Remedial Investigation Work Plan

Proposed Whole Foods Market

220 3rd Street
Brooklyn, Kings County,
New York

NYSDEC BCP Site No. C224100

Prepared on Behalf of:

WFM Properties Brooklyn, LLC
Cambridge, Massachusetts

BL Companies Project No. 03C497

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Prepared on Behalf of:

WFM Properties Brooklyn, LLC
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Prepared by:

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October 29, 2004
Revised May 12, 2005 & June 24, 2005

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1.0 INTRODUCTION, REGULATORY PROGRAM STATUS, PROJECT TEAM

1.1 Introduction

On behalf of WFM Properties Brooklyn, LLC, BL Companies has prepared this Remedial Investigation Work Plan for Additional Site Characterization at the proposed Whole Food Market site located at 220 3rd Street, Brooklyn, Kings County, New York (the site). A Site Location Map is included in Appendix A.

WFM Properties Brooklyn, LLC proposes to redevelop the site with a Whole Foods Market and a public access promenade along the 4th Street Basin. Site plans showing the existing conditions and proposed development are included as Figures SP-01 and SP-5, respectively in Appendix A. A fact sheet describing the proposed development, recently released to the Borough of Brooklyn and neighborhood community groups, is included as Appendix G.

1.2 Program Regulatory Status

The Remedial Investigation Work Plan has been prepared as required by the Brownfield Cleanup Program Agreement between WFM Properties Brooklyn, LLC and the New York State Department of Environmental Conservation (NYSDEC). Under the Brownfield Cleanup Program (BCP) Agreement, the NYSDEC has identified the site as Site No. C224100, Index # W2-1052-05-02. WFM Brooklyn Properties, LLC, executed the BCP Agreement on March 31, 2005. According to Denise D'Ambrosio, Project Attorney, Division of Environmental Enforcement, NYSDEC the BCP agreement was executed on April 25, 2005 making it affective as of that date. The BCP Agreement represents the Oversight Document between NYSDEC and WFM Properties Brooklyn, LLC.

WFM Properties Brooklyn, LLC is applying to the BCP as a volunteer. WFM Properties Brooklyn, LLC purchased the site from the former owner, Richard Kowalski and Levanic, Inc., in January 2005. WFM Properties Brooklyn, LLC has no current or former relationship with any current or former owner/operator of the site.

The BCP Agreement represents the Oversight Document between NYSDEC and WFM Properties Brooklyn, LLC.

A pre-application meeting was held with the NYSDEC on September 8, 2004. During the meeting, NYSDEC indicated that the site should be eligible to participate in the BCP program as a volunteer. The determination of eligibility is based on several factors, including the past uses of the site. The site has a long history of industrial and commercial uses, as described in Section 2.2.

The BCP application was submitted to the NYSDEC in October 2004 and was deemed complete on November 10, 2004. Public comment regarding the application and this Remedial Investigation Work Plan was held from November 17 through December 31, 2004. No public comments were received. The BCP Agreement between WFM Properties Brooklyn, LLC and NYSDEC became effective on April 25, 2005. Under the BCP Agreement, the following definitions will apply to the site:

- "Contemplated Use": commercial/retail use with public access promenade along the 4th Street Basin excluding residential uses, day care, childcare, and medical care uses.

- "Existing Contamination": volatile organic compounds (VOCs), poly-aromatic hydrocarbons (PAHs), and metals have been detected beneath the site at concentrations above NYSDEC regulatory criteria for soil. Concentrations of VOCs, PAHs, and metals have been detected in the ground water beneath the site above New York State Ground Water Standards, as identified in a Comprehensive Phase II Site Investigation Report prepared by BL Companies on behalf of WFM Properties Brooklyn, LLC and dated February 13, 2004.

- "Site": that parcel of property located at 220 3rd Street, Brooklyn, Kings County, New York, and currently identified on the Kings County Tax Map as Block 978, lot 1, lot 16, and lot 19. The site purchased by WFM Properties Brooklyn, LLC does not include the existing two-story building located on the corner of 3rd Street and 3rd Avenue (360 3rd Avenue).

- "Applicant": WFM Properties Brooklyn, LLC, a Massachusetts Corporation, the future owner and developer of the site, with an address of 125 Cambridge Park Drive, Cambridge, MA 02140

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It should be noted that the site specific clean-up goals required for formal site closure under the BCP have not been established by NYSDEC.

The Remedial Investigation Work Plan has been prepared in general accordance with the NYSDEC Voluntary Cleanup Program Guide and the Draft DER – 10, Technical Guidance for Site Investigation and Remediation. The main goals of the voluntary cleanup investigation includes, but may not be limited to the following:

- Defining the nature and extent of the on-site contamination, both aerially and vertically. It is known that shallow ground water beneath the site flows toward and likely discharges into the 4th Street Basin (Gowanus Canal). In addition, the investigation will identify the quality of the ground water flowing onto the site from upgradient, off-site facilities. As a BCP Volunteer that has never operated at or owned the site, WFM Properties Brooklyn, LLC will also conduct sufficient investigation to perform a qualitative on- and off-site exposure assessment. WFM Properties Brooklyn, LLC will develop a separate RIWP to evaluate potential impacts to the 4th Street Basin (Gowanus Canal).

- Identifying contaminant source areas / areas of concern (AOCs).
- Investigation of each AOC identified during the Phase I ESA.
- Producing data of sufficient quantity and quality to support the development of an acceptable Remedial Action Work Plan. This will include generating sufficient data to properly characterize soil that will be displaced by construction (currently estimated at 8,800 cubic yards) for off-site disposal or re-use on other portions of the site, and to determine if additional excavation and/or in-situ treatment is required for soil that will not be displaced by construction.

The specific goals of the additional site characterization at this site include the following:

- Determination of the degree and extent of petroleum related compounds (aromatic volatile organic compounds, poly-aromatic hydrocarbons) in soil,
- Identification of the petroleum release areas,
- Delineation of degree and extent of degreasing solvents (chlorinated VOCs) in soil gas and soil,
- Identification of the chlorinated VOC release area(s),
- Delineation of degree and extent of PCBs in soil in the vicinity of B-13/MW-1 (the only location that PCBs were detected in the Phase II SI),
- Identification of the PCB release area,
- Delineation of degree and extent of PAHs and metals in soil resulting from the placement of urban fill at the site,
- Evaluation for the presence of metals release areas due to former on-site processes, if any,
- Delineation of the degree and extent of regulated compounds including VOCs, PAHs, PCBs, metals in ground water beneath the site.
- Identification of potential migration pathways away from the site, and

- Identification of locations where additional on-site and off-site investigations may be required.

This Remedial Investigation Work Plan represents the next phase of investigation of the site. The specific goals will be achieved by investigating each AOC identified at the site with regard to items previously mentioned.

1.3 Project Team

The individuals directly involved with the site project and their specific responsibilities are outlined below.

- Mr. Mark Mobley, WFM Properties Brooklyn, LLC, Project Manager

- Mr. Tim White, WFM Properties Brooklyn, LLC, Director of Construction

- James A. Quinn, Environmental Engineer, Chief, Section B, NYSDEC Project Manager: Review and approve Quality Assurance Project Plans (QAPP) and subsequent revisions in terms of project scope and objectives. Ensure QAPP implementation. Conduct assessments of field activities, as necessary.

- Javier Perez, NYSDEC, Environmental Engineer, Project Supervisor: Provide programmatic oversight, review remedial investigation and alternative selection.

- Denise D’Ambrosio, Project Attorney, Division of Environmental Enforcement, NYSDEC: NYSDEC Legal Representative, Coordinate and execute BCP Agreement.

- Christopher M. Doroski, NYSDOH Public Health Specialist 2, Review Remedial Investigation Report (RIR) and Remedial Action Work Plan (RIWP).

- Samuel R. Haydock, BL Companies Project Manager: Senior project management. Review and approval of QAPP. Ensure QAPP implementation. Conduct in-house audits of field operations.

- Nicholas C. Tsacoyannis, BL Companies Field Team Leader: Coordination of all subcontractors. Direct the sampling operations according to the QAPP. Provide data analysis and reporting.

- Mark Koellner, QA Manager: Overall quality of work product.

- Severn Trent Laboratories, Inc., Lab Director: Coordination and scheduling of lab analysis, data review, and coordination of all laboratory activities.

- Carole Tomlins, Data Quality Indicator & Associates, Inc.: Data validation and preparation of the Data Usability Summary Reports.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description

The irregular-shaped site is situated on approximately 2.155-acres of land located on the southern side of 3rd Street, approximately 30-feet west of the 3rd Street and 3rd Avenue intersection in the Borough of Brooklyn, City of New York, Kings County, New York. The City of New York Assessor's office lists the parcels as Block 978, Lots 1, 16, and 19. The property covers the following addresses, 210 to 220 3rd Street, and 360, 370 and 376 to 384 3rd Avenue. The site to be purchased and redeveloped by WFM Properties Brooklyn, LLC does not include the existing two-story building located at the corner of 3rd Street and 3rd Avenue (360 3rd Avenue).

The site consists of several interconnected buildings and an open, rear area at the northwest corner of 3rd Street and 3rd Avenue. A Site Plan is included as Figure SP-01 in Appendix A. These buildings consist of a one-story warehouse building and a two story auto repair shop located on the eastern portion of the site, and a one/two-story building formerly used for truck repairs located on the northwestern portion of the site. The site also contains a one/two-story building/loading dock (currently vacant) located on the northern portion of the site. The remaining area (rear) is an open area that borders the 4th Street Basin (Gowanus Canal) and is used for parking and/or storage. An office trailer is located on the southwestern portion of the site and is used as a pigeon coop. Access to the site is from 3rd Avenue via a paved driveway. Public water and natural gas currently service the buildings. Two septic systems provide on-site wastewater treatment.

The warehouse contains radiators (mostly new) and heat exchangers for automobiles and trucks. A small amount of welding flux was observed in the eastern portion of the warehouse and scrap radiators were observed in the southern portion of this building. At one time, radiators were manufactured in this building. Old equipment/machinery, used in manufacturing radiators, including an oven, were observed in the southeastern portion of the warehouse.

At the time of a site visit in November 2003, the auto repair building contained two open vats of antifreeze, an open vat of oil, and a paint booth. A collection system for capturing antifreeze or oil that spills to the floor is located on the lower level of this building. Radiator repairs are conducted in the first floor, while the basement is used for storage.

A loading dock/building, currently unoccupied, is used as a storage area for metal scaffolding and structure supports.

The former truck repair building is currently vacant (as of July 2004) and contains office space on the upper and lower levels, a repair area, a storage area and employee area. An oil storage tank is located in the eastern portion of the building, and a waste oil tank is located in the southern portion of the building.

The site is located in a commercial area and is zoned as “Medium Manufacturing District”. The site is bordered by 3rd Street and Verizon, followed by a Jewish Center and commercial properties to the north; by a two-story office building, 3rd Avenue, followed by MB Contracting, Novarts, Staples, and commercial properties to the east; by the 4th Street Basin (Gowanus Canal) followed by Hochburg Brothers, Schan Inc., Hollywood Signs and commercial properties to the south; and by All Boro Building Materials, followed by Red Hook Rock Crushers, the Gowanus Canal and residential and commercial properties to the west.

The two-story building (carriage house) located at the corner of 3rd Avenue and 3rd Street (360 3rd Avenue) is owned by the former owner of the site, Mr. Kowalski. Mr. Kowalski intends to use the building as office space for himself and his business, Levanic, Inc. The property located at 190 3rd Street is occupied by All Boro Building Materials and is located in a commercial area that is zoned as “Medium Manufacturing District”. Although the future use of this property is unknown, it is suspected that either the All Boro will remain at this location or if it moves, another commercial business will replace it. Based on the zoning of this area and the immediate surroundings, it is highly unlikely that residences will occupy this location.

2.2 Site History

The usage history of the site has been reconstructed from information obtained during interviews with site representatives and review of topographic maps, street directories, and Sanborn™ Fire Insurance Maps. Aerial photographs for the site have been ordered and will be reviewed on receipt.

Prior to the late 1800’s, the site was part of the Edwin Clarke and Grace Hill Litchfield Estate. The 1886 Sanborn™ Fire Insurance Map depicts the site as developed with a two-story building, the Hopkins and Ennis Coal Yard, A. Polhemus & Son Long Island Ice Company, and a portion of the J. E. Litchfield and Co.’s Lumber Yard. The Hopkins and Ennis Coal Yard consisted of a coal pile located in the southeastern portion of the site, a two-story office building located in the northern portion of the site, and an outbuilding located to the south of the office building. The A. Polhemus & Son Long Island Ice Company consisted of an office building located in the northwestern portion of the site and an outbuilding located in the central portion of the site.

The 1904 Sanborn™ Fire Insurance Map depicts the site as developed with the existing two-story garage listed as a Shoppe, the Schroeder and Horstman Coal Yard and the

Powell and Titus Coal Yard. The coal yards consisted of office buildings located along Third Street, storage buildings located in the central portion of the site, and coal sheds located in the southeastern and southwestern portions of the site. The 1904 Sanborn™ Fire Insurance Map also indicates the presence of Pure Oil Company located on the western portion of the site which had a 200,000-gallon oil tank located in the northwestern portion of the site.

The 1915 Sanborn™ Fire Insurance Map depicts the site as developed with the Schroeder and Horstman Coal Yard and the Powell and Titus Coal Yard. The site was also developed with the John Morton Sons Co. Building Materials in the western portion.

The 1938 Sanborn™ Fire Insurance Map depicts the site as developed with the Horstman and Higley Co., Inc. Coal Yard, the Powell and Titus Coal Yard, and Carroll Trucking Corp. The layout of the coal yards had not significantly changed since the 1915 Sanborn™ Fire Insurance Map. The Carroll Trucking Corp. was depicted on the western portion of the site.

The 1950 Sanborn™ Fire Insurance Map depicts the site as developed with a lumberyard and a freight depot on the southern portion and an auto junkyard and auto repair on the northern portion.

The 1969 Sanborn™ Fire Insurance Map shows the site as developed with the all of the current buildings. Freight storage is depicted along most of 3rd Avenue and on the southeastern portion of the site. Auto repair is depicted at 370 3rd Avenue where the current radiator repair shop is located. A loading dock/building is depicted on the central portion of the site, with the former truck engine repair building depicted on the northwestern portion of the site. Storage areas for brick and tile are depicted on the western and southwestern portions of the site.

The 1977, 1979, and 1980 Sanborn™ Fire Insurance Maps show the site similar to the 1969 map. The 1981 Sanborn™ Fire Insurance Map depicts the building on the northwestern portion of the site as occupied by auto repair. The remaining portions of the site are depicted as they appear on the 1980 map. The 1982, 1986, 1987, 1988, 1991, 1992, 1993, 1995, and 1996 Sanborn™ Fire Insurance Maps depict the site similar to the 1981 map.

The site is first listed in the street directories in 1960 with the following tenants, AAA Aluminum Warehouse Co. (210), All Boros Bldg Material Corp (210), Aluminum Buying Corp. (210) Du Betta (210), Harvey & Co (210), Lembo Brick Sales Inc. (210), PLJ Realty Corp (220), and Port Equip Renting Corp (220).

The 1965 street directory lists the following tenants, Jos J. Lombardo (210), Acme Carriers Inc. (216), C & S Trucking Corp (216), Robert S Motor Express, Inc. (216), Loubil Const. Corp (220), Mara Trucking Inc. (220), PLJ Realty Corp (220), and Port Equip Renting Corp (220).

The 1970 street directory lists the following tenants, Statewide Fireproof Door Co. Inc. (210), Acme Carriers Inc. (216), Riveredge Transportation & Storage Co. Inc. (220), PLJ Realty Corp (220), and Port Equip Renting Corp (210).

The 1973 and 1976 street directories list the following tenants, Acme Carriers Inc. (216), Riveredge Transportation & Storage Co. Inc. (220), PLJ Realty Corp (220), and Port Equip Renting Corp (220).

The 1985 street directory lists the following tenants, Cooling System Specialties (210), Jo-Rich Service Center (210), Pippin Auto Radiator Inc. (210), Acme Carriers Inc. (216), Riveredge Transportation & Storage Co. Inc. (220), PLJ Realty Corp (220), and Port Equip Renting Corp (210).

The 1992 street directory lists the following tenants, Telcei (210), Telcel (210), Brooklyn Truck & Equipment Corp. (212), Van San Construction Corp. (212), Linear Abatement (216), Cooling System Specialties (220), Pippin Auto Radiator Inc. (220), and Radiator Express (220).

The 1997 street directory lists the following tenants, Empire State Bus Corp. (216), Cooling System Specialties (220), Mulveny Barr Corp. Auto Radiators (220), Pippin Auto Radiator Inc. (220), and Radiator Express (220).

The 2000 street directory lists the following tenants, Brooklyn Truck & Equipment Corp. (212), Cooling System Specialties (220), JCJ Trucking (220), Mulveny Barr Corp. Auto Radiators (220), Pippin Auto Radiator Inc. (220), and Radiator Express (220).

Current tenants include Pippin Auto Radiator, Inc. and Radiator Express; Brooklyn Truck & Equipment Corp. vacated the site in July 2004.

2.3 Site Investigation and Reporting

A Phase I Environmental Site Assessment (ESA) was completed by BL Companies in December 2003. The Phase I ESA recommended additional investigation of the site based on the past use of the property by auto and truck repair businesses, as a coal yard, and as a bulk petroleum storage facility. In addition, two above ground storage tanks with associated staining, one confirmed and one suspected underground storage tank, on-site septic tanks/leachfields (still active), hydraulic lifts in the buildings, open vats of antifreeze and oil, and 55-gallon drums of unidentified material stored throughout the site, including outside on the gravel parking areas and inside the buildings, were identified as specific areas of concern requiring additional investigation. Copies of the

Phase I and II reports were submitted with the BCP application and prior to the September 8, 2004 pre-application meeting.

A Phase II Site Investigation (SI) was completed by BL Companies in February 2004. During completion of the Phase II SI, VOCs, PAHs, and metals were identified in the soil and ground water beneath the site. The specific compounds detected at the site are summarized in the tables included in Appendix B. Specific sampling locations are illustrated on Figure SP-02 in Appendix A.

The Brownfield Cleanup Program (BCP) application was submitted by Robinson & Cole LLP on behalf of WFM Properties Brooklyn, LLC to the NYSDEC on October 27, 2004. As a BCP Volunteer, WFM Properties Brooklyn, LLC commits to both on-site investigation and remediation to achieve appropriate clean-up goals and objectives.

WFM Properties Brooklyn, LLC is a Volunteer under the BCP that has never operated at or owned the site. WFM Properties Brooklyn, LLC will conduct sufficient investigation to perform a qualitative on- and off-site exposure assessment. WFM Properties Brooklyn, LLC will develop a separate RIWP to evaluate potential impacts to the 4th Street Basin (Gowanus Canal).

2.4 Geology / Hydrogeology

Geologically, the site is located in the Atlantic Coastal Plain Physiographic Province and is underlain by Glacial and Alluvial deposits where the underlying geology is unknown. Bedrock outcrops are not present at the site.

Surficial materials have been mapped as glacial till consisting of clay, silt clay, and boulder clay.

Based on information obtained from geotechnical and environmental exploration borings, the site is underlain by approximately ten feet of fill. The fill is underlain by a twenty-foot organic layer composed of varying proportions of silt and clay. The organic layer is underlain by a ten-foot layer of sandy silt and silty clay, underlain by an eighteen foot section comprised of fine to medium sands. Coarser sands were identified below this layer to a depth of approximately 77 feet below grade.

Topographically, the site slopes gently to the southeast and has an approximate average elevation of 15-feet AMSL.

Ground water in the site vicinity is expected to mimic the surrounding topography and flow to the southwest toward the Gowanus Canal, located adjacent on the south of the site. Therefore, hydraulically upgradient sites are inferred to be located to the northeast.

Nine ground water monitoring wells have been installed at the site. Depth to ground water in the monitoring wells has been measured on several occasions and ranges from 3.19 to 7.59 feet below ground surface. A ground water elevation contour map, included as Figure SP-04, confirms the direction of shallow ground water flow to the southeast.

3.0 WORK PLAN OBJECTIVES, CONCEPTUAL SITE MODEL, AND SCOPE OF WORK

3.1 Work Plan Objectives

As previously stated the goals of the Remedial Investigation Work Plan is to gather additional site-specific data from the site in order to:

- Determination of the degree and extent of petroleum related compounds (aromatic VOCs, poly-aromatic hydrocarbons (PAHs)) in soil,
- Identification of the petroleum release areas,
- Delineation of degree and extent of degreasing solvents (chlorinated VOCs) in soil gas and soil,
- Identification of the chlorinated VOC release area(s),
- Delineation of degree and extent of PCBs in soil in the vicinity of boring B-13/MW-1 (the only location that PCBs were detected in the Phase II SI),
- Identification of the PCB release area,
- Delineation of degree and extent of PAHs and metals in soil resulting from the placement of urban fill at the site,
- Evaluation for the presence of metals release areas due to former on-site processes, if any,
- Delineation of the degree and extent of regulated compounds including VOCs, PAHs, PCBs, and metals in ground water beneath the site.
- Identification of potential migration pathways away from the site, and
- Identification of locations where additional on-site and off-site investigations may be required.

The ultimate goal of this and any other phases of site investigation is to identify and select the most effective long term remedial measures consistent with the "Contemplated Use" of the site, including source reduction/removal and remediation of the ground water plume, as appropriate and necessary, in order to achieve "No Further Action" status consistent with the terms and conditions of the BCP Agreement.

The tasks associated with the Investigation Work Plan will be designed to collect geologic, hydrogeologic, contaminant, and cultural data.

Geologic data will include, but may not be limited to:

- Site topographic features,
- Published information regarding soils, surficial geology, and bedrock geology;
- Published information regarding surface water and ground water quality, and
- Site-specific documentation of surficial materials and stratigraphy.

Hydrogeologic data will include, but may not be limited to:

- Depth to ground water,
- Direction of ground water flow and hydraulic gradients,
- Vertical hydraulic gradients,
- Hydraulic conductivity and velocity data,
- Identification of preferred migration pathways, and
- Published information regarding local and regional aquifer conditions and uses.

Contaminant data will include, but may not be limited to:

- Identification of release areas and the maximum contaminant concentrations associated therewith in both the saturated and unsaturated zone, including an evaluation for the presence of free-phase product,
- Identification of the size, shape and migration pathway of the ground water plume(s), and
- Identification of vapors potentially present in the unsaturated soil overlying the ground water plume.

Cultural data will include, but may not be limited to:

- Land use within a half-mile radius of the site boundary,
- Proximity to sensitive receptors, both human and ecological,
- Identification of subsurface infrastructure and utilities with the potential to influence contaminant migration pathways, and
- Identification of other spills and release sites in the area.

3.2 Conceptual Site Model

The data elements described above will be collected and evaluated with respect to a Conceptual Site Model (CSM). The CSM will evolve with the generation of additional data. At the present time, the CSM has identified fourteen (14) AOCs that include:

- AOC #1 – Brooklyn Truck & Equipment Corp. building (also former auto repair),
- AOC #2 – Former 200,000-gallon above ground storage tank (AST) area,
- AOC #3 – Potential underground storage tank (UST),
- AOC #4 – Former junk car storage, former ice and former coal companies,
- AOC #5 – Former coal company and auto parts warehouse,
- AOC #6 – Radiator repair business and former auto repair and coal businesses,
- AOC #7 – Former coal pile and radiator manufacturing area,
- AOC #8 – Possible UST area,
- AOC #9 – Former coal yard and possible septic tank and leach field area,
- AOC #10 – Septic tank area and former lumber company,
- AOC #11 – Former dumpster/truck storage areas,
- AOC #12 – Junk car storage area and former coal yard business,
- AOC #13 – Scrap radiator storage area and former coal yard business, and
- AOC #14 – PCB in shallow soil area.

AOCs are illustrated in Figure SP-03 and Figures SP-03A through SP-03N in Appendix A.

Past use of the site has included the operation of an ice business, a lumber yard, coal yards, a bulk petroleum storage facility, a radiator repair and associated products business, and auto and truck repair businesses since at least 1890 until 2004. In addition, the site was likely filled with material of unknown origin at some time in its past. No other significant industrial or high-risk commercial operations are known to have operated at the site.

The 2.155 acre site is entirely developed with buildings and surrounding paved and unpaved parking areas as shown on the attached Site Plan (Figure SP-01 in Appendix A). On-site locations with the potential to have been used for the storage, use and/or disposal of chlorinated solvents are essentially limited to the auto and truck repair businesses and the radiator repair business. On-site locations with the potential to have been used for the storage, use and/or disposal of petroleum-hydrocarbon related compounds are limited to the bulk petroleum storage facility, the auto and truck repair businesses, and underground storage tanks that may have been present. Septic systems are also present at the site. Based on borings completed across the site, the site was likely a former wetland area filled early in its developed history to create the existing land area.

An electronic database search of federal and state files for properties of potential environmental concern was conducted by BL Companies. Based on the results of this search, the site was not identified as an active or proposed Federal Superfund site, CERCLA site, State Hazardous Waste Site (SHWS), RCRA hazardous waste Treatment Storage Disposal Facility (TSDF), or as a Solid Waste Landfill. There were no records of registered USTs at the site, nor have there been any releases of hazardous materials reported to the Emergency Response Notification System (ERNS), or Leaking Underground Storage Tank (LUST) lists. However, the site is listed on the RCRA hazardous waste generators, RCRA No Longer Regulated (NLR) and state spills list.

- 220 3rd Street [Pippin Enterprises, LTD], was identified on the RCRA NLR and state spills lists. The site (ID# NYD987023181) is listed as a RCRA NLR (9/9/03), indicating that the site is no longer regulated. One spill is listed for the site, which occurred on July 21, 1999 when an unknown amount of antifreeze was discovered on the sidewalk along 3rd Avenue. The status of this spill is "closed".

- 216 3rd Street, Empire State Bus Corp. was identified on the RCRA generators of hazardous waste list. The site (ID# NYD001869049) is listed as a RCRA Conditionally Exempt Small Quantity Generator, indicating that the facility generates less than 100 kilograms of waste per month.

Additional information regarding the compliance history of the site is included in the Phase I ESA submitted with the BCP application.

3.3 Scope of Work

In order to meet the goals described above and in order to refine the Conceptual Site Model, the additional site characterization/investigation will include the following initial tasks. These tasks have been selected and designed to build off the existing data generated as part of the Phase II SI. Proposed sampling locations are illustrated on the Figure SP-03 included in Appendix A:

- The advancement of additional soil borings within each AOC.

- The collection of additional soil and ground water samples for laboratory analysis from each AOC.

- Collection of additional hydrogeologic data including ground water flow, gradient and hydraulic conductivity data,

- The collection of cultural data and the completion of a sensitive receptor survey to evaluate sensitive land uses within 0.5-mile of the site.

- The scope of work will also include laboratory data validation, preparation of a Quality Assurance Project Plan (QAPP), and preparation of a Health and Safety Plan (HASP)

The results of the additional investigation will aid in understanding the site geology and hydrogeology, background conditions in ground water, the degree and extent of chlorinated solvents, petroleum-hydrocarbon related compounds, PCBs, and/or metals in soil and/or groundwater, potential interim and long-term remedial measures, and areas where additional on-site and off-site investigations will be required.

The tasks listed above are described in more detail below. Sampling locations, past and proposed, are illustrated on the attached site plan (Figure SP-03) in Appendix A.

3.3.1 *Shallow Ground Water Monitoring Well Installation*

Nine ground water monitoring wells exist at the site. Up to ten shallow ground water monitoring wells will be installed during the completion of the Remedial Investigation Work Plan to augment the existing monitoring well network in order that AOCs can be properly monitored for remedial completeness. As part of the Remedial Investigation Work Plan investigation proposed here, ground water samples will be collected from the shallow portion of the aquifer in each AOC. Proposed monitor well locations are illustrated on Figure SP-03 in Appendix A.

Proposed wells will be installed using a Geoprobe unit and will be constructed of 1-inch inside diameter polyvinyl chloride with the lowermost portion of the well pipe consisting of 0.010-inch slotted well screen. The length of the screen will be such that the screened portion of the well penetrates the saturated zone of the soil and extends above the apparent seasonal high water table. The borehole surrounding the screened section of the well will be backfilled with silica sand and sealed above the water table with a bentonite clay seal. The top of the well will be completed at grade with a protective, flush-mount road box set in a concrete surface seal to reduce the potential for surface water intrusion, vandalism, or other damage.

