#7

REMEDIAL ALTERNATIVES

REPORT

For the "Perx Property"

located at

68 South Broadway
Village of Red Hook
Dutchess County, New York

NYSDEC Spill Number: 0210253

January 2004

ESI File: DR99140.42

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Ecosystems Strategies, Inc. Environmental Services and Solutions

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The undersigned has reviewed this Remedial Alternatives Report and certifies To Dutchess County Department of Planning that the information provided in this document is accurate as of the date of issuance by this office.

Any and all questions or comments, including requests for additional information, should be submitted to the undersigned.

Paul H. Ciminello
President

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1.0 INTRODUCTION

1.1 Purpose and Organization of this Report

Ecosystems Strategies, Inc. (ESI) is conducting a Remedial Alternatives study of the "Perx Property" located at 68 South Broadway in the Village of Red Hook, Dutchess County, New York. The purpose of this Remedial Alternatives Report (RAR) is to identify and evaluate alternatives for mitigating documented contamination and/or controlling the impacts of such contamination. Through a process of identifying potential remedies and screening each relative to a predetermined set of criteria, a remedial response is selected that is technically feasible, protective of human health and the environment, cost-effective and consistent with the local objectives for the property.

This RAR is divided into four sections, as follows:

Section 1.0 Introduction

Section 1.0 provides a summary description of this RAR, the Site that is the focus of this RAR, and the known recognized environmental conditions (RECs) on the Site, discovered during previous Site assessments (see Appendix A).

Section 2.0 Methodology

Section 2.0 provides a detailed discussion of the methodology by which the remedial technologies and remedial alternatives will be evaluated, with a detailed discussion of the criteria which are used in the evaluation process.

Section 3.0 Identification and Preliminary Screening of Alternatives

Section 3.0 summarizes the screening process for various remedial alternatives and provides brief descriptions of each alternative.

Section 4.0 Detailed Analysis of Remedial Alternatives

Section 4.0 thoroughly analyzes the potential remedial alternatives, with the intent of selecting the most appropriate alternative for this Site, based on the criteria developed in Section 2.0.

1.2 Site Information

1.2.1 Site Location and Description

The Perx property is located at 68 South Broadway, in the Village of Red Hook, Dutchess County, New York. The property is approximately 20 acres in size. Frontage along the western side of South Broadway provides access to the property.

1.2.2 Site History

Information obtained during the preparation of a previous Phase I ESA (conducted by ESI in September 1999) indicates that the on-site structures have been present on the subject property since the mid-1950s. The property had been used as an apple processing facility beginning in 1949, was a frozen-food processing and packaging plant from 1955 to some time after 1981, and has been vacant since circa 1985. Apple orchards were located on the western portion of the subject property during the 1950s and 1960s.

1.2.3 Proposed Future Usage of the Site

The Site is proposed for re-use as residential development.

1.3 Site Environmental Conditions

This section provides a summary of Site investigations performed to date, which are detailed in ESI's Summary Report of Site Investigation and Interim Remedial Activities Report (Summary Report), dated June 2003 and revised December 2003. This report documents laboratory data, field observations and technical findings amassed during previous Site investigations. Selected portions of the Summary Report are provided in Appendix A.

1.3.1 Nature and Extent of Contamination

Data collected during the Site Investigation phase of the project provide a comprehensive assessment of existing on-Site environmental conditions. The results of field investigation services (including laboratory analyses) are summarized below for each media.

Petroleum

ESI coordinated and supervised the removal of three underground storage tanks (USTs) and four aboveground storage tanks (ASTs) from various locations throughout the subject property. All confirmatory soil samples related to the tanks were petroleum free, with the exception of soils obtained from near a 750-gallon fuel oil UST formerly located east of the water treatment buildings. A small volume of contaminated soil was observed at the north invert of this tank, and a spill event was reported to the NYSDEC (Spill File number 0210253). The source of this contamination, the UST, has been removed. Field evidence supports the conclusion that the total volume of contaminated soil in the vicinity of the former 750-gallon UST is less than 50 cubic yards. A ground water monitoring well (TMW-1) was installed adjacent and downgradient (east) of the tank grave. No VOCs or PAHs were detected in water samples obtained from this monitoring well.

Two additional petroleum bulk storage tanks were identified immediately east of the maintenance garage during the final phase of field investigative/remedial activity. An initial analysis of soil material obtained from near the tank inverts indicates the absence of petroleum contamination.

Recent communications with people knowledgeable of Site conditions identified the possible presence of a fuel-oil tank (possibly as large as 10,000-gallons) under the building. No field evidence of this UST has been encountered during various Site inspections and no evidence of petroleum contamination has been identified on the Site in the vicinity of this suspected UST.

Metals and Pesticides

Surface soil samples (from 0-4 inches below surface grade [bsg]) were collected at various locations throughout the west wastewater treatment system. These samples had concentrations of arsenic in excess of NYSDEC recommended cleanup objectives. Lead was also detected in two surface samples at concentrations in excess of NYSDEC recommended cleanup objectives. The exceedences detected for surface soils in this area are low-level marginal exceedences and indicate that the wastewater system and related components have not significantly impacted soils in this area.

Floor drains within the main processing warehouse exhibited high concentrations of pesticides and lead in sediment samples obtained from the drain bottoms. Additional samples collected from the base of the skimmer shed (the terminus of the floor drains) indicate concentrations of pesticides below NYSDEC recommended cleanup objectives.

At this time, it is estimated that between 750 and 1,000 cubic yards of soils would be subject to remediation (see area outlined in the Fieldwork Map, Appendix C).

Additional soil samples collected in the former orchard and wetlands portion of the property exhibit concentrations of arsenic in excess of NYSDEC recommended cleanup objectives (these contaminated soils/sediments were collected from a depth of 0-4" bsg). Contamination in surface soils in the former orchard areas, and in sediment material from points throughout the wetlands, are low-level marginal exceedences and support the conclusion that historic arsenic-based pesticide use has not significantly impacted soils in this area. Additionally, low levels of pesticides (DDD, DDE, DDT and Chlordane) were detected in sediment samples (0-4" bsg) collected from the wetlands area. The concentrations of pesticides were far below NYSDEC recommended cleanup objectives. Based on the projected volume and square footage of soils impacted in this area, and the densely wooded character of this portion of the parcel, a soil removal effort is not deemed appropriate. The potential for human contact with affected soils on this portion of the property is minimal.

Subsurface Waste

Surface debris had been noted in the wooded area on the western portion of the subject property, suggesting the potential presence of buried wastes. Seven test pits (3TP-10 through 3TP-16) were extended in these areas of surface debris. No field evidence of subsurface waste was encountered during the extension of these test pits. Very low levels of VOCs, all well below NYSDEC recommended cleanup objectives, were detected in three of the four samples analyzed, and one sample had detected levels of 4,4' DDT at concentrations well below the NYSDEC recommended cleanup objective. Field evidence and results of laboratory analysis support the conclusion that soils in this portion of the subject property have not been impacted.

Debris

Limited volumes of liquid and solid wastes were noted at various locations throughout the main on-site building. The waste is contained in metal and paper barrels and bags. In addition to the non-hazardous waste identified throughout the property, a potential ammonia tank was identified in a freezer within the main processing warehouse.

1.3.2 Contaminant Fate and Transport

The wetland area that extends onto the western portion of the subject property is the likely receptor for any on-site contamination.

1.3.3 Exposure Assessment

As part of the Site Investigation phase of this project, an exposure assessment was conducted to qualitatively assess the potential impacts of the existing Site on human health and the environment. For the human health component of the assessment, both current and future land use scenarios were considered.

The primary contaminants present on this Site are organic and inorganic pesticides. Compounds are present in surface soils in the immediate vicinity of the warehouse and in the wastewater treatment areas. Pesticide compounds are not present in deeper soils and not in the groundwater.

This assessment determined that direct contact or inhalation of either contaminated soils or dust generated during soil disturbance activities is the most likely exposure pathway. Ingestion of contaminated media is another possible exposure pathway. Ingestion of contaminated water is not a reasonable route of exposure as the Site is served by central water.

On-site workers involved in future remediation and/or development activities are the most likely receptor population. The implementation of a Health and Safety Plan (HASP) would include a community air-monitoring plan, mitigating the possibility that off-site populations are a potential receptor population. Any Site-specific remedial designs that involve soil disturbance will require monitoring and mitigation plans to address potential dust generation and increased contaminant migration. Occasional trespassers onto the Site are currently a receptor population and may be a future receptor population.

2.0 METHODOLOGY

2.1 Overview of Screening Process

In order to identify and screen potential remedial technologies, remedial objectives and clean-up criteria are established. These objectives and criteria are based on NYSDEC guidance documents, community input and risk-based assessments. These criteria are also a function of known recognized environmental conditions (RECs) on this Site.

Based on the media that are subject to potential remediation, an initial screening of various potential technologies is conducted (Section 3.0). For each alternative, this screening considers three factors, including: the feasibility of each technology specific to the Site, the estimated cost of implementation, and the effectiveness in achieving the Site-specific objectives. Remedial approaches that are determined not to be feasible, cost-effective, or sufficiently effective are dropped from further consideration.

The technologies that pass the initial screening are then assessed in greater detail in Section 4.0, using the criteria set forth in Section 2.2.2. The various alternatives are also qualitatively compared to each other to assess which is most successful at achieving each individual criterion. This comparative process is instrumental in identifying a preferred alternative. *For this specific RAR, none of the identified potential remediation strategies screened in Section 3.0 were dropped from further consideration; that is, all the potential alternatives identified in Section 3.0 are also assessed in Section 4.0.*

2.2 Screening Methodology

This section provides a discussion of the overall remedial objectives for this Site and the methodology used in screening potential remedial alternatives. The goals specified below are consistent with NYSDEC guidance documents pertaining to Brownfield restoration procedures.

2.2.1 Remedial Objectives

The remedial objectives considered to be appropriate for this Site have been determined through a process established for this purpose by the NYSDEC (6 NYCRR Part 375-1.10). A significant element in that process is the proposed future use of a particular site, so that potential remedial actions can be assessed, and a preferred remedial action ultimately recommended and selected that is compatible with the intended future use. As stated above (see Section 1.2.1), this Site is proposed for use as a residential development.

It is the overall objective of this project to implement remedial actions that provide for the appropriate level of protection of the public health and environment. To the extent feasible and practical, such protection should be maintained for as long as the Site is used for the purpose around which the protection was designed (i.e. proposed residential development).

Objectives are set forth for each media of concern to ensure that appropriate levels of remediation are achieved. Objectives include the protection of public health and also the environmental health of the Site (including wildlife). For this Site, the media warranting remediation include petroleum-contaminated soil in the vicinity of a former 750-gallon UST, exceedences of NYSDEC recommended cleanup objectives for metals (arsenic) and pesticides in soils in the wastewater processing area, and high exceedences of pesticides in the drains in the on-site structure.

Based on the Site's proposed future use as a residential development, it is the objective of remedial activities to eliminate, to the extent practical, the potential for direct human or animal exposure to petroleum, metals and pesticide contamination in on-site soils.

2.2.2 NYSDEC Review Criteria

Potential technologies and specific Site remedial alternatives are analyzed relative to criteria developed by the NYSDEC. This section discusses each of these criteria, with particular concern for their relevance to this Site.

The following review criteria have been developed to address the technical and policy considerations that are used in selecting the preferred remedial alternative:

1. Overall Protection of Human Health and the Environment

The community's post-remedial exposure to affected materials is evaluated. The surrounding environment's exposure is also evaluated. All media that could directly or indirectly affect the community are evaluated: air, groundwater, soils, sediments, surface waters, and wildlife vectors.

2. Compliance with Standards, Criteria and Guidance Values (SCG)

Detected compounds of concern are compared to relevant federal, state or local regulatory standards, guidance levels, or health risk limits. SCGs included in this RAR are derived from United States Environmental Protection Agency (USEPA), NYSDEC, and New York State Department of Health (NYSDOH) documents, unless otherwise noted.

3. Short-term Effectiveness

Short-term effectiveness is measured relative to the level of protection afforded to the community during remediation activities. Also, any other impacts to the environment are assessed, as well as the time necessary to implement each alternative.

4. Long-term Effectiveness and Permanence

Long-term effectiveness and permanence of the remedial action is assessed. Generally, a time frame of 30 years is used for purposes of comparison and analysis; however, the ultimate objective is to promote a remedial alternative that is effective for the time period that this Site is used as a residential development. In addition, residual risks are evaluated, and the adequacy and reliability of proposed controls are assessed as they relate to the proposed remedy and the surrounding community.

5. Reduction of Toxicity, Mobility, and Volume

The reduction of several factors of concern is assessed. These factors include toxicity, mobility and volume of the identified contaminants of concern. The anticipated reduction in volume of hazardous substances and the post-remedial mobility and toxicity of remaining Site contaminants is assessed.

6. Feasibility

The suitability of each alternative is analyzed in relation to Site-specific conditions, as well as how reasonable is its implementation. As part of this assessment, the availability of services and materials, and the alternative's cost-effectiveness is considered.

7. Community Acceptance

The people most directly impacted by the final selection of a Site remedy are the inhabitants of the local community. The concerns of the community are assessed in conjunction with the first six criteria.

Community acceptance is evaluated following the public comment period. Within this RAR, the issues most likely to be of concern, or generate controversy, are discussed.

2.2.3 Determination of Costs

Finally, consideration is given to the costs associated with each potential remedial technology and/or alternative. A cost for each alternative is formulated based on reasonably foreseeable expenses. Both initial and long term costs are considered. Long-term costs are estimated on an annual basis, with lifetime costs a function of the net present value and a discount rate of four percent, per annum over 30 years. Costs that not easily quantified are also identified.

3.0 IDENTIFICATION AND PRELIMINARY SCREENING OF ALTERNATIVES

This section identifies and assesses remedial alternatives that have been selected for possible implementation on the Site. These alternatives are identified utilizing the remedial response objectives (see Section 2.2 above) as a guide.

Subsequent to identification, each alternative is assessed relative to the review criteria specified in NYSDEC guidance documents on Brownfields sites. Specifically, each alternative is assessed relative to:

- Overall protection of human health and the environment
- Compliance with Standards, Criteria, and Guidance Values (SCG)
- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility and volume
- Feasibility
- Community acceptance

3.1 Identification of Possible Remedial Alternatives

This Section identifies a wide range of reasonable remedial options including excavation and removal. Subsequent to this preliminary assessment, a general analysis of the alternatives is provided in Section 3.2 below, and a detailed discussion of all three alternatives is provided in Section 4.0.

Table: Summary of Alternative Technologies Subject to Screening

Alternative	Benefits	Deficiencies
No Action (Section 3.2.1)	• Easily implemented • Low short-term cost	• No short- or long-term effectiveness • Potential long-term costs • Not protective of human health or the environment • Prevents re-use of the Site
Engineered Soil Cover (Section 3.2.2)	• Simple implementation • Protective of human health and the environment • Long- & short-term effectiveness • Allows Site re-use	• Highest cost
Excavation (Section 3.2.3)	• Simple implementation • Protective of human health and the environment • Long- & short-term effectiveness • Allows for flexible Site re-use	• Moderate cost

3.2 Preliminary Screening of Alternatives

The alternatives identified above for this Site are summarized below, and are evaluated for effectiveness, implementability and cost. These alternatives are also thoroughly described and analyzed in Section 4.0.

3.2.1 No Action

Description

The No Action Alternative would involve no active remediation of the Site. The existing buildings would remain (and continue to deteriorate) and the existing (and suspected) tanks would not be pumped and would remain in place. No covering of the existing surface would be introduced and no attempt to minimize, treat, or eliminate known on-site contaminants would occur.

Consideration of this alternative is required by the NYSDEC to ensure that any costs and societal benefits (e.g., protection of human health, elimination of contaminant migration) associated with the selected alternative are justified.

Feasibility

The No Action Alternative would be simple to implement. No local approvals would be required for implementation. On-going Site management activities, however, would be required. Site safety is a present and future consideration. Site fences are in poor condition and will require repair. Additionally, fences (or other access control features) would need to be installed where none currently exist (e.g., the adjoining property to the north) and these fences would need to be maintained. Some consideration (and therefore costs) for future maintenance of Site control features (e.g., fences) must be included in this alternative. Improving and maintaining Site access control features may become burdensome to the County.

Additionally, the remaining tanks and buildings will deteriorate with time, increasing the risk of tank failure and building collapse. Such situations may necessitate complete building demolition and/or tank excavation. That is, the No Action Alternative will likely require some response actions during its projected 30-year lifetime.

