WORK PLAN FOR THE EVALUATION OF THE UNCONSOLIDATED OVERBURDEN AQUIFER

Former Star Facility
Mountainville, New York

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1.0 INTRODUCTION

The Former Star Facility consists of an approximately 200,000 square foot warehouse and a small residential structure located on 37 acres in Orange County, in the hamlet of Mountainville, Town of Cornwall, New York (the "Site"). Currently, the Site is primarily used to warehouse various dry goods manufactured elsewhere.

As a result of Site use by a previous occupant, the Site has been listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites. According to the New York State Department of Environmental Conservation (NYSDEC), chlorinated solvents represent the principal contaminants of concern, potentially impacting soil and groundwater at the Site.

The Site has been the subject of numerous investigations as well as several remediation efforts (see Section 3.0). Nevertheless, NYSDEC has identified gaps in the overall characterization of the Site (NYSDEC correspondence to Samuel Kaufman dated July 23, 2002). In response to the results of TRC's recent Site Investigation, NYSDEC has indicated a need to further delineate groundwater contamination in the area of the former solvent recovery still/oil water separator and to further evaluate levels of volatile organic compound (VOCs) in the sub-slab vapor and indoor air of the on-site residence. (NYSDEC correspondence to Samuel Kaufman dated March 29, 2006). Thus, the overall goal of this work plan is to address the data gaps by:

- Establishing post-remediation groundwater conditions in the unconsolidated overburden aquifer throughout the Site,
- Delineating the extent of contamination detected in the area of the former oil-water separator/solvent recovery still and, if warranted, in other areas of concern (AOCs) at the Site,
- Characterizing the properties of the unconsolidated overburden aquifer (thickness, groundwater flow direction, etc.) and
- Collecting additional sub-slab vapor and indoor air samples in the on-site residence to further evaluate the potential health risk to occupants.

This work plan has been prepared to satisfy NYSDEC requirements for the Site, and, with respect to sampling of subslab vapor and indoor air, presents methodologies consistent with the February 2005 NYSDOH draft guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (NYSDOH Guidance Document).

2.0 SITE DESCRIPTION

2.1 Location and Surrounding Land Use

The Former Star Facility encompasses approximately 37 acres in Mountainville, Orange County, New York. A slab on grade, single-story warehouse and a small residential structure are located on the property. The property is bounded by the New York State Thruway to the west, Woodbury Creek to the east, Creamery Hill Road to the north, and farmland to the south. Figure 1 shows the Site location.

Currently, the on-site warehouse is utilized primarily to store various dry goods manufactured elsewhere. In general, the surrounding land use can be characterized as a mixture of woodlands, agricultural and rural.

2.2 History/Past Use

The following summary of the history and past uses of the Site is based on a review of the Comprehensive RCRA Facility Investigation Work Plan, prepared by Eder Associates, dated January 1995, and available information on the NYSDEC database for Inactive Hazardous Waste Disposal Sites.

The former occupant and owner, the Star Expansion Company (Star), began operations in 1954 and manufactured a broad line of fasteners for residential, commercial and building industries. In 1997, Star filed for bankruptcy and abandoned the Site. Star NewCo purchased the Site out of bankruptcy in 1997, and entered into a Consent Order (D3-0001-96-12) with NYSDEC to perform specific remedial work at the Site. In 1997, Star NewCo also filed for bankruptcy. The Site was then resold in 2004, out of bankruptcy, to Cornwall Properties, LLC.

Past manufacturing activities performed at the Former Star Facility included metal cold forming, die casting, plastic injection molding, heat-treating, zinc plating, assembly, and packaging. Off-site supply wells provided water for drinking and manufacturing. An on-site plant treated industrial wastewater and discharged directly to Woodbury Creek pursuant to a NYSDEC SPDES permit.

Numerous environmental studies were conducted at the Site between 1985 and 1997. These studies identified elevated levels of VOCs in the soil and groundwater at the Site, and the NYSDEC has indicated that VOCs are presently the primary site contaminants of concern. Based on available information, under a Consent Order with the NYSDEC, former owners completed remediation of several areas of the Site, although the nature and extent of this work may not have been fully documented (see Section 3 for discussion of previous studies and remediation efforts).

2.3 Geology

The Site is located near the northeastern boundary of the geologic provenance known as Hudson Highlands. The geology consists of glacial and fluvial deposits overlying Ordovician age dolomite bedrock, which has been shown to be solution prone. Previous studies show the unconsolidated glacial-fluvial sediments to be heterogeneous, varying from relatively impermeable lacustrine clays to permeable outwash sands and gravels. The unconsolidated deposits generally thicken to the north, reflecting the bedrock surface that dips in that direction. Based on reports by others, the thickest of the unconsolidated deposits appears to be confined within a bedrock trough that begins near the former waste pile to east of the warehouse building and extends northward off the Site. The bedrock occurs just beneath the surface near the former waste pile area and outcrops to the east of the Site in Woodbury Creek.

2.4 Hydrogeology

The two principal aquifers at the Site are an unconsolidated aquifer in the glacial overburden deposits, and a bedrock aquifer in the underlying, dolomite bedrock. According to an evaluation of the hydrogeology by Hopkins Environmental Management, Inc., there is no extensive confining unit between the overburden deposits and bedrock aquifer. Available boring and well logs from previous studies support this conclusion.

Depth to groundwater in the overburden deposits ranges from 4 to 18 feet below ground surface (bgs) across the Site, and groundwater flow is predominately to the east, toward Woodbury Creek, with a southeast flow component at the south end of the Site. The reported flow velocity based upon slug tests is approximately 0.07 feet per day.

