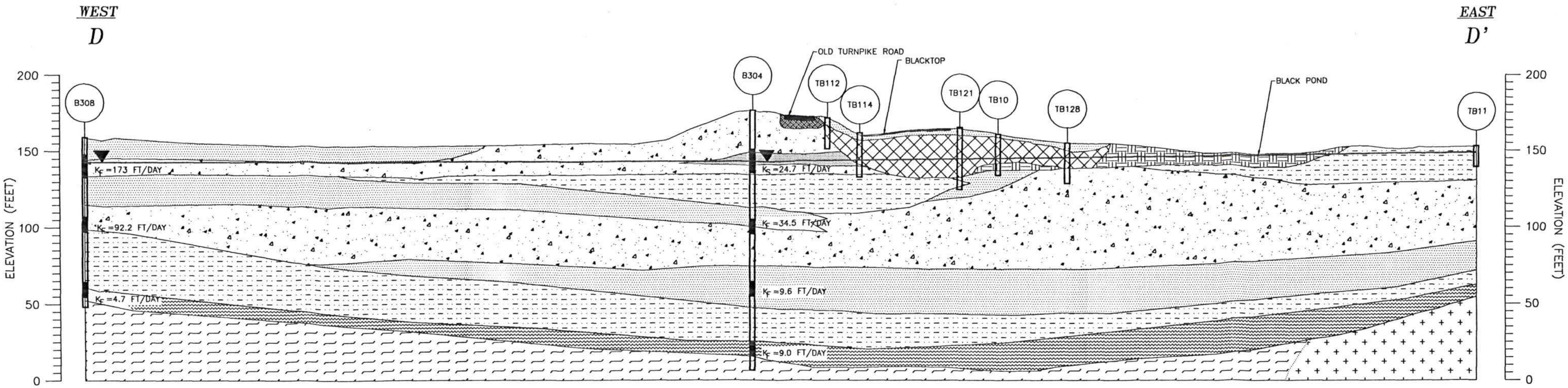
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-4

GEOLOGIC CROSS-SECTION C - C'

DRAWING NAME: SECCC.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

LOCATION OF BORING

B204 — BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

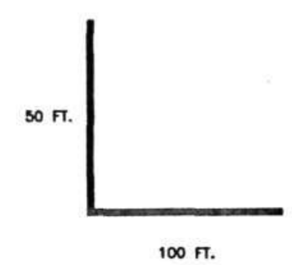
HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

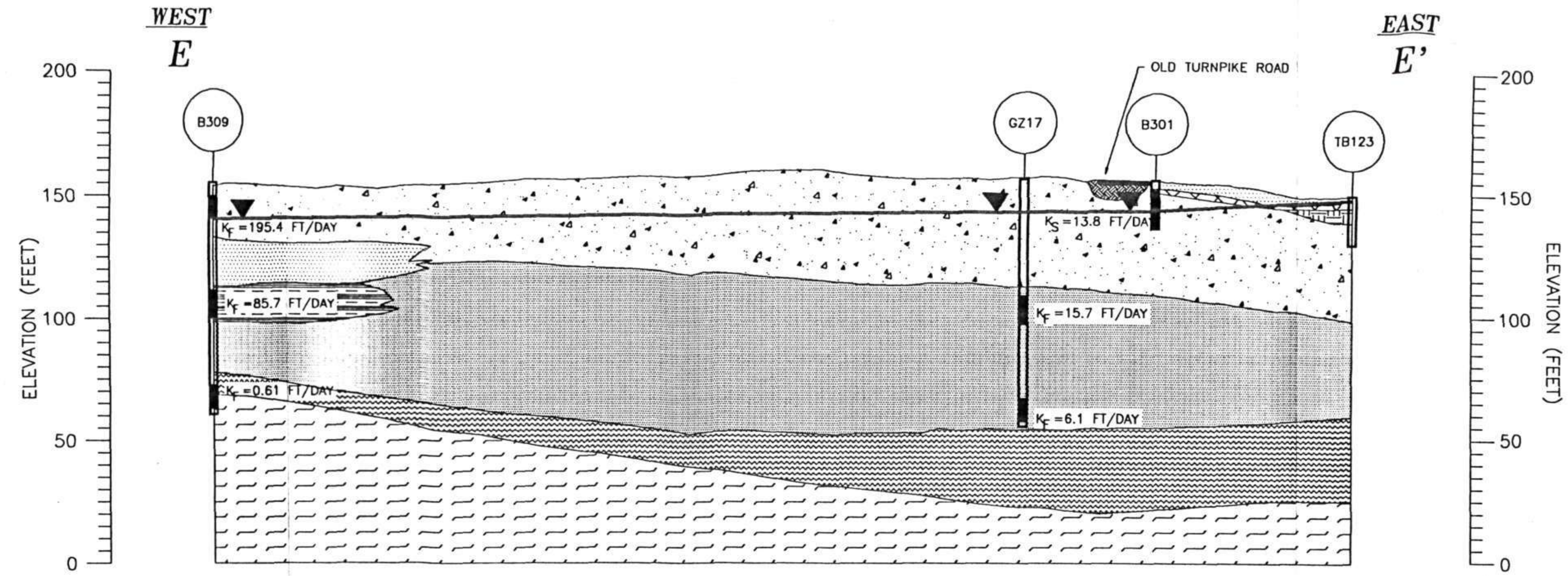
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-5

GEOLOGIC CROSS-SECTION D – D'

DRAWING NAME: SECDD.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93

279199-3-5.JPG



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

B204 — LOCATION OF BORING; BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

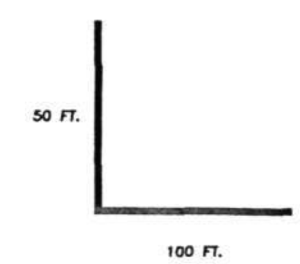
HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

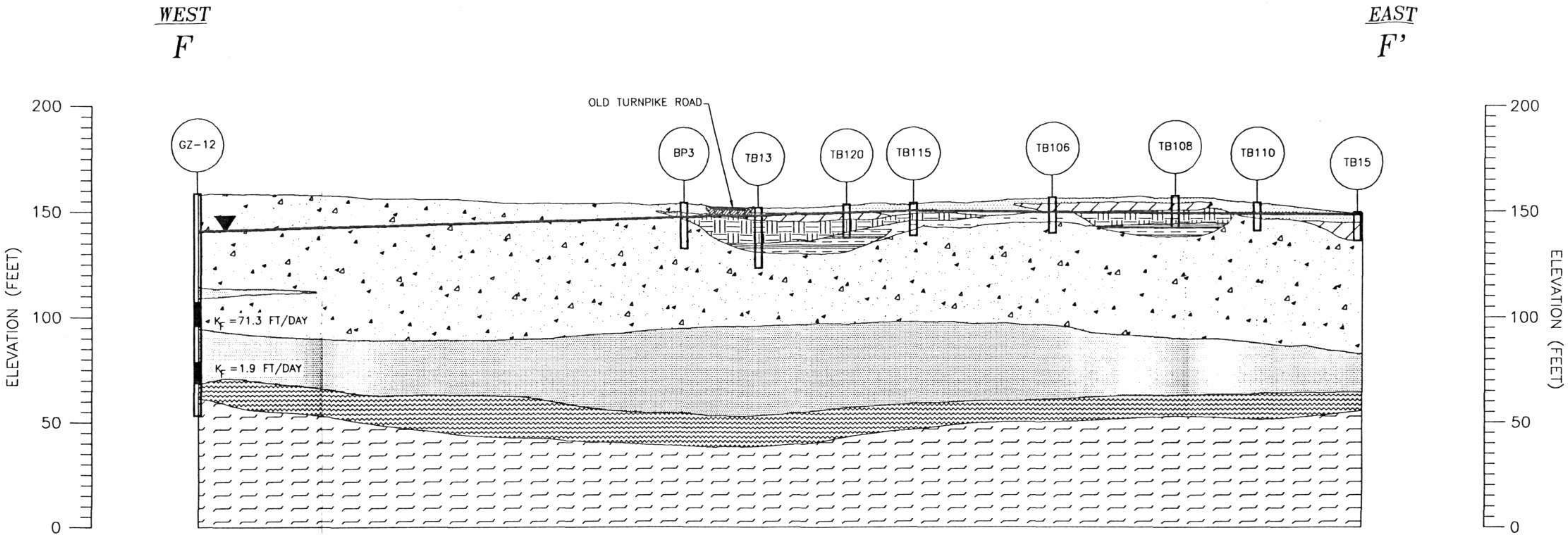
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3–6

GEOLOGIC CROSS–SECTION E – E'

DRAWING NAME: SECEE.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93

279199-3-6.jpg



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

LOCATION OF BORING
B204 — BORING NUMBER
MEASURED WATER LEVEL 11/18/92
WELL SCREEN
BORING DEPTH

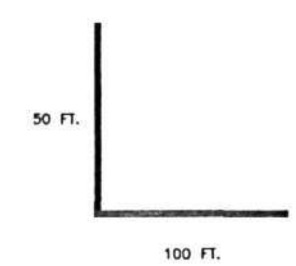
HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