Cost

The No Action Alternative would be relatively inexpensive to implement. Expenses include the costs of maintaining, and in some cases improving, fences and other Site access control features. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total short-term costs for the No Action Alternative are estimated at $75,000 (see Appendix B for detailed cost estimates). Long-term costs would likely include the demolition of the on-site structures, thereby increasing the cost of this alternative to $1,230,000 (see Appendix B for detailed cost estimates).

The opportunity cost of not developing this property is estimated to be relatively high. Qualitatively, the opportunity costs include lost construction jobs, pre-construction costs and property taxes.

Effectiveness of the No Action Alternative

The No Action Alternative is not considered to be protective of human health and the environment in either the short or long term. The potential will exist for contact by future Site users with metals and pesticide-contaminated soils, which will remain on-site and will remain untreated.

Based on these findings, it is concluded that the No Action Alternative does not meet the requirement for long-term protection of public health from the known on-site contaminants.

Installation of an Engineered Soil Cover

Description

This Soil Cover Alternative would involve the excavation and removal of remaining on-site tanks and any petroleum-contaminated soil, the demolition of on-site structures, and the installation of an engineered soil cover over select portions of the Site (see Appendix C). Specifically, the soil cover will be installed over those portions of the Site where metals- and pesticide-contaminated soil remains. This soil cover would create a protective barrier between contaminated soils and surface soils that are directly exposed to Site occupants or other persons.

A minimum number of groundwater monitoring wells will be either retained or installed to provide periodic monitoring of water quality on this Site. Groundwater monitoring is considered warranted to document the long-term effectiveness of this alternative.

Feasibility

The Soil Cover Alternative is considered to be relatively simple to implement. The debris generated by the demolition of on-site structures and any remaining and/or regulated wastes would be required to be transported off-site by trucks. The soils necessary for the installation of the cover would be transported onto the Site via trucks.

Cost

The costs associated with this alternative include the demolition of on-site structures, excavation and removal of the remaining tanks and associated soils (as warranted), the installation of the soil cover, and periodic groundwater monitoring for thirty years. Total lifetime costs for the Soil Cover Alternative are $1,632,800 (see Appendix B for detailed cost estimates).

This cost estimate does not include any costs associated with maintenance of the soil cover or additional costs that will be incurred for any disturbance of the cover.

Effectiveness

This Soil Cover Alternative is considered to be an effective method of protecting human health and the environment.

The excavation and removal of the remaining tanks (and associated soils, as warranted) and on-site structures will eliminate potential, future sources of contamination.

Previous fieldwork performed on the Site indicates elevated levels of metals and pesticides and low-level petroleum contamination of on-site soils. While these contaminated and impacted soils will not be removed from the Site, the engineered soil cover will be a sufficient barrier to prevent future Site users from coming into contact with on-site contaminants.

3.2.2 Excavation and Re-Grade

Description

The Excavation Alternative would involve demolition of on-site structures, the excavation and removal of on-site tanks and petroleum-contaminated soils, and the excavation and removal of metals- and pesticide-contaminated soils. The Site would then be returned "to grade"; that is, clean fill (e.g., soils, small stones, and/or unregulated on-site demolition materials) would be used to fill the excavated areas to their pre-excavation elevations.

Feasibility

The Excavation Alternative is considered to be simple to implement. Tank removal and building demolition pose no special difficulties. It is estimated that 800 cubic yards of contaminated soils will be excavated from the Site. Excavated soils and clean fill will be transported from and to the Site via trucks. Access to the Site is not restricted.

Cost

The costs associated with this alternative include the demolition of on-site structures and the excavation and removal of the remaining tanks (and surrounding soils, as warranted), and the excavation, removal and proper disposal of contaminated soils. Associated laboratory costs for post-excavation confirmatory sampling will also be incurred. Total costs for the Excavation Alternative are $1,528,800 (see Appendix B for detailed cost estimates).

Effectiveness

This alternative is the most effective for protecting human health and the environment. It will also allow maximum flexibility for future development.

3.2.4 Comparison of Alternative Technologies

The No Action Alternative is not consistent with the goals of the NYSDEC Brownfields program as it would not permit the re-use of the Site as planned by the Town (residential development). Furthermore, the No Action Alternative does not meet the criteria of public acceptance and long-term protection of public health and the environment. Therefore, the No Action Alternative is not considered to be an appropriate remedial strategy for this Site.

The Soil Cover Alternative, which includes existing building demolition, tank excavation, and installation of an engineered soil cover over portions of the Site, is an appropriate remedial strategy for this Site. This alternative provides for effective long-term protection of public health and the environment and permits the proposed re-use of the Site. Although soil contamination will remain (metal-, pesticide- and petroleum-impacted soils will be covered, not removed), the presence of the engineered soil cover will prevent direct access to these soils in the short- and long-term.

The Excavation Alternative, which includes existing building demolition, tank excavation, contaminated soil excavation from some portions of the Site, and "return to grade", is an appropriate remedial strategy for this Site. This alternative provides for effective long-term protection of public health and the environment. Additionally, because soils currently impacted with significant levels of contaminants will be removed, there will be more flexibility in future Site use. In comparison to the Soil Cover Alternative, there will be less future oversight necessary with regard to institutional controls and maintenance of barrier integrity.

4.0 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This Section provides a detailed analysis of the identified potential alternatives, which are:

- No Action Alternative
- Soil Cover Alternative, including demolition of current structures, tank excavation, and installation of a 24" engineered soil cover over specific areas of concern
- Excavation Alternative, including demolition of current structures, tank excavation, excavation and removal of contaminated soils in specific areas of concern, and return to grade.

4.1 Common Elements and Considerations of All Alternatives

This section discusses the work elements common to all three alternatives. By reference, these common elements are incorporated in the detailed description and/or implementation of each alternative provided in Section 4.2.

Where noted, some of these elements are not presently necessary for the No Action Alternative. However, if the No Action Alternative is finally chosen, building and tank deterioration will occur over time. As a result, these tasks may become necessary in the future; therefore, they have been included as contingencies for the No Action Alternative.

4.1.1 Establishing and Securing Site Borders and Utility Locations

Prior to any substantive Site work, Site work boundaries and utility locations will be established.

If not available, a survey will be conducted by a licensed surveyor, and a certified survey map of the Site boundaries will be filed with the appropriate agencies. The field Survey will include the placement of field markers or the identification of existing pins. A Survey Map and a "metes and bounds" description will be filed with the appropriate governmental agencies. This map and description will incorporate all tax lots that are part of the Perx property, as well as delineate the areas of special concern. In the case of the Soil Cover Alternative, the Survey Map and meets and bounds description will also delineate the area of capping, to be added to the Survey Map and description after its installation.

The Soil Cover Alternative and the Excavation Alternative will require utility "mark-outs", and the No Action Alternative may require mark-outs in the future. As part of this task, underground utility demarcations will be ordered from the appropriate utility providers. These demarcations will be field-checked prior to fieldwork activities.

4.1.2 Site Clearing

All on-site structures will be demolished prior to the implementation of any active remedial alternatives (i.e., Soil Cover Alternative and Excavation Alternative). This element may be an eventual requirement of the No Action Alternative, as deterioration over time may necessitate building demolition to mitigate safety concerns.

Specifically, all on-site structures will be razed using mechanized equipment and hand tools, as required. Prior to any demolition, a Health and Safety Plan (HASP) will be prepared for the selected alternative that provides comprehensive and appropriate protections for all on-site personnel and surrounding populations. The HASP will detail known and possible areas of concern. The HASP will include safety and monitoring plans that conform to the standards and requirements of applicable agencies, including the New York State Department of Labor (NYSDOL) and the Occupational Safety and Health Administration (OSHA).

4.1.3 Tank Removal Activities and Confirmatory Soil Sampling

All remaining on-site tanks will be excavated and disposed of in accordance with applicable regulations. This element may be an eventual requirement of the No Action Alternative, as deterioration over time may necessitate tank excavation, and/or the NYSDEC may require tank excavation regardless of future Site usage. If the No Action Alternative is chosen, and tank removal becomes necessary in the future, other associated activities (detailed in 4.1.4 and 4.1.5 will also be required).

Known on-site petroleum storage tanks include a 500-gallon UST and a 500-gallon AST, suspected of storing diesel-fuel or waste oil. Additionally, a 10,000-gallon fuel oil tank is purportedly under the existing main warehouse, according to former personnel with knowledge about the Site. To date, no records or field indications of such a tank have been discovered.

All tank excavations will be conducted in conjunction with in-field analyses of soils using VOC detectors, and laboratory testing of confirmatory soil samples collected from the walls and base of each excavation. This confirmatory testing will be conducted to ensure that no soils remain that have elevated levels of petroleum constituents in excess of regulatory thresholds. These in-field and laboratory analyses will be conducted in accordance with NYSDEC standards to be detailed in future remedial Workplans.

Soils excavated during tank removal activities will be stockpiled pending the results of laboratory analysis. Final soil disposition may include on-site reuse or off-site transport, depending on these analytical results. The extent of required soil excavation will also be a function of field indications of contamination (including elevated PID readings) and laboratory data of wall and floor samples.

All tanks will be pumped of remaining product and rendered free of vapors before their removal. Any product or wastewater retrieved from the tanks will be disposed of by a licensed hauler in accordance with applicable regulations. The final facilities that receive any pumped materials will be property licensed and will provide manifests documenting final disposition. These manifests will become the property of the Owner and the NYSDEC.

Finally, additional soil cores will be extended in the footprint of the former on-site USTs. Soils will be analyzed for VOCs (USEPA Method 8021) to document the presence or absence of volatile hydrocarbons.

4.1.4 Equipment Preparation

Prior to any on-site sampling activities, all field analysis equipment will be calibrated to ensure proper working order, and all records of calibration will be provided to the Owner and the NYSDEC.

Equipment that may come into contact with potentially contaminated media will be decontaminated before and after on-Site usage. Wastewater generated during the decontamination process will be properly handled and containerized on-site and provisions will be made for appropriate off-site disposition.

4.1.5 Water Run-off Control

For the Soil Cover Alternative and the Excavation Alternative, water run-off controls will be required during remediation activities to prevent runoff from entering the wetland area to the west. Run-off control will consist of silt fencing, diversion channels and/or hay bales. For the purpose of all cost estimates, sedimentation control measures have been incorporated into all project costs.

4.1.6 Future Institutional and Physical Controls

The long-term effectiveness of any of the potential alternatives depends, in part, on ensuring that future Site access and/or disturbance activities are controlled. Such control is most important to No Action Alternative and the Soil Cover Alternative, as both will purposefully leave contaminated soils in place.

In the specific case of the No Action Alternative, institutional controls in the form of deed restrictions and other recordings and registrations will restrict the future use of the Site.

In the specific case of the Soil Cover Alternative, both institutional controls and construction controls will be applied. Institutional controls will work to alert future developers or other on-site personnel as to the exact location of the soil cover and impacted soils and guide future development possibilities. A construction control will be installed in the form of a plastic orange fence under the barrier layer. This control will alert personnel who encounter it that the barrier to further excavation is intended and warranted. Standard industry practice recognizes these controls (i.e., buried barriers) as purposeful obstructions designed to protect human safety and environmental health.

4.2 Analysis of Remedial Alternatives

4.2.1 No Action Alternative

4.2.1.1 Description

The No Action Alternative would require the establishment and securing of site borders and utilities (Task 4.1.1), and the implementation of institutional and physical controls (Task 4.1.6). These tasks are described above, in the sections noted.

With deterioration over time, it may also eventually require site clearing (Task 4.1.2), tank removal activities and confirmatory soil sampling (Task 4.1.3), equipment preparation (Task 4.1.4), and water run-off control (Task 4.1.5). These tasks are described above, in the sections noted.

No active remediation would be conducted unless future Site conditions or regulatory agencies require such actions.

4.2.1.2 Implementation Schedule

The installation and repair of fences would require little time (less than one week, weather permitting). The field and research activities necessary to complete a certified survey would require a similar amount of time; however, several weeks are usually required between the time a survey is commissioned and its completion. The final filing of institutional controls with the appropriate governmental agencies (County Clerk's Office, Local Building Department, etc.) would require up to three months. For safety purposes, on-site structures and tanks may eventually require demolition and/or excavation.

4.2.1.3 Criteria Assessment

Short-term effectiveness: The No Action Alternative is considered to be ineffective in protecting human health and the environment in the short term. Data support the conclusion that pesticide-contaminated soils in on-site floor drains represent a threat to public health or to the environment and require removal. Other on-site soils are impacted by metals and petroleum. It is likely the NYSDEC will require the excavation and removal of remaining on-site tanks and the removal of any remaining petroleum-contaminated soils.

Long Term Effectiveness: The No Action Alternative would provide no reduction in risk to human health and the environment, does not utilize any means to control the source of Site contamination and would be relatively expensive over the long term. Over time, the Site will pose an increasing risk to public health, as the remaining tanks and structures deteriorate.

As a result, the No Action Alternative will not be protective of human health and/or the environment in the long term.

Compliance with Standards, Criteria and Guidance (SCG): The No Action Alternative does not comply with any of the SCGs identified for this Site. In situations where attainment of SCGs is not economically feasible and where protection of human health can be achieved through alternate means, the need to reduce on-site contaminants to levels less than SCGs may be determined by the NYSDEC to be no longer necessary.

Overall Protection of Human Health and the Environment: The No Action Alternative will not provide long-term protection of human health or protection to the environment, because this alternative does not provide any means of controlling long-term exposure to the on-site contaminants. Risks to future Site users will increase as the tanks and structures deteriorate, potentially increasing the amount of petroleum impacted soils and the potential for exposure to metals- and pesticide-contaminated soils.

Reduction in Toxicity, Mobility and Volume: The No Action Alternative does not include any treatment or method of reducing the toxicity of the on-site contaminants. The principal Site contaminants are metals and pesticides which will not degrade naturally over time. Mobility of on-site contaminants is likely to increase in the long term under this alternative (contaminants are likely to have an increased likelihood of entering the adjoining wetland to the west).

Feasibility: The No Action Alternative would be relatively simple to implement. No Site improvements would be required and no construction would occur. No local approvals would be required for implementation. On-going management activities would be required.

The perimeter fence is damaged in several places and there is easy access to the Site from the adjoining property to the north. The fence will need to be repaired and access from the northern adjoining property prevented. In the long term, Site safety will become a consideration and therefore some consideration (and therefore costs) for future maintenance of Site control features (e.g., fences) must be included in this alternative, regular groundwater monitoring and maintaining Site access control features may become burdensome to the county.

Community Acceptance: The No Action Alternative does not permit the re-use of this Site and is unlikely to find community acceptance.

4.2.1.4 Cost

The costs associated with the No Action Alternative would be costs resulting from the maintenance of Site access control features. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total costs for the No Action Alternative are estimated at a present value of $1,230,000 (see Appendix B for detailed cost estimates).

4.2.2 Soil Cover Alternative

4.2.2.1 Description

The Soil Cover Alternative would involve establishing and securing site borders and utilities (Task 4.1.1), site clearing (Task 4.1.2), tank removal activities and confirmatory soil sampling (Task 4.1.3), equipment preparation (Task 4.1.4), water run-off control (Task 4.1.5), and institutional and physical controls (Task 4.1.6). These tasks are described above, in the sections noted.

In addition, the following actions are components of this Alternative:

- Waste materials and waste storage containers (including the ammonia tank) will be removed from the building in accordance with applicable NYSDEC regulations;
- The on-site buildings will be demolished after proper removal of all asbestos-containing materials;
- Wastewater treatment equipment, including tanks and piping, will be removed; and,
- Petroleum storage tanks, including related piping, will be removed.

In addition, a soil cover approximately 24 inches thick and comprised of imported soils and/or soil amendments (e.g., sodium bentonite) would be installed over all portions of the Site having documented levels of contaminants above recommended NYSDEC cleanup objectives. Specifically, soils currently containing elevated levels of arsenic and chlordane would be covered with 24 inches of certified clean soils.

The lateral extent of the soil cover is detailed on the map provided in Appendix C, and identified as the "proposed area of soil capping or excavation".

Only authorized personnel would be allowed on-site during remediation activities. Site personnel would be properly trained, in accordance with OSHA and NYSDOL requirements. Additionally, they would be informed of Site-specific concerns and properly instructed with regard to pertinent details. These concerns, details, and procedures will be detailed in a Workplan to be prepared specific to the Site conditions. The NYSDEC will approve the Workplan prior to the start of any remedial activities.

In total, an estimated 6,450 cubic yards of fill materials would be imported for this soil cover (overage is included to allow for soil compaction) on the selected portions of the Site.

4.2.2.2 Implementation Schedule

It is estimated that the time necessary to design and construct the soil cover would be four months. This time schedule is divided into a design phase of one month, a bid solicitation and award phase of one month, and a construction phase of two months.