It should be noted that most of the wells installed during the Phase II SI and the RIWP will be destroyed during site redevelopment. Additional monitoring wells for additional post remediation monitoring will be installed at the site. The exact location and number of wells will be identified in the Remedial Action Work Plan.

3.3.2 *Deep Ground Water Monitoring Well Installation*

One well triplet (deep, intermediate and shallow ground water monitoring wells) will be installed to augment the existing monitoring well network in order to properly monitor the aquifer at depth. As part of the Remedial Investigation Work Plan investigation proposed here, ground water samples will be collected from the deep and intermediate portions of the aquifer. The proposed well triplet location is illustrated on Figure SP-03 in Appendix A.

These wells will be installed via a hollow stem auger drill rig and will be installed in a location toward the 4th Street Basin (Gowanus Canal) down gradient of the highest areas of impact detected to date in both the soil and ground water. Soil samples will be collected continuously to the water table and at 5-foot intervals afterwards. The rationale for not collecting continuous samples (as specified in NYSDEC Draft DER-10, Section 3.5.1) to the bottom of the borings is that the immediate area of the well triplet has been characterized with continuous sampling in borings B-2, B-124, B-127, B-128, and B-130. The intent is to protect these wells during redevelopment activities. If they are not protected, they will be abandoned in accordance with NYSDEC protocols.

3.3.3 *Ground Water Flow Data*

Depth to water measurements will be collected in each well once in November and once in December, to determine the elevation of the water table, the direction of ground water flow across the site, and the horizontal ground water flow gradient. This data will be used to supplement existing data that suggests flow towards the basin. Figure SP-04 shows the direction of ground water flow beneath the site on June 29, 2004 and is included in Appendix A.

Depth to water within the well triplet will be used to determine vertical hydraulic gradients.

Slug tests, falling head and rising head, will be conducted on several of the monitoring wells (MW-1. MW-5, MW-6, MW-4 and MW-8)) to gather data regarding hydraulic conductivity and the potential rates of ground water movement.

3.3.4 *Soil Sampling at each AOC*

Soil samples will be collected from varying depths at each AOC; it is estimated that a total of fifty soil samples will be collected. These soil samples will be collected to determine if elevated levels of compounds of concern (COCs) for that AOC are present in the subsurface. Soil samples will be collected using a truck-mounted Geoprobe unit or mini-probe, depending on equipment access into the buildings. One of the objectives of this investigation is to close-out AOCs, where appropriate, with thorough area characterization. Soil samples will be collected continuously at all locations with a 4-foot macro-core sampler to a depth of 20 feet below ground surface (bgs) or to the top of the organic layer. Field situations may dictate deeper or shallower exploration borings. Soil cores will be examined, logged and field screened by a BL Companies representative for total organic vapors using a photoionization detector (PID); we will also evaluate for regulated compounds via visual and olfactory characteristics.

> **AOC #1 –** Historic activities in this area consisted of an auto repair business, a lumber yard, a trucking company, and most recently, a truck engine repair business. Several smaller AOCs exist in this building and include: at least one hydraulic lift, a motor oil above ground storage tank (AST), a waste-oil AST, and

a former parts degreaser. COCs for this area would be related to the former occupants/uses and includes petroleum-related compounds, degreasing solvents and possibly metals. It should be noted that all of these items will be removed during building demolition activities. Additional inspection and sampling will be conducted during the removal of all below grade components.

Ten soil and five soil gas and ground water samples from several sampling events from MW-5 were previously collected in this area during a Phase II SI. VOCs, PAHs, and metals were detected at concentrations that exceeded NYSDEC applicable regulatory criteria (STARS & TAGM). The soil gas samples detected concentrations of tetrachloroethylene (PCE) that possible suggest a release area, particularly SG-8 which was located near the former parts degreaser.

Six additional borings are proposed for this area to collect soil samples from various depths. One boring will be advanced northeast of the hydraulic lift (a boring had been advanced southwest of it during the Phase II SI). One boring will be advanced in the area of the former parts degreaser. Borings will also be advanced in the area of the former motor oil and waste oil ASTs to supplement previous borings and provide coverage around each sub-AOC. Soil samples will be collected and submitted to a laboratory to be analyzed for VOCs, PAHs and metals. An additional monitoring well that will be installed in AOC #2 will also be able to monitor COCs from AOC #1. Figure SP-03A presents the proposed boring locations.

AOC #2 – This AOC is for a 200,000-gallon AST and several oil tanks (it is unknown if these were USTs or ASTs) that were present when the Pure Oil Company occupied the site in 1904. Compounds of concern are petroleum related.

Four soil and five soil gas samples were previously collected in this area around the former perimeter of the AST during the Phase II SI. Aromatic VOCs were detected in the soil gas samples. The concentration of regulated petroleum-related compounds was below laboratory method detection limits for the two soil samples analyzed from ground surface to a depth of 8 feet bgs.

One additional boring is proposed at the center of the former AST and three borings are proposed in the area of the former oil tanks. Soil samples will be analyzed for VOCs and PAHs. One ground water monitoring well will be installed in the former center of the AST. Ground water samples will be collected and submitted to a laboratory to be analyzed for VOCs and PAHs. Figure SP-03B presents the proposed boring locations.

AOC #3 – A potential UST may be located in this area based on a ground penetrating radar survey (GPR) that was completed at the site. Compounds of concern are petroleum related.

Three soil samples and ground water samples from several sampling events from MW-2 were previously collected in this area during the Phase II SI. Samples were collected from down and side gradient positions to the possible UST. VOCs, PAHs, and metals were detected with some of the concentrations exceeding NYSDEC applicable clean-up criteria.

One additional boring is proposed in an upgradient position of the former AST to look for evidence of a release. Three soil samples will be collected from various depths and submitted to a laboratory to be analyzed for VOCs, PAHs and metals. A monitoring well is located downgradient of this AOC. A ground water sample will be collected and will be analyzed for VOCs, PAHs and metals. Figure SP-03C presents the proposed boring and well locations.

AOC #4 – Ice and coal companies operated at the site in the early 1900's. Junk cars were also stored in this area. Compounds of concern for this area would be related to the car storage and be petroleum-related compounds, and metals. The ice company most likely utilized gasses such as ammonia (NH_3), methyl chloride (CH_3CL), and sulfur dioxide (SO_2), as refrigerants which are not COCs due to their gaseous nature.

Two soil samples were previously collected in this area during a Phase II SI in a position that was upgradient of where the cars were stored. VOCs were detected.

Two additional borings are proposed for this area to collect soil samples and one of the borings will be completed with a monitoring well. The soil and ground water samples will be analyzed for VOCs and metals. Figure SP-03D presents the proposed boring and well locations.

AOC #5 – Offices for a coal company occupied this area in the early 1900's and this area was also used as an auto parts warehouse in the more recent past. Compounds of concern for this area would be related to the former occupants/uses and includes petroleum-related compounds and metals.

Two Soil samples were previously collected in this area during a Phase II SI. VOCs were not detected at concentrations above laboratory minimum detection limits in the two samples analyzed (0-4 and 4-8 feet bgs).

Four additional borings are proposed for this area to collect soil samples; a monitoring well will be installed in one of the exploration borings. Soil and ground water samples will be analyzed for VOCs and metals. Figure SP-03E presents the proposed boring and well locations.

AOC #6 – This building was used as an auto repair business and most recently as a radiator repair business. Compounds of concern for this area would be related to the former occupants/uses and includes petroleum-related compounds, possibly solvents and metals.

Two Soil gas samples were previously collected in this area during a Phase II SI. VOCs were detected.

Due to height restrictions in this area, two hand borings are proposed for this area to collect soil samples. The soil samples will be analyzed for VOCs and metals. Figure SP-03F presents the proposed boring locations.

AOC #7 – According to a review of Sanborn Fire Insurance Maps, coal piles had been present in this area. This area had previously been used for storage and most recently as a radiator manufacturing area. Compounds of concern for this area would be related to the former occupants/uses and includes poly-aromatic hydrocarbons (PAHs), solvents and metals.

Five soil and four soil gas samples were previously collected in this area during a Phase II SI. VOCs were detected in both media.

Nine additional borings are proposed for this area to collect soil samples. Soil samples will be analyzed for VOCs, PAHs and metals. A monitoring well will be installed in one of the exploration borings. The ground water sample will be analyzed for VOCs, PAHs and metals. Figure SP-03G presents the proposed boring and well locations.

AOC #8 – A UST may be located in this area based on the field observation that a fill pipe was present and a GPR survey. Compounds of concern for this area would be related to petroleum-related compounds.

Three Soil and ground water samples from several sampling events from MW-9 were previously collected in this area during a Phase II SI. VOCs and metals were detected in the soil. VOCs were not detected in the ground water sample at concentrations above laboratory method detection limits.

Three additional borings are proposed for this area to collect soil samples. Soil samples will be analyzed for VOCs and metals. The existing monitoring well is located down and side gradient of this AOC and will be sampled. The ground water sample will be analyzed for VOCs and metals. Figure SP-03H presents the proposed boring locations.

AOC #9 – Coal and ice companies were present at the site in the early 1900's. A possible septic tank and discharge line may also be present in this area. Compounds of concern for this area would be related to the past occupants/uses and include PAHs and petroleum-related compounds.

Twelve soil and ground water samples from several sampling events from MW-3 and MW-8 were previously collected in this area during the Phase II SI. VOCs, PAHs and metals were detected in the soil and ground water samples with some of the concentrations above NYSDEC applicable clean-up criteria.

Eight additional borings are proposed for this area to collect soil samples. One of the exploration borings will be completed as a monitoring well. The soil and ground water samples will be analyzed for VOCs, PAHs and metals. Figure SP-03I presents the proposed boring locations.

AOC #10 – A septic tank is present in this area. Compounds of concern for this area would be related to petroleum-related compounds and solvents.

Two soil and a ground water sample from one sampling event from MW-4 were previously collected in this area during a Phase II SI. MW-4 has had product detected in it on more than one occasion and has not been sampled when product was present. VOCs, PAHs and metals were detected in the soil and ground water samples. Some of the concentrations of PAHs and metals exceeded the applicable NYSDEC clean-up criteria.

Two additional borings are proposed for this area to collect soil samples. The soil samples will be analyzed for VOCs, PAHs and metals. Figure SP-03J presents the proposed boring locations.

AOC #11 – This area had been used to store tiles, dumpsters and trucks and had a lumber yard present. Compounds of concern for this area would be related to petroleum-related compounds and metals.

Ten soil and ground water samples from several sampling events from MW-7 were previously collected in this area during the Phase II SI. VOCs, PAHs and metals were detected in the soil samples with some of the concentrations exceeding the applicable NYSDEC clean-up criteria. VOCs and PAHs were detected in the ground water samples at concentrations that exceeded the applicable NYSDEC clean-up criteria.

Six borings are proposed for this area to collect soil samples; two of the borings will be completed as monitoring wells. The soil and ground water samples will be analyzed for VOCs, PAHs and metals. Figure SP-03K presents the proposed boring locations.

AOC #12 – Ice and coal companies occupied this site in the early 1900's and more recently, this area was used to store junk cars. Compounds of concern for this area would be related to the former occupants/uses and includes petroleum-related compounds and metals.

Three soil samples were previously collected in this area during a Phase II SI. PAHs were detected at concentrations that exceeded the applicable NYSDEC clean-up criteria.

Two borings are proposed for this area to collect soil samples; one of the borings will be completed as a monitoring well. The soil and ground water samples will be analyzed for PAHs and metals. Figure SP-03L presents the proposed boring locations.

AOC #13 – A coal company occupied this area in the early 1900's and this area was recently used as for scrap radiator storage. Compounds of concern for this area would be related to the former occupants/uses and includes PAHs, solvents and metals.

Samples have not been collected in this area yet.

Due to access restrictions, one boring is proposed for this area to collect soil samples. A monitoring well will be installed in the boring. The soil and ground water samples will be analyzed for VOCs, PAHs and metals. Figure SP-03M presents the proposed boring locations.

AOC #14 – PCBs were detected in one shallow soil sample (B-13, 0-4 feet bgs) collected during the Phase II SI. PCBs have not been detected above laboratory method detection limits in ground water samples collected to date at the site or in the other eighteen soil samples analyzed during the Phase II SI. The use of PCBs at the site in the past is not believed to have been widespread. The source of the PCBs detected in the soil at B-13 is unknown and may be related to an off-site release.

Three borings are proposed for this area to collect soil samples. The soil samples will be analyzed for PCBs. Figure SP-03N presents the proposed boring locations.

3.3.5 *Soil-Gas Sampling at selected AOCs*

Soil-gas samples will be collected from selected AOCs (AOCs #1, #2, #3, #6, #7, and #8) where current or historic indoor operations involved petroleum-related compounds and/or solvents. The purpose of additional soil gas sampling is to evaluate the potential presence of release areas of VOCs beneath building slabs and where present to help pinpoint the actual release location. In addition, soil-gas sampling will be performed to identify the possibility of vapor intrusion into nearby buildings. Soil gas samples will be collected according to our SOP which will include purging vapor from beneath a building slab using a vacuum pump, collecting soil samples in a tedlar bag and analyzing samplings for VOCs by EPA Method TO-17.

3.3.6 *Collection of Cultural Data and Sensitive Receptor Survey*

Cultural data will be collected for the area within a half-mile of the site in order to evaluate land use, infrastructure and utilities with the potential to impact the direction of contaminant migration, and a sensitive receptor survey. The sensitive receptor survey will be conducted within a 0.5-mile radius of the site and will address both risks to human health and the environment. The survey will include reviews of Water Company records, City of New York and State of New York Health Department files, and available mapping to locate schools, playgrounds, residential neighborhoods, and ground water wells within the search area.

A qualitative on-site and off-site public health exposure assessment will be completed as part of this investigation. It should be noted that the site is currently used for industrial/commercial purposes.

3.3.7 On and Off-Site Fish and Wildlife Exposure Assessment

A Fish and Wildlife Exposure Assessment is required under the BCP Program as stated in the BCP Program Guide (Section 3.6, item [3]). The NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation provides information to determine if a Fish and Wildlife Impact Analysis is necessary. If a Fish and Wildlife Impact Analysis is required, the resource characterization should be conducted by a qualified biologist, ecologist, or other professional experienced in habitat assessment and assessment of contaminant impact.

BL Companies has evaluated the need for a fish and wildlife impact analysis with respect to the site itself and, based on the site's current development and its location in an urban industrial area, a fish and wildlife impact analysis is not required. The site is fully developed with buildings and/or pavement and is not a habitat for any type of flora or fauna. This is also true for the majority of the adjacent and surrounding properties. As with the site, the surrounding area is fully developed with buildings and pavement.

The only exception to this is the presence of the 4th Street Basin adjacent to the southwestern boundary of the site. By definition, the 4th Street Basin represents a sensitive receptor, although it has been degraded by nearby industrial and commercial activities and discharges. Based on the NYSDEC technical guidance, a fish and wildlife impact analysis may be required for assessing impacts from the site to the 4th Street Basin. However, it is our professional opinion that WFM Properties Brooklyn LLC should not be required to conduct a fish and wildlife impact analysis for the 4th Street Basin.

As a volunteer and not the responsible party in the BCP, there is some obligation for WFM Properties Brooklyn, LLC to investigate off-site impacts but no obligation to remediate. Ground water flow beneath the site is toward the 4th Street Basin and any ground water contamination originating on-site likely discharge into the basin. Current ground water data indicates that low levels of certain VOCs and SVOCs are present on the site and may be discharging into the surface water in the basin. There is no evidence of any free product discharging into the basin.

Based on the levels of contaminants potentially discharging into the basin via ground water flow, impact to surface water quality is expected to be minimal. The low levels of dissolved phase contaminants would be further diluted and flushed from the canal during twice daily tidal flushing. Impacts to sediments in the basin are also expected to be minimal from the ground water discharge, except possibly in the sediments between high and low tides along the length of the site.

The current ground water data at the edge of the site is sufficient to assess potential impact to the canal. The canal has been subject to over 100 years of discharges from countless industrial/commercial sources. There is no way to directly connect any regulated compounds in surface water or sediments, or the potential impact to fish and wildlife directly to the site.

The Army Corps of Engineers and EPA are currently conducting an investigation of the Gowanus Canal, including the 4th Street Basin and will likely develop a proposed remedial action plan, if necessary. Given the fact that this work is ongoing, and for the reasons stated above, the applicant believes that no further assessment is necessary under the BCA.

3.3.8 Community Air Monitoring Plan

A site specific Community Air Monitoring Plan (CAMP) will be implemented at the site in accordance with all provisions of the NYSDOH Generic CAMP. The CAMP will provide real-time continuous monitoring for VOCs and particulates (dust) at the down gradient perimeter of each designated work area when ground intrusive activities are in progress at the site. Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of surface soil and sediment samples or the collection of ground water samples from existing monitoring wells. A copy of the generic plan is included in Appendix H. The site-specific CAMP is included in the HASP in Appendix D.

3.3.9 Laboratory Analysis and Data Validation

Severn Trent Laboratories (STL) located in Shelton, Connecticut has been selected to perform all laboratory analyses on the soil, soil vapor, and ground water samples collected as part of future site characterization/investigation and remediation activities. STL is a NYSDOH ELAP CLP certified laboratory for analysis for chlorinated and non-chlorinated VOCS by EPA Method 8260B, PAHs by EPA Method 8270, PCBs by EPA Method 8082 and metals by EPA Method 6010.

Based on the PID readings and field observations and depending on the location investigated, soil samples collected from the borings will be submitted for the presence of one or a combination of the following: chlorinated and non-chlorinated VOCS by EPA Method 8260B, PAHs by EPA Method 8270, PCBs by EPA Method 8082 and metals by EPA Method 6010.

Ground water samples will be analyzed for the presence of one or a combination of the following: chlorinated and non-chlorinated VOCS by EPA Method 8260B, PAHs (in particular PAHs) by EPA Method 8270, PCBs by EPA Method 8082 and metals by EPA Method 6010.

Soil gas samples will be analyzed for the presence of aromatic and/or chlorinated VOCs by EPA Method TO-17

During all sampling events, appropriate field and laboratory Quality Assurance/Quality Control (QA/QC) methods will be employed. Field blanks, trip blanks, method blanks, and duplicate samples will be run on a routine basis.

The analytical methods used will conform to the NYSDEC Analytical Services Protocol (ASP). Category B laboratory deliverables as defined in the NYSDEC ASP will be submitted for all samples.

A Data Usability Summary Report (DUSR) will be prepared as required by the Brownfield Cleanup Agreement in order to provide a thorough evaluation of the analytical data collected at the site. The primary objective of the DUSR is to determine if the data meets the project specific criteria for data quality and data use. Ms. Carole Tomlins of The Data Quality Indicator & Associates, Inc will complete the DUSR. A copy of Ms. Tomlins' resume and qualifications are included in Appendix E.

The data shall be reviewed for contractual compliance in accordance with the requested methodologies, and qualifications shall be applied as specified in the NYSDEC Guidance for the Development of Data Usability Summary Reports (6/99).

For each sample, any positive detection reported for the Volatile and/or Semi volatile analyses shall be confirmed via visual review of chromatograms and ion spectra.

Quality controls indicators, where applicable, shall be used to evaluate the usability of the analytical data within each data package: Sample Integrity, Holding Times, Blank Contamination, Calibration information, Laboratory Control Sample and/or Blank Spike, Matrix Spike Analysis, Dilutions Performed, Laboratory Duplicate Analyses, Chromatogram Evaluation, and Calculations. In addition, a verification of the reporting limits, method detection limits (MDLs), and units used to report all data shall also be assessed.

3.3.10 *Quality Assurance Project Plan*

A Quality Assurance Project Plan (QAPP) has been prepared and is included in Appendix C.

3.3.11 *Health and Safety Plan*

A Health and Safety Plan (HASP) has been prepared and is included in Appendix D.

The proposed tasks for additional site characterization/investigation represent the next phase in the investigation of the site and will generate the data necessary to make decisions regarding interim remedial measures and the need for additional on-site and off-site investigation.

4.0 SCHEDULE AND REPORT PREPARATION

4.1 Schedule

The following schedule reflects the commitment by WFM Properties Brooklyn, LLC to aggressively investigate and characterize the site, and ultimately to conduct the remedial efforts necessary to remediate the site consistent with the Contemplated Uses. It should be noted that certain field activities described herein have been completed without the knowledge and general consent of NYSDEC because the work was completed during due diligence prior to finalizing the purchase and sale agreement with the owner and prior to entering into the BCP program.

It should further be noted that the schedule proposed by WFM Properties Brooklyn, LLC is closely tied to the proposed new store construction schedule. At this time the new store is proposed to open in September 2006. In order for this schedule to be met, the foundation excavation activities must begin in July 2005. The schedule listed below reflects our intent to complete the RIWP and develop the Remedial Action Work Plan, with NYSDEC and NYSDOH approval, prior to July 1, 2005. The proposed site design is such that the majority of soil remediation and source removal activity is anticipated to occur concurrently with the foundation excavation. Figure SP-06 illustrates the proposed cuts and fills necessary to construct the proposed project.

October 2004

Completion of the sensitive receptor survey.
RIWP subsurface investigation begins.

March 2005

Completion of RIWP.
Compilation and evaluation of RIWP subsurface investigation.

May 2005

Preparation Remedial Investigation Report (RIR) and preliminary Remedial Action Work Plan (RAWP).

June 2005
Submit RIR and RAWP to NYSDEC and NYSDOH
Complete Asbestos Abatement

Begin Building Demolition

July 2005
Submit Pre-Construction Notice to NYSDEC
Begin Foundation Excavation and Soil Excavation/Disposal

The schedule above reflects the intent to remove impacted soil and source areas during excavation activities. WFM Properties Brooklyn, LLC recognizes that certain ground water remediation and/or monitoring activities will extend beyond site excavation activities.

4.2 Report Preparation

The RIR will include the following information:

- Site description
- Geologic, hydrogeologic, and topographic setting
- Collection of soil, soil gas, and ground water samples
- Laboratory results
- Significance of results
- Public health exposure assessment
- Data usability summary report
- Conclusions and recommendations, including an evaluation of the investigation, a determination of areas where additional on-site and off-site investigations will be required, and a discussion of both interim and long term remedial options.

The RIR will present and discuss information specified in Sections 3.1 through 3.11 of the NYSDEC Draft DER-10 Technical Guidance document and, at a minimum, address items specified in Section 3.14 of the Technical Guidance document.

APPENDICES

Appendix A	Figures
Appendix B	Existing Data Table
Appendix C	Quality Assurance Project Plan
Appendix D	Health and Safety Plan
Appendix E	Resumes
Appendix F	Standard Operating Procedures
Appendix G	Whole Foods Market Brooklyn Site Public Fact Sheet and Press Release (October 2004)
Appendix H	New York State Department of Health Generic Community Air Monitoring Plan

APPENDIX A

Figures

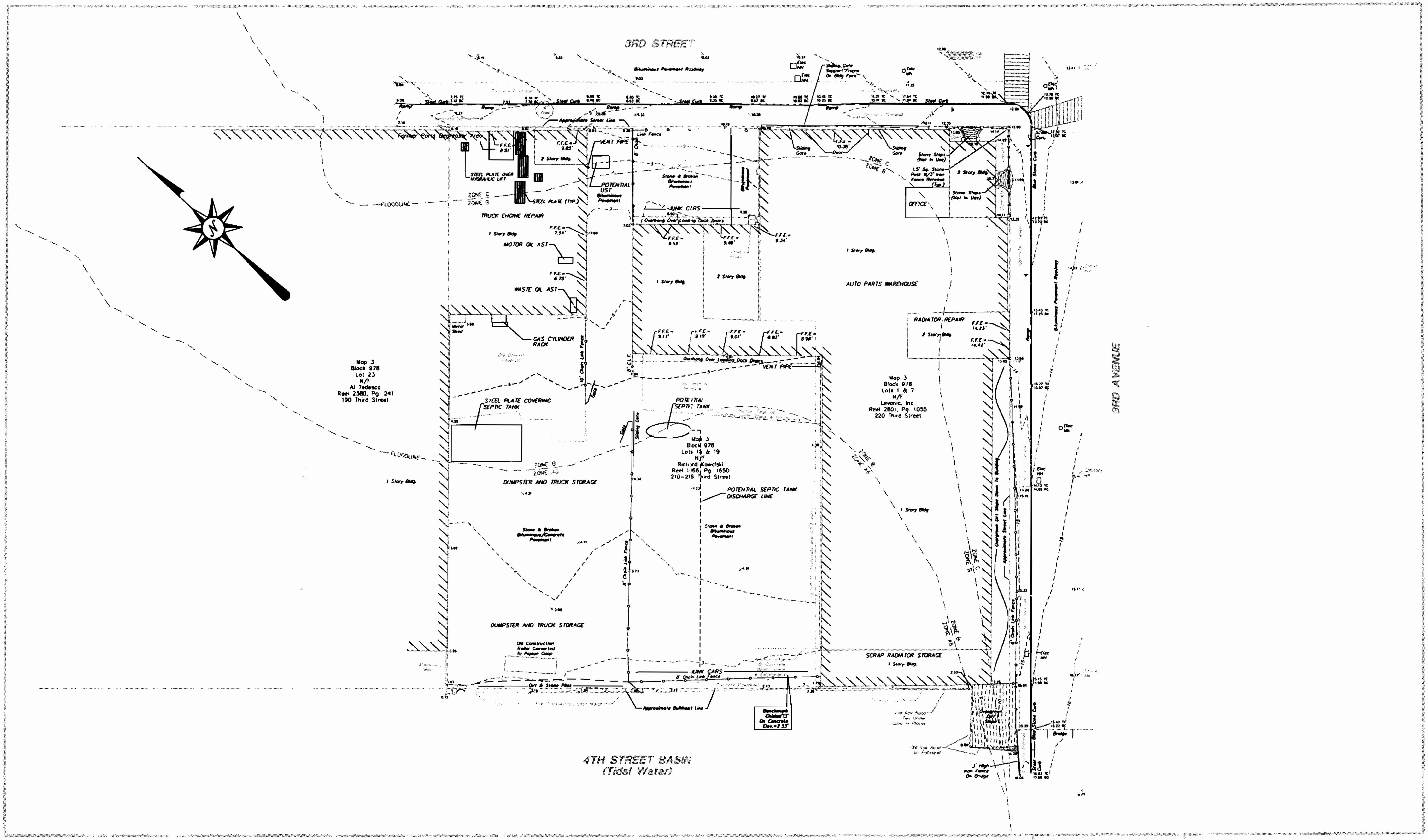
Base map is a reproduction of the U.S.G.S. 7.5 Minute Topographic Quadrangle of Brooklyn, New York, 1967, photo revised 1979.