According to geological cross sections from previous reports, the bedrock surface slopes downward to the north. Previous studies also show the presence of a north-south trending, bedrock trough located to the east of the warehouse building near former Waste Pile Area, with corresponding rise in the bedrock surface to the west near the warehouse building and to the east at Woodbury Creek. Groundwater flow in the bedrock aquifer is presumed to be to the north.

2.5 Public Water Supply

Presently, the Site receives water from a newly installed private well. Properties in the surrounding area receive water from private wells. In September 2005, NYSDEC sampled 47 private wells adjacent to the Site in all directions. Based on the groundwater sampling results, NYSDEC concluded that the Site has not caused impacts to groundwater conditions in the off-site wells (see Appendix A).

3.0 PREVIOUS INVESTIGATIONS/REMEDIATION

Previous investigations and remediation completed by others at the Site are described in the RCRA Facility Assessment Sampling Visit (RFA-SV) Report by Eder Associates (Eder, 1994), Comprehensive RCRA Facility Investigation Work Plan by Eder Associates (Eder, 1995), Site Investigation and Remedial Action Plan (RAP) by Innovative Recycling Technologies, Inc. (IRT, 1997), and Monthly Progress Reports by Hopkins Environmental Management, Inc. and IRT (Hopkins/IRT, February-August 1997). In addition the results of soil, groundwater, sub-slab vapor and indoor air sampling performed at the Site by TRC are presented in the Site Investigation Report (TRC, 2006). The following subsections provide a brief overview of the previous environmental activities conducted at the Site, as presented in the reports. Figure 2 shows the locations of areas of concern and existing monitoring wells.

3.1 RCRA Facility Assessment Sampling Visit (RFA-SV) Report (September 1994)

Eder Associates prepared a RCRA Facility Assessment Sampling Visit Report (RFA-SV) concerning the Former Scrap Metal/Waste Oil Storage Area at the Site. Sergio Smiriglio Environmental Consultants, Inc. (SSEC) reportedly performed the sampling in accordance with a NYSDEC-approved work plan (SSEC, January 1994). Soil samples were collected approximately one foot below the ground surface for laboratory analysis. Significant findings of this report are as follows:

- VOCs were found in soil located immediately beneath a concrete storage pad in the Former Scrap Metal/Waste Oil Storage Area. The concentration of 1,1,1-trichloroethane detected in the soil sample collected beneath the storage pad (1.5 parts per million or ppm) was above the NYSDEC recommended soil cleanup objective (RSCO) of 0.7 ppm.
- No VOCs were found in soil samples collected beneath the asphalt adjacent to the concrete pad, indicating that the extent of VOC related impacts to soil were limited in this area, and
- Except for zinc, the concentrations of metals detected in the soil samples were below the RSCOs. Zinc was detected at less than 100 ppm, and its presence in soil was attributed to native background concentrations.

3.2 Comprehensive RCRA Facility Investigation Work Plan (January 1995)

Eder Associates prepared a RCRA Facility Investigation (RFI) Work Plan that presents a scope of work to characterize and define the extent of contamination associated with three solid waste management units (SWMUs) at the Site. The SWMUs targeted in Eder's RFI Work Plan are:

1. The Former Landfill Area (SWMU-1) that had reportedly received metal and plastic off-specification products, ash from an on-site incinerator that burned non-hazardous rubbish, and floor sweepings, and encompassed approximately a 10,600 square foot area in the northeast portion of the Site,

2. The Former Waste Pile Area (SWMU-2) near the eastern property boundary that had reportedly received non-hazardous hydroxide wastewater sludge, which was excavated and disposed at an off-site facility prior to Eder's RFI, and encompassed approximately 25 feet by 50 feet[1],

3. The Former Wastewater Treatment Area (SWMU-3) in the southeastern portion of the Site where reportedly industrial wastewater from the facility was treated in accordance with a NYSDEC SPDES permit (Permit No. NY0007889).

Significant findings of previous historic investigations, as reported by Eder in the RFI Work Plan are summarized below.

- Former Landfill Area (SWMU-1): Groundwater sampling results revealed elevated VOCs only, with the highest levels of total VOCs found in two downgradient wells (LF-4 and LF-9). Of the VOCs, trichloroethene (TCE), its byproduct, trans-1, 2-dichloroethene, and 1,1-dichloroethane and chloroethane were detected at the highest concentrations in the groundwater monitoring wells. The concentrations of metals and SVOCs detected in groundwater were generally below Class GA groundwater standards.

- Former Waste Pile Area (SWMU-2): Groundwater sampling results revealed elevated VOCs only. Of the VOCs, 1,1,1-trichloroethane and its byproduct, 1,1-dichloroethane, were detected at the highest concentration in the groundwater monitoring wells. The concentrations of metals detected in groundwater were generally below Class GA groundwater standards.

- Former Wastewater Treatment Area (SWMU-3): Groundwater sampling results revealed elevated VOCs only. Elevated concentrations of total VOCs were detected in two groundwater monitoring wells (WLG-3 and WLG-6) in the

[1] The size of SWMU No. 2 described in the text of the Eder RFI is inconsistent with the area depicted in a drawing. The drawing shows the extent of SWMU-2 to be larger.

former waste lagoons and in the groundwater monitoring wells installed in the location of the former filter beds. The highest concentrations of total VOCs were found in groundwater monitoring wells FB-4 and FB-10 located in the area of the former filter beds. Of the VOCs detected in the groundwater samples, TCE and its byproduct, trans-1,2-dichloroethene, were found at the highest concentrations. Elevated levels of PCE were also detected in groundwater monitoring wells in the area of the former filter beds. In the case of groundwater well FB-10, it was later determined that the well had been installed in a wastewater treatment tank that had been abandoned in-place. The concentrations of metals detected in groundwater were generally below Class GA standards.