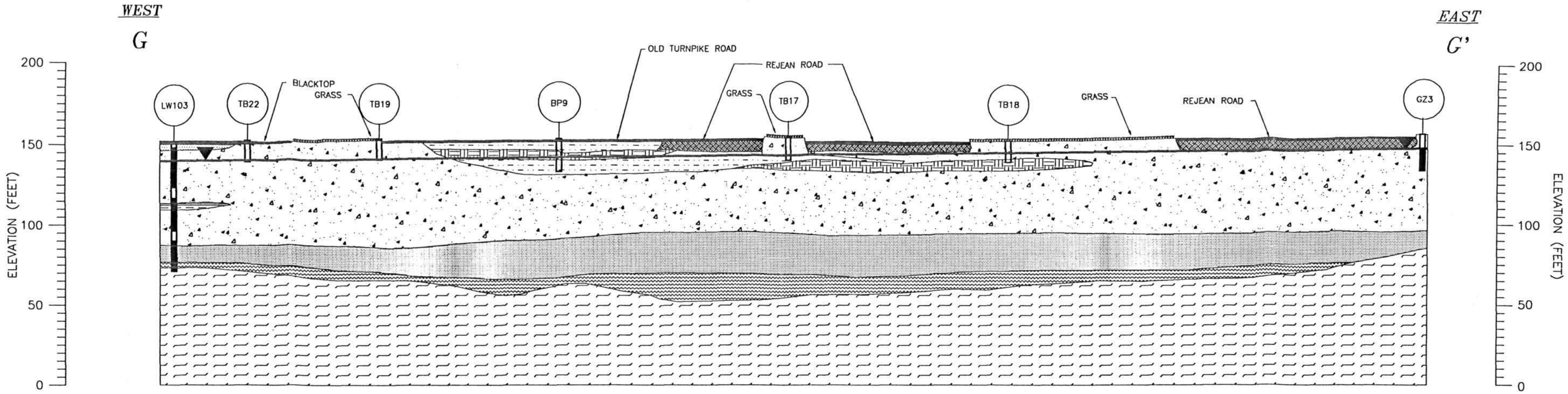
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-7

GEOLOGIC CROSS-SECTION F – F'

DRAWING NAME: SECFF.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93



LEGEND

WOOD DEBRIS

SOLID WASTE

PEAT

SAND AND GRAVEL (UNDIFFERENTIATED)

SAND (UNDIFFERENTIATED)

FINE SAND

LAMINATED FINE SAND AND SILT

SILT AND CLAY

ROAD FILL

GRAVEL

TILL

BEDROCK (NEW HAVEN ARKOSE)

BEDROCK (WEST ROCK DIABASE)

B204 — LOCATION OF BORING; BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.

50 FT.

100 FT.

SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATION IN FEET, NGVD 1929

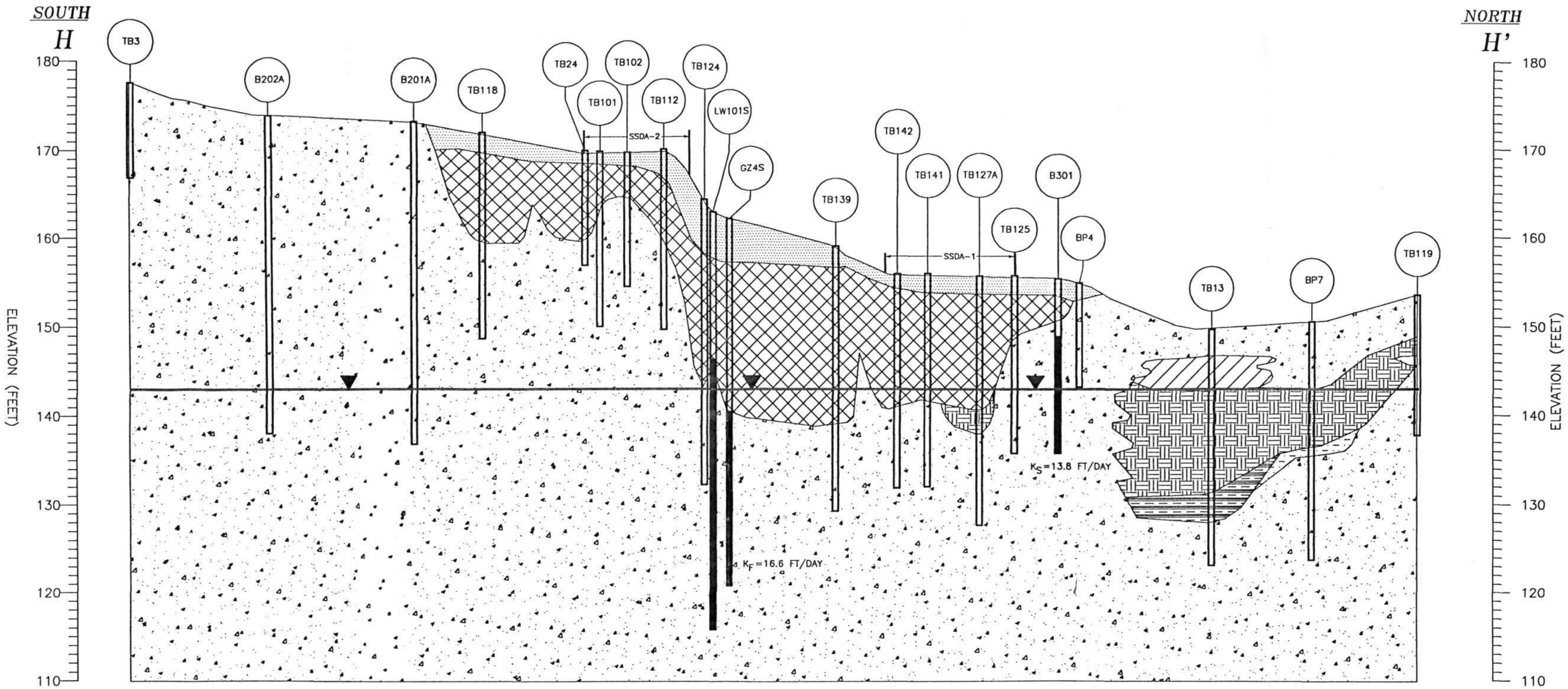
ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-8

GEOLOGIC CROSS-SECTION G – G'

DRAWING NAME: SECGG.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

B204 — LOCATION OF BORING; BORING NUMBER; WELL SCREEN; BORING DEPTH

▼ MEASURED WATER LEVEL 11/18/92

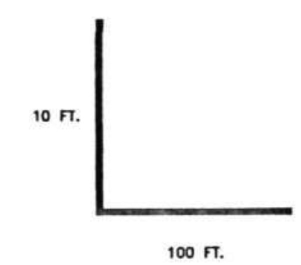
HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 10 FEET
VERTICAL EXAGGERATION = 10
ELEVATIONS IN FEET, NGVD 1929

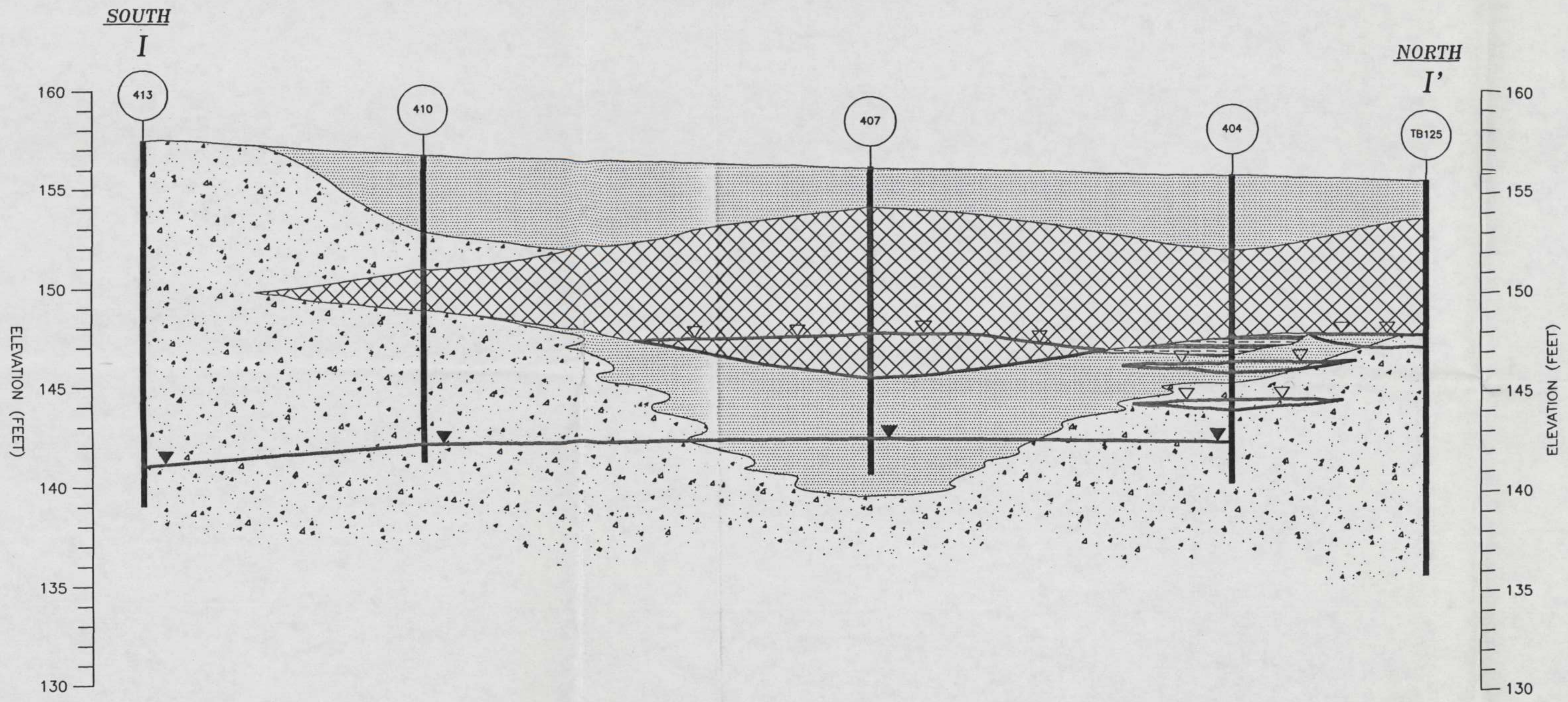
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

