FORMER DARBY DRUGS DISTRIBUTION CENTER
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NEW YORK
BROWNFIELD CLEANUP PROGRAM ID: C130140

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

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Hazardous Waste Remediation
NYSDEC Region 1

New York State
Department of Environmental Conservation

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1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared the following Supplemental Remedial Investigation Work Plan (SRIWP) to outline procedures and a scope of work intended to address on-site areas of concern at the property located at 80 - 100 Banks Avenue, Rockville Centre, New York (the site). Areas of concern to be addressed by the supplemental investigation are in response to comments received from the New York State Department of Environmental Conservation (NYSDEC) in letters dated August 15, 2005 and September 20, 2007. The August 2005 letter details NYSDEC's comments to PWGC's September 2004 Draft Remedial Investigation (RI) report; the September 2007 letter documents NYSDEC comments to the July 2007 Operable Unit II (OUII) Work Plan (off-site investigation) prepared by Environmental Business Consultants (EBC). Copies of the NYSDEC's August 2005 and September 2007 correspondence are included in **Appendix A.**

The on-site and off-site components of this project have been separated into two Operable Units which will be managed by separate and distinct parties. The on-site component will be addressed under a Brownfield Cleanup Agreement between ARC Chase Partners, LLC, Avalon Bay Communities, Inc. and the NYSDEC. The off-site component has been designated as Operable Unit II (OUII) and will be addressed under an Order on Consent between the NYSDEC and Darby Drug Group Companies, Inc. (Darby).

This SRIWP is intended to address potential areas of concern within the property boundary of the site only, and does not address areas of concern outside of the property boundary. A Remedial Investigation Work Plan (RIWP) for OUII prepared by EBC on behalf of Darby was previously submitted to the NYSDEC and subsequently approved.

1.1 Project Background

The subject site is located at 80-100 Banks Avenue in Rockville Centre, New York and is currently improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building. The subject site was recently purchased by Avalon Bay Communities, Inc., and was formerly owned by Darby Group Companies, Inc. (Darby), which ceased operation at the site in November 2000. Darby had occupied the building since 1978 until the recent acquisition by Avalon Bay Communities, Inc. and operated it as a pharmaceutical product warehouse and distribution center. Demolition of the existing structures and the phased development of two residential buildings consisting of a 100,492 square foot (footprint) north complex and a 60,128 square foot (footprint) south complex are planned.

The chlorinated solvent, tetrachloroethene (PCE), was first identified in shallow soil beneath the southwestern portion of the building, during a Phase II investigation performed at the site in November 2003. PCE is believed to have been released between 1972 and 1978 when a textile company leased the southern portion of the site (80 Banks Avenue). A Remedial Investigation (RI), performed in accordance with NYSDEC Draft DER-10, Technical Guidance for Site Investigation and Remediation (DER10), was initiated in March 2004, to characterize the nature and extent of PCE in soil and groundwater at the site. The results of the investigation, as documented in the Draft

RI Report (PWGC, 8/04), recommended an Interim Remedial Measure (IRM) to remove mobile and residual dense non-aqueous phase liquid (DNAPL). The site was accepted into New York State's Brownfield Clean-up Program (BCP), and a Brownfield Clean-up Agreement (BCA) was executed on June 29, 2005. Upon review of the RI Report, NYSDEC provided multiple comments in an August 15, 2005 letter, including providing further detail about initial investigation sample collection techniques and the need to further evaluate and investigate additional on-site areas of concern.

An IRM Work Plan was approved by the NYSDEC May 12, 2006. The IRM Work Plan addresses source areas of PCE contamination, by removing DNAPL that has accumulated at a clay boundary (11-17 ft below surface), and by excavating residually impacted soils down to the clay surface.

A September 20, 2007 NYSDEC letter to EBC, the consultant representing Darby for the off-site investigation portion of the BCP, requested additional areas of concern to be investigated as part of the Work Plan for OU-2 (off-site). Although this letter focuses on the previously submitted OU-2 Work Plan, several of the comments requested further investigation within the property boundary, including investigation of 14 leaching pools on the western side of the building and groundwater sampling outside the source area beneath the clay layer. The letter included a copy of a 1971 State Pollution Discharge Elimination System Permit (SPDES) application for the site which detailed the location of three supply wells, four diffusion wells, and 14 leaching pools located on the western portion of the property. Although suspected during previous investigation, this application shows locations of the leaching pool system.

1.2 Previous Investigations

A summary of previously conducted Phase I Environmental Site Assessment (ESA), a Preliminary Soil and Foundation Investigation, a Phase II Investigation, and the results and recommendations of the 2004 Remedial Investigation are detailed in PWGC's September 2004 Draft RI Report October 2005.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description

The subject site is located at 80-100 Banks Avenue in the Village of Rockville Centre, New York. The site is located within the Town of Hempstead and Nassau County. The site is situated at the northwest corner of the intersection of Nassau Street and Banks Avenue. The property is identified as Section 38, Block 539, Lots 27 and 30 by the Nassau County Department of Assessment. The site is approximately 7.1 acres and is currently improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building, both of masonry construction. A Vicinity Map is included as **Figure 1**; a Site Plan is included as **Figure 2**.

The subject site was recently purchased by Avalon Bay Communities, Inc., and was formerly owned by Darby Group Companies, Inc. (Darby), which ceased operation at the site in November 2000. Darby has occupied the building since 1978 and operated it as a pharmaceutical product warehouse and distribution center. Demolition

of the existing structures and the phased development of two residential buildings consisting of a 100,492 square foot (footprint) north complex and a 60,128 square foot (footprint) south complex are planned.

2.2 Site History

According to title information provided by Darby Group Companies, Inc, the 80 Banks Avenue parcel was owned by the RVC Urban Renewal Agency until 1971, when it was sold to the partnership of Walter G. Stackler, Leonard L. Frank and Herbert Z. Gold. The parcel remained under the ownership of various forms of the original partnership until it was purchased by Darby Drug Co., Inc. in 1978. The 100 Banks Avenue parcel has a similar history and was owned by the RVC Urban Renewal Agency prior to 1972. From 1972 to 1973 the title lists Stafgo Corporation as the owner. In 1973, ownership of the parcel was transferred by Stafgo Corporation to 420 Doughty Blvd Corporation, which merged with Darby Drug Co. Inc. in 1975. In 1993 the 80 Banks Avenue and 100 Banks Avenue property was transferred to Darby Group Companies, Inc by the successor-in-interest to Darby Drug Co., Inc.

Although Darby occupied the 80 Banks Avenue premises since 1978 and the 100 Banks Avenue property from 1973, no information regarding previous operators except as set forth above or tenants of either parcel has been identified other than Downen Zier Knits, Inc. which leased the 80 Banks Avenue property from 1972 to 1978. Downen Zier went bankrupt in 1978. Unverified information indicates that a rug cleaning or carpet manufacturing business may have occupied the property prior to Darby's acquisition of the 80 Banks Ave property; however, this could not be confirmed.

2.3 Regional Geology/Hydrogeology

The hydrogeologic setting of Long Island is well documented and consists of impermeable bedrock composed of schist and gneiss, which is overlain by a series of unconsolidated glacial deposits. The thickness of these deposits range from zero in northern Queens, where the bedrock is exposed, to more than 2,000 feet in the southern part of Nassau and Suffolk Counties. The glacial advance is marked by two terminal moraines, which form an east-west trending line of deposits with a maximum altitude of 400 feet. A gently sloping outwash plain composed of well-sorted and permeable sand and gravel extends south of the moraine to the shore, with a slope of approximately 20ft/mi (Cohen).

The lowest unit in the sequence is the Raritan formation, which overlies an erosional bedrock surface composed of granite, diorite, gneiss and schist (Lubke, 1964). The Raritan formation includes the Lloyd Sand Member, which consists of sands and gravels of moderate permeability forming the Lloyd Aquifer and the Raritan Clay Member, which consists of very low permeable clay known as the Raritan Confining unit.

The Raritan is overlain by the Magothy formation, which consists of up to 1,000 feet of highly stratified layers of sand, gravel, silt and clay, which dip gently to the southeast. The Magothy formation is the principal aquifer for Long Island, and is the main source of water for public supply (Kilburn and Krulikas, 1987). The saturated thickness of the Magothy Aquifer in the vicinity of the site is 600 feet with an estimated hydraulic conductivity of 56 ft/day (McClymonds and Franke, 1972).

Along the south shore of Long Island, the Magothy is confined by a 150 foot thick low permeability sequence of clay, silty clay and fine sand known as the Gardiner's Clay. Although the Gardiner's Clay has been mapped north of Sunrise Highway in the Rockville Center area (Doriski, 1981), the clay is shown to be absent along the Hempstead Lake - Mill River corridor. As such, it is not known if the Magothy Aquifer is confined by the Gardiner's Clay in the immediate vicinity of the site.

In this area of Nassau County, the Upper Glacial Aquifer overlies either the Magothy Aquifer, or the Gardiner's Clay, if present. The upper glacial deposits consist mainly of stratified beds of fine to coarse sand and gravel but also contain beds of silt and clay (Kilburn and Krulikas, 1987). The Upper Glacial Aquifer contains the water table in most of the area. The estimated hydraulic conductivity of the Upper Glacial Aquifer is 270 ft/day (McClymonds and Franke, 1972).

The site is situated some distance south of a regional groundwater divide located along the terminal moraine, where groundwater flows to the north, west and south. Located south of the divide, groundwater in the vicinity of the site generally flows in a southwesterly direction toward the Mill River and Hempstead Bay.

2.4 Site Geology/Hydrogeology

The site overlies an interconnected aquifer system consisting of the upper glacial deposits and the underlying Magothy Formation. Depth to groundwater in the underlying glacial aquifer is approximately 5 to 9 feet below land surface (bls). The lithologic description of the sediments from soil borings advanced during this and previous investigations at the site, identifies the materials as fine to coarse sand with small amounts of gravel to a depth of 12 to 18 feet below surface. Below the sand is a silty clay layer, which was documented by MTA to be approximately 9 feet thick. The clay layer was encountered at all boring locations completed during the RI.

Groundwater elevation data, obtained on March 24, 2004, was used to prepare a contour map of the water table surface, included as **Figures 3**. As shown, groundwater flow is generally to the south at an average gradient of 0.01 ft/ft. **Table 1** provides a summary of the monitoring well elevation data including total well depth, screened interval, casing elevation and the measured depth to water.

The horizontal hydraulic conductivity across the site, as determined from rising head tests performed in the site monitoring wells, ranged from 0.077 to 0.51 feet per day with a mean value of 0.242. The hydraulic conductivity values are inconsistent with sediments described as fine to coarse sands. A review of the data sheets from the rising head tests indicate that the wells were very slow to recharge, providing a coarse verification of the calculated hydraulic conductivity values. In this case it may be that the wells installed by MTA, or the formation immediately around the wells, are clogged or fouled. The hydraulic conductivity values are considered unreliable and, as such may not be appropriate for calculating an average seepage velocity at the site.

2.5 Site Features

The project site slopes gently from an elevation of approximately 17 feet above sea level at the north end of the site to an elevation of approximately 10 feet at the southern end of the site. The paved areas of the site slope locally to drainage structures positioned through out the parking areas. The nearest surface water body is Smith Pond, located approximately 100 feet west of the site.

2.6 Current and Future Site Use

The site is currently improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building, both of masonry construction. Both structures are currently vacant. Proposed future plans for the site include demolition of the existing structures and the phased development of two residential buildings consisting of a 100,492 square foot (footprint) north complex and a 60,128 square foot (footprint) south complex are planned.

2.6.1 Surrounding Land Use

The site is situated in a mixed industrial, residential and commercial area of the Village of Rockville Centre. The adjacent land uses, as shown in **Figure 4**, include a vacant one-story building, the Long Island Bus Depot and the Rockville Racquet Club to the south, a Church, a four-story office building and a one-story office/industrial building to the east, multiple family housing to the north, and Morgan Day's Park and Smith Pond to the west.

3.0 STANDARDS, CRITERIA, AND GUIDANCE (SCGS)

Based on the 2004 Remedial Investigation findings, the primary chemical of potential concern (COPC) to be encountered at the site is tetrachloroethene (PCE) and its breakdown products.

The NYSDEC Technical Administrative and Guidance Memorandum (TAGM) 4046 established recommended soil cleanup objectives (RSCOs) for use in restoring inactive hazardous waste sites to predisposal conditions.

NYSDEC 6 NYCRR Part 375 provides soil cleanup objectives based upon future site use. In addition, Track 3 (restricted use with modified soil cleanup objectives) and Track 4 (restricted use with site-specific cleanup objectives) cleanup options can include complete removal of contaminated soils using site specific soil objectives, partial removal with surface capping, in situ treatment, and Institutional Controls and/or Engineering Controls to prevent exposure.

Groundwater sample results will be compared to the NYSDEC Class GA Ambient Water Quality Standards (AWQS) as specified in the Technical Operation and Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Tables 2, 3 and 4 summarize identified soil cleanup objectives for VOCs, SVOCs and metals; **Tables 5, 6 and 7** summarize NYSDEC groundwater standards for VOCs, SVOCs and metals.

4.0 OBJECTIVES, SCOPE AND RATIONALE

The primary objectives of the additional work detailed in this plan will be to collect the information and field data necessary to address NYSDEC comments pertaining to on-site issues, as detailed in correspondence dated August 15, 2005 and September 20, 2007.

The Scope of Work includes the following tasks:

1. Ground Penetrating Radar (GPR) Survey
2. Characterization of leaching structures located beneath the property
3. Evaluation of sub-slab and exterior soil vapor quality
4. Evaluation of groundwater quality below the clay layer present beneath the site
5. Further delineation of subsurface soil impacts in the vicinity of the suspected source area.
6. Evaluation of soil and groundwater quality beneath the northern portion of the site.
7. Site Survey

4.1 Ground Penetrating Radar Survey

Four drainage structures (i.e. floor drains and unidentified piping) have been identified within the existing building; however, dye testing during implementation of the original RI did not identify discharge points for these structures. During previous investigations, the locations of 24 on-site leaching structures, believed to be storm drain catch basins, were documented. Samples were collected from seven of these structures during implementation of the original RI. During a recent site walk through, an additional two solid covers at grade, which may be attached to leaching structures, were observed on the east side of the property. Based upon review of a State Pollution Discharge Elimination System (SPDES) permit issued to the site in 1971, it appears that there may be as many as 22 leaching structures present beneath the property on the west and south sides of the building, several of which were located during the previous investigations. The leaching structures on the west and south side of the property may be storm drain catch basins and/or overflows or may potentially be determined to be industrial waste water pools. In total, there may be as many 41 leaching structures, both storm drain catch basins, overflow basins, and potential industrial waste water pools, located on the site. The previous investigation also identified the locations of three supply wells and four diffusion wells, also located in the southwestern portion of the property. Interior drainage structures and known and suspected leaching structure locations are illustrated in a Drainage System Map, included as **Figure 5.**

In an effort to better determine outflow of the interior drains and potential overflow structures related to the known structures, a ground-penetrating radar (GPR) survey will be performed to identify the following:

- Subsurface piping associated with drainage structures within the existing building, leading to discharge points.
- Locations of potential leaching structures beneath the property.
- Usage of each structure (i.e., storm water drainage, industrial discharge).

GPR is based upon the transmission of repetitive, radio-frequency electromagnetic (EM) pulses into the subsurface. When the transmitted energy of down-going wave contacts an interface of dissimilar electrical character, part of the energy is returned to the surface in the form of a reflected signal. This reflected signal is detected by a receiving transducer and is displayed on the screen of the GPR unit as well as being recorded on the internal hard-drive.

If necessary (i.e., GPR survey results are inconclusive), a sewer camera will be utilized to attempt to locate leaching structures. The sewer camera is inserted into drainage structures and/or subsurface piping and advanced along the pipe until a subsurface leaching structure is identified. The camera's location is traced via a handheld sensor at the surface.

Discharge points for interior drainage structures identified by GPR survey and/or tracing subsurface piping will be confirmed via dye testing. Exploratory test pits will be installed in the vicinity of anomalies identified as potential leaching structures. If leaching structures are identified, samples will be collected as detailed in Section 4.2.

4.2 Leaching Structure Characterization

Sediment samples were collected from seven storm water drywells (identified as SD-1 through SD-7) during implementation of the original RI. To determine if remaining on-site leaching structures have been impacted by historic site operations, soil/sediment samples will be collected from each leaching structure located on site, from which a sample was not previously collected. Leaching structure sampling will include known structures as well as structures identified during the GPR survey. Samples will be collected in accordance with United States Environmental Protection Agency (USEPA) Underground Injection Control (UIC) program and Nassau County Department of Health (NCDH) procedures.

4.2.1 Storm Water Drainage Structures

One shallow soil/sediment sample will be collected from each structure determined to be used primarily for storm water drainage. Samples will be collected manually using a stainless steel hand auger. Soil/sediment will be collected from zero to six inches below the base of each structure at a minimum of three locations. Soils from each of the three grab samples within each structure will be screened with a PID; the grab sample exhibiting the highest PID response will be collected for VOC analysis. Remaining soils collected from each of the three points will be deposited in a stainless steel mixing bowl and homogenized prior to sample collection.

4.2.2 Industrial Discharge Structures

One shallow and one deep soil/sediment sample will be collected from each structure suspected of having been used for discharge of industrial waste water.

Shallow samples will be collected manually using a stainless steel hand auger. Soil/sediment will be collected from zero to six inches below the base of each structure at a minimum of three locations. Soils from each of the three grab samples within each structure will be screened with a PID; the grab sample exhibiting the highest PID

response will be collected for VOC analysis. Remaining soils collected from each of the three points will be deposited in a stainless steel mixing bowl and homogenized prior to sample collection.

Deep samples will be collected using a Geoprobe® direct-push drill rig (or equivalent) outfitted with a macro-core sample and dedicated acetate liners. Collected soils will be field screened for the presence of VOCs using a photo-ionization detector (PID). For each industrial discharge pool, borings will be installed to a depth corresponding to the top of the clay layer present beneath the site, as determined by location specific field observations. A sample will be collected from each structure from the two foot interval exhibiting the most evidence of impact (e.g., PID response, staining, etc...). In the event that no evidence of impact is identified, a sample will be collected from the two foot interval immediately above the clay layer.

4.3 Soil Vapor Evaluation

To determine whether soil vapor intrusion may be a potential concern for the proposed redevelopment of the property, and address NYSDEC concerns regarding the soil vapor sampling protocol utilized during the original RI, a total of eleven soil vapor sampling points will be installed throughout the interior (SG-2008-01 through SG-2008-03 and SG-2008- 11) and exterior (SG-2008-04 through SG-2008-010) of the property. Proposed soil vapor sampling points are illustrated in **Figure 6**.

Soil vapor sampling point installation and sample collection will be performed in accordance with New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006), and United States Environmental Protection Agency (USEPA) Standard Operating Procedure (SOP) 2042, *Soil Gas Sampling*.

Within the existing structure, sub-slab vapor samples will be collected away from foundation footings from the soil or aggregate immediately below the basement slab or slab-on-grade. Sampling points will be installed to a depth of approximately two inches beneath the slab and constructed of inert tubing (e.g. polyethylene or Teflon®) to grade. Porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc...) will be added to cover approximately one inch of the tip of the sampling point. The sampling point will be sealed to the surface with a non-VOC-containing, non-shrinking compound (e.g., permagum grout, melted beeswax, putty, etc...).

Exterior soil vapor samples will be collected from the north, west and southern boundary of the property. Sampling points will be installed using a Geoprobe® direct-push drill rig (or equivalent) to a depth of approximately four feet below existing grade (groundwater has been observed from five to nine feet below grade throughout the site). Sampling points will be constructed of a dedicated stainless steel screen fitted with inert tubing (e.g. polyethylene or Teflon®) to grade. Porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc...) will be added to create a sampling zone 1 to 2 feet in length. The sampling point will be sealed above the sampling zone with bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole will be backfilled with clean material.

Soil vapor samples will be collected using SUMMA® canisters fitted with a pre-set flow regulator. The laboratory will provide certified-clean canisters with an initial vacuum of approximately 26 inches of mercury (in. of Hg) for sample collection and flow regulators pre-set to provide uniform sample collection over an approximate 2-hour sampling period. Sample collection will be ceased (i.e., the valve on the canister closed) when approximately 2 in. of Hg vacuum remains in the canister, leaving a vacuum in the canister as a means for the laboratory to verify the canister did not leak while in transit.

4.4 Source Area Delineation

To further delineate the extent of the suspected source area, soil borings will be around the estimated source area location to quantify the horizontal extent of subsurface impact. A minimum of six soil borings (SB-2008-09 through SB-2008-14) will be installed around the perimeter of the suspected source area, both inside and outside of the building. Delineation borings will be concentrated in areas from which samples were not previously collected during the ESI Phase II ESA and/or original RI. Proposed soil boring locations are illustrated in **Figure 7**.

Soil borings will be installed utilizing a Geoprobe® direct-push drill rig outfitted with a macro-core sampler and dedicated acetate liners. Soils will be collected continuously from ground surface to a depth corresponding to the top of the clay layer present beneath the site, as determined by location specific field observations. Soils will be field screened for the presence of VOCs using a PID.

At minimum, two soil samples will be collected at each boring location. Samples will be collected from the two-foot interval within the vadose zone (approximately zero to nine feet below grade) exhibiting the highest PID response, and the two foot interval immediately above the clay layer (estimated at 11 to 18 feet below grade). If no PID response above background concentrations is observed in soils collected from within the vadose zone, a sample will be collected from the two-foot interval immediately above the water table interface.

In the event that field observations and PID responses identify the presence of impacted soil in perimeter borings, step-out borings shall be installed approximately 10 to 20 feet outward (with respect to the approximate source area location) from the boring in which impacted soil was identified. Additional step-out borings shall be installed, as necessary, until field observations indicate that the horizontal extent of subsurface impact has been adequately delineated, or to the property boundary.

4.5 Soil and Groundwater Evaluation

To evaluate general soil and groundwater quality beneath the northern portion of the site, a minimum of eight soil borings (SB-2008-01 through SB-2008-08) and temporary groundwater sampling points (GW-2008-01 through GW-2008-08) will be installed throughout the area. These locations have been chosen to provide a representative selection of general soil and groundwater conditions on the northern portion of the site, and are not biased towards any potential areas of concern. To evaluate groundwater quality throughout the entire site and in the vicinity of the supply, diffusion and monitoring wells the existing onsite well network will be sampled. Proposed soil

borings, temporary groundwater sampling points, and supply, diffusion and monitoring well locations are illustrated in **Figure 7**.

4.5.1 Soil Borings

Soil borings will be installed utilizing a Geoprobe® direct-push drill rig outfitted with a macro-core sampler and dedicated acetate liners. Soils will be collected continuously from ground surface to a depth corresponding to the top of the clay layer (estimated at 11 to 18 feet below grade) present beneath the site, as determined by location specific field observations. Soils will be field screened for the presence of VOCs using a PID.

At minimum, a soil sample will be collected at each boring location from the two-foot interval exhibiting the highest PID response. If no PID response above background concentrations is observed, a sample will be collected from the two-foot interval immediately above the water table (estimated at five to nine feet below grade).

In the event that impacted soil is identified, step-out borings may be installed approximately 10 to 20 feet outward from the boring in which impacted soil was identified. Additional step-out borings may be installed, as necessary, until field observations indicate that the horizontal extent of subsurface impact has been adequately delineated, or to the property boundary. The decision to install step-out borings will be based on field observations and the judgment of the Field Team Leader and/or Project Manager.

4.5.2 Groundwater Sampling Points

Temporary groundwater sampling points will be installed at each soil boring location detailed in Section 4.5.1. Groundwater samples will be collected from a depth of approximately three feet below the water table (estimated at five to nine feet below grade). At each sampling location, a four-foot long screen point sampler will be driven to the desired depth using a Geoprobe® direct-push drill rig. At the desired depth dedicated polyethylene tubing fitted with a stainless steel check valve will be inserted through the probe rods into the water bearing zone. Tubing will then be oscillated by hand to draw water to the surface. Prior to sampling, approximately three to five times the volume of standing water within the well casing will be purged to reduce sample turbidity.

4.5.3 Supply, Diffusion and Monitoring Well Sampling

Following the location and identification of the suspected supply, diffusion and monitoring wells each well will be sampled. Depth to bottom and depth to water measurements will be collected from each well. Water level measurements will be obtained with an electronic water level probe relative to the marked measuring point. Water level and depth to bottom measurements will be used to calculate the purge volume for each well. Three to five casing well volumes will be removed from each well prior to the collection of samples. The wells will be purged by using a submersible pump or dedicated disposable high-density polyethylene bailer.

Field readings will be collected for pH, temperature and conductivity, initially and for each well volume. The groundwater sample will be collected with a dedicated, disposable high-density polyethylene bailer suspended by a polypropylene cord. The samples will be poured directly from the bailer into laboratory-supplied containers.