The Eder RFI Work Plan proposed additional soil and/or groundwater sampling at each of the previously described SWMUs. However, there is no known final report by Eder or reference in subsequent reports by others indicating that Eder implemented the RFI Work Plan.

3.3 Site Investigation and Remedial Action Plan (February 1997)

IRT presented the results of a site investigation as part of a Remedial Action Plan (RAP) for the Site. The overall objective of IRT's site investigation was to establish the vertical and horizontal limits of soil contamination in the Former Landfill area (SWMU No.1) and the Former Wastewater Treatment Area (SWMU-3). No soil sampling was performed in the Former Waste Pile Area (SWMU-2). Significant findings of IRT's site investigation are summarized below.

- Former Landfill (SWMU-1): Total concentrations of VOCs in soil exceeded the cleanup objective of 200 parts billion (ppb) for the Site in only one soil sample (ILF-9, collected from 9 to11 feet bgs). Groundwater sampling results for two temporary wells (LFW-1 and LFW-2) revealed no detectable concentrations of VOCs and total petroleum hydrocarbons (TPHs).

- Former Wastewater Treatment Area (SWMU-3): The concentrations of total VOCs in soil samples collected from three of eight borings (ILG-1, ILG-2 and ILG-4) exceeded the cleanup objective. Soil samples collected from other borings exhibited elevated concentrations of TPHs.[2] VOCs were not detected above the site-specific cleanup objective in soil samples collected from the 12 borings installed outside the limits of the former waste lagoons. Soil samples

[2] No numeric value was given in IRT's RAP that established a cleanup objective for TPHs. Rather, the determination of elevated TPHs warranting remediation was apparently largely based upon field measurements and/or observations.

collected from several of these borings, however, exhibited elevated concentrations of TPHs.

- Off-Site: No detectable concentrations of VOCs were found in the two off-site groundwater wells (IOS-1 and IOS-2) installed by IRT.

The stated goals of IRT's Remedial Action Plan (RAP) were to remove contaminated soils that act as a source of groundwater contamination, expand the existing pump and treat system to remediate contaminated groundwater, and cap the Former Waste Pile Area. The RAP established a site-specific soil cleanup objective of 200 parts per billion (ppb) for total VOCs. The scope of remediation proposed by IRT included the following work:

- Removal and off-site disposal of underground equalization tanks and filter beds associated with the former wastewater treatment plant,
- Excavation and off-site disposal of the soils comprising the waste lagoons associated with the Former wastewater treatment plant,
- Excavation and off-site disposal of soils and debris comprising the Former Landfill until the soil cleanup objective is met,
- Capping of the Former Waste Pile Area, and
- Installation of new wells after remediation (one new well to the southeast of the Former Landfill, six wells in the Former Wastewater Treatment Area, and three off-site wells).

In February 1997, NYSDEC gave conditional approval of the RAP. Subsequent progress reports by IRT and others indicate that the proposed remediation was implemented at the Site (see Section 3.4).

3.4 Hopkins/IRT Monthly Progress Reports (February-August 1997)

Hopkins Environmental Management Inc. and IRT prepared monthly progress reports documenting the remediation activities performed pursuant to NYSDEC Consent Order D3-0001-96-12. However, based on available information, a final engineering report documenting the implementation of the RAP was never submitted to NYSDEC. A summary of the remediation activities performed in each SWMU and other AOCs, as reported in the monthly progress reports, is presented below.

- Former Landfill Area (SWMU-1): Contaminated soil and waste materials comprising the landfill were excavated and disposed off-site.

- Former Waste Pile Area (SWMU-2): The waste pile area was graded and capped with a silty clay loam.

- Former Wastewater Treatment Area -West (SWMU-3): The equalization tanks were emptied, cleaned, removed and disposed off-site as hazardous waste. The filter beds and surrounding soil were excavated and also disposed off-site as hazardous waste. In the lagoon areas, contaminated soils were excavated to a depth below the water table (7 to 8 feet bgs) at most locations. Excavated soils from the lagoon areas were disposed off-site.

- Wastewater Treatment Area - East: A previously unidentified area of potential concern was found to the east of the known Former Wastewater Treatment Area, and described as a third lagoon referred to as the "Wastewater Treatment Area – East". A pipe from an oil/water separator in SWMU-2 was found extending into this area. Soil from the area was excavated and disposed off-site. Post-remediation soil sampling results indicated elevated levels of TPH in 13 of 20 borings. Concentrations of total VOCs in these post-remediation soil samples exceeded cleanup objectives in only one sample (i.e., the sample collected from boring B2 at a depth of 4 to 8 feet).

3.5 Site Investigation Report (January 2006)

Intermittently between September and November 2005, TRC performed soil, groundwater, sub-slab vapor and indoor air sampling in accordance with a NYSDEC approved work plan. Significant findings are as follows:

- TCE, tetrachloroethene (PCE) and 1,1,1-trichloroethane (TCA) were detected at concentrations above the mitigation criteria established by NYSDOH in sub-slab vapor samples collected beneath the warehouse floor slab.

- Groundwater sampling results revealed impacts to groundwater quality, primarily limited to MW-102, which was installed near the location of a former solvent recovery still and oil water separator inside the warehouse building.

- Groundwater sampling results for MW-101 located north of MW-102, and MW-103 located south of MW-102, showed no significant levels of VOCs, indicating that the groundwater contamination may be localized in the area of MW-102.

4.0 SITE INVESTIGATION SCOPE AND TASKS

This section of the work plan presents the objectives, scope and rationale for the proposed investigation at the Site which is the subject of this work plan. This work plan has been prepared based on a careful review of previous reports, consideration of areas identified by NYDEC as warranting further investigation and the results of an inspection performed by TRC in April 2006 to determine the locations and conditions of existing monitoring wells at the Site.