This schedule assumes no seasonal constraints. Should the project schedule result in the construction occurring in the winter, the total project schedule timetable will be extended.

4.2.2.3 Criteria Assessment

Short Term Effectiveness: The Soil Cover Alternative is considered to be effective in protecting human health and the environment in the short term. The Soil Cover Alternative would involve the removal of all on-site tanks and petroleum contaminated soils. This alternative would not treat or reduce the volume or toxicity of other on-site contaminants; however, this alternative would eliminate, to the extent practical, exposure to the metals- and pesticide-impacted soils. The implementation of appropriate measures during building demolition and/or on-site soil disturbance activities is likely to effectively prevent the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures are not likely to be significantly impacted by on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones for these closure projects).

Long Term Effectiveness: The Soil Cover Alternative is considered to be effective in protecting human health and the environment in the long term. The Soil Cover Alternative would involve the removal of all on-site tanks and petroleum contaminated soils. This alternative would not treat or reduce the volume or toxicity of other on-site contaminants; however, this alternative would eliminate, to the extent practical, exposure to the metals- and pesticide-impacted soils.

Feasibility: It is technically feasible to install a partial soil cover on this Site. Existing on-site structures obstruct access to pesticide impacted soils. Supervision of demolition personnel during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils will be necessary. Due to the relative simplicity of the soil cover's design, it is reasonable to assume that, properly installed, the cover will be reliable over time.

There are minimal long term administrative issues and activities.

Compliance with Standards, Criteria and Guidance Values (SCGs): This alternative removes potential sources of contamination (petroleum bulk storage tanks) and associated contaminated soil from the Site. It does not reduce the low levels of metals and pesticide contamination in other portions of the Site.

Overall Protection of Human Health and the Environment: This alternative provides for the protection of human health and the environment in both the short and long term. The proper installation of the soil cover will eliminate direct contact with the on-site contaminated surface soils. Future users will not come in contact with the on-site contaminants and the maintenance of the cover over time will minimize the likelihood of contaminants migrating off-site.

Reduction in Toxicity, Mobility and Volume: The Soil Cover Alternative includes the excavation and removal of the 750-gallon UST and associated contaminated soils and covering the metals- and pesticide-impacted soils at the southern end of the Site. The contaminants that would remain are generally immobile.

This alternative will decrease the volume of on-site material considered to be contaminated.

Community Acceptance: This alternative provides the opportunity to transform this property into a residential development and therefore achieves the community's overall objective for this Site.

4.2.2.4 Cost

The costs associated with the Soil Cover Alternative would be costs resulting from the installation of the soil cover and UST removal. For the purpose of cost calculations, a project lifetime of 30 years is assumed in this analysis. Total costs for the Soil Cover Alternative estimated at a present value are $1,632,800 (see Appendix B for detailed cost estimates).

4.2.3 Excavation Alternative

4.2.3.1 Description

The Excavation Alternative would include establishing and securing site borders and utilities (Task 4.1.1), site clearing (Task 4.1.2), tank removal activities and confirmatory soil sampling (Task 4.1.3), equipment preparation (Task 4.1.4), water run-off control (Task 4.1.5), and institutional and physical controls (Task 4.1.6). These tasks are described above in detail, in the sections noted.

In addition, the following actions are components of this Alternative:

- Waste materials and waste storage containers (including the ammonia tank) will be removed from the building in accordance with applicable NYSDEC regulations;
- The on-site buildings will be demolished after proper removal of all asbestos-containing materials;
- Wastewater treatment equipment, including tanks and piping, will be removed; and,
- Petroleum storage tanks, including related piping, will be removed.

Finally all known contaminated soils would be excavated and the Site returned to existing grade with clean fill.

The lateral extent of the proposed excavation is detailed on the map provided in Appendix C, and identified as the "proposed area of soil capping or excavation".

Soils would be excavated by properly licensed personnel. Site personnel would be properly trained, in accordance with OSHA and NYSDOL requirements. Additionally, they would be informed of Site-specific concerns and properly instructed with regard to pertinent details. These concerns, details, and procedures will be detailed in a Workplan to be prepared specific to the Site conditions. The NYSDEC will approve the Workplan prior to the start of any remedial activities.

After excavation, confirmatory soil samples will be collected for laboratory analysis, consistent with collection methodology described in Task 4.1.3. Pending confirmation that all impacted soils requiring remediation have been removed, the area will be returned to grade.

The fill used to return the area to pre-excavation elevations will be a mix of materials. Any on-site demolition debris that is not hazardous or regulated will fill the lowest layer of the excavation. Soils needed to fill the remainder of the excavation will be imported via trucks. Sources of imported soils will be recorded and soil integrity will be documented. These records will become the property of the Owner and the NYSDEC.

4.2.3.2 Implementation Schedule

It is estimated that the time necessary to design and conduct demolition and soil removal would be four months. This time schedule is divided into a design phase of one month, a bid solicitation and award phase of one month, and a fieldwork phase of two months.

This schedule assumes no seasonal constraints. Should the project schedule result in the construction occurring in the winter, the total project schedule timetable will be extended.

4.2.3.3 Criteria Assessment

Short Term Effectiveness: The Excavation Alternative is considered to be effective in protecting human health and the environment in the short term. This alternative would involve the removal of all on-site tanks and contaminated soils, and would eliminate exposure to contaminant sources. The implementation of appropriate measures during building demolition and/or on-site soil disturbance activities is likely to effectively prevent the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures are not likely to be significantly impacted by on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones for these closure projects).

Long Term Effectiveness: The Excavation Alternative would remove the on-site sources of contamination and remove future concerns with regard to potential RECs. Future threats to human health and the environment will be eliminated.

Feasibility: It is technically feasible to excavate impacted soils from the Site. Existing on-site structures obstruct access to pesticide impacted soils. Supervision of demolition personnel during the demolition of the relevant structures in order to avoid accidental dispersion of impacted soils and/or human contact with these soils will be necessary. The Site has reasonably clear access roads for trucks to enter and exit and sufficient space for the loading and unloading (including temporary stockpiling) of materials. The Site not steeply graded.

There are minimal long term administrative issues and activities.

Compliance with Standards, Criteria and Guidance Values (SCG): This alternative removes known sources of contamination and associated contaminated soil from the Site. Post-remedial conditions would meet or exceed cleanup requirements.

Overall Protection of Human Health and the Environment: This alternative provides for the protection of human health and the environment in both the short and long term.

Reduction in Toxicity, Mobility and Volume: The Excavation Alternative will eliminate all on-site material considered to be contaminated.

Community Acceptance: This alternative provides the community with the opportunity to transform this Site from abandoned industrial property to productive real estate and therefore achieves the community's overall objective for this Site. Community concern is most likely to focus on the anticipated increase in truck traffic during remedial activities.

4.2.3.4 Cost

The costs associated with the Excavation Alternative would be costs resulting from the demolition of on-site structures, removal of on-site tanks, and removal of all contaminated soils. For the purpose of cost calculations, a project lifetime of thirty years is assumed in this analysis. Total costs for the Excavation Alternative are estimated at a present value of $1,528,800.

4.3 Comparative Analysis of Alternatives

In this Section, the strengths and weaknesses of each alternative is assessed relative to the other alternatives for each analysis criteria. For each criterion, the alternative which is considered to provide the best overall performance is discussed first, followed in rank order by the other two alternatives.

4.3.1 Short-Term Effectiveness

The Soil Cover and Excavation Alternatives are considered to be equally effective in the short term in protecting human health and the environment. The No Action alternative is not considered to be effective in the short term in protecting human health and the environment.

4.3.2 Long Term Effectiveness

The Excavation Alternative is considered to be the best alternative with regard to long-term effectiveness. This alternative will protect human health and the environment in the long-term by eliminating on-site contaminants. As a result, there is flexibility in future Site uses, without the limitations imposed by institutional or physical controls.

The Soil Cover Alternative is considered to be sufficiently effective in the long term at protecting human health and the environment for the Site's proposed future use as a residential development. This alternative permits Site re-use with little risk of exposure to future users from on-site contaminants. Institutional and physical controls will limit flexibility in Site re-use.

The No Action Alternative affords the least long-term effectiveness. The eventual degradation of structures and the remaining tanks will result in a steady worsening of Site conditions and increase potential future contamination.

4.3.3 Feasibility

The No Action Alternative is the most easily implemented in the short-term; however, long-term management considerations may significantly complicate implementation of this alternative.

The Soil Cover Alternative is the second most easily implemented alternative. Soil cover technologies are well established as effective and relatively simple.

The Excavation Alternative is considered to be the most difficult to implement. More laboratory analyses will be required to implement this alternative. Additionally, this alternative will generate the most traffic during remedial activities.

4.3.4 Reduction of Toxicity, Mobility and Volume

The Excavation Alternative is the most successful at reducing toxicity, mobility and volume of on-site contaminants. In this alternative, all areas of significant contamination will be removed, and future potential sources of contamination would be removed. This would eliminate future toxicity and mobility concerns.

The Soil Cover Alternative would reduce the volume of materials of concern by removing all tanks and surrounding soils with excess concentrations of petroleum constituents. This alternative would not remove all contaminated soils; however, the installation of the engineered soil cover will reduce the mobility and practical toxicity of these soils.

The No Action Alternative does not reduce the volume of contaminated material on-site. This alternative also increases the mobility of contaminants in the long-term, due to the degradation of on-site tanks and structures.

4.3.5 Compliance with Standards, Criteria and Guidance Values (SCG)

The Excavation Alternative best complies with established SCGs, by eliminating soil materials containing contamination above regulatory thresholds and removing potential contaminant sources.

The Soil Cover Alternative will remove potential sources of petroleum contamination and will satisfy regulatory requirements regarding remaining on-site contamination. Failure of the soil cover, however, could potentially lead to a release of regulated materials.

The No Action Alternative does not meet basic SCGs. The Site would not be fit for future re-use under this alternative.

4.3.6 Overall Protection of Human Health and the Environment

The Excavation Alternative best protects human health and the environment. Short periods will occur during remedial activities when dust generation and contaminant exposure have the potential to impact human health and the environment. However, the strict implementation of a NYSDEC-approved HASP and Workplan will mitigate these concerns.

The Soil Cover Alternative is the second best protector of human health and the environment. This alternative would create short periods, during remedial activities, when dust generation and contaminant exposure may impact human health and the environment. However, the strict implementation of a NYSDEC-approved HASP and Workplan will mitigate these concerns. Overall concerns may remain after Site mitigation with regard to maintaining the integrity of the soil cover and the resulting barrier to contaminants.

The No Action Alternative would do little to safeguard human health or the environment from environmental concerns in the long-term. For this reason, it is considered that worst alternative for affording protection.

4.3.7 Community Acceptance

Community acceptance cannot be definitively determined until public comment has been solicited and incorporated into this RAR. The presence of continued on-site contamination and increased truck traffic are the potential issues most like to generate public concern and controversy. With respect to these two issues, the Excavation Alternative is likely to have the highest level of community acceptance. The short-term increase in truck traffic is greatest in the Excavation Alternative, but the Soil Cover Alternative would also create short-term truck traffic increases. Given that the Excavation Alternative would result in no significant contamination left on-site, this alternative is the most likely one to be accepted.

The continued presence of on-site contamination in the Soil Cover Alternative is likely to negatively outweigh the benefit of less truck traffic. Therefore, it is anticipated that the Soil Cover Alternative is the second most likely to be accepted by the public.

It is anticipated that the No Action Alternative would be least accepted by the public. The public is likely to be very concerned about taking no remedial actions for two significant reasons: 1.) worry over the safety of drinking water supplies, and 2.) concerns for the safety of residents, especially children, that may be accidentally exposed to Site contaminants or hurt in on-site structures that are in disrepair.

4.4 Recommendation of Preferred Alternative

The recommended remedial alternative for this Site is the Excavation Alternative, for the following reasons:

1. This alternative provides effective protection of public health and the environment in both the short-term and the long-term by eliminating on-site sources of contamination and thereby eliminating the possibility that future users would come into contact with on-site contaminants.

2. This alternative provides the County with both short-term and long-term effective methods of securing the Site and preventing contaminants from migrating off-site or impacting future users.

3. This alternative is easily implemented, and it can be efficiently integrated into the residential development planning process.

4. This alternative is the least costly alternative that provides effective long-term management of Site contaminants.

APPENDIX A

Excerpts from Previous Environmental Reports

1.0 INTRODUCTION

1.1 Purpose

This Summary Report of Site Investigation and Interim Remedial Activities (Report) summarizes all fieldwork performed by Ecosystems Strategies, Inc. (ESI) on specified portions of the "Perx Property" (hereafter referred to as the "Site") located at 68 South Broadway in the Village of Red Hook, Dutchess County, New York. The work summarized in this Report was performed to address potential environmental liabilities resulting from historic industrial and commercial usage of the property (see Section 2.2, below).

The specific purpose of this Report is to further define the extent of known surface and subsurface soil contamination on the subject property. Investigative services were conducted consistent with the Workplan for Site Investigation and Interim Remedial Activities (Workplan) as reviewed and approved by the New York State Department of Environmental Conservation (NYSDEC). Any variations from this approved Workplan are described in this Report.

This Report describes all fieldwork methodology and soil and groundwater sampling procedures, includes discussions of the resulting analytical data from collected soil and groundwater samples, and provides conclusions and recommendations drawn from the fieldwork and analytical data.

1.2 Limitations

This written analysis is an assessment of the site characterization activities conducted on specified portions of the Perx Property, Village of Red Hook, Dutchess County, New York and is not relevant to other portions of this property or any other property. It is a representation of those portions of the property analyzed as of the respective dates of fieldwork. This Report cannot be held accountable for activities or events resulting in contamination after the dates of fieldwork.

Services summarized in this Report were performed in accordance with generally accepted practices and established NYSDEC protocols. Unless specifically noted, the findings and conclusions contained herein must be considered not as scientific certainties, but as probabilities based on professional judgment.

1.3 Investigative and Remedial Objectives

ESI conducted a subsurface investigation on selected portions of the subject property to achieve the following objectives:

1. To remove on-site underground and aboveground storage tanks and to document the presence or absence of soil contamination in the vicinity of the tanks;

2. To survey and, if possible, remove non-hazardous waste materials located within the on-site structures;

3. To identify all on-site, interior floor drains and determine their discharge points, if possible; and,

4. To further define residual contamination from pesticide usage on the Site, including additional soils, sediment and groundwater sampling.

2.0 SITE DESCRIPTION AND LOCATION

2.1 Site Location and Description

The Perx Property is located at 68 South Broadway in the Village of Red Hook, Dutchess County, New York (see Site Location Map, Appendix A). The property is approximately 20 acres in size. Frontage along the western side of South Broadway provides access to the property. For the purpose of this Report, the Site is defined as the northern portion of the 5.0-acre lot that contains a warehouse and associated structures.

2.2 Previous Environmental Reports

Information obtained during the preparation of a previous Phase I ESA (conducted by ESI in September 1999) indicates that the on-site structures have been present on the subject property since the mid-1950s. The subject property had been used as an apple processing facility beginning in 1949 and was also a frozen-food processing and packaging plant from 1955 to some time after 1981. Apple orchards were located on the western portion of the subject property during the 1950s and 1960s. The Phase I ESA indicated that the subject property had been vacant for approximately 10 to 15 years.

Phase I ESA and Subsurface Investigations prepared by ESI have documented environmental conditions of concern, including the following:

- The presence of at least three, unregistered underground storage tanks (USTs) on the Site for which no records of tank or soil integrity were available;
- Evidence of soil contamination in a former orchard area from arsenic-based pesticide usage. Soil arsenic concentrations exceeding NYSDEC guidance values have been documented; however, a comprehensive investigation of the entire, former orchard area had not been conducted and the extent of pesticide and related metals contamination had not been fully documented;
- The presence of three, manifolded aboveground storage tanks (ASTs) located near the maintenance garage and a fourth AST located in the basement crawlspace of the former office adjacent to the east entrance;
- The presence of drums and bags within the on-site structures containing undetermined liquids and solids;
- No groundwater contamination has been identified. However, the existing three water-supply wells are in close proximity to each other, and data from these wells is therefore not necessarily representative of conditions throughout the site. Additionally, the construction of the existing wells which were sampled is not known. Because the wells are supply wells, they are likely to be open boreholes and dilution of contaminated groundwater could have occurred;
- Floor drains throughout the main processing/warehouse facility may have received discharges of contaminants. The terminus of these drains and the integrity of surrounding soils and groundwater had not been documented; and,
- Two wastewater treatment systems (east and west), including a lagoon, may have received contaminants related to food and apple processing activities; the integrity of the soils in this area had not been documented.