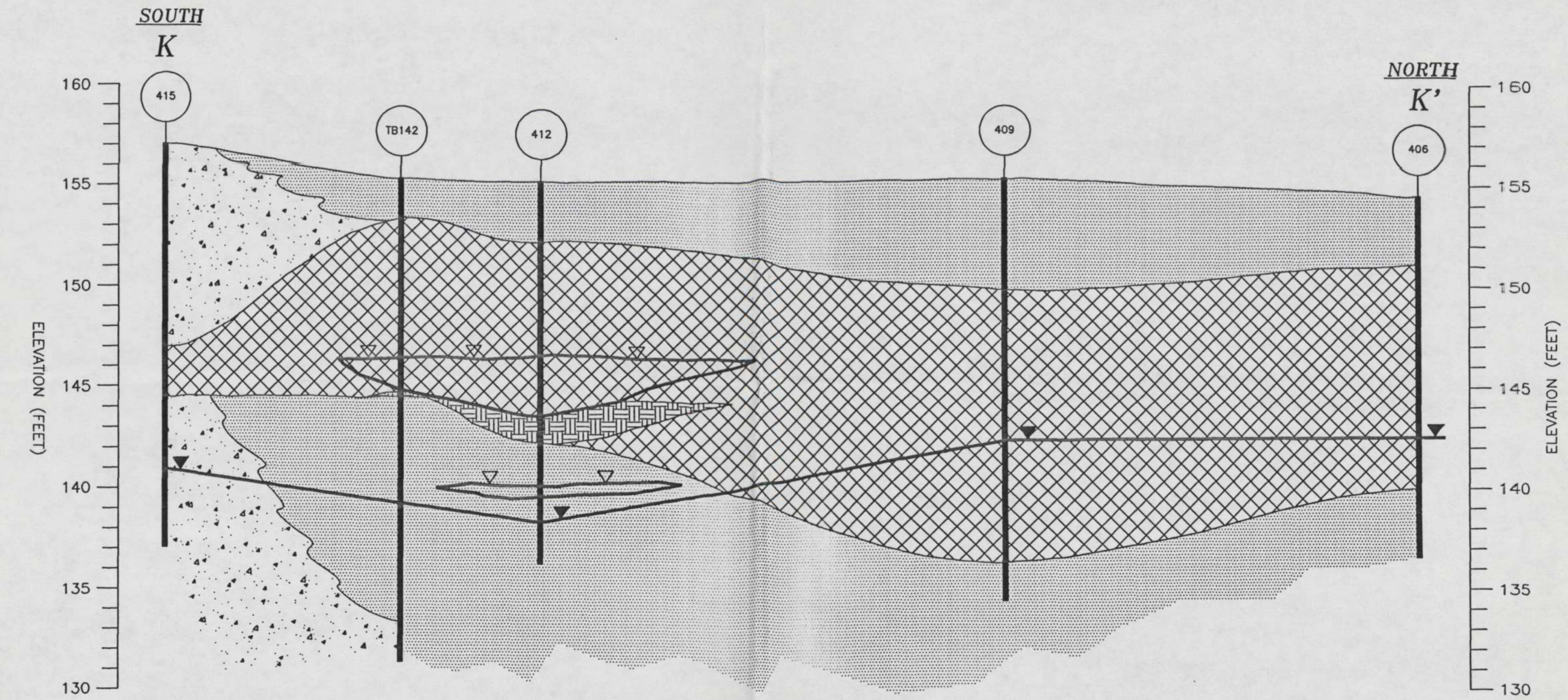
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

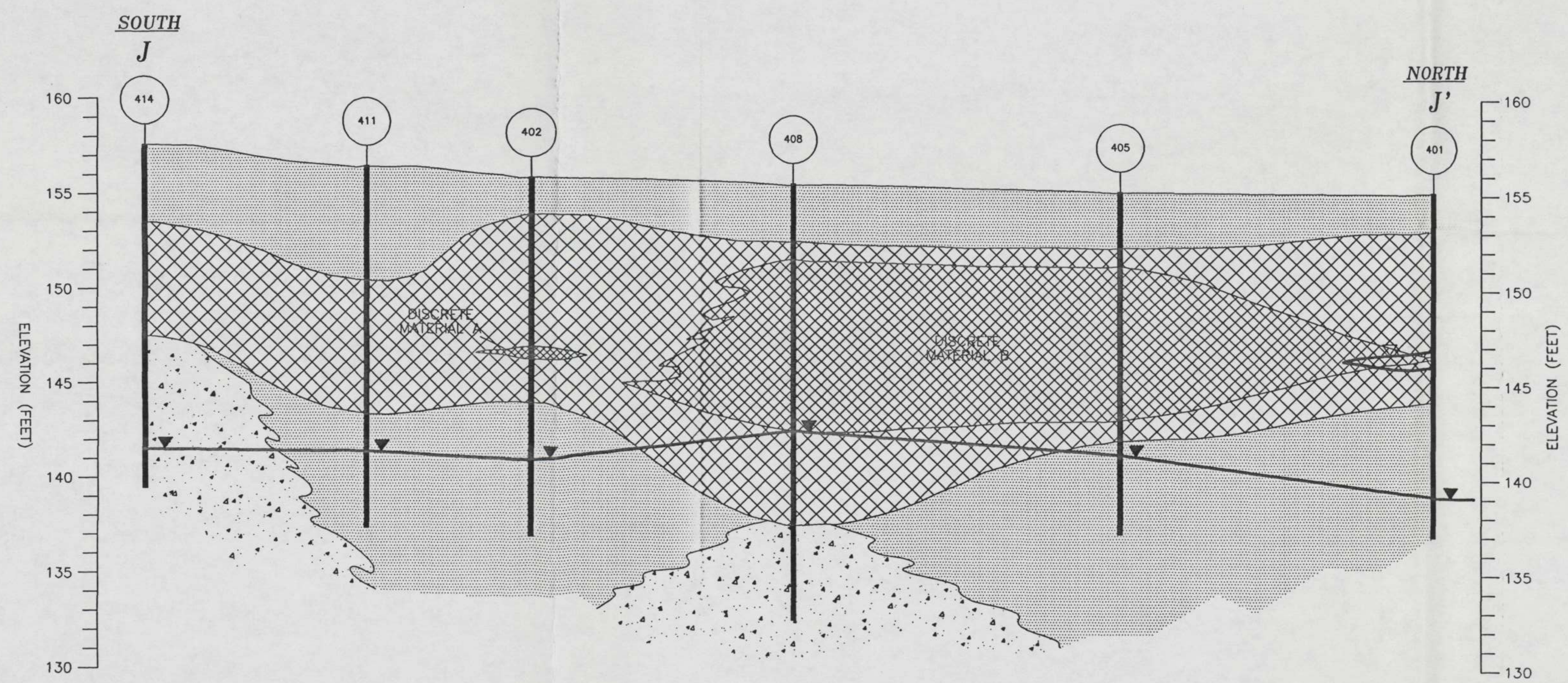
PLATE 3-9

GEOLOGIC CROSS-SECTION H – H'

DRAWING NAME: SECHH.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93







LOCATION OF BORING
B204
BORING NUMBER
▼ APPROXIMATE GROUNDWATER LEVEL OCTOBER, 1993
▽ PERCHED WATER TABLE

NOTES:
1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.

LEGEND

- SILT AND CLAY
- SOLID WASTE
- DISCRETE MATERIAL A (WITHIN SOLID WASTE MASS)
- DISCRETE MATERIAL B (WITHIN SOLID WASTE MASS)
- SAND (UNDIFFERENTIATED)
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)

5 FT.
10 FT.

SCALE
HORIZONTAL: 1 INCH EQUALS 10 FEET
VERTICAL: 1 INCH EQUALS 5 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 3-10

GEOLOGIC CROSS-SECTION I-I', J-J', K-K'

DRAWING NAME: SECIK.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 12/10/93