4.6 Evaluation of Groundwater Quality Beneath Clay Layer

Based on previous investigations at the site, it appears that a clay layer of varying thickness exists beneath the site. The top of the clay layer has been observed at depths ranging from 11 to 18 feet below existing grade at various locations throughout the site. It appears that the clay unit has prevented DNAPL and dissolved groundwater contamination from migrating vertically downward; however, based on the 1971 SPDES permit issued to the site, supply and diffusion wells were installed through the clay layer and such installations may have allowed contamination to reach the lower aquifer. To evaluate groundwater quality in the aquifer segment beneath the clay layer, a minimum of four temporary vertical profile wells will be installed throughout the southern portion of the property (downgradient of the suspected source areas). Proposed temporary vertical profile well locations are illustrated in **Figure 8**; proposed well locations may be adjusted based on field conditions and/or analytical data to minimize potential migration of impacted soil and groundwater downward through the clay layer present beneath the site.

Vertical profile wells will be installed using either a rotary drill rig or an earth probe capable of installing hollow-stem augers down to the clay layer (12-18 feet below grade). Drill augers with an inside diameter of greater or equal to 3 inches, will be advanced to approximately two feet into the clay layer, following which a smaller diameter direct push rod, fitted with a drop-down sampling screen, will be inserted inside the hollow stem augers and advanced down, using direct push technology, to the terminal depth of the boring. Installation of outer hollow augers into the top of the clay is intended to isolate impacted soil and/or groundwater above the clay layer from the smaller sampling equipment and therefore minimize impacted soil and groundwater from migrating downward through the penetration in the clay layer.

The drive rods and sample screen will be advance down to approximately 100 feet below existing grade. To determine the depth and thickness of the clay layer at each location, a gamma geophysical log will be performed through the open augers at each location.

Upon completion of the gamma geophysical log, a two foot long stainless steel drop-out well screen will be allowed to drop out from the push rods. Initial sample collection will be performed at the terminal depth of the boring; additional samples will be collected at 20 foot intervals above the terminal depth by pulling up and removing sections of the temporary well.

Prior to sample collection, wells will be purged of three to five casing volumes of water using a stainless steel submersible pump. Prior to the collection of the initial (deepest) groundwater sample at each location, a volume of water equal to the amount added to maintain hydrostatic head will be purged from the well in addition to the

standard three to five casing volumes. Purge water will be containerized on site and handled in accordance with the procedures outlined in Section 5.9.

Following collection of groundwater samples from each sample location, the 2 inch diameter steel well pipe and screen will be removed from the borehole. The penetration through the clay layer will then be sealed by with bentonite pellets, via a tremie tube, to a depth above the top of the clay. The bentonite pellets will be emplaced inside the larger auger flights until they can be measured to a minimum of one foot above the top layer of the clay. The bentonite pellets will then be hydrated per the manufacturer's recommendations and the remaining augers will be removed from the borehole.

4.7 Site Survey

In order to accurately map sampling locations, leaching structure, soil boring and temporary groundwater sampling point locations will be surveyed by a New York State licensed surveyor relative to a fixed location at the site.

5.0 QUALITY ASSURANCE PROJECT PLAN

This quality assurance project plan (QAPP) presents the objectives, functional activities, methods, and quality assurance / quality control (QA/QC) requirements associated with sample collection and laboratory analysis for characterization activities. The QAPP follows requirements detailed in DER-10, Section 2.

5.1 Project Organization

The investigative efforts defined in this RI work plan will be coordinated by PWGC on behalf of AvalonBay Communities, Inc. The following text identifies the responsibilities of various organizations supporting the RI:

- The NYSDEC Project Manager (Mark Bufalini) will be responsible for reviewing and approving this work plan, coordinating approval of requested modifications, and providing guidance on regulatory requirements.
- The PWGC Program Manager (James Rhodes) will provide technical expertise for review of the project plans, reports and ongoing field activities. The program manager will be responsible for the coordination of the overall Voluntary Cleanup Program with the NYSDEC. The Program Manager will act as the project's Quality Assurance Manager.
- PWGC Project Manager (Kris Almskog) will be responsible for the day to day project management, task leadership, and project engineering support and for the planning and implementation of RI activities. The Project Manager is responsible for ensuring that the requirements of this RI work plan are implemented. The project manager will also act as the site Health and Safety Manager (HSM).
- PWGC Field Team Leader (Thomas Melia) will be responsible for sample collection, oversight of subcontractor personnel, and coordination of daily field activities. Mr. Melia will act as the Site Health and Safety Officer ensuring implementation of the Site Health and Safety Plan.

- A NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory (to be determined) will be contracted to perform required analyses and reporting, including Analytical Services Protocol (ASP) Category B Deliverables, which will allow for data validation.
- Subcontractors will perform surveying, drilling, and/or sampling at the direction of the Field Team Leader in accordance with this work plan.

An organizational flow chart showing the lines of responsibility for the project activities is included as **Figure 9**.

5.2 Laboratory Analysis

Requirements for sample analysis are described below. Analytical methods, preservation, container requirements, and holding times are summarized in **Table 8**.

5.2.1 Storm Water Drainage Structure Soil Samples

Soil/sediment samples will be collected as described in Sections 4.2.1. Soil samples will be submitted to a NYSDOH ELAP certified laboratory (to be determined). Soil samples will be analyzed for VOCs by USEPA Method 8260, Base-Neutral SVOCs by USEPA Method 8270BN, Total Petroleum Hydrocarbons (TPH) by USEPA Method 8015 and Resource Conservation and Recovery Act (RCRA) Metals by USEPA Methods 6010/7000. Analysis will conform to NYSDEC Analytical Services Protocol (ASP); Category B data deliverables will be submitted.

5.2.2 Industrial Discharge Structure Soil Samples

Soil samples will be collected as described in Sections 4.2.2. Soil samples will be submitted to a NYSDOH ELAP certified laboratory (to be determined). Soil samples will be analyzed for Target Compound List (TCL) VOCs by USEPA Method 8260, TCL SVOCs by USEPA Method 8270 and Target Analyte List (TAL) Metals by USEPA Methods 6010/7000. Analysis will conform to NYSDEC Analytical Services Protocol (ASP); Category B data deliverables will be submitted.

5.2.3 Soil Vapor Samples

Soil vapor samples will be collected as described in Section 4.3. Soil Vapor samples will be analyzed for VOCs by USEPA Method TO-15. Analysis will conform to NYSDEC Analytical Services Protocol (ASP); Category B data deliverables will be submitted.

5.2.4 Soil Samples

Soil samples will be collected as described in Sections 4.4 and 4.5.1. Soil samples will be submitted to a NYSDOH ELAP certified laboratory (to be determined). All soil samples will analyzed for TCL VOCs by USEPA Method 8260. In addition, a minimum of four soil samples (SB-2008-01, SB-2008-08, SB-2008-10, and SB-2008-14) from throughout the site will be analyzed for, TCL SVOCs by USEPA Method 8270, TAL Metals by USEPA Methods 6010/7000, pesticides by USEPA Method 8081, and PCBs by USEPA Method 8082, in order to document background soil quality throughout the site. Analysis will conform to NYSDEC Analytical Services Protocol (ASP); Category B data deliverables will be submitted.

5.2.5 Groundwater Samples

Groundwater samples will be collected as described in Sections 4.5.2, 4.5.3 and 4.6. All groundwater samples will analyzed for TCL VOCs by USEPA Method 8260. Groundwater samples collected in the vicinity of potential industrial wastewater discharge structures (locations to be determined) will be analyzed for TCL VOCs by USEPA Method 8260, TCL SVOCs by USEPA Method 8270 and TAL Metals by USEPA Methods 6010/7000. In addition, groundwater samples from one supply, one diffusion and each of monitoring wells will be analyzed for, TCL SVOCs by USEPA Method 8270, TAL Metals by USEPA Methods 6010/7000, pesticides by USEPA Method 8081, and PCBs by USEPA Method 8082, in order to document background water quality throughout the site.

5.3 Field/Laboratory Data Control Requirements

Quality Control (QC) procedures will be followed in the field and at the laboratory to ensure that reliable data are obtained. When performing field sampling, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. QC samples, including blind duplicates, equipment blanks, trip blanks, method blanks, matrix spike and matrix spike duplicates, and their frequency to be collected in the field are summarized in **Table 9**.

5.4 Sample Identification

Each sample will be identified with a set of information relating individual sample characteristics. Required information consists of Sample Designation, Depth, Date, Time, and Matrix. Examples of sample IDs are shown below.

- PWG-DW-2008-01 @ 10-10.5' (sediment sample, dry well #1 from 10 to 10.5 feet)
- PWG-SG-2008-05 (soil vapor sample, location #5)
- PWG-VP-2008-07 @ 95 to 100' (groundwater sample, vertical profile well #7, screen depth 95 to 100 feet)
- PWG-SB-2008-11 @ 8-10' (subsurface soil sample, soil boring #11 from 8 to 10 feet)
- PWG-GW-2008-11 @ 12-16' (groundwater sample, soil boring location #11, screen depth 12 to 16 feet)
- MW-4 (groundwater sample from existing monitoring well #4)
- SW-2 (groundwater sample from existing supply well #2)
- DW-3 (groundwater sample from existing diffusion well #3)

Sample frequency, locations, depths, and nomenclature may change subject to field decisions and professional judgment. Estimated number of samples to be collected is summarized in **Table 10.**

5.5 Chain-of-Custody, Sample Packaging and Shipment

Each day that samples are collected, a chain-of-custody/request for analysis form will be completed and submitted to the laboratory with samples to be analyzed. A copy of the chain-of-custody will be retained by the Project Manager. The chain-of-custody will include the project name, sampler's signature, sample IDs, date and time of sample collection, and analysis requested.

Samples will be packaged and shipped in a manner that maintains sample preservation requirements during transport (i.e., ice to keep samples cool until receipt at the laboratory), ensures that sample holding times can be achieved by the laboratory, and prevents samples from being tampered with.

If a commercial carrier ships samples, a bill of lading (waybill) will be used as documentation of sample custody. Receipts for bills of lading and other documentation of shipment shall be maintained as part of the permanent custody documentation. Commercial carriers are not required to sign the chain-of-custody as long as it is enclosed in the shipping container and evidence tape (custody seal) remains in place on the shipping container.

5.6 Data Usability and Validation

The main purpose of the data is for use in defining the extent of contamination at the site, to aid in evaluation of potential human health and ecological exposure assessments, and to support remedial action decisions. Based upon this data use usability and validation will be performed as described below. Complete data packages will be archived in the project files, and if deemed necessary additional validation can be performed using procedures in the following sections.

5.6.1 Data Usability and Validation Requirements

Data usability and validation are performed on analytical data sets, primarily to confirm that sampling and chain-of-custody documentation are complete, sample IDs can be tied to specific sampling locations, samples were analyzed within the required holding times, and analyses are reported in conformance to NYSDEC ASP, Category 2 data deliverable requirements as applicable to the method utilized.

5.6.2 Data Usability and Validation Methods

A designee of the PWGC Project Manager will complete a data usability evaluation for the data collected during the RI and a data usability summary report (DUSR) will be prepared. The DUSR will be prepared in accordance with NYSDEC DER-10, Appendix 2B.

Independent third party data validation will be performed on 5% of the sample data, or on one sample from each sample delivery group (SDG), whichever is greater. Data validation will be performed by a qualified subcontractor independent of the project.

5.7 Field Equipment Calibration

Equipment will be inspected and approved by the Field Team Leader before being used. Equipment will be calibrated to factory specifications, if required. Monitoring equipment will be calibrated following manufacturers recommended schedules. Daily field response checks and calibrations will be performed as necessary (i.e. PID calibrations) following manufacturers standard operating procedures. Equipment calibrations will be documented in a designated field logbook.

5.8 Equipment Decontamination

In order to minimize the potential for cross-contamination, non-dedicated drilling and sampling equipment shall be properly decontaminated prior to and between sampling/drilling locations.

5.8.1 *General Procedures*

Drilling equipment will be decontaminated in a designated area. Sampling equipment and probes will be decontaminated in an area covered with plastic sheeting near the sampling location. Waste material generated during decontamination activities will be containerized, stored and disposed of in accordance with the procedures detailed in Section 5.9. Decontamination of sampling equipment shall be kept to a minimum, and wherever possible, dedicated sampling equipment shall be used. Personnel directly involved in equipment decontamination shall wear appropriate protective equipment.

5.8.2 *Drilling Equipment*

Drilling equipment shall be decontaminated by steam cleaning prior to performance of the first boring/excavation and between all subsequent borings/excavations. This shall include hand tools, casing, augers, drill rods, temporary well material and other related tools and equipment. Water used during drilling and/or steam cleaning operations shall be from a potable source.

5.8.3 *Sampling Equipment*

Sampling equipment (i.e., trowels, knives, split-spoons, bowls, hand augers, etc...) will be decontaminated prior to each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
- Generous tap water rinse
- Distilled water rinse

5.8.4 *Meters and Probes*

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., PID meters) will be decontaminated between uses as follows:

- Laboratory-grade detergent and tap water solution wash
- Tap water rinse
- Distilled water rinse (triple rinse)

5.9 Management of Investigation Derived Waste

Waste materials generated from the field operations may consist of soil cuttings, purge water, and miscellaneous solid materials such as personal protective equipment (PPE) and supplies. Use of direct push drilling technology will minimize the volumes of investigation-derived waste (IDW) generated. IDW generated during field operations will be disposed of in accordance with applicable regulations.

Soil cuttings generated from soil boring and vertical profile well installation activities will be stored in 55-gallon drums. Drums will be labeled to indicate the source of the soil and will be stored in a designated area on site. Soil cores and soil cuttings will be field screened using a PID, while performing drilling operations. Drummed soils will

be sampled to determine if spreading on-site is appropriate or off-site disposal is required. Following receipt of the analytical results, recommendations for disposition of the drummed soil will be provided to the NYSDEC.

Development and purge water generated during the field activities will be stored in a portable holding tank and/or 55-gallon drums. Drums will be labeled to indicate the source of the fluid and will be stored in a designated area on site. Drummed groundwater will be sampled to determine if discharge to the surface of the site is appropriate or off-site disposal is required. Following receipt of the groundwater sampling results, recommendations for disposition of the water will be provided to NYSDEC.

5.10 Field Documentation

Documentation will take place on either appropriate forms or in a dedicated site logbook. Permanent black or blue ink will be used to record information in the logbook. Errors in field documentation will be lined through, initialed, dated, and corrected. Forms will be kept by the PWGC Field Team Leader during the field activities. Field activities will be documented in the field logbook. The logbook will contain waterproof pages that are consecutively numbered, and be permanently bound with a hard cover. Upon completion of daily activities, unused portions of pages will be lined-through and initialed.

The primary purpose of the field logbook is to document the daily field activities and to provide descriptions of each activity. All entries in the field logbook will be recorded and dated by person making the entry.

6.0 REMEDIAL INVESTIGATION REPORT PREPARATION

The Supplemental Remedial Investigation Report will incorporate the methods and findings of the Supplemental Investigation activities performed as outlined in this work plan. The report will identify specific contamination concentrations throughout each media (e.g. soil, groundwater, etc), delineate the extent of contamination in soil and groundwater, evaluate potential exposure pathways, and provide conclusions and recommendations for additional investigation and/or remedial action. Electronic copies of the Supplemental Investigation Report will be submitted to the NYSDEC along with hard copies.

7.0 HEALTH AND SAFETY

Field operations will be performed in accordance with the health and safety requirements as provided in the attached Health and Safety Plan (HASP) (**Appendix B**). The HASP outlines the requirements for training, medical surveillance, daily tailgate meetings, emergency response, and accident and injury reporting.

Activity hazard analyses (AHAs) have been completed for identified work activities planned for the investigation.

The PWGC Field Team Leader will be responsible for implementing the HASP, completing the daily tailgate safety meetings and performing necessary Industrial Hygiene (IH) monitoring as specified in the HASP.

8.0 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (**Appendix C**) provides measures for protection for on-site workers and the downwind community from potential airborne contaminants as a direct result of the Supplemental Investigation. The Community Air Monitoring Plan will be implemented and executed in accordance with 29 CFR 1910.120(h), the New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan, and the New York State Department of Environmental Conservation (NYSDEC) TAGM #4031.

9.0 PROJECT SCHEDULE

The preliminary schedule for the major project milestones is presented in **Table 8**. Field work is anticipated to start in July 2008 and be completed by September 2008. A draft Supplemental Investigation Report will be submitted to the NYSDEC by December 1, 2008.

10.0 REFERENCES

EcolSciences, Inc., March 28, 2002, Phase I Environmental Site Assessment for 80-100 Banks Avenue, Rockville Centre, NY.

EcolSciences, Inc., December 2003, Phase II Environmental Investigation Report for 80-100 Banks Avenue, Rockville Centre, NY.

Melick-Tully and Associates, April 4, 2002, Preliminary Soils and Foundation Investigation Report, 80-100 Banks Avenue, Rockville Centre, NY.

P.W. Grosser Consulting, Inc., September 2004, Remedial Investigation Report, 80-100 Banks Avenue, Rockville Centre, New York

NYSDEC, Division of Environmental Restoration, 6 NYCRR Part 375 Subpart 6, Remedial Program Soil Cleanup Objectives

NYSDEC, Division of Environmental Remediation, December 2002, Draft DER-10, Technical Guidance for Site Investigation and Remediation.

NYSDEC, Division of Hazardous Waste Remediation, January 24, 1994, Memorandum # 4046, Technical and Administrative Guidance Memorandum #4046, Determination of Soil Cleanup Objectives and Cleanup Levels

NYSDEC, Division of Water, June 1998, Addendum April 2000, Technical and Operational Guidance Series 1:1:1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations

NYSDOH, October 2006, Guidance for Evaluating Soil Vapor Intrusion in the State of New York

USEPA, Standard Operating Procedure SOP 2042, Soil Gas Sampling

Table 1

Monitoring Well Elevation and Construction Details
Former Darby Drug Distribution Center

Well Designation	Total Depth	Screened Interval	Casing Elevation	3/23/2004 DTW	3/23/2004 GW Elevation
MW1	NA	NA	103.56	8.66	94.90
MW2	NA	NA	99.47	7.02	92.45
MW3	NA	NA	102.97	8.90	94.07
MW4	NA	NA	99.08	7.70	91.38
MW5	NA	NA	97.76	6.81	90.95
MW6	NA	NA	97.39	5.59	91.80
B1/MW13	15	5 to 15	NA	–	–
B5/MW14	17	7 to 17	NA	–	–
B7/MW7	15	5 to 15	97.47	5.26	92.21
B9/MW8	12	2 to 12	96.5	4.68	91.82
B11/MW9	12	2 to 12	96.05	4.81	91.24
B12/MW10	12	2 to 12	95.89	5.47	90.42
B13/MW11	14	4 to 14	97.85	8.46	89.39
B14/MW12	12	2 to 12	95.9	5.90	90.00
B18/MW15	16	6 to 16	NA	–	–

Notes:
All units are feet
NA - Not available

Table 2

NYSDEC Soil Cleanup Objectives for VOCs
Former Darby Drug Distribution Center

Analyte	CAS #	RSCO[1]	Unrestricted Use SCO[2]	Residential Use SCO[3]	Restricted Residential Use SCO[3]	Commercial Use SCO	Industrial Use SCO[3]	Protection of Ecological Resources SCO[4]	Protection of Groundwater SCO[5]
1,1,1,2-Tetrachloroethane	630-20-6	0.6	NS	NS	NS	NS	NS	NS	NS
1,1,1-Trichloroethane	71-55-6	0.8	0.68	100	100	500	1,000	NS	0.68
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	6.0	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethane	75-34-3	0.2	0.27	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	0.4	0.33	100	100	500	1,000	NS	0.33
1,1-Dichloropropene	563-58-6	NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichloropropane	96-18-4	0.4	NS	NS	NS	NS	NS	NS	NS
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trichlorobenzene	120-82-1	3.4	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trimethylbenzene	95-63-6	NS	3.6	47	52	190	380	NS	3.6
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromoethane	106-93-4	0.1	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	95-50-1	7.9	1.1	100	100	500	1,000	NS	1.1
1,2-Dichloroethane	107-06-2	NS	0.02	2.3	3.1	30	60	10	0.02
1,2-Dichloropropane	78-87-5	NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-Trimethylbenzene	108-67-8	NS	8.4	47	52	190	380	NS	8.4
1,3-Dichlorobenzene	541-73-1	1.6	2.4	17	49	280	560	NS	2.4
1,3-Dichloropropane	142-28-9	0.3	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene	106-46-7	8.5	1.8	9.8	13	130	250	20	1.8
2,2-Dichloropropane	590-20-7	NS	NS	NS	NS	NS	NS	NS	NS
2-Butanone	78-93-3	0.3	0.12	100	100	500	1,000	100	0.12
2-Chloroethyl vinyl ether	110-75-8	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorotoluene	95-49-8	NS	NS	NS	NS	NS	NS	NS	NS
2-Hexanone	591-78-6	NS	NS	NS	NS	NS	NS	NS	NS
2-Propanol	67-63-0	NS	NS	NS	NS	NS	NS	NS	NS
4-Chlorotoluene	106-43-4	NS	NS	NS	NS	NS	NS	NS	NS
4-Isopropyltoluene	99-87-6	NS	NS	NS	NS	NS	NS	NS	NS
4-Methyl-2-pentanone	108-10-1	1.0	NS	NS	NS	NS	NS	NS	NS
Acetone	67-64-1	0.2	0.05	100	100	500	1,000	2.2	0.05
Acrolein	107-02-8	NS	NS	NS	NS	NS	NS	NS	NS
Acrylonitrile	107-13-1	NS	NS	NS	NS	NS	NS	NS	NS
Benzene	71-43-2	0.06	0.06	2.9	4.8	44	89	70	0.06
Benzoic Acid	65-85-0	NS	NS	NS	NS	NS	NS	NS	NS
Bromobenzene	108-86-1	NS	NS	NS	NS	NS	NS	NS	NS
Bromochloromethane	74-97-5	NS	NS	NS	NS	NS	NS	NS	NS
Bromodichloromethane	75-27-4	NS	NS	NS	NS	NS	NS	NS	NS
Bromoform	75-25-2	NS	NS	NS	NS	NS	NS	NS	NS
Bromomethane	74-83-9	NS	NS	NS	NS	NS	NS	NS	NS
Carbon disulfide	75-15-0	2.7	NS	NS	NS	NS	NS	NS	NS
Carbon tetrachloride	56-23-5	0.6	0.76	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	1.7	1.1	100	100	500	1,000	40	1.1
Chlorodifluoromethane	75-45-6	NS	NS	NS	NS	NS	NS	NS	NS
Chloroethane	75-00-3	1.9	NS	NS	NS	NS	NS	NS	NS
Chloroform	67-66-3	0.3	0.37	10	49	350	700	12	0.37
Chloromethane	74-87-3	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene	156-59-2	NS	0.25	50	100	500	1,000	NS	0.25
cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	NS	NS	NS	NS	NS
Dibromochloromethane	124-48-1	NS	NS	NS	NS	NS	NS	NS	NS
Dibromomethane	74-95-3	NS	NS	NS	NS	NS	NS	NS	NS
Dichlorodifluoromethane	75-71-8	NS	NS	NS	NS	NS	NS	NS	NS
Diisopropyl ether	108-20-3	NS	NS	NS	NS	NS	NS	NS	NS
Ethanol	64-17-5	NS	NS	NS	NS	NS	NS	NS	NS
Ethyl acetate	141-78-6	NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene	100-41-4	5.5	1.0	30	41	390	780	NS	1.0
Freon-114	76-14-2	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	87-68-3	NS	NS	NS	NS	NS	NS	NS	NS
Isopropyl acetate	108-21-4	NS	NS	NS	NS	NS	NS	NS	NS
Isopropylbenzene	98-82-8	NS	NS	NS	NS	NS	NS	NS	NS
Methyl tert-butyl ether	1634-04-4	NS	0.93	62	100	500	1,000	NS	0.93
Methylene chloride	75-09-2	0.1	0.05	51	100	5000	1,000	12	0.05
n-Amyl acetate	628-63-7	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	91-20-3	NS	NS	NS	NS	NS	NS	NS	NS
n-Butyl acetate	123-86-4	NS	NS	NS	NS	NS	NS	NS	NS
n-Butylbenzene	104-51-8	NS	12	100	100	500	1,000	NS	12
n-Propyl acetate	109-60-4	NS	NS	NS	NS	NS	NS	NS	NS
n-Propylbenzene	103-65-1	NS	3.9	100	100	500	1,000	NS	3.9
p-Diethylbenzene	105-05-5	NS	NS	NS	NS	NS	NS	NS	NS
p-Ethyltoluene	622-96-8	NS	NS	NS	NS	NS	NS	NS	NS
sec-Butylbenzene	135-98-8	NS	11	100	100	500	1,000	NS	11
Styrene	100-42-5	NS	NS	NS	NS	NS	NS	NS	NS
t-Butyl alcohol	75-65-0	NS	NS	NS	NS	NS	NS	NS	NS
tert-Butylbenzene	98-06-6	NS	5.9	100	100	500	1,000	NS	5.9
Tetrachloroethene	127-18-4	1.4	1.3	5.5	19	150	300	2	1.3
Toluene	108-88-3	1.5	0.7	100	100	500	1,000	36	0.7
trans-1,2-Dichloroethene	156-60-5	0.3	0.19	100	100	500	1,000	NS	0.19
trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	NS	NS	NS	NS	NS
Trichloroethene	79-01-6	0.7	0.47	10	21	200	400	2	0.47
Trichlorofluoromethane	75-69-4	NS	NS	NS	NS	NS	NS	NS	NS
Vinyl acetate	108-05-4	NS	NS	NS	NS	NS	NS	NS	NS
Vinyl chloride	75-01-4	0.2	0.02	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20-7	1.2	0.26	100	100	500	1,000	0.26	1.6