Companies

SITE LOCATION MAP

PROPOSED WHOLE FOODS MARKET
NYSDEC BCP Site No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Project No. 03C497-B



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BL Companies

355 Research Parkway
Meriden, CT 06450
(203) 630-1406
(203) 630-2615 Fax

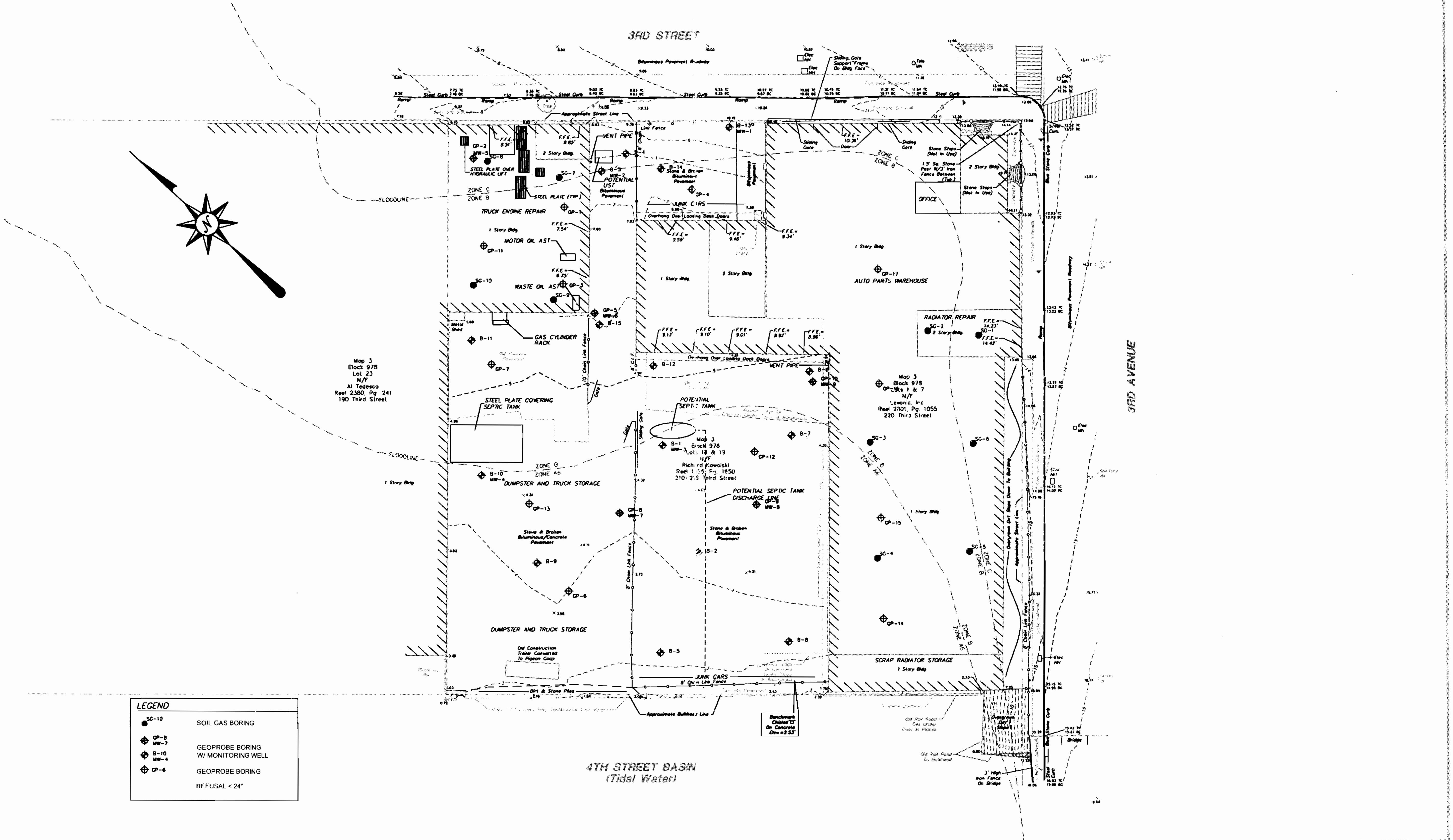
SITE PLAN

WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No	03C497
Date	02/06/04
CAD File	N-DWG-NYSDEC-03C497B-SP01-041102

XREF(s): NONE

SP-01



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SITE PLAN - PHASE II BORING LOCATIONS

WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DWG-NYSDEC-03C497B-SP02-041102

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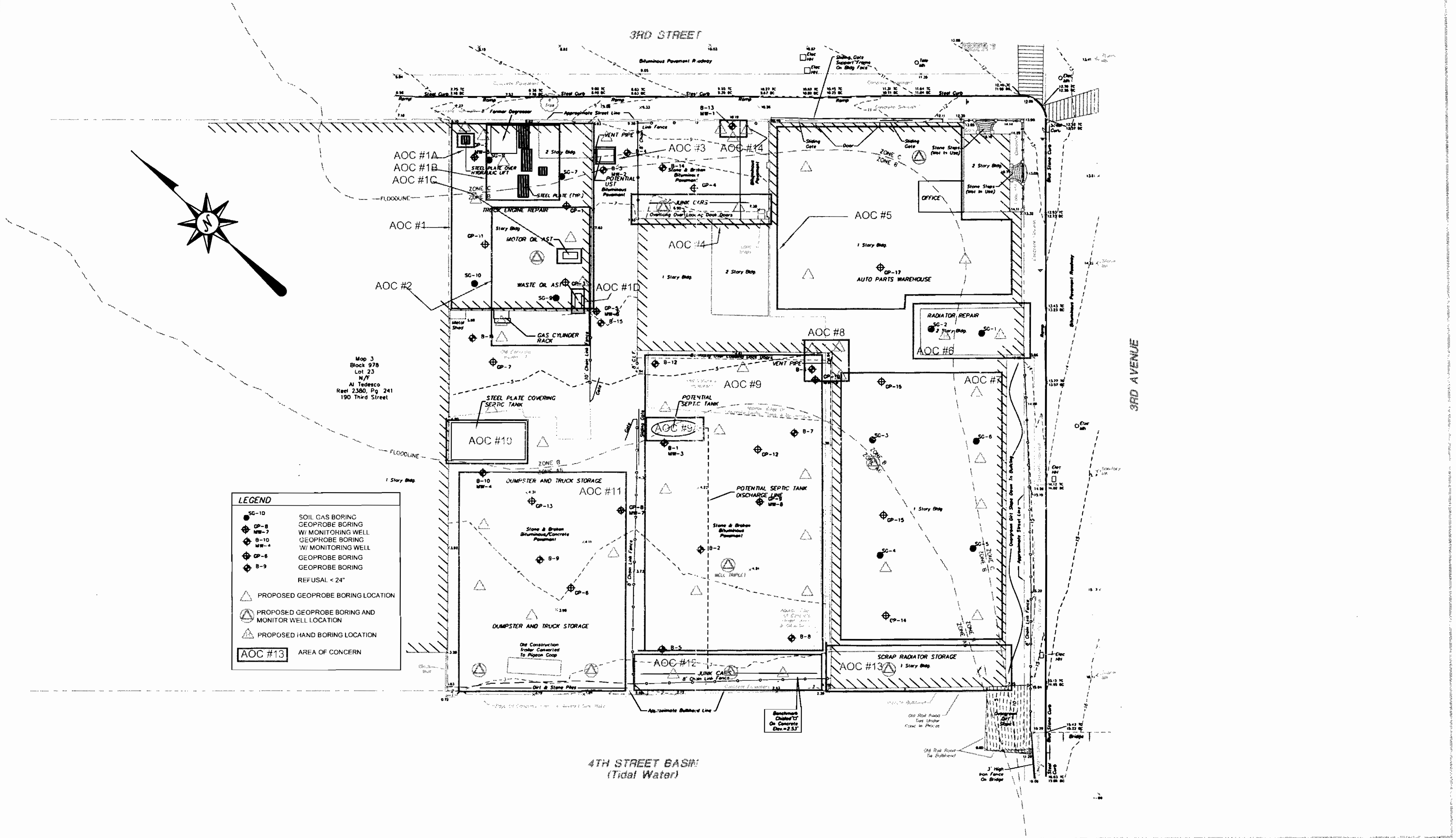
SP-02



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PROPOSED TEST BORINGS / MONITOR WELL LOCATIONS MAP

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
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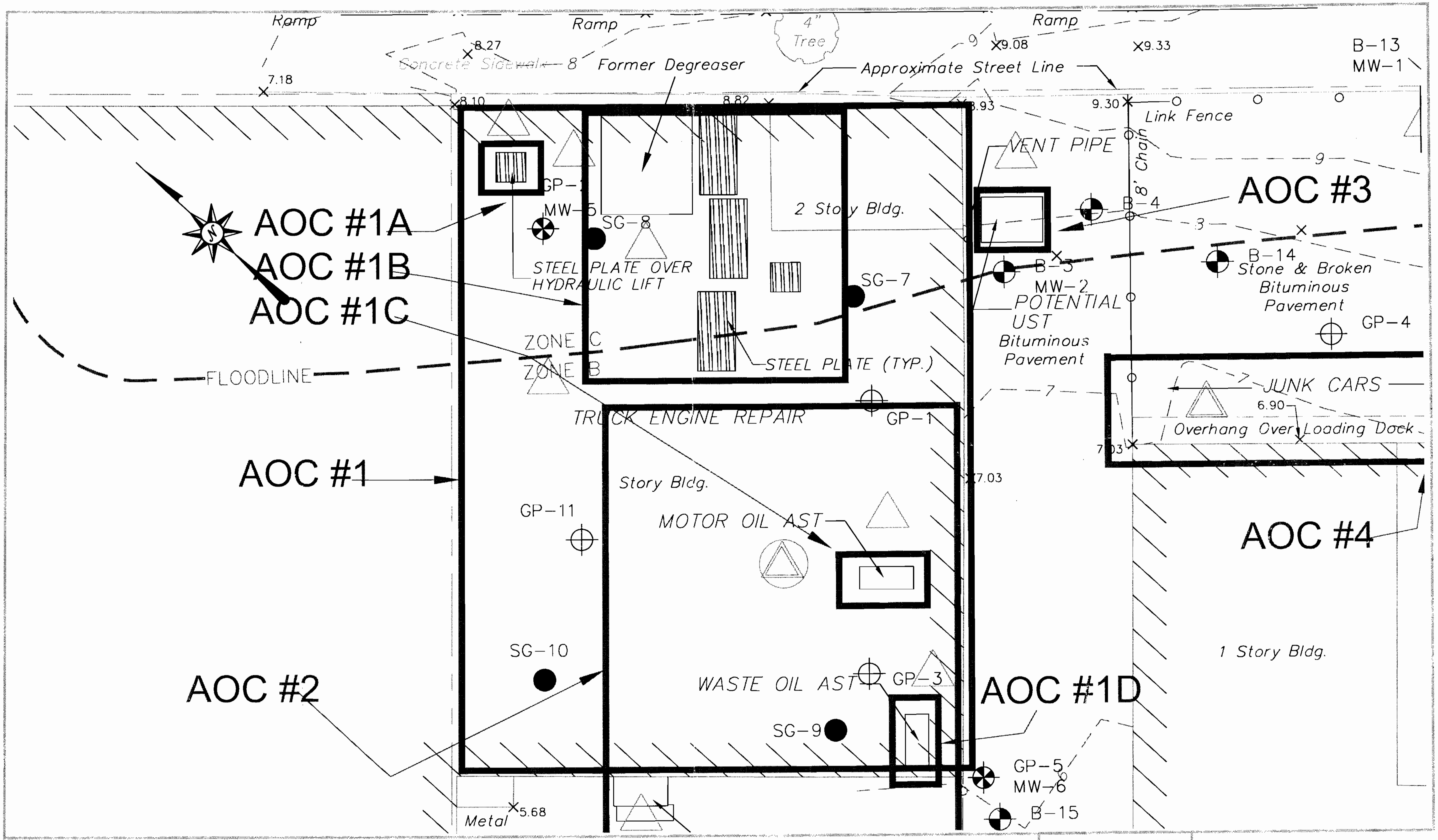
SP-03



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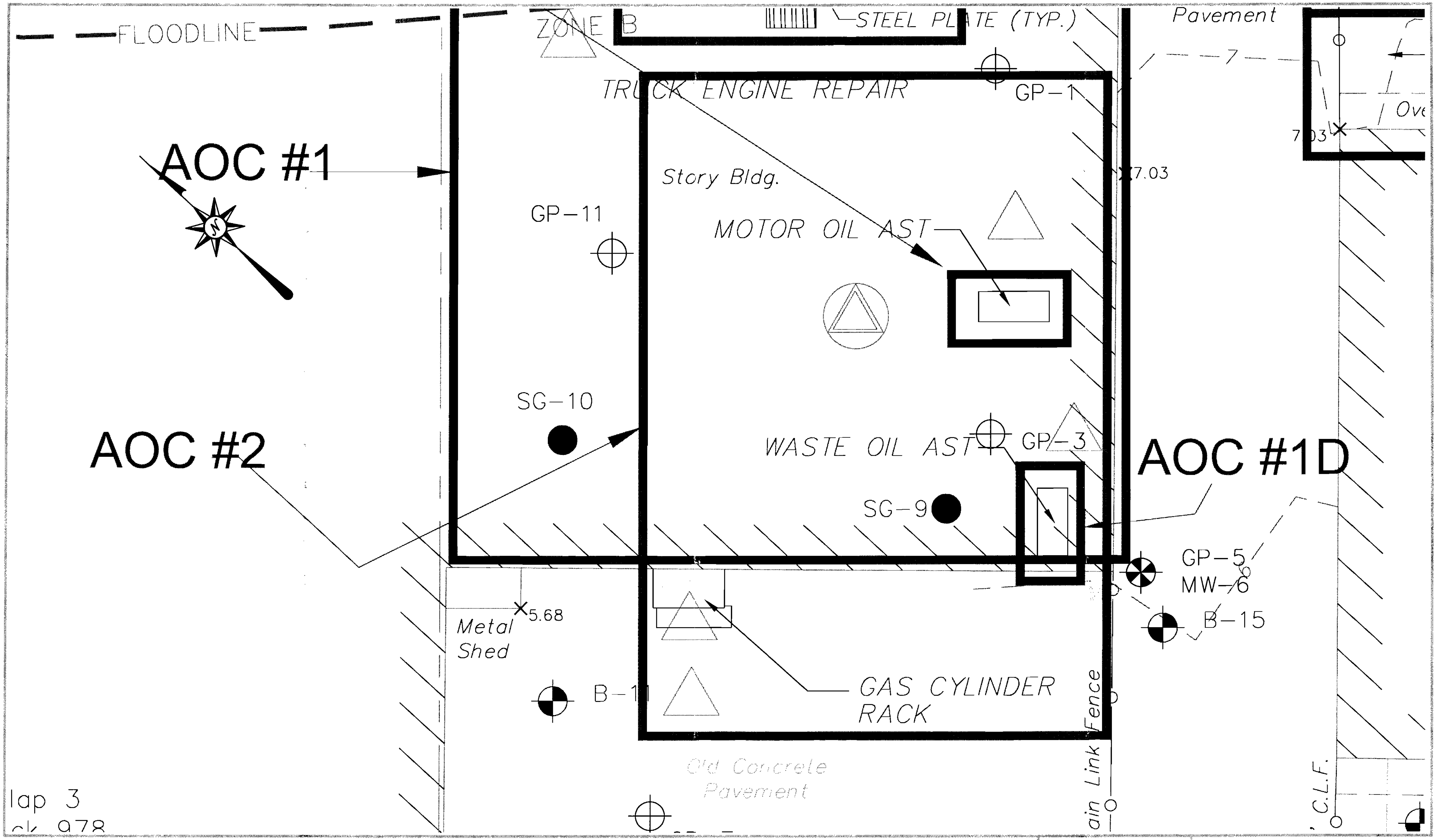
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #1

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03A-041102

XREF(s): NONE

SP-03A



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Meriden, CT 06450
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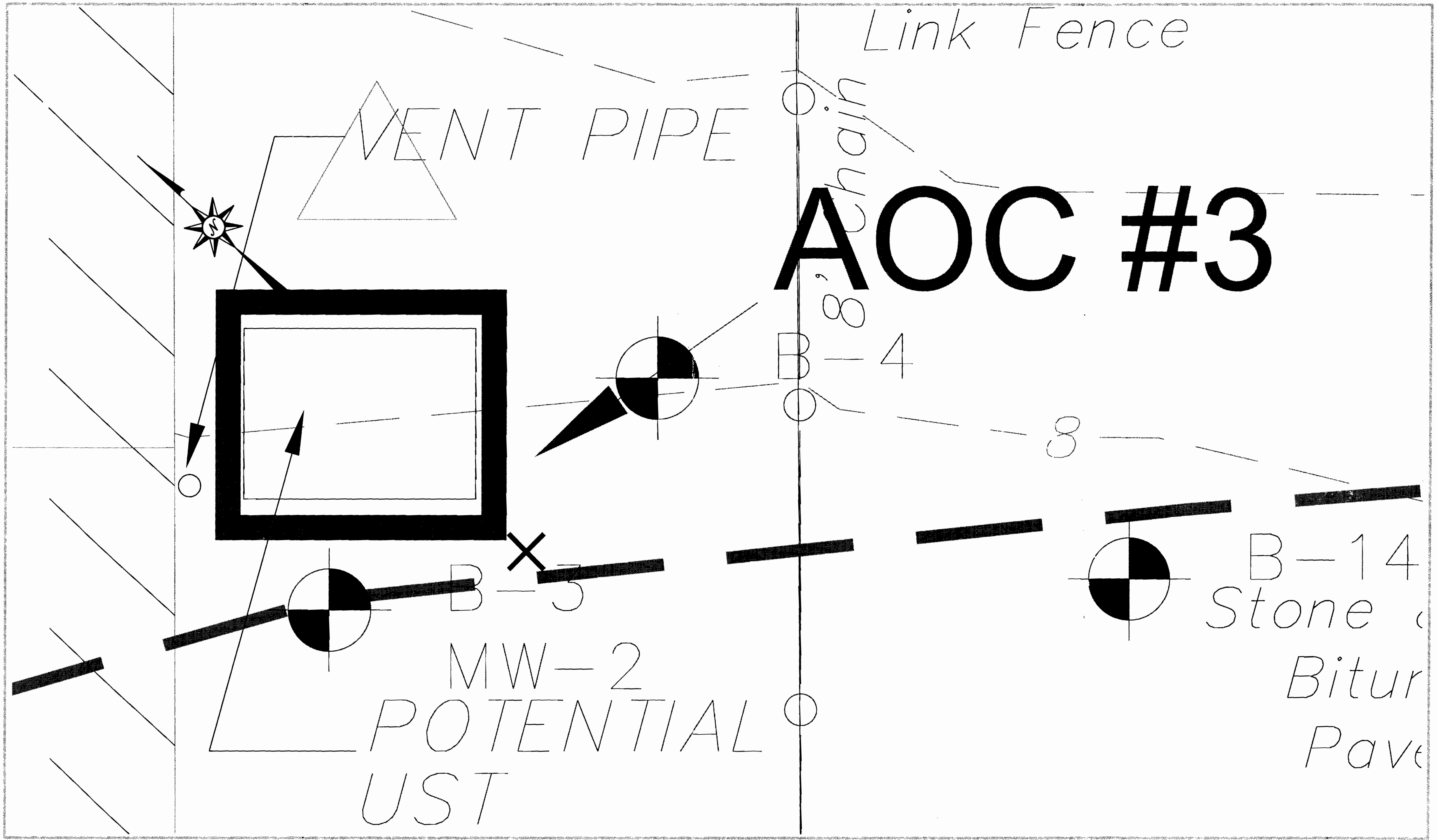
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #2

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03B-041102

XREF(s): NONE

SP-03B



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355 Research Parkway
Meriden, CT 06450
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(203) 630-2615 Fax

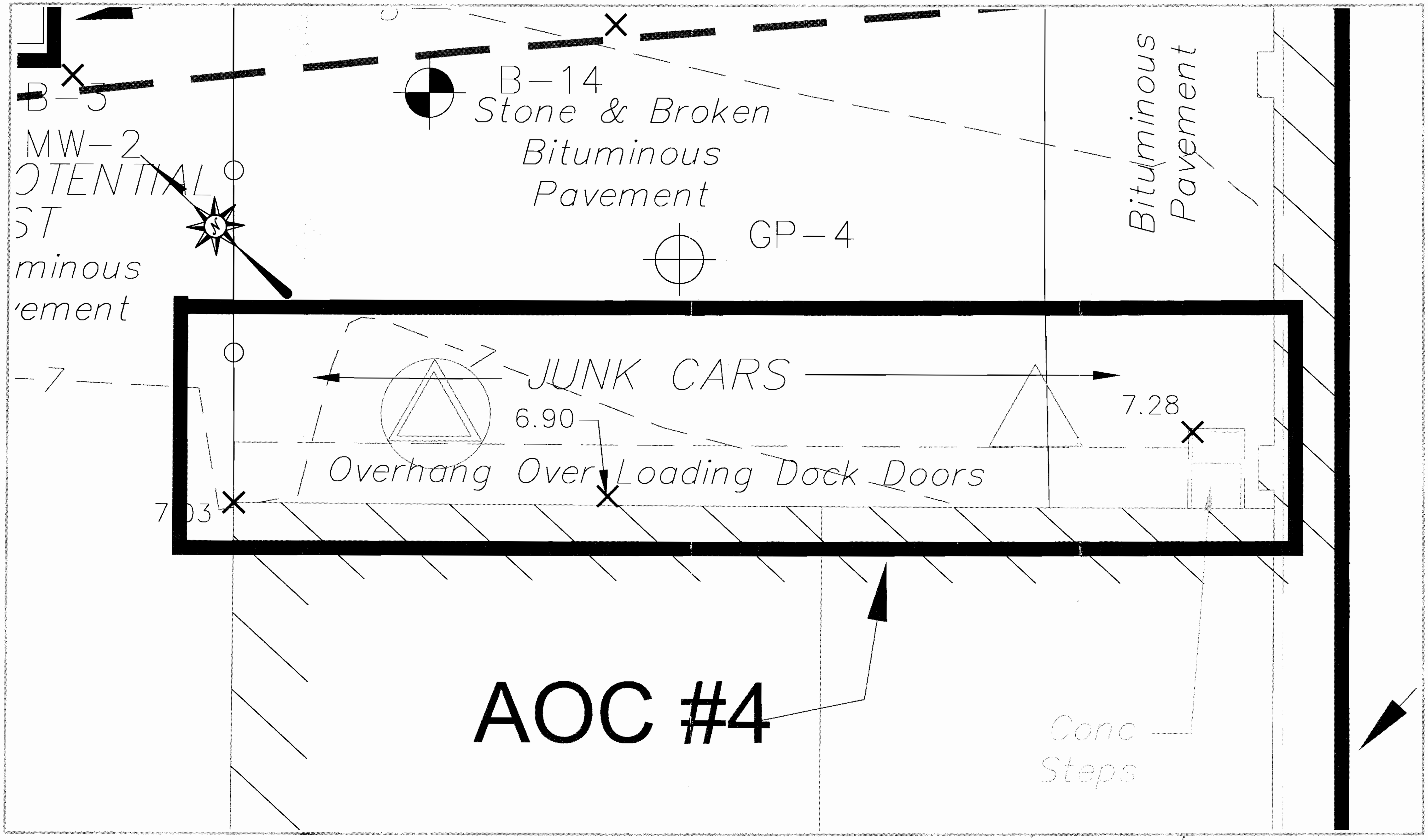
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #3

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03C-041102

XREF(s): NONE

SP-03C



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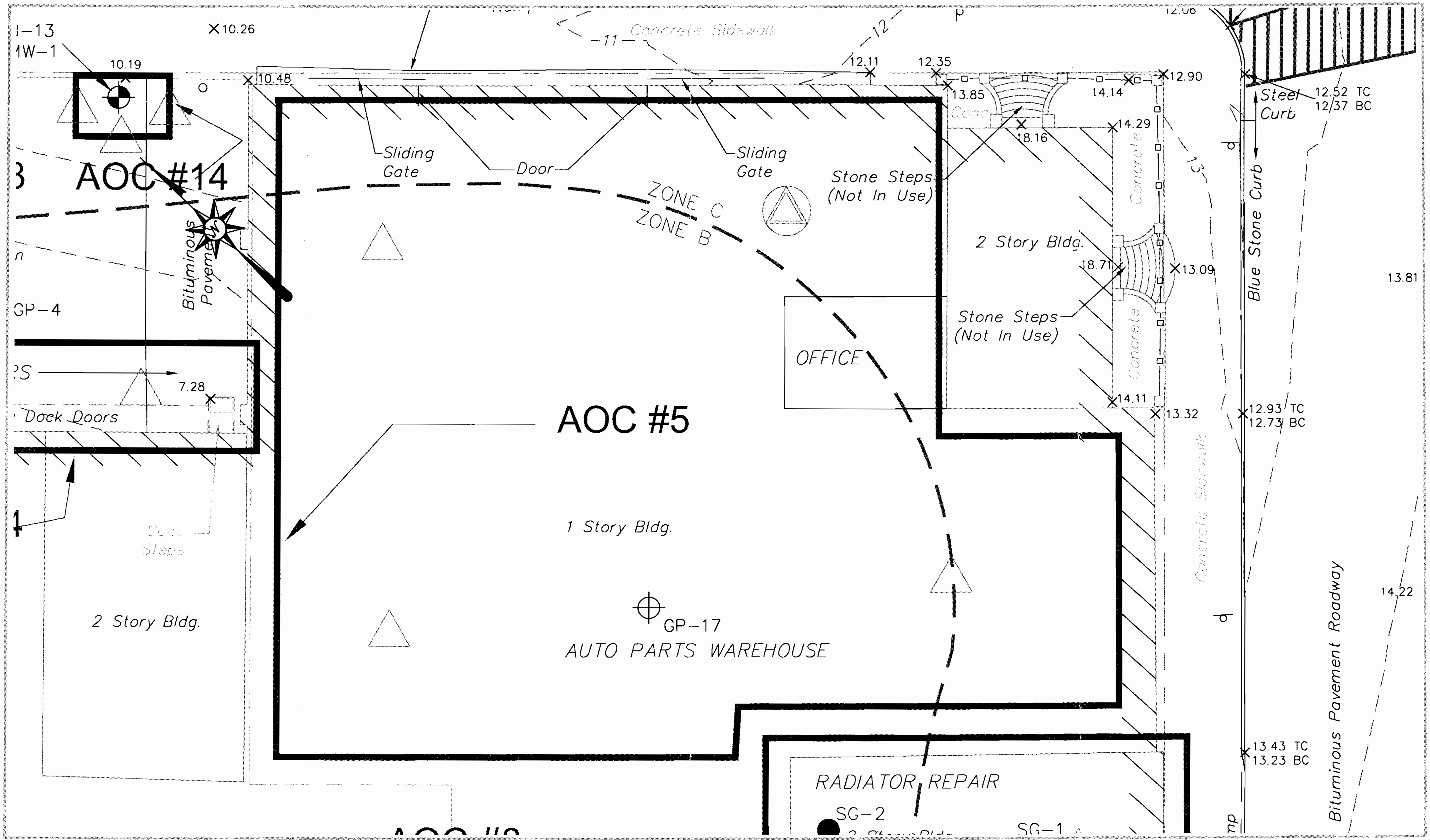
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #4

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03D-041102

XREF(s): NONE

SP-03D



PROPOSED BORINGS / MW LOCATIONS MAP - AOC #5

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

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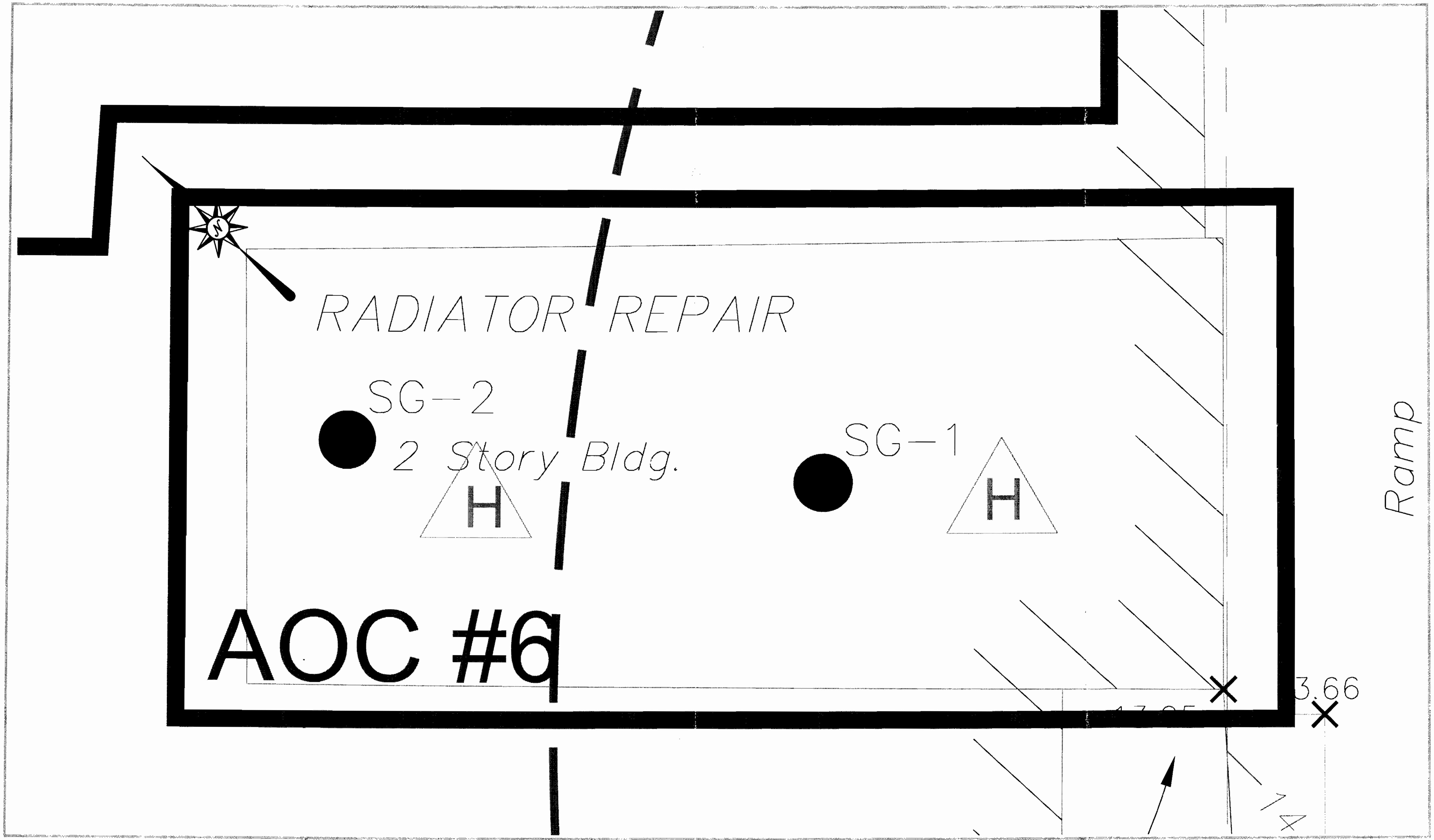
Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03E-041102