0 100 200 400

SCALE IN FEET

LEGEND

■ AM-127 SITE WALK THROUGH AIR MONITORING LOCATION AND IDENTIFICATION USING PHOTOIONIZATION DETECTOR, PID

○ AS-5 AIR MONITORING LOCATION – USING FIELD GAS CHROMATOGRAPH

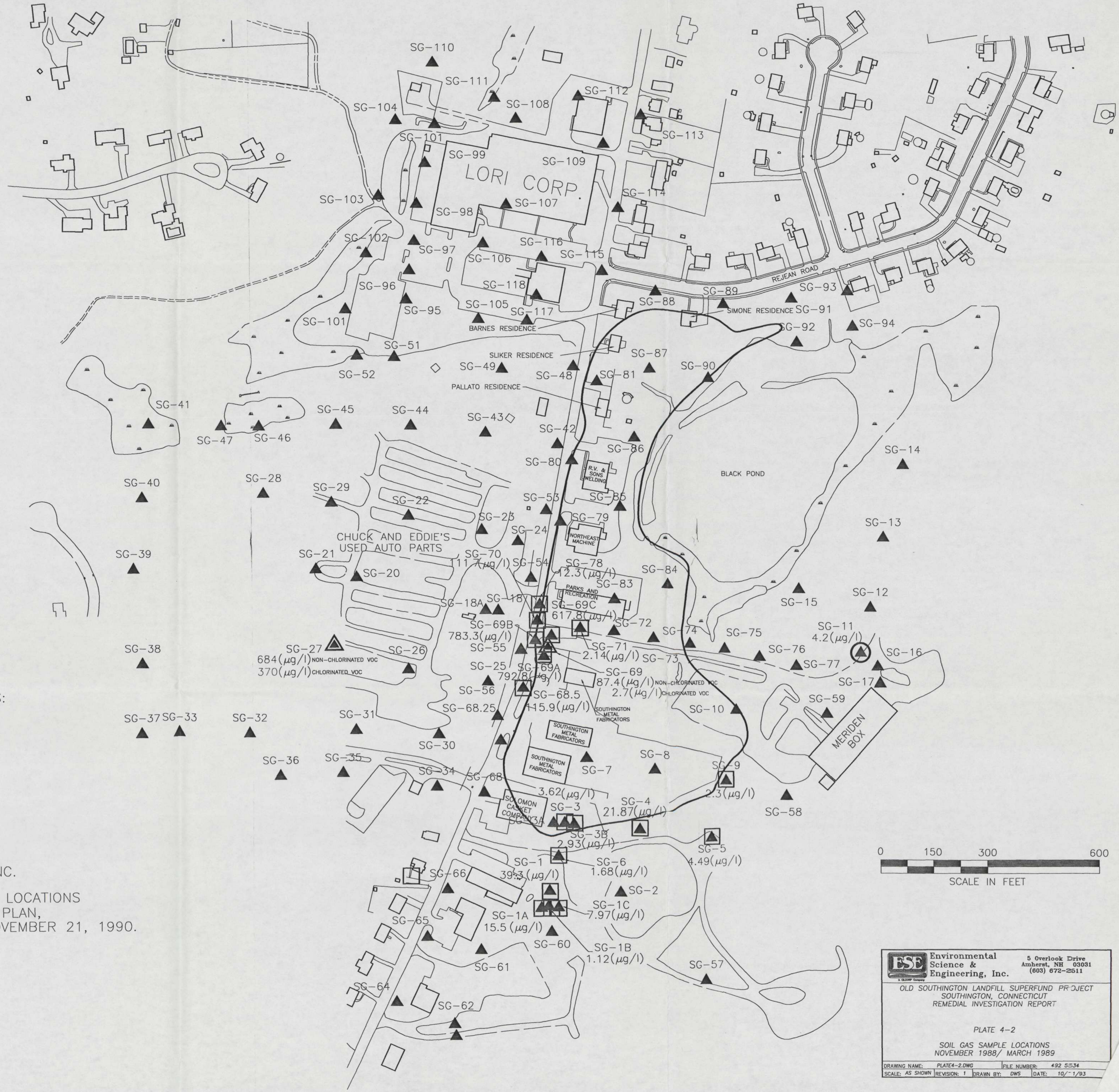
ESE Environmental Science & Engineering, Inc. 5 Overlook Drive Amherst, NH 03031 (603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-1

AIR QUALITY MONITORING LOCATIONS

DRAWING NAME:	AIRSAMP.DWG			FILE NUMBER:	492 5534
SCALE: 1"=100'	REVISION: 1	DRAWN BY:	DWS	DATE:	10/11/93



LEGEND

EXTENT OF STUDY SITE

SG-38 — SOIL GAS SAMPLING POINT–NO VOC DETECTED.

SG-1 39.3(µg/l) — SOIL GAS SAMPLING POINT NON-CHLORINATED VOC MEASURED ABOVE THE DETECTION LIMIT.

SG-11 4.2(µg/l) — SOIL GAS SAMPLING POINT CHLORINATED VOC MEASURED ABOVE THE DETECTION LIMIT.

SG-27 684(µg/l) NON-CHLORINATED VOC 370(µg/l) CHLORINATED VOC — SOIL GAS SAMPLING POINT CHLORINATED AND NON-CHLORINATED VOC MEASURED ABOVE THE DETECTION LIMIT.

NOTES

1. NON-CHLORINATED VOC MEASURED AND RESPECTIVE DETECTION LIMITS:
   - BENZENE 0.5 µg/L
   - TOLUENE 0.5 µg/L
   - ETHYL BENZENE 2.0 µg/L
   - XYLENES 2.0 µg/L
2. CHLORINATED VOC MEASURED AND RESPECTIVE DETECTION LIMITS:
   - TCE 1.0 µg/L
   - 1,1,1-TCA 50 µg/L
   - TRANS-1,2-DCE 5.0 µg/L
   - PERC 2.0 µg/L
3. SOIL GAS MEASUREMENTS PERFORMED BY GZA GEOENVIRONMENTAL, INC.
4. BASE MAP ADAPTED GEOMAP, INC. (1989) SOIL GAS SAMPLING POINT LOCATIONS FROM GZA GEOENVIRONMENTAL PLAN ENTITLED " SOIL GAS LOCATION PLAN, OLD SOUTHINGTON LANDFILL, SOUTHINGTON, CONNECTICUT," DATED NOVEMBER 21, 1990.

ESE Environmental Science & Engineering, Inc. 5 Overlook Drive Amherst, NH 03031 (603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-2

SOIL GAS SAMPLE LOCATIONS
NOVEMBER 1988/ MARCH 1989

DRAWING NAME: PLATE4-2.DWG		FILE NUMBER: 492 5534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: DWS	DATE: 10/ 1/93

B204A	
DEPTH 16 FEET	
PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTICIDES	NA
PCB	NA
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	NA

TB7SA	
DEPTH 24 FEET	
PARAMETER	CONCENTRATION
PAH	76,450
NON-PAH	38,950
PESTICIDES	ND
PCB	2,560
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	543

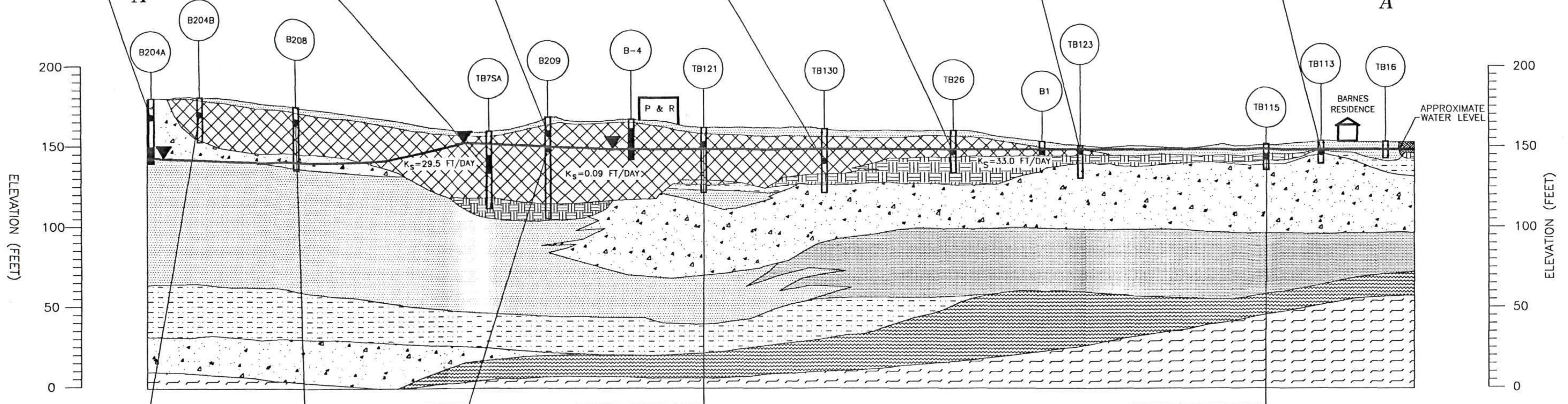
B209	
DEPTH 10 FEET	
PARAMETER	CONCENTRATION
PAH	10,540
NON-PAH	ND
PESTICIDES	381
PCB	650
CL VOC	162
NON-CL VOC	25
HEAVY METALS	455

TB130	
DEPTH 20 FEET	
PARAMETER	CONCENTRATION
PAH	23,239
NON-PAH	3,062
PESTICIDES	54
PCB	ND
CL VOC	131
NON-CL VOC	250
HEAVY METALS	2,903

TB26	
DEPTH 14 FEET	
PARAMETER	CONCENTRATION
PAH	8,150
NON-PAH	ND
PESTICIDES	ND
PCB	1,100
CL VOC	ND
NON-CL VOC	46
HEAVY METALS	1,691

TB122	
DEPTH 4 FEET	
PARAMETER	CONCENTRATION
PAH	7,898
NON-PAH	ND
PESTICIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	1,481

TB113	
DEPTH 3 FEET	
PARAMETER	CONCENTRATION
PAH	ND
NON-PAH	ND
PESTICIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	ND



B204B	
DEPTH 12 FEET	
PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTICIDES	NA
PCB	NA
CL VOC	1,500
NON-CL VOC	47,800
HEAVY METALS	NA

B208	
DEPTH 10 FEET	
PARAMETER	CONCENTRATION
PAH	25,650
NON-PAH	780
PESTICIDES	29
PCB	176
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	552

B209	
DEPTH 18 FEET	
PARAMETER	CONCENTRATION
PAH	91,800
NON-PAH	1,600
PESTICIDES	66
PCB	1,410
CL VOC	ND
NON-CL VOC	2,000
HEAVY METALS	835

TB121	
DEPTH 10 FEET	
PARAMETER	CONCENTRATION
PAH	2,046
NON-PAH	3,022
PESTICIDES	ND
PCB	300
CL VOC	ND
NON-CL VOC	166
HEAVY METALS	657

TB115	
DEPTH 8 FEET	
PARAMETER	CONCENTRATION
PAH	53,900
NON-PAH	ND
PESTICIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	2,817

LEGEND:

WOOD DEBRIS

SOLID WASTE

PEAT

SAND AND GRAVEL (UNDIFFERENTIATED)

SAND (UNDIFFERENTIATED)

FINE SAND

LAMINATED FINE SAND AND SILT

SILT AND CLAY

ROAD FILL

GRAVEL

TILL

BEDROCK (NEW HAVEN ARKOSE)

BEDROCK (WEST ROCK DIABASE)

NOTE: GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.