Notes:
All concentrations are mg/kg (ppm)
[1]NYSDEC Recommended Soil Cleanup Objectives (RSCO), Technical and Administrative Guidance Memorandum (TAGM) #4046, 12/00
[2]NYSDEC 6 NYCRR Environmental Remediation Programs Part 375 Unrestricted Use Soil Cleanup Objectives (SCO) Table 375-6.8a 12/06
[3]NYSDEC 6 NYCRR Environmental Remediation Programs Part Restriced Use of Soil Cleanup Objective (SCO) Table 375-6.8b 12/06
MDL - Method Detection Limit
NS - No Standard Established

Table 3

NYSDEC Soil Cleanup Objectives for SVOCs
Former Darby Drug Distribution Center

Analyte:	CAS #:	RSCO[1]	Unrestricted Use SCO[2]	Residential Use SCO[2]	Restricted Residential Use SCO[3]	Commercial Use SCO[2]	Industrial Use SCO[3]	Protection of Ecological Resources SCO[3]	Protection of Groundwater SCO[3]
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	95-50-1	NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichlorobenzene	541-73-1	NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene	106-46-7	NS	NS	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol	95-95-4	0.1	NS	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol	120-83-2	0.4	NS	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol	105-67-9	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol	51-28-5	0.200 or MDL	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene	606-20-2	1.0	NS	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene	91-58-7	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorophenol	95-57-8	0.8	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	91-57-6	36.4	NS	NS	NS	NS	NS	NS	NS
2-Methylphenol	95-48-7	0.100 or MDL	0.33	100	100	500	1,000	NS	0.33
2-Nitroaniline	88-74-4	0.430 or MDL	NS	NS	NS	NS	NS	NS	NS
2-Nitrophenol	88-75-5	0.330 or MDL	NS	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	NS	NS	NS	NS	NS
3+4-Methylphenol	108-39-4/106-44	0.9	0.33	100	100	500	1,000	NS	0.33
3-Nitroaniline	99-09-2	0.500 or MDL	NS	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol	534-52-1	NS	NS	NS	NS	NS	NS	NS	NS
4-Bromophenyl phenyl ether	101-55-3	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol	59-50-7	0.240 or MDL	NS	NS	NS	NS	NS	NS	NS
4-Chloroaniline	106-47-8	0.220 or MDL	NS	NS	NS	NS	NS	NS	NS
4-Chlorophenyl phenyl ether	7005-72-3	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitroaniline	100-01-6	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitrophenol	100-02-7	0.100 or MDL	NS	NS	NS	NS	NS	NS	NS
Acenaphthene	83-32-9	50.0[c]	20	100	100	500	1,000	20	98
Acenaphthylene	208-96-8	41.0	100	100	100	500	1,000	NS	107
Aniline	62-53-3	0.1	NS	NS	NS	NS	NS	NS	NS
Anthracene	120-12-7	50.0[c]	100	100	100	500	1,000	NS	1,000
Azobenzene	103-33-3	NS	NS	NS	NS	NS	NS	NS	NS
Benzidine	92-87-5	NS	NS	NS	NS	NS	NS	NS	NS
Benzo(a)anthracene	56-55-3	0.224 or MDL	1	1	1	5.6	11	NS	1
Benzo(a)pyrene	50-32-8	0.061 or MDL	1	1	1	1	1.1	2.6	22
Benzo(b)fluoranthene	205-99-2	1.1	1	1	1	5.6	11	NS	1.7
Benzo(g,h,i)perylene	191-24-2	50.0[c]	100	100	100	500	1,000	NS	1,000
Benzo(k)fluoranthene	207-08-9	1.1	0.8	1	3.9	56	110	NS	1.7
Benzoic acid	65-85-0	2.7	NS	NS	NS	NS	NS	NS	NS
Benzyl alcohol	100-51-6	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-chloroethoxy)methane	111-91-1	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-chloroethyl)ether	111-44-4	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-chloroisopropyl)ether	108-60-1	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-ethylhexyl)phthalate	117-81-7	50.0[c]	NS	NS	NS	NS	NS	NS	NS
Butyl benzyl phthalate	85-68-7	50.0[c]	NS	NS	NS	NS	NS	NS	NS
Carbazole	86-74-8	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene	218-01-9	0.4	1	1	3.9	56	110	NS	1
Dibenzo(a,h)anthracene	53-70-3	0.014 or MDL	0.33	0.33	0.33	0.56	1.1	NS	1,000
Dibenzofuran	132-64-9	6.2	NS	NS	NS	NS	NS	NS	NS
Diethyl phthalate	84-66-2	7.1	NS	NS	NS	NS	NS	NS	NS
Dimethyl phthalate	131-11-3	2.0	NS	NS	NS	NS	NS	NS	NS
Di-n-butyl phthalate	84-74-2	8.1	NS	NS	NS	NS	NS	NS	NS
Di-n-octyl phthalate	117-84-0	50.0[c]	NS	NS	NS	NS	NS	NS	NS
Fluoranthene	206-44-0	50.0[c]	100	100	100	500	1,000	NS	1,000
Fluorene	86-73-7	50.0[c]	30	100	100	500	1,000	30	386
Hexachlorobenzene	118-74-1	0.41	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	87-68-3	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	NS	NS	NS	NS	NS
Hexachloroethane	67-72-1	NS	NS	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-c,d)pyrene	193-39-5	3.2	0.5	0.5	0.5	5.6	11	NS	8.2
Isophorone	78-59-1	4.4	NS	NS	NS	NS	NS	NS	NS
Naphthalene	91-20-3	13.0	12	100	100	500	1,000	NS	12
Nitrobenzene	98-95-3	0.200 or MDL	NS	NS	NS	NS	NS	NS	NS
N-Nitrosodimethylamine	62-75-9	NS	NS	NS	NS	NS	NS	NS	NS
N-Nitrosodi-n-propylamine	621-64-7	NS	NS	NS	NS	NS	NS	NS	NS
N-Nitrosodiphenylamine	86-30-6	NS	NS	NS	NS	NS	NS	NS	NS
Pentachlorophenol	87-86-5	1.0 or MDL	0.8	2.4	6.7	6.7	55	0.8	0.8
Phenanthrene	85-01-8	50.0[c]	100	100	100	500	1,000	NS	1,000
Phenol	108-95-2	0.03 or MDL	0.33	100	100	500	1,000	30	0.33
Pyrene	129-00-0	50.0[c]	100	100	100	500	1,000	NS	1,000
Pyridine	110-86-1	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
All concentrations are mg/kg (ppm)
[1]NYSDEC Recommended Soil Cleanup Objectives (RSCO), Technical and Administrative Guidance Memorandum (TAGM) #4046, 12/00
[2]NYSDEC 6 NYCRR Environmental Remediation Programs Part 375 Unrestricted Use Soil Cleanup Objectives (SCO) Table 375-6.8a 12/06
[3]NYSDEC 6 NYCRR Environmental Remediation Programs Part Restriced Use of Soil Cleanup Objective (SCO) Table 375-6.8b 12/06
[c]As per TAGM #4046, Total Semi-VOCs < 500 ppm and Individual Semi-VOCs < 50 ppm
MDL - Method Detection Limit
NS - No Standard Established

Table 4

NYSDEC Soil Cleanup Objectives for Metals
Former Darby Drug Distribution Center

Analyte:	CAS #:	RSCO[1]	Unrestricted Use SCO[2]	Residential Use SCO[2]	Restricted Residential Use SCO[3]	Commercial Use SCO[3]	Industrial Use SCO[3]	Protection of Ecological Resources SCO[3]	Protection of Groundwater SCO[3]
Aluminum	7429-90-5	SB	NS	NS	NS	NS	NS	NS	NS
Antimony	7440-36-0	SB	NS	NS	NS	NS	NS	NS	NS
Arsenic	7440-38-2	7.5 or SB	13	16	16	16	16	13	16
Barium	7440-39-3	300 or SB	350	350	400	400	10,000	433	820
Beryllium	7440-41-7	0.16 or SB	7	14	72	590	2,700	10	47
Cadmium	7440-43-9	1 of SB	2.5	2.5	4.3	9.3	60	4	7.5
Calcium	7440-70-2	SB	NS	NS	NS	NS	NS	NS	NS
Chromium	16065-83-1	10 or SB	30	36	180	1,500	6,800	41	NS
Cobalt	7440-48-4	30 or SB	NS	NS	NS	NS	NS	NS	NS
Copper	7440-50-8	25 or SB	50	270	270	270	10,000	50	1,720
Iron	7439-89-6	2,000 or SB	NS	NS	NS	NS	NS	NS	NS
Lead	7439-92-1	SB	63	400	400	1,000	3,900	63	450
Magnesium	7439-95-4	SB	NS	NS	NS	NS	NS	NS	NS
Manganese	7439-96-5	SB	1,600	2,000	2,000	10,000	10,000	1,600	2,000
Mercury	7439-97-6	0.1	0.18	0.81	0.81	2.8	5.7	0.18	0.73
Nickel	7440-02-0	13 or SB	30	140	310	310	10,000	30	130
Potassium	7440-09-7	SB	NS	NS	NS	NS	NS	NS	NS
Selenium	7782-49-2	2 or SB	3.9	36	180	1,500	6,800	3.9	4
Silver	7440-22-4	SB	2	36	180	1,500	6,800	2	8.3
Sodium	7440-23-5	SB	NS	NS	NS	NS	NS	NS	NS
Thallium	82870-81-3	SB	NS	NS	NS	NS	NS	NS	NS
Vanadium	7440-62-2	150 or SB	NS	NS	NS	NS	NS	NS	NS
Zinc	7440-66-6	20 or SB	109	2,200	10,000	10,000	10,000	109	2,480

Notes:
All concentrations are mg/kg (ppm)
[1]NYSDEC Recommended Soil Cleanup Objectives (RSCO), Technical and Administrative Guidance Memorandum (TAGM) #4046, 12/00
[2]NYSDEC 6 NYCRR Environmental Remediation Programs Part 375 Unrestricted Use Soil Cleanup Objectives (SCO) Table 375-6.8a 12/06
[3]NYSDEC 6 NYCRR Environmental Remediation Programs Part Restriced Use of Soil Cleanup Objective (SCO) Table 375-6.8b 12/06
MDL - Method Detection Limt
NS - No Standard Established
SB - Site Background

Table 5

NYSDEC Groundwater Standards for VOCs
Former Darby Drug Distribution Center

Analyte:	CAS #:	Class GA AWQS[1]
1,1,1,2-Tetrachloroethane	630-20-6	5
1,1,1-Trichloroethane	71-55-6	5
1,1,2,2-Tetrachloroethane	79-34-5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5
1,1,2-Trichloroethane	79-00-5	1
1,1-Dichloroethane	75-34-3	5
1,1-Dichloroethene	75-35-4	5
1,1-Dichloropropene	563-58-6	5
1,2,3-Trichlorobenzene	87-61-6	5
1,2,3-Trichloropropane	96-18-4	0.04
1,2,4,5-Tetramethylbenzene	95-93-2	5
1,2,4-Trichlorobenzene	120-82-1	5
1,2,4-Trimethylbenzene	95-63-6	5
1,2-Dibromo-3-chloropropane	96-12-8	0.04
1,2-Dibromoethane	106-93-4	5
1,2-Dichlorobenzene	95-50-1	3
1,2-Dichloroethane	107-06-2	0.6
1,2-Dichloropropane	78-87-5	1
1,3,5-Trimethylbenzene	108-67-8	5
1,3-Dichlorobenzene	541-73-1	3
1,3-Dichloropropane	142-28-9	5
1,4-Dichlorobenzene	106-46-7	3
2,2-Dichloropropane	590-20-7	5
2-Butanone	78-93-3	NS
2-Chloroethyl vinyl ether	110-75-8	NS
2-Chlorotoluene	95-49-8	5
2-Hexanone	591-78-6	50
2-Propanol	67-63-0	NS
4-Chlorotoluene	106-43-4	5
4-Isopropyltoluene	99-87-6	5
4-Methyl-2-pentanone	108-10-1	NS
Acetone	67-64-1	50
Acrolein	107-02-8	5
Acrylonitrile	107-13-1	5
Benzene	71-43-2	1
Benzoic Acid	65-85-0	NS
Bromobenzene	108-86-1	5
Bromochloromethane	74-97-5	5
Bromodichloromethane	75-27-4	5
Bromoform	75-25-2	NS
Bromomethane	74-83-9	5
Carbon disulfide	75-15-0	60

Analyte:	CAS #:	Class GA AWQS[1]
Carbon tetrachloride	56-23-5	5
Chlorobenzene	108-90-7	5
Chlorodifluoromethane	75-45-6	NS
Chloroethane	75-00-3	5
Chloroform	67-66-3	7
Chloromethane	74-87-3	NS
cis-1,2-Dichloroethene	156-59-2	5
cis-1,3-Dichloropropene	10061-01-5	0.04
Dibromochloromethane	124-48-1	NS
Dibromomethane	74-95-3	5
Dichlorodifluoromethane	75-71-8	5
Diisopropyl ether	108-20-3	NS
Ethanol	64-17-5	NS
Ethyl acetate	141-78-6	NS
Ethylbenzene	100-41-4	5
Freon-114	76-14-2	NS
Hexachlorobutadiene	87-68-3	0.5
Isopropyl acetate	108-21-4	NS
Isopropylbenzene	98-82-8	5
Methyl tert-butyl ether	1634-04-4	10
Methylene chloride	75-09-2	5
n-Amyl acetate	628-63-7	NS
Naphthalene	91-20-3	10
n-Butyl acetate	123-86-4	NS
n-Butylbenzene	104-51-8	5
n-Propyl acetate	109-60-4	NS
n-Propylbenzene	103-65-1	5
p-Diethylbenzene	105-05-5	NS
p-Ethyltoluene	622-96-8	NS
sec-Butylbenzene	135-98-8	5
Styrene	100-42-5	5
t-Butyl alcohol	75-65-0	NS
tert-Butylbenzene	98-06-6	5
Tetrachloroethene	127-18-4	5
Toluene	108-88-3	5
trans-1,2-Dichloroethene	156-60-5	5
trans-1,3-Dichloropropene	10061-02-6	0.04
Trichloroethene	79-01-6	5
Trichlorofluoromethane	75-69-4	5
Vinyl acetate	108-05-4	NS
Vinyl chloride	75-01-4	2
Xylene (mixed)	1330-20-7	5

Notes:
All concentrations are µg/L (ppb)
[1]NYSDEC Class GA Ambient Water Quality Standards (AWQS), Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidace Values and Groundwater Effluent Limitations, 6/98
NS - No Standard Established

Table 6

NYSDEC Groundwater Standards for SVOCs
Former Darby Drug Distribution Center

Analyte:	CAS #:	Class GA AWQS[1]
1,2,4-Trichlorobenzene	120-82-1	5
1,2-Dichlorobenzene	95-50-1	3
1,3-Dichlorobenzene	541-73-1	3
1,4-Dichlorobenzene	106-46-7	3
2,4,5-Trichlorophenol	95-95-4	1
2,4,6-Trichlorophenol	88-06-2	NS
2,4-Dichlorophenol	120-83-2	1
2,4-Dimethylphenol	105-67-9	50
2,4-Dinitrophenol	51-28-5	1
2,4-Dinitrotoluene	121-14-2	5
2,6-Dinitrotoluene	606-20-2	5
2-Chloronaphthalene	91-58-7	10
2-Chlorophenol	95-57-8	1
2-Methylnaphthalene	91-57-6	NS
2-Methylphenol	95-48-7	1
2-Nitroaniline	88-74-4	5
2-Nitrophenol	88-75-5	1
3,3'-Dichlorobenzidine	91-94-1	5
3+4-Methylphenol	108-39-4/106-44	NS
3-Nitroaniline	99-09-2	5
4,6-Dinitro-2-methylphenol	534-52-1	NS
4-Bromophenyl phenyl ether	101-55-3	NS
4-Chloro-3-methylphenol	59-50-7	1
4-Chloroaniline	106-47-8	5
4-Chlorophenyl phenyl ether	7005-72-3	NS
4-Nitroaniline	100-01-6	5
4-Nitrophenol	100-02-7	1
Acenaphthene	83-32-9	20
Acenaphthylene	208-96-8	NS
Aniline	62-53-3	5
Anthracene	120-12-7	50
Azobenzene	103-33-3	5
Benzidine	92-87-5	5
Benzo(a)anthracene	56-55-3	0.002
Benzo(a)pyrene	50-32-8	NS
Benzo(b)fluoranthene	205-99-2	0.002

Analyte:	CAS #:	Class GA AWQS[1]
Benzo(g,h,i)perylene	191-24-2	NS
Benzo(k)fluoranthene	207-08-9	0.002
Benzoic acid	65-85-0	NS
Benzyl alcohol	100-51-6	NS
Bis(2-chloroethoxy)methane	111-91-1	5
Bis(2-chloroethyl)ether	111-44-4	1
Bis(2-chloroisopropyl)ether	108-60-1	NS
Bis(2-ethylhexyl)phthalate	117-81-7	5
Butyl benzyl phthalate	85-68-7	50
Carbazole	86-74-8	NS
Chrysene	218-01-9	0.002
Dibenzo(a,h)anthracene	53-70-3	NS
Dibenzofuran	132-64-9	NS
Diethyl phthalate	84-66-2	50
Dimethyl phthalate	131-11-3	NS
Di-n-butyl phthalate	84-74-2	50
Di-n-octyl phthalate	117-84-0	50
Fluoranthene	206-44-0	50
Fluorene	86-73-7	50
Hexachlorobenzene	118-74-1	0.04
Hexachlorobutadiene	87-68-3	0.5
Hexachlorocyclopentadiene	77-47-4	5
Hexachloroethane	67-72-1	5
Indeno(1,2,3-c,d)pyrene	193-39-5	0.002
Isophorone	78-59-1	50
Naphthalene	91-20-3	10
Nitrobenzene	98-95-3	0.4
N-Nitrosodimethylamine	62-75-9	50
N-Nitrosodi-n-propylamine	621-64-7	NS
N-Nitrosodiphenylamine	86-30-6	NS
Pentachlorophenol	87-86-5	1
Phenanthrene	85-01-8	50
Phenol	108-95-2	1
Pyrene	129-00-0	50
Pyridine	110-86-1	50

Notes:
All concentrations are µg/L (ppb)
[1]NYSDEC Class GA Ambient Water Quality Standards (AWQS), Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidace Values and Groundwater Effluent Limitations, 6/98
NS - No Standard Established

Table 7

NYSDEC Groundwater Standards for Metals
Former Darby Drug Distribution Center

Analyte:	CAS #:	Class GA AWQS[1]
Aluminum	7429-90-5	NS
Antimony	7440-36-0	3
Arsenic	7440-38-2	25
Barium	7440-39-3	1,000
Beryllium	7440-41-7	3
Cadmium	7440-43-9	5
Calcium	7440-70-2	NS
Chromium	16065-83-1	50
Cobalt	7440-48-4	NS
Copper	7440-50-8	200
Iron	7439-89-6	300(a)
Lead	7439-92-1	25
Magnesium	7439-95-4	35,000
Manganese	7439-96-5	300(a)
Mercury	7439-97-6	0.7
Nickel	7440-02-0	100
Potassium	7440-09-7	NS
Selenium	7782-49-2	10
Silver	7440-22-4	50
Sodium	7440-23-5	20,000
Thallium	82870-81-3	0.5
Vanadium	7440-62-2	NS
Zinc	7440-66-6	2,000

Notes:
All concentrations are µg/L (ppb)
[1]NYSDEC Class GA Ambient Water Quality Standards (AWQS), Technical and Operational Guidance Series 1.1.1, Ambient Water Quality Standards and Guidace Values and Groundwater Effluent Limitations, 6/98
[a]Per TOGS 1.1.1 the sum of Iron and Managanese concentrations may not exceed 500 µg/L (ppb)
NS - No Standard Established

Table 8

Laboratory Analytical Methods
Former Darby Drug Distribution Center

Sample Location	Sample Matrix	Sample Type	Parameters	EPA Method	Sample Preservation	Holding Time	Sample Container
Stormwater Drainage Structures	Soil	Grab	VOCs	8260	Cool to 4°C	7 days	2-oz. wide mouth glass
	Soil	Grab	SVOCs	8270BN	Cool to 4°C	7 days	8-oz. wide mouth glass
	Soil	Grab	TPH	8015	Cool to 4°C	14 days	8-oz. wide mouth glass
	Soil	Grab	RCRA Metals	6010/7000	Cool to 4°C	Mercury: 28 days Other Parameters: 180 days	8-oz. wide mouth glass
Industrial Wastewater Discharge Structures	Soil	Grab	TCL VOCs	8260	Cool to 4°C	7 days	2-oz. wide mouth glass
	Soil	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	8-oz. wide mouth glass
	Soil	Grab	TAL Metals	6010/7000	Cool to 4°C	Mercury: 28 days Other Parameters: 180 days	8-oz. wide mouth glass
Soil Vapor	Air	Grab	VOCs	TO-15	N/A	14 days	6-L SUMMA
Source Delineation Area	Soil	Grab	TCL VOCs	8260	Cool to 4°C	7 days	2-oz. wide mouth glass
	Soil	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	8-oz. wide mouth glass
	Soil	Grab	Pesticides/PCBs	8081/8082	Cool to 4°C	14 days	8-oz. wide mouth glass
	Soil	Grab	TAL Metals	6010/7000	Cool to 4°C	Mercury: 28 days Other Parameters: 180 days	8-oz. wide mouth glass
Northern Portion/Background of Property	Soil	Grab	TCL VOCs	8260	Cool to 4°C	7 days	2-oz. wide mouth glass
	Soil	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	8-oz. wide mouth glass
	Soil	Grab	Pesticides/PCBs	8081/8082	Cool to 4°C	14 days	8-oz. wide mouth glass
	Soil	Grab	TAL Metals	6010/7000	Cool to 4°C	Mercury: 28 days Other Parameters: 180 days	8-oz. wide mouth glass
	Groundwater	Grab	TCL VOCs	8260	Cool to 4°C HCl to pH<2	14 days	40-mL vials
	Groundwater	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	Pesticides/PCBs	8081/8082	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	TAL Metals	6010/7000	Cool to 4°C HNO_3 to pH<2	Mercury: 28 days Other Parameters: 180 days	250-mL polyethelyene
Vertical Profile Wells	Groundwater	Grab	TCL VOCs	8260	Cool to 4°C HCl to pH<2	14 days	40-mL vials
Monitoring Wells	Groundwater	Grab	TCL VOCs	8260	Cool to 4°C HCl to pH<2	14 days	40-mL vials
	Groundwater	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	Pesticides/PCBs	8081/8082	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	TAL Metals	6010/7000	Cool to 4°C HNO_3 to pH<2	Mercury: 28 days Other Parameters: 180 days	250-mL polyethelyene
Supply/Diffusion Wells	Groundwater	Grab	TCL VOCs	8260	Cool to 4°C HCl to pH<2	14 days	40-mL vials
	Groundwater	Grab	TCL SVOCs	8270	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	Pesticides/PCBs	8081/8082	Cool to 4°C	7 days	1-L amber glass
	Groundwater	Grab	TAL Metals	6010/7000	Cool to 4°C HNO_3 to pH<2	Mercury: 28 days Other Parameters: 180 days	250-mL polyethelyene