XREF(s): NONE

SP-03E



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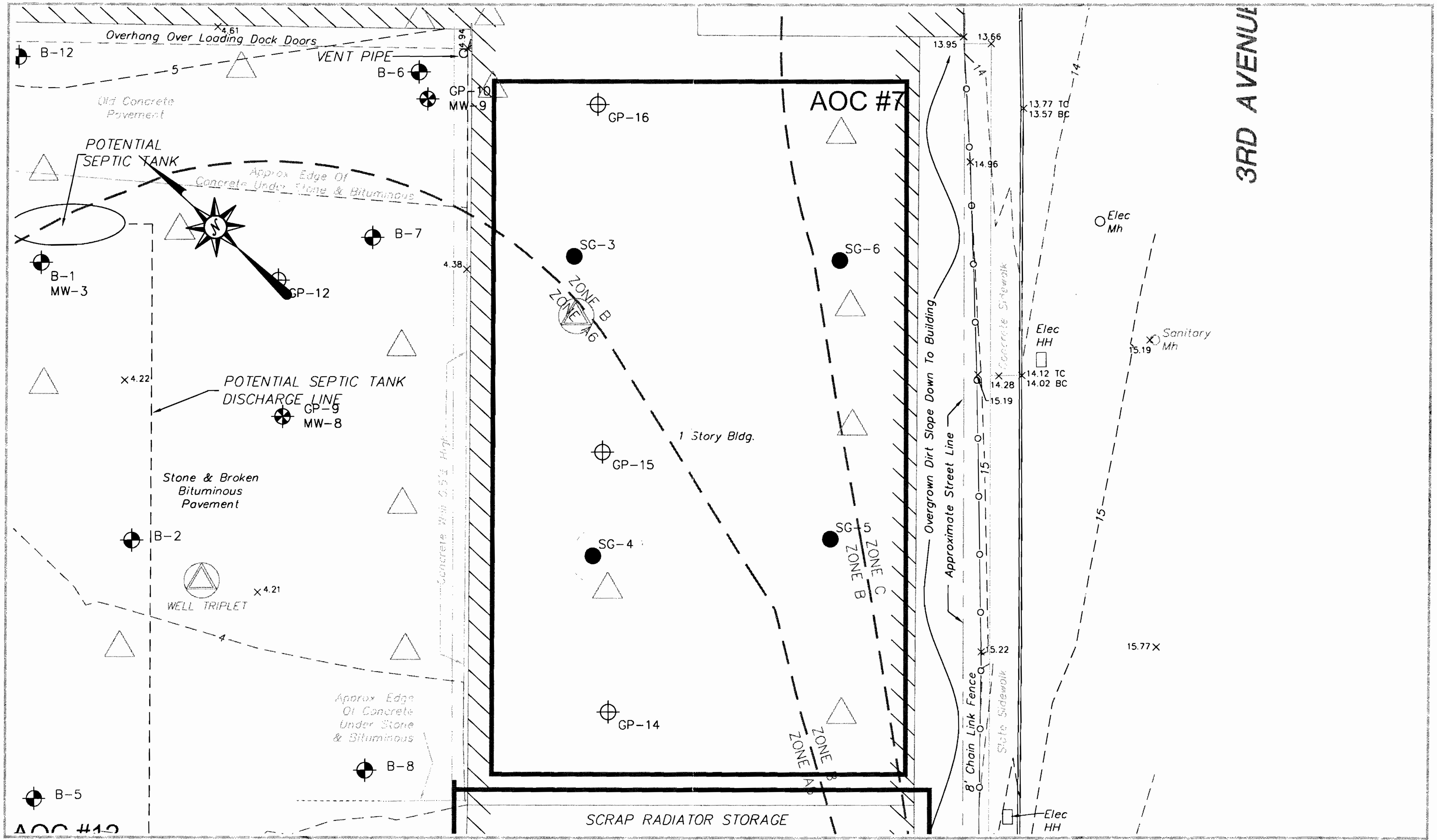
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #6

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03F-041102

XREF(s): NONE

SP-03F



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PROPOSED BORINGS / MW LOCATIONS MAP - AOC #7

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03G-041102

XREF(s): NONE

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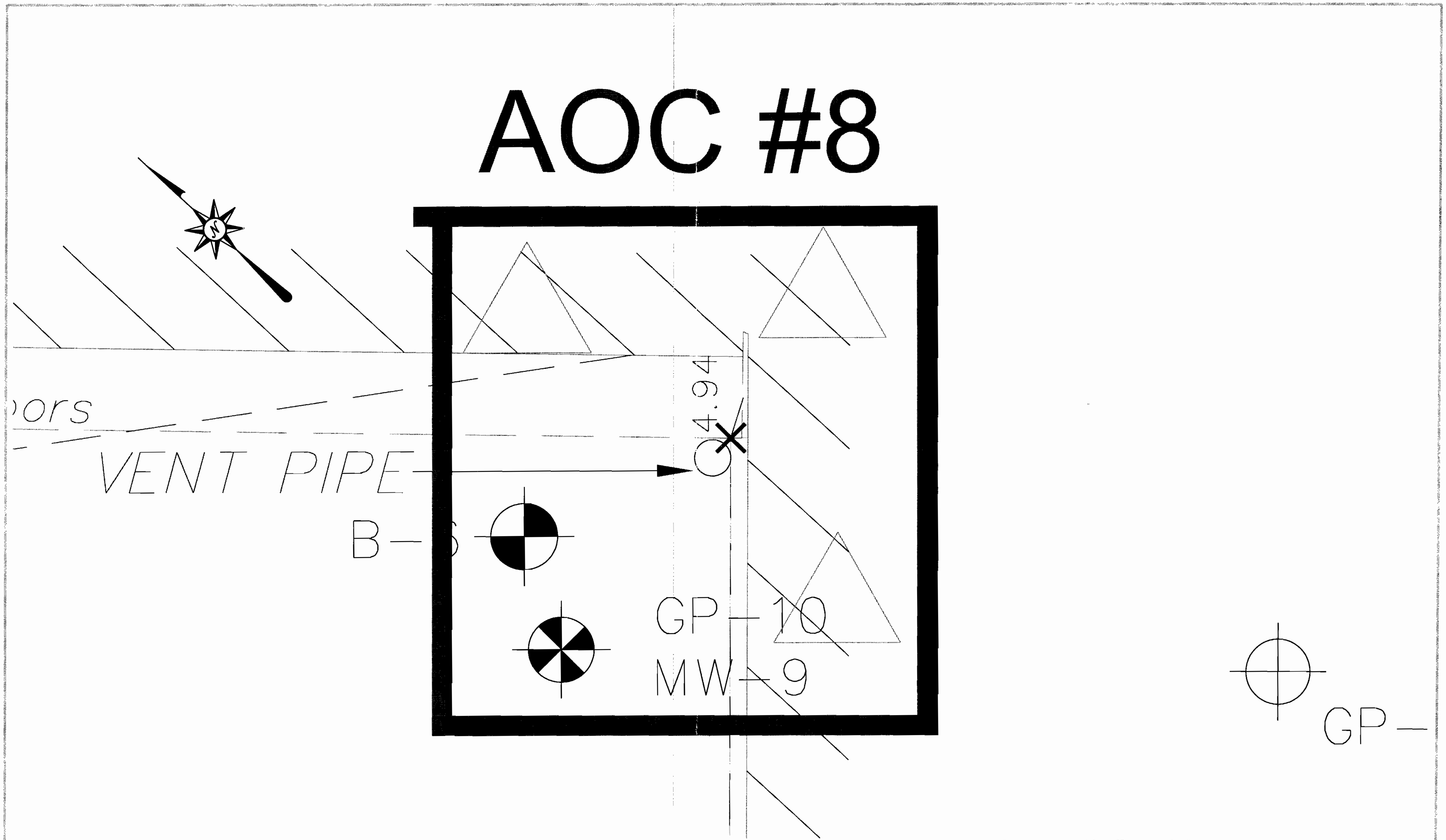

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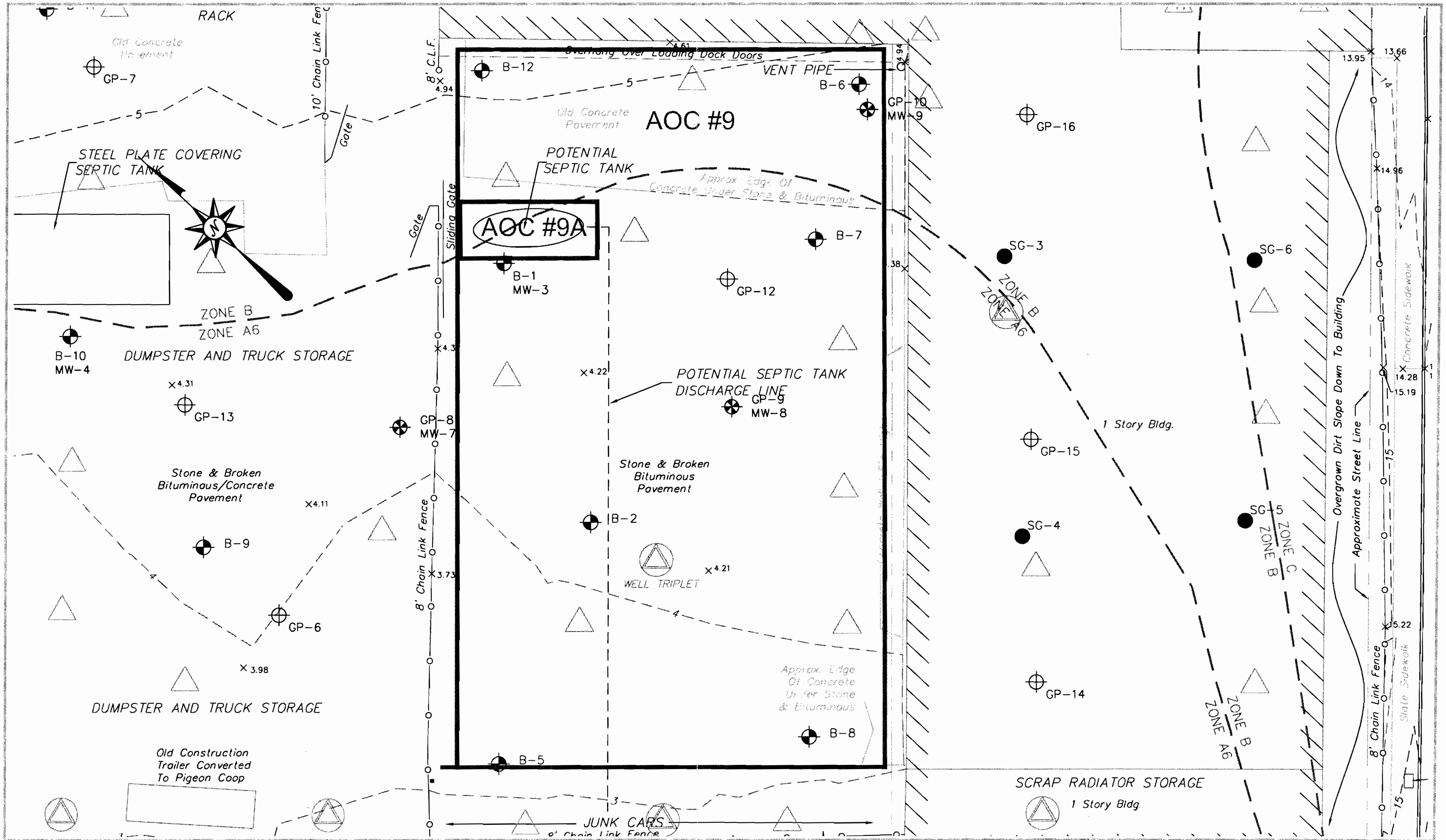
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #8

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03H-041102

XREF(s): NONE

SP-03H



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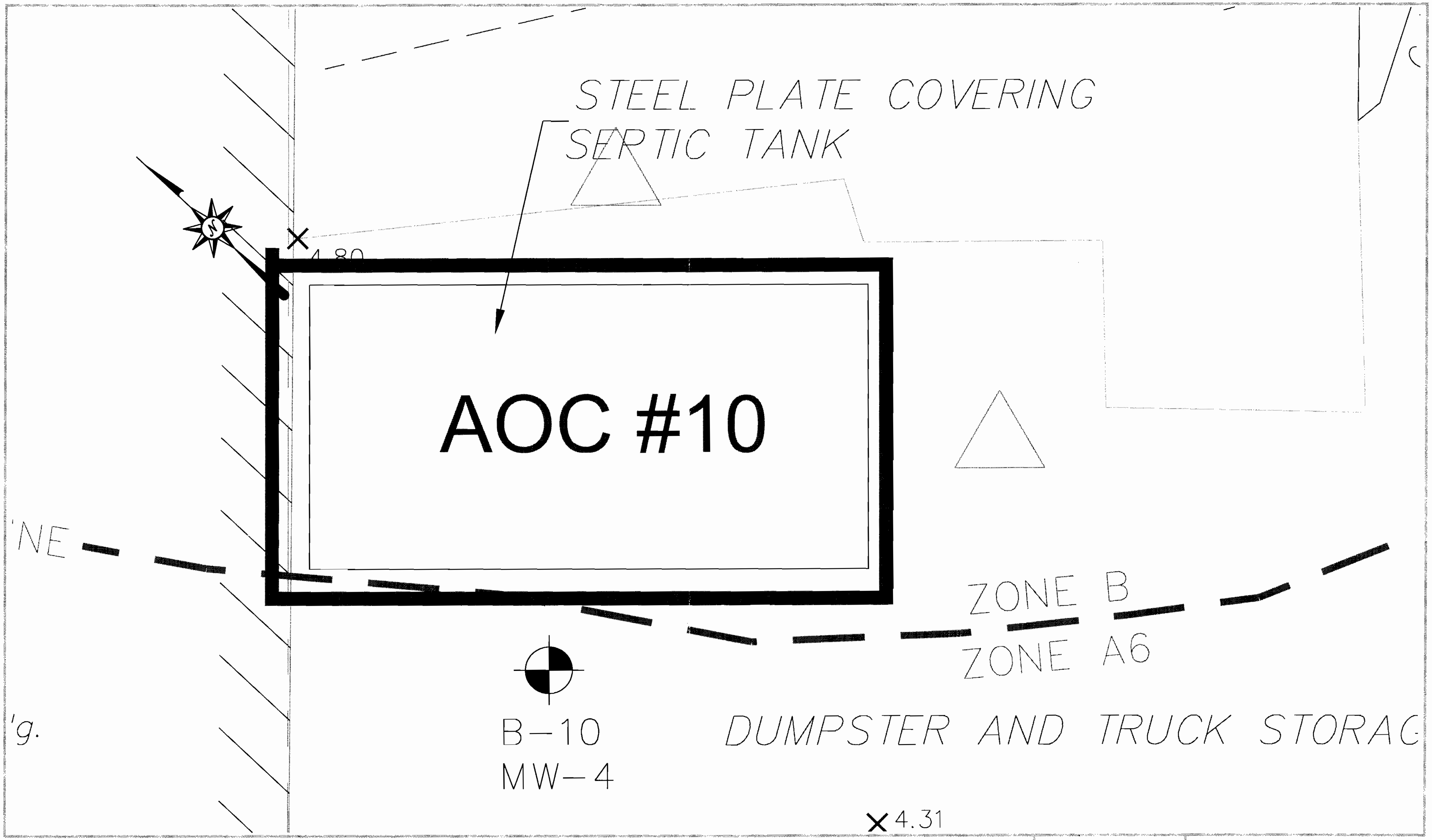
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #9

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP031-041102

XREF(s): NONE

SP-031



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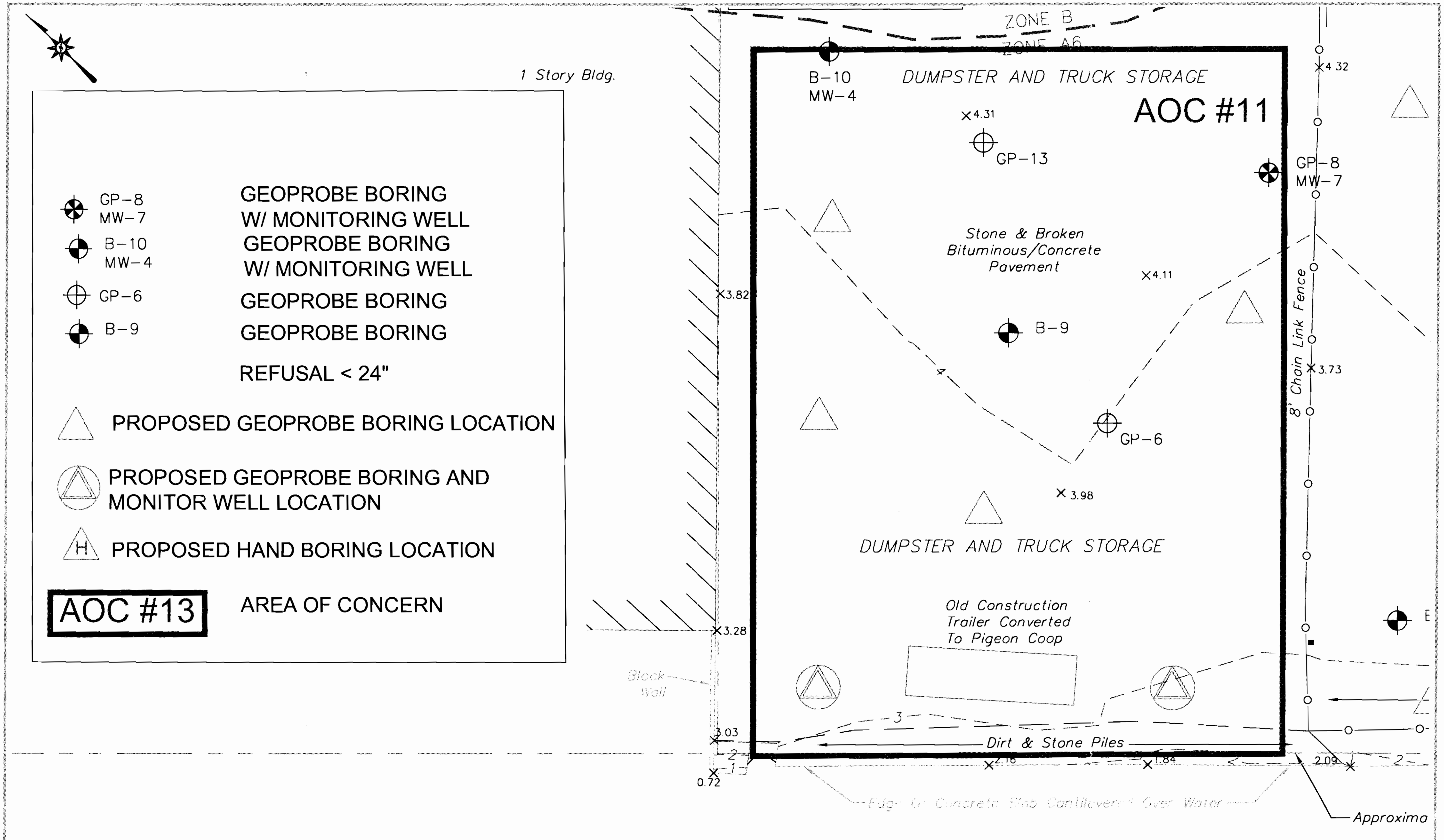
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #10

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03J-041102

XREF(s). NONE

SP-03J



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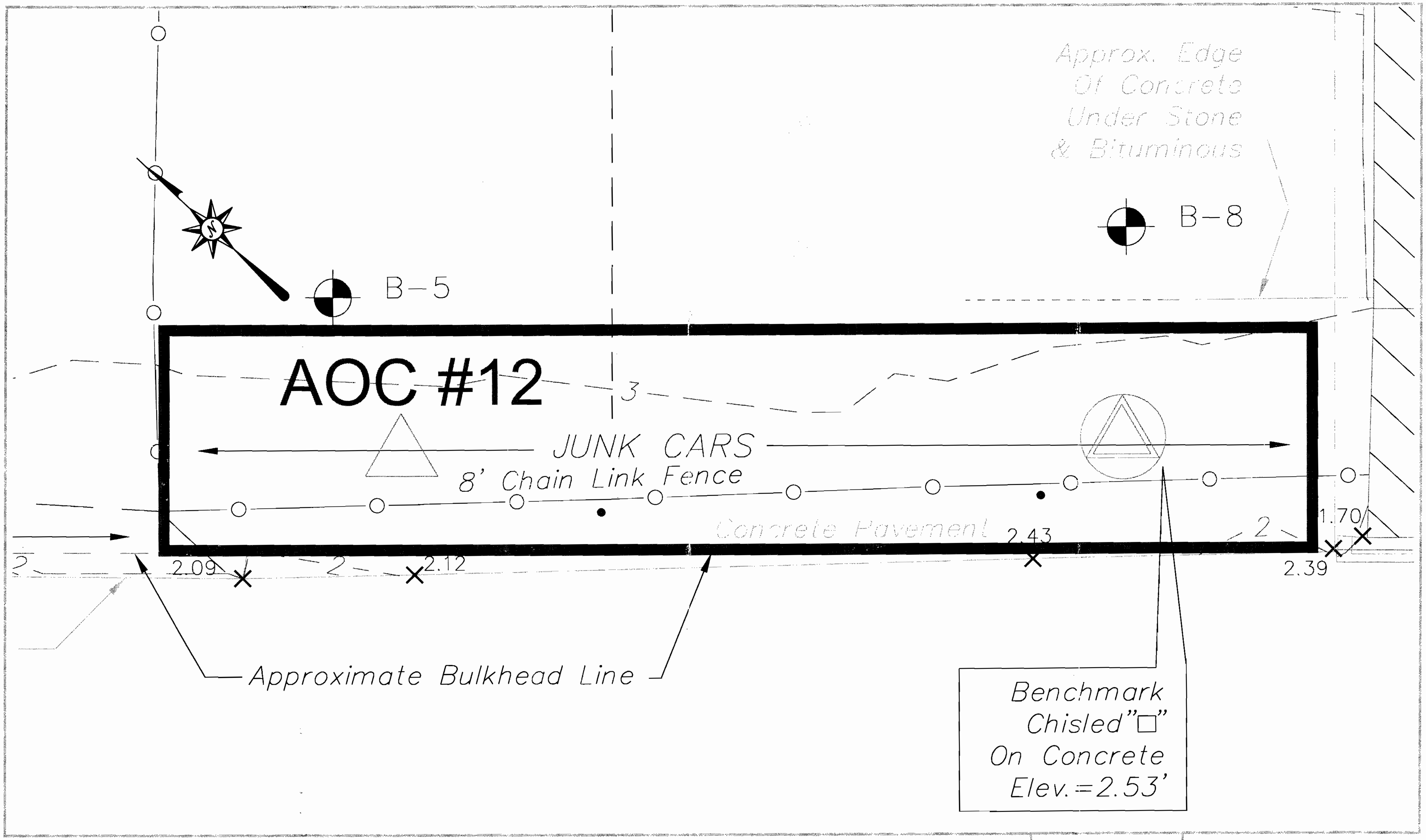
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #11

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03K-041102

XREF(s): NONE

SP-03K



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PROPOSED BORINGS / MW LOCATIONS MAP - AOC #12

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03L-041102

XREF(s): NONE

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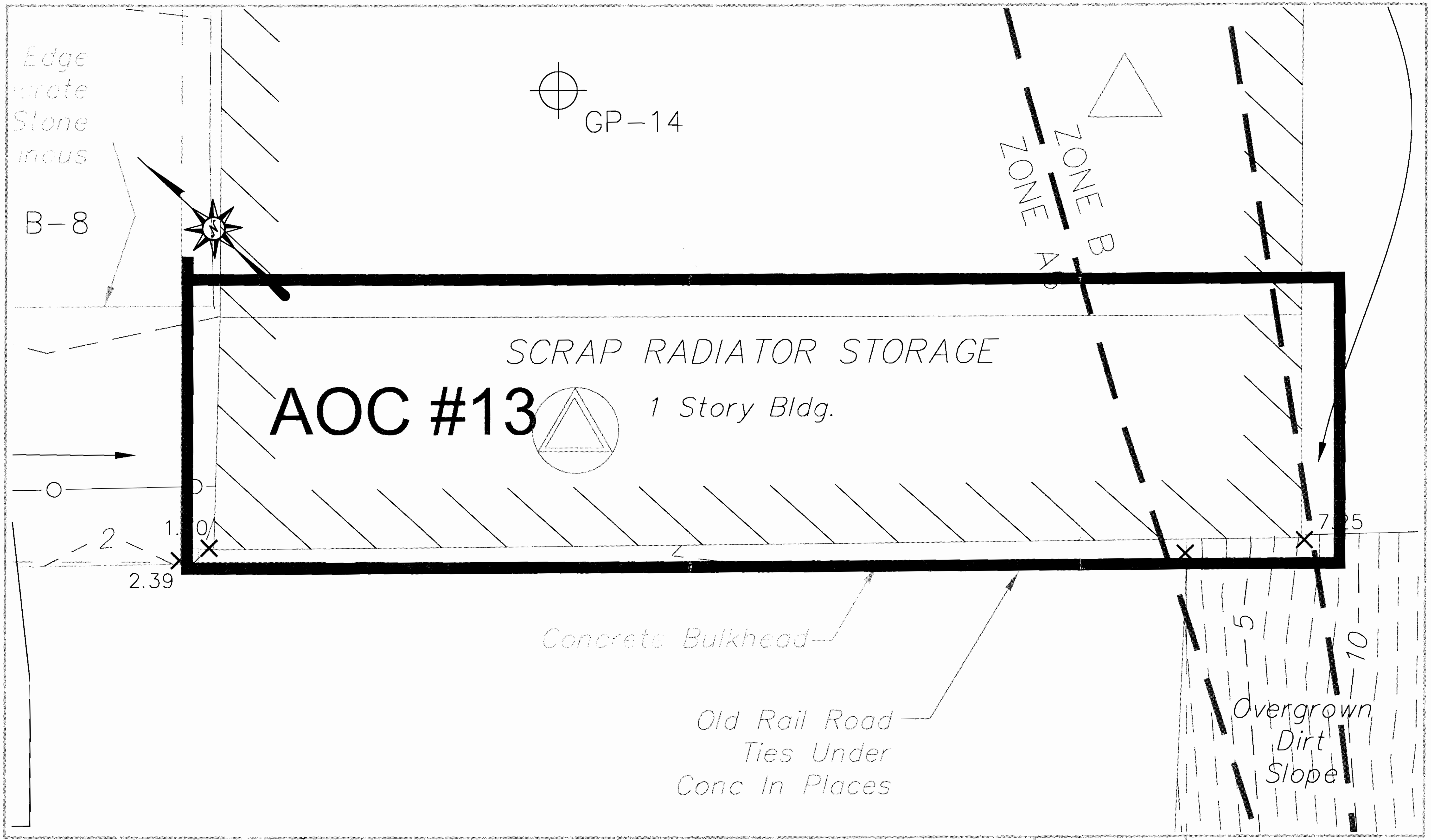