With regards to the latter, TRC inspected the Site to locate and assess on-site and off-site wells believed to have been installed in connection with previous investigations. Of these, TRC found 27 on-site wells and 4 off-site wells and determined the condition of each well. The wells are listed in Table 1 along with relevant information. Figure 2 shows the locations of the existing wells.

4.1 Areas of Concern

Previous reports describe several areas of concern (AOCs) at the Site (see Section 3.0). Based on review of these previous reports, the table below summarizes the AOCs. The locations of the AOCs are shown on Figure 2.

Area of Concern	Nature of Concern	Current Status
AOC No.1: Former Landfill (SWMU-1)	Elevated metals and VOCs in soil and VOCs in groundwater	Soil remediation complete; current groundwater conditions unknown
AOC No.2: Former Waste Pile Area (SWMU-2)	Elevated VOCs in groundwater	Soil remediation complete (capping); current groundwater conditions unknown
AOC No.3: Former Wastewater Treatment Area (SWMU-3)	Elevated VOCs and TPH in soil and VOCs in groundwater	Soil remediation complete; current groundwater condition unknown.
AOC No. 4: Former Scrap Metal/Waste Oil Storage Area	Suspected elevated VOCs in soil	Extent of VOC contamination, if any, is unknown

Area of Concern	Nature of Concern	Current Status
AOC No. 5: Former Wastewater Area – East	Elevated TPH in soil	Soil remediation partially complete; current groundwater conditions unknown
AOC No. 6: Former Solvent Recovery Still/ Oil Water Separator Area	Elevated VOCs in groundwater	Extent of VOC impacted groundwater unknown
AOC No. 7: Warehouse Building Sub-Slab	VOCs in sub-slab vapor	First phase of sub-slab depressurization system design has been approved
AOC No.8: Residential Building	VOCs in sub-slab vapor	VOCs in sub-slab vapor to be monitored

4.2 Objectives

The principal objectives of the planned investigation are as follows:

- Establish site-wide post-remediation groundwater conditions in the unconsolidated overburden aquifer,
- Evaluate levels of VOCs, with depth, in the overburden aquifer, to assess potential for impacts to the underlying bedrock aquifer
- Delineate the extent of VOC contamination in the unconsolidated overburden groundwater in the vicinity of the Former Solvent Recovery Still/Oil Water Separator Area (AOC No. 6) and, if warranted, in other AOCs at the Site,
- Characterize the properties of the unconsolidated overburden aquifer and determine depth to bedrock in the areas under study, and
- Monitor levels of VOCs in the sub-slab vapor and indoor air in the private residence on the Site.

4.3 Scope and Rationale

In order to achieve the principal objectives outlined above, the scope of work includes the following:

- Installation of deep borings to determine the depth to bedrock within the areas of concern,
- Collection and analysis for VOCs of soil samples in potential remaining on-site source areas, above the water table,
- Collection and analysis for VOCs of groundwater samples from on-site existing shallow and deep groundwater monitoring wells and proposed new shallow and deep groundwater monitoring wells in the unconsolidated overburden aquifer,
- Collection and analysis for VOCs of sub-slab vapor and indoor air samples in the on-site residence, and
- Preparation of a final report summarizing the results and findings, and presenting relevant conclusions and recommendations.

The site-specific sampling techniques and analytical methods to be used in implementing the investigation are presented in the Quality Assurance Project Plan (QAPP) in Appendix B. The investigation activities will be performed in accordance with the site-specific Health and Safety Plan (HASP) that was utilized during TRC's prior investigation work at the Site (see Appendix C). . Community air monitoring will be performed during implementation of the field investigation in accordance with the New York State Department of Health Generic Community Air Monitoring Plan (see Appendix D). A summary of the sampling program is presented in Table 2, and each component of the planned investigation is described in the following subsections.

4.4 Task 1 – Installation of Deep Borings to Bedrock

The overall objective of this task will be to determine the depth to bedrock on the east side of the Site where known AOCs are located. TRC will rely upon 13 borings to determine the depth to bedrock. Figure 3 shows the proposed locations of eight deep borings B-101 through B-108 and five borings, MW-105D, MW-106D, MW-107D, MW-108D and MW-109D, that will be converted into deep monitoring wells.

Each of the 13 borings will be advanced via hollow stem auger drilling methods to the depth of refusal. Split spoon soil samples will be collected at 5-foot intervals in each borehole, and continuously below the water table in the monitoring well boreholes. The geologic characteristics of each sample will be logged along with additional field observations (i.e., odor, staining, etc.) and the results of screening with a photoionization detector (PID). Based on the results of the soil boring program, TRC will prepare geological cross-sections showing approximate thickness of the unconsolidated overburden aquifer and lithology encountered in areas of interest.

4.5 Task 2 – Soil Sampling and Analysis

The overall objective of this task will be to investigate potential on-site sources of VOCs above the water table. Soil samples collected from the deep borings to be advanced to bedrock, and from the boreholes for the proposed shallow and deep groundwater monitoring wells will be selected for analysis based on field observations. A hollow-stem auger drill rig will be utilized to advance soil borings to bedrock (see Task 1).

The sample from each boring that exhibits the highest potential for contamination based on field observations will be selected for analysis. If there are no indications of contamination in a monitoring well borehole, the sample closest to the water table will be selected for analysis. For the deep borings to be installed solely for determining the depth of the top of bedrock, no soil sample will be submitted for analysis if there are no indications of contamination. The soil samples selected for analysis will be analyzed for Target Compound List (TCL) VOCs.