LOCATION OF BORING

B204 – BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

PAH = TOTAL POLYAROMATIC HYDROCARBONS, UG/KG

NON-PAH = TOTAL NON-PAH SEMIVOLATILE ORGANIC COMPOUNDS, UG/KG

PESTICIDES = TOTAL PESTICIDES, UG/KG

PCB = TOTAL POLYCHLORINATED BIPHENYLS, UG/KG

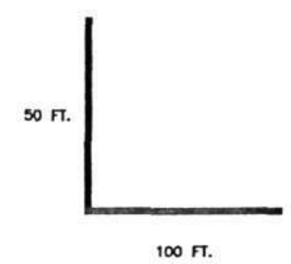
CL VOC = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

NON-CL VOC = TOTAL NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

METALS = TOTAL SELECTED HEAVY METALS, MG/KG

ND = NOT DETECTED ABOVE CRQL (ORGANICS)
NOT DETECTED ABOVE BACKGROUND (METALS)

NA = NOT ANALYZED



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

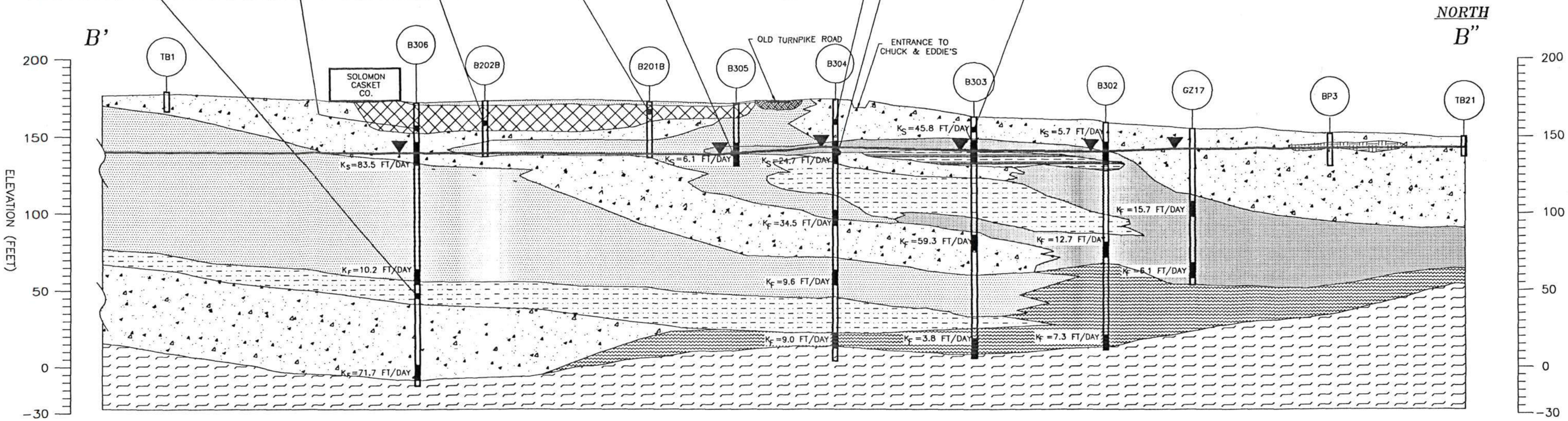
Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

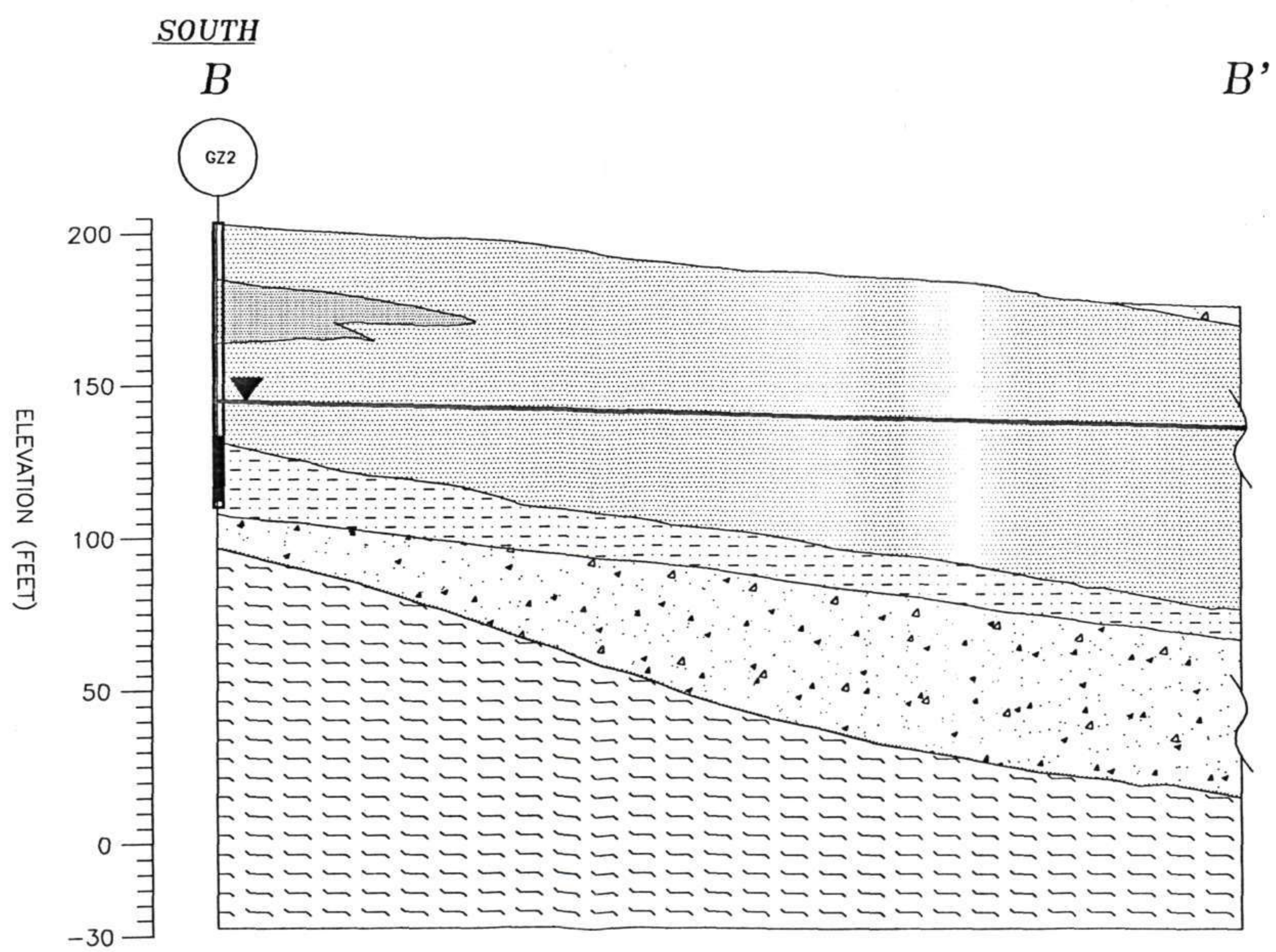
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-3
ANALYTICAL RESULTS – SUBSURFACE SOIL
GEOLOGIC CROSS-SECTION A – A'

DRAWING NAME: SECAA.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93

Boring	Depth	Parameter	Concentration
B306-B	124 FEET	CL VOC	ND
		NON-CL VOC	ND
B306-A	16 FEET	CL VOC	ND
		NON-CL VOC	ND
B202B	16 FEET	CL VOC	362,800
		NON-CL VOC	ND
B201B	6 FEET	CL VOC	45
		NON-CL VOC	1,651
B305	33 FEET	CL VOC	830
		NON-CL VOC	4,413
B304-1	15 FEET	CL VOC	ND
		NON-CL VOC	733,000
B304-2	35 FEET	CL VOC	3,140
		NON-CL VOC	1,550,000
B303	8 FEET	CL VOC	ND
		NON-CL VOC	ND





LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

LOCATION OF BORING
B204 — BORING NUMBER
MEASURED WATER LEVEL 11/18/92
WELL SCREEN
BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

CL VOC = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

NON-CL VOC = TOTAL NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.