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PROPOSED BORINGS / MW LOCATIONS MAP - AOC #13

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03M-041102

XREF(s): NONE

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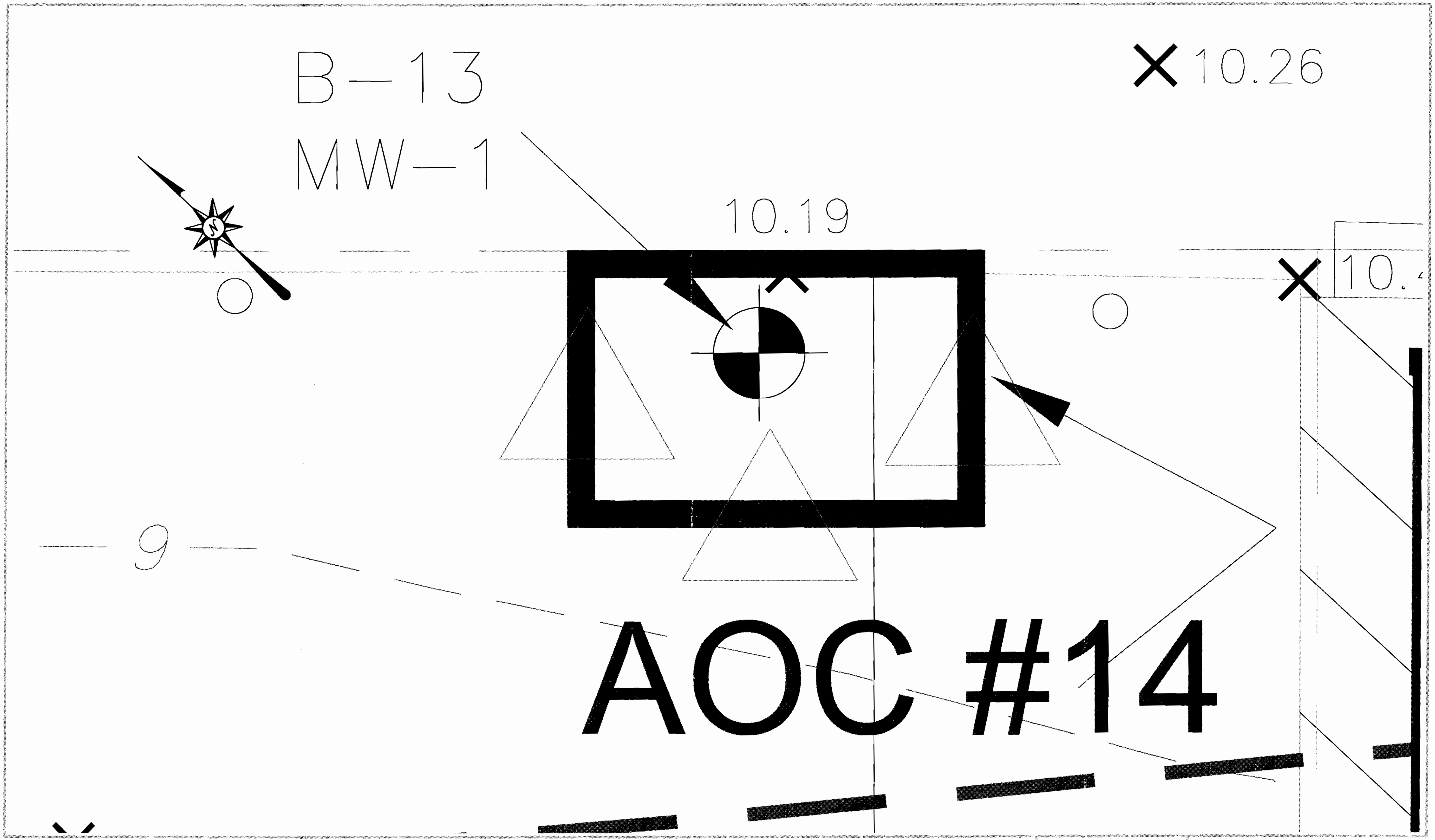

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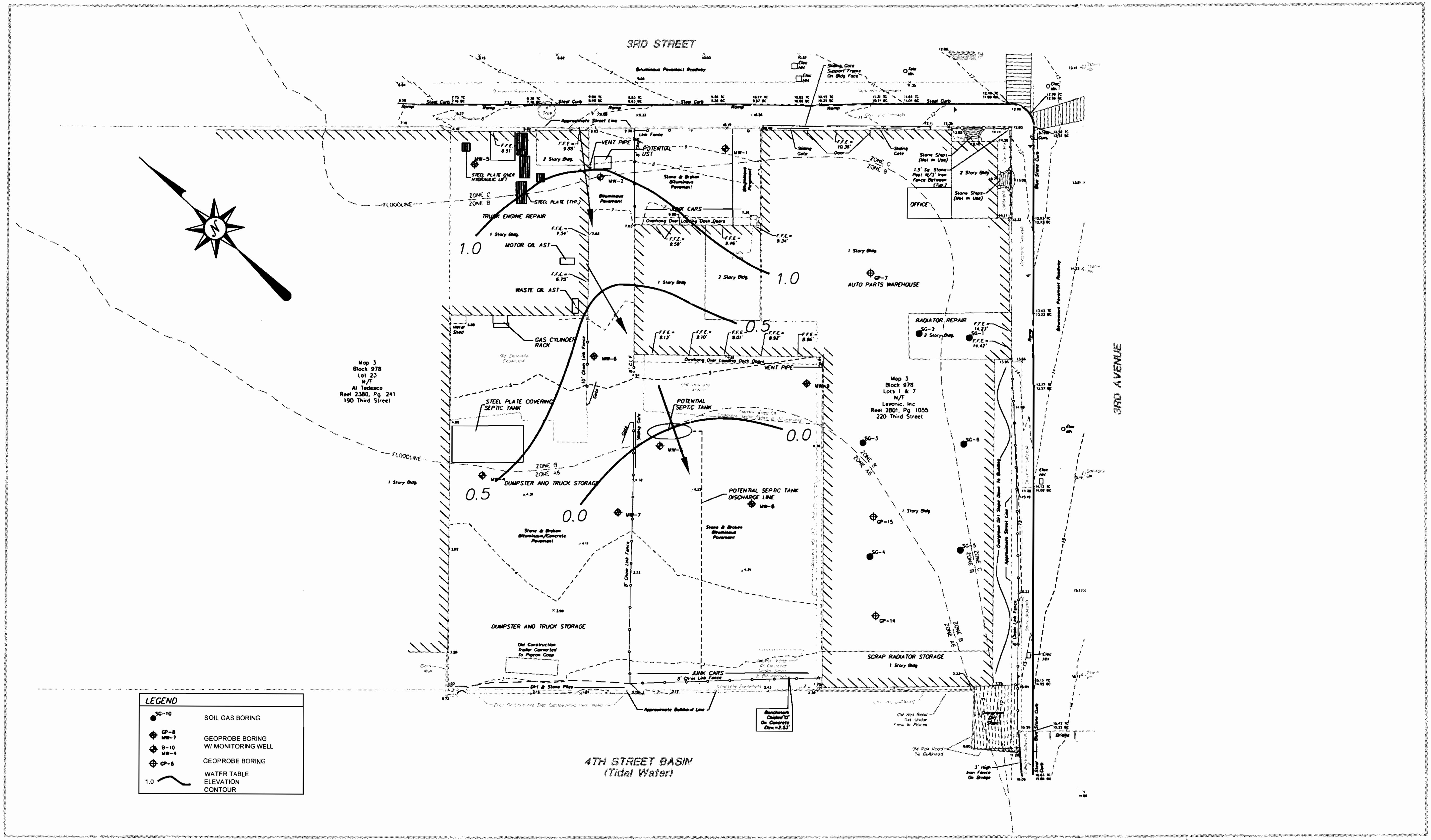
PROPOSED BORINGS / MW LOCATIONS MAP - AOC #14

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP03N-041102

XREF(s): NONE

SP-03N



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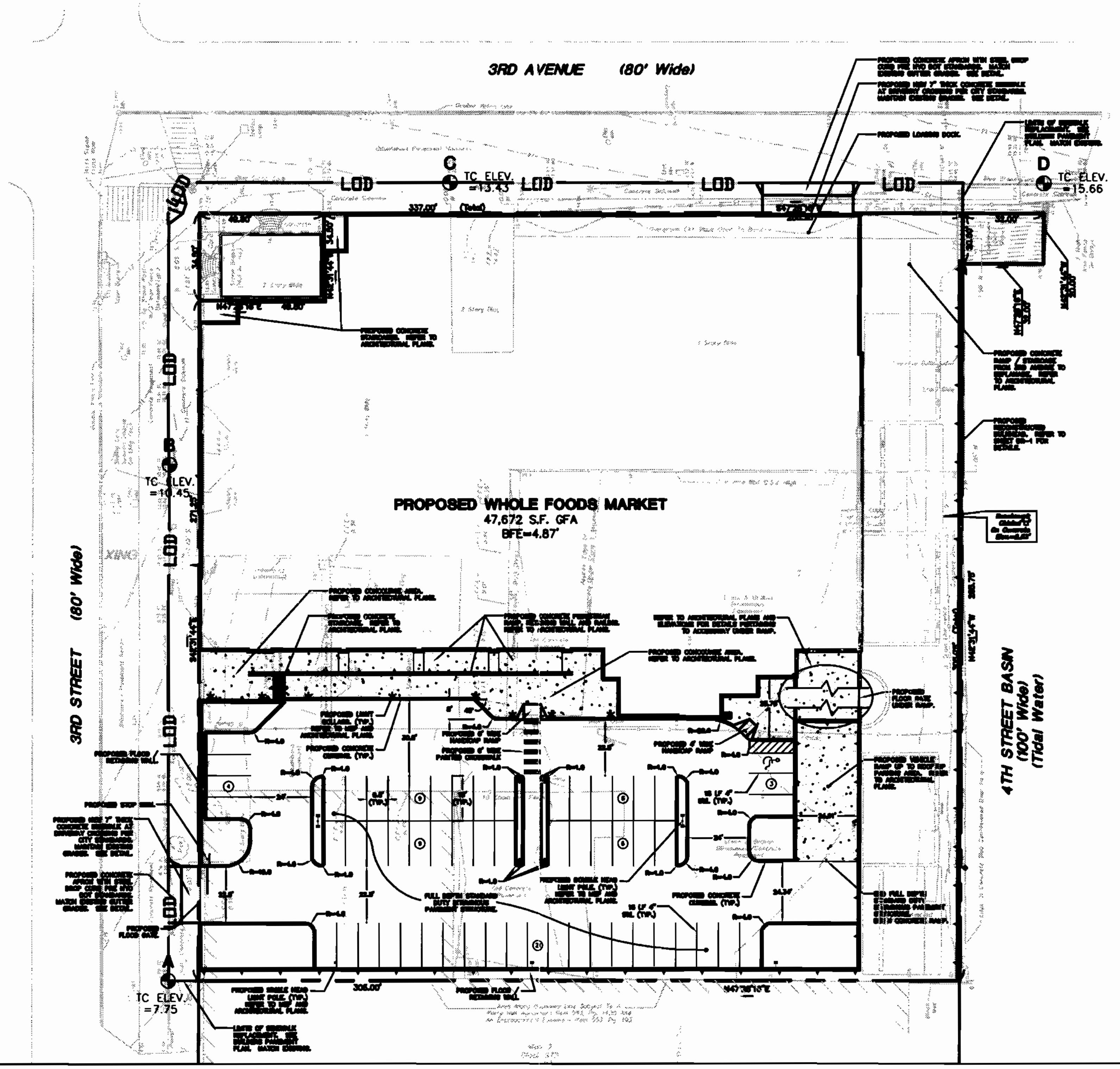
GROUND WATER FLOW MAP- 6/29/04

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DWG-NYSDEC-03C497B-SP04-041104

XREF(s): NONE

SP-04



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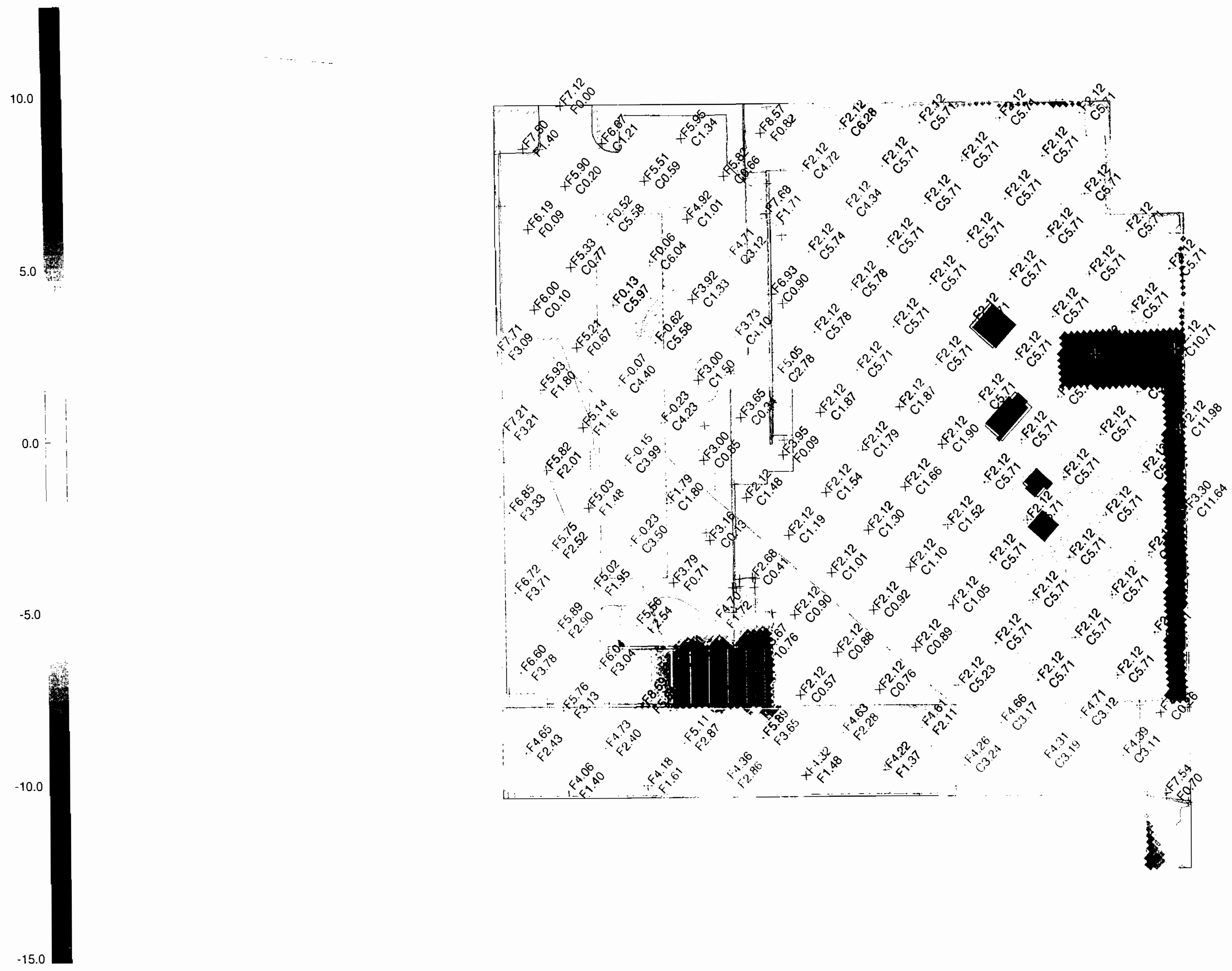
PROPOSED REDEVELOPMENT PLAN

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	S.R.L.
Checked	
Approved	
Scale	1"=100'
Project No.	03L849
Date	12/31/03
CAD File	N-SP05

SP-05

XREF(s): XXXXXXXX



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SITE PLAN - CUT/FILL ANALYSIS

PROPOSED WHOLE FOODS MARKET / NYSDEC BCP SITE No. C224100
220 3RD STREET
CITY OF NEW YORK, KINGS COUNTY, BROOKLYN, NEW YORK

Designed	X.X.X.
Drawn	K.H./P.R.L.
Checked	
Approved	
Scale	1"=50'
Project No.	03C497
Date	02/06/04
CAD File	N-DSG-NYSDEC-03C497B-SP06-041102

SP-06

APPENDIX B

Existing Data Tables

Table 1

Soil Analytical Results
Samples Collected December 5 and 9, 2003
03C497
Soil Analytical Results
City of New York, Bourough of Brooklyn, Kings County, New York

Compound	NYSDEC Regulatory Criteria		Concentration of Compound in Sample																		
	STARS Memo #1	TAGM	B-1/S-2(4-8)	B-2/S-1(0-4)	B-3/S-3 (8-12)	B-4/S-2 (4-8)	B-6/S-2 (4-8)	B-7, S-1 (0-4)	B-8/S-2 (4-8)	B-9/S-2 (4-8)	B-9/S-3 (8-12)	B-10/S-2 (4-8)	B-11/S-1 (0-4)	B-11/S-2 (4-8)	B-12/S-1 (0-4)	B-13/S-1(0-4)	B-13/S-2(4-8)	B-14/S-1(0-4)	B-14/S-2 (4-8)	B-15/S-3 (4-8)	B-15/S-4 (8-10)
VOCs (ppb)																					
1,2,4-Trimethylbenzene	100	NE	ND	ND	65	ND	ND	ND	4	10	1,000	16	12	31	ND	ND	ND	15	ND	18	23,000
1,3,5-Trimethylbenzene	100	NE	ND	ND	11	ND	ND	ND	ND	ND	500	6	ND	10	33	ND	ND	6	ND	5	4,600
Ethylbenzene	100	5,500	ND	ND	6	ND	ND	ND	ND	15	830	11	8	23	57	ND	ND	21	5	13	20,000
Isopropylbenzene	100	NE	ND	ND	9	ND	ND	ND	ND	ND	430	23	ND	6	ND	ND	ND	ND	ND	16	2,100
Napthalene	200	NE	ND	ND	8	ND	ND	ND	ND	85	73,000	16	110	600	750	26	180	36	ND	15	2,200,000
n-Butylbenzene	100	NE	ND	ND	35	ND	ND	ND	ND	ND	340	23	ND	42	ND	ND	ND	ND	ND	18	4,400
n-Propylbenzene	100	NE	ND	ND	11	ND	ND	ND	ND	ND	390	31	ND	5	ND	ND	ND	ND	ND	18	2,000
o-Xylene	100	NE	ND	ND	9	ND	ND	ND	7	27	180	20	15	28	33	6	ND	25	7	21	3,000
p-&m-Xylene	NE	NE	ND	ND	13	ND	ND	6	9	50	280	39	25	43	62	11	ND	45	14	38	1,900
p-Isopropyltoluene	100	NE	ND	ND	9	ND	ND	ND	ND	ND	290	24	ND	ND	ND	ND	ND	ND	ND	23	3,500
sec-Butylbenzene	100	NE	ND	ND	6	ND	ND	ND	ND	ND	100	49	ND	39	ND	ND	ND	ND	ND	32	350
tert-Butylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	6	ND	10	ND	5	ND	ND	ND	ND	ND	ND	1,800
Toluene	100	1,500	ND	ND	6	ND	ND	7	7	40	170	14	11	12	61	10	ND	43	13	15	220
SVOCs (ppb)																					
2-Methylnapthalene	NE	36,400	ND	ND	5,600	ND	ND	ND	ND	ND	4,200	ND	ND	ND	ND	ND	ND	ND	ND	3,400	62,000
Acenapthene	400	50,000	ND	ND	40,000	ND	ND	ND	ND	ND	13,000	ND	ND	ND	ND	ND	ND	ND	ND	8,500	73,000
Acenapthalene	NE	41,000	ND	ND	6,300	3,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11,000
Anthracene	1,000	50,000	ND	ND	21,000	ND	ND	ND	ND	ND	5,000	ND	ND	ND	ND	ND	ND	2,100	ND	6,400	42,000
Benzo(a)anthracene	0.04*	224 or MDL	350	730	17,000	1,800	ND	450	360	950	3,600	ND	ND	ND	ND	1,400	ND	6,500	ND	3,200	27,000
Benzo(a)pyrene	0.04*	61 or MDL	ND	ND	12,000	3,700	ND	ND	ND	ND	4,100	ND	ND	ND	ND	1,300	ND	6,700	ND	ND	27,000
Benzo(b)fluoranthene	0.04*	1,100	ND	ND	12,000	1,700	ND	ND	ND	ND	1,800	ND	ND	ND	ND	1,100	ND	4,300	ND	2,200	29,000
Benzo(g,h,i)perylene	0.04*	50,000	ND	ND	6,900	2,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.04*	1,100	ND	ND	11,000	2,000	ND	340	340	ND	2,500	ND	ND	ND	ND	1,400	ND	4,500	ND	3,200	32,000
Chrysene	0.04*	400	380	870	17,000	2,500	ND	470	470	970	3,800	340	ND	ND	790	1,600	690	8,200	ND	4,000	30,000
Fluoranthene	1,000	50,000	690	1,800	23,000	3,800	ND	1,100	1,000	1,200	7,900	1,300	ND	ND	1,200	3,000	1,100	11,000	ND	7,300	51,000
Flourene	1,000	50,000	ND	ND	35,000	ND	ND	ND	ND	ND	7,400	ND	ND	ND	ND	ND	ND	ND	ND	4,000	54,000
Indeno(1,2,3-cd)pyrene	0.04*	3,200	ND	ND	4,800	1,700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	200	13,000	ND	ND	3,600	ND	ND	ND	ND	ND	7,600	ND	ND	ND	ND	ND	ND	ND	ND	7,200	140,000
Pheneanthrene	1,000	50,000	640	1,300	51,000	ND	ND	1,100	860	1,900	14,000	870	ND	ND	1,300	2,300	700	8,200	ND	13,000	110,000
Pyrene	1,000	50,000	650	1,700	45,000	7,400	ND	950	910	1,400	12,000	1,000	ND	ND	1,500	2,900	1,100	9,300	ND	11,000	85,000
PCBs (ppm)																					
PCB 1260	NA	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND
PCB, Total	NA	1.0 (surface)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND
	NA																				
RCRA Metals Total, (ppm)																					
Arsenic	NA	7.5 or SB	4.14	7.54	2.89	2.79	2.79	12.64	2.1	3.49	3.54	2.73	3.16	4.89	4.21	5.09	3	7.38	5.4	4.28	3.26
Barium	NA	300 or SB	27.8	111	23.9	42.6	16.9	56.5	14.4	23.7	106	53.8	21.5	57.3	49.4	65.2	56.9	254	67.9	39.9	50.2
Cadmium	NA	1 or SB	ND	ND	ND	ND	ND	ND	ND	9.53	0.52	ND	ND	ND	ND	ND	ND	0.84	ND	ND	ND
Chromium	NA	10 or SB	7.96	13.3	8.56	10	8.58	8.03	3.2	8.42	9.7	12.2	7.84	18.1	15.2	12.9	10.8	13.8	17	16.7	18.1
Lead	NA	SB	37.9	297	28.7	66.9	15.5	182	25.5	632	21.4	14.2	26.9	380	58.3	137	161	837	125	56.4	86.6
Selenium	NA	2 or SB	1.88	2.36	2.03	1.62	ND	3.24	ND	1.69	1.62	1.41	1.54	1.74	1.82	1.67	1.4	2.2	1.84	1.73	1.48
Mercury	NA	0.1	0.12	0.15	0.63	0.29	ND	0.27	0.15	ND	0.29	0.24	0.39	0.21	ND	0.21	0.24	0.5	0.45	0.57	ND

NOTES

Only compounds detected are listed
STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy
TAGM = Technical and Administrative Guidance Memorandum Soil Cleanup objectives
Shading indicates exceedence of Stars Memo #1 Criteria
Bold indicates exceedence of TAGM Criteria
0.04* = TCLP Extraction Method must be used to demonstrate Ground Water Protection for these compounds
ND = Not Detected
NE = None Established by DEC
NA = Not Applicable
SB = Site Background
ppm = parts per million
ppb = parts per billion

TABLE 1 (continued Page 2 of 3)

Soil Analytical Results
Samples Collected January 19 and 20, 2004
03C497
Soil Analytical Results
City of New York, Bourough of Brooklyn, Kings County, New York

Compound	NYSDEC Regulatory Criteria		Concentration of Compound in Sample																
	STARS Memo #1	TAGM	GP-1/S-1	GP-1/S2	GP-2/S1	GP-2/S-2	GP-3/S-1	GP-3/S-2	GP-4/S-1	GP-4/S-2	GP-5/S-1	GP-5/S-2	GP-6/S-1	GP-7/S-1	GP-8/S-1	GP-8/S-2	GP-8/S-2A	GP-9/S-1	GP-9/S-2
VOCs (ppb)																			
1,2,4-Trimethylbenzene	100	NE	ND	ND	ND	10	ND	ND	ND	ND	6	7	ND	ND	ND	ND	[illegible]	ND	ND
1,3,5-Trimethylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17	ND	ND	[illegible]	ND	ND
Benzene	14	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
Ethylbenzene	100	5,500	ND	ND	ND	25	ND	ND	11	ND	10	15	ND	36	ND	ND	[illegible]	6	ND
Isopropylbenzene	100	NE	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
Napthalene	200	NE	ND	ND	ND	27	ND	ND	ND	ND	ND	ND	ND	18	[illegible]	ND	[illegible]	ND	ND
n-Butylbenzene	100	NE	ND	ND	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
n-Propylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
o-Xylene	100	NE	ND	ND	ND	12	ND	ND	ND	ND	8	9	ND	17	ND	ND	[illegible]	ND	ND
p-&m-Xylene	NE	NE	ND	ND	20	24	ND	ND	ND	ND	9	18	ND	48	ND	ND	[illegible]	ND	5
p-Isopropyltoluene	100	NE	ND	ND	ND	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
sec-Butylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	10	ND	ND	ND	ND	ND
tert-Butylbenzene	100	NE	ND	ND	ND	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
Toluene	100	1,500	ND	ND	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND
Tetrachloroethylene	NE	1,400	ND	ND	17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs (ppb)																			
2-Methylnapthalene	NE	36,400	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	ND	NA	NA
Acenapthene	400	50,000	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	[illegible]	NA	NA
Acenapthalene	NE	41,000	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	ND	NA	NA
Anthracene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	[illegible]	NA	NA
Benzo(a)anthracene	0.04*	224 or MDL	NA	NA	[illegible]	ND	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	ND	NA	NA
Benzo(a)pyrene	0.04*	61 or MDL	NA	NA	[illegible]	ND	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	ND	NA	NA
Benzo(b)fluoranthene	0.04*	1,100	NA	NA	[illegible]	ND	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	ND	NA	NA
Benzo(g,h,i)perylene	0.04*	50,000	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	ND	NA	NA
Benzo(k)fluoranthene	0.04*	1,100	NA	NA	[illegible]	ND	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	ND	NA	NA
Chrysene	0.04*	400	NA	NA	[illegible]	ND	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	ND	NA	NA
Fluoranthene	1,000	50,000	NA	NA	11,000	580	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	[illegible]	NA	NA
Flourene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	[illegible]	NA	NA
Indeno(1,2,3-cd)pyrene	0.04*	3,200	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	ND	NA	NA
Napthalene	200	13,000	NA	NA	ND	[illegible]	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	[illegible]	NA	NA
Pheneanthrene	1,000	50,000	NA	NA	[illegible]	590	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	[illegible]	NA	NA
Pyrene	1,000	50,000	NA	NA	[illegible]	510	NA	NA	NA	NA	NA	ND	NA	[illegible]	NA	NA	[illegible]	NA	NA

NOTES

* = Due to the high detection limit for a soil matrix, the TCLP Extraction Method nust be used to demonstrate groujdwater quality protection for theses compounds.
Only compounds detected are listed
STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy
TAGM = Technical and Administrative Guidance Memorandum Soil Cleanup objectives
[illegible]
Bold indicates exceedence of TAGM Criteria
ND = Not Detected
NE = None Established by DEC
NA = Not Applicable
SB = Site Background
ppm = parts per million
ppb = parts per billion

TABLE 1 (continued Page 3 of 3)

Soil Analytical Results
Samples Collected January 19 and 20, 2004
03C497
Soil Analytical Results
City of New York, Bourough of Brooklyn, Kings County, New York

Compound	NYSDEC Regulatory Criteria																
	STARS Memo #1	TAGM	GP-10/S-1	GP-10/S-2	GP-11/S-1	GP-11/S-2	GP-12/S-1	GP-12/S-2	GP-13/S-1	GP-13/S-2	GP-14/S-1	GP-14/S-2	GP-15/S-1	GP-16/S-1	GP-16/S-2	GP-17/S-1	GP-17/S-2
VOCs (ppb)																	
1,2,4-Trimethylbenzene	100	NE	ND	ND	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	100	NE	ND	ND	ND	57	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	ND
Benzene	14	60	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	100	5,500	ND	15	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene	200	NE	ND	ND	12	100	ND	ND	16	10	ND	ND	ND	150	ND	ND	ND
n-Butylbenzene	100	NE	ND	ND	ND	49	ND	ND	ND	13	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	100	NE	6	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-&m-Xylene	NE	NE	13	ND	16	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND
p-Isopropyltoluene	100	NE	ND	ND	ND	55	ND	ND	ND	18	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	100	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	100	1,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	NE	1,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs (ppb)																	
2-Methylnapthalene	NE	36,400	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Acenapthene	400	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Acenapthalene	NE	41,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Anthracene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.04*	224 or MDL	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.04*	61 or MDL	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.04*	1,100	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.04*	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.04*	1,100	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.04*	400	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Flourene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.04*	3,200	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Napthalene	200	13,000	NA	NA	ND	[redacted]	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Pheneanthrene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Pyrene	1,000	50,000	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA

NOTES

* = Due to the high detection limit for a soil matrix, the TCLP Extraction Method nust be used to demonstrate groujdwater quality protection for theses compounds.