Table 9

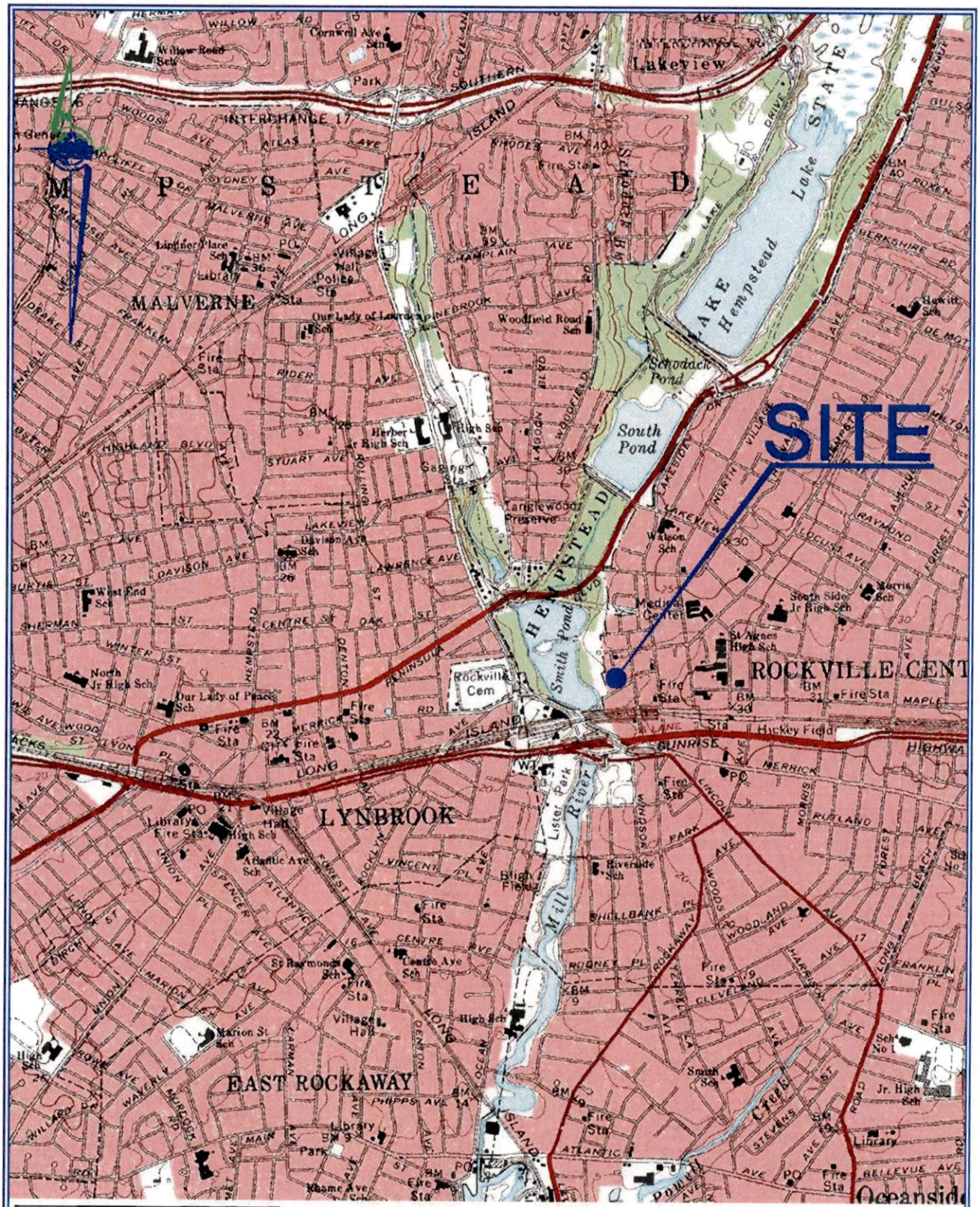
Field/Laboratory QA/QC Requirements
Former Darby Drug Distribution Center

Sample Type	Frequency	Purpose
Blind Duplicate	One duplicate sample, or One per 20 samples of the same matrix.	To evaluate the precision of the field sampling and laboratory analyses.
Equipment Blank	One per type of sampling method used for each batch of sampling equipment. Equipment blanks are collected in the field using analyte-free water supplied by the laboratory.	To assess the cleanliness of the sampling equipment and the effectiveness of the decontamination process.
Trip Blank	One VOA (volatile organic analysis) trip blank per sample cooler that contains site samples to be analyzed for VOAs.	To detect VOC cross-contamination during sample shipping and handling. No trip blanks are anticipated because VOCs are not part of the proposed analytical analysis.
Method Blank	One per 20 samples of same matrix	To document contamination resulting from the analytical process.
Matrix Spike	One per 20 samples of same matrix	It is used to measure the efficiency of all steps of the sampling and analytical methods in recovering the target analytes from the sample. It is a sample spiked with known quantities of analytes and subjected to the entire analytical procedure.
Matrix Spike Duplicate	One per 20 samples of same matrix.	To reinforce the matrix spike information. It is a second aliquot of the same sample as the matrix spike.

Table 10

Estimated Number of Samples
Former Darby Drug Distribution Center

Sample Type	Matrix	Estimated # of samples to be collected
Storm water drainage structure characterization	Soil	21
Industrial wastewater discharge structure characterization (shallow samples)	Soil	14
Industrial wastewater discharge structure characterization (deep samples)	Soil	14
Soil vapor	Air	10
Source area delineation	Soil	12
Step-out soil borings	Soil	TBD
Evaluation of northern/background portion of the property	Soil	8
Evaluation of northern portion of the property	Groundwater	8
Vertical profile well	Groundwater	16
Supply Wells	Groundwater	3
Diffusion Wells	Groundwater	3
Moniotring Wells	Groundwater	6



Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York
Department of Transportation
Control by USGS, USC&GS, and New Jersey Geodetic Survey

VICINITY MAP

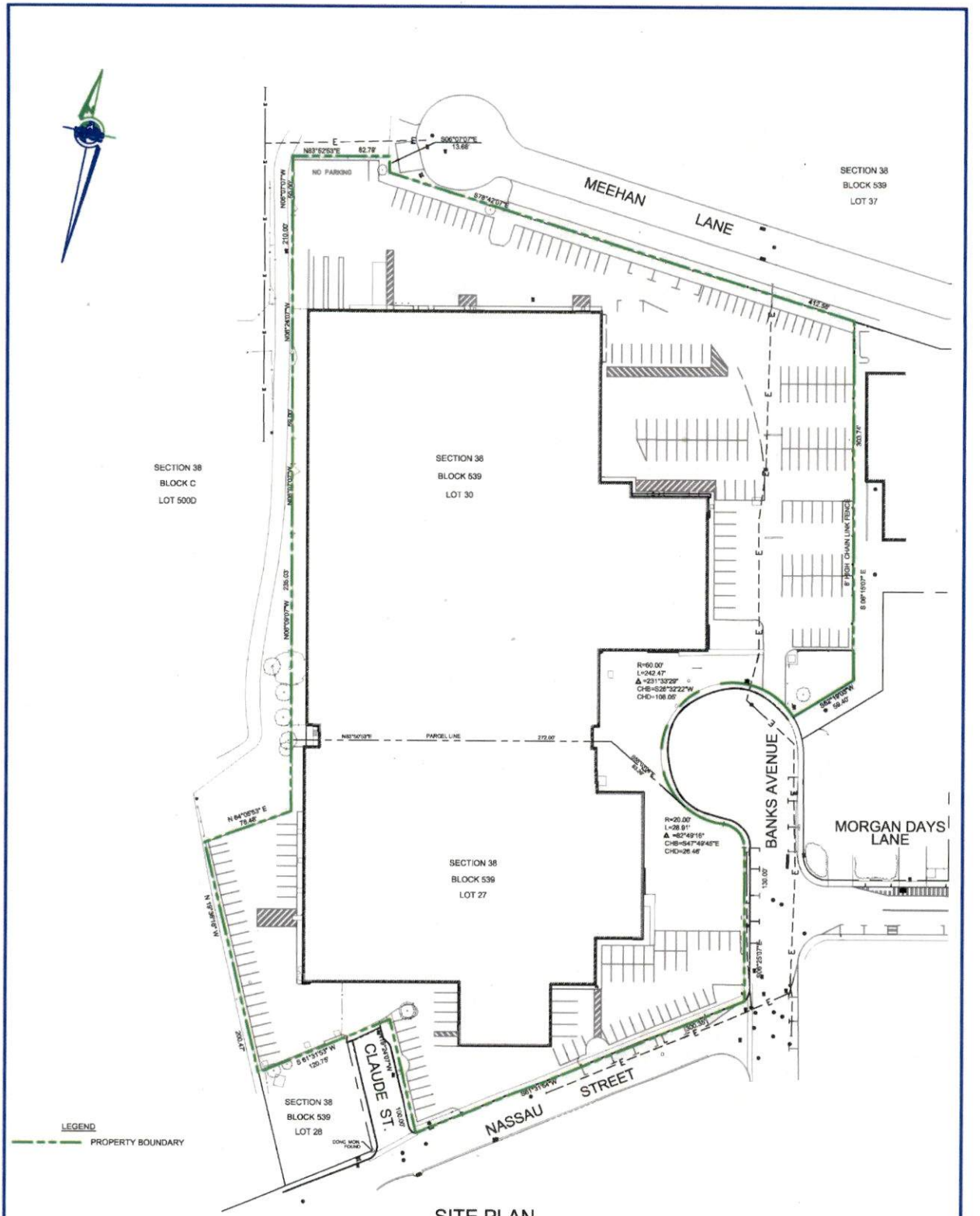
SCALE: 1:24,000

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555 Johnson Ave, Suite 7
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Ph: 631 582-6900 Fx: 631 582-6905
Email: info@pwgcnow.com

80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

Project: AV80901	Figure No: 1
Designed by: TM	
Approved By: PWG	
Drawn By: LLG	Date: 9/10/09



SITE PLAN
SCALE: 1"=80'

0 80 160
SCALE: 1" = 80'

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CONSULTANTS

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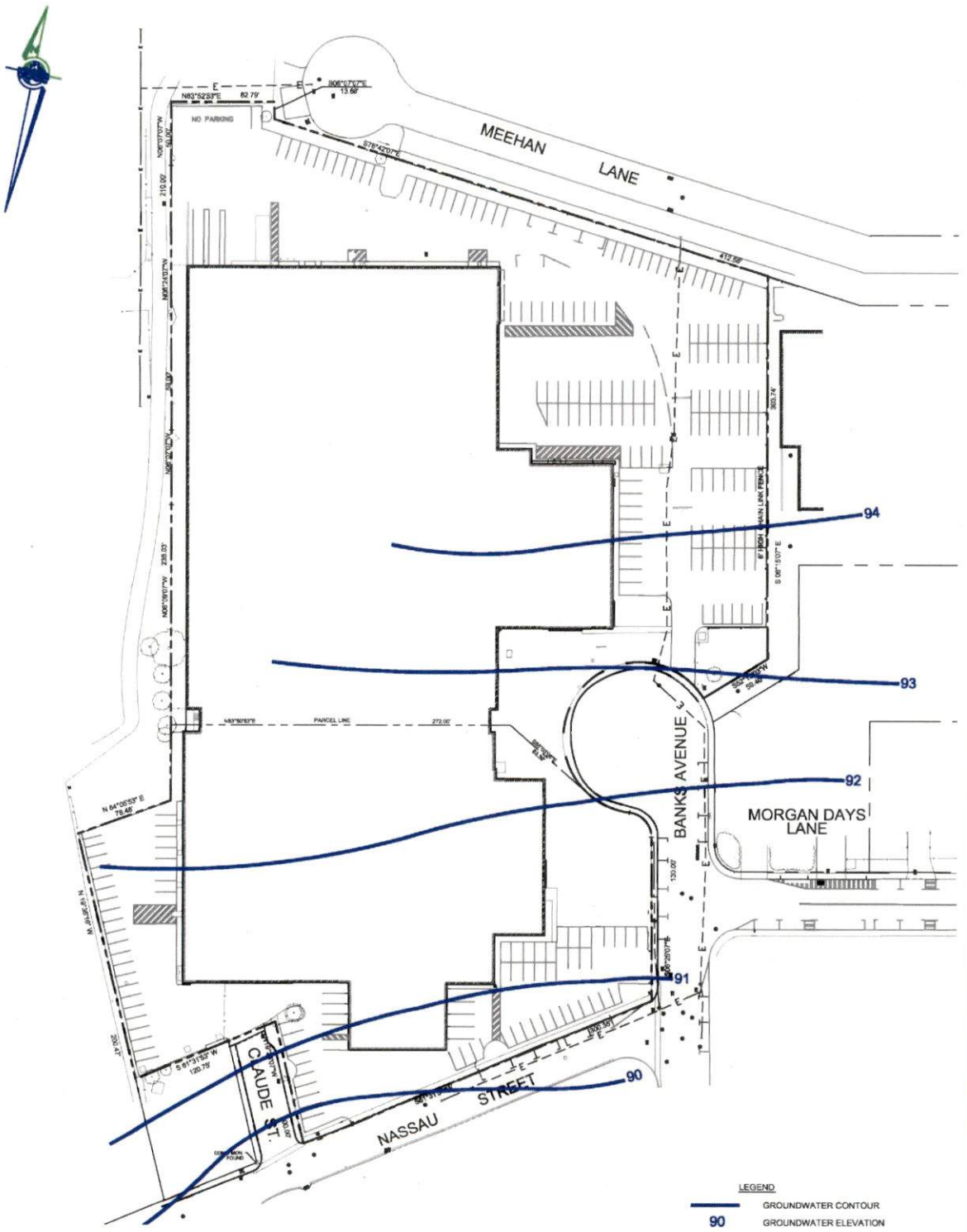
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DESIGNED BY: KEA	DATE: 3/3/08	
DRAWN BY: LLG	SCALE: AS SHOWN	
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SHEET TITLE
SITE PLAN
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO. 2

SHEET 2 OF 9



GROUNDWATER CONTOUR MAP

SCALE: 1"=80'

NOTE:
GROUNDWATER CONTOURS BASED ON
MARCH 24, 2004 DATA

0 80 160

SCALE: 1" = 80'

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DESIGNED BY:	KEA	DATE:	3/10/08
DRAWN BY:	LLG	SCALE:	AS SHOWN

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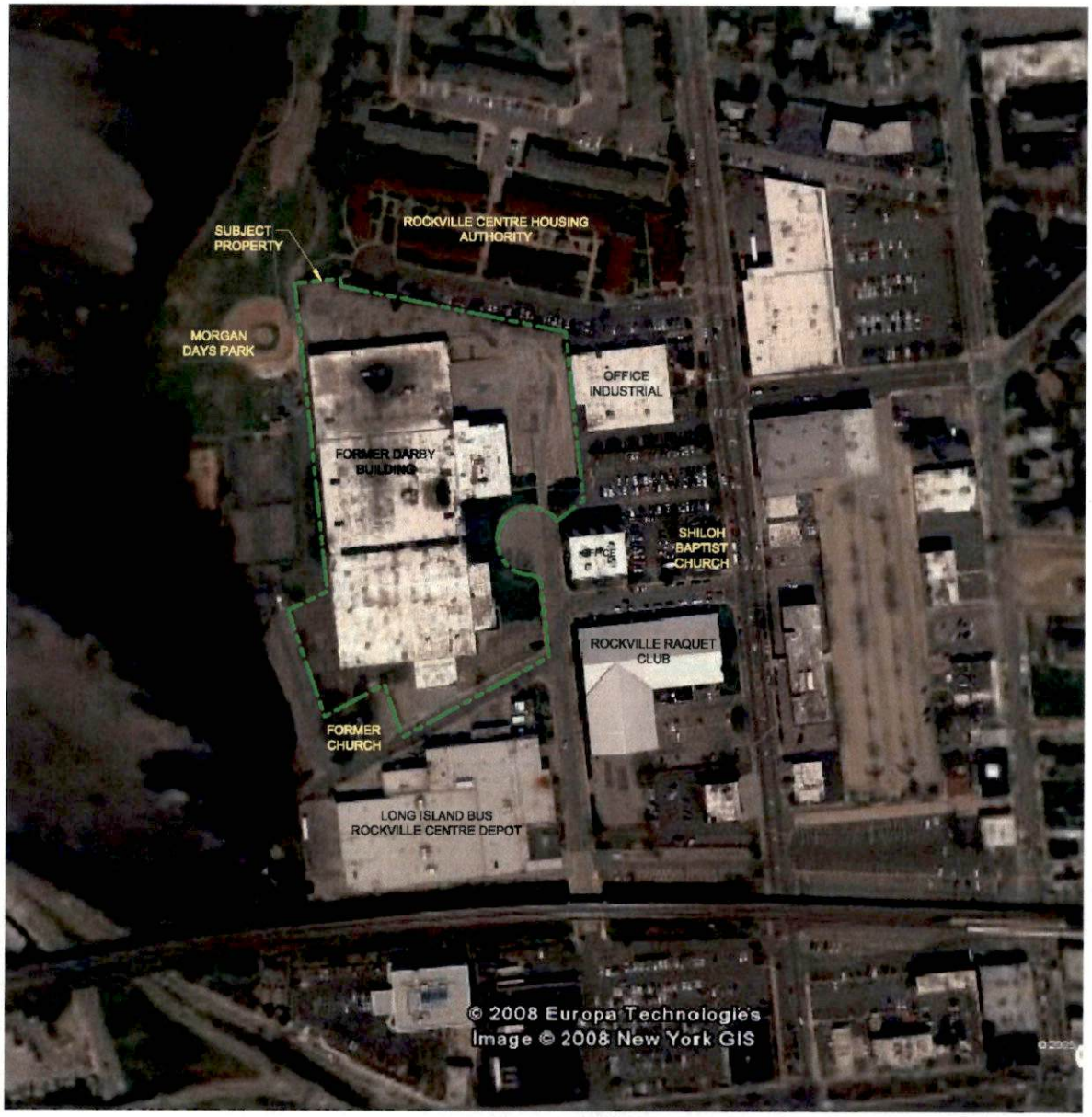
SHEET TITLE

GROUNDWATER CONTOUR MAP

80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO. 3

SHEET 3 of 9



AERIAL MAP
SCALE: 1"=200'

Google

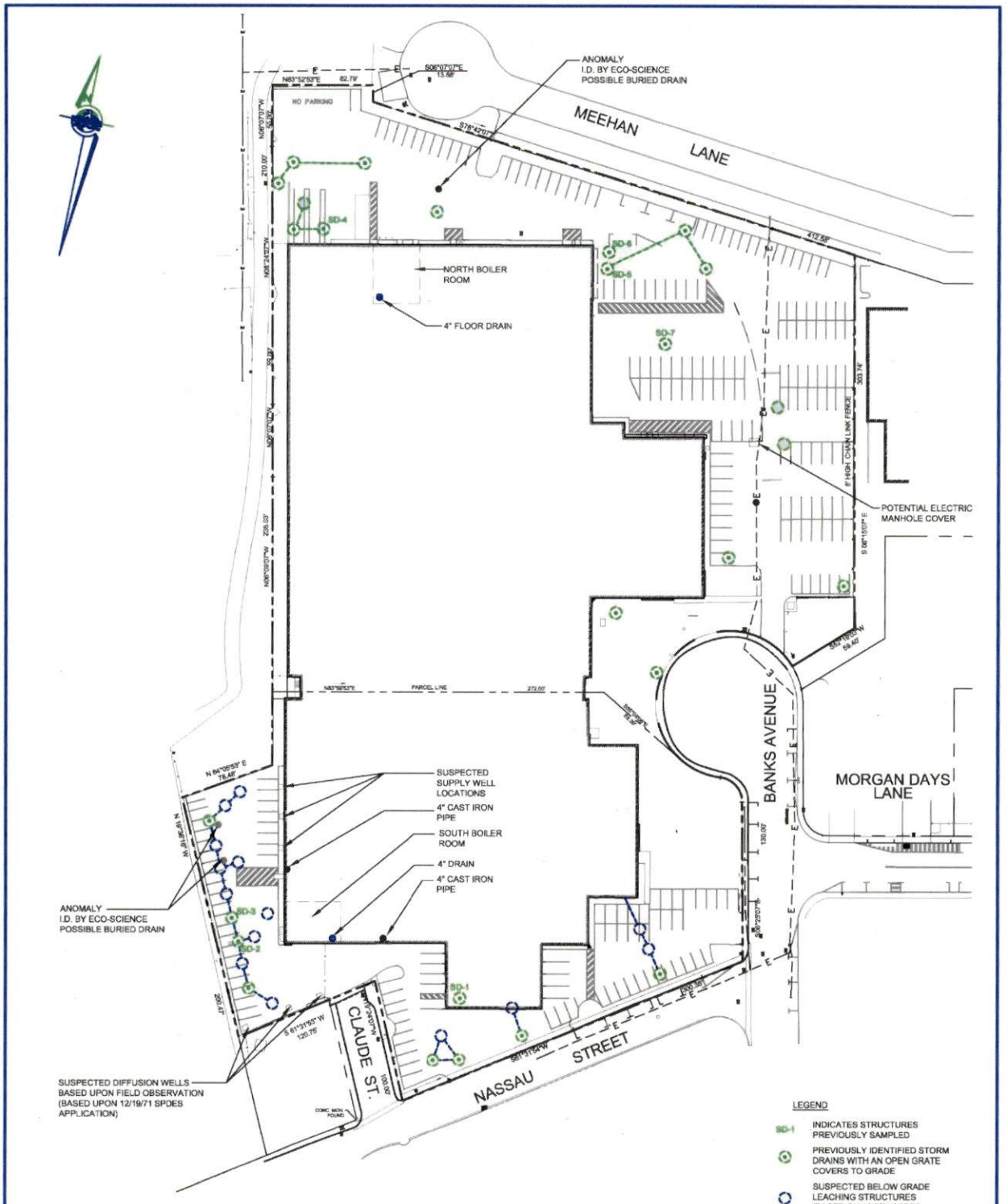
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SCALE: 1" = 200'

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SURROUNDING LAND USE
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO 4

SHEET 4 of 9



DRAINAGE SYSTEM

SCALE: 1"=80'

NOTE:
PRIMARY & SECONDARY STATUS OF LEACHING STRUCTURES TO BE DETERMINED AS PART OF SUPPLEMENTAL REMEDIAL INVESTIGATION.