3.0 SUBSURFACE INVESTIGATION

3.1 General

3.1.1 Utility Markout

Prior to the initiation of fieldwork, a request for a complete utility markout of the subject property was submitted by ESI as required by New York State Department of Labor regulations. Confirmation of underground utility locations was secured and a field check of the utility markout was conducted prior to the extension of soil cores.

3.1.2 Personnel

Fieldwork documented in this Report was performed, observed, and/or supervised by ESI personnel. The following subcontractors were retained to provide additional on-site services:

- Tank removal services were provided by S. J. Lore Contracting, Inc. ESI observed and documented all tank removal services, including the collection of confirmatory endpoint soil samples, and signing all relevant manifests;

- Well installation services were conducted by Todd J. Syska Inc. Well installation services were supervised by ESI personnel to document the condition of on-site soils during well installation; and,

- Laboratory services were subcontracted to York Analytical Laboratories, Inc., a New York State Department of Health certified laboratory (ELAP Certification Number 10854). Due to an error during chain-of-custody completion, New York State Department of Environmental Conservation (NYSDEC) requested methods (ASP-1 and ASP-2) were not used; rather, United States Environmental Protection Agency (USEPA) Methods 8260 and 8270 were used in the analysis of soil samples. The detection limits for all analyses performed are consistent with detection limits provided for in the ASP Methods; therefore, it is the opinion of ESI that this deviation from the Workplan does not invalidate the data.

3.1.3 Terminology

Recommended Soil Cleanup Objectives

The term "recommended soil cleanup objective" as defined in this Report, refers to the concentration of a particular contaminant above which remedial actions are considered more likely. The overall objective of setting recommended soil cleanup objectives is to assess the integrity of on-site soils and groundwater relative to conditions which are likely to present a threat to public health, given the existing and probable future uses of the site. On-site soils and groundwater with contaminant levels exceeding these recommended soil cleanup objectives are considered more likely to warrant remediation. No independent risk assessment was performed as part of this investigation.

Recommended soil cleanup objectives for all compounds, both organic and inorganic, are based on the NYSDEC's Technical and Administrative Guidance Memorandum #4046 (TAGM), dated January 24, 1994.

Background Levels

The term "background level", as defined in this Report is the concentration of a particular metal which is known to naturally occur in Eastern United States soils. The overall objective of setting background levels for metals is to assess the concentrations of metals in on-site soils relative to those that are naturally occurring. On-site soils with metal concentrations exceeding these background levels are considered more likely to have been affected by anthropogenic contributions. Background levels do not exist for refined petroleum hydrocarbons and, therefore, no discussion of naturally occurring levels for these compounds is appropriate. The background levels for metals provided in this Report are based on the average concentrations of arsenic and lead in ten samples collected from five locations on the subject property considered by ESI to represent undisturbed site soils.

Five background samples were collected from surface (0-4") and subsurface (20-24") soils in distinct areas on the property boundary which were unlikely to have been disrupted or influenced by site activity. All five samples were analyzed for total weight arsenic and lead. Soil samples BS-3 and BS-5 were also screened for chromium.

The average background concentrations of arsenic in surface soils (0-4") on the property was determined to be 11.1 mg/kg (peak value 22.6 mg/kg) and the average background concentration of arsenic in subsurface soils (20-24") is 5.41 mg/kg (peak value 8.17 mg/kg). The NYSDEC recommended soil cleanup objective for arsenic is 7.5 mg/kg or site background.

The average background concentration of lead in surface soils was determined to be 43.2 mg/kg (peak value 63.0 mg/kg) and the average background concentration of lead in subsurface soils is 31.2 mg/kg (peak value 104 mg/kg). The NYSDEC recommended soil cleanup objective for lead is site background. According to the NYSDEC's TAGM, background levels for lead vary widely; average levels for lead in undeveloped rural areas may range from 4-61 ppm while average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

The average background concentration of chromium in surface soils (0-4") was determined to be 16.4 ppm (peak value 16.7 mg/kg) and the average subsurface (20-24") concentration of chromium is 17.5 ppm (peak value 18.4 mg/kg).

3.2 Data Validation

3.2.1 Scope of Data Validation

This Section summarizes data validation services conducted on select organic analyses as performed by York Analytical Laboratories, Inc. (York). This data validation relied upon the USEPA National Functional Guidelines for Organic Data Review as well as other relevant documents. To the extent that this review made recommendations for data to be modified, notations have been made on the data sheets provided in Appendix B of this Report. Standard modifiers as expressed below may have been used in qualifying the supplied data. "J" for estimated value, "N" for presumptive evidence of a compound being present and "U" for presumptive evidence of a compound being absent. The complete Data Usability Summary Review by York Analytical Laboratories, Inc. is provided in Appendix D.

To assess the validity of these data, a review was conducted of chain of custody documents, method of shipment, laboratory provided quality control data (including holding time and surrogate recovery) and submitted field, trip or equipment blanks.

3.2.2 Chain of Custody

Chain of custody (COC) forms were reviewed for completeness and accuracy. For all COC forms, samples are noted as having been collected by ESI staff and all containers are noted as being picked up by courier for delivery directly to the laboratory. No samples are noted as being sent via overnight package delivery service (e.g., Federal Express) or by other means of transport.

COC forms identify each sample and the date of sample collection. The time of sampling is not noted. On several COC forms, the date of sample collection is noted on the top of the form for the first sample, but there is no notation (e.g., a line or ditto marks) indicating that the specified date extends to all samples on that COC form. This does not invalidate the data but is contrary to procedures.

On certain COC forms the "Analyses Requested" section is completed with a notation "Analyses to be faxed". The analyses are included on a subsequent COC form, relating each sample ID number with the requested analysis.

3.2.3 Holding Times

A subset of 20 percent of all laboratory analyses was reviewed for conformance to NYSDEC holding time requirements. All analyses were completed within specified holding times. No violations of holding times were noted for both organic and inorganic analyses.

3.2.4 Surrogate Recovery

Documentation provided by York Laboratories was reviewed to assess compliance with NYSDOH - ELAP surrogate guidelines. For VOC analysis, three (3) surrogate compounds are recommended: 1, 2 Dichloroethane, Toluene d8, and Bromofluorobenzene. Comparisons of surrogate recovery rates (i.e., comparison of concentrations of each compound as introduced and recorded).

Evaluation of surrogate recoveries indicate that the Quality Control criteria for all compounds were met.

3.2.5 Matrix Spike / Matrix Spike Duplicate

Matrix Spike / Matrix Spike Duplicate (MS / MSD) data are generated to determine the long-term precision and accuracy of the analytical method in various matrices and to demonstrate acceptable compound recovery. MS / MSD are used in conjunction with other Quality Control criteria for data qualifications.

No site-specific MS / MSD analyses were performed for this data set.

3.2.6 GC / MS Calibration

Satisfactory instrument calibration is established to ensure that the equipment is capable of producing acceptable quantitative data. Calibration prior to initiating analyses provide a baseline documentation of equipment accuracy; continuing calibration documents on-going accuracy. Calibration considers response factors as well as percent relative standard deviation.

Calibration data indicate that all response factor criteria were net in the initial calibration curve analysis, as well as the single continuing calibration analysis provided for this project.

3.3 Interim Remedial Activities

3.3.1 Tank Removal

All tank excavation activities (including off-site disposal of tanks) was conducted by S. J. Lore Contracting, Inc. during November and December, 2002. Pumping service and disposal of all liquid waste was performed by Advanced Oil Recycling prior to tank removal. These activities were observed and documented by ESI personnel. All confirmatory soil samples were collected by ESI personnel and analyzed for volatile organic compounds (VOCs) and/or polynuclear aromatic hydrocarbons (PAHs) as dictated by former tank contents and specified in the Workplan. A complete Summary Report of Tank Removal Services is provided as Appendix C of this Report.

Prior to tank removal, each tank was inspected for the presence of product and drained. Exterior surfaces of the tanks were visually inspected to determine the structural integrity of the tank. Visual inspection of the tanks indicated that the tanks were generally in satisfactory condition with only surface rusting and no obvious holes or pitting. A summary of tanks removed from the site is presented in Table 1.

3.3.1.1 Additional Tanks Encountered

In addition to the three USTs and four ASTs detected during prior investigative work, two additional tanks were located during fieldwork activities. A 550-gallon fuel-oil AST and a 300-gallon waste-oil UST were identified along the east exterior wall of the maintenance garage at the south center of the property. The tanks were discovered in an area of dense vegetation.

There is also rumored to be at least one 10,000-gallon fuel-oil tank present under the building. No evidence of this tank was noted in the site inspections.

550-Gallon AST

A 550-gallon fuel-oil AST was identified adjacent to the maintenance garage. Measurement of the product level indicated that the tank contained approximately 400 gallons of product. There was no field evidence of petroleum-contaminated soils in the vicinity of the tank. A surface soil sample 3SS-1(550-AST) was collected from the uppermost six inches of soils beneath the eastern invert of the tank in order to confirm the presence or absence of petroleum contamination. Soil sample 3SS-1(550-AST) was analyzed for PAHs. No PAHs were detected in the sample.

300-Gallon UST

A 300-gallon waste-oil UST was identified adjacent to the maintenance garage. Measurement of the product level indicated the tank contained approximately 100 gallons of product. A test pit was excavated adjacent to the east wall of the tank to provide access to soils at the invert of the tank. There was no field evidence of petroleum-contaminated soils in the vicinity of the tank. Two soil samples, 5EP-N (300-UST) and 5EP-S (300-UST), were collected from the north and south invert of the tank, respectively, and were analyzed for PAHs and VOCs. No petroleum compounds were detected in the soil samples.

A Field Work Map indicating tank locations is provided in Appendix A.

Table 1: Summary of USTs/ASTs Removed from the Site

Tank	Location	Size	Contents	Observations
1	Approximately 30 feet west of the center of the main processing/warehouse	2000-gallon UST and pump	Gasoline	Tank was in satisfactory condition with no evidence of a release in adjacent soils
2	Adjacent to north wall of waste water block-house at north center of property	1000-gallon UST and pump	Diesel	Tank was in satisfactory condition with no evidence of a release in adjacent soils
3	East of wastewater treatment building at north central border of property	750-gallon UST	Fuel oil	Tank appeared to be in satisfactory condition, low-volume of soils in vicinity of tank exhibit petroleum contamination
4	Exterior of west wall of maintenance garage at south center of property	3 manifolded ASTs (one partially buried)	Fuel oil and/or waste Oil	Tanks appear to be in satisfactory condition with no evidence of a release in adjacent soils
5	Basement crawlspace of two-story frame office structure at east entrance of property	275-gallon AST	Fuel oil	Tank in satisfactory condition with no evidence of a release on adjacent slab surface

3.3.2 Waste Survey

ESI personnel conducted a comprehensive inventory of wastes, including drums and other waste containers, present inside the on-site structures. The inventory consisted of visual inspections and, where considered safe, field-testing of waste solids and liquids. No containers determined by ESI field personnel to represent an immediate danger to the Site or to the environment were identified during this inspection. All containers appeared to contain materials that can be disposed of by licensed haulers at a reasonable time in the future (i.e., immediate response is not warranted). Approximately five rusted 55-gallon metal drums (located near the fence perimeter surrounding the wastewater lagoon) were inspected. These barrels appeared empty and the original contents are unknown. An inventory of on-site wastes is provided in Table 2. Contrary to the workplan, these wastes were not removed, as coordination of ammonia treatment and removal could not be secured due to contractor unavailability.

Table 2: Summary of Waste Survey

Waste	Container/ Volume	Location	Observations
Sodium Hydroxide	1, 55-Gallon paper drum, full	Southeast mechanical room in main processing/warehouse	Paper barrel deteriorating with contents spread around base
Waste oils	4, 55-Gallon metal drums, full	2 drums in metal wastewater treatment building on north central property border and 2 drums in southeast mechanical room in main processing warehouse	Drums are open with some staining noted around base (drums in wastewater treatment building have released contents, with large overt area of oil-like staining on concrete floor in mechanical shop
Aluminum Sulfate	Approximately 50, 30 lb. bags	White block shed at north central portion of property	Paper bags moist and in various stages of deterioration
Unknown	2, 55-gallon plastic drums	Southeast processing room of main processing warehouse	Substance is visible in open drum and appears to be a grease/oil-like substance
Ammonia Tank	300-gallon ammonia tank (content volume unknown)	Southwest cold-storage room	Heavy steel tank, contents unknown

3.3.3 Floor Drain Investigation

Sediment Sampling Floor Drains-Main Warehouse

Various grate covered, 12" floor drains were detected throughout portions of the main processing warehouse. Several drains were opened and inspected on April 18, 2003. The drains contained several inches of dark, soil-like sediment which was sampled at two distinct drain locations. Sample 2D-1 and 2D-2 were collected, respectively, from floor drains in the north and south portion of the building. The samples were analyzed for the presence of total weight pesticides utilizing USEPA method 8080, and total weight arsenic and lead.

Arsenic was detected in sample 2D-1 at 12.5 mg/kg. The recommended NYSDEC recommended soil cleanup objective for arsenic on the site is 7.5 mg/kg or site background (determined to be 11.1 mg/kg in surface soils and 5.41 mg/kg in subsurface soils). Lead was detected in sample 2D-1 at 215 mg/kg and in sample 2D-2 at 6880 mg/kg. The concentrations of lead detected in both samples exceed site background (determined to be 43.2 mg/kg in surface soils and 31.2 mg/kg ion subsurface soils), which is considered to be the recommended soil cleanup objective according to TAGM. Both samples exhibited pesticide concentrations of 4,4'-DDD and 4,4'-DDT. Sample 2D-1 exhibited 3000 μg/kg 4,4'-DDD and 7600 μg/kg 4,4'-DDT. Sample 2D-2 exhibited 4800 μg/kg 4,4'-DDD and 22,000 μg/kg 4,4'-DDT. The NYSDEC recommended soil cleanup objectives for 4,4'-DDD and 4,4'-DDT are, respectively, 2,900 μg/kg and 2,100 μg/kg.

Dye Test/ Floor Drain Terminus

On April 18, 2003 a floor drain in the northeast portion of the main processing warehouse was opened and inspected. Approximately half of the estimated 20 floor drains throughout the structure still had ice in the reservoirs. After sediment samples were obtained from the base of floor drain bottom (2D-1), a hose was inserted into the drain and freshwater was allowed to flow unobstructed into the drain reservoir. An outflow was noted at the drain bottom. A USEPA approved, non-toxic, biodegradable green liquid-dye was added to the running water in an attempt to visually identify the terminus of the drain. Approximately 75 to 100 gallons of water was injected into the floor drain. After approximately ½ hour had elapsed the dye stained water was detected flowing into the east end of the skimmer shed (western wastewater treatment complex) through a six-inch PVC influent pipe. The dye test confirms the connection of this floor drain (2D-1) to the skimmer shed located at the western wastewater treatment system (see Fieldwork Map for connection).

3.3.4 Test Pit Extensions

ESI extended four (4) test pits to depths ranging from six (6) to twelve (12) feet to assess subsurface conditions in the eastern, wastewater treatment portion of the site, where surface debris was previously noted and where, based on topographic features (including earthen mounds), it was suspected that buried wastes could be present.

An additional three (3) test pits were extended in soil/debris mounds located in the western portion of the property. Demolition debris including concrete and steel screening was observed intermixed throughout the surface of these mounds.

3.3.4.1 Methodology

Test pits were extended using a standard rubber-tired backhoe. Soils were excavated and stockpiled next to the test pit to allow for more detailed observation of buried materials and to allow for screening of the soils with field instruments. A MiniRAE 2000 (Model PGM 7600) photo-ionization detector (PID) was utilized by ESI personnel to screen all encountered material for the presence of any volatile organic vapors where appropriate. Prior to the initiation of fieldwork, this PID was properly calibrated to read parts per million calibration gas equivalents (ppm-cge) of isobutylene in accordance with protocols set forth by the equipment manufacturer. Calibration results were recorded in fieldwork logs by ESI personnel.

Composite soil samples were collected by ESI personnel from soils intermixed with debris or from the stratum exhibiting the most pronounced field indications (e.g., PID readings) of contamination. Samples were collected in laboratory-cleaned glassware using properly decontaminated equipment. Samples were stored in coolers in the field. Proper chain-of-custody procedures were followed.

Samples were analyzed for VOCs using USEPA Method 8021 and/or 8260, PAHs using USEPA Method 8270, total weight RCRA metals, and pesticides using USEPA Method 8080. Complete laboratory data packages are included as Appendix B of this Report.