Only compounds detected are listed

STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy

TAGM = Technical and Administrative Guidance Memorandum Soil Cleanup objectives

[redacted]

Bold indicates exceedence of TAGM Criteria

ND = Not Detected

NE = None Established by DEC

NA = Not Applicable

SB = Site Background

ppm = parts per million

ppb = parts per billion

Table 2

Soil-Gas Analytical Results
Samples Collected December 5 and 9, 2003
BL Project No. 03C497
220 3rd Street and 360 3rd Avenue
City of New York, Bourough of Brooklyn, Kings County, New York

Compound	NYSDEC Regulatory Criteria		Concentration of Compound in Sample									
	STARS Memo #1	TAGM	SG-1	SG-2	SG-3	SG-4	SG-5	SG-6	SG-7	SG-8	SG-9	SG-10
VOCs (ppb)												
1,1,1-Trichloroethane	NE*	NE*	2.1	2.5	ND	ND	1.8	2.2	2.7	ND	1.7	1.4
1,1-Dichloroethane	NE*	NE*	ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND
1,2,4-Trimethylbenzene	NE*	NE*	ND	ND	ND	ND	ND	ND	ND	28.0	ND	ND
1,3,5-Trimethylbenzene	NE*	NE*	ND	ND	ND	ND	ND	ND	ND	30.0	ND	ND
Benzene	NE*	NE*	5.4	ND	ND	1.3	ND	ND	ND	11.0	5.0	1.3
Dichlorodifluoromethane	NE*	NE*	ND	ND	4.5	12.0	ND	3.6	ND	1.9	ND	ND
Ethylbenzene	NE*	NE*	5.7	ND	ND	1.0	ND	ND	ND	8.0	ND	ND
o-Xylene	NE*	NE*	ND	ND	ND	ND	ND	ND	ND	26.0	ND	1.2
p-&m-Xylene	NE*	NE*	1.6	ND	ND	ND	ND	ND	ND	19.0	ND	1.2
Tetrachloroethylene	NE*	NE*	ND	ND	ND	ND	ND	ND	4.2	5,800	6.8	13.0
Toluene	NE*	NE*	11.0	1.7	1.4	1.5	1.4	1.6	1.7	29.0	7.2	5.0
Trichloroethylene	NE*	NE*	ND	ND	ND	ND	ND	ND	ND	7.9	ND	ND
Trichlorofluoromethane	NE*	NE*	37.0	8.2	45.0	2,400	34.0	9.8	3.1	440	3.4	ND

NOTES
Only compounds detected are listed
STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy
TAGM = Technical and Administrative Guidance Memorandum Soil Cleanup objectives
Shading indicates exceedence of Stars Memo #1Criteria
Bold indicates exceedence of TAGM Criteria
ND = Not Detected
NE = None Established by DEC
NA = Not Applicable
ppb = parts per billion
*NYS DEC has not established regulatory levels for compounds in soil gas

Table 3
Ground Water Analytical Results

Samples Collected December 16, 2003 (MW-1 to MW- 4)
and January 21, 2004, (MW-5 TO MW-9)
BL Project No. 03C497
220 3rd Street and 360 3rd Avenue
City of New York, Borough of Brooklyn, Kings County, New York

Compound	TOGS	Concentration of Compound in Sample								
	Standards and Guidance Values	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
		ND	ND	ND	ND	ND	ND	ND	ND	ND
VOCs (ppb)		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5	ND	12	ND	ND	13	58	ND	ND	ND
1,3,5-Trimethylbenzene	5	ND	3	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	110	ND	ND
Chloroform	7	ND	ND	ND	7	ND	ND	ND	ND	ND
1,2 Dichlorobenzene	3	ND	ND	ND	ND	ND	10	ND	ND	ND
Ethylbenzene	5	ND	ND	ND	ND	ND	61	540	ND	ND
Isopropylbenzene	5	ND	ND	ND	3	12	13	ND	ND	ND
Napthalene	10	ND	160	ND	4	280	3000	1200	ND	ND
n-Butylbenzene	5	ND	ND	ND	ND	14	ND	530	ND	ND
n-Propylbenzene	5	ND	1	ND	ND	ND	11	ND	ND	ND
sec-butylbenzene	5	ND	ND	ND	2	ND	ND	ND	ND	ND
o-Xylene	5	ND	ND	ND	ND	ND	12	130	ND	ND
p-& m-Xylenes	5	ND	ND	ND	ND	ND	12	230	ND	ND
SVOCs (ppb)										
Acenapthene	20	ND	100	ND	ND	NA	NA	NA	NA	NA
Anthracene	50	ND	17	ND	ND	NA	NA	NA	NA	NA
Fluoranthene	50	ND	13	ND	11	NA	NA	NA	NA	NA
Flourene	50	ND	46	ND	ND	NA	NA	NA	NA	NA
Pheneanthrene	50	ND	57	ND	14	NA	NA	NA	NA	NA
Pyrene	50	ND	19	ND	11	NA	NA	NA	NA	NA
PCBs (ppb)	0.09	NA	ND	ND	ND	NA	NA	NA	NA	NA
Dissolved RCRA Metals (ppm)										
Barium	1	NA	0.199	0.109	0.073	NA	NA	NA	NA	NA
Chromium	0.050	NA	0.010	0.008	ND	NA	NA	NA	NA	NA
Lead	0.025	NA	0.016	0.034	0.019	NA	NA	NA	NA	NA

NOTES
Only compounds detected are listed
TOGS- Technical and Operational Guidance Series
Shading indicates exceedance of TOGS standards and guidance values
ppb = parts per billion
ppm = parts per million
ND = not detected
NA = not analyzed

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
1	1/20/2004	GP-11, S-1	0-4	Soil	VOCs	1,2,4,-Trimethylbenzene -16 ppb Benzene - 11 ppb Ethylbenzene - 11 ppb Napthalene - 12 ppb o-Xylene - 14 ppb p&m-Xylene - 16 ppb
					SVOCs	ND
1	1/20/2004	GP-11, S-2	4-8	Soil	VOCs	1,3,5,-Trimethylbenzene - 57 ppb Napthalene - 100 ppb n-Butylbenzene - 49 ppb p-Isopropyltoluene - 55 ppb
					SVOCs	**Napthalene - 430 ppb (exceeds STARS MEMO #1)**
1	12/16/2003	SG-8	0.5	Soil Gas	VOCs	1,2,4,-Trimethylbenzene -28 ppb 1,3,5,-Trimethylbenzene - 30 ppb Benzene - 11 ppb Dichlorodifluoromethane - 1.9 ppb Ethylbenzene - 8 ppb o-Xylene - 26 ppb p&m-Xylene - 19 ppb Tetrachloroethylene (PCE) - 5,800 ppb Toluene - 29 ppb Trichloroethylene (TCE) - 7.9 ppb Trichlorofluoromethane - 440 ppb
1	12/16/2003	SG-9	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 1.7 ppb Benzene - 5 ppb PCE - 6.8 ppb Toluene - 7.2 ppb Trichlorofluoromethane - 3.4 ppb
1	12/16/2003	SG-10	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 1.4 ppb Benzene - 1.3 ppb o-Xylene - 1.2 ppb p&m-Xylene - 1.2 ppb

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
1	12/16/2003	SG-10	0.5	Soil Gas	VOCs	PCE - 13 ppb
						Toluene - 5 ppb
1A	1/19/2004	GP-2, S-1	0-4	Soil	VOCs	p&m-Xylene - 20 ppb
						Toluene - 8 ppb
						PCE - 17 ppb
					SVOCs	**Benzo(a)anthracene - 4,700 ppb (exceeds STARS and TAGM)**
						Benzo(a)pyrene - 4,500 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 4,500 ppb (exceeds STARS and TAGM)
						Benzo(k)fluoranthene - 5,000 ppb (exceeds STARS and TAGM)
						Chrysene - 5,000 ppb (exceeds STARS and TAGM)
						Fluoranthene - 11,000 ppb (exceeds STARS)
						Pheneanthrene - 5,300 ppb (exceeds STARS)
						Pyrene - 9,300 ppb (exceeds STARS)
1A	1/19/2004	GP-2, S-2	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene -10 ppb
						Ethylbenzene - 25 ppb
						Isopropylbenzene - 23 ppb
						Napthalene - 27 ppb
						n-Butylbenzene - 25 ppb
						o-Xylene - 12 ppb
						p&m-Xylene - 24 ppb
						p-Isopropyltoluene - 21 ppb
						tert-Butylbenzene - 24 ppb
					SVOCs	Fluoranthene - 580 ppb
						Napthalene - 640 ppb (exceeds STARS)
						Pheneanthrene - 590 ppb
						Pyrene - 510 ppb
1A	12/16/2003	MW-5	NA	Ground Water	VOCs	**1,2,4,-Trimethylbenzene -13 ppb (exceeds TOGS)**
						Isopropylbenzene - 12 ppb (exceeds TOGS)
						Napthalene - 280 ppb (exceeds TOGS)
						n-Butylbenzene - 14 ppb
1A	6/29/2004	MW-5	NA	Ground Water	VOCs	**Benzene - 9 ppb (exceeds TOGS)**
						Isopropylbenzene - 91 ppb (exceeds TOGS)

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
1A	6/29/2004	MW-5	NA	Ground Water	VOCs	**MTBE - 67 ppb (exceeds TOGS)**
						n-Propylbenzene - 40 ppb (exceeds TOGS)
						sec-Butylbenzene - 31 ppb (exceeds TOGS)
					SVOCs	ND
1B	12/16/2003	SG-7	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 2.7 ppb
						1,1,-Dichloroethane - 1.6 ppb
						PCE - 4.2 ppb
						Toluene - 1.7 ppb
						Trichlorofluoromethane - 3.1 ppb
1C	NA	NA	NA	NA	NA	NA
1D	12/9/2003	B-15, S-3	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene -18 ppb
						1,3,5,-Trimethylbenzene - 5 ppb
						Ethylbenzene - 13 ppb
						Isopropylbenzene - 16 ppb
						Napthalene - 15 ppb
						n-Butylbenzene - 18 ppb
						n-Propylbenzene - 18 ppb
						o-Xylene - 21 ppb
						p&m-Xylene - 38 ppb
						p-Isopropyltoluene - 23 ppb
						sec-Butylbenzene - 32 ppb
						Toluene - 1.7 ppb
					SVOCs	2-Methylnapthalene - 3,400 ppb
						Acenapthene - 8,500 ppb (exceeds STARS)
						Anthracene - 6,800 ppb (exceeds STARS)
						Benzo(a)anthracene - 3,200 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 2,200 ppb (exceeds STARS and TAGM)
						Benzo(k)fluoranthene - 3,200 ppb (exceeds STARS and TAGM)
						Chrysene - 4,000 ppb (exceeds STARS and TAGM)
						Fluoranthene - 7,300 ppb (exceeds STARS)
						Fluorene - 6,000 ppb (exceeds STARS)
						Napthalene - 7,200 ppb (exceeds STARS)

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
1D	12/9/2003	B-15, S-3	4-8	Soil	SVOCs	**Pheneanthrene - 13,000 ppb (exceeds STARS)**
						Pyrene - 11,000 ppb (exceeds STARS)
					PCBs	ND
					RCRA 8 Metals	Arsenic - 4.28 ppm
						Barium - 39.9 ppm
						Chromium - 16.7 ppm (exceeds TAGM)
						Lead - 56.4 ppm
						Selenium - 1.73 ppm
						Mercury - 0.57 ppm (exceeds TAGM)
1D	12/9/2003	B-15, S-4	8-10	Soil	VOCs	**1,2,4,-Trimethylbenzene - 2,300 ppb (exceeds STARS)**
						1,3,5,-Trimethylbenzene - 4,600 ppb (exceeds STARS)
						Ethylbenzene - 20,000 ppb (exceeds STARS and TAGM)
						Isopropylbenzene - 2,100 ppb (exceeds STARS)
						Napthalene - 2,200,000 ppb (exceeds STARS)
						n-Butylbenzene - 4,400 ppb (exceeds STARS)
						n-Propylbenzene - 2,000 ppb (exceeds STARS)
						o-Xylene - 3,000 ppb (exceeds STARS)
						p&m-Xylene - 1,900 ppb
						p-Isopropyltoluene - 3,000 ppb (exceeds STARS)
						sec-Butylbenzene - 350 ppb (exceeds STARS)
						tert-Butylbenzene - 1,800 ppb (exceeds STARS)
						Toluene - 220 ppb (exceeds STARS)
					SVOCs	**2-Methylnapthalene - 3,400 ppb (exceeds TAGM)**
						Acenapthene - 73,000 ppb (exceeds STARS and TAGM)
						Acenapthalene - 11,000 ppb
						Anthracene - 42,000 ppb (exceeds STARS)
						Benzo(a)anthracene - 27,000 ppb (exceeds STARS and TAGM)
						Benzo(a)pyrene - 27,000 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 29,000 ppb (exceeds STARS and TAGM)
						Benzo(k)fluoranthene - 32,000 ppb (exceeds STARS and TAGM)
						Chrysene - 30,000 ppb (exceeds STARS and TAGM)
						Fluoranthene - 61,000 ppb (exceeds STARS and TAGM)

Table 4
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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
1D	12/9/2003	B-15, S-4	8-10	Soil	SVOCs	**Fluorene - 54,000 ppb (exceeds STARS and TAGM)** **Napthalene - 140,000 ppb (exceeds STARS and TAGM)** **Pheneanthrene - 110,000 ppb (exceeds STARS and TAGM)** **Pyrene - 85,000 ppb (exceeds STARS and TAGM)**
					PCBs	ND
					RCRA 8 Metals	Arsenic - 3.26 ppm Barium - 50.2 ppm **Chromium - 18.1 ppm (exceeds TAGM)** Lead - 86.6 ppm Selenium - 1.48 ppm
1D	1/19/2004	GP-5, S-1	0-4	Soil	VOCs	1,2,4,-Trimethylbenzene -6 ppb Ethylbenzene - 10 ppb o-Xylene - 8 ppb p&m-Xylene - 9 ppb sec-Butylbenzene - 5 ppb
1D	1/19/2004	GP-5, S-2	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene -7 ppb Ethylbenzene - 15 ppb o-Xylene - 9 ppb p&m-Xylene - 18 ppb
					SVOCs	ND
1D	1/21/2004	MW-6	NA	Ground Water	VOCs	**1,2,4,-Trimethylbenzene -58 ppb (exceeds TOGS)** **1,2,-Dichlorobenzene - 10 ppb (exceeds TOGS)** **Ethylbenzene - 61 ppb (exceeds TOGS)** **Isopropylbenzene - 13 ppb (exceeds TOGS)** **Napthalene - 3,000 ppb (exceeds TOGS)** **n-Propylbenzene - 11 ppb (exceeds TOGS)** **o-Xylene - 12 ppb (exceeds TOGS)** **p&m-Xylene - 12 ppb (exceeds TOGS)**
2	1/19/2004	GP-1, S-1	0-4	Soil	VOCs	ND
2	1/19/2004	GP-1, S-2	4-8	Soil	VOCs	ND
2	1/19/2004	GP-3, S-1	0-4	Soil	VOCs	ND
2	1/19/2004	GP-3, S-2	4-8	Soil	VOCs	ND

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
3	12/5/2003	B-3, S-3	8-12	Soil	VOCs	1,2,4,-Trimethylbenzene -65 ppb
						1,3,5,-Trimethylbenzene - 11 ppb
						Ethylbenzene - 6 ppb
						Isopropylbenzene - 9 ppb
						Napthalene - 8 ppb
						n-Butylbenzene - 35 ppb
						n-Propylbenzene - 11 ppb
						o-Xylene - 9 ppb
						p&m-Xylene - 13 ppb
						p-Isopropyltoluene - 9 ppb
						sec-Butylbenzene - 6 ppb
						Toluene - 6 ppb
					SVOCs	2-Methylnapthalene - 5,600 ppb
						Acenapthene - 40,000 ppb (exceeds STARS)
						Acenapthalene - 6,300 ppb
						Anthracene - 21,000 ppb (exceeds STARS)
						Benzo(a)anthracene - 17,000 ppb (exceeds STARS and TAGM)
						Benzo(a)pyrene - 12,000 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 12,000 ppb (exceeds STARS and TAGM)
						Benzo(g,h,i)perylene - 6,900 ppb (exceeds STARS)
						Benzo(k)fluoranthene - 11,000 ppb (exceeds STARS and TAGM)
						Chrysene - 17,000 ppb (exceeds STARS and TAGM)
						Fluoranthene - 32,000 ppb (exceeds STARS)
						Fluorene - 35,000 ppb (exceeds STARS)
						Indeno(1,2,3,-cd)pyrene - 4,800 ppb (exceeds STARS and TAGM)
						Napthalene - 3,600 ppb (exceeds STARS)
						Pheneanthrene - 51,000 ppb (exceeds STARS and TAGM)
						Pyrene - 45,000 ppb (exceeds STARS)
					PCBs	ND
					RCRA 8 Metals	Arsenic - 2.89 ppm
						Barium - 23.9 ppm
						Chromium - 8.65 ppm

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
3	12/5/2003	B-3, S-3	8-12	Soil	RCRA 8 Metals	Lead - 28.7 ppm
						Selenium - 2.03 ppm
						Mercury - 0.63 ppm (exceeds TAGM)
3	12/5/2003	B-4, S-2	4-8	Soil	VOCs	ND
					SVOCs	Acenapthalene - 3,000 ppb
						Benzo(a)anthracene - 1,800 ppb (exceeds STARS and TAGM)
						Benzo(a)pyrene - 3,700 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 1,700 ppb (exceeds STARS and TAGM)
						Benzo(g,h,i)perylene - 3,000 ppb (exceeds STARS)
						Benzo(k)fluoranthene - 2,000 ppb (exceeds STARS and TAGM)
						Chrysene - 2,500 ppb (exceeds STARS and TAGM)
						Fluoranthene - 3,800 ppb (exceeds STARS)
						Indeno(1,2,3,-cd)pyrene - 1,700 ppb (exceeds STARS)
						Pyrene - 7,400 ppb (exceeds STARS)
					PCBs	ND
					RCRA 8 Metals	Arsenic - 2.79 ppm
						Barium - 42.6 ppm
						Chromium - 10 ppm
						Lead - 66.9 ppm
						Selenium - 1.62 ppm
						Mercury - 0.29 ppm (exceeds TAGM)
3	1/21/2004	MW-2	NA	Ground Water	VOCs	**1,2,4,-Trimethylbenzene -12 ppb (exceeds TOGS)**
						1,3,5,-Trimethylbenzene - 3 ppb
						Napthalene - 160 ppb (exceeds TOGS)
						n-Propylbenzene - 1 ppb
					SVOCs	**Acenapthene - 100 ppb (exceeds TOGS)**
						Anthracene - 17 ppb
						Fluoranthene - 13 ppb
						Fluorene - 46 ppb
						Pheneanthrene - 57 ppb (exceeds TOGS)
						Pyrene - 19 ppb
					PCBs	ND

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
3	1/21/2004	MW-2	NA	Ground Water	Dissolved RCRA 8 Metals	Barium - 0.199 ppm Chromium - 0.10 ppm Lead - 0.016 ppm
3	6/29/2004	MW-2	NA	Ground Water	VOCs	**1,2,4,-Trimethylbenzene -28 ppb (exceeds TOGS)** **1,3,5,-Trimethylbenzene - 8 ppb (exceeds TOGS)** **MTBE - 140 ppb (exceeds TOGS)** **Napthalene - 160 ppb (exceeds TOGS)**
					SVOCs	Acenapthene - 12 ppb Anthracene - 2.8 ppb **Benzo(a)anthracene - 4.3 ppb (exceeds TOGS)** **Benzo(a)pyrene - 4.0 ppb (exceeds TOGS)** **Chrysene - 4.8 ppb (exceeds TOGS)** Fluoranthene - 11 ppb Fluorene - 2 ppb Pheneanthrene - 3.9 ppb Pyrene - 30 ppb
4	1/19/2004	GP-4, S-1	0-4	Soil	VOCs	Ethylbenzene - 11 ppb
4	1/19/2004	GP-4, S-2	4-8	Soil	VOCs	ND
5	1/20/2004	GP-17, S-1	0-4	Soil	VOCs	ND
5	1/20/2004	GP-17, S-2	4-8	Soil	VOCs	ND
6	12/16/2003	SG-1	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 2.1 ppb Benzene - 5.4 ppb Ethylbenzene - 5.7 ppb p&m-Xylene - 1.6 ppb Toluene - 11 ppb Trichlorofluoromethane - 37 ppb
6	12/17/2003	SG-2	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 2.5 ppb Toluene - 1.7 ppb Trichlorofluoromethane - 8.2 ppb
7	1/20/2004	GP-14, S-1	0-4	Soil	VOCs	ND
7	1/20/2004	GP-14, S-2	4-8	Soil	VOCs	ND

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
7	1/20/2004	GP-15, S-1	0-4	Soil	VOCs	ND
7	1/20/2004	GP-16, S-1	0-4	Soil	VOCs	1,3,5,-Trimethylbenzene - 9 ppb Napthalene - 150 ppb p&m-Xylene - 6 ppb
7	1/20/2004	GP-16, S-2	4-8	Soil	VOCs	ND
7	12/16/2003	SG-3	0.5	Soil Gas	VOCs	Dichlorodifluoromethane - 4.5 ppb Toluene - 1.4 ppb Trichlorofluoromethane - 45 ppb
7	12/16/2003	SG-4	0.5	Soil Gas	VOCs	Benzene - 1.3 ppb Dichlorodifluoromethane - 12 ppb Ethylbenzene - 1 ppb Toluene - 1.5 ppb Trichlorofluoromethane - 2,400 ppb
7	12/16/2003	SG-5	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 1.8 ppb Toluene - 1.4 ppb Trichlorofluoromethane - 34 ppb
7	12/16/2003	SG-6	0.5	Soil Gas	VOCs	1,1,1,-Trichloroethane - 2.2 ppb Dichlorodifluoromethane - 3.6 ppb Toluene - 1.6 ppb Trichlorofluoromethane - 9.8 ppb
8	12/9/2003	B-6, S-2	4-8	Soil	VOCs	ND
					SVOCs	ND
					PCBs	ND
					RCRA 8 Metals	Arsenic - 2.79 ppm Barium - 16.9 ppm Chromium - 6.58 ppm Lead - 15.5 ppm
8	1/19/2004	GP-10, S-1	0-4	Soil	VOCs	o-Xylene - 6 ppb p&m-Xylene - 13 ppb
8	1/19/2004	GP-10, S-2	4-8	Soil	VOCs	Ethylbenzene - 15 ppb
8	1/21/2004	MW-9	NA	Ground Water	VOCs	ND

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
8	6/29/2004	MW-9	NA	Ground	VOCs	Napthalene 1.3 ppb
				Water	SVOCs	Napthalene 1.3 ppb
9	12/5/2004	B-2, S-1	0-4	Soil	VOCs	ND
					SVOCs	**Benzo(a)anthracene - 730 ppb (exceeds STARS and TAGM)**
						Chrysene - 870 ppb (exceeds STARS)
						Fluoranthene - 1,600 ppb (exceeds STARS)
						Pheneanthrene - 1,300 ppb (exceeds STARS)
						Pyrene - 1,700 ppb (exceeds STARS)
					PCBs	ND
					RCRA 8 Metals	**Arsenic - 7.54 ppm (exceeds TAGM)**
						Barium - 111 ppm
						Chromium - 13.3 ppm (exceeds TAGM)
						Lead - 297 ppm
						Selenium - 2.36 ppm (exceeds TAGM)
						Mercury - 0.15 ppm (exceeds TAGM)
9	12/9/2003	B-7, S-1	0-4	Soil	VOCs	p&m-Xylene - 6 ppb
						Toluene - 7 ppb
					SVOCs	**Benzo(a)anthracene - 350 ppb (exceeds STARS and TAGM)**
						Benzo(k)fluoranthene - 340 ppb (exceeds STARS)
						Chrysene - 470 ppb (exceeds STARS)
						Fluoranthene - 1,100 ppb (exceeds STARS)
						Pheneanthrene - 1,100 ppb (exceeds STARS)
						Pyrene - 950 ppb
					PCBs	ND
					RCRA 8 Metals	**Arsenic - 12.64 ppm (exceeds TAGM)**
						Barium - 56.5 ppm
						Chromium - 8.03 ppm
						Lead - 182 ppm
						Selenium - 3.24 ppm (exceeds TAGM)
						Mercury - 0.27 ppm (exceeds TAGM)
9	12/9/2003	B-8, S-2	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene - 4 ppb
						o-Xylene - 7 ppb

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
9	12/9/2003	B-8, S-2	4-8	Soil	VOCs	p&m-Xylene - 6 ppb
						Toluene - 7 ppb
					SVOCs	**Benzo(a)anthracene - 360 ppb (exceeds STARS and TAGM)**
						Benzo(k)fluoranthene - 340 ppb (exceeds STARS)
						Chrysene - 470 ppb (exceeds STARS)
						Fluoranthene - 1,000 ppb
						Pheneanthrene - 860 ppb
						Pyrene - 910 ppb
					PCBs	ND
					RCRA 8 Metals	Arsenic - 2.1 ppm
						Barium - 14.4 ppm
						Chromium - 3.2 ppm
						Lead - 25.5 ppm
						Mercury - 0.15 ppm (exceeds TAGM)
9	12/9/2003	B-12, S-1	0-4	Soil	VOCs	1,3,5,-Trimethylbenzene - 33 ppb
						Ethylbenzene - 57 ppb
						Napthalene - 760 ppb (exceeds STARS)
						o-Xylene - 33 ppb
						p&m-Xylene - 62 ppb
						Toluene - 61 ppb
					SVOCs	**Chrysene - 790 ppb (exceeds STARS and TAGM)**
						Fluoranthene - 1,200 ppb (exceeds STARS)
						Pheneanthrene - 1,300 ppb (exceeds STARS)
						Pyrene - 1,500 ppb (exceeds STARS)
					PCBs	ND
					RCRA 8 Metals	Arsenic - 4.21 ppm
						Barium - 49.4 ppm
						Chromium - 15.2 ppm (exceeds TAGM)
						Lead - 58.3 ppm
						Selenium - 1.82 ppm
9	1/19/2004	GP-9, S-1	0-4	Soil	VOCs	Ethylbenzene - 6 ppb
9	1/19/2004	GP-9, S-2	4-8	Soil	VOCs	p&m-Xylene - 5 ppb