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DESIGNED BY:	KEA	DATE:	3/6/08
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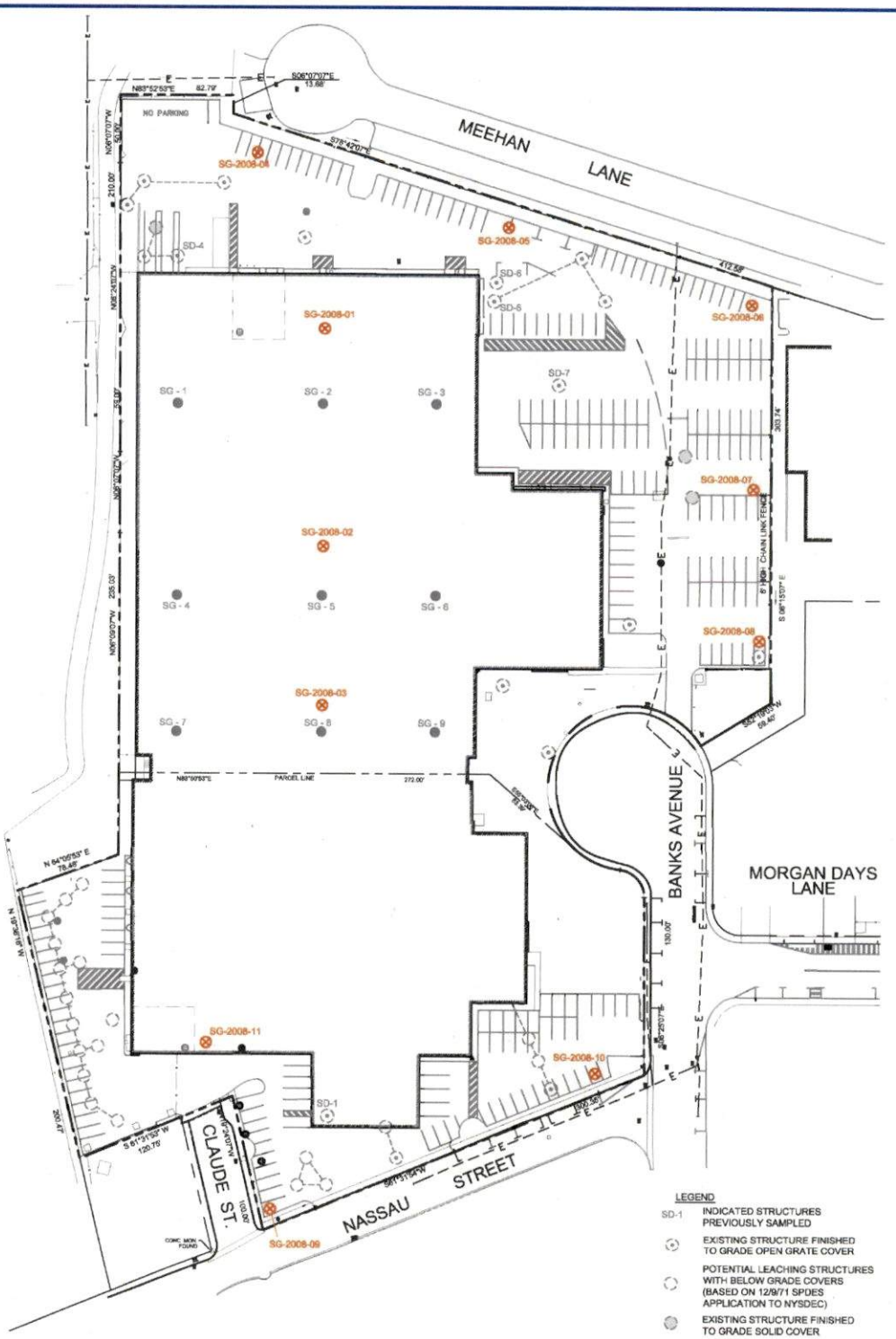
SHEET TITLE

DRAINAGE SYSTEM

80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO. 5

SHEET 5 of 9



LEGEND

- SD-1 INDICATED STRUCTURES PREVIOUSLY SAMPLED
- EXISTING STRUCTURE FINISHED TO GRADE OPEN GRATE COVER
- POTENTIAL LEACHING STRUCTURES WITH BELOW GRADE COVERS (BASED ON 12/9/71 SPDES APPLICATION TO NYSDEC)
- EXISTING STRUCTURE FINISHED TO GRADE SOLID COVER
- SUSPECTED DIFFUSION WELL
- SUSPECTED SUPPLY WELL
- PIPE
- DRAIN
- SG - 1 2004 SOIL GAS LOCATION
- SG-2008-01 PROPSED SOIL GAS LOCATION

PROPOSED SOIL GAS SAMPLE LOCATIONS

SCALE: 1"=80'

0 80 160

SCALE: 1" = 80'

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DRE-DRWD BY:	KEA	DATE:	3/6/08
DRAWN BY:	LLG	SCALE:	AS SHOWN

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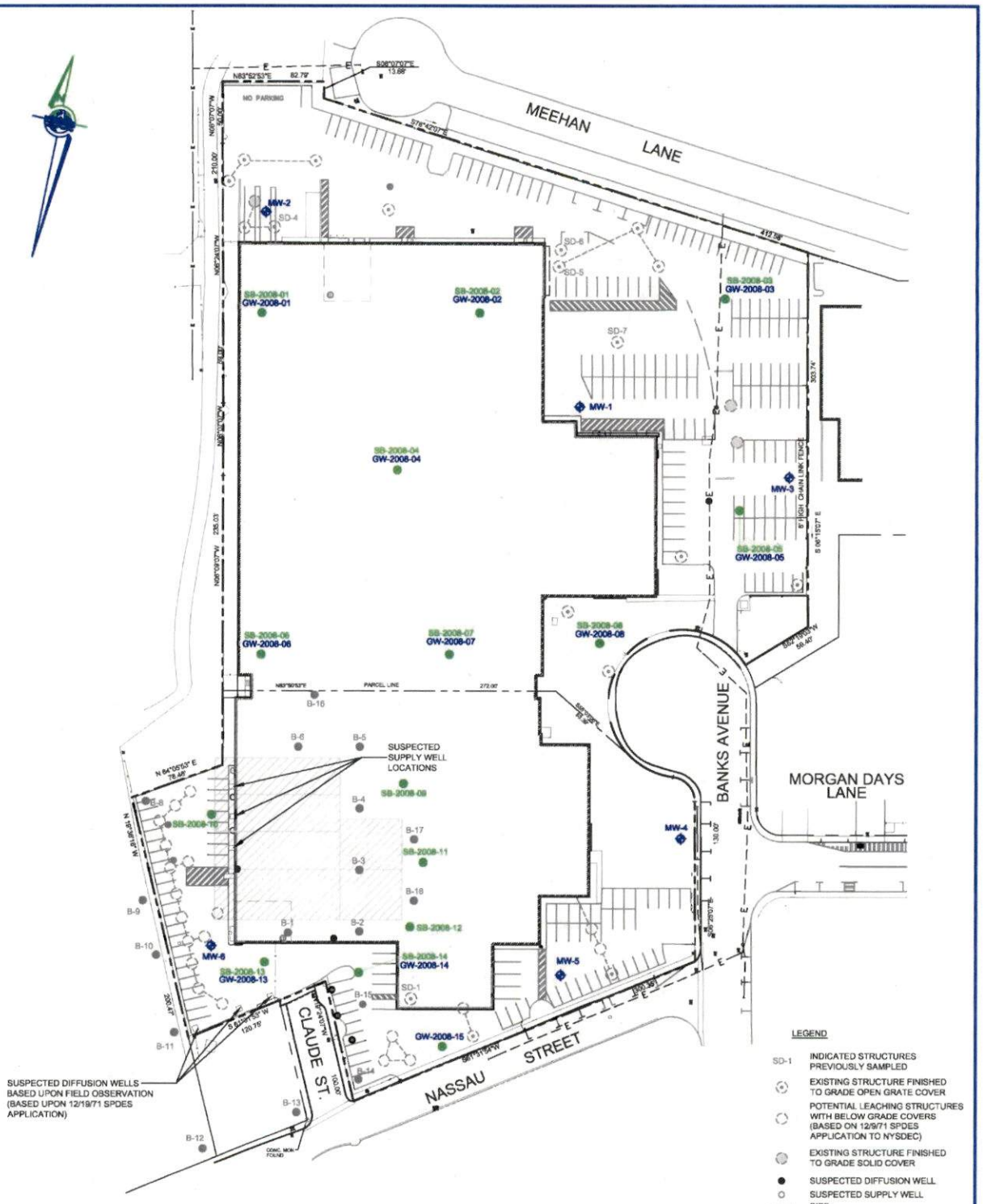
SHEET TITLE

PROPOSED SOIL GAS SAMPLE LOCATIONS

80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO 6

SHEET 6 OF 9



PROPOSED SOIL & GROUNDWATER SAMPLE LOCATIONS

SCALE: 1"=80'

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DRAWN BY:	LLG	SCALE:	AS SHOWN

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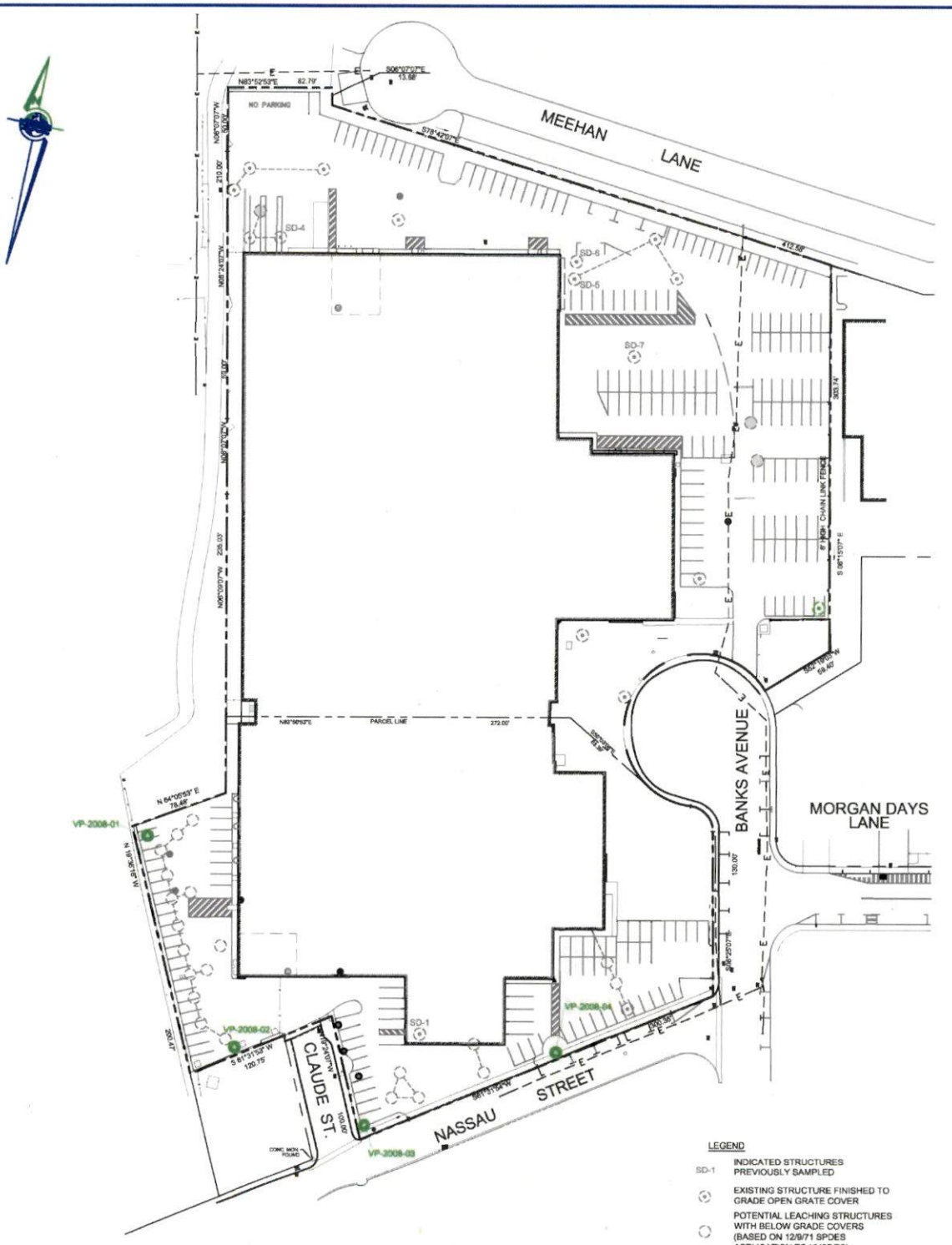
SHEET TITLE

PROPOSED SOIL & GROUNDWATER SAMPLE LOCATIONS

80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

FIGURE NO 7

SHEET 7 of 9



PROPOSED VERTICAL PROFILE GROUNDWATER SAMPLING LOCATIONS

SCALE: 1"=80'

0 80 160

SCALE: 1" = 80'

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DESIGNED BY:	KEA	DATE:	3/6/08
DRAWN BY:	LJG	SCALE:	AS SHOWN

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SHEET TITLE

PROPOSED VERTICAL PROFILE GROUNDWATER SAMPLING LOCATIONS 80-100 BANKS AVENUE ROCKVILLE CENTRE, NY

FIGURE NO 8

SHEET 8 OF 9

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL
CONSERVATION

HEATHER BISHOP

CONTRACT
P.W. GROSSER CONSULTANTS
(PWGC)

PROGRAM MANAGER AND QUALITY ASSURANCE/
QUALITY CONTROL (QA/QC) MANAGER
JAMES RHODES

PROJECT MANAGER
KRIS ALMSKOG

FIELD TEAM LEADER AND
HEALTH AND SAFETY OFFICER
THOMAS MELIA

CONTRACT SUPPORT SERVICES

DRILLING SERVICES
LABORATORY SERVICES
SURVEYING SERVICES
VALIDATION SERVICES

PROJECT MANAGEMENT
ORGANIZATION CHART
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NY

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Project	Designed by	Figure No.
AVB0801	TM	9
CADD Operator	Approved by	Date
LLC	PWG	3/10/08

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Strategic Environmental Engineering Solutions

APPENDIX A
NYSDEC CORRESPONDENCE

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 11th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9620 • **FAX:** (518) 402-9020
Website: www.dec.state.ny.us

Denise M. Sheehan
Acting
Commissioner

RECEIVED AUG 18 2005

August 15, 2005

Mr. Clark Hamilton
Managing Member
ARC Chase Partners, LLC
One Gateway Center Suite 230
11-43 Raymond Plaza West
Newark, New Jersey 07102

Re: Brownfield Cleanup Program
Former Darby Drugs, C130140
80-110 Banks Avenue
Rockville Centre, Town of Hempstead,Nassau County

Dear Mr. Hamilton:

The Department, in conjunction with the NYSDOH, has reviewed the draft Remedial Investigation Report for the Former Darby Drugs site and offers the following comments.

1. The procedures that were implemented in the field to collect the soil gas samples must be documented and included in the report.
2. The discharge points must be further investigated and identified for the four (4) interior drainage systems mentioned on page 8 of the report.
3. The suspected leaching structure in the vicinity of boring B8 must be further investigated.
4. Deeper groundwater beneath the clay layer should be investigated because it is possible that the three (3) injection wells discharged beneath the clay layer at the site. Appropriate precautions must be taken to prevent contamination from migrating below the clay layer during the investigation.
5. There appears to have been very limited soil and groundwater investigation in the northern portion of the property. This area may require further investigation.
6. To further delineate the potential for site related contamination to Smith Pond, sediment samples should be collected and analyzed for semi-volatile organic compounds, volatile organic compounds, and metals.

7. The qualitative exposure assessment (section 4.3) did not include possible dermal exposure. This route of exposure must be addressed in the qualitative exposure assessment.

8. There are several locations at which the level of contamination in the groundwater samples and the level of contamination in the soil samples do not coincide. The levels in the groundwater are higher than the levels in the soil would indicate they should be; sample locations B-2, B-4, B-6, B-15, and B-17. These inconsistencies should be addressed in the RI report. Based on the current data, the Department does not support the conclusion that remediation in these areas is not necessary because the soil sample is below the recommended soil cleanup guidance value.

9. High levels of PCE were detected in the groundwater near the south property line. An offsite threat assessment is necessary. Considering the VOC soil and groundwater contamination source areas that have been identified at the site, the potential soil vapor intrusion should be considered in the offsite threat assessment at the down gradient commercial and residential properties.

10. Based on the report, seven (7) drywells were sampled. Four of the seven drywells contained elevated levels of metals (SD-1 : 94 ppm chromium, SD-3 : 720 ppm lead, SD-4 : 2.9 ppm mercury, SD-6 : 1.5 ppm mercury). The other 17 drywells at the site should also be sampled. The four contaminated drywells mentioned above and any other contaminated drywells detected, based on the sampling results, will require evaluation and possible remediation.

11. In Section 2.4.2. Monitoring Well Installation, the report indicates that 1 inch permanent monitoring wells were installed with Geoprobe equipment. The NCDH does not accept 1 inch monitoring wells. Monitoring wells must have a minimum diameter of two (2) inches and should be drilled and properly developed. The 1 inch monitoring wells should be replaced with proper 2 inch wells.

12. The horizontal extent of soil contamination at the site needs to be further delineated.

13. Attention should be brought to grammatical errors found on the following pages: on page 5 under the potential injection wells paragraph, the word property is misspelled (*properly*). On page 7 in the last paragraph, there is an extra word in the first sentence. On page14 under 2.9.1 leaching structure results paragraph, there is an extra word in the first sentence.

14. On page 22 in the first paragraph, consultants reported that *"Previous investigations performed at the site identified a concentration of chlorinated VOCs, primarily PCE, in soils beneath the **southeast** portion of the building."* The majority of the investigation at this site was conducted in the southwest portion of the building. During the 2/10/05 meeting with the BCP candidate, it was indicated that this wording was an error. The wording should be corrected to read "southwest."

Please feel free to contact me if you have any questions.

Sincerely,

Daniel J. Eaton
Engineering Geologist

cc: M. Faltischek
C. Sosik

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 11th Floor
Albany, New York 12233-7015
Phone: (518) 402-9625 • **Fax:** (518) 402-9020 / (518) 402-9627
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

September 20, 2007

Mr. Charles B. Sosik
EBC Environmental Business Consultants
9 Peconic Road
Ridge NY 11961

RE: OU-2 Work Plan Review/Response
Darby Drugs Distribution Center.
80-100 Banks Avenue
Rockville Center, NY
Site No. C130140

Dear Mr. Sosik:

The New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH), have reviewed the Work Plan for Operable Unit 2 (OU-2), dated July 2007. The following is a list of comments provided by the two departments. Each of the comments must be addressed in a revised work plan or as an addendum to the current before the NYSDEC will grant approval.

Comments:

1. NYSDEC has recently learned that in 1971 Downen-Zier Knits applied for a State Pollutant Discharge Elimination System Permit (SPDES) in which they requested the approval to install 3 supply wells for cooling water. The application (see attachment) also identifies diffusion wells to return the water to aquifer and 14 leaching pools on the western side of the property. This confirms the long speculation of a leaching pool system on the west side of the building. The existence and location of the pools should be determined and sediment and groundwater sampling be completed on all the pools.

2. The work plan should include sampling beneath the clay layer. As the above noted permit request indicates, the diffusion wells punctured the clay layer. It is only an assumption that the clay layer has not been breached. No sampling has ever been completed below the clay layer in the area of the suspected plume. To assume that there is no contamination in the lower aquifer would be incorrect. According to the SPDES permit, three wells were installed at depths between 40' to 50' (i.e. below the clay layer). If the wells were not sealed correctly, contamination could have leaked into the lower aquifer. Another potential pathway to the aquifer are the three diffusion wells. These wells are noted to be at 37'-50', located on the south west side of the building. The diffusion wells were installed to dispense the water from the 3 supply wells after it was used in a closed loop cooling system for dry cleaning. It is possible, that heat exchanger leaks could provide a pathway to cross contamination, thus impacting the aquifer. Therefore, samples should be taken outside of the source area, to a depth between the clay and confining layers.

3. The transects should continue to the west and east, so as to identify the complete extent (width) of the plume. The three transects should extend to Smith Pond and Mill River.

4. If the plume is found to be discharging into the river, ground water samples should be taken from beneath the river.

5. The analysis should include testing for metals because metals such as antimony are often used in textile production. The TAL metals by methods 6010/7000 and TCL SVOC by 8270 should be included.

6. Soil vapor intrusion sampling should be completed in the adjacent buildings MTA bus terminal, hotel, Shiloh Baptist Church and Rockville Housing Authority building.

7. Include the following details on the public well field;
   1. Profile sampling should be completed on the west side of the water bodies and between the wells to determine if plume is being pulled towards the well field.
   2. Periodic sampling of the Centinel well should be completed to give warning of plume reaching the well field.

8. A DUSR (Data Usability Summary Report) is also required.

9. Since the second transect will not be started until results have returned from the first, the NYSDEC and NYSDOH request adequate time to review the sample report.

If you have any questions please feel free to contact me via phone or e-mail (prior to any formal letter response) at (518)-402-9622 or mebufali@gw.dec.state.ny.us

Sincerely,

Mark E. Bufalini
Project Manager
Remedial Bureau B

ec:

J. Yavonditte - NYSDEC
W. Parish - RHWRE Reg 1.
S. Karpinski - NYSDOH

State of New York

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Long Island Well Application No. W-2842

In the Matter of the Application

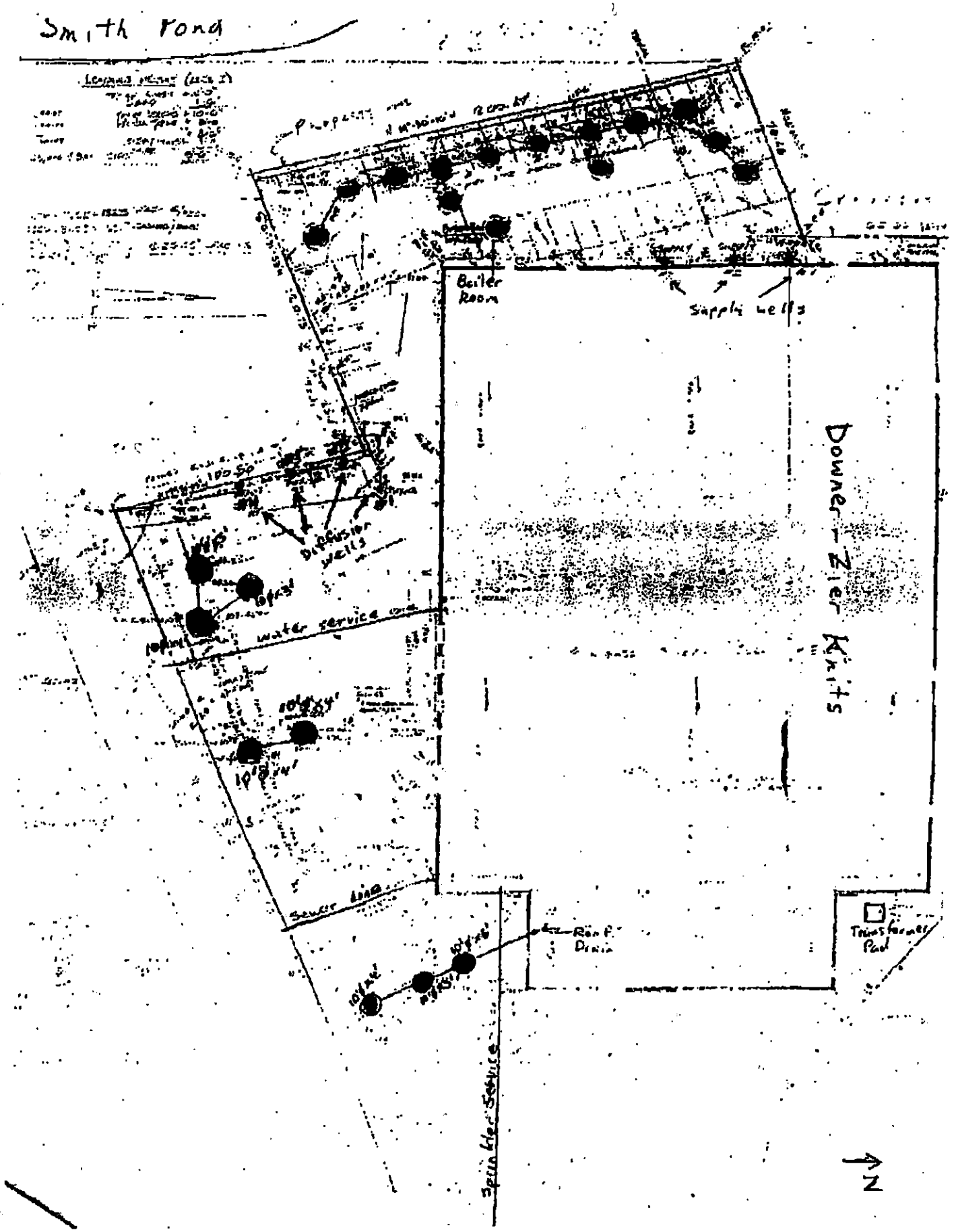
- of -

DOREEN-ZIER KNITS, INC.

for approval to install wells at its premises at Banks Avenue, Rockville Center, County of Nassau, State of New York.

D E C I S I O N

Application filed	December 9, 1971
Hearing held in Westbury	December 17, 1971
Decision	January 27, 1972


Smith Pond
Boiler Room
Supply wells
Downer-Zier Knits
Diffuser wells
water service
sewer line
Main Elec. Service
Trans former Pad
N

4. The water will be used about 300 days a year at an average rate of 360,000 gallons a day. Annual usage will not exceed 108 million gallons.

5. Water is to pass from the wells through a common supply header to the various cooling units, then through a common return header into 6 separate diffusion wells spaced at 20-foot intervals at a location about 150 feet southeast of the supply wells. There will be no outlets or connections in the system that will permit usage of this water for any other purpose.

6. There are no other wells on this property and water for all other purposes will be obtained from the Village of Rockville Center public supply system.

7. Since all water pumped from the proposed wells is to be returned to the same pumping zone, there will be no net loss to the underground strata or any adverse effect on any public supply wells. The nearest public supply wells are Nos. N-5656 and N-7521 of the Long Island Water Corp. located about 3/8 of a mile to the west.

CONDITIONS

The Department finds it to be necessary to protect the interests of the applicant and of the people of the State to impose the following conditions:

A. By authority of this decision and approval, applicant is authorized to use water pumped from this well or wells for cooling as indicated herein but for no other purpose whatsoever.

B. This water may be used only in a completely closed system and the water must be returned through the proposed diffusion well or wells, or some other equivalent satisfactory structure, to the zone in which the supply well is screened. Although each case will be decided on its particular merits, in general this zone will be considered to extend from 50 feet above the top of the supply well screen to 50 feet below the bottom of the supply well screen. In the event of multiple screen settings in the supply well or wells, the diffusion zone will probably be determined by the lowermost supply well screen. The above limits may be extended, if it can be established to the satisfaction of this Department that the proposed diffusion zone is freely interconnected with the supply well zone.

C. Detailed plans showing the proposed method of returning the water after use must be submitted to and approved by this Department before such work is started. Plans of a diffuser will be considered only after the stratification has been revealed by the pumping of the supply well. The entire project must be completed in accordance with approved plans.

D. No overflows or connections to sewers or cross-connections to any other source of water supply may be installed or maintained.

E. Upon completion of the proposed supply wells and before a permit to operate will be issued, applicant shall submit to the Department the results of an analysis made from a sample of water taken from the well or wells, as prescribed by the Department.

F. No chemical or polluting substance may be discharged in this water or into the diffusion well and the material used in this piping of the cooling system shall be of a nature reasonably resistant to corrosion which would pollute the water and tend to clog the diffusion well.

G. This entire plant and the apparatus connected therewith must at all reasonable hours be open to inspection and test by duly accredited agents of this Department and of the local water authorities.

H. This decision and approval shall not be held to grant exemption from general restrictions of the use of water for this particular purpose which may at any time be imposed by other competent authority.

I. The Department of Environmental Conservation reserves the right to reconsider this approval at any time and, after due notice and hearing, at that time to continue, rescind or modify this decision in such a manner as may be found to be just and equitable.