3.3.4.2 Field Observations

In general, test pits TP-1 through TP-4, extended at the eastern portion of the site adjacent to soil mounds and the wastewater treatment system, documented a low-volume of buried material that did not represent hazardous wastes. Minimal quantities of putrescible materials were present in the subsurface. No drums or liquid-waste storage containers were encountered. No significant areas of stained soils were identified other than at TP-1, which exhibited a slight petroleum odor. Stained soils at TP-1 are likely to be associated with a low-volume release from a former 750-gallon UST. Grease-like substances in this excavation are most likely related to the proximity of the settling lagoon. Field evidence of petroleum contamination was not detected below 7 - 8'

Test pits 2TP-5 through 2TP-7 were extended at soil mounds observed in the western portion of the site. Approximately 200 yards of debris consisting of steel-reinforced concrete rubble was observed intermixed within the surface soils in this area. A small volume of fiberglass insulation was observed in shallow soils at TP-5. In general, field observations at 2TP-5 through 2TP-7 documented a low-volume of buried material that did not represent hazardous wastes. Minimal quantities of putrescible materials were present in the subsurface. No drums or liquid-waste storage containers were encountered.

Field observations at each test pit are provided in Table 3. The locations for all test pits are provided on the Fieldwork Map in Appendix A.

Table 3: Field Observations - Test Pits, January 2003

Test Pit	Location	Depth (feet)	PID Reading (ppm)	Observations
TP-1	Tank grave near treatment shed, and lagoon	0-7	0.0	(7') petroleum odor and staining at north end of excavation
		7-8	20	Sewer odor in soil, minor brick debris, glass bottles, grease-like deposits
		8-12	3.5	Sewer odor decreases, coarse sands, no debris, no evidence of petroleum contamination
TP-2	Earth mound, east side of site	0-4	3.2	Traces of asphalt, brick, concrete
		4-6	0.4	Pipe at 5', no debris at base, no evidence of contamination
TP-3	Earth mound, east side of site	0-4	0.0	Minor debris – brick and concrete
		4-9	0.0	6-inch concrete pipe fragment, no evidence of contamination
TP-4	Earth mound, east side of site	0-4	0.0	No significant debris, medium-brown soil, trace of gravel
		4-6	0.0	Same as above
		6-8	0.0	Clay-like soils, no evidence of contamination
2TP-5	Earth mound, west side of site	0-4	0.0	Steel reinforced concrete rubble, plastic sheeting fragments, ceramic tile fragments, foul, musty odor
		4-6	0.0	No significant debris, medium-brown soil, trace of gravel and sand
		6-8	0.0	Same as above
2TP-6	Earth mound, west side of site	0-4	0.0	Steel reinforced concrete rubble
		4-6	0.0	No significant debris, medium-brown sandy soil
		6-8	0.0	Same as above
2TP-7	Earth mound, west side of site	0-4	0.0	No significant debris, medium-brown sandy soil
		4-6	0.0	Same as above
		6-8	0.0	Same as above

3.3.5 Laboratory Analysis and Findings

TP-1 through TP-4

With the exception of toluene detected at 11 μg/kg at TP-4 (recommended soil cleanup objective 1,500 μg/kg), no VOCs, PAHs, or chlorinated pesticides were identified in soil samples. Field observations of soil material at TP-4 did not indicate the presence of petroleum or chemical contaminants. Similarly, data indicate no significantly elevated concentrations of metals in soils; concentrations of metals were generally within ranges considered normal for soils in eastern New York, and were consistent with metal concentrations found in the background samples.

2TP-5 through 2TP-7

Two pesticides, DDT and chlordane, were detected at concentrations below NYSDEC recommended cleanup levels in the composite sample collected from 2TP-5. No VOCs or PAHs were identified in soil samples. Data indicate no significantly elevated concentrations of metals in soils; concentrations of metals were generally within ranges considered normal for soils in eastern New York, and were consistent with metal concentrations found in the background samples. Complete laboratory data packages are included as Appendix B of this Report.

Table 4: Summary of Laboratory Data from Test Pits
(Data for VOCs and PAHs are expressed as μg/kg and data for metals are expressed as mg/kg. Concentrations exceeding TAGM recommended soil cleanup objectives are shown in **bold**.)

Analyte	TAGM Level[1]	TP-1 (7'-8')	TP-1 (12')	TP-2 (0-4')	TP-2 (6')	TP-3 (Comp)	TP-4 (0-3')	TP-4 (7')	2TP-5 (Comp)	2TP-6 (Comp)	2TP-7 (Comp)
VOCs: Toluene	1,500	ND	ND	ND	ND	ND	ND	11	ND	ND	ND
VOCs: (all other)	Varies	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PAHs: (all)	Varies	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (all)	Varies	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals: Arsenic	11.1[2]	6.44	5.85	6.15	5.57	6.63	4.57	2.49	6.32	4.79	5.02
Barium	300	43.6	50.0	53.2	54.4	60.6	64.6	138	43.5	39.3	45.6
Cadmium	1.0	**3.65**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	16.4[2]	13.9	14.3	15.3	14.7	15.9	**16.5**	**65.3**	15.2	12.8	15.9
Lead	43.2[2]	41.5	22.6	24.0	24.6	21.6	30.0	12.5	**46.7**	13.3	19.0
Selenium	2.0	ND	ND	1.18	ND	1.27	1.61	**3.76**	ND	ND	ND
Silver	NE	ND	ND	ND	ND	ND	ND	ND	0.59	ND	0.67
Mercury	0.1	ND	ND	ND	ND	ND	ND	**0.15**	**0.24**	**0.20**	**0.18**

Notes:
1. Source: NYSDEC's Technical and Administrative Guidance Memorandum #4046 (TAGM), dated January 24, 1994
2. Guidance level is established based on site-specific background level. See Section 3.1.3 for a more detailed discussion.

ND = Not Detected
NE = Not Established

3.4 Site Investigation Services: Soil and Sediment Testing

Elevated levels of arsenic were formerly identified in soil samples obtained from distinct locations within the suspected orchard area, as well as in material collected from drains in the main warehouse/processing structure. Soil and material samples exhibited concentrations of arsenic from 11.3 mg/kg to 33.8 mg/kg in the former orchard area and from 36.0 mg/kg to 55.3 mg/kg in two drains screened in the main processing warehouse.

The NYSDEC recommended soil cleanup objective for arsenic is 7.5 mg/kg or sight background (11.1 mg/kg in surface soils and 5.41 mg/kg in sub soils). Based on the presence of arsenic at these locations at concentrations in excess of NYSDEC recommended soil cleanup objectives, an additional sampling plan was recommended to address areas potentially impacted by the historic use of arsenic-based chemicals and pesticides.

Soil samples were collected from various locations throughout the Site to document current surface and subsurface conditions. ESI personnel coordinated and supervised the collection of 22 soil samples, including five background soil samples, from the vicinity of the wastewater treatment system and lagoon area, the area formerly identified as an orchard, and the wetland area. Five soil samples were obtained from distinct locations in the northeast, southeast and northwest extremes of the property in order to provide background samples for comparison purposes. Soil samples were collected from both the uppermost 0-4 inches of soil and from a depth of 20-24 inches. Wetlands sediment samples were obtained from the uppermost four inches of material.

All wastewater/lagoon and orchard samples were analyzed for total weight arsenic and lead. Wetlands samples were analyzed for chlorinated pesticides (using USEPA Method 8080) and total weight arsenic. Background samples were analyzed for total weight arsenic and lead.

Fieldwork methodology and observations made during the collection of these samples is described below in Sections 3.3.1 and 3.3.2. The soil and sediment sample locations are shown on the Fieldwork Map in Appendix A.

3.4.1 Sample Collection Methodology

All soil and sediment samples were collected in a manner consistent with USEPA and NYSDEC sample collection protocols. Samples were collected in pre-cleaned jars provided by the laboratory. Decontaminated stainless steel trowels and dedicated gloves were used at each sample location to place the material into jars. After sample collection, the sample containers were placed in a cool (4°C), dry place prior to their transport to York Analytical Laboratories, Inc., a NYSDOH approved laboratory (ELAP Certification #10854) for analytical testing. Appropriate chain-of-custody procedures were followed. Soil samples were collected from a depth of 0-4 inches and 20-24 inches for all areas, excluding the wetlands samples which were sampled from the uppermost 0-4 inches of material.

Additional soil samples were obtained from the wastewater treatment system located on the east central border of the property. Two buried wastewater treatment tanks and related piping networks were discovered in a courtyard at the east central border of the property during fieldwork activity in this area. Soil samples were collected using a Geoprobe® hand-held direct-push sampling system. Two surface soil samples were also collected from the courtyard in this area.

3.4.2 Fieldwork Observations

An assessment of subsurface soil characteristics, including soil type, the presence of foreign materials, field indications of contamination (e.g., unusual coloration patterns or odors) was made during the collection of all soil samples. ESI personnel maintained field logs documenting field observations and measurements. Relevant information from ESI field notes for all sampling locations is summarized in tables 5 through 8.

Table 5:
Field Observations – Soil Sampling at Western Wastewater Treatment/Lagoon Complex

Boring	Location	Soil Characteristics	PID Readings	Observations
LA-1	South wall of wastewater treatment lagoon	(0-2") medium-brown, coarse sandy soil material, gravel to ¼' (20-24") mostly coarse sandy soil, moist	0.0 ppm	No evidence of contamination
LA-2	West wall of wastewater treatment lagoon	(0-2") medium to dark-brown, dense soil material, some decaying leaf litter (20-24") medium to dark-brown, dense soil material, some decaying leaf litter, concrete fragments to 1"	0.0 ppm	No evidence of contamination
LA-3	East wall of wastewater treatment lagoon	(0-2") medium to dark-brown, coarse sandy soil, some organic decaying matter, concrete and root fragments to 1" (20-24") medium to dark-brown, coarse sandy soil, some organic matter, concrete fragments to 1"	0.0 ppm	No evidence of contamination
LA-4	Approximately 15 feet north of wastewater skimmer shed	(0-4") medium-brown soil material, some organic decaying material, moist, gravel to ¼" (20-24") medium-brown soil material, some organic decaying material, moist, gravel to ¼"	NA	No evidence of contamination
LA-5	Between aeration tank and skimmer shed	(0-2") medium-brown soil material, some organic decaying material, moist, gravel to ¼" (20-24") medium-brown soil material, some organic decaying material, moist, gravel to ¼"	NA	No evidence of contamination
LA-6	Between filter bed and aeration tank	(0-4") medium-brown moist soil material, gravel to ½" (20-24") fine to coarse sand and gravel mix, moist	NA	No evidence of contamination
LA-7	North of fence gate in wetland area	(0-4") medium to dark-gray, dense silty material, decaying wood, organic matter (20-24") medium to dark-gray, dense silty material, decaying wood, organic matter	NA	No evidence of contamination
LA-8	South of fence gate in wetland area	(0-4") medium to dark-gray, dense silty material, decaying wood, organic matter (20-24") medium to dark-gray, dense silty material, decaying wood, organic matter	NA	No evidence of contamination
WW-HB-1	North of wastewater treatment tanks (UST)	Medium brown, coarse to fine sandy soil	NA	No evidence of contamination
WW-HB-2	South of wastewater treatment tanks (UST)	Medium brown, coarse to fine sandy soil	NA	No evidence of contamination
Skim Shed-1	East end of skimmer shed, at effluent of floor drain	Medium brown moist soil material	NA	No evidence of contamination
Skim Shed-2	Southwest end of skimmer shed	Dark brown, moist, decaying leaf litter	NA	No evidence of contamination, slight chemical odor, sample pressurized when sealed into jar
Skim Shed-3	East end of skimmer shed, outside shed in sluiceway-pre skimmer shed	Dark brown, decaying leaf litter, humus like material	NA	No evidence of contamination

Table 6: Field Observations – Soil Sampling- East Wastewater Treatment Courtyard

Boring	Location	Soil Characteristics	PID Readings	Observations
WT-HB-1 (10-12')	West center invert of wastewater tanks	Medium brown, dense, clay-like soil material	0.0	No evidence of contamination
WT-HB-2 (10-12')	East center invert of wastewater tanks	Medium brown, dense, clay-like soil material	0.0	No evidence of contamination
WT-SSB-1 (0-12")	Northwest corner of courtyard	Dark brown, moist organic soil	0.0	No evidence of contamination
WT-SS-2 (0-12")	Southwest corner of courtyard	Dark brown, moist organic soil	0.0	No evidence of contamination

Table 7: Field Observations – Soil Sampling in Vicinity of Former Orchard

Boring	Location	Soil Characteristics	PID Readings	Observations
OR-1	North-central portion of former orchard	(0-4") medium brown, moist soil with gravel to ½" (20-24") light-brown soil material with gravel to ¼"	NA	No evidence of contamination
OR-2	North-central portion of former orchard	(0-4") medium to dark-brown soil, dense and moist (20-24") light-brown soil material with gravel to ¼"	NA	No evidence of contamination
OR-3	Northwestern portion of former orchard	(0-4") medium to dark-brown soil, dense and moist (20-24") fine to coarse, medium brown, moist sand and gravel mix	NA	No evidence of contamination
OR-4	Northwestern portion of former orchard	(0-4") medium to dark-brown soils with some organic matter and gravel to ¼" (20-24") light-brown, dense, moist soil material	NA	No evidence of contamination
OR-5	West-central portion of former orchard	(0-4") medium to dark-brown soils with some organic matter and gravel to ¼" (20-24") light-brown, dense, moist soil material	NA	No evidence of contamination
OR-6	Central portion of former orchard	(0-4") medium to dark-brown soils with some organic matter and gravel to ¼" (20-24") light-brown, dense, moist soil material	NA	No evidence of contamination
OR-7	Eastern portion of former orchard	(0-4") medium to dark-brown soils with some organic matter and gravel to ¼" (20-24") light-brown, dense, moist soil material	NA	No evidence of contamination
OR-8	Central portion of former orchard	(0-4") medium to dark-brown soils with some organic matter and gravel to ¼" (20-24") light-brown, dense, moist soil material	NA	No evidence of contamination

Table 8: Field Observations – Sediment Sampling in Wetlands Area

Boring	Location	Soil Characteristics	PID Readings	Observations
WL-1	Northwestern portion of wetland	(0-4") dark-brown, saturated, organic soil with humus, root material and odor of decay	NA	No evidence of contamination
WL-2	Northwestern portion of wetland	(0-4") dark-brown, moist, organic soil with humus and root material	NA	No evidence of contamination
WL-3	West-central portion of wetland	(0-4") dark-brown, moist, organic soil with humus, root material and odor of decay	NA	No evidence of contamination
WL-4	Southwestern portion of wetland	(0-4") light to medium-dark gray silty, clay-like soils	NA	No evidence of contamination
WL-5	Northeast end of wetland	(0-4") saturated medium to dark-brown soil with organic matter	NA	No evidence of contamination
WL-6	Easternmost end of wetland	(0-4") saturated medium to dark-brown soil with organic matter	NA	No evidence of contamination

3.4.3 Laboratory Analysis and Findings

<u>West Wastewater Treatment/Lagoon Sampling</u>

Soil samples were collected from the wastewater treatment/lagoon areas of the Site and analyzed for total weight arsenic and lead. Sixteen soil samples were collected (from two depths, 0-4" and 20-24") from eight distinct locations.

All sixteen soil samples exhibited concentrations of arsenic, ranging from 3.38 mg/kg to 10.6 mg/kg. Eight soil samples recorded marginal exceedences of the NYSDEC recommended soil cleanup objective for arsenic (7.5 mg/kg or site background). Six of the eight exceedences were recorded in the uppermost 0-4 inches of soil. The average background level recorded for arsenic on the site (undisturbed soils) was 11.1 mg/kg for soils at 0-4 inches and 5.41 mg/kg for soils collected from 20-24 inches.

All sixteen samples exhibited concentrations of lead, ranging from 14.0 mg/kg to a peak of 489 mg/kg at LA-8 (0-4"). The NYSDEC recommended soil cleanup objective for lead is site background. The average background level recorded for lead in undisturbed site soils was 42.9 mg/kg for soils from 0-4 inches in depth and 36.7 mg/kg for soils from a depth of 20-24 inches. Soil sample LA-1 (0-4") and LA-8 (0-4") exhibited concentrations of lead in excess of NYSDEC recommended soil cleanup objectives (i.e. site background levels).

During the final phase of the initial round of investigative fieldwork, two additional subsurface wastewater discharge points and associated piping (not identified in previous investigative reports) were encountered on the Site. A suspected concrete-block drywell was identified approximately 30-feet west of the west wall of the maintenance garage structure at the south-central portion of the property, and a large corrugated-metal drywell was identified at the exterior southwest corner of the main processing/warehouse structure.