50 FT.
100 FT.

SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-4
ANALYTICAL RESULTS – SUBSURFACE SOIL
GEOLOGIC CROSS-SECTION B – B"

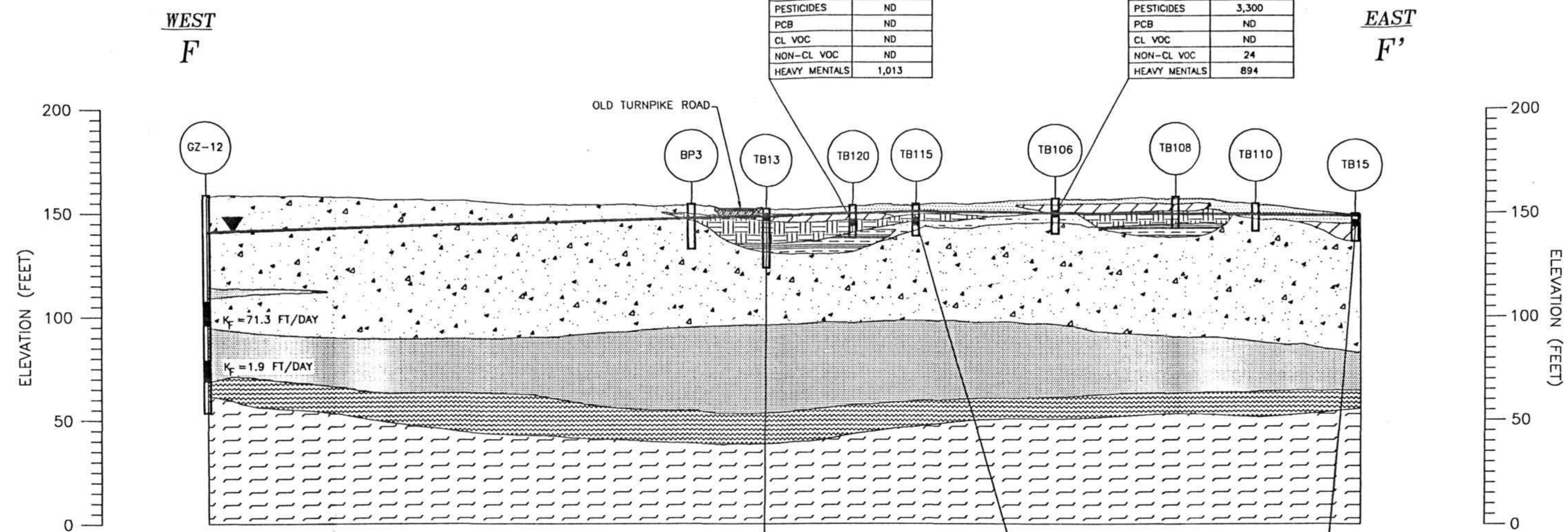
DRAWING NAME: SECBB.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93

TB120

DEPTH 8 FEET	
PARAMETER	CONCENTRATION
PAH	547,800
NON-PAH	1,300
PESTICIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY MENTALS	1,013

TB106

DEPTH 8 FEET	
PARAMETER	CONCENTRATION
PAH	11,149,000
NON-PAH	ND
PESTICIDES	3,300
PCB	ND
CL VOC	ND
NON-CL VOC	24
HEAVY MENTALS	894



TB13

DEPTH 4 FEET	
PARAMETER	CONCENTRATION
PAH	8,160
NON-PAH	ND
PESTICIDES	48
PCB	ND
CL VOC	ND
NON-CL VOC	18
HEAVY MENTALS	ND

TB115

DEPTH 8 FEET	
PARAMETER	CONCENTRATION
PAH	53,900
NON-PAH	ND
PESTICIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY MENTALS	2,817

TB15

DEPTH 7 FEET	
PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTICIDES	NA
PCB	NA
CL VOC	ND
NON-CL VOC	28
HEAVY MENTALS	152

LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

B204 — LOCATION OF BORING; BORING NUMBER

MEASURED WATER LEVEL 11/18/92

WELL SCREEN

BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

PAH = TOTAL POLYAROMATIC HYDROCARBONS, UG/KG

NON-PAH = TOTAL NON-PAH SEMIVOLATILE ORGANIC COMPOUNDS, UG/KG

PESTICIDES = TOTAL PESTICIDES, UG/KG

PCB = TOTAL POLYCHLORINATED BIPHENYLS, UG/KG

CL VOC = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

NON-CL VOC = TOTAL NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG

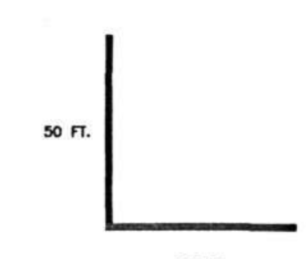
METALS = TOTAL SELECTED HEAVY METALS, MG/KG

ND = NOT DETECTED ABOVE CRQL (ORGANICS)
NOT DETECTED ABOVE BACKGROUND (METALS)

NA = NOT ANALYZED

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.



SCALE

HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 50 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

ESE Environmental Science & Engineering, Inc.
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-5
ANALYTICAL RESULTS – SUBSURFACE SOIL
GEOLOGIC CROSS-SECTION F – F'

DRAWING NAME: SECFF.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93

B202A

DEPTH 12 FEET

PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTCIDES	NA
PCB	NA
CL VOC	43
NON-CL VOC	ND
HEAVY METALS	NA

TB101

DEPTH 5 FEET

PARAMETER	CONCENTRATION
PAH	677
NON-PAH	338
PESTCIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	1,337
HEAVY METALS	ND

TB102

DEPTH 10 FEET

PARAMETER	CONCENTRATION
PAH	ND
NON-PAH	ND
PESTCIDES	ND
PCB	ND
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	ND

TB141

DEPTH 13.5 FEET

PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTCIDES	NA
PCB	NA
CL VOC	17,800
NON-CL VOC	1,350,000
HEAVY METALS	NA

TB127A

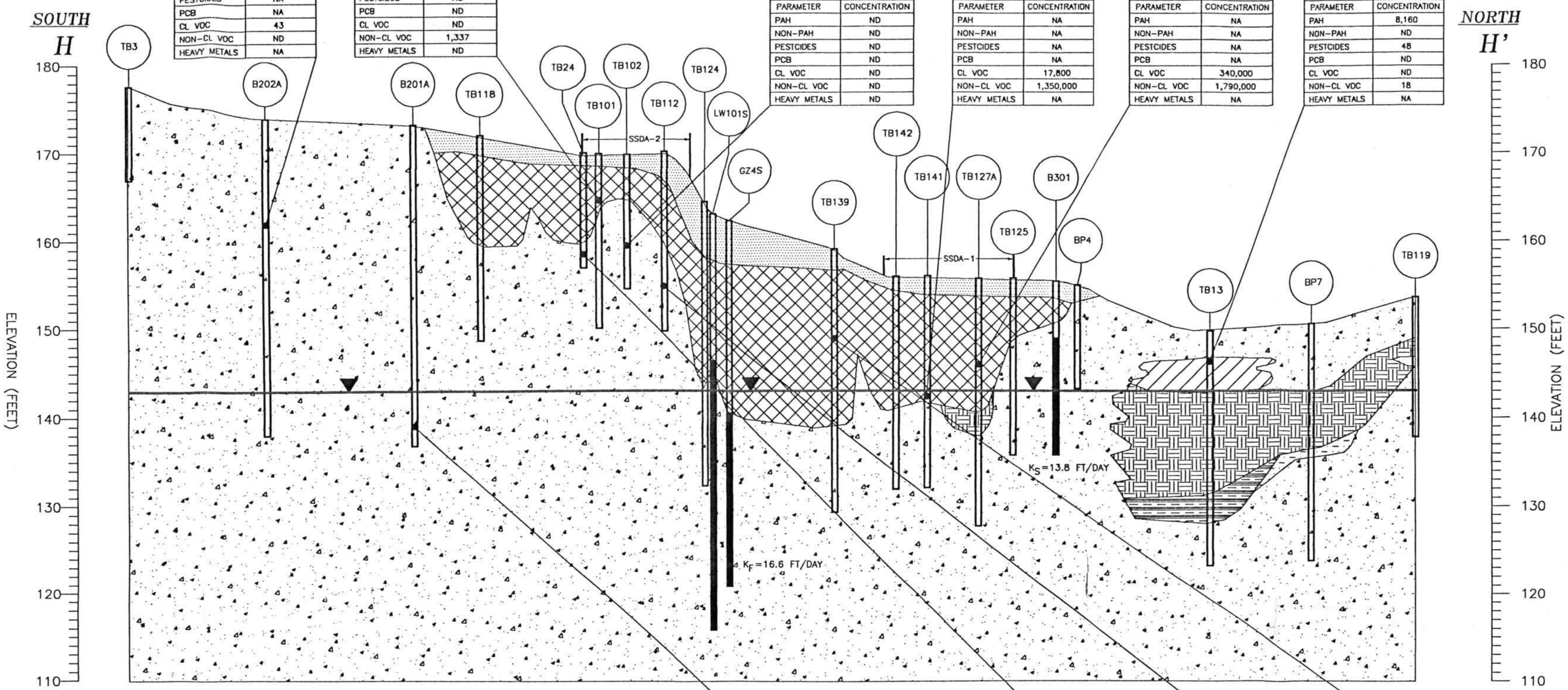
DEPTH 9.5 FEET

PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTCIDES	NA
PCB	NA
CL VOC	340,000
NON-CL VOC	1,790,000
HEAVY METALS	NA

TB13

DEPTH 4 FEET

PARAMETER	CONCENTRATION
PAH	8,160
NON-PAH	ND
PESTCIDES	48
PCB	ND
CL VOC	ND
NON-CL VOC	18
HEAVY METALS	NA



B201A

DEPTH 34 FEET

PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTCIDES	NA
PCB	NA
CL VOC	ND
NON-CL VOC	ND
HEAVY METALS	NA

TB24

DEPTH 11 FEET

PARAMETER	CONCENTRATION
PAH	756
NON-PAH	ND
PESTCIDES	19
PCB	ND
CL VOC	ND
NON-CL VOC	10,700
HEAVY METALS	ND

TB112

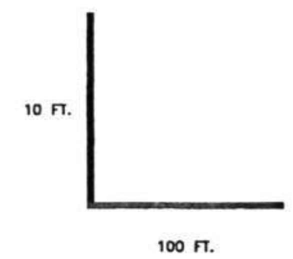
DEPTH 15 FEET

PARAMETER	CONCENTRATION
PAH	NA
NON-PAH	NA
PESTCIDES	NA
PCB	NA
CL VOC	ND
NON-CL VOC	576
HEAVY METALS	NA

TB139

DEPTH 8 FEET

PARAMETER	CONCENTRATION
PAH	ND
NON-PAH	674
PESTCIDES	ND
PCB	ND
CL VOC	950
NON-CL VOC	ND
HEAVY METALS	7,946



LEGEND

- WOOD DEBRIS
- SOLID WASTE
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)
- SAND (UNDIFFERENTIATED)
- FINE SAND
- LAMINATED FINE SAND AND SILT
- SILT AND CLAY
- ROAD FILL
- GRAVEL
- TILL
- BEDROCK (NEW HAVEN ARKOSE)
- BEDROCK (WEST ROCK DIABASE)

NOTES:

1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.
2. WATER TABLE APPROXIMATE EXCEPT WHERE MEASURED.