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
9	1/20/2004	GP-12, S-1	0-4	Soil	VOCs	ND
9	1/20/2004	GP-12, S-2	4-8	Soil	VOCs	ND
9	1/21/2004	MW-8	NA	Ground Water	VOCs	ND
9	6/29/2004	MW-8	NA	Ground Water	VOCs SVOCs	Napthalene - 4.1 ppb Anthracene - 2.7 ppb **Benzo(a)anthracene - 11 ppb (exceeds TOGS)** **Benzo(a)pyrene - 9.3 ppb (exceeds TOGS)** **Benzo(b)fluoranthene - 7.4 ppb (exceeds TOGS)** **Benzo(k)fluoranthene - 12 ppb (exceeds TOGS)** **Chrysene - 14 ppb (exceeds TOGS)** Fluoranthene - 27 ppb Pheneanthrene - 8.1 ppb Pyrene - 27 ppb
9	7/7/2004	GT-9	4-6	Soil	VOCs PAHs	ND Anthracene - 180 ppb **Benzo(a)anthracene - 1,200 ppb (exceeds STARS and TAGM)** **Benzo(a)pyrene - 720 ppb (exceeds STARS and TAGM)** **Benzo(b)fluoranthene - 660 ppb (exceeds STARS)** **Benzo(g,h,i)perylene - 230 ppb (exceeds STARS)** **Benzo(k)fluoranthene - 760 ppb (exceeds STARS)** **Chrysene - 860 ppb (exceeds STARS and TAGM)** **Dibenz(a,h)anthracene 130 ppb (exceeds TAGM)** **Fluoranthene - 1,700 ppb (exceeds STARS)** **Indeno(1,2,3,-cd)pyrene - 280 ppb (exceeds STARS)** Pheneanthrene - 260 ppb **Pyrene - 1,500 ppb (exceeds STARS)**
9A	12/5/2003	B-1, S-2	4-8	Soil	VOCs SVOCs	ND **Benzo(a)anthracene - 350 ppb (exceeds STARS and TAGM)** **Chrysene - 380 ppb (exceeds STARS)** Fluoranthene - 690 ppb Pheneanthrene - 640 ppb

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
9A	12/5/2003	B-1, S-2	4-8	Soil	SVOCs	Pyrene - 650 ppb
					PCBs	ND
					RCRA 8 Metals	Arsenic - 4.14 ppm
						Barium - 27.8 ppm
						Chromium - 7.96 ppm
						Lead - 37.9 ppm
						Selenium - 1.88 ppm
						Mercury - 0.12 ppm (exceeds TAGM)
9A	12/16/2003	MW-3	NA	Ground Water	VOCs	ND
					SVOCs	ND
					PCBs	ND
					Dissolved RCRA 8 Metals	Barium - 0.109 ppm
						Chromium - 0.008 ppm
						Lead - 0.034 ppm (exceeds TOGS)
9A	6/29/2004	MW-3	NA	Ground Water	VOCs	MTBE- 4 ppb
					SVOCs	ND
10	12/9/2003	B-10, S-2	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene - 16 ppb
						1,3,5,-Trimethylbenzene - 6 ppb
						Ethylbenzene - 11 ppb
						Isopropylbenzene - 23 ppb
						Napthalene - 16 ppb
						n-Butylbenzene - 23 ppb
						n-Propylbenzene - 31 ppb
						o-Xylene - 20 ppb
						p&m-Xylene - 39 ppb
						p-Isopropyltoluene - 24 ppb
						sec-Butylbenzene - 49 ppb
						tert-Butylbenzene - 10 ppb
						Toluene - 14 ppb
					SVOCs	**Chrysene - 340 ppb (exceeds STARS)**
						Fluoranthene - 1,300 ppb (exceeds STARS)
						Pheneanthrene - 870 ppb

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10	12/9/2003	B-10, S-2	4-8	Soil	SVOCs	Pyrene - 1,000 ppb
					PCBs	ND
					RCRA 8 Metals	Arsenic - 2.73 ppm
						Barium - 53.8 ppm
						Chromium - 12.2 ppm (exceeds TAGM)
						Lead - 14.2 ppm
						Selenium - 1.41 ppm
						Mercury - 0.24 ppm (exceeds TAGM)
10	12/16/2004	MW-4	NA	Ground Water	VOCs	Chloroform - 7ppb
						Isopropylbenzene - 3 ppb
						Napthalene - 4 ppb
						sec-Butylbenzene - 2 ppb
					SVOCs	Fluoranthene - 11 ppb
						Pheneanthrene - 14 ppb
						Pyrene - 11 ppb
					PCBs	ND
					Dissolved RCRA 8 Metals	Barium - 0.073 ppm
						Lead - 0.019 ppm
11	12/9/2003	B-9, S-2	4-8	Soil	VOCs	1,2,4,-Trimethylbenzene - 10 ppb
						Ethylbenzene - 15 ppb
						Napthalene - 85 ppb
						o-Xylene - 27 ppb
						p&m-Xylene - 50 ppb
						tert-Butylbenzene - 6 ppb
						Toluene - 40 ppb
					SVOCs	**Benzo(a)anthracene - 950 ppb (exceeds STARS and TAGM)**
						Chrysene - 970 ppb (exceeds STARS and TAGM)
						Fluoranthene - 1,200 ppb (exceeds STARS)
						Pheneanthrene - 1,900 ppb (exceeds STARS)
						Pyrene - 1,400 ppb (exceeds STARS)
					PCBs	ND

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11	12/9/2003	B-9, S-2	4-8	Soil	RCRA 8 Metals	Arsenic - 3.49 ppm
						Barium - 23.7 ppm
						Cadmium - 9.53 ppm (exceeds TAGM)
						Chromium - 8.42 ppm
						Lead - 632 ppm
						Selenium - 1.69 ppm
11	12/9/2003	B-9, S-3	8-12	Soil	VOCs	**1,2,4,-Trimethylbenzene - 1,000 ppb (exceeds STARS)**
						1,3,5,-Trimethylbenzene - 500 ppb (exceeds STARS)
						Ethylbenzene - 830 ppb (exceeds STARS and TAGM)
						Isopropylbenzene - 430 ppb (exceeds STARS)
						Napthalene - 75,000 ppb (exceeds STARS)
						n-Butylbenzene - 340 ppb (exceeds STARS)
						n-Propylbenzene - 330 ppb (exceeds STARS)
						o-Xylene - 180 ppb (exceeds STARS)
						p&m-Xylene - 280 ppb
						p-Isopropyltoluene - 290 ppb (exceeds STARS)
						sec-Butylbenzene - 100 ppb (exceeds STARS)
						Toluene - 170 ppb (exceeds STARS)
					SVOCs	2-Methylnapthalene - 4,200 ppb
						Acenapthene - 13,000 ppb (exceeds STARS)
						Anthracene - 5,000 ppb (exceeds STARS)
						Benzo(a)anthracene - 3,600 ppb (exceeds STARS and TAGM)
						Benzo(a)pyrene - 4,100 ppb (exceeds STARS and TAGM)
						Benzo(b)fluoranthene - 1,800 ppb (exceeds STARS and TAGM)
						Benzo(k)fluoranthene - 2,500 ppb (exceeds STARS and TAGM)
						Chrysene - 3,800 ppb (exceeds STARS and TAGM)
						Fluoranthene - 7,900 ppb (exceeds STARS)
						Fluorene - 7,400 ppb (exceeds STARS)
						Napthalene - 7,600 ppb (exceeds STARS)
						Pheneanthrene - 14,000 ppb (exceeds STARS)
						Pyrene - 12,000 ppb (exceeds STARS)
					PCBs	ND

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AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
11	12/9/2003	B-9, S-3	8-12	Soil	RCRA 8 Metals	Arsenic - 3.54 ppm Barium - 106 ppm Cadmium - 0.52 ppm Chromium - 9.7 ppm Lead - 21.4 ppm Selenium - 1.62 ppm **Mercury - 0.29 ppm (exceeds TAGM)**
11	1/19/2004	GP-6, S-1	0-4	Soil	VOCs	ND
11	1/19/2004	GP-8, S-1	0-4	Soil	VOCs	**Napthalene 2,000 ppb (exceeds STARS)**
11	1/19/2004	GP-8, S-2	4-7	Soil	VOCs	ND
11	1/19/2004	GP-8, S-2A	7-8	Soil	VOCs	**1,2,4,-Trimethylbenzene - 58,000 ppb (exceeds STARS)** **1,3,5,-Trimethylbenzene - 52,000 ppb (exceeds STARS)** **Benzene - 750 ppb (exceeds STARS and TAGM)** **Ethylbenzene - 150,000 ppb (exceeds STARS and TAGM)** **Isopropylbenzene - 11,000 ppb (exceeds STARS)** **Napthalene - 19,000,000 ppb (exceeds STARS)** **n-Butylbenzene - 230,000 ppb (exceeds STARS)** **n-Propylbenzene - 19,000 ppb (exceeds STARS)** **o-Xylene - 68,000 ppb (exceeds STARS)** **p&m-Xylene - 140,000 ppb (exceeds STARS)** **p-Isopropyltoluene - 14,000 ppb (exceeds STARS)** **tert-Butylbenzene - 77,000 ppb (exceeds STARS)** **Toluene - 1,600 ppb (exceeds STARS and TAGM)**
					SVOCs	**Acenapthene - 1,800,000 ppb (exceeds STARS and TAGM)** **Anthracene - 960,000 ppb (exceeds STARS and TAGM)** **Fluoranthene - 1,300,000 ppb (exceeds STARS and TAGM)** **Fluorene - 1,000,000 ppb (exceeds STARS and TAGM)** **Napthalene - 15,000,000 ppb (exceeds STARS and TAGM)** **Pheneanthrene - 3,400,000 ppb (exceeds STARS and TAGM)** **Pyrene - 2,100,000 ppb (exceeds STARS and TAGM)**
11	1/20/2004	GP-13, S-1	0-4	Soil	VOCs	Napthalene - 16 ppb

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
11	1/20/2004	GP-13, S-2	4-8	Soil	VOCs	Napthalene - 10 ppb n-Butylbenzene - 13 ppb p-Isopropyltoluene - 18 ppb
					SVOCs	ND
11	1/21/2004	MW-7	NA	Ground Water	VOCs	**Benzene - 110 ppb (exceeds TOGS)** **Ethylbenzene - 540 ppb (exceeds TOGS)** **Napthalene - 1,200 ppb (exceeds TOGS)** **n-Butylbenzene - 530 ppb (exceeds TOGS)** **o-Xylene - 130 ppb (exceeds TOGS)** **p&m-Xylene - 230 ppb (exceeds TOGS)**
11	6/29/2004	MW-7	NA	Ground Water	VOCs	**1,2,4,-Trimethylbenzene -110 ppb (exceeds TOGS)** **1,3,5,-Trimethylbenzene - 25 ppb (exceeds TOGS)** **Benzene - 73 ppb (exceeds TOGS)** **Ethylbenzene - 400 ppb (exceeds TOGS)** **Napthalene - 5800 ppb (exceeds TOGS)** **o-Xylene - 88 ppb (exceeds TOGS)** **p&m-Xylene - 150 ppb (exceeds TOGS)**
					SVOCs	**Acenapthene - 480 ppb (exceeds TOGS)** **Anthracene - 120 ppb (exceeds TOGS)** **Fluoranthene - 67 ppb (exceeds TOGS)** **Fluorene - 100 ppb (exceeds TOGS)** **Pheneanthrene - 230 ppb (exceeds TOGS)** **Pyrene - 140 ppb (exceeds TOGS)**
12	7/7/2004	TP-1	0-2	Soil	VOCs	ND
					PAHs	Anthracene - 830 ppb **Benzo(a)anthracene - 1,800 ppb (exceeds STARS and TAGM)** **Benzo(a)pyrene - 3,900 ppb (exceeds STARS and TAGM)** **Benzo(b)fluoranthene - 3,100 ppb (exceeds STARS and TAGM)** **Benzo(g,h,i)perylene - 1,700 ppb (exceeds STARS)** **Benzo(k)fluoranthene - 3,200 ppb (exceeds STARS and TAGM)** **Chrysene - 1,900 ppb (exceeds STARS and TAGM)** **Dibenz(a,h)anthracene - 760 ppb (exceeds TAGM)**

Table 4
Summary of Laboratory Analytical Data by AOC
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	Date	SAMPLE ID	Depth (ft)	Matrix	ANALYSIS	RESULTS
12	7/7/2004	TP-1	0-2	Soil	PAHs	**Fluoranthene - 1,400 ppb (exceeds STARS)** **Indeno(1,2,3,-cd)pyrene - 1,700 ppb (exceeds STARS)** Pheneanthrene - 620 ppb **Pyrene - 3,000 ppb (exceeds STARS)**
12	7/7/2004	TP-1	2-4	Soil	VOCs PAHs	ND **Benzo(a)anthracene - 110 ppb (exceeds STARS)** **Benzo(a)pyrene - 75 ppb (exceeds STARS and TAGM)** **Benzo(b)fluoranthene - 66 ppb (exceeds STARS)** **Benzo(k)fluoranthene - 79 ppb (exceeds STARS)** **Chrysene - 96 ppb (exceeds STARS)** Fluoranthene - 180 ppb Pheneanthrene - 94 ppb Pyrene - 170 ppb
13	NA	NA	NA		NA	NA
14						

Table 5
Summary of Proposed Number of Borings and Laboratory Analyses
PROPOSED WHOLE FOODS MARKET
220 3rd Street and 360 3rd Avenue
Brooklyn, New York
BL Companies Project No. 03C497

AOC	# of Borings	ANALYSIS
1	6	VOCs, SVOCs, Metals
2	4	VOCs, SVOCs
3	1	VOCs, SVOCs, Metals
4	2	VOCs, Metals
5	4	VOCs, Metals
6	2	VOCs, Metals
7	9	VOCs, SVOCs, Metals
8	3	VOCs, Metals
9	8	VOCs, SVOCs, Metals
10	2	VOCs, SVOCs, Metals
11	6	VOCs, SVOCs, Metals
12	2	SVOCs, Metals
13	1	VOCs, SVOCs, Metals
14	3	PCBs
TOTAL	53	

APPENDIX C

Quality Assurance Project Plan

Quality Assurance Project Plan

Proposed Whole Foods Market

220 3rd Street
Brooklyn, Kings County,
New York

NYSDEC BCP SITE No. C224100

Prepared on Behalf of:

WFM Properties Brooklyn, LLC
125 Cambridge Park Drive
Cambridge, MA 02140

Prepared by:

BL Companies
355 Research Parkway
Meriden, Connecticut 06450

October 29, 2004
Revised May 12, 2005

Samuel R Haydock
Samuel R. Haydock, MS, PG, LEP
BL Companies Project Manager

May 12, 2005
Date

Nicholas C. Tsacoyannis, CPG, LEP
BL Companies Field Team Leader

May 12, 2005
Date

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A. Project Management

B. Measurement/Data Acquisition

C. Assessment/Oversight

D. Data Validation and Usability

A. Project Management

A3. Distribution List

BL Companies:	Samuel R. Haydock, MS, PG, LEP, Project Manager Nicholas C. Tsacoyannis, CPG, LEP, Field Team Leader Mark Koellner, QA Manager
Severn Trent Laboratories, Inc.:	Jeff Curran, Lab Director
NYSDEC:	NYSDEC representative (to be determined), Project Manager NYSDEC representative (to be determined), Senior Attorney
WFM Properties Brooklyn, LLC:	Mr. Tim White, Director of Construction

A4. Project/Task Organization

The individuals directly involved with the 220 3rd Street Site project and their specific responsibilities are outlined below. See also, Appendix A, Figure 1.

- Mr. Mark Mobley, WFM Properties Brooklyn, LLC, Project Manager

- Mr. Tim White, WFM Properties Brooklyn, LLC, Director of Construction

- James A. Quinn, Environmental Engineer, Chief, Section B, NYSDEC Project Manager: Review and approve Quality Assurance Project Plans (QAPP) and subsequent revisions in terms of project scope and objectives. Ensure QAPP implementation. Conduct assessments of field activities, as necessary.

- Javier Perez, NYSDEC, Environmental Engineer, Project Supervisor: Provide programmatic oversight, review remedial investigation and alternative selection.

- Denise D'Ambrosio, Project Attorney, Division of Environmental Enforcement, NYSDEC: NYSDEC Legal Representative, Coordinate and execute BCP Agreement.

- Christopher M. Doroski, NYSDOH Public Health Specialist 2, Review Remedial Investigation Report (RIR) and Remedial Action Work Plan (RIWP).

- Samuel R. Haydock, BL Companies Project Manager: Senior project management.

Review and approval of QAPP. Ensure QAPP implementation. Conduct in-house audits of field operations.

- Nicholas C. Tsacoyannis, BL Companies Field Team Leader: Coordination of all subcontractors. Direct the sampling operations according to the QAPP. Provide data analysis and reporting.
- Mark Koellner, QA Manager: Overall quality of work product.
- Severn Trent Laboratories, Inc., Lab Director: Coordination and scheduling of lab analysis, data review, and coordination of all laboratory activities.
- Carole Tomlins, Data Quality Indicator & Associates, Inc.: Data validation and preparation of the Data Usability Summary Reports.

A5. Problem Definition/Background

The irregular-shaped site is situated on approximately 2.155-acres of land located on the southern side of 3rd Street, approximately 30-feet west of the 3rd Street and 3rd Avenue intersection in the Borough of Brooklyn, City of New York, Kings County, New York.

A Phase I Environmental Site Assessment (ESA) was completed by BL Companies in December 2003. The Phase I ESA recommended additional investigation of the site based on the past use of the property by auto and truck repair businesses, as a coal yard, and as a bulk petroleum storage facility. In addition, two above ground storage tanks with associated staining, one confirmed and one suspected underground storage tank, on-site septic tanks/leachfields (still active), hydraulic lifts in the buildings, open vats of antifreeze and oil, and 55-gallon drums of unidentified material stored throughout the site, including outside on the gravel parking areas and inside the buildings, were identified as specific areas of concern requiring additional investigation. Copies of the Phase I and II reports were submitted with the BCP application and prior to the September 8, 2004 pre-application meeting.

A Phase II Site Investigation (SI) was completed by BL Companies in February 2004. During completion of the Phase II SI, VOCs, PAHs, and metals were identified in the soil and ground water beneath the site.

Areas of Concern/Release Areas

The presence of regulated compounds in soil, soil gas and ground water beneath the site is documented by the data collected during the Phase II SI and represent release areas. The sources of the releases are most likely from the use of portions of the site by Truck and Auto repair businesses, coal businesses, an oil company, and from potentially polluted fill that was placed at the site.

A6. Project/Task Description

BL Companies project number is 03C497-B.

The purpose of this project is to delineate the extent of regulated compounds detected in on-site soil and ground water during the Comprehensive Phase II Site Investigation and, to determine the methods and costs to achieve compliance with the New York State standards, criteria, and guidance (SCGs).

The objectives for the project involve measuring the concentration of VOCs, PAHs, metals and PCBs and to determine the remedial actions appropriate for the site's contemplated use.

The resulting data will be used to determine the methods and associated costs to achieve compliance with the New York State SCGs.

Field activities are expected to last several months. Samples will be delivered to the laboratory no later than 48 hours after collection and will be stored at 4 degrees Celsius during transportation.

A Geoprobe and a hollow-stem auger drill rig will be used to collect subsurface soil samples. A Geoprobe will be used to install shallow ground water monitoring wells. The drill rig will be used to install the ground water monitoring well triplet. A New York–licensed subcontractor to BL Companies will operate the Geoprobe and hollow-stem auger drill rig. Appropriate pumps will be used to collect aqueous and vapor samples from the monitoring wells.

A7. Quality Objectives and Criteria for Measurement Data

The project data quality objective is to provide valid data of known and documented quality for the areas sampled, to determine the potential for human exposure to regulated chemical compounds, and to deleniate the extent of regulated compounds in soil and ground water in order to achieve compliance with the New York State SCGs. The data quality indicators to be measured are identified below.

Representativeness will be addressed by collecting the samples as described in this document.

Comparability will be addressed by collecting, analyzing, and reporting the data as described in this document.

A completeness goal of 95% is needed for the project.

A precision of 10% for the field duplicate samples will be used to assess the laboratory data generated from those samples.

A9. Special Training Requirements/Certification

No special training requirements or certifications are required for this project except for the 40-hour HAZWOPER class and annual refreshers. A qualified chemist will complete the Data Usability Summary Report. Information concerning the personnel qualifications for those individuals performing the site investigation/characterization can be found in Appendix E of the Investigation Work Plan.

A10. Documentation and Records

Documentation of field data shall be maintained by BL Companies for three years following the completion of the Investigation Report. Laboratory records shall be maintained by Severn Trent Laboratories, Inc. in accordance with their Laboratory Operations and Administration Manual.

B. Measurement/Data Acquisition

B1. Sampling Process Design

It is anticipated that at least 50 Geoprobe soil borings will be advanced for the purpose of collecting soil samples. It is anticipated that ten soil borings will be advanced and finished as shallow monitoring wells. A well triplet will be installed at one of the boring locations that will include a shallow, an intermediate and a deep monitoring well. The nine existing shallow monitoring wells extend into the top of the ground water table. Hand augers will be advanced beneath the concrete floor in the former auto repair business building. The existing and proposed boring locations are illustrated on Figure SP-03 in Appendix A of the Remedial Investigation Work Plan.

B2. Sampling Methods Requirements

All samples will be collected with a Geoprobe™ or hollow-stem augers. Standard Geoprobe™ equipment and hollow-stem augers will be used to advance the borings. BL Companies or its drilling subcontractor will prepare a boring log for each boring.

One trip blank for VOCs per cooler for ground water samples will be utilized and submitted for analysis with a maximum amount of 20 samples per trip blank.

One MS/MSD sample for soil VOC samples and one MS/MSD sample for ground water VOC samples will be run by the analytical laboratory.

BL Companies will conduct the sampling in accordance with this QAPP and Standard Operating Procedures, which are included in Appendix F of the Investigation Work Plan.

B3. Sample Handling and Custody Requirements

Chain-of-custody and field documentation will be in accordance with generally accepted practice and EPA protocol. The time of collection, location, sample section size, and the sample depth will be recorded on field sheets produced by BL Companies.

B4. Analytical Methods Requirements

The soil, ground water, and soil vapor samples collected from the sample locations will be analyzed by Severn Trent Laboratories, Inc. in accordance with the EPA Methods and the associated typical Method Detection Limits (MDLs) included in the following table.

Analyte Category	**EPA Method**	**Typical Detection Limit**	**# of Samples**	**Container/ Preservative**	**Holding Time**
Volatile Organic Compounds	8260B	100.0 ug/kg 100.00 ug/kg soil 1 ug/kg water	50 soil plus 1 duplicate, 8 ground water plus 1 Duplicate	40 ml Glass (2 each) / 4 oz. Glass Jar 4 degrees C/HCL	7 days
STARs memo #1 SVOCs	8270C	100.0 ug/kg 100.00 ug/kg soil 1 ug/kg water	50 soil plus 1 duplicate, 8 ground water plus 1 Duplicate	4 oz Glass Jar/ 1 Liter Glass Amber 4 degrees C	7 days
Metals	6010B 7471A	0.010 ug/kg soil 5 ug/l water	50 soil plus 1 duplicate, 8 ground water	8 oz 500 ml plastic 4 degrees C/HNO_3	180 days 28 Hg
PCBs	8082	0.017 ug/kg soil 0.521 ug/l water	6 soil, 3 ground water	8 oz 2 l-liter amber unpreserved	7 days 14 days

B5. Quality Control Requirements

One duplicate sample per sample batch (soil, ground water and soil gas) will be submitted for analysis for all parameters as quality assurance/quality control (QA/QC) samples. One trip blank will be used for this project. No split samples or field blanks are planned for this project.

Laboratory quality control elements, including spikes and blanks, will be performed in accordance with Severn Trent Laboratories SOP.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Potential field equipment to be used during this project includes:

- Photoionization detector (PID) (Photovac 2020)
- Slope electronic water level meter with 150 ft. polyurethane cable with divisions to 0.01 ft.
- Geoprobe vehicle and equipment
- Hollow-stem auger drill rig and equipment
- Hermit or Troll automated data recorder (for slug test data)

The PID will be calibrated to an isobutylene (100 ppm) standard on site prior to each day's use and periodically during the workday.

For the analytical instrumentation, the testing, inspection, and maintenance will be performed in accordance with the above-referenced analytical SOP and manufacturer's recommendations.

B7. Instrument Calibration and Frequency

The PID will be calibrated to an isobutylene (100 ppm) standard on site prior to each day's use and periodically during the workday.

For the analytical instrumentation, the calibration will performed in accordance with the manufacturer's recommendations.

B8. Inspection/Acceptance Requirements for Supplies and Consumables

No special requirements are needed.

B9. Data Acquisition Requirements

No laboratory analytical data will be used from other sources, except that data generated from the Phase II SI completed during Site Due Diligence should be considered valid.

B10. Data Management

Data pertaining to this investigation will be maintained by BL Companies for a minimum of three years following report production.

C. Assessment/Oversight

C1. Assessments and Response Actions

The BL Companies QA Manager (or his designee) may conduct an audit of the field activities for this project. The QA Manager (or his designee) and the Project Manager will have the authority to issue a stop work order upon finding a significant condition that would adversely affect the quality and usability of the data. The Project Manager will have the responsibility for initiating and implementing response actions associated with findings identified during the on-site audit. Once the response actions have been implemented, the QA Manager (or his designee) will perform a follow-up audit to verify and document that the response actions were implemented effectively.

C2. Reports to Management

BL Analytical will include in its QA/QC package (as appropriate to the method):

- Blanks
- Surrogate recoveries
- Laboratory control sample results
- Laboratory duplicate results
- MS/MSD results, and
- Laboratory narrative describing any problems or issues related to the data set

Once the project is complete and the resulting data obtained, the Project Manager will prepare a Remedial Investigation Report (RIR). The RIR will include a summary of the activities performed during the project and the resulting data (along with any statements about problems concerning data quality). The Project Manager will also identify any release areas and the need for further assessment or recommend a response action. The report will be forwarded to the NYSDEC Project Manager.

D. Data Validation and Usability

D1. Data Review, Validation, and Verification Requirements

The data will be peer reviewed by a qualified analyst and the lab Director as identified in the Severn Trent Laboratories, Inc. Quality Control Manual (QCM). The BL Companies Project Manager (or his designee) will be responsible for overall validation and final approval of the data in accordance with project purpose and use of the data. Such validation will include the verification that the data package received is complete, correct, and contractually compliant. Should data be missing from the package, such data will be requested for delivery from the laboratory and additional appropriate actions will be taken. The data validation process will be documented in a validation report.

The laboratory narrative reports will be reviewed by the BL Companies' Project Manager. If additional QC documentation is required based on the laboratory narratives, then such documentation will be requested of the laboratory. Results of these findings will be documented in the validation report, identifying any parameters and samples not meeting criteria, as well as any bias that may be associated with the data. Limitations on the use of the data will be documented, if necessary, in the validation report.

Independent data validation will be performed by Carole Tomlins of Data Quality Indicator and Associates, Inc.

D2. Validation and Verification Methods

The data will be internally validated in accordance with standard Severn Trent Laboratories, Inc. QA/QC procedures. QC spot checks may be performed by BL Companies.

Ms. Tomlins will perform the final review and approval of the data prior to it being published in a final RIR. The Project Manager and data validator will look at field duplicates to ensure they are acceptable. The Project Manager and data validator will also compare the sample descriptions with the field sheets for consistency and will ensure that any anomalies in the data are appropriately documented.

D3. Reconciliation with User Requirements

Once the data results are compiled, the Project Manager or data validator will review the field duplicates to determine if they fall within the acceptance limits as defined in this QAPP. Completeness will also be evaluated to determine if the completeness goal for this project has been met.

If data quality indicators do not meet the project's requirements as outlined in this QAPP, any or all of the data may be discarded and re-sampling may occur. The Project Manager will evaluate the cause of the failure (if possible) and make the decision to discard data and re-sample. If the failure is tied to the laboratory analysis, calibration, and maintenance techniques, they will be reassessed as identified by the appropriate lab personnel. If the failure is associated with the sample collection and re-sampling is needed, the samplers will be retrained. Results of all tasks described above will be documented in the final report.

The overall representativeness of the data will be assessed and documented in the final report, including specific areas surrounding the sample locations and the site as a whole. All observations, conclusions, and limitations on the use of the data will be documented in the final Investigation Report.