Subsequent investigation conducted on April 7, 2003 correctly identified the suspected drywell adjacent to the maintenance garage as a water main valve-housing. The dry well immediately south of the main processing warehouse was confirmed and investigated. The well is constructed of a 36-inch diameter corrugated pipe imbedded to approximately six feet in the ground and acting as a drywell or catch basin. A six-inch plastic pipe was observed running beneath the corrugated drywell at a depth of approximately 6-7 feet. The origin and course of this pipe is unknown. The interior walls of the well are stained with a grease-like residue. A 2-inch diameter hole was observed on the building wall adjacent to the drain and exhibited similar staining. It is probable that this served as an outflow or discharge point from the warehouse to the well.

Soil at the base of the drain was sampled (DW-1, 0-12"). Field observations of this material indicated a grease-like residue. Instrument readings and field observations did not provide evidence of a petroleum release. Sample DW-1 (0-12") was analyzed for VOCs, chlorinated pesticides and RCRA metals. No VOCs or chlorinated pesticides were detected in the sample. Concentrations of metals were generally within ranges considered normal for soils in eastern New York, and were consistent with metal concentrations found in the background samples.

Additional Sampling at West Wastewater Treatment Complex

Skimmer Shed

During the dye test conducted on April 18, 2003 the terminus of at least one of the floor drains in the northeast portion of the main warehouse was determined to be a six inch PVC pipe in the southeast corner of the skimmer shed (see Fieldwork Map). Three soil samples were collected from distinct locations throughout the skimmer shed structure. Soil samples Skimshed-1 (0-4"), Skimshed-2 (0-4") and Skimshed-3-outflow (0-4") were collected and analyzed for pesticides utilizing USEPA method 8080. All three samples exhibited concentrations of four pesticides (4,4'-DDD,4,4'-DDE' 4,4'-DDT and chlordane) at concentrations below NYSDEC recommended soil cleanup objectives.

West Wastewater Tanks/Sumps

During the April 18, 2003 fieldwork event three 24-inch diameter manhole covers were discovered in the ground immediately south of the skimmer shed structure. These covers concealed subsurface tanks or sump like features. The tanks or sumps appeared to be full of water and were approximately 5-6 feet deep. Two hand borings were extended in the immediate vicinity of the manhole covers. Samples WW-HB-1(5-7') and WW-HB-2(5-7') were collected from the presumed invert of the tanks/sumps and were submitted for analysis of pesticides utilizing USEPA method 8080. Soil sample WW-HB-2 (5-7') was also analyzed for VOCs utilizing USEPA method 8021. No pesticides or VOCs were detected in the soil samples above minimum detection limits.

East Wastewater Treatment Tanks Sampling

Two underground wastewater storage/treatment tanks were discovered during fieldwork activity in a courtyard near the eastern central border of the property. The two steel tanks have an approximate capacity of 4,000 gallons. On April 7, 2003 two soil samples, WT-HB-1 (10-12') and WT-HB-2 (10-12'), were collected from near the east and west inverts of the tanks and analyzed for VOC's utilizing USEPA method 8260, chlorinated pesticides utilizing USEPA method 8080 and RCRA metals. No VOC's were detected in either of the samples analyzed. Only one pesticide, at concentrations below NYSDEC recommended cleanup objectives, was detected in each of the soil samples. Marginal exceedences for mercury and chromium were recorded for both soil samples. All other RCRA metals concentrations, however, were generally within ranges considered normal for soils in eastern New York, and were consistent with metal concentrations found in the background samples.

Two surface soil samples were also collected from distinct locations within the courtyard. Soil samples WT-SS-1 and WT-SS-2 were collected from a depth of 10-12". Both samples were analyzed for VOC's utilizing USEPA method 8260, chlorinated pesticides utilizing USEPA method 8080 and RCRA metals. No VOC's were detected in the soil samples. NYSDEC recommended soil cleanup objectives were exceeded for chromium and mercury. All other RCRA metals concentrations, however, were generally within ranges considered normal for soils in eastern New York, and were consistent with metal concentrations found in the background samples. Two pesticides (4,4'-DDT and chlordane) were detected in both soil samples. Chlordane was detected at 8000 μg/kg in sample WT-SS-1 (0-12"). The NYSDEC recommended cleanup objective for chlordane is 540 μg/kg. 4,4'-DDT was detected at concentrations below its NYSDEC recommended cleanup objective.

Former Orchard-Area Sampling

Soil samples were collected from the former orchard area and were analyzed for total weight arsenic and lead. Sixteen soil samples were collected at two depths (0-4" and 20-24") from eight distinct locations.

All sixteen soil samples exhibited concentrations of arsenic, ranging from 4.76 mg/kg to 25.4 mg/kg. Eight soil samples recorded exceedences of the NYSDEC recommended soil cleanup objectives for arsenic (7.5 mg/kg or site background). All soils containing arsenic above the NYSDEC recommended soil cleanup objective were surface soils collected from the uppermost 0-4 inches of soil. Seven of the eight soil samples which exhibited an exceedence for arsenic also exceeded the average background level for arsenic in surface soils.

All sixteen samples exhibited concentrations of lead, ranging from 12.7 mg/kg to a peak of 82.5 mg/kg. The NYSDEC recommended soil cleanup objective for lead is site background. The average background level recorded for lead at the site was 42.9 mg/kg for surface soils (0-4") and 36.7 mg/kg for soils at the 20-24 inch depth. Seven samples from the 0-4 inch depth exhibited concentrations of lead above average background levels.

Wetlands Sampling

Soil/sediment samples were collected from the wetlands area and were analyzed for total weight arsenic and chlorinated pesticides (using USEPA Method 8080). Six soil/sediment samples were collected from six distinct locations. Four soil samples exhibited low levels of four pesticides (including 4,4'-DDD,4,4'-DDE' 4,4'-DDT) at concentrations below NYSDEC recommended soil cleanup objectives.

Five soil/sediment samples exhibited concentrations of arsenic above NYSDEC recommended soil cleanup objectives. Four of these five samples contained arsenic above average background levels.

Pesticide Sampling - Main Warehouse Exterior

Additional soil samples were collected adjacent to the exterior of the main processing warehouse and were analyzed for pesticides utilizing USEPA method 8080. Ten soil samples were collected from five distinct locations (from 0-4" and 20-24" in depth). These samples were deemed necessary by Michael McCabe of the NYSDEC subsequent to the discovery of elevated concentrations of chlordane in soil samples previously collected in this area. Soil samples 5SS-1 through 5SS-4, collected from both depths, did not exhibit concentrations of pesticides above minimum detection limits. Soil sample 5SS-5 (0-4") exhibited concentrations of 4,4'-DDD, 4,4'-DDE', 4,4'-DDT and chlordane below NYSDEC recommended cleanup objectives.

Soil sample 5EFL-1(0-4") was an additional surface soil sample collected from the southeast exterior of the main warehouse building beneath two capped effluent pipes. Soil sample 5EFL-1 was submitted for analysis of pesticides and VOC's utilizing USEPA method 8080 and 8021, respectively. No VOC's or pesticides were detected in the soil sample above minimum detection limits.

Table 9a: Summary of Lead/Arsenic in Wastewater Treatment/Lagoon Soil Samples (0-4")
(All data provided in mg/kg. Concentrations shown in **bold** exceed NYSDEC soil cleanup objectives).

			Sample Identification							
Metals	**Average Site-Specific Background Levels[1]**	**TAGM Level[2]**	**LA-1**	**LA-2**	**LA-3**	**LA-4**	**LA-5**	**LA-6**	**LA-7**	**LA-8**
Arsenic	11.1	7.5	**7.88**	6.91	6.79	**7.75**	**8.16**	**10.5**	**7.74**	**10.5**
Lead	43.2	250	**293**	**153**	**76.5**	31.1	38.0	38.6	**91.5**	**489**

Notes:
1. See Section 3.3
2. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)

Table 9b:
Summary of Lead/Arsenic in Wastewater Treatment/Lagoon Soil Samples (20-24")
(All data provided in mg/kg. Concentrations shown in **bold** exceed NYSDEC soil cleanup objectives).

			Sample Identification							
Metals	**Average Site-Specific Background Levels[1]**	**TAGM Level[2]**	**LA-1**	**LA-2**	**LA-3**	**LA-4**	**LA-5**	**LA-6**	**LA-7**	**LA-8**
Arsenic	11.1	7.5	**8.11**	6.25	4.69	7.25	**10.6**	5.09	3.43	3.38
Lead	43.2	250	23.4	**64.7**	24.9	22.6	28.8	15.2	14.0	24.5

Notes:
1. See Section 3.3
2. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)

Table 10a: Summary of Lead/Arsenic in Orchard Soil Samples (0-4")
(All data provided in mg/kg. Concentrations shown in **bold** exceed NYSDEC soil cleanup objectives).

			Sample Identification							
Metals	**Average Site-Specific Background Levels[1]**	**TAGM Levels[2]**	**OR-1**	**OR-2**	**OR-3**	**OR-4**	**OR-5**	**OR-6**	**OR-7**	**OR-8**
Arsenic	11.1	7.5	**25.4**	**22.4**	**7.58**	**24.0**	**12.7**	**15.7**	**11.6**	**11.6**
Lead	43.2	250	**82.5**	**70.1**	22.6	**70.1**	**52.2**	39.7	39.7	37.6

Notes:
1. See Section 3.3
2. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)

Table 10b:
Summary of Lead/Arsenic in Wastewater Treatment/Orchard Soil Samples (20-24")
(All data provided in mg/kg. Concentrations shown in **bold** exceed NYSDEC soil cleanup objectives).

			Sample Identification							
Metals	**Average Site-Specific Background Levels[1]**	**TAGM Levels[2]**	**OR-1**	**OR-2**	**OR-3**	**OR-4**	**OR-5**	**OR-6**	**OR-7**	**OR-8**
Arsenic	11.1	7.5	5.34	6.69	5.17	4.89	6.41	5.33	4.90	4.76
Lead	43.2	250	14.4	15.2	14.5	12.7	14.6	12.2	12.3	14.2

Notes:
1. See Section 3.3
2. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)

Table 11: Summary of Pesticides/Arsenic in Wetland Soil/Sediment Samples.
(All data provided in mg/kg. Concentrations shown in **bold** exceed NYSDEC soil cleanup objectives.)

		Sample Identification					
Pesticides (USEPA Method 8080)	**TAGM Levels[1]**	**WL-1 (0-4")**	**WL-2 (0-4")**	**WL-3 (0-4")**	**WL-4 (0-4")**	**WL-5 (0-4")**	**WL-6 (0-4")**
Aldrin	41	ND	ND	ND	ND	ND	ND
alpha-BHC	11.0	ND	ND	ND	ND	ND	ND
beta-BHC	200	ND	ND	ND	ND	ND	ND
delta-BHC	300	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	60	ND	ND	ND	ND	ND	ND
Chlordane	540	ND	ND	ND	ND	ND	77.8
2.4-D	500	ND	ND	ND	ND	ND	ND
4,4'-DDD	2,900	13.4	18.9	157	ND	ND	ND
4,4'-DDE	2,100	10.2	92.8	57.7	ND	ND	ND
4,4'-DDT	2,100	ND	31.1	27.1	ND	ND	ND
Dieldrin	44	ND	ND	ND	ND	ND	ND
Endosulfan I	900	ND	ND	ND	ND	ND	ND
Endosulfan II	900	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	1,000	ND	ND	ND	ND	ND	ND
Endrin	100	ND	ND	ND	ND	ND	ND
Endrin aldehyde	NE	ND	ND	ND	ND	ND	ND
Heptachlor	100	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	20	ND	ND	ND	ND	ND	ND
Methoxychlor	NE	ND	ND	ND	ND	ND	ND
Toxaphene	NE	ND	ND	ND	ND	ND	ND
Arsenic	7.5	**8.11**	**7.74**	5.63	**8.42**	**8.53**	**15.0**

Notes:
1. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)
ND = Not Detected
NE = Not Established

Table 12: Summary of Laboratory Data from East Wastewater Treatment Tanks Sampling
(All data are in μg/l. Concentrations exceeding NYSDEC guidance values are shown in **bold**.)

		Sample Identification			
Pesticides (USEPA Method 8080)	**TAGM Levels[1]**	**WT-HB-1 (10-12')**	**WT-HB-2 (10-12')**	**WT-SS-1 (0-12")**	**WT-SS-2 (0-12")**
Aldrin	41	ND	ND	ND	ND
alpha-BHC	11.0	ND	ND	ND	ND
beta-BHC	200	ND	ND	ND	ND
delta-BHC	300	ND	ND	ND	ND
gamma-BHC (Lindane)	60	ND	ND	ND	ND
Chlordane	540	ND	458	**8000**	142
2.4-D	500	ND	ND	ND	ND
4,4'-DDD	2,900	ND	ND	ND	ND
4,4'-DDE	2,100	ND	ND	ND	ND
4,4'-DDT	2,100	ND	ND	1000	21.0
Dieldrin	44	ND	ND	ND	ND
Endosulfan I	900	ND	ND	ND	ND
Endosulfan II	900	ND	ND	ND	ND
Endosulfan sulfate	1,000	ND	ND	ND	ND
Endrin	100	ND	ND	ND	ND
Endrin aldehyde	NE	12.2	ND	ND	ND
Heptachlor	100	ND	ND	ND	ND
Heptachlor epoxide	20	ND	ND	ND	ND
Methoxychlor	NE	ND	ND	ND	ND
Toxaphene	NE	ND	ND	ND	ND
Arsenic	7.5	ND	ND	ND	ND

Notes:
1. Source: NYSDEC Technical and Administrative Guidance Memorandum #4046 (January 24, 1994)
ND = Not Detected
NE = Not Established

3.5 Site Investigation Services: Groundwater Testing

3.5.1 Groundwater Monitoring Well Installation

Three former supply wells are located on the western wooded portion of the Site. Although the wells were previously sampled and found to be free of contamination, the wells are in close proximity to each other, and data from these wells is therefore not necessarily representative of conditions throughout the site. Additionally, the construction of these previously sampled wells is not known. Because the wells are supply wells, they are likely to be open boreholes and dilution of contaminated groundwater could have occurred.

Based upon field observations and laboratory data compiled from soil samples collected in 2001, four (4) groundwater monitoring wells were installed throughout the wastewater/lagoon portion of the Site on January 2003 in order to determine the impact to groundwater, if any, from contaminants identified in soils, or from compounds suspected of having been used on the Site.

During well installation, soil bore spoils were monitored with the PID and soil characteristics were documented. No field evidence of contamination was encountered at any of the well installation locations. Soil samples were collected from the groundwater interface (groundwater was detected at depths of 8-14' below grade). Soil samples from all well locations were analyzed for VOCs using USEPA Method 8260. Due to evidence of a petroleum release from the adjacent former 750-gallon UST, and the proximity of the wastewater-settling pond, soil collected from TMW-1 was additionally analyzed for chlorinated pesticides (USEPA Method 8080), PAHs (USEPA Method 8270) and total weight RCRA Metals.

No VOCs were detected in soils at any well location. No PAHs or chlorinated pesticides were detected in soil sampled during the installation of TMW-1. Six RCRA metals were detected at TMW-1; concentrations of three metals (chromium, selenium and mercury) were above NYSDEC recommended soil cleanup objectives.

Wells were installed by Todd J Syska Inc. ESI personnel supervised the driller and documented all well installation procedures. Each well was constructed utilizing one-inch PVC casing and 0.01-inch slotted PVC well screening with raised casings. All four (4) wells were initially secured with lock-ties.

Wells were constructed such that a minimum of two feet of well screen extended above the static water table as encountered on the day of installation and the remaining eight feet of well screen extended below the water table. The annular space between the PVC casing and the borehole was filled with clean silica sand.

The location of all wells is provided on the Fieldwork Map, Appendix A.

3.5.2 Monitoring Well Development

On January 21, 2003 all four monitoring wells were developed. Development was performed in order to clear fine-grained material that might have settled around the well screen and to enhance the natural hydraulic connection between the well screen and the surrounding soils Prior to development, each monitoring well casing was opened and the well column immediately screened with a PID to document the presence of any volatile organic vapors. Each monitoring well was developed manually with dedicated, disposable polyethylene bailers (used to avoid cross-contamination of the wells). Water removed from each monitoring well was visually inspected for indications of petroleum contamination.

3.5.3 Site Hydrogeology

Mean Groundwater Elevations

Information gathered during the fieldwork conducted by this office in January 2003 indicates that groundwater is present on the site between 10.69 feet (recorded at TMW-2) and 14.46 feet (recorded at TMW-1) below surface grade. Groundwater elevation information gathered during fieldwork activity is provided in Table 12, below.