B204 — LOCATION OF BORING; BORING NUMBER; MEASURED WATER LEVEL 11/18/92; WELL SCREEN; BORING DEPTH

HYDRAULIC CONDUCTIVITY:

K_S = SLUG TESTS: 01/93

K_F = FLOW TESTS: 11/92

PAH = TOTAL POLYAROMATIC HYDROCARBONS, UG/KG
NON-PAH = TOTAL NON-PAH SEMIVOLATILE ORGANIC COMPOUNDS, UG/KG
PESTICIDES = TOTAL PESTICIDES, UG/KG
PCB = TOTAL POLYCHLORINATED BIPHENYLS, UG/KG
CL VOC = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG
NON-CL VOC = TOTAL NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG
METALS = TOTAL SELECTED HEAVY METALS, MG/KG
ND = NOT DETECTED ABOVE CRQL (ORGANICS)
NOT DETECTED ABOVE BACKGROUND (METALS)
NA = NOT ANALYZED

SCALE

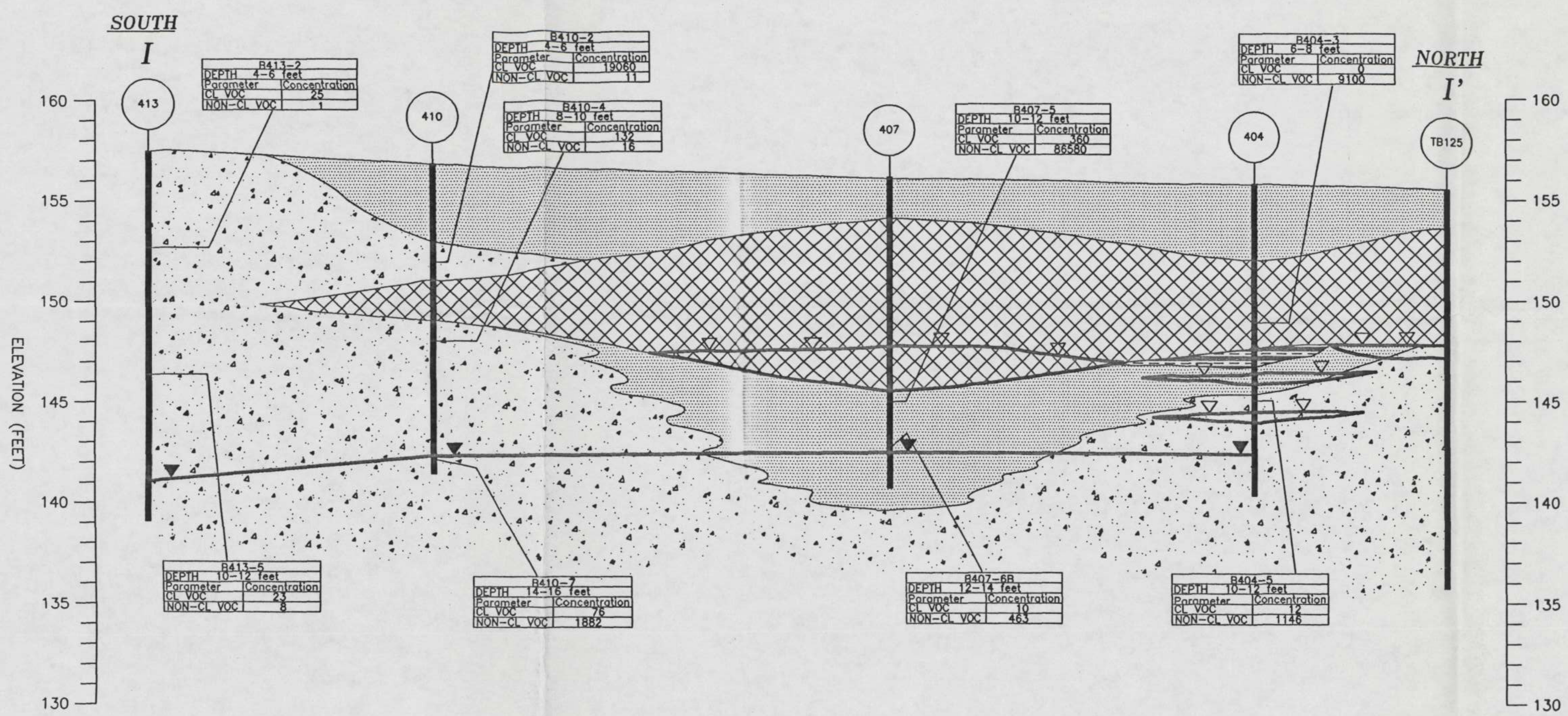
HORIZONTAL: 1 INCH EQUALS 100 FEET
VERTICAL: 1 INCH EQUALS 10 FEET
VERTICAL EXAGGERATION = 10
ELEVATIONS IN FEET, NGVD 1929

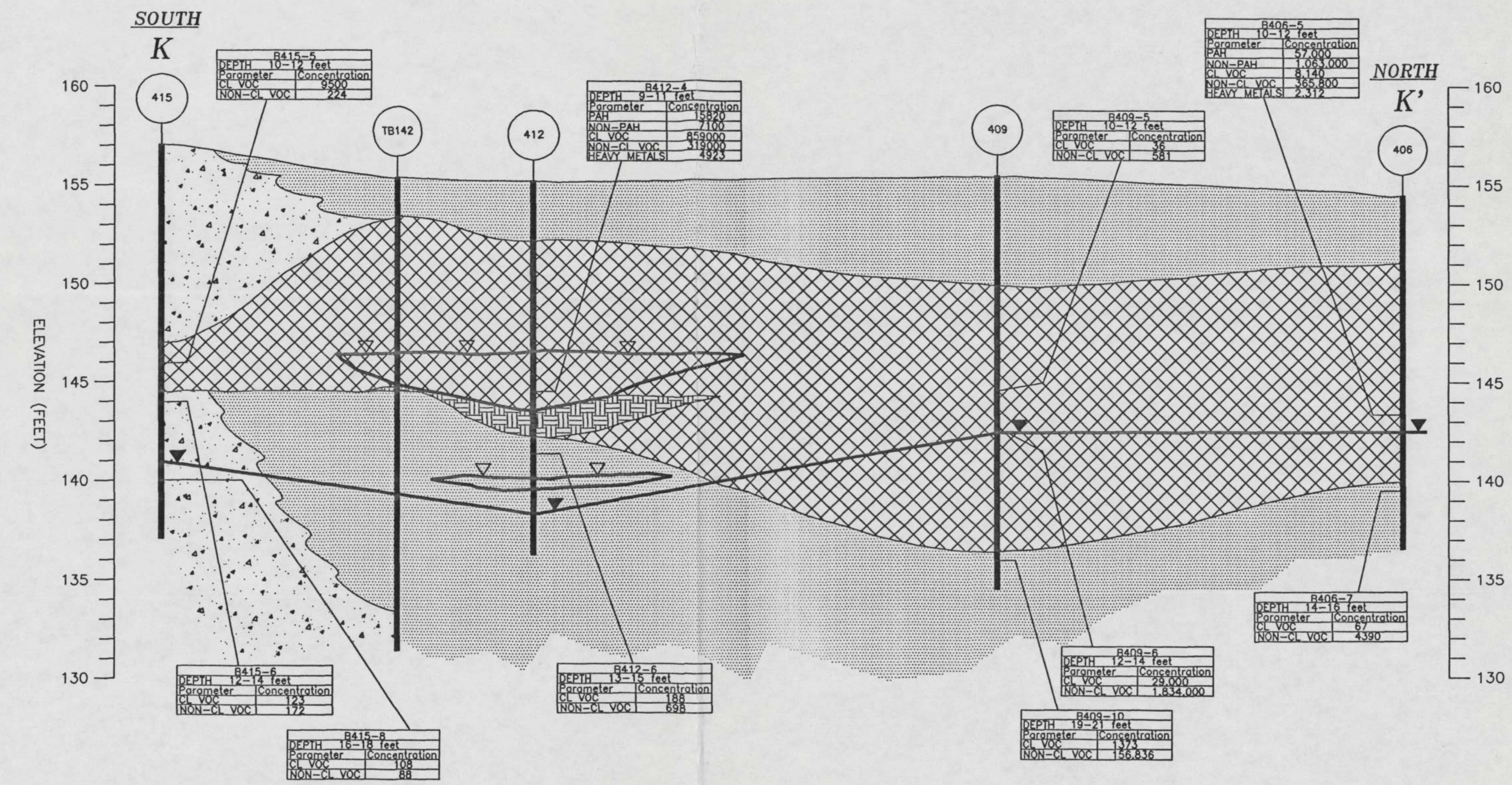
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