3. Unless all work authorized by the decision shall have been completed by February 1, 1975, or within such extended time as may have been applied for and granted by the Department, then and on that date this approval shall be deemed to have lapsed.

DETERMINATION

In view of the above, the Department of Environmental Conservation under the provisions of Section 4.6 of the Conservation Law, approves of this application as above modified.

APPENDIX B
HEALTH AND SAFETY PLAN

FORMER DARBY DRUGS DISTRIBUTION CENTER
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NEW YORK
BROWNFIELD CLEANUP PROGRAM ID: C130140

SUPPLEMENTAL REMEDIAL INVESTIGATION HEALTH AND SAFETY PLAN

Submitted To:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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Albany, New York 12233-7015

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PWGC Project Number: AVB0801

APRIL 2008

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STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to detail policies and procedures to prevent workers from exposure to chemical, biological, and physical hazards during the planned Remedial Investigation (RI) activities to be performed at the project site located at 80 – 100 Banks Avenue, Rockville Centre, New York. P.W. Grosser Consulting Inc.'s (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, medical monitoring, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this HASP. PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This HASP, which applies to persons present at the site who are actually or potentially exposed to safety or health hazards, describes emergency response procedures for actual and potential physical, biological and chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy.

1.0 INTRODUCTION

1.1 Purpose

This Health and Safety Plan (HASP) addresses the minimum health and safety practices that will be employed by site workers participating in remedial investigation (RI) activities at the project site located at the project site located in Rockville Centre, Nassau County, New York

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by P.W. Grosser Consulting, Inc. (PWGC), its subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. PWGC sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in this HASP and must be made available to PWGC.

Activities performed under this HASP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926 and all other applicable federal, state, and local regulations. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM). A copy of this HASP will be maintained on-site during work activities.

Refusal to comply with the HASP or violation of any safety procedures by field personnel may result in their immediate removal from the site following consultation with the HSM and the Field Team Leader (FTL)/Site Health and Safety Officer (SHSO).

1.2 Scope

This HASP addresses the potential hazards related to the RI activities. The primary RI activities include the following:

- Site Mobilization/Demobilization;
- Drilling, and;
- Soil and Groundwater Sampling

The potential hazards associated with this scope are listed below and are discussed in more detail in this HASP after the project organization and responsibilities section.

- Chemical Hazards
- Biological Hazards
- Physical Hazards

1.3 Application

The HASP applies to personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- PWGC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies the project organization and responsibilities.

2.1 Project Manager

- Participates in major incident investigations;
- Ensures that the HASP has required approvals before site work is conducted; and
- Has the overall project responsibility for project health and safety.

2.2 Field Team Leader (FTL)/ Site Health and Safety Officer (SHSO)

- Ensures that the HASP is implemented in conjunction with the Health and Safety Manager (HSM);
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the HSM is informed of project changes that require modifications to the HASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the site safety briefing;
- Reports to HSM to provide summaries of field operations and progress; and
- Acts as Emergency Coordinator.

2.3 Health and Safety Manager

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned SHSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and
- Assists in the investigation of major accidents.

2.4 Site Personnel

- Report any unsafe or potentially hazardous conditions to the FTL/SHSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP; and
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.

3.0 SITE HISTORY AND PROJECT DESCRIPTION

3.1 Project Background

The subject site is located at 80-100 Banks Avenue in Rockville Centre, New York and is currently improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building. The subject site was recently purchased by Avalon Bay Communities Inc., and was formerly owned by Darby Group Companies, Inc. (Darby), which ceased operation at the site in November 2000. Darby has occupied the building since 1978 and operated it as a pharmaceutical product warehouse and distribution center. Demolition of the existing structures and the phased development of two residential buildings consisting of a 100,492 square foot (footprint) north complex and a 60,128 square foot (footprint) south complex are planned.

The chlorinated solvent, tetrachloroethene (PCE), was first identified in shallow soil beneath the southwestern portion of the building, during a Phase II investigation performed at the site in November 2003. PCE is believed to have been released between 1972 and 1978 when a textile company leased the southern portion of the site (80 Banks Avenue). A Remedial Investigation (RI), performed in accordance with NYSDEC Draft DER-10, Technical Guidance for Site Investigation and Remediation (DER10), was initiated in March 2004, to characterize the nature and extent of PCE in soil and groundwater at the site. The results of the investigation, as documented in the Draft RI Report (PWGC, 8/04), recommended an Interim Remedial Measure (IRM) to remove mobile and residual dense non-aqueous phase liquid (DNAPL). The site was accepted into New York State's Brownfield Clean-up Program (BCP), and a Brownfield Clean-up Agreement (BCA) was executed on June 29, 2005. Upon review of the RI Report, NYSDEC provided multiple comments in an August 15, 2005 letter, including providing further detail about initial investigation sample collection techniques and the need to further evaluate and investigate additional on-site areas of concern.

An IRM Work Plan was approved by the NYSDEC May 12, 2006. The IRM Work Plan addresses source areas of PCE contamination, by removing DNAPL that has accumulated at a clay boundary (11-17 ft below surface), and by excavating residually impacted soils down to the clay surface. Due to ongoing land use litigation and transfer of property ownership, no portions of the IRM have been implemented to date.

A September 20, 2007 NYSDEC letter to EBC, the consultant representing Darby for the off-site investigation portion of the BCP, requested additional areas of concern to be investigated as part of the Work Plan for Operable Unit 2 (OU-2) (off-site). Although this letter was prepared to comment on the previously submitted OU-2 Work Plan, several of the comments requested further investigation within the property boundary, including investigation of 14 leaching pools on the western side of the building and groundwater sampling outside the source area beneath the clay layer. The letter included a copy of a 1971 State Pollution Discharge Elimination System Permit (SPDES) application for the site which detailed the location of three supply wells, four diffusion wells, and 14 leaching pools located on the western portion of the property. Although suspected during previous investigation, this application shows locations of the leaching pool system.

3.2 Site Location and Description

The subject site is located at 80-100 Banks Avenue in the Village of Rockville Centre, New York. The site is located within the Town of Hempstead and Nassau County. The site is situated at the northwest corner of the intersection of Nassau Street and Banks Avenue. The property is identified as Section 38, Block 539, Lots 27 and 30 by the Nassau County Department of Assessment. The site measures total of approximately 7.1 acres and is currently improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building, both of masonry construction.

4.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.0. Additional information can be found in **Appendix A** - Material Safety Data Sheets or in **Appendix B** - Activity Hazard Analyses.

4.1 Chemical Hazards

Review of historical information from the site indicates that the soil and groundwater at the site are contaminated primarily with volatile organic compounds (VOCs) especially PCE, which is present at ppm levels. Trichloroethene (TCE), 1,1,1-Trichloroetane (1,1,1-TCA), 2-Butanone, 1,2-Dichlorothene (1,2-DCE) and vinyl chloride are also present, but at ppb levels in the groundwater and/or soil. These compounds may present an occupational exposure hazard during site operations.

Specific information on the chemicals identified at the Site can be found in **Table 4-1** as well as on the Material Safety Data Sheets found in **Appendix A**.

TABLE 4-1
CHEMICAL DATA

COMPOUND	CAS#	OSHA PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Tetrachloroethene	127-18-4	100 ppm	Inhalation Ingestion Skin Absorption Skin Contact	Irritates eyes, nose, throat; nausea; flushed face & neck; vertigo, dizziness, incoordination, headache, somnolence; skin erythema; potential human carcinogen.	Skin, eyes, respiratory system, kidneys, liver, CNS	Vapor pressure, 14 mm Hg Chloroform like odor, IP= 9.32 eV
Trichloroethene	79-01-6	100 ppm	Inhalation Ingestion Skin Contact	Irritates eyes, throat; redness, tearing, blurred vision, vertigo, dizziness, incoordination, irregular heart beat, potential human carcinogen.	Heart, liver, kidneys, CNS	Vapor pressure, 60 mm Hg Irritating odor at high concentrations
Vinyl Chloride	75-01-04	1 ppm	Inhalation Ingestion Skin Contact	Mild irritation to eyes, blurred vision, dizziness, confusion, tingling in hands and feet, symptoms of frost bite, confirmed human carcinogen.	Liver, spleen, kidneys, respiratory system, CNS	Vapor pressure, 35.3 psig, sweet etheral odor
1,1,1-Trichloroethane	71-55-6	350 ppm	Inhalation Ingestion Skin Contact	Irritates eyes, skin; headache, lassitude, CNS depression, poor equilibrium; dermatitis; cardiac arrhythmia	Skin, eyes, liver, CNS, CVS	Vapor pressure, 100 mm Hg Chloroform like odor IP= 11.0 eV
2-Butanone	78-93-3	200 ppm	Inhalation Ingestion Skin Contact	Irritates eyes, nose, and throat; headache; dizziness; nausea; shortness of breath; skin redness and itching.	Skin, eyes, respiratory system, CNS	Vapor pressure, 78 mm Hg Sharp mint-like odor
1,2-Dichloroethene	156-60-5	200 ppm	Inhalation Ingestion Skin Absorption	Irritates eyes, nose, and throat; nausea; drowsiness.	Skin, eyes, respiratory system	Vapor pressure, 400 mm Hg Pleasant odor

Abbreviations

C = Ceiling limit, not to be exceeded
CNS = Central Nervous System
CVS = Cardiovascular System
TWA = Time-weighted average (8 hours)
IP = Ionization Potential
OSHA = Occupational Safety and Health Administration
ppm = parts per million
PEL=Permissible Exposure Limit
eV = Electron volt

4.2 Biological Hazards

The site is improved with a one-story, 150,000 square foot warehouse building and a 2-story 24,000 square foot office building, which are currently vacant. Potential exists for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analyses found in **Appendix B** includes specific hazards and control measures for each task, if applicable.

4.2.1 Animals

The Site is located in a predominantly commercial area. However, a small pond (Smith Pond) is located in close proximity to the Site which may support and attract some animals. Workers shall use discretion and avoid contact with animals.

4.2.2 Insects

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents and PPE, if deemed necessary, when working in areas where insects are expected to be present.

During the months of April through October, particular caution must be exercised to minimize exposure to deer ticks and the potential for contracting Lyme disease. Specific precautionary work practices that are recommended include the following:

- Cover your body as much as possible. Wear long pants and long sleeved shirts. Light color clothing makes spotting of ticks easier.

- Try to eliminate possible paths by which the Deer Tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles). If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized for added protection when the potential for heat stress is not a concern.

- Conduct periodic and frequent, (e.g., hourly), surveys of your clothing for the presence of ticks. Remove any tick, save it and report to the clinic with the tick.

- Use insect/tick repellents that contain the chemical DEET (n,n-Diethyltoluamide). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF.

4.2.3 Plants

Poison ivy and poison oak may be present at the site. The FTL/SHSO should identify the susceptible individuals. Worker shall avoid contact with these plants.

4.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in **Appendix B** for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

4.3.1 Temperature Extremes

Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment.

PWGC's Heat/Cold Stress Protocols are specified in **Appendix C**.

4.3.2 Steam, Heat and Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Splashing can also occur during well development and sampling activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds.

4.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, drill rigs, pumps and engines. Workers will wear hearing protection while in the work zone when these types of machinery are operating.

4.3.4 Fire and Explosion

When conducting excavation or drilling activities, the opportunity of encountering fire and explosion hazards may exist from encountering underground utilities, from the use of diesel engine equipment, and other potential ignition sources. During dry periods there is an increased chance of forest and brush fires starting at the job site. If these conditions occur no smoking will be permitted at the site and operations involving potential ignition sources will be monitored continuously (fire watch).

4.3.5 Manual Lifting/Material Handling

Manual lifting of heavy objects may be required. Failure to use proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common work place injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

4.3.6 *Slips, Trips and Falls*

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from rough terrain, surfaces that are steep inclines, surfaced debris, or surfaces which are wet from rain or ice. Falls may result in twisted ankles, broken bones, head trauma or back injuries.

4.3.7 *Heavy Equipment Operation*

A backhoe excavator/bobcat may be used to excavate test pits and a Geoprobe will be used to install soil borings and groundwater sampling points. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm.

4.3.8 *Electrocution*

Encountering underground utilities may pose electrical hazards to workers. Additionally, overhead electrical lines can be a concern during drilling operations. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

5.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during phase preparatory meetings.

AHAs have been developed by PWGC for the following phases of work:

1. Site Mobilization/Demobilization;
2. Excavation/Drilling;
3. Soil and Groundwater sampling; and
4. Decontamination

Copies of these AHAs are included in **Appendix B** of this HASP.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in **Table 6-1** represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on known potential hazards can be found under Section 4.0 and **Appendix B** - Activity Hazard Analyses. For the purposes of PPE selection, the HSM and FTL/SHSO are considered competent persons. The signatures on the approval page of the HASP constitute certification of the hazard assessment. For activities not covered by **Table 6-1**, the FTL/SHSO will conduct the hazard assessment, select the PPE, and document changes in the appropriate field logs. PPE selection will be made in consultation with the HSM.

Modifications for initial PPE selection may also be made by the FTL/SHSO in consultation with the HSM and changes documented accordingly. If major modifications occur, the HSM will notify the PM.

PPE Abbreviations

HEAD PROTECTION
HH = Hard Hat

HEARING PROTECTION
EP = ear plugs
EM = ear muffs

EYE/FACE PROTECTION
APR = Full Face Air Purifying Respirator
MFS = Mesh Face shield
PFS =Plastic Face shield
SG = ANSI approved safety glasses with side shields

FOOT PROTECTION
Neo = Neoprene
OB = Overboot
Poly = polyethylene coated boot
Rub = rubber slush boots
STB = Leather work boots with steel toe

HAND PROTECTION
Cot = cotton
But = Butyl
LWG = Leather Work Gloves
Neo = Neoprene
Nit = Nitrile
Sur = Surgical

BODY PROTECTION
WC = work clothes
Cot Cov = Cotton Coveralls
Poly = Polyethylene coated Tyvek® coveralls
Saran = Saranex coated coveralls
Tyvek® = Uncoated Tyvek® coveralls

RESPIRATORY PROTECTION
APR = Full-face air purifying respirator with organic vapor cartridges
ASR = Full face air supplied respirator with escape bottle
SCBA = Self-contained breathing apparatus

6.1 Hazard Assessment for Selection of Personal Protective Equipment

The initial selection of personal protective equipment for each task was done by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical hazards present;
- Work operations to be performed;
- Potential routes of exposure;
- Concentrations of contaminants present; and
- Characteristics, capabilities and limitations of PPE and any hazard that the PPE presents or magnifies.

A review of the analytical data from previous sampling events indicates that VOCs identified in **Table 4-1** are the primary contaminants of concern.

The exposure routes for these chemicals are inhalation, skin absorption, skin/eye contact and ingestion. Chemical protective gloves will be required for activities that involve sample handling and the likelihood for skin contact. The proper use of PPE and strict adherence to decontamination and personal hygiene procedures will effectively minimize skin contact and ingestion as potential routes of exposure.

TABLE 6-1
PERSONAL PROTECTIVE EQUIPMENT SELECTION

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/ Demobilization	HH	SG	STB	WG	WC	None	None
Excavation, loading and backfilling	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Drilling Activities	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Soil/GW sampling	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Decontamination	HH	SG	STB	Nit + Sur	WC, Tyvek® as needed	None	None initially APR if action levels exceeded

6.2 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. If the use of respirators is necessary, the respirator cartridge change-out schedule for this project will be as follows:

1. Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first; and
2. If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short of time period they were used the day before.

7.0 AIR MONITORING

Air monitoring will be performed for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at the site. Air monitoring will be used to help to confirm that the remedial work will not spread contamination off-site through the air. The primary concerns for this site are dust particulates. Although no VOCs have been reported during previous sampling events at the site monitoring with a photo-ionization detector (PID) will be performed during any invasive activities.

Real-time monitoring for dust and VOCs will be conducted both within the work area, and along the site perimeter, during intrusive activities such as excavation and drilling activities.

Level D level of protection will be utilized unless dust monitoring exceeds concentrations greater than 150 µg/m3 over daily background or PID readings in excess of 5.0 ppmv in the breathing zone are detected.

Detailed information on the types, frequency and location of real-time monitoring and community air monitoring requirements are provided in the Community Air Monitoring Plan prepared for this project.

8.0 ZONES, PROTECTION AND COMMUNICATION

8.1 Site Control

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized, as appropriate. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered or reduced due to work plan revisions. Should this occur, the work zones will be adjusted accordingly, and documented in the field logbook.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Support Zone - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - Activities which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an EZ. The FTL/SHSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site FTL/SHSO allowing adequate space for the activity to be completed, field members and emergency equipment.

8.2 Contamination Control

Decontamination areas will be established for the following activities.

- Drilling Activities

8.2.1 Personnel Decontamination Station

Personnel and portable equipment used in the EZ shall be subject to a thorough decontamination process, as deemed necessary by the FTL/SHSO. Sampling equipment shall be decontaminated. As necessary, boots and gloves will be decontaminated using soap and water solution and scrub brushes or by simple removal and

disposal. Used respiratory protective equipment will be decontaminated daily and sanitized with appropriate sanitizer solution.

Drums generated as a result of sampling and decontamination activities will be marked and stored at a designated area at the site until the materials can be property disposed of off-site. Non-expendable sampling equipment will be decontaminated. This usually entails the use of Alconox, solvent and distilled/deionized water rinses to eliminate contaminants.

8.3 Communication

Each team member will have a Nextel cell phone/radio for communication with the PM, FTL/SHSO and other team members during field activities.

Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist.	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

9.0 MEDICAL SURVEILLANCE PROCEDURES

Contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f).

10.0 SAFETY CONSIDERATIONS

10.1 General Health and Safety Work Practices

A list of general health and safety work practices is included as an included in **Appendix D**. The work rules will be posted in a conspicuous location at the site.

10.2 The Buddy System

At a minimum, employees shall work in groups of two in such a manner that they can observe each other and maintain line-of-sight for each employee within the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

10.3 Sample Handling

Personnel responsible for the handling of samples should wear the prescribed level of protection. Samples should be identified as to their hazard and packaged as to prevent spillage or breakage. Sample containers shall be decontaminated in the CRZ or EZ before entering a clean Support Zone area. Any unusual sample conditions, odors, or real-time readings should be noted. Laboratory personnel should be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling, in order to assure that the practices are appropriate for the suspected contaminants in the sample.

10.4 Drill Rigs

When conducting drilling activities, the opportunity of encountering fire and explosion hazards exists from underground utilities and gases. The locations of underground utilities will be verified prior to performing any intrusive activities. Additionally, because of the inherently hazardous nature of drilling operations, safety and accident prevention are crucial when drilling operations are performed. Most drilling accidents occur as a direct result of lack of training and supervision, improper handling of equipment, and unsafe work practices. Hazards include: assembling and disassembling rigs, rotary and auger drilling, and grouting. The drilling contractor shall perform drilling in accordance with its own Health & Safety Program for Drill Rig Safety.

10.4.1 Safety During Drilling Operations

- Safety requires the attention and cooperation of every worker and site visitor.
- Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick), look up to check for overhead obstructions.
- Maintain a minimum of 15 feet clearance from overhead electric lines.
- Before raising the mast (derrick), drill rig personnel (with the exception of the operator) and visitors shall be cleared from the areas immediately to the rear and the sides of the mast. Drill rig personnel and visitors shall be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid cribbing. Lower the mast (derrick) only when the leveling jacks are down and do not raise the leveling jack pads until the mast (derrick) is lowered completely.
- The operator of a drill rig shall only operate a drill rig from the position of the controls.

- Throwing or dropping tools shall not be permitted. Tools shall be carefully passed by hand between personnel or a hoist line shall be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.
- Unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors, or animals form stepping or falling into the hole.
- Terminate drilling operations during an electrical storm and move the entire crew away from the drill rig.

10.5 Excavation

Excavation, if necessary, will be performed in accordance with the requirements contained in 29 CFR 1926, Subpart P-Excavations. It provides for the designation of a "Competent Person" and general requirements for safe excavating practices. The program also incorporates company standards for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

The Competent Person will be the FTL or other designee with appropriate training and experience. The Competent Person will be assisted in his/her duties by other technical personnel such as the HSM, geologists, structural engineers and soils engineers.

11.0 DISPOSAL PROCEDURES

Discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site.

Potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. Non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed as applicable.

12.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, and preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

12.1 Responsibilities

12.1.1 Health and Safety Manager (HSM)

The HSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that pre-emergency requirements are met. The HSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

12.1.2 Field Team Leader/Site Health and Safety Officer (FTL/SHSO)

The FTL/SHSO is responsible for ensuring that personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The FTL/SHSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that OSHA is notified within the required time frame. The HSM will be notified of OSHA recordable injuries, fires, spills, releases or equipment damage in excess of $500 within 24 hours.

12.1.3 Emergency Coordinator

The Emergency Coordinator for the project is the FTL/SHSO.

The emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

12.1.4 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency.

12.2 Communication

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

12.2.1 Hand Signals

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

12.2.2 Field Radios and Cell Phones

PWGC field personnel are provided Nextel cellular phones with telephone and two-way radio capabilities for site communication and emergency use.

12.3 Local Emergency Support Units

A route map from the site to the nearest hospital can be found in **Appendix E**. This map will be placed with the above emergency telephone numbers in on-site vehicles.

12.4 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the FTL/SHSO immediately. First aid equipment will be available on site at the following locations:

First Aid Kit: Support Zone (or designated by FTL/SHSO upon arrival)

During site-specific training, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. **A map and directions to the hospital can be found in Appendix E.**

TABLE 12-1
EMERGENCY TELEPHONE NUMBERS

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	South Nassau Communities Hospital	(516) 632-3000
Ambulance		911
Project Manager/Health and Safety Manager	Kris Almskog - PWGC	(631) 589-6353
Site Health & Safety Officer	Tom Melia - PWGC	(631) 589-6353
NYSDEC Site Contact	Mark Bufalini	(518) 402-9623
Poison Control Center		(800) 962-1253
Chemtrec(for spills)		(800) 424-9300

12.5 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

Project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, the EC will notify site personnel. Heavy equipment will be shut down and personnel will evacuate the work areas and assemble at the evacuation meeting point, which will be determined upon arrival at the site by the FTL/SHSO, prior to work beginning. This will then be conveyed to crew members during the site-specific briefing.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation.

12.6 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

12.6.1 Fire Prevention

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on heavy equipment, in trailers and near hot work activities; and
- Monthly inspections of fire extinguishers.

12.7 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility.

12.8 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or postponed. The FTL/SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

12.9 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Health and Safety Manager;
- Project Manager; and
- The employer of any injured worker who is not a PWGC employee.

Written confirmation of verbal reports is to be completed by the FTL/SHSO using the Incident Report Form and submitted within 24 hours. The incident report and investigation form is found in **Appendix G**. If the employee involved is not a PWGC employee, his employer will receive a copy of the report.

12.10 Adverse Weather Conditions

In the event of adverse weather conditions, the FTL/SHSO will determine if work can continue without potentially risking the safety of field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The FTL/SHSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

12.11 Spill Control and Response

Small hazardous spills/environmental releases shall be contained as close as possible to the source. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. Spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill. The following seven steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the FTL/SHSO;
- If a flammable liquid, gas or vapor is involved, remove ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove surrounding materials that can react or compound with the spill.

12.12 Emergency Equipment

At a minimum, an industrial first aid kit and fire extinguishers (one per work area) shall be kept and maintained on-site during work activities.

13.0 TRAINING

13.1 General Health and Safety Training

In accordance with PWGC corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

13.1.1 Three Day Supervised On the Job Training

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

13.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

13.3 Site-Specific Training

Prior to commencement of field activities, field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

13.4 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the FTL/SHSO to assist site personnel in safely conducting their work activities. A copy of the Daily Briefing Sign-In Sheet is contained in **Appendix F**.

Briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. Briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. Meetings will also be an opportunity to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

13.5 First Aid

The HSM will identify those individuals requiring first aid training so that emergency medical treatment is available during field activities. It is anticipated that a minimum of one field person on-site at any one time will have first aid

training. The training will be consistent with the requirements of the American Red Cross Association or American Heart Association. If none are available on-site, then the HSM shall be notified.

14.0 LOGS, REPORTS AND RECORDKEEPING

Changes to the HASP will be documented in the Health and Safety log book and as appropriate, the HSM and/or PM will be notified. Daily tailgate meetings will be documented in the H&S log book as well as personnel on-site.

14.1 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained by the HSM. Records for subcontractor employees will also be maintained by the HSM.

14.2 Incident Report and Investigation Form

The incident report and investigation form is to be completed for each accident and incident, including near misses. The form can be found in **Appendix G.**

14.3 Health and Safety Logbooks

The FTL/SHSO will maintain a logbook during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. Logbooks will become part of the exposure records file.