Direction of Groundwater Flow

All on-site groundwater-monitoring wells were plotted on a site survey by ESI personnel using a fixed on-site marker with an arbitrary benchmark elevation of 200 feet above mean sea level (msl). Well elevations were surveyed to the nearest 0.01-foot in relation to this benchmark. The direction of groundwater flow was determined based on elevations of static groundwater, measured prior to water quality sample collection. Measurements were collected with an electronic depth meter accurate to the nearest 0.01-foot. Data were recorded in field logs for use in generating a Direction of Groundwater Flow Map (included in Appendix A of this Report). The direction of groundwater flow was determined to be in a north-northeasterly direction. The rate of groundwater flow is not known at this time. (The elevations of the three former supply wells were not determined and were not considered in the creation of the Direction Of Groundwater Flow Map).

3.5.4 Groundwater Sampling Procedures

Each groundwater monitoring well was properly purged of at least three well volumes using dedicated, disposable polyethylene bailers. Samples were then collected from each well using new, dedicated disposable polyethylene bailers to avoid cross-contamination of the wells. Each groundwater sample was collected in sample vials or bottles pre-cleaned at the laboratory. No groundwater samples were filtered prior to analysis. After sample collection, the containers were placed in a cooler prior to transport via overnight courier delivery to York Analytical laboratories. All samples were accompanied by proper chain of custody documentation.

3.5.5 Laboratory Analysis and Findings

Groundwater samples were submitted to the laboratory and analyzed for chlorinated pesticides using USEPA Method 8080 and RCRA metals using USEPA Method 6010B. Monitoring well TMW-1 was also sampled for VOCs and PAHs using USEPA Methods 8260 and 8270, respectively. Groundwater samples obtained from TMW-1 did not exhibit any detectable concentrations of VOCs, PAHs or chlorinated pesticides. The absence of petroleum compounds in the groundwater sample is an indicator that groundwater integrity has not been influenced by the low-volume petroleum release from the adjacent 750-gallon UST.

Concentrations of five RCRA metals were detected in the four groundwater samples obtained from the temporary monitoring wells. Monitoring wells TMW-1, TMW-2, TMW-3 and TMW-4 exhibited exceedences of NYSDEC Groundwater Protection Standards for total lead. In addition, groundwater samples obtained from TMW-3 and TMW-4 exhibited NYSDEC Groundwater Protection Standards exceedences for barium. Low levels of arsenic were detected in groundwater samples from TMW-2. No chlorinated pesticides were detected in any of the groundwater samples.

Table 13: Summary of Laboratory Data from Monitoring Well Samples
(All data are in μg/l. Concentrations exceeding NYSDEC guidance values are shown in **bold**.)

		Monitoring Well Samples			
Analyte	**NYSDEC Guidance Value[1]**	**TMW-1**	**TMW-2**	**TMW-3**	**TMW-4**
VOCs (all)	Varies	ND	NA	NA	NA
PAHs (all)	Varies	ND	NA	NA	NA
Pesticides (all)	Varies	ND	ND	ND	ND
Arsenic	25	ND	12	ND	ND
Barium	1,000	868	873	**1,280**	**2,670**
Cadmium	10	ND	ND	ND	ND
Chromium	50	23	41	31	8
Lead	50	**128**	**223**	**118**	**84**
Seleium	10	ND	ND	ND	ND
Silver	50	ND	ND	ND	ND
Mercury	2	ND	ND	ND	0.4

Notes:
1. Source: NYSDEC Water Quality Regulations, Surface Water and Groundwater Classifications and Standards, New York State Codes, Rules and Regulations, Title 6, Chapter X parts 700-706, including amendments through August 4, 1999.

ND = Not Detected
NA = Not Analyzed

4.0 CONCLUSIONS AND RECOMMENDATIONS

This office has completed the services summarized in Section 3.0 on specified portions of the approximately 0.65-acre "Perx Property" located at 68 South Broadway in the Village of Red Hook, Dutchess County, New York. The following remedial and investigative tasks were completed to address environmental conditions identified in section 2.2 of this Report as they relate to previous investigative work documented in the Phase I ESA (September 1999) and Summary of Environmental Services (April 2001) prepare by ESI. Environmental services documented in this Report are intended to augment previous investigative and remedial efforts on the site.

4.1 Conclusions

1. ESI coordinated and supervised the removal of three underground storage tanks (USTs) and four aboveground storage tanks (ASTs) from various locations throughout the subject property, and collected confirmatory samples from all tank graves and tank inverts, according to NYSDEC regulations. A Summary Report of Tank Removal Services is included as Appendix C of this Report.

   All confirmatory soil samples related to the USTs and ASTs were petroleum free, with the exception of soils obtained from the north end of the 750-gallon fuel oil UST located at the northern central portion of the site (see sample ID 3B-N (6.5'), described in the Summary Report of Tank Removal Services, Appendix C). A small volume of contaminated soil was observed at the north invert of this tank, and a spill event was reported to the NYSDEC (Spill File number 0210253). The source of this contamination, the UST, has been removed.

   Samples from a test pit located adjacent to the tank (TP-1) exhibited no evidence of petroleum contamination beneath the north invert of the tank to a depth of 12 feet. A ground water monitoring well (TMW-1) was installed adjacent and down-gradient of the tank grave. No VOCs or PAHs were detected in water samples obtained from this monitoring well.

   Field evidence supports the conclusion that the total volume of contaminated soil in the vicinity of the former 750-gallon UST is less than 50 cubic yards.

2. Two additional storage tanks were identified adjacent to the east exterior wall of the maintenance garage at the southern central portion of the property during the final phase of field investigative/remedial activity. An initial analysis of soil material obtained from the tank inverts indicates the absence of petroleum contamination. Recent communications with people knowledgeable of this Site identified the possible presence of a fuel-oil tank (possibly as large as 10,000-gallons) under the building. No field evidence of this UST has been encountered during various site inspections.

3. Four temporary monitoring wells were installed in the vicinity of the former wastewater treatment system at the center of the property in order to document potential impacts to groundwater quality from the on-site use of chlorinated pesticides and other chemicals. No VOCs, PAHs or chlorinated pesticides were detected in any of the groundwater samples obtained from the monitoring wells.

   Low levels of arsenic were detected in groundwater samples from TMW-2. Samples from all monitoring wells exhibited low level guidance level exceedences for lead. All groundwater samples exhibited concentrations of barium, including TMW-3 and TMW-4, which exceeded NYSDEC guidance levels. The nature of the low level exceedences for metals, including arsenic in TMW-2, coupled with the absence of VOCs and chlorinated pesticides in groundwater samples, is an indicator that groundwater has not been affected by former activity on the site.

4. Soil samples collected at various locations throughout the west wastewater treatment system exhibit concentrations of arsenic in surface soils (0-4") in excess of NYSDEC recommended cleanup objectives. Lead was also detected in two surface samples at concentrations in excess of NYSDEC recommended cleanup objectives. The exceedences recorded for surface soils in the vicinity of the west wastewater treatment system are low-level marginal exceedences and indicate that the wastewater system and related components have not adversely impacted soils in this area. Floor drains within the main processing warehouse which terminate in the skimmer shed exhibit high concentrations of pesticides and lead in sediment samples obtained from the drain bottoms. Additional samples collected from the base of the skimmer shed, to which the floor drains connect, indicate concentrations of pesticides below NYSDEC recommended cleanup objectives.

   At this time it is estimated that between 750 and 1,000 cubic yards of soils would be subject to remediation (see area outlined in the Fieldwork Map).

5. Two additional subsurface wastewater treatment tanks and related piping were observed in a courtyard located on the east central border of the site. Soil samples obtained from the invert of two tanks related to the east wastewater treatment system exhibit concentrations of pesticides below NYSDEC recommended cleanup objectives. Surface soil samples located in the east wastewater treatment system courtyard exhibited elevated concentrations of chlordane above NYSDEC recommended cleanup objectives.

6. Limited volumes of liquid and solid wastes were noted at various locations throughout the main on-site building. The waste is contained in metal and paper barrels and bags. In addition to the non-hazardous waste identified throughout the property, a potential ammonia tank related to on-site refrigeration was identified in a freezer within the main processing warehouse.

7. Additional soil samples collected in the former orchard and wetlands portion of the site exhibit concentrations of arsenic in excess of NYSDEC guidance levels. The soils/sediments exhibiting exceedences of NYSDEC guidance levels were collected from a depth of 0-4". The exceedences recorded for surface soils in the former orchard areas, and in sediment material from points throughout the wetlands, are low-level marginal exceedences and support the conclusion that historic arsenic-based pesticide use has not adversely impacted soils in this area. Additionally, low levels of pesticides (DDD, DDE, DDT and Chlordane) were detected in sediment samples (0-4") collected from the wetlands area. The concentrations of pesticides were far below NYSDEC recommended guidance levels. Based on the projected volume and square footage of soils impacted in this area, and the densely wooded character of this portion of the parcel, a soil removal effort is not deemed appropriate. The potential for human contact with affected soils on this portion of the property is minimal

8. Test pits extended throughout the wastewater treatment portion of the site did not reveal the presence of significant volumes of subsurface debris. Analysis of composite soil samples collected from these test pits indicated the absence of VOCs, PAHs and chlorinated pesticides, with the exception of toluene detected at 11 ppb (NYSDEC recommended soil cleanup objective of 1,500 ppb). Concentrations of metals were detected in the soil samples at levels considered consistent with background levels for the property.

4.2 Recommendations

This section provides a general discussion of the remedial actions that are warranted at this Site, based on the findings summarized in this Report and in previous environmental reports on this property. A detailed discussion of remedial actions will be provided in the Remedial Alternatives Report and the Remedial Action Workplan.

The following response actions are warranted at this Site:

1. The on-site structure should be demolished, including the proper removal of non-hazardous requlated wastes, including the interior ammonia tank. Documentation of proper disposition should be provided to the NYSDEC in a final report.

2. Internal drains contain sediment exhibiting elevated concentrations of lead and chlorinated pesticides. Material present in these drains should be removed and properly containerized for off-site disposition. For budgetary and project planning purposes, all interior drains should be managed in this manner.

3. It is recommended that the extensive west wastewater treatment system and components be properly de-commissioned. Soil material within the floor drains contain elevated pesticides which will require to be removed and may require special handling. Additionally, soils in and around the footprint of the skimmer shed should be excavated and disposed of at the proper repository. Surface soils (including the uppermost 12 inches) in the vicinity of the former wastewater treatment system should be removed and disposed of off-site at a proper repository as non-hazardous waste.

4. It is recommended that the east wastewater treatment system located at the courtyard area near the east central border of the site be properly decommissioned and confirmatory sampling be conducted in the vicinity of the tanks and piping system to provide a profile of soil conditions as they relate to impacts from the wastewater treatment system. Soils throughout the courtyard exhibiting high concentrations of chlordane should be removed and disposed of at the proper off-site repository.

5. It is recommended that the contaminated soil present near the former 750-gallon UST be removed. Field evidence suggests that the volume of contaminated soil is less than 50 cubic yards. Following removal, confirmatory sampling and proper documentation of remedial activities (including waste disposal manifests and laboratory data) should be provided to the NYSDEC in support of closure of Spill File number 0210253.

   A comprehensive Tank Closure Report will be completed as an addendum to this document at the conclusion of all tank removal activity. Upon completion of all removal efforts the former on-site USTs should be registered with the NYSDEC as being closed.

6. No further investigation of the former orchard and wetlands areas is recommended. Surface soils in these areas should remain undisturbed if proposed site utility will not include direct contact with affected soil material. Areas where disturbance of soils is proposed should have surface soils removed and disposed of off-site. Appropriate deed documentation and posting of the area should be completed to reduce the potential for human contact with affected soil material.

7. No groundwater remediation is recommended at this time. Groundwater monitoring wells should be sampled for dissolved metals (both filtered and unfiltered) on a quarterly basis over the next year to document any change in lead and barium concentrations.

APPENDIX B

Cost Estimates

Cost Estimate Calculations

No Action Alternative

Short-Term Costs	
Site Security and Control	
Installation of Fencing	$ 25,000
Securing Wastewater Treatment Buildings	$ 10,000
Securing Main Building	$ 40,000
Total Short-Term Costs	$ 75,000
Long-Term Costs	
Site Security ($5,000/yr.)	$150,000
Building Demolition	$800,000
Total Long-Term Costs	$950,000
Subtotal Costs	$1,025,000
Contingency (10%)	$ 102,500
Administrative (10%)	$ 102,500
TOTAL	$1,230,000

Cost Estimate Calculations

Soil Cover Alternative

Demolition of On-Site Structures and Removal of Debris	$ 800,000
Contingency for Sub-Slab Petroleum Tank	$ 50,000
Subtotal	$ 850,000
Closure of Wastewater Treatment Tanks and Removal of Equipment	$ 50,000
Excavation of Petroleum-Contaminated Soils (including USTs Removal)	
Soil Testing	$ 5,000
Tank Removal (including liquid)	$ 25,000
Soil Disposal (50 tons at $50/ton)	$ 2,500
Subtotal	$ 32,500
Installation of Soil Cover (assuming 24 inches of Soil)	
Soil (6,450 cubic yards @ $30/cubic yard)	$ 193,500
Installation	$ 40,000
Maintenance to cover ($3,000/yr for 30 yrs)	$ 90,000
Subtotal	$ 323,500
Demolition and Remediation Subtotal	$1,256,000
Contingency (20%)	$ 251,200
Administrative (10%)	$ 125,600
TOTAL	$1,632,800