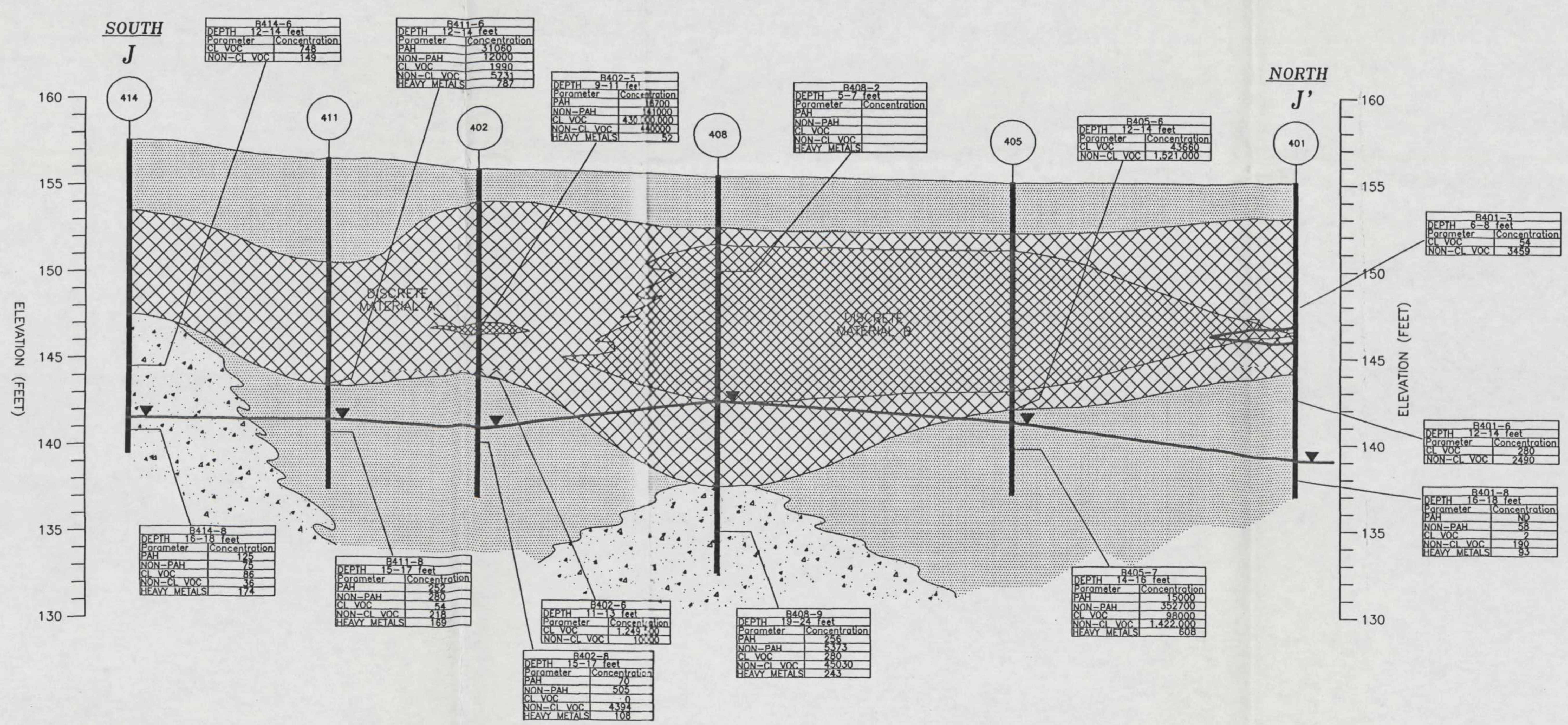
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-6
ANALYTICAL RESULTS – SUBSURFACE SOIL
GEOLOGIC CROSS-SECTION H – H'

DRAWING NAME: SECHH.DWG		FILE NUMBER: 4925534	
SCALE: AS SHOWN	REVISION: 1	DRAWN BY: WB	DATE: 10/11/93







LOCATION OF BORING

B204

BORING NUMBER

APPROXIMATE GROUNDWATER LEVEL OCTOBER, 1993

PERCHED WATER TABLE

PAH = TOTAL POLYAROMATIC HYDROCARBONS, UG/KG
NON-PAH = TOTAL NON-PAH SEMIVOLATILE ORGANIC COMPOUNDS, UG/KG
CL VOC = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG
NON-CL VOC = TOTAL NON-CHLORINATED VOLATILE ORGANIC COMPOUNDS, UG/KG
METALS = TOTAL SELECTED HEAVY METALS, MG/KG
ND = NOT DETECTED

NOTES:
1. GEOLOGY BELOW TERMINATION POINT OF BORINGS INFERRED FROM ADJACENT BORINGS AND OTHER CROSS SECTIONS.

LEGEND

- SILT AND CLAY
- SOLID WASTE
- DISCRETE MATERIAL A (WITHIN SOLID WASTE MASS)
- DISCRETE MATERIAL B (WITHIN SOLID WASTE MASS)
- SAND (UNDIFFERENTIATED)
- PEAT
- SAND AND GRAVEL (UNDIFFERENTIATED)

5 FT.
10 FT.

SCALE
HORIZONTAL: 1 INCH EQUALS 10 FEET
VERTICAL: 1 INCH EQUALS 5 FEET
VERTICAL EXAGGERATION = 2
ELEVATIONS IN FEET, NGVD 1929

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
5 Overlook Drive
Amherst, NH 03031
(603) 672-2511

OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT

PLATE 4-7

ANALYTICAL RESULTS
GEOLOGIC CROSS-SECTIONS I-I',J-J',K-K'

DRAWING NAME: SECIK2.DWG		FILE NUMBER:	492 5534
SCALE: AS SHOWN	REVISION: 0	DRAWN BY: DJB	DATE: 12/10/93

CW-20(MW)
NO EXCEEDANCES
FORMER MUNICIPAL WELL No. 5
GZ-11S,D(MW)
D-NO EXCEEDANCES
LORI CORP.
CW-15(MW)
NO EXCEEDANCES
LW-103S,M,D(MW)
S,M-NO EXCEEDANCES
LORI WELL
LW-15S,M,D(MW)
BARNES RESIDENCE
SIMONE RESIDENCE
SLIKER RESIDENCE
REJEAN ROAD
GZ-3
TW-18(MW)
GZ-12M,D(MW)
D-NO EXCEEDANCES
PALLATO RESIDENCE
B301(MW)
TW-17 S(MW)
GZ-17 M,D(MW)
D-NO EXCEEDANCES
B,C-NO EXCEEDANCES
B302A,B,C(MW)
B309A,B,C(MW)
R.V. & SONS WELDING
BLACK POND
CHUCK AND EDDIE'S USED AUTO PARTS
B303A,B,C(MW)
NORTHEAST MACHINE
B-3(MW)
GZ-4 S,M,D(MW)
B308A,B,C(MW)
PARKS & RECREATION
B304A,B,C,D(MW)
B-4(MW)
GZ-5S,M,D(MW)
B305(MW)
SMF
TB-7 S(MW)
OLD TURNPIKE ROAD
CHUCK & EDDIE'S SUPPLY WELL
SOUTHINGTON METAL FABRICATORS
GZ-7 S,M,D(MW)
MERIDEN BOX
GZ-14S,M,D(MW)
S-NO EXCEEDANCES
B307
SOUTHINGTON METAL FABRICATORS
B306A,B,C(MW)
SOLOMON CASKET COMPANY
GZ-13S,M,D(MW)
NO EXCEEDANCES
GZ-1(MW)
N
LEGEND
ANALYTE
BEN BENZENE
CHL CHLOROFORM
DCE 1,2-DICHLOROETHENE
ETB ETHYL BENZENE
MCL METHYLENE CHLORIDE
PERC TETRACHLOROETHENE
TOL TOLUENE
TCA 1,1,1-TRICHLOROETHANE
VC VINYL CHLORIDE
XYL XYLENE
BBP BUTYL BENZYL PHTHALATE
BEHP BIS(2-ETHYLHEXYL) PHTHALATE
1254 AROCLOR 1254
1260 AROCLOR 1260
SB ANTIMONY
BA BARIUM
BE BERYLLIUM
CD CADMIUM
CR CHROMIUM
PB LEAD
MN MANGANESE
HG MERCURY
NI NICKEL
TH THALLIUM
GZ-2(MW)
NO EXCEEDANCES
0 100 200 400
SCALE IN FEET
ESE Environmental Science & Engineering, Inc.
5 Overlook Drive Amherst, NH 03031 (603) 672-2511
OLD SOUTHINGTON LANDFILL SUPERFUND PROJECT
SOUTHINGTON, CONNECTICUT
REMEDIAL INVESTIGATION REPORT
PLATE 4-8
WELL LOCATIONS EXCEEDING MCLs OUTSIDE STUDY SITE
DRAWING NAME: CHEMOUT.DWG
FILE NUMBER: 492 5534
SCALE: 1"=100'
REVISION: 1
DRAWN BY: DJB
DATE: 12/10/93