15.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the FTL/SHSO as a project record. Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

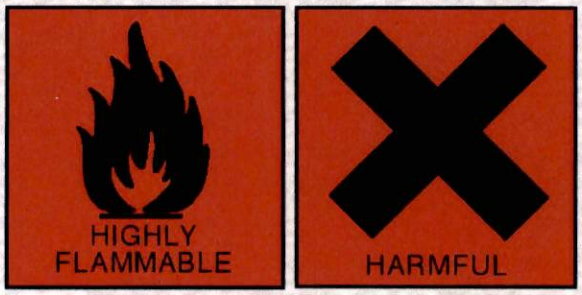
I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I will comply with the provisions contained therein.

Name (Print and Sign)	Date

APPENDIX A

MATERIAL SAFETY DATA SHEETS

Safety data for 1,1-dichloroethylene



Glossary of terms on this data sheet.

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

General

Synonyms: 1,1-dce, NCI-C54262, vinylidene chloride, sconatex, asym-dichloroethylene, 1,1-dichloroethene, VDC, vinylidene dichloride
Molecular formula: $C_2H_2Cl_2$

CAS No: 75-35-4
EC No: 200-864-0
Annex I Index No: 602-025-00-8

Physical data

Appearance: colourless liquid
Melting point: -122 C
Boiling point: 31.7 C
Vapour density: 3.46 g/l
Vapour pressure: 500 mm Hg at 20 C
Density (g cm^{-3}): 1.218
Flash point: -10 C

Explosion limits: 6.5 - 15.5%
Autoignition temperature:
Water solubility: moderate

Stability

Stable. Very flammable - note low flash point. Vapour may travel considerable distances to a source of ignition. Incompatible with strong oxidizing agents, alcohols, halides, sopper, aluminium. Rapidly absorbs oxygen from the air and forms explosive peroxides. Light and water promote self-polymerisation. May form explosive mixtures with air. Usually inhibited with a small amount (ca. 0.02%) of hydroquinone monomethyl ether.

Toxicology

Poison. Harmful if ingested, inhaled or absorbed through the skin. An experimental carcinogen, tumorigen, neoplastigen and teratogen. May cause systemic effects if inhaled. May cause reproductive damage. Note that a maximum exposure limit is defined for this material for use in the UK.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)
IHL-HMN TCLO 25 ppm
ORL-RAT LD50 200 mg kg^{-1}
ORL-MUS LD50 194 mg kg^{-1}
IVN-DOG LDLO 225 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R12 R20 R40. (Note: Annex I does not quote risk phrase R19. However, this material is reported to form peroxides when stored in contact with the air and should be handled as though R19 applies.)

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)

UN No 1303. Hazard class 3. Packing group I.

Personal protection

Safety glasses, gloves, good ventilation. Treat as a possible carcinogen. Remove all sources of ingition, including hot plates, from working area.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on March 29, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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1,2-DICHLOROETHYLENE

0436
May 2003

CAS No: 540-59-0
RTECS No: KV9360000
UN No: 1150
EC No: 602-026-00-3

1,2-Dichloroethene
Acetylene dichloride
symmetrical Dichloroethylene
$C_2H_2Cl_2$ / ClCH=CHCl
Molecular mass: 96.95

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE		**STRICT HYGIENE!**	
Inhalation	Cough. Sore throat. Dizziness. Nausea. Drowsiness. Weakness. Unconsciousness. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
Skin	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	**PACKAGING & LABELLING**
Remove all ignition sources. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: complete protective clothing including self-contained breathing apparatus.)	F Symbol Xn Symbol R: 11-20-52/53 S: (2-)7-16-29-61 Note: C UN Hazard Class: 3 UN Pack Group: II

EMERGENCY RESPONSE	**STORAGE**
Transport Emergency Card: TEC (R)-30GF1-I+II NFPA Code: H2; F3; R2	Fireproof. Well closed. See Chemical Dangers.

IPCS
International Programme on Chemical Safety

UNEP

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SEE IMPORTANT INFORMATION ON THE BACK.

IMPORTANT DATA

Physical State; Appearance
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

Physical dangers
The vapour is heavier than air and may travel along the ground; distant ignition possible.

Chemical dangers
The substance decomposes on heating or under the influence of air, light and moisture producing toxic and corrosive fumes including hydrogen chloride. Reacts with strong oxidants. Reacts with copper or copper alloys, and bases to produce toxic chloroacetylene which is spontaneously flammable in contact with air. Attacks plastic.

Occupational exposure limits
TLV: 200 ppm as TWA; (ACGIH 2003).
MAK: 200 ppm, 800 mg/m^3; Peak limitation category: II(2); (DFG 2002).

Routes of exposure
The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

Inhalation risk
A harmful contamination of the air will be reached quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

Effects of short-term exposure
The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system at high levels, resulting in lowering of consciousness.

Effects of long-term or repeated exposure
The liquid defats the skin. The substance may have effects on the liver.

PHYSICAL PROPERTIES

Boiling point: 55°C
Relative density (water = 1): 1.28
Solubility in water: poor
Relative vapour density (air = 1): 3.34
Flash point: 2°C c.c.
Auto-ignition temperature: 460°C
Explosive limits, vol% in air: 9.7-12.8
Octanol/water partition coefficient as log Pow: 2

ENVIRONMENTAL DATA

NOTES

This compound has two isomers, cis and trans. Data for the isomers: cis-isomer (CAS 156-59-2), trans isomer (CAS 156-60-5); other boiling point 60.3, melting point -81.5°C (cis), -49.4°C (trans); flash point c.c. 6°C (cis), 2-4°C (trans); relative density (water = 1) 1.28 (cis), 1.26 (trans); vapour pressure 24.0 kPa (cis), 35.3 kPa (trans) at 20°C; relative density of the vapour/air-mixture at 20°C (air = 1): 1.6 (cis), 1.8 (trans); octanol/water partition coefficient as log Pow: 1.86 (cis), 2.09 (trans).
Depending on the degree of exposure, periodic medical examination is suggested.

ADDITIONAL INFORMATION

LEGAL NOTICE Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

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1,1,1-TRICHLOROETHANE

0079
October 1994

CAS No: 71-55-6
RTECS No: KJ2975000
UN No: 2831
EC No: 602-013-00-2

Methyl chloroform
Methyltrichloromethane
alpha-Trichloroethane
$C_2H_3Cl_3$ / CCl_3CH_3
Molecular mass: 133.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. Heating will cause rise in pressure with risk of bursting. See Notes. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE		PREVENT GENERATION OF MISTS!	
Inhalation	Headache. Dizziness. Drowsiness. Nausea. Ataxia. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
Skin	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Diarrhoea. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Ventilation. Collect leaking and spilled liquid in sealable, suitable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.	Xn Symbol N Symbol R: 20-59 S: (2-)24/25-59-61 Note: F UN Hazard Class: 6.1 UN Pack Group: III	Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61S2831 NFPA Code: H2; F1; R0	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Ventilation along the floor.

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SEE IMPORTANT INFORMATION ON THE BACK.

IMPORTANT DATA

Physical State; Appearance
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

Physical dangers
The vapour is heavier than air.

Chemical dangers
The substance decomposes on heating or on burning producing toxic and corrosive fumes including phosgene and hydrogen chloride. Reacts violently with aluminium, manganese and their alloys, alkalis, strong oxidants, acetone and zinc. Attacks natural rubber. Mixtures of 1,1,1-trichloroethane with potassium or its alloys are shock sensitive. Reacts slowly with water releasing corrosive hydrochloric acid.

Occupational exposure limits
TLV: 350 ppm as TWA, 450 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2004).
MAK: 200 ppm, 1100 mg/m^3; Peak limitation category: II(1); skin absorption (H); Pregnancy risk group: C; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

Inhalation risk
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20 C.

Effects of short-term exposure
The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the heart, central nervous system and liver, resulting in cardiac disorders and respiratory failure. Exposure at high levels may result in death. Medical observation is indicated.

Effects of long-term or repeated exposure
The liquid defats the skin. The substance may have effects on the liver.

PHYSICAL PROPERTIES

Boiling point: 74 C
Melting point: -30 C
Relative density (water = 1): 1.34
Solubility in water: none
Vapour pressure, kPa at 20 C: 13.3
Relative vapour density (air = 1): 4.6
Flash point: see Notes
Auto-ignition temperature: 537 C
Explosive limits, vol% in air: 8-16
Octanol/water partition coefficient as log Pow: 2.49

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to air quality and ground water contamination.

NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions.
The substance burns only in excess oxygen or if a strong source of ignition is present.
Use of alcoholic beverages enhances the harmful effect.
Depending on the degree of exposure, periodic medical examination is suggested.
An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.
Do NOT use in the vicinity of a fire or a hot surface, or during welding.
Aerothene, Algylen, Trichloran, Chlorylen, Genklene, Chlorothene NU, Chlorothene VG, and Solvent 111 are trade names.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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BENZ(a)ANTHRACENE

0385
October 1995

CAS No: 56-55-3
RTECS No: CV9275000
EC No: 601-033-00-9

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		**AVOID ALL CONTACT!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety goggles, face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	T Symbol N Symbol R: 45-50/53 S: 53-45-60-61

EMERGENCY RESPONSE	SAFE STORAGE
	Well closed.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS TO YELLOW - BROWN FLUORESCENT FLAKES OR POWDER.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Occupational exposure limits
TLV: A2 (suspected human carcinogen); (ACGIH 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

Inhalation risk
Evaporation at 20 C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

Effects of long-term or repeated exposure
This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Sublimation point: 435 C
Melting point: 162 C
Relative density (water = 1): 1.274

Solubility in water: none
Vapour pressure, Pa at 20 C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form.
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.
Do NOT take working clothes home.
Tetraphene is a common name.
Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification.

ADDITIONAL INFORMATION

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CHROMIUM

0029
October 2004

CAS No: 7440-47-3
RTECS No: GB4200000

Chrome
(powder)
Cr
Atomic mass: 52.0

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		**PREVENT DISPERSION OF DUST!**	
Inhalation	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.	

EMERGENCY RESPONSE	SAFE STORAGE

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IMPORTANT DATA

Physical State; Appearance
GREY POWDER

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.

Occupational exposure limits
TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m^3 as TWA; A4; (ACGIH 2004).
MAK not established.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed.

Effects of short-term exposure
May cause mechanical irritation to the eyes and the respiratory tract.

PHYSICAL PROPERTIES

Boiling point: 2642 C
Melting point: 1900 C
Density: 7.15 g/cm^3
Solubility in water: none

ENVIRONMENTAL DATA

NOTES

The surface of the chromium particles is oxidized to chromium(III)oxide in air.
See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

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CHRYSENE

1672
October 2006

CAS No: 218-01-9
RTECS No: GC0700000
UN No: 3077
EC No: 601-048-00-0

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	**See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.**	**AVOID ALL CONTACT!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL

Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

PACKAGING & LABELLING

EU classification
T Symbol
N Symbol
R: 45-68-50/53
S: 53-45-60-61
UN classification
UN Hazard Class: 9
UN Pack Group: III
GHS classification
Signal: Warning
Health haz-Enviro
Suspected of causing cancer
Very toxic to aquatic life
Toxic to aquatic life with long lasting effects

EMERGENCY RESPONSE

Transport Emergency Card: TEC (R)-90GM7-III

SAFE STORAGE

Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS TO BEIGE CRYSTALS OR POWDER

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
The substance decomposes on burning producing toxic fumes. Reacts violently with strong oxidants.

Occupational exposure limits
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK: skin absorption (H); Carcinogen category: 2 (DFG 2007).

Routes of exposure
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed.

Effects of long-term or repeated exposure
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 448 C
Melting point: 254 - 256 C
Density: 1.3 g/cm^3

Solubility in water: very poor
Octanol/water partition coefficient as log Pow: 5.9

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.
This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.
Card has been partially updated in January 2008: see Occupational Exposure Limits.

ADDITIONAL INFORMATION

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DIBENZO(a,h)ANTHRACENE

0431

October 1995

CAS No: 53-70-3
RTECS No: HN2625000
EC No: 601-041-00-2

1,2:5,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		**AVOID ALL CONTACT!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	T Symbol N Symbol R: 45-50/53 S: 53-45-60-61

EMERGENCY RESPONSE	SAFE STORAGE
	Well closed.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS CRYSTALLINE POWDER.

Occupational exposure limits
TLV not established.

Routes of exposure
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

Inhalation risk
Evaporation at 20 C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

Effects of long-term or repeated exposure
The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 524 C
Melting point: 267 C
Relative density (water = 1): 1.28

Solubility in water: none
Octanol/water partition coefficient as log Pow: 6.5

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

NOTES

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form.
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.
Do NOT take working clothes home.
DBA is a commonly used name.
This substance is one of many polycyclic aromatic hydrocarbons (PAH).
Card has been partly updated in October 2005. See section EU classification.

ADDITIONAL INFORMATION

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DIETHYL PHTHALATE

0258
March 2001

CAS No: 84-66-2
RTECS No: TI1050000

1,2-Benzenedicarboxylic acid diethyl ester
DEP
$C_6H_4(COOC_2H_5)_2$ / $C_{12}H_{14}O_4$
Molecular mass: 222.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE			
Inhalation	Dizziness. Dullness.	Ventilation. Local exhaust.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea.	Do not eat, drink, or smoke during work.	Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Personal protection: particulate filter adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.	

EMERGENCY RESPONSE	SAFE STORAGE
NFPA Code: H 0; F 1; R 0	

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS OILY LIQUID

Chemical dangers
The substance decomposes on heating or on burning producing toxic fumes and gases (phthalic anhydride - see ICSC 0315). Attacks some plastics.

Occupational exposure limits
TLV: 5 mg/m^3 as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005).
MAK not established.

Routes of exposure
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

Inhalation risk
A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20 C.

PHYSICAL PROPERTIES

Boiling point: 295 C
Melting point: -67 to -44 C
Relative density (water = 1): 1.1
Solubility in water, g/100 ml at 25 C: none
Relative vapour density (air = 1): 7.7

Flash point: 117 C (c.c.)
Auto-ignition temperature: 457 C
Explosive limits, vol% in air: 0.7%- ?
Octanol/water partition coefficient as log Pow: 2.47

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to fish.

NOTES

Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.
Card has been partially updated in July 2007: see Spillage Disposal.

ADDITIONAL INFORMATION

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LEAD

0052
October 2002

CAS No: 7439-92-1
RTECS No: OF7525000

Lead metal
Plumbum
(powder)
Pb
Atomic mass: 207.2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	**See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.**	**PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	

EMERGENCY RESPONSE	SAFE STORAGE
	Separated from food and feedstuffs and incompatible materials. See Chemical Dangers.

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IMPORTANT DATA

Physical State; Appearance
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

Occupational exposure limits
TLV: 0.05 mg/m^3 as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m^3; (EU 2002).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of long-term or repeated exposure
The substance may have effects on the blood, bone marrow, central nervous system, peripheral nervous system and kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 1740 C
Melting point: 327.5 C
Density: 11.34 g/cm^3
Solubility in water: none

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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MERCURY

0056
April 2004

CAS No: 7439-97-6
RTECS No: OV4550000
UN No: 2809
EC No: 080-001-00-0

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		**STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!**	**IN ALL CASES CONSULT A DOCTOR!**
Inhalation	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
Skin	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eyes		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	T Symbol N Symbol R: 23-33-50/53 S: (1/2-)7-45-60-61 UN Hazard Class: 8 UN Pack Group: III	Special material. Do not transport with food and feedstuffs.

EMERGENCY RESPONSE	STORAGE
Transport Emergency Card: TEC (R)-80GC9-II+III	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed.

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IMPORTANT DATA

Physical State; Appearance
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

Chemical dangers
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

Occupational exposure limits
TLV: 0.025 mg/m^3 as TWA; (skin); A4; BEI issued; (ACGIH 2004).
MAK: 0.1 mg/m^3; Sh; Peak limitation category: II(8); Carcinogen category: 3B; (DFG 2003).

Routes of exposure
The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!

Inhalation risk
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 C.

Effects of short-term exposure
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.

Effects of long-term or repeated exposure
The substance may have effects on the central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357 C
Melting point: -39 C
Relative density (water = 1): 13.5
Solubility in water: none
Vapour pressure, Pa at 20 C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20 C (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

NOTES

Depending on the degree of exposure, periodic medical examination is indicated.
No odour warning if toxic concentrations are present.
Do NOT take working clothes home.

ADDITIONAL INFORMATION

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SELENIUM

0072
April 1993

CAS No: 7782-49-2 (powder)
RTECS No: VS7700000 Se
EC No: 034-001-00-2 Atomic mass: 79.0

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide. NO water.
EXPLOSION	Risk of fire and explosion on contact with oxidants.		
EXPOSURE		**PREVENT DISPERSION OF DUST! STRICT HYGIENE!**	
Inhalation	Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
Skin	Redness. Skin burns. Pain. Discolouration.	Protective gloves. Protective clothing.	Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes.
Eyes	Redness. Pain. Blurred vision.	Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	T Symbol R: 23/25-33-53 S: (1/2-)20/21-28-45-61	Airtight. Do not transport with food and feedstuffs.

EMERGENCY RESPONSE	SAFE STORAGE
	Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs. Dry.

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IMPORTANT DATA

Physical State; Appearance
ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.

Chemical dangers
Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids. Reacts with water at 50 C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.

Occupational exposure limits
TLV: 0.2 mg/m^3 as TWA; (ACGIH 2004).
MAK: (Inhalable fraction) 0.05 mg/m^3; Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

Inhalation risk
Evaporation at 20 C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of short-term exposure
The substance is irritating to the eyes and the respiratory tract. Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. The effects may be delayed.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin, resulting in nausea, vomiting, cough, yellowish skin discolouration, loss of nails, garlic breath and bad teeth.

PHYSICAL PROPERTIES

Boiling point: 685 C
Melting point: 170-217 C
Relative density (water = 1): 4.8
Solubility in water: none
Vapour pressure, Pa at 20 C: 0.1

ENVIRONMENTAL DATA

NOTES

Do NOT take working clothes home.
Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

ADDITIONAL INFORMATION

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TETRACHLOROETHYLENE

0076
April 2000

CAS No: 127-18-4
RTECS No: KX3850000
UN No: 1897
EC No: 602-028-00-4

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C=CCl_2$
Molecular mass: 165.8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		**STRICT HYGIENE! PREVENT GENERATION OF MISTS!**	
Inhalation	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
Skin	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness. Pain.	Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Xn Symbol N Symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Pack Group: III	Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61S1897 NFPA Code: H2; F0; R0	Separated from metals, (see Chemical Dangers), food and feedstuffs. Keep in the dark. Ventilation along the floor.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

Physical dangers
The vapour is heavier than air.

Chemical dangers
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

Occupational exposure limits
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H); Carcinogen category: 3B; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20 C.

Effects of short-term exposure
The substance is irritating to the eyes, the skin and the respiratory tract. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 121 C
Melting point: -22 C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20 C: 0.015
Vapour pressure, kPa at 20 C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20 C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
The odour warning when the exposure limit value is exceeded is insufficient.
Do NOT use in the vicinity of a fire or a hot surface, or during welding.
An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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TRICHLOROETHYLENE

0081
October 2000

CAS No: 79-01-6
RTECS No: KX4550000
UN No: 1710
EC No: 602-027-00-9

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
C_2HCl_3 / $ClCH=CCl_2$
Molecular mass: 131.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		**PREVENT GENERATION OF MISTS! STRICT HYGIENE!**	
Inhalation	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
Skin	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.	T Symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Pack Group: III	Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61S1710 NFPA Code: H2; F1; R0	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs. Dry. Keep in the dark. Ventilation along the floor.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

Physical dangers
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

Chemical dangers
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene, hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene, which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

Occupational exposure limits
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK: Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20 C.

Effects of short-term exposure
The substance is irritating to the eyes and the skin. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system, resulting in respiratory failure. Exposure could cause lowering of consciousness.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system, resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 87 C
Melting point: -73 C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20 C: 0.1
Vapour pressure, kPa at 20 C: 7.8
Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20 C (air = 1): 1.3
Auto-ignition temperature: 410 C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions.
Use of alcoholic beverages enhances the harmful effect.
Depending on the degree of exposure, periodic medical examination is suggested.
The odour warning when the exposure limit value is exceeded is insufficient.
Do NOT use in the vicinity of a fire or a hot surface, or during welding.
An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.
Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

ADDITIONAL INFORMATION

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VINYL CHLORIDE

0082
April 2000

CAS No: 75-01-4
RTECS No: KU9625000
UN No: 1086 (stabilized)
EC No: 602-023-00-7

Chloroethene
Chloroethylene
VCM
(cylinder)
C_2H_3Cl / $H_2C=CHCl$
Molecular mass: 62.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.

EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
Inhalation	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
Skin	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
Eyes	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.	F+ Symbol T Symbol R: 45-12 S: 53-45 Note: D UN Hazard Class: 2.1

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-20S1086 NFPA Code: H 2; F 4; R 2	Fireproof. Separated from incompatible materials. (See Chemical Dangers.) Cool. Store only if stabilized.

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IMPORTANT DATA

Physical State; Appearance
COLOURLESS COMPRESSED LIQUEFIED GAS, WITH CHARACTERISTIC ODOUR.

Physical dangers
The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

Chemical dangers
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride, phosgene). Attacks iron and steel in the presence of moisture.

Occupational exposure limits
TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).
MAK: Carcinogen category: 1; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation.

Inhalation risk
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

Effects of short-term exposure
The substance is irritating to the eyes. The liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure could cause lowering of consciousness. Medical observation is indicated.

Effects of long-term or repeated exposure
The substance may have effects on the liver, spleen, blood and peripheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: -13 C
Melting point: -154 C
Relative density (water = 1): 0.9 (liquid)
Density: 8 (vapour) at 15 C g/l
Solubility in water: none
Relative vapour density (air = 1): 2.2
Flash point: -78 C c.c.
Auto-ignition temperature: 472 C
Explosive limits, vol% in air: 3.6-33
Octanol/water partition coefficient as log Pow: 0.6

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to ground water contamination.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
The odour warning when the exposure limit value is exceeded is insufficient.
Do NOT use in the vicinity of a fire or a hot surface, or during welding.
An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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APPENDIX B

ACTIVITY HAZARD ANALYSES

Project Identification 80-100 Banks Avenue	**Location** Rockville Centre, NY	**Estimated Dates** TBD
Phase of Work Mobilization/ Demobilization	**Page 1 of 1**	**Analysis Approved by** Kris Almskog, PM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Mobilization and demobilization of equipment site tools, personnel	Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Vehicular traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.
	Noise	• Ear plugs or ear muffs shall be worn for operations that exceed 85 decibels.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (50 kV). This distance will increase .4 inches for each 1 kV above 50 kV.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.

Project Identification 80-100 Banks Avenue	**Location** Rockville Centre, NY	**Estimated Dates** TBD
Phase of Work Drilling	**Page 1 of 2**	**Analysis Approved by** Kris Almskog, PM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Drill to required depths and collect soil samples/install groundwater sampling points.	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Perform air monitoring per Community Air Monitoring Plan; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Hand and power tool usage	• Equip electrical equipment with GFCI's; • Inspect electrical equipment and tools prior to use; • Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; • Use in accordance with manufacturer instructions; and Tag and remove defective equipment.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and, • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Fire/Explosion	• ABC type fire extinguishers shall be readily available; • No smoking in work area.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.
	Heavy equipment	• Ground personnel will stay clear of suspended loads; • Ground personnel will stay out of the swing radius; • Eye contact with operators will be made before approaching equipment; • Equipment will not be approached on blind sides; • Equipment will be equipped with backup alarms or spotters shall be used.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and mark and repair if possible tripping hazards are present.

Project Identification 80-100 Banks Avenue	**Location** Rockville Centre, NY	**Estimated Dates** TBD
Phase of Work Drilling	**Page 2 of 2**	**Analysis Approved by** Kris Almskog, PM
TASKS	**HAZARDS**	**CONTROL MEASURES**
	Noise	• Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear heating protective devices. • Disposable ear plugs or other hearing protection required when working near noisy equipment..
	Steam/Heat/Splashing	• Use face shield and safety glasses or goggles; • Stay out of the splash/steam radius; • Do not direct steam at anyone; • Do not hold objects with your foot and steam area near it; • Direct spray to minimize spread of constituents of concern; and • Use shielding as necessary.
	Excavation hazards	• Follow 29 CFR 1926 Subpart P.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.

Project Identification 80-100 Banks Avenue	**Location** Rockville Centre, NY	**Estimated Dates** TBD
Phase of Work Soil/Groundwater Sampling	**Page 1 of 1**	**Analysis Approved by** Kris Almskog, PM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Collect soil/groundwater samples.	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.

Project Identification 80-100 Banks Avenue	**Location** Rockville Centre, NY	**Estimated Dates** TBD
Phase of Work Decontamination	**Page 1 of 1**	**Analysis Approved by** Kris Almskog, PM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Decontaminate equipment	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.

APPENDIX C

HEAT/COLD STRESS PROTOCOLS

HEAT STRESS

Heat Stress (Hyperthermia)

Heat stress is the body's inability to regulate the core temperature. A worker's susceptibility to heat stress can vary according to his/her physical fitness, degree of acclimation to heat, humidity, age and diet.