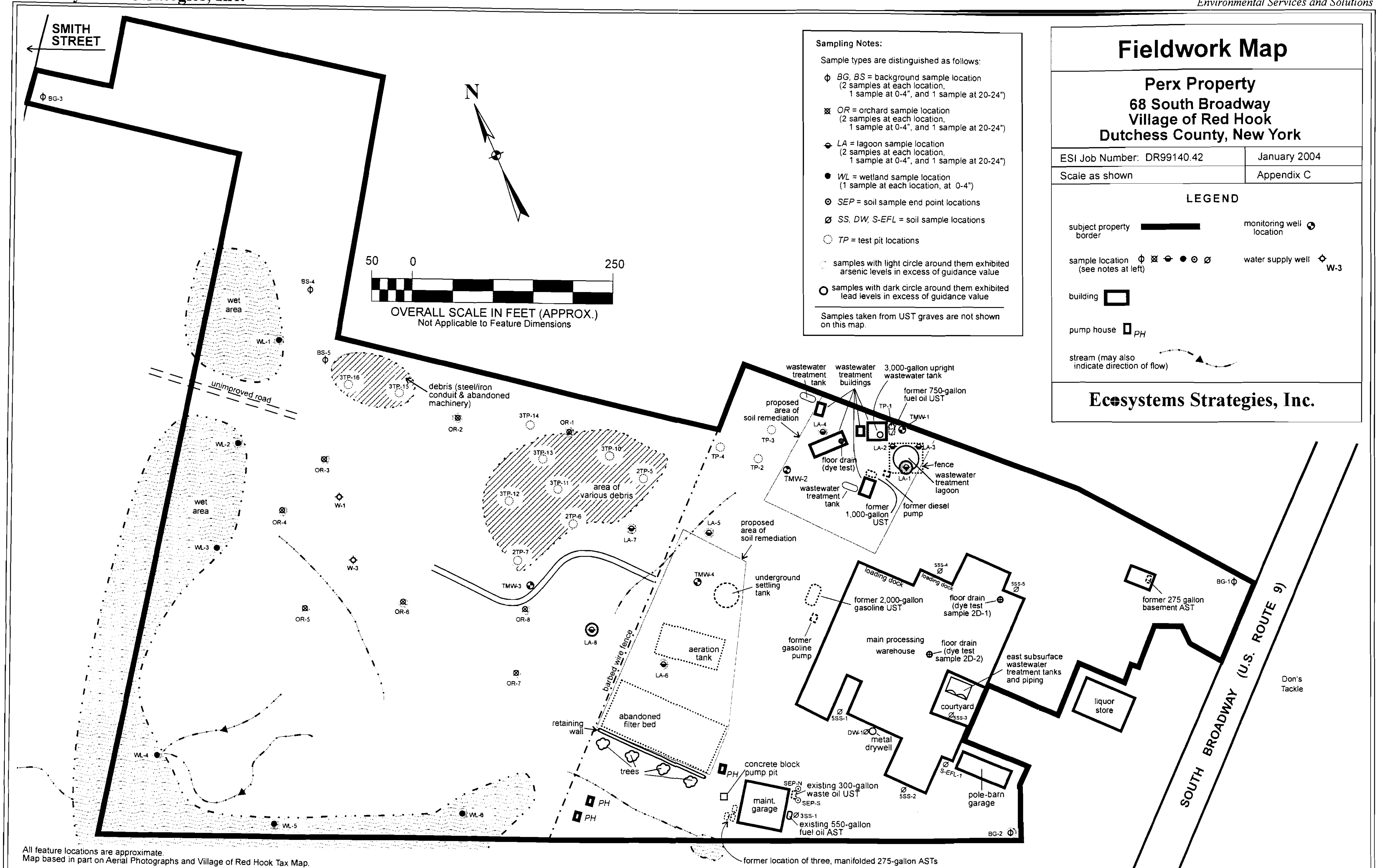
Cost Estimate Calculations

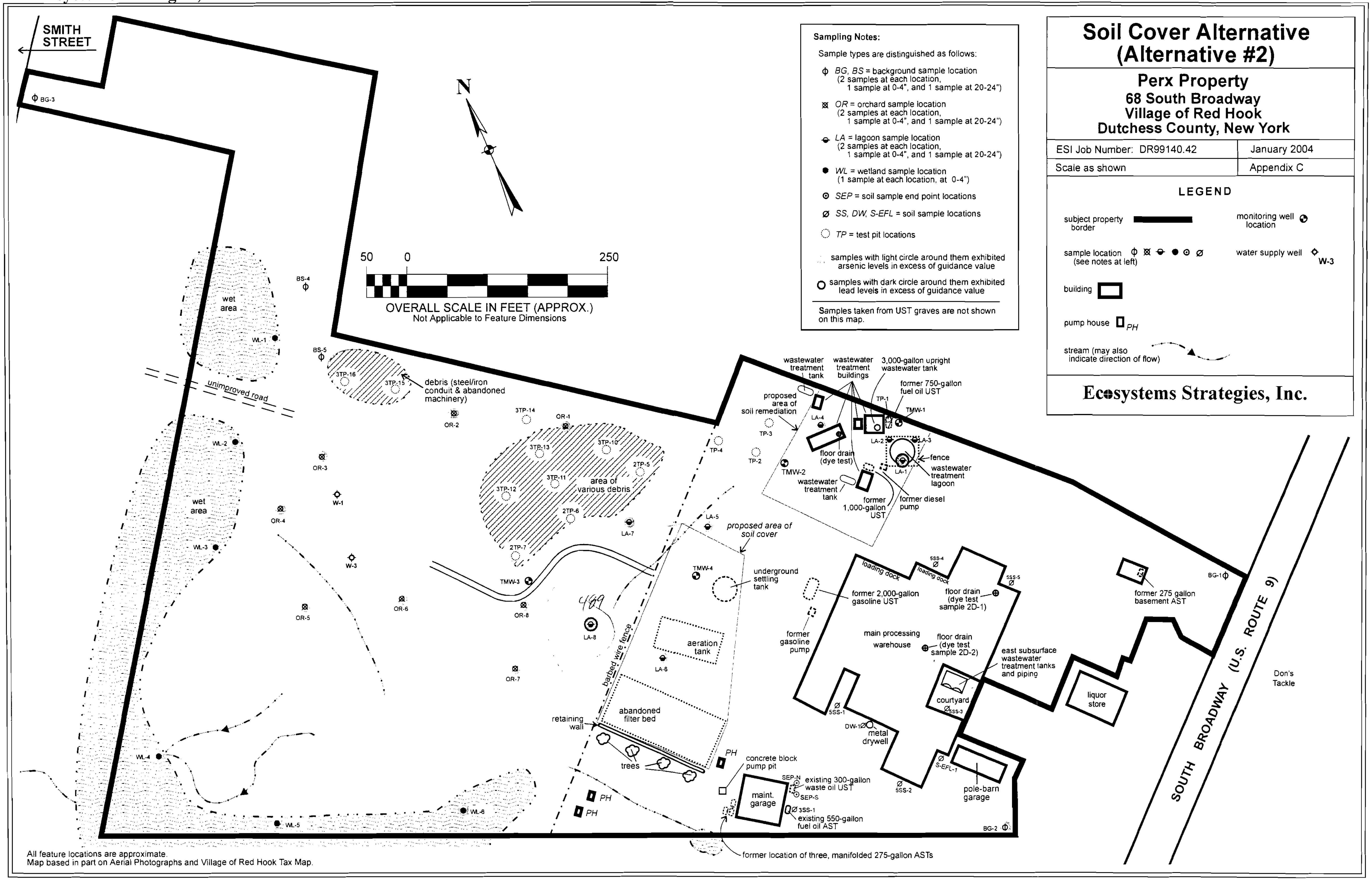
Excavation Alternative

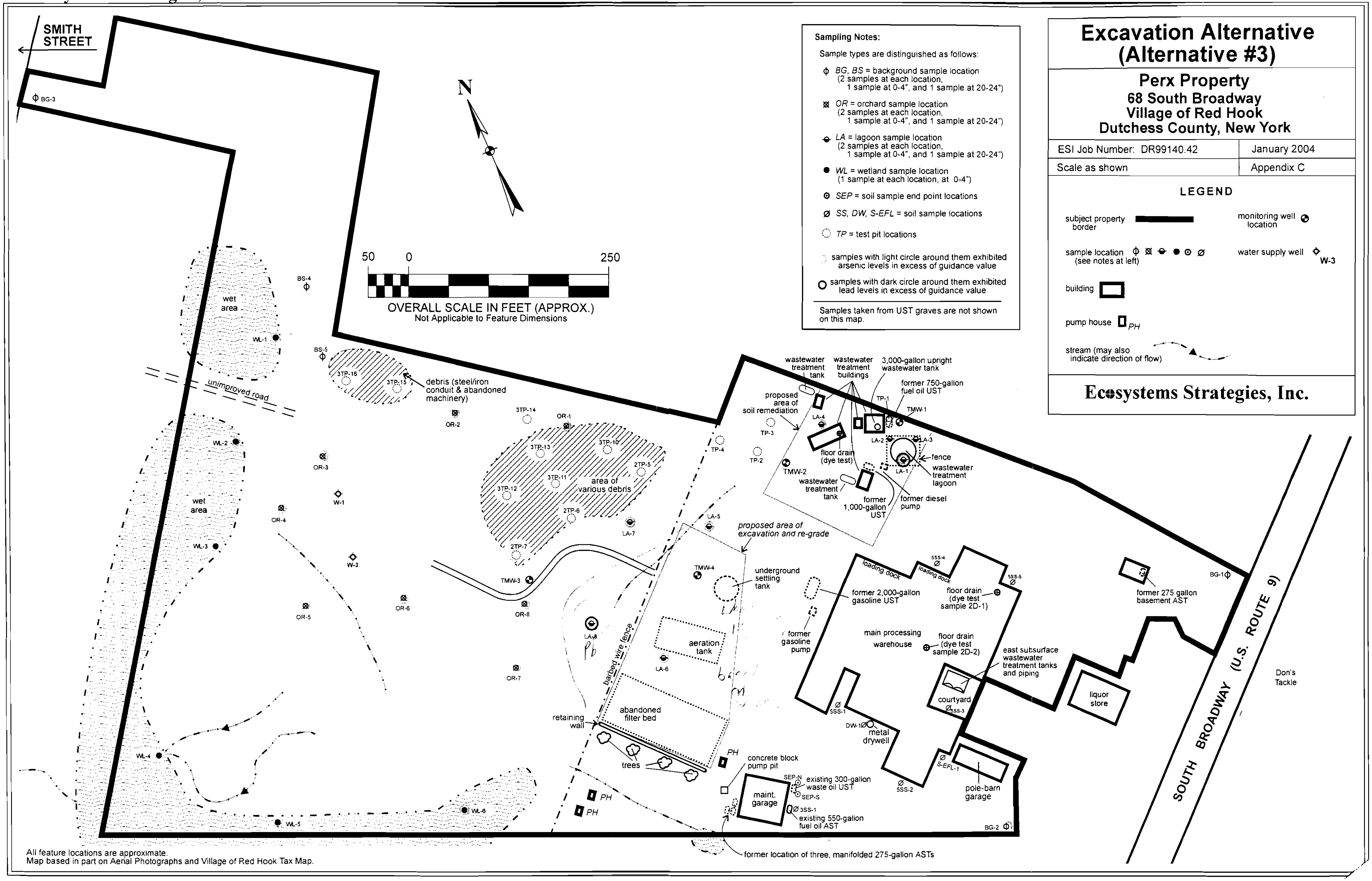
Demolition of On-Site Structures and Removal of Debris	$ 800,000
Contingency for Sub-Slab Petroleum Tank	$ 50,000
Subtotal	$ 850,000
Closure of Wastewater Treatment Tanks and Removal of Equipment	$ 50,000
Excavation of Petroleum-Contaminated Soils (including USTs removal)	
Soil Testing	$ 5,000
Tank Removal (including liquid)	$ 25,000
Soil Disposal (50 tons at $50/ton)	$ 2,500
Subtotal	$ 32,500
Excavation of Chlordane-Contaminated Soils	
Soil Excavation	$ 10,000
Soil testing / Site Restoration	$ 6,000
Soil Disposal (100 tons at $250/ton)	$ 50,000
Subtotal	$ 66,000
Excavation of Metals- and Pesticide - Impacted Soils	
Soil Excavation	$ 25,000
Disposal (1000 tons at $100/ton)	$100,000
Soil Testing	$ 10,000
Site Restoration (750 yd^3 at $30/yd)	$ 22,500
Site Regrading	$ 20,000
Subtotal	$177,500
Demolition and Remediation Subtotal	$1,176,000
Contingency (20%)	$ 235,200
Administrative (10%)	$ 117,600
TOTAL	$1,528,800

APPENDIX C

Maps


Fieldwork Map
Perx Property
68 South Broadway
Village of Red Hook
Dutchess County, New York
ESI Job Number: DR99140.42
January 2004
Scale as shown
Appendix C
LEGEND
subject property border
monitoring well location
sample location (see notes at left)
water supply well W-3
building
pump house PH
stream (may also indicate direction of flow)
Ecosystems Strategies, Inc.
Sampling Notes:
Sample types are distinguished as follows:
BG, BS = background sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
OR = orchard sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
LA = lagoon sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
WL = wetland sample location (1 sample at each location, at 0-4")
SEP = soil sample end point locations
SS, DW, S-EFL = soil sample locations
TP = test pit locations
samples with light circle around them exhibited arsenic levels in excess of guidance value
samples with dark circle around them exhibited lead levels in excess of guidance value
Samples taken from UST graves are not shown on this map.
SMITH STREET
N
50 0 250
OVERALL SCALE IN FEET (APPROX.)
Not Applicable to Feature Dimensions
wet area
unimproved road
debris (steel/iron conduit & abandoned machinery)
area of various debris
retaining wall
barbed wire fence
abandoned filter bed
aeration tank
trees
underground settling tank
proposed area of soil remediation
wastewater treatment tank
wastewater treatment buildings
3,000-gallon upright wastewater tank
former 750-gallon fuel oil UST
floor drain (dye test)
fence
wastewater treatment lagoon
former 1,000-gallon UST
former diesel pump
former 2,000-gallon gasoline UST
former gasoline pump
loading dock
floor drain (dye test sample 2D-1)
main processing warehouse
floor drain (dye test sample 2D-2)
east subsurface wastewater treatment tanks and piping
courtyard
metal drywell
concrete block pump pit
existing 300-gallon waste oil UST
maint. garage
existing 550-gallon fuel oil AST
former location of three, manifolded 275-gallon ASTs
pole-barn garage
liquor store
former 275 gallon basement AST
SOUTH BROADWAY (U.S. ROUTE 9)
Don's Tackle
All feature locations are approximate.
Map based in part on Aerial Photographs and Village of Red Hook Tax Map.


Soil Cover Alternative
(Alternative #2)
Perx Property
68 South Broadway
Village of Red Hook
Dutchess County, New York
ESI Job Number: DR99140.42
January 2004
Scale as shown
Appendix C
LEGEND
subject property border
monitoring well location
sample location (see notes at left)
water supply well
W-3
building
pump house
PH
stream (may also indicate direction of flow)
Ecosystems Strategies, Inc.
Sampling Notes:
Sample types are distinguished as follows:
BG, BS = background sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
OR = orchard sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
LA = lagoon sample location (2 samples at each location, 1 sample at 0-4", and 1 sample at 20-24")
WL = wetland sample location (1 sample at each location, at 0-4")
SEP = soil sample end point locations
SS, DW, S-EFL = soil sample locations
TP = test pit locations
samples with light circle around them exhibited arsenic levels in excess of guidance value
samples with dark circle around them exhibited lead levels in excess of guidance value
Samples taken from UST graves are not shown on this map.
SMITH STREET
N
50
0
250
OVERALL SCALE IN FEET (APPROX.)
Not Applicable to Feature Dimensions
BG-3
BS-4
BS-5
wet area
WL-1
WL-2
WL-3
WL-4
WL-5
WL-6
unimproved road
debris (steel/iron conduit & abandoned machinery)
3TP-16
3TP-15
3TP-14
3TP-13
3TP-12
3TP-11
3TP-10
2TP-5
2TP-6
2TP-7
area of various debris
OR-1
OR-2
OR-3
OR-4
OR-5
OR-6
OR-7
OR-8
W-1
W-3
TMW-1
TMW-2
TMW-3
TMW-4
LA-1
LA-2
LA-3
LA-4
LA-5
LA-6
LA-7
LA-8
489
barbed wire fence
proposed area of soil cover
underground settling tank
aeration tank
abandoned filter bed
retaining wall
trees
PH
wastewater treatment tank
wastewater treatment buildings
3,000-gallon upright wastewater tank
former 750-gallon fuel oil UST
proposed area of soil remediation
TP-1
TP-2
TP-3
TP-4
floor drain (dye test)
fence
wastewater treatment lagoon
former 1,000-gallon UST
former diesel pump
loading dock
5SS-1
5SS-2
5SS-3
5SS-4
5SS-5
former 2,000-gallon gasoline UST
former gasoline pump
floor drain (dye test sample 2D-1)
main processing warehouse
floor drain (dye test sample 2D-2)
east subsurface wastewater treatment tanks and piping
courtyard
DW-1
metal drywell
S-EFL-1
pole-barn garage
concrete block pump pit
SEP-N
SEP-S
existing 300-gallon waste oil UST
maint. garage
3SS-1
existing 550-gallon fuel oil AST
former location of three, manifolded 275-gallon ASTs
BG-1
BG-2
former 275 gallon basement AST
liquor store
SOUTH BROADWAY (U.S. ROUTE 9)
Don's Tackle
All feature locations are approximate.
Map based in part on Aerial Photographs and Village of Red Hook Tax Map.


Excavation Alternative (Alternative #3)
Perx Property
68 South Broadway
Village of Red Hook
Dutchess County, New York
ESI Job Number: DR99140.42
January 2004
Scale as shown
Appendix C
LEGEND
subject property border
monitoring well location
sample location (see notes at left)
water supply well
W-3
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stream (may also indicate direction of flow)
Ecosystems Strategies, Inc.
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SMITH STREET
N
50 0 250
OVERALL SCALE IN FEET (APPROX.)
Not Applicable to Feature Dimensions
BG-3
BS-4
BS-5
wet area
WL-1
WL-2
WL-3
WL-4
WL-5
WL-6
unimproved road
3TP-16
3TP-15
debris (steel/iron conduit & abandoned machinery)
3TP-14
OR-1
OR-2
OR-3
OR-4
OR-5
OR-6
OR-7
OR-8
W-1
W-3
3TP-13
3TP-10
3TP-11
3TP-12
2TP-5
2TP-6
2TP-7
area of various debris
LA-7
TMW-3
TMW-4
LA-8
LA-5
LA-6
TP-4
TP-3
TP-2
TP-1
TMW-1
TMW-2
LA-4
LA-2
LA-3
LA-1
wastewater treatment tank
wastewater treatment buildings
3,000-gallon upright wastewater tank
former 750-gallon fuel oil UST
proposed area of soil remediation
floor drain (dye test)
fence
wastewater treatment lagoon
wastewater treatment tank
former 1,000-gallon UST
former diesel pump
proposed area of excavation and re-grade
underground settling tank
aeration tank
abandoned filter bed
barbed wire fence
retaining wall
trees
PH
concrete block pump pit
former 2,000-gallon gasoline UST
former gasoline pump
loading dock
SSS-4
SSS-5
floor drain (dye test sample 2D-1)
main processing warehouse
floor drain (dye test sample 2D-2)
east subsurface wastewater treatment tanks and piping
courtyard
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SSS-1
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metal drywell
SSS-2
S-EFL-1
pole-barn garage
SEP-N
SEP-S
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SOUTH BROADWAY (U.S. ROUTE 9)
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