4.6 Task 3 – Groundwater Sampling and Analysis

The overall objective of this task will be to characterize groundwater conditions in the unconsolidated overburden aquifer at the Site. The locations of existing and proposed new monitoring wells to be sampled are shown on Figure 3. The following subsections present the rationale for the groundwater sampling locations, and describe the methods which will be followed for installing and sampling the groundwater monitoring wells.

4.6.1 Groundwater Monitoring Well Locations

The existing and new groundwater monitoring locations were selected to define current levels of VOCs in groundwater at the Site and to complete the delineation of VOCs in the overburden aquifer. If indicated necessary by groundwater sampling results, additional wells will be installed to complete the delineation of VOCs in the overburden aquifer.

The existing and proposed shallow and deep wells listed below will be sampled to evaluate post-remediation levels of VOCs and/or to complete the delineation of VOCs in groundwater.

- Former Landfill (AOC No. 1): existing wells LF-1, LF-2, LF-4, LF-6, LF-9, LF-10, LF-11S, LF-11D (deep well) and LF-12, and proposed cluster wells MW-109S/D (shallow and deep wells);
- Former Waste Pile Area (AOC No. 2): proposed cluster wells MW-108S/D;
- Former Wastewater Treatment Area (AOC No. 3): existing wells WLG-2, WLG-7D and WLG-10, and proposed cluster wells MW-105S/D;
- Former Scrap Metal/Waste Oil Storage Area (ACO No. 4): proposed cluster wells MW-107S/D;
- Former Wastewater Treatment Area-East (AOC No. 5): proposed cluster wells MW-106S/D; and
- Former Solvent Recovery Still/Oil Water Separator Area (AOC No. 6): existing well MW-102S, proposed deep well MW-102D, proposed shallow well MW-104, and proposed cluster wells MW-110S/D.

Lastly, proposed shallow well MW-111 will be sampled to characterize groundwater conditions at the north end of the Site.

4.6.2 Groundwater Monitoring Well Construction and Development

Well construction procedures are described in detail in Section 4.4 of the QAPP. For new wells to be installed inside the warehouse (MW-102D and MW-104), groundwater is expected to be at approximately 6 feet below ground surface (bgs), based on a recent water table elevation measurement in monitoring well MW-102S. For new wells outside of the warehouse (MW-105S/D through MW-110S/D and MW-111), groundwater is expected to be approximately 8 feet bgs, based upon water table elevation measurements in monitoring well MW-3R (destroyed). Therefore, shallow groundwater monitoring wells at these locations are expected to be approximately 16 feet deep.

To collect representative groundwater samples, previously installed soil borings will be converted into permanent two-inch diameter monitoring wells. Groundwater monitoring wells will be constructed of threaded Schedule 40 PVC well casing and 10-slot well screen. The shallow wells will be screened a minimum of 2 feet above the water table and 8 feet below the water table, if the depth to water and surface elevation permits. The deep well screens will extend from approximately bedrock surface to 10 feet above the top of bedrock. Deep wells will be installed at the proposed locations only if there exists at least 15 feet of overburden aquifer. Solid PVC riser with a locking well cap, attached (via threaded flush joints) to the well screen and a protective surface casing will be installed and a measuring point will be marked on the north side of each PVC well riser. Clean silica sand, Morie No. 1, or equivalent, will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. A two-foot bentonite seal will be placed above the sand pack. Well construction diagrams will be prepared for each well.

Following installation, the groundwater monitoring wells will be developed, using a submersible pump (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature and dissolved oxygen) sufficiently stabilize. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal, but not an absolute value. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for 7 days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook.

Existing groundwater monitoring wells will also be redeveloped in the same manner as described above.

4.6.3 Topographic, Soil Boring and Monitoring Well Survey

Under this task a topographic survey will be prepared for the eastern portion of the Site, for use in preparing geologic cross-sections. In addition to ground surface elevation contours at 2-foot intervals, the topographic survey map will show prominent physical features including surface water bodies, on-site structures and above ground utilities within the area under study. Additionally, as part of the survey, the locations of the soil borings and groundwater monitoring wells, both existing and new, will be mapped, as well as the elevation of the ground surface near each monitoring well and soil boring and the elevation of the top of the casing of each existing and new groundwater monitoring well.

4.6.4 Groundwater Sampling

Prior to sampling, when opening each monitoring well, the concentration of ionizable vapors in the headspace will be measured using a PID and water level measurements will be recorded using an electronic oil-water interface probe. The depth to product (if present), depth to water, and the total well depth will be measured from the top of the marked PVC casings. (If measurable product is encountered in any well, a groundwater sample will not be collected for analysis.) The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made.

Before sampling, the wells will be purged utilizing a low-flow peristaltic pump and dedicated polyethylene tubing connected to a flow cell. Very low purging rates are proposed, approximately 100 to 500 milliliters per minute, minimizing suspension of particulate matter in the well. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. Ideally, pumping rates will be at a rate so that no draw-down of the groundwater level occurs (i.e., pumping rate is less than recharge rate).

Groundwater from each well will be purged until groundwater parameters have stabilized. A turbidity level of 50 NTUs or less is the well purging goal. Other field parameters including temperature, conductivity, pH, and dissolved oxygen (DO) will also be monitored. In addition, oxidation/reduction potential (ORP), dissolved iron and manganese concentrations, and nitrate/sulfate concentrations will be measured to evaluate the potential for reductive dechlorinization in the overburden aquifer. Field measurements will be recorded during and after purging, and before sampling. During purging, TRC will actively monitor and track the volume of water purged and the field parameter readings. Prior to sampling, field parameters should generally be within ±10 percent for two consecutive readings, one minute apart. Data will be recorded in the field logbook.