1. Prior to site activity, the field team leader may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature, and body water loss) during actual site work if conditions warrant. In addition, the FTL is to ensure that each team member has been acclimatized to the prevailing environmental conditions, that personnel are aware of the signs and symptoms of heat sickness, that they have been adequately trained in first aid procedures, and that there are enough personnel on-site to rotate work assignments and schedule work during hours of reduced temperatures. Personnel should not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.

2. Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, some indicators are tobacco or medication use, dietary habits, body weight, and chronic conditions such as high blood pressure or diabetes.

3. *Heat cramps*, caused by profuse perspiration with inadequate fluid intake and salt replacement, most often afflict people in good physical condition who work in high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress rapidly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and replace lost fluids with water.

4. Thirst is not an adequate indicator of heat exposure. Drinking fluid by itself does not indicate sufficient water replacement during heat exposure. A general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every half pound of water lost, 8 ounces of water should be ingested. Water should be replaced by drinking 2 – 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink split 50/50 with water.

5. *Heat exhaustion* results from salt and water loss along with peripheral pooling of blood. Like heat cramps, heat exhaustion tends to occur in persons in good physical health who are working in high temperatures and humidity. Heat exhaustion may come on suddenly as dizziness and collapse. Untreated, heat exhaustion may progress to heat stroke.

6. *Treatment for heat exhaustion*: Move the victim to a cool environment (e.g. air-conditioned room/car), lay victim down and fan him/her. If the air-conditioning is not available, remove the victim to a shaded area, remove shirt, and fan. If symptoms do not subside within an hour, notify 911 to transport to hospital.

7. *Heat stroke* results from the body's inability to dissipate excess heat. A true medical emergency that requires immediate care, it usually occurs when one ignores the signs of heat exhaustion and continues strenuous activities. Working when the relative humidity exceeds 60% is a particular problem. Workers in the early phase of heat stress may not be coherent of they will be confused, delirious or comatose. Changes in behavior, irritability and combativeness are useful early signs of heat stroke.

8. *Treatment of heat stroke*: Move the victim to a cool, air-conditioned environment. Place victim in a semi-reclined position with head elevated and strip to underclothing. Cool victim as rapidly as possible, applying ice packs to the arms and legs and massaging the neck and torso. Spray victim with tepid water and constantly fan to promote evaporation. Notify 911 to transport to hospital as soon as possible.

TABLE 1

SYMPTOMS OF HEAT STRESS

Heat cramps are caused by heavy sweating with inadequate fluid intake. Symptoms include;

- Muscle cramps
- Cramps in the hands, legs, feet and abdomen

Heat exhaustion occurs when body organs attempt to keep the body cool. Symptoms include;

- Pale, cool moist skin
- Core temperature elevated 1-2°
- Thirst
- Anxiety
- Rapid heart rate
- Heavy sweating
- Dizziness
- Nausea

Heat stroke is the most serious form of heat stress. Immediate action must be taken to cool the body before serious injury and death occur. Symptoms are;

- Red, hot, dry skin
- Lack of perspiration
- Seizures
- Dizziness and confusion
- Strong, rapid pulse
- Core temperature of 104° or above
- Coma

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TABLE 2

HEAT STRESS INDICATORS

Heat stress indicator	When to measure	If Exceeds…	Action
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99°F (after thermometer is under tongue for 3 minutes) 100.6°F	Shorten next work period by 33% Prohibit work in impermeable clothing
Body weight	1. Before workday begins (a.m.) 2. After workday ends (p.m.)		Increase fluid intake

COLD STRESS

Cold stress (Hypothermia)

In hypothermia the core body temperature drops below 95°F. Hypothermia can be attributed to a decrease in heat production, increased heat loss or both.

Prevention

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 98.6°F or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing that can keep the body warm even when the clothing is wet.
2. Avoid frostbite by adequately covering hands, feet and other extremities. Clothing such as insulated gloves or mittens, earmuffs and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20°F), workers should wear gloves. Tool handles should be covered with insulating material.
3. Adjust work schedules to provide adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide heated shelter. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the buildup of toxic or explosive gases or vapors. Care must be taken to keep a heat source away from flammable substances.
6. Using a wind chill chart such as the one in Table 3, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT of 20°F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -25°F.

Frostbite

Personnel should be aware of symptoms of frostbite/hypothermia. If the following symptoms are noticed in any worker, he/she should immediately go to a warm shelter.

Condition	Skin Surface	Tissue Under Skin	Skin Color
Frostnip	Soft	Soft	Initially red, then white
Frostbite	Hard	Soft	White and waxy
Freezing	Hard	Hard	Blotchy, white to yellow-gray to gray

1. *Frostnip* is the incipient stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cool/cold air. Wind chill or cold water also can be major factors. This condition is not serious. Tissue damage is minor and the response to care is good. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostnip.

2. *Treatment of frostnip*: Care for frostnip by warming affected areas. Usually the worker can apply warmth from his/her bare hands, blow warm air on the site, or, if the fingers are involved, hold them in the armpits. During recovery, the worker may complain of tingling or burning sensation, which is normal. If the condition does not respond to this simple care, begin treatment for frostbite.

3. *Frostbite*: The skin and subcutaneous layers become involved. If frostnip goes untreated, it becomes superficial frostbite. This condition is serious. Tissue damage may be serious. The worker must be transported to a medical facility for evaluation. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostbite. The affected area will feel frozen, but only on the surface. The tissue below the surface must still be soft and have normal response to touch. *DO NOT* squeeze or poke the tissue. The condition of the deeper tissues can be determined by gently palpating the affected area. The skin will turn mottled or blotchy. It may also be white and then turn grayish-yellow.

4. *Treatment of frostbite*: When practical, transport victim as soon as possible. Get the worker inside and keep him/her warm. Do not allow any smoking or alcohol consumption. Thaw frozen parts by immersion, re-warming in a 100°F to 106°F water bath. Water temperature will

drop rapidly, requiring additional warm water throughout the process. Cover the thawed part with a dry sterile dressing. Do not puncture or drain any blisters.

NOTE: Never listen to myths and folk tales about the care of frostbite. *Never* rub a frostbitten or frozen area. *Never* rub snow on a frostbitten or frozen area. Rubbing the area may cause serious damage to already injured tissues. Do not attempt to thaw a frozen area if there is any chance it will be re-frozen.

5. *General cooling/Hypothermia*: General cooling of the body is known as systemic hypothermia. This condition is not a common problem unless workers are exposed to cold for prolonged periods of time without any shelter.

Body Temperature	°C	Symptoms
99-96	37-35.5	Intense, uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, he has difficulty speaking.
90-86	32-30	Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected. Erratic or jerkey movements are produced. Thinking is less clear. General comprehension is dulled. There may be total amnesia. The worker is generally still able to maintain the appearance of psychological contact with his surroundings.
85-81	29.4-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stuporous state. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	26.6-18.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	25.5	Cardiac and respiratory centers of the brain fail. Ventricular fibrillation occurs; probably edema and hemorrhage in the lungs; death.

6. *Treatment of hypothermia*: Keep worker dry. Remove any wet clothing and replace with dry clothes, or wrap person in dry blankets. Keep person at rest. Do not allow him/her to move around. Transport the victim to a medical facility as soon as possible.

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TABLE 3[(1)]
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)

Estimated wind Speed (in mph)	Actual Temperature Reading (°F)P											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	15	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-146
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER in < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and imersion foot may occur at any point on this chart											

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

(1) Reproduced from American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1985-1986, p.01.

APPENDIX D

GENERAL HEALTH AND SAFETY WORK PRACTICES

GENERAL HEALTH AND SAFETY WORK PRACTICES

1. Site personnel must attend each day's Daily Briefing and sign the attendance sheet.

2. Any individual taking prescribed drugs shall inform the FTL/SHSO of the type of medication. The FTL/SHSO will review the matter with the HSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.

3. The personal protective equipment specified by the FTL/SHSO and/or associated procedures shall be worn by site personnel. This includes hard hats and safety glasses which must be worn in active work areas.

4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.

5. Personnel must follow proper decontamination procedures and shower as soon as possible upon completion of work shift.

6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the HSM to allow fluid intake during heat stress conditions).

7. Lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.

8. Signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FTL/SHSO.

9. No one shall enter a permit-required confined space without a permit and appropriate training. Confined space entry permits shall be implemented as issued.

10. Personnel must follow Hot Work Permits as issued.

11. Personnel must use the Buddy System in the Exclusion Zone.

12. Personnel must follow the work-rest regimens and other practices required by the heat stress program.

13. Personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.

14. No person shall operate equipment unless trained and authorized.

15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.

16. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.

17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.

18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.

19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.

20. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.

21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.

22. Horseplay of any kind is prohibited.

23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.

24. Incidents, no matter how minor, must be reported immediately to the Supervisor.

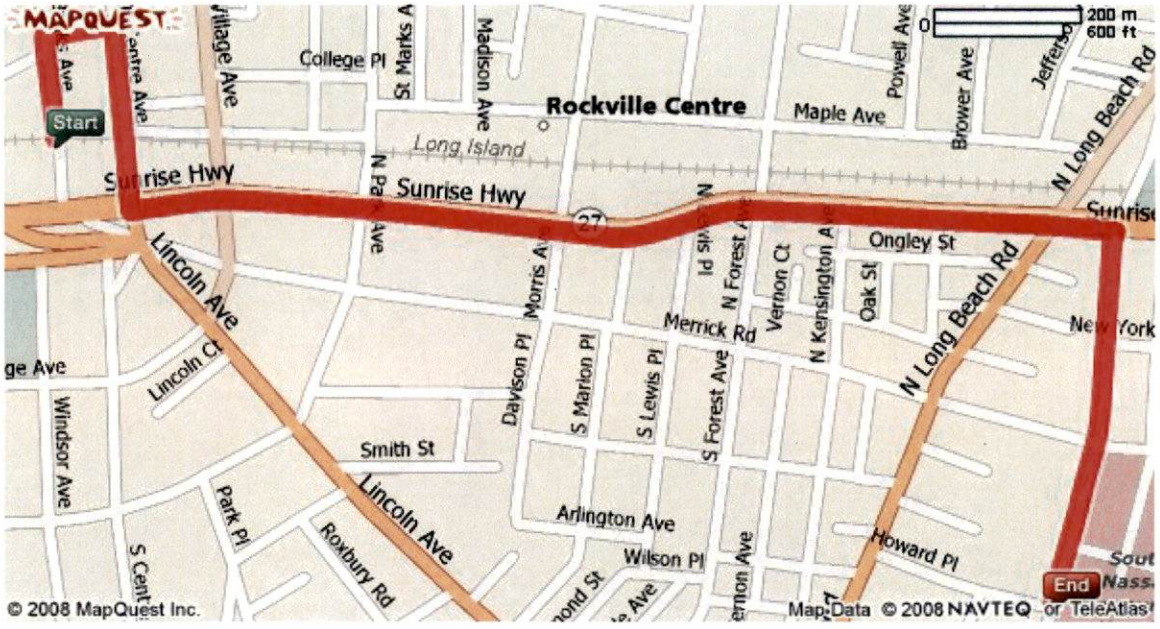
25. Personnel shall be familiar with the Site Emergency Response Plan, which is contained in Section 12 of the HASP.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with regulations set forth by OSHA, the client, PWGC Supervisors, and the FTL/SHSO.

APPENDIX E

HOSPITAL ROUTE MAP

Hospital Information and Map



Total Est. Time: 5 minutes Total Est. Distance: 1.73 miles

START	1:	Start out going NORTH on BANKS AVE toward NASSAU ST.	0.1 miles
	2:	Turn RIGHT onto MORGAN DAYS DR.	<0.1 miles
	3:	Turn RIGHT onto N CENTRE AVE.	0.1 miles
EAST 27	4:	Turn LEFT onto SUNRISE HWY / NY-27 E / POW / MIA MEMORIAL HWY.	0.9 miles
	5:	Turn RIGHT onto N OCEANSIDE RD.	0.3 miles
END	6:	End at South Nassau Communities Hospital: 2445 Oceanside Rd, Oceanside, NY 11572, US	

Total Est. Time: 5 minutes Total Est. Distance: 1.73 miles

South Nassau Communities Hospital
2445 Oceanside Road
Oceanside, New York 11572
(516) 632- 3000

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APPENDIX F

DAILY BRIEFING SIGN-IN SHEET

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DAILY BRIEFING SIGN-IN SHEET

Date: _____ Project Name/Location: _____

Person Conducting Briefing: _____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc.)

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc.)

_____

_____

_____

3. ATTENDEES (Print Name):

1.	21.
2.	22.
3.	23.
4.	24.
5.	25.
6.	26.
7.	27.
8.	28.
9.	29.
10.	30.
11.	31.
12.	32.
13.	33.
14.	34.
15.	35.
16.	36.
17.	37.
18.	38.
19.	39.
20.	40.

APPENDIX G

INCIDENT REPORT FORM / INVESTIGATION FORM

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INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 1 OF 2			
TYPE OF INCIDENT - CHECK ALL THAT APPLY			
INJURY/ILLNESS	VEHICLE DAMAGE	PROPERTY DAMAGE	FIRE
SPILL/RELEASE	PERMIT EXCEEDENCE	NEAR MISS	OTHER
GENERAL INFORMATION			
PROJECT NAME:	DATE OF REPORT:	REPORT NO.:	
DATE OF INCIDENT:	TIME:	DAY OF WEEK:	
LOCATION OF INCIDENT:			
WEATHER CONDITIONS:	ADEQUATE LIGHTING AT SCENE? YES NO N/A		
DESCRIBE WHAT HAPPENED (STEP BY STEP - USE ADDITIONAL PAGES IF NECESSARY)			
AFFECTED EMPLOYEE INFORMATION			
NAME:	EMPLOYEE: YES NO		
HOME ADDRESS:			
SOCIAL SECURITY NO.:	HOME PHONE NO.:		
JOB CLASSIFICATION:	YEARS IN JOB CLASSIFICATION:		
HOURS WORKED ON SHIFT PRIOR TO INCIDENT:	AGE:		
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? YES NO			
INJURY/ILLNESS INFORMATION			
NATURE OF INJURY OR ILLNESS:			
OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:			
FIRST AID PROVIDED? YES NO			
IF YES, WHERE WAS IT GIVEN: ON-SITE OFF-SITE			
IF YES, WHO PROVIDED FIRST AID:			
WILL THE INJURY/ILLNESS RESULT IN: RESTRICTED DUTY LOST TIME UNKNOWN			

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INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 2 OF 2 REPORT NO.
MEDICAL TREATMENT INFORMATION
WAS MEDICAL TREATMENT PROVIDED? YES NO
IF YES, WAS MEDICAL TREATMENT PROVIDED: ON-SITE DR.'S OFFICE HOSPITAL
NAME OF PERSON(S) PROVIDING TREATMENT:
ADDRESS WHERE TREATMENT WAS PROVIDED:
TYPE OF TREATMENT:
VEHICLE AND PROPERTY DAMAGE INFORMATION
VEHICLE/PROPERTY DAMAGED:
DESCRIPTION OF DAMAGE:
SPILL AND AIR EMISSIONS INFORMATION:
SUBSTANCE SPILLED OR RELEASED: FROM WHERE: TO WHERE:
ESTIMATED QUANTITY/DURATION:
CERCLA HAZARDOUS SUBSTANCE? YES NO
REPORTABLE TO AGENCY? YES NO SPECIFY:
WRITTEN REPORT: YES NO TIME FRAME:
RESPONSE ACTION TAKEN:
PERMIT EXCEEDENCE
TYPE OF PERMIT: PERMIT #:
DATE OF EXCEEDENCE: DATE FIRST KNOWLEDGE OF EXCEEDENCE:
PERMITTED LEVEL OR CRITERIA:
EXCEEDENCE LEVEL OR CRITERIA:
REPORTABLE TO AGENCY? YES NO SPECIFY:
WRITTEN REPORT: YES NO TIME FRAME:
RESPONSE ACTION TAKEN:
NOTIFICATIONS
NAMES OF PERSONNEL NOTIFIED: DATE/TIME:
CLIENT NOTIFIED: DATE/TIME:
AGENCY NOTIFIED: DATE/TIME:
CONTACT NAME:
PERSONS PREPARING REPORT
EMPLOYEE'S NAME:(PRINT) SIGN:
SUPERVISOR'S NAME:(PRINT) SIGN:

INVESTIGATIVE REPORT			
DATE OF INCIDENT:	DATE OF REPORT:	REPORT NUMBER:	
INCIDENT COST: ESTIMATED: $_____	ACTUAL: $_____		
OSHA RECORDABLE(S): YES NO # RESTRICTED DAYS ____ # DAYS AWAY FROM WORK ____			
CAUSE ANALYSIS			
IMMEDIATE CAUSES - WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT?			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT?			
ACTION PLAN			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED?			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
PERSONS PERFORMING INVESTIGATION			
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
MANAGEMENT REVIEW			
PROJECT MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			
H&S MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			

EXAMPLES OF IMMEDIATE CAUSES

Substandard Actions

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Failure to use PPE properly
9. Improper loading
10. Improper placement
11. Improper lifting
12. Improper position for task
13. Servicing equipment in operation
14. Under influence of alcohol/drugs
15. Horseplay

Substandard Conditions

1. Guards or barriers
2. Protective equipment
3. Tools, equipment, or materials
4. Congestion
5. Warning system
6. Fire and explosion hazards
7. Poor housekeeping
8. Noise exposure
9. Exposure to hazardous materials
10. Extreme temperature exposure
11. Illumination
12. Ventilation
13. Visibility

EXAMPLES OF BASIC CAUSES

Personal Factors

1. Capability
2. Knowledge
3. Skill
4. Stress
5. Motivation
6. Work Standards
7. Wear and tear
8. Abuse or misuse

Job Factors

1. Supervision
2. Engineering
3. Purchasing
4. Maintenance
5. Tools/equipment

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration
2. Management training
3. Planned inspections
4. Task analysis and procedures
5. Task observation
6. Emergency preparedness
7. Organizational rules
8. Accident/incident analysis
9. Personal protective equipment
10. Health control
11. Program audits
12. Engineering controls
13. Personal communications
14. Group meetings
15. General promotion
16. Hiring and placement
17. Purchasing controls

APPENDIX C
COMMUNITY AIR MONITORING PLAN

FORMER DARBY DRUGS DISTRIBUTION CENTER
80-100 BANKS AVENUE
ROCKVILLE CENTRE, NEW YORK
BROWNFIELD CLEANUP PROGRAM ID: C130140

SUPPLEMENTAL REMEDIAL INVESTIGATION COMMUNITY AIR MONITORING PLAN

Submitted To:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Prepared For:

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135 Pinelawn Road, Suite 130 South
Melville, New York 11747

Prepared By:

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630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

PWGC Project Number: AVB0801

APRIL 2008

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TABLES

Table 1-1 Frequency and Location of Air Monitoring
Table 1-2 Real-Time Air Monitoring Action Levels

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial investigation) from potential airborne contaminant releases resulting from subsurface investigation activities at the Former Darby Drug Distribution Center, Rockville Centre, New York.

Action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air.

The primary concerns for this site are VOCs and dust particulates.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan: This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air.

- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2.0 AIR MONITORING

The following sections contain information describing the types, frequency and location of real-time monitoring.

2.1 Real-Time Monitoring

This section addresses the real-time monitoring conducted within the work area, and along the site perimeter, during intrusive activities such as drilling, excavation, product recovery, manipulation of soil piles, extraction of sheet piling, etc.

2.1.1 Work Area

The following instruments shall be used for work area monitoring:

- Photoionization Detector (PID)
- Dust Monitor

Table 1-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. **Table 1-2** lists the Real-Time Air Monitoring Action Levels to be used in work areas.

2.1.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air quality monitoring shall be performed at several locations around the site perimeter before investigation activities begin. Air monitoring shall be continued periodically in series during work activities.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent. Air will be monitored for VOCs with a portable Photovac MicroTip photoionization detector (PID), or equivalent. **Table 1-1** presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. **Table 1-2** lists the Real-Time Air Monitoring Action Levels to be used in work areas. Air monitoring data shall be documented in a site log book by the designated site safety officer. PWGC's site safety officer or delegate shall calibrate and maintain air monitoring instruments in accordance with manufacturer's specifications. Instruments shall be zeroed daily and checked for accuracy and a daily log shall be kept. If additional air monitoring is required, protocols shall be appended to this plan.

TABLE 1-1
FREQUENCY AND LOCATION OF AIR MONITORING

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Drilling, Excavation	PID, Dust Monitor	Continuous in Breathing Zone (BZ) during intrusive activities or if odors become apparent, screening in the BZ every 30 minutes during non-intrusive activities

TABLE 1-2
REAL-TIME AIR MONITORING ACTION LEVELS

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	0-25 ppm, non-transient	None	Exposure below established exposure limits
PID	Breathing Zone	25-100 ppm, non-transient	Don APR	Based on potential exposure to VOCs
PID	Breathing Zone	>100 ppm, non-transient	Don ASR or SCBA, Institute vapor/odor suppression measures, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas.
PID	Work Area Perimeter	< 5 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter	> 5 ppm	Stop work and implement vapor release response plan until readings return to acceptable levels, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas
Aerosol Monitor	Work Area Perimeter	>100 but < 150 $\mu g/m^3$ for 15 minutes	Institute dust suppression measures, Notify HSM.	Work to continue if particulate concentrations remain below 150 $\mu g/m^3$
Aerosol Monitor	Work Area Perimeter	>150 $\mu g/m^3$	Don ASR or SCBA, Institute dust suppression measures, Notify HSM.	Stop work and implement dust suppression techniques until readings return to acceptable levels, Notify HSM.

3.0 VAPOR EMISSION RESPONSE PLAN

This section is excerpted from the NYSDOH guidance for Community Air Monitoring Plan - Ground Intrusive Activities.

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities shall be halted and monitoring continued. Vapor suppression measures can also be taken at this time. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- Organic vapor levels 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If organic vapor levels exceed 25 ppm at the perimeter of the work area, work activities shall be halted. When work is halted, downwind air monitoring as directed by the Site Health & Safety Officer (SHSO) shall be implemented to determine whether vapor emission may impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan Section.

4.0 MAJOR VAPOR EMISSION RESPONSE PLAN

If organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, work activities shall be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality shall be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source (see Section 5.0) are unsuccessful and if organic vapor levels are approaching 5 ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect.

However, the Major Vapor Emission Response Plan shall be immediately placed in effect if organic vapor levels are greater than 10 ppm above background.

Upon activation, the following activities shall be undertaken:

1. Emergency Response Contacts, as identified in the Health & Safety Plan, shall go into effect.

2. The local police authorities shall be contacted immediately by the Health & Safety Officer and advised of the situation.

3. Frequent air monitoring shall be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Health & Safety Officer.

5.0 VAPOR SUPPRESSION TECHNIQUES

Vapor suppression techniques shall be employed when action levels warrant their use. Techniques to be implemented for control of VOCs from stockpiled soil or from the open excavation should include one or more of the following:

- cover with plastic
- cover with "clean soil"
- application of hydro-mulch material*
- limit working hours to favorable wind and temperature conditions

*This material is a seedless version of the hydro-seed product commonly used by commercial landscaping contractors to provide stabilization and rapid grow-in of grasses or wild flowers along highways, embankments and other large areas. Hydro-mulch can be sprayed over open excavation areas, temporary stockpile areas and loaded trucks, as necessary. This is a highly effective method for controlling odors, because the release of odors is sealed immediately at the source.

6.0 DUST SUPPRESSION TECHNIQUES

Reasonable dust-suppression techniques shall be employed during work that may generate dust, such as excavation, grading, and placement of clean fill. The following techniques were shown to be effective for controlling the generation and migration of dust during remedial activities:

- Wetting equipment and excavation faces;
- Spraying water on buckets during excavation and dumping;
- Hauling materials in properly covered containers; and,
- Restricting vehicle speeds to 10 mph.

Using atomizing sprays should prevent overly wet conditions, conserve water, and offer an effective means of suppressing fugitive dust. It is imperative that utilizing water for suppressing dust not create surface runoff.

7.0 DATA QUALITY ASSURANCE

7.1 Calibration

Instrument calibration shall be documented in the designated field logbook. Instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

7.2 Operations

Instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment shall be maintained on-site by the FOL/HSO for reference.

7.3 Data Review

The Field Team Leader FOL/SHSO shall interpret monitoring data based on **Table 1-2** and his/her professional judgment. The FOL/HSO shall review the data with the HSM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with sample documentation shall be periodically reviewed by the HSM.

8.0 RECORDS AND REPORTING

Readings shall be recorded and available for review by personnel from NYSDEC and NYSDOH. Should any of the action levels be exceeded, the NYSDEC Division of Air Resources shall be notified in writing within five (5) working days.

The notification shall include a description of the control measures implemented to prevent further exceedances.