Once groundwater conditions have stabilized and groundwater levels have recovered, representative groundwater samples will be collected using the appropriate, "low-flow" sampling method described in Section 4.4.4 of the QAPP. Groundwater samples will be analyzed for TCL VOCs. In addition, samples collected from the following wells will be analyzed for acetic acid, ethanol and dissolved gases (ethane, ethene and methane) to further evaluate the extent of "natural attenuation" occurring in the aquifer: MW-102S, MW-104, MW-107S and MW-108S.

4.6.5 Groundwater Elevation Gauging

Groundwater flow direction will be determined by water table surface elevation measurements. The water table elevations in all monitoring wells will be measured within the same 24-hour period. As described above, top of casing elevations for monitoring wells will be surveyed to the National Geodetic Vertical Datum.

4.7 Task 4 – Sub-slab Vapor Sampling and Analysis

Prior to the sub-slab vapor and indoor air sampling, an inspection for potential sources (e.g., open paint thinner container) of airborne VOCs will be performed. Efforts will be made to eliminate any such sources an ample amount of time prior to sampling.

A sub-slab vapor sample will be collected at one location in the residential building shown on Figure 3. The sub-slab vapor sampling will be performed in accordance with the NYSDOH Guidance Document. The sub-slab vapor sample will be collected by drilling an approximately 1½-inch diameter hole through the basement floor of the residence. Dedicated polyethylene tubing will be installed no deeper than two inches below the sub-slab, and the annulus between the floor and the tubing will be sealed with modeling clay.

Prior to sample collection the integrity of the seal for the sampling point will be tested using a tracer gas. Helium will be released above the sampling point while the sample tubing is connected to a MARK Model 9822 helium detector.

After the integrity of the sampling point has been verified, one to three volumes of sub-slab vapor will be purged utilizing a 60-milliliter syringe. When purging is complete, the sub-slab vapor sample will be collected utilizing a six-liter Summa® canisters equipped with a regulator to control sample collection flow rate to 0.2 liters per minute or less.

The sub-slab vapor sample as well as a trip blank will be delivered via overnight mail for analysis for VOCs by United States Environmental Protection Agency (USEPA) Method TO-15.

4.8 Task 5 – Indoor Air Sampling and Analysis

The indoor air sample will be collected at the same location and time as the sub-slab vapor sample. The indoor air sampling will be performed in accordance with the NYSDOH Guidance Document. The indoor air sample will be collected utilizing a six-liter Summa® canister and allowing it to fill with indoor air. Sample collection flow rate will be controlled, using a regulator, to 0.2 liters per minute or less. The indoor air sample will be collected from approximately 3 to 5 feet above the floor slab in the "breathing zone". The indoor air sample will be delivered via overnight mail for analysis for VOCs by USEPA Method TO-15.

4.9 Waste Management

Investigation derived wastes (IDW) are waste materials that will be generated during the site investigation. IDW will include decontamination liquid, and personnel protective equipment (PPE).

Excess soil from borings converted to permanent monitoring wells, and groundwater generated during development and sampling will be returned to the ground surface near the sample collection location. Decontamination liquids from cleaning of sampling equipment will be placed into U.S. Department of Transportation (DOT) - approved drums. These materials will be disposed of at an appropriate off-site disposal facility based on sampling results. If free of visible contamination, disposable PPE and sampling equipment (scoops, gloves, rope, tubing, etc.) will be placed in heavy-duty plastic bags and disposed as municipal solid waste.

4.10 Site Investigation Report

An SI Report will be prepared after the completion of the field activities. The SI Report will present the results of the investigation, including documentation of field activities, notation of any deviations from the work plan, a presentation of the data collected, interpretation of the data, and conclusions and recommendations, as appropriate. The SI report will include a topographic survey, geological cross-sections and a bedrock surface elevation contour map based on data compiled during the investigation and in previous reports by TRC and others.

5.0 PROJECT SCHEDULE

Presented below are estimated completion dates for key milestones associated with implementation of the Work Plan.

SCHEDULE MILESTONE	ESTIMATED COMPLETION DATE
Submit Work Plan to NYSDEC	May 31, 2006
NYSDEC Approval of Work Plan	July 1, 2006
Complete Field Investigations	August 1, 2006
Laboratory Analysis Completed	September 1, 2006
Submit SI Report to NYSDEC	October 1, 2006

6.0 REFERENCES

1. *RFA and Sampling Visit Work Plan, Waste Oil and Scrap Metal Area*, Sergio Smiriglio Environmental Consultants, Inc., December 1993.
2. *RCRA Facility Assessment Sampling Visit* Report, Eder Associates, September 1994.
3. Comprehensive *RCRA Facility Investigation Work Plan*, Eder Associates, June 20, 1995.
4. *Site Investigation and Remedial Action Plan*, Innovative Recycling Technologies, Inc., February 12, 1997.
5. *February and March, 1997 Progress Report*, Innovative Recycling Technologies, Inc., April 15, 1997.
6. *April 1997 Progress Report*, Hopkins Environmental Management, Inc., May 5, 1997.
7. *May 1997 Progress Report*, Hopkins Environmental Management, Inc., June 4, 1997.
8. *June 1997 Progress Report*, Hopkins Environmental Management, Inc., July 8, 1997.
9. *July 1997 Progress Report,* Hopkins Environmental Management, Inc., August 4, 1997.
10. *August 1997 Progress Report*, Hopkins Environmental Management, Inc., September 8, 1997.
11. *Site Investigation Report*, TRC Engineers, Inc., January 2006.
12. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Public Comment Draft*, New York State Department of Health, February 2005.

TABLES

TABLE 1
FORMER STAR FACILITY
STATUS OF EXISTING MONITORING WELLS
AS OF APRIL 27, 2006

Well ID Number	Stick Up or Flush Mount	Stick Up Height (ft)	Well Diameter (in)	Casing Type (PVC or Steel)	Depth to Water (ft)	Total Depth (ft)	Latitude	Longitude	Comments
BR-1	Stick Up	1	4	PVC	7.28	>101	41°24' 09.43"	74°04' 50.08"	Good condition
BR-2	Stick Up	1	4	PVC	12.16	17.61	41°24' 06.28"	74°04' 47.55"	Good condition (no cap)
BR-3	Stick Up	3	6	Steel	7.30	37.13	41°24' 07.56"	74°04' 45.92"	Good condition (No PVC)
FB-1	Stick Up	4	2	PVC	7.79	12.50	41°24' 02.66"	74°04' 55.53"	PVC needs to be raised inside steel standpipe
ISO-1	Flush Mount	NA	2	PVC	6.62	20.40	41°24' 11.55"	74°04' 45.68"	Good condition
ISO-1A	Flush Mount	NA	2	PVC	7.40	46.00	41°24' 11.52"	74°04' 45.59"	Good condition
ISO-3D	Flush Mount	NA	2	PVC	5.46	25.62	41°24' 08.72"	74°04' 44.57"	Good condition
ISO-4	Flush Mount	NA	2	PVC	4.12	36.37	41°24' 08.90"	74°04' 45.59"	Good condition
LF-1	Stick Up	3	2	PVC	6.32	16.65	41°24' 08.41"	74°04' 49.30"	Good condition
LF-2	Stick Up	3	2	PVC	3.72	18.22	41°24' 06.88"	74°04' 47.37"	Good condition
LF-3	Stick Up	3	2	PVC	4.74	16.52	41°24' 06.13"	74°04' 48.09"	Good condition
LF-4	Flush Mount	NA	2	PVC	3.98	11.00	41°24' 07.73"	74°04'47.68"	PVC needs to be raised
LF-6	Stick Up	1	2	PVC	15.82	23.61	41°24' 05.93"	74°04' 48.83"	Good condition
LF-8	Stick Up	2	2	PVC	8.52	24.87	41°24' 08.12"	74°04'46.93"	Good condition
LF-9	Stick Up	2	2	PVC	7.32	31.61	41°24' 07.74"	74°04' 46.02"	Good condition
LF-9D	Stick Up	1	4	Steel	12.20	87.25	41°24' 07.70"	74°04' 46.03"	Good condition
LF-9M	Stick Up	2	4	PVC	10.92	83.95	41°24' 07.61"	74°04' 45.96"	Good condition
LF-10	Stick Up	3	2	PVC	9.30	32.20	41°24' 08.69"	74°04' 47.67"	Good condition
LF-11D	Stick Up	1	2	PVC	6.16	38.60	41°24' 05.83"	74°04' 47.76"	In same 6" standpipe as LF-11S
LF-11S	Stick Up	1	2	PVC	6.31	21.14	41°24' 05.83"	74°04' 47.76"	In same 6" standpipe as LF-11D
LF-12	Stick Up	1	2	PVC	5.12	10.00	41°24' 06.79"	74°04' 46.65"	PVC standpipe broken

Depth to water and total depth include stick up height.

TABLE 1
FORMER STAR FACILITY
STATUS OF EXISTING MONITORING WELLS
AS OF APRIL 27, 2006

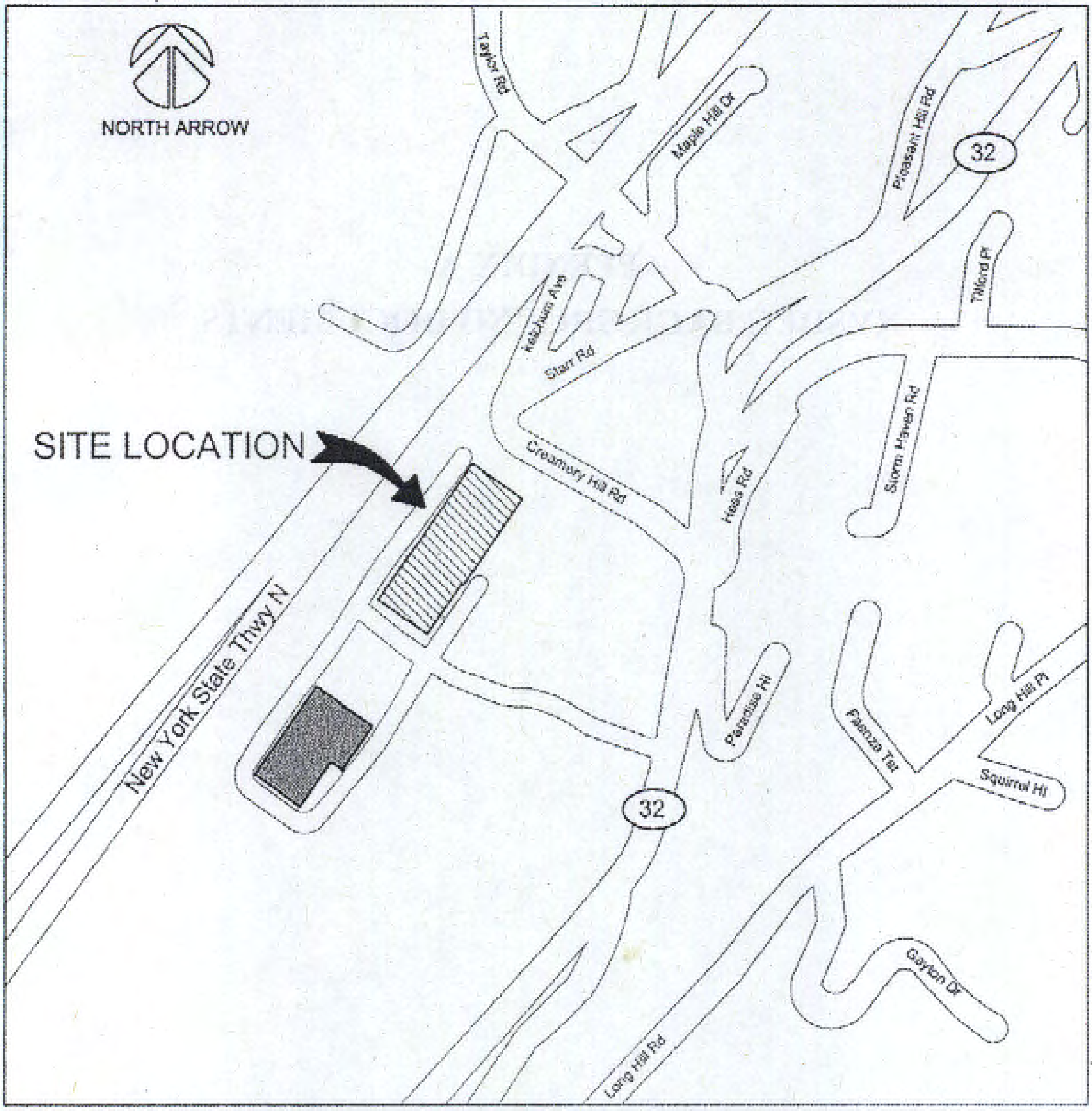
Well ID Number	Stick Up or Flush Mount	Stick Up Height (ft)	Well Diameter (in)	Casing Type (PVC or Steel)	Depth to Water (ft)	Total Depth (ft)	Latitude	Longitude	Comments
SWMO-MW-1	Stick Up	1	6	Steel	13.36	58.60	41°24' 04.25"	74°04' 53.56"	Good condition
SWMO-MW-2	Stick Up	1	6	Steel	17.57	50.56	41°24' 04.01"	74°04' 53.44"	Good condition
SWMO-MW-3	Stick Up	1	6	PVC	22.20	52.40	41°24' 03.66"	74°04' 54.05"	Good condition
SWMO-MW-4	Flush Mount	NA	2	PVC	DRY	8.60	41°24' 04.22"	74°04' 53.62"	Dry
WLG-2	Stick Up	1	2	PVC	8.25	16.38	41°24' 03.65"	74°04' 56.48"	PVC is 3' bgs, needs to be raised
WLG-4	Stick Up	2	2	PVC	8.31	12.54	41°24' 02.29"	74°04' 55.08"	Good condition
WLG-7D	Flush Mount	NA	2	PVC	7.94	12.35	41°24' 01.50"	74°04' 55.20"	Flush mount needs manhole or standpipe
WLG-9	Stick Up	1	2	PVC	12.32	18.85	41°24' 02.73"	74°04' 58.74"	Good condition
WLG-10	Stick Up	2	2	PVC	8.90	17.90	41°24' 01.42"	74°04' 56.91"	Good condition
WP-2	Stick Up	1	4	PVC	DRY	21.50	41°24' 05.00"	74°04' 49.90"	Dry

Depth to water and total depth include stick up height.

TABLE 2
FORMER STAR FACILITY
WORK PLAN FOR THE EVALUATION OF THE UNCONSOLIDATED OVERBURDEN AQUIFER
SAMPLING SUMMARY

Program Element	Environmental Media	Sample Type	Equipment	Number of Samples for Analysis	Parameters
Soil Sampling	Soil	Discrete sample, from depth exhibiting highest field contamination or, if no evidence of contamination, sample above groundwater table	Split spoon	To Be Determined	TCL VOCs
Groundwater Sampling	Groundwater	Water in well after purging well	Low-flow sampling pump and disposable polyethylene tubing	28 4	TCL VOCs Acetic acid, ethanol, and dissolved gases ethane, ethene and methane
Sub-slab Vapor Sampling	Sub-slab Vapor	Discrete sample from sub-slab vapor probe	SUMMA canister and disposable polyethylene tubing	1	TO-15 VOCs
Indoor Air Sampling	Indoor Air	Discrete sample at sub-slab vapor sampling location	SUMMA canister and disposable polyethylene tubing	1	TO-15 VOCs
Trip Blanks	Distilled Water	Laboratory-prepared VOA vile	Sample supplied by laboratory	1	TCL VOCs
	Air	Laboratory-prepared Summa canister	Summa canister supplied by laboratory	1	TO-15 VOCs
Equipment Blanks	Distilled Water	Distilled waster poured over soil sampling equipment prior to sample collection	Decontaminated split spoon	1	TCL VOCs
	Distilled Water	Distilled water pumped through groundwater sampling equipment prior to sample collection.	Decontaminated pump	1	TCL VOCs
Matrix Spike/Matrix Spike Duplicates	Groundwater	Groundwater split sample	Low-flow sampling pump and disposable polyethylene tubing	1MS & 1 MSD	TCL VOCs
	Soil	Soil split sample	Split spoon	1MS & 1 MSD	TCL VOCs

FIGURES



NOT TO SCALE

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FORMER STAR FACILITY
SITE LOCATION MAP

FIGURE 1

MAY 2006

APPENDIX A
NYSDEC BACKGROUND DOCUMENTS

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN
(QAPP)

APPENDIX C

SITE SPECIFIC HEALTH AND SAFETY PLAN

APPENDIX D

NEW YORK STATE DEPARTMENT OF HEALTH GENERIC COMMUNITY AIR MONITORING PLAN