APPENDIX D

Health and Safety Plan

IMPACTED SOIL EXCAVATION
HEALTH AND SAFETY PLAN

FOR

PROPOSED WHOLE FOODS MARKET
BROOKLYN, NEW YORK

NYSDEC BCP SITE No. C224100

Prepared For

WFM PROPERTIES BROOKLYN LLC
CAMBRIDGE, MASSACHUSETTS

Prepared by:

BL COMPANIES, INC.
355 RESEARCH PARKWAY
MERIDEN, CONNECTICUT 06450

To the best of my knowledge this Health and Safety Plan (HASP) meets the applicable OSHA standards, project specifications, and industry standards for good health and safety practices. Furthermore, this HASP provides both organizational responsibility and employee procedure to ensure that work can be conducted safely and effectively.

Nicholas C. Tsacoyannis, CPG, LEP

EMERGENCY TELEPHONE NUMBERS

A. Local Emergency Numbers

Police Department	911
Fire Department	911
Ambulance	911

B. Project Emergency Numbers

BL Companies, Inc.	(203) 630-1406
Whole Foods Market	(617) 492-5500
Subcontractor (To be determined)	

C. Hospital Location and Directions

Nearest Hospital:	Interfaith Medical Center 1545 Atlantic Avenue Brooklyn, NY	(718) 604-6000

Leave site going north on 3rd Street. Turn left onto 3rd Avenue. Turn right onto Atlantic Avenue. Go approximately 2.4 miles and arrive at hospital.

D. Additional Phone Numbers

NYSDEC Spill Hotline	(518) 457-7362
NYSDEC, Environmental Conservation Police	(718) 482-4885
U.S. EPA Emergency Response	(800) 424-8802
Poison Control Center	(800) 343-2722
Con Edison Emergency	(800) 752-6633
Keyspan Energy	(718) 643-4050
AT&T Emergency Phone	(800) 222-3000
SNET Repair Service	(800) 922-4646

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APPENDICES

I. INTRODUCTION

The following Site Health & Safety Plan (HASP) describes standard operating procedures for worker protection during the excavation and movement of impacted soil at the proposed Whole Foods Market, 220 3rd Street, Brooklyn, NY. This HASP was prepared for WFM Properties Brooklyn LLC by BL Companies, Inc. (BL), Meriden, CT and is not for construction activities; the site GC will develop their own HASP. The protocols and procedures described below apply directly to the BL Companies' employees and subcontractors while conducting excavating activities in areas identified as Areas of [Environmental] Concern (AOCs).

Employees of BL Companies and all subcontractors involved with the excavation and movement of impacted soil will be familiar with the contents of the HASP prior to entry into restricted zones on-site. A copy of this plan will be posted on-site at all times during site operations. Should new information regarding conditions at the site become available, the HASP will be updated. Employees' and subcontractors involved in site operations will be apprised of the changes and provided with a copy of the revised HASP.

During subsurface investigations at the site, impacted soil and ground water were encountered. BL Companies collected samples of the soil and ground water and submitted them to a state-certified laboratory for analysis. The results of the investigations identified concentrations of semi-volatile organic compounds/polynuclear aromatic hydrocarbons (SVOCs/PAHs), VOCs, metals, and PCBs. Construction will result in disturbing the contaminated material thereby classifying certain areas as AOCs.

The purpose of this Health & Safety Plan is to communicate potential and known health and safety hazards that may be encountered in the AOCs. If additional AOCs are identified during the construction phase of this project, the HASP will be revised addressing those concerns. Health and safety measures, including engineering controls, personal protective equipment and decontamination, decontamination of equipment, and personnel training are outlined in this HASP and must be adhered to in order to reduce health and safety risks to personnel working in an AOC. All personnel assigned to work in an AOC will be required to read and sign the HASP, thereby certifying that they have read and understand its requirements.

II. STATEMENT OF SAFETY AND HEALTH POLICY

This HASP has been developed to provide guidance for compliance to the standards set forth in the Occupational Safety and Health Administration (OSHA), 29 Code of Federal Regulations (CFR) 1926 (29CFR 1926), *Safety and Health Regulations for Construction*. This HASP was also developed in accordance with OSHA 29 CFR 1910.120 *Hazardous Waste Site Operations and Emergency Response*, which has been formerly incorporated into 29 CFR 1926.65. The policies and procedures described within the HASP are based upon existing information pertinent to the project and made available to BL Companies at the time the HASP was prepared, as well as BL Companies' past experience with similar projects.

BL Companies does not guarantee the Health and Safety of any person(s) entering the site. Due to the potential for the presence of hazards at the site and the proposed activities scheduled to occur within the boundaries of the site, it is not possible to discover, evaluate, and provide protection from all potential hazards that may be encountered. Strict adherence to the specific items and procedures outlined in the HASP are intended to reduce, but not eliminate, the potential for injury to persons at the site. Therefore, the guidelines outlined in this HASP are intended for this site and should not be applied to other sites.

III. SITE INFORMATION AND CONTAMINATION CHARACTERIZATION

This project consists of the excavation of material for the installation of a building foundation, including the installation of several underground structures (storm water detention system, etc.), and the general redevelopment of the site at 220 3rd Street, Brooklyn, New York as a Whole Foods Market store. Contaminated soil and ground water have been identified within the construction area. This material is to be handled, removed and/or disposed of in accordance with all local, state and federal laws. The site has several AOCs.

BL Companies collected numerous soil and ground water samples from the site. The analytical results of the sample analyzed indicated the presence of volatile organic compounds (VOCs) polynuclear aromatic hydrocarbon (PAHs), metals, and PCBs. Some of the concentrations of those compounds exceeded the NYSDEC STARS and/or TAGM 4046 maximum contaminant levels. Therefore, contaminated material excavated from the Site will require special handling, disposal, and/or documentation.

IV. SAFETY AND HEALTH RISK ANALYSIS

The overall health and safety risks from construction activities performed within the AOCs for this project are considered low due to the concentration of contaminants detected in the proposed construction areas.

Note: NIOSH develops and periodically revises Recommended Exposure Limits (REL) for hazardous substances or conditions in the workplace. OSHA promulgates and enforces Permissible Exposure Limits (PELs) for hazardous substances in the workplace; Threshold Limit Values (TLVs) and Short Term Exposure Limits (STELs) are recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH); PELs and TLVs are normally compared to 8-hour TWA exposures. IDLH - immediately dangerous to life and health.
ST = short-term exposure; C15 = ceiling 15-min (e.g.); 5 min (2) = 5 minute max peak in any 2 hours (e.g.); 10 min = 10 minute max peak; A3 = animal carcinogen (ACGIH); Ca = potential occupational carcinogen (NIOSH), A4 = not classifiable as a carcinogen (ACGIH); A1 = confirmed human carcinogen (ACGIH); A2 = suspected human carcinogen.

Exposure media includes vapors, dust, soil particulates, and groundwater. Exposure routes include inhalation, absorption, ingestion and contact.

The following contaminants were detected in the material analyzed between December 2003 and December 2004:

1. Semi-Volatile Organic Compounds (SVOCs)/Polynuclear Aromatic Hydrocarbons (PAHs)

The following SVOCs/PAHs were detected at the Site:

- 2-Methylnapthalene, ND – 170 ppm (B-148, 4-8 ft bgs)
- Acenapthene, ND – 1,800 ppm (GP-8, 4-8 ft bgs)
- Acenapthalene, ND – 49 ppm (B-148, 4-8 ft bgs)
- Anthracene, ND – 960 ppm (GP-8, 4-8 ft bgs)
- Benzo(a)anthracene, ND – 67 ppm (B-132, 0-4 ft bgs)
- Benzo(a)pyrene, ND – 80 ppm (B-148, 4-8 ft bgs)
- Benzo(b)fluoranthene, ND – 48 ppm (B-133, 0-4 ft bgs)
- Benzo(g,h,i)perylene, ND – 52 ppm (B-148, 4-8 ft bgs)
- Benzo(k)fluoranthene, ND – 53 ppm (B-132, 0-4 ft bgs)
- Chrysene, ND – 74 ppm (B-132, 0-4 ft bgs)
- Fluoranthene, ND – 1,300 ppm (GP-8, 4-8 ft bgs)
- Flourene, ND – 1,000 ppm (GP-8, 4-8 ft bgs)
- Indeno(1,2,3-cd)pyrene, ND – 29 ppm (B-132, 0-4 ft bgs)
- Napthalene, ND – 15,000 ppm (GP-8, 4-8 ft bgs)
- Pheneanthrene, ND – 3,400 ppm (GP-8, 4-8 ft bgs)
- Pyrene, ND – 2,100 ppm (GP-8, 4-8 ft bgs)

The following are available exposure limits for releases into the air:

TLV as coal tar pitch volatiles: 0.2 mg/m^3 A1 PEL: 0.2 mg/m^3 REL:0.1 mg/m^3 Ca

2. Volatile Organic Compounds (VOCs)

The following VOCs were detected at the Site:

- 1,2,4-Trimethylbenzene, ND – 58 ppm (GP-8, 4-8 ft bgs)
- 1,3,5-Trimethylbenzene, ND – 52 ppm (GP-8, 4-8 ft bgs)
- Benzene, ND – 750 ppm (GP-8, 4-8 ft bgs)
- Ethylbenzene, ND – 150 ppm (GP-8, 4-8 ft bgs)
- Isopropylbenzene, ND – 11 ppm (GP-8, 4-8 ft bgs)
- Napthalene, ND – 19,000 ppm (GP-8, 4-8 ft bgs)
- n-Butylbenzene, ND – 230 ppm (GP-8, 4-8 ft bgs)
- n-Propylbenezene, ND – 19 ppm (GP-8, 4-8 ft bgs)
- Total Xylenes, ND – 154 ppm (GP-8, 4-8 ft bgs)
- p-Isopropyltoluene, ND – 14 ppm (GP-8, 4-8 ft bgs)
- sec-Butylbenzene, ND – 8.5 ppm (B-111, 4-8 ft bgs)
- tert-Butylbenzene, ND – 77 ppm (GP-8, 4-8 ft bgs)
- Toluene, ND – 2.5 ppm (B-111, 4-8 ft bgs)
- Pheneanthrene, ND – 3,400 ppm (GP-8, 4-8 ft bgs)

The following are available exposure limits for releases into the air using benzene as the primary compound of concern:

TLV as benzene: 0.2 mg/m^3 A1 PEL: 1 mg/m^3 REL:0.1 mg/m^3 Ca

3. Inorganic Metals

RCRA metals were detected at the site. The concentration of some of the detected metals exceeded the applicable standards and is discussed below.

Lead: The highest concentration of lead detected in the soil sampled was 2,320 mg/kg. According to the Federal EPA, Residential Direct Exposure Criteria, soil is considered contaminated with lead at a total concentration greater than 400 mg/kg. NYSDEC TAGM limits are based on site background levels.

The following are exposure limits for elemental lead released into the air:
REL: 0.100 mg/m^3 PEL: 0.050 mg/m^3 IDLH: 100 mg/m^3 (Pb)

Physical Description: Metal: A heavy ductile, soft gray solid. Exposure media includes dust, soil particulates, and as dissolved in water.

Chromium: the highest total concentration detected in the soil sampled was 53.1 mg/kg. According to the NYSDEC TAGM 4046 criteria, soil is considered contaminated with chromium at a concentration of 10 mg/kg.

The following are exposure limits for chromium compounds:
REL: 0.5 mg/m^3 PEL: 1 mg/m^3 IDLH: 250 mg/m^3 (Cr)

Physical Description: Appearance and odor vary depending upon the specific chromium compound.

Arsenic: the highest total concentration detected in the soil sampled was 47.3 mg/kg. According to the NYSDEC TAGM 4046 criteria, soil is considered contaminated with arsenic at a total concentration of 7.5 mg/kg. ACGIH notes that arsenic is a confirmed human carcinogen.

The following are exposure limits for inorganic arsenic released into the air:
REL Ceiling: 0.002 mg/m^3 15 min (Ca) PEL: 0.010 mg/m^3 IDLH: 5 mg/m^3 (Ca)

Physical Description: Metal: Silver-gray or tin-white brittle, odorless solid. Exposure media includes dust, soil particulates, and as dissolved in water.

Mercury: the highest total concentration detected in the soil sampled was 2.2 mg/kg. According to the NYSDEC TAGM 4046 criteria, soil is considered contaminated with arsenic at a total concentration of 0.1 mg/kg. ACGIH notes that arsenic is a confirmed human carcinogen.

The following are exposure limits for inorganic arsenic released into the air:
REL Ceiling: 0.05 mg/m^3 PEL: 0.10 mg/m^3 IDLH: 5 mg/m^3 (Hg)

Physical Description: Metal: Silver-gray or tin-white brittle, odorless solid. Exposure media includes dust, soil particulates, and as dissolved in water.

Selenium: the highest total concentration detected in the soil sampled was 24.2 mg/kg (ppm). According to the NYSDEC TAGM 4046 criteria, soil is considered contaminated with selenium at a concentration of 24.2 ppm.

The following are exposure limits for selenium:
REL: 0.2 mg/m^3 PEL: 0.2 mg/m^3 IDLH: 1 mg/m^3 (Se)

Physical Description: Amorphous or crystalline, red to gray solid. Exposure media includes dust and/or soil particulates.

4. PCBs

PCBs were detected solely in soil at one location at the site. The highest concentration of PCBs detected at the site was 55 parts per billion (ppb). According to NYSDEC TAGM 4046, soil is considered contaminated with a total PCB concentration of 1 mg/kg.

The following are exposure limits for PCBs released into the air:
REL: 0.2 mg/m^3 PEL: 0.5 mg/m^3 IDLH: 5 mg/m^3

Physical Description: Colorless to pale-yellow solid with mild hydrocarbon odor. Exposure media includes dust and/or soil particulates.

V. HAZARD ANALYSIS

The hazard analysis for this project is based upon the anticipated risk posed by the proposed activities. The following is a summary of each anticipated activity, associated hazard(s), and methods to minimize and/or prevent these hazards:

Typical hazards associated with movement within the site include: tripping hazards from uneven surfaces and vegetation; exposure to plants such as poison ivy and pricker bushes (which may cause allergic reactions); wildlife hazards such as ticks (Lyme Disease), mosquitoes, bees, snakes, and rodents; exposure to on-site chemicals and contaminants; accidents with on site equipment and/or vehicles; heat stress; and back strain due to improper lifting of heavy loads.

The following techniques will help prevent/minimize these hazards: "be alert while walking across the site, wear steel toed/shank construction boots, wear long pants and sleeved garments to protect against plants and wildlife; avoid wildlife such as snakes, bees and rodents; inspect driving route before moving equipment and/or vehicles, notify persons working in the area when moving equipment; wear seat belts whenever moving a vehicle; implement a heat stress reduction/monitoring program; and use proper lifting techniques to avoid back strain."

Site specific hazards that may be encountered during monitoring, sampling, and excavation activities include: exposure to harmful chemicals, and/or contaminants; electrical hazards from power sources, handling glass containers, exposure to loud noises, and overhead hazards from heavy equipment.

These hazards can be prevented by using trained personnel for air monitoring and sample collection, using ground fault interrupters, using well maintained equipment, not using electrical equipment in wet or flammable areas, being aware of the action levels for the chemical contaminants on site, wearing personal protective equipment, and reading and understanding the HASP.

VI. RESPONSIBILITIES

The following personnel are designated to perform the stated site activities and provide proper communications in the event of an emergency or need for medical attention.

Project Manager
Samuel R. Haydock, PG, LEP, BL Companies, Inc.

Health and Safety Manager
Nicholas C. Tsacoyannis, CPG, LEP, BL Companies, Inc.
Qualifications: Completed 40-hour and Annual 8-hour Refresher "HAZWOPER" Training
Completed 8-hour Site Supervisor Training
Completed 4-hour lockout/tag out
Completed 4-hour Confined Space Entry
Certified Professional Geologist, Registered Geologist, Licensed Environmental Professional
Experience in performing air-monitoring activities on various construction sites utilizing PIDs, FIDs, Dust Meters, Personal Sampling Pumps, and Oxygen & Combustible Gas Meters

Guy F. LaBella, PhD, PE, CHMM, LEP, BL Companies, Inc.
Qualifications: Completed 40-hour and Annual 8-hour Refresher "HAZWOPER" Training
Completed 8-hour Site Supervisor Training
National Association of Safety and Health Professionals- Certified Hazardous Materials Manager (CHMM)
Professional Engineer, Licensed Environmental Professional

Experience in performing air-monitoring activities on various ConnDOT construction sites utilizing PIDs, FIDs, Dust Meters, Personal Sampling Pumps, Oxygen & Combustible Gas Meters, and Portable Gas Chromatograph
Certified First Aid and CPR

<u>Health and Safety Officer/ Site Safety Officers</u>
BL Companies (TBA)
Qualifications: Completed 40-hour and Annual 8-hour Refresher "HAZWOPER" Training
Completed 8-hour Site Supervisor Training

Experience in performing air-monitoring activities on various construction sites utilizing PIDs, Dust Meters, Personal Sampling Pumps, Oxygen & Combustible Gas Meters, and Portable Gas

The responsibility of the Health and Safety Manager is to review and approve the HASP.

Enforcement of this HASP will be the responsibility of the Site Safety Officer and/or the Health and Safety Officer designated for the site, or in their absence, a designated, qualified replacement. Employees of BL Companies, subcontractors, or their employees may be excluded from the site at the discretion of the Health and Safety Officer or the Site Safety Officer, should a violation of the protocols established in this Health and Safety Plan occur.

While working within an Area of Environmental Concern, the Health and Safety Officer and Site Safety Officer will report to the Project Manager on a daily basis regarding the conformance to the protocols outlined in the HASP. The primary responsibilities of the Health and Safety Officer and Site Safety Officer are:

1. Ensure that all BL Companies personnel and subcontractors are familiar with the HASP.

2. Communicate to BL Companies personnel and subcontractors the hazards associated with site activities within the Areas of Environmental Concern.

3. Utilize engineering and administrative controls in order to reduce health and safety risks encountered during project activities.

4. Determine that BL Companies will provide personal protective equipment to their personnel, when engineering and administrative controls are known to be limited in effectiveness.

5. Require that personal protective equipment be properly utilized and maintained by project personnel.

6. Oversee the overall performance of project-related personnel and encourage safe work practices.

7. Identify and correct deficiencies and unsafe work practices.

8. Conduct field screening and monitoring procedures utilizing direct reading instrumentation in order to identify chemical hazards present in construction areas.

9. Advise the Project Manager regarding the reclassification of hazards, as well as any changes in the level of personal protective equipment to be worn.

10. Direct emergency and evacuation procedures for personnel covered under this HASP.

11. Issue stop-work orders as necessary.

The responsibilities of the Project Manager include, but are not limited to:

1. Determine if BL Companies personnel and subcontractors who will work in the exclusion zone, have successfully completed the appropriate educational requirements stipulated in 29 CFR 1926.65, are currently monitored under a medical surveillance program in compliance with those regulations, and are physically fit for work in Level C conditions.

2. Determine availability of personal protective equipment for all BL Companies personnel who will be working in the Areas of Environmental Concern.

3. Notify the Owner of any changes in actual site conditions.

4. Notify the Owner of the reclassifications of hazards within the construction site, as well as any changes in the levels of personal protective equipment to be worn.

5. Conduct oversight of the site operations.

VII. EMPLOYEE TRAINING

Prior to the initiation of operations on the site, employees and subcontractors will receive a pre-entry briefing based upon the contents of this plan. This briefing will include at a minimum the following items:

- Verbal description of the site and hazards present.
- A chemical hazard briefing.
- The location of the nearest emergency communications and emergency facilities and emergency telephone numbers.
- Emergency procedures.
- The identification of hazards that are associated with anticipated tasks of the day
- Hazards specific to the site, their chemical nature, concentrations present or expected, exposure limits, symptoms of overexposure, and emergency first response first aid.
- The inspection and use of personal safety equipment.

- A discussion of the location of safe areas if emergency evacuation is necessary.
- How to detect/eliminate/prevent hazards through the use of monitoring and control measures.

Unless the Action levels outlined in Section X are exceeded during on-site air monitoring in the Area of Environmental Concern, BL Companies personnel and subcontractors are only required to be trained according to 29 CFR 1926.65 paragraph (c)(3)-Initial Training. However, if air monitoring determines that concentrations of contaminants have exceeded the Action Levels outlined in Section X, then all BL Companies personnel who will perform activities within the Area of Environmental Concern will be required to have successfully completed health and safety training meeting all requirements of OSHA 29 CFR 1926.65 and 29 CFR 1910.120. Should this situation occur, a copy of their training certificate will be required on site to confirm that every assigned person has currently received the necessary training.

The purpose of the training is to ensure that workers are aware of potential hazards they may encounter, provide knowledge and skills in order to complete tasks with minimal risk to health and safety, provide knowledge of the purpose and limitations of personal protective equipment, develop safe work practices, and inform workers of the requirement of a medical surveillance program, including the recognition of symptoms and signs that might indicate exposure to a hazard.

VIII. PERSONAL PROTECTIVE EQUIPMENT

Standard levels of personal protection have been divided into four categories by the Environmental Protection Agency, OSHA, U.S. Coast Guard, and National Institute for Occupational Safety and Health (NIOSH). These categories have been established according to the level of hazard that personnel may be exposed to. These four levels include:

Level A - Provides the highest level of respiratory, skin and eye protection.

Level B - Provides the highest respiratory protection, but lower skin protection than in Level A.

Level C - Provides the same skin protection as Level B, but has lower level of respiratory protection.

Level D - Provides no respiratory protection and minimal skin protection.

When working in the Area of Environmental Concern, the level of personal protective equipment (PPE) worn will be in conformance with OSHA 29 CFR 1926.65. The minimal level of PPE will be level D. All BL Companies personnel and subcontractors entering work zones on this project are required to wear Level D PPE at all times. This level of protection may be upgraded to a Level C (either partial or full) at the discretion of the Health and Safety Manager or Site Safety Officer, in the event that site conditions and/or air monitoring results indicate a potential exposure risk.

Level D PPE includes: Coveralls/Tyvek*

Work Gloves
Steel Toe/Shank Work Boots
Hard Hat
Nitrile or Latex Inner Sampling Gloves*
Disposable Outer Boots*
Safety Glasses/Goggles/Face Shield*
Hearing Protection*
Approved Safety Vests (when working within the highway R-O-W)
*When Hazards Exist/Optional

The criteria for Level D PPE include:

- No contaminants are present above the concentrations as specified in the Safety and Health Risk Analysis - Section IV of this HASP.
- Work functions preclude unexpected contact with, or inhalation of any contaminants.
- No contaminants are known or suspected to be present at the site that may cause immediate adverse effects upon contact or inhalation.
-

Level C PPE includes:
Minimum of 2 Workers
Steel Toe/Shank Boots
Hard Hat
Full Face or Half Face Respirator with Appropriate Filters (e.g. Organic vapor cartridge and/or high efficiency particulate filter)
Chemical Specific Protective Clothing
Nitrile or Latex Inner Sampling Gloves
Chemical Specific Protective Outer Gloves
Chemical Specific Protective Outer Boots
Safety Glasses/Goggles/Face Shield*
Hearing Protection*

*When Hazard Exists/Optional

The criteria for Level C include:

- Oxygen concentrations are not less than 19.5% by volume.
- Contact with atmospheric contaminants will not affect exposed areas of the body.
- Measured concentrations in air of identified constituents will be reduced below the threshold limit value (TLV) by the respirator used and the concentrations are within the service limit of the filter canister and the safety factor provided by the type of respirator used.

In the event that airborne concentrations of site contaminants exceed the established exposure action levels set by this HASP, respiratory protective equipment must be worn by OSHA-trained personnel in order to protect workers from hazardous conditions. Every effort will be made to use engineering controls to minimize exposure levels prior to the use of PPE. However, respiratory equipment should be readily available to personnel at all times. Activities associated with this project are not expected to warrant the use of Level C, Level B, or Level A type respiratory equipment.

IX. MEDICAL SURVEILLANCE PROGRAM

Medical surveillance is essential in the assessment and monitoring of worker fitness and health, both prior to employment and during the course of employment. Accurate medical records should be maintained on file. The information obtained from the program can also be used to adjust claims, provide evidence in litigation and provide information regarding worker health and medical conditions. A medical monitoring program includes a pre-employment medical examination, periodic medical examinations based upon frequency of worker exposure, record keeping, post-injury/accident examinations, and termination medical examination. The medical surveillance program shall categorize employees as "fit for work" and able to wear respiratory protective equipment.

A medical monitoring program is required for employees engaging in operations conducted on hazardous waste sites (29 CFR 1926.65). Since previous environmental investigations conducted at the site did not detect the presence of hazardous concentrations of contaminants, this project is not considered a hazardous waste site. Therefore, BL Companies personnel and subcontractors are not required to be under a medical surveillance program unless air monitoring/laboratory analyses determines that concentrations of contaminants in the Area of Environmental Concern exceeds the Action Levels for this site. In the event this occurs, all personnel working in the Area of Environmental Concern will be required to be provide proof of participation in a medical surveillance program.

X. MONITORING PROGRAM FOR CHEMICAL SUBSTANCES/PHYSICAL AGENTS

Personnel entering the project site must use adequate safety precautions in order to minimize exposure to contaminants. These precautions include exposure monitoring to characterize potential site health hazards, determine type of personal protective equipment necessary, and establish standard operating procedures. Air monitoring is one method of obtaining important information on site hazards. Decisions based upon air monitoring data will be used to determine the level of personal protection. In addition, the air-monitoring program will determine whether personnel need to be trained in accordance with OSHA 29 CFR 1926.65.

The Site Safety Officer, or assigned designee, will be responsible for air monitoring during activities performed in the Area of Environmental Concern. Identification and quantification of airborne contaminants is the overall objective of the air-monitoring program. Results obtained from the air monitoring activities will be carefully evaluated and used in the selection of the proper level of personal protection. This data will also help delineate areas where and when personal protection equipment is needed, identify areas where reclassification or upgrading of PPE is necessary, assess potential health effects from contaminant exposure and determine the need for specific medical monitoring of project personnel.

The air-monitoring program will employ two methods of identifying airborne contaminants. The first method will employ the use of direct reading instruments to obtain "real-time" exposure levels. Real time air monitoring will be conducted for VOCs in the work zone during soil excavation and handling activities. Monitoring for VOCs will be conducted using a photo-ionization detector (PID) equipped with a 10.6 eV lamp calibrated with isobutylene and referenced to benzene in air. Concentrations of volatile organic compounds in the air will be available immediately to personnel so that the appropriate corrective action can be taken.

Certain groups of compounds detected at this site could present a particulate inhalation hazard (dust) if present in elevated concentrations. Real-time particulate air monitoring will be conducted using a Particulate Material Sampler. This instrument is designed to measure the concentration of airborne particulate matter, liquid or solid, and provides a direct and continuous readout.

Monitoring for explosive atmospheres will be conducted using a LEL meter calibrated with pentane as a reference standard and with the alarm set at 10 percent LEL. Monitoring with the LEL meter are required when the potential for explosive atmospheric sources or methane sources are encountered. Hydrogen Sulfide monitoring will also be required prior to entering excavations. Hydrogen sulfide monitoring will be conducted using a Hydrogen Sulfide meter. Air monitoring will also include the use of an oxygen meter prior to entry into an excavation.

Direct reading instruments will be used continuously during excavation activities in the Area of Environmental Concern.

The second method of detection will supplement the direct reading instruments listed above. Because of the low exposure limits of benzene (1 ppm), the PID does not provide a safe screening method for benzene when used alone. Therefore, PID readings will be supplemented with specific colorimetric indicator tubes (Draegar, Sensidyne or equivalent) to detect the presence of benzene, PCE and/or hydrogen sulfide in the breathing zone of the workers during intrusive activities.

Personal sampling may be conducted for activities identified by the Site Safety Officer as requiring additional safety factors. Results of sample analysis can determine changes in personal protective equipment requirements. The Site Safety Officer will have the option of discontinuing air monitoring when conditions prove to be adequate in protecting worker health and safety.

If noise levels become a concern, a calibrated sound level meter will be used to determine employee exposure levels.

Monitoring data will be recorded and maintained by the Site Safety Officer. Notification to BL Companies will be made when airborne contaminant concentrations exceed the action levels set forth in this HASP. If the Action Levels are exceeded, all personnel will be required to leave the work area. Only OSHA-trained personnel will be allowed to return to the work area after donning the appropriate PPE. The date, time, location, sampling parameters and instrument readings will be recorded and transferred to the Project Manager for placement into the project files.

A. Direct Reading Instruments

Direct reading instruments provide information at the time of sampling, thereby enabling rapid decision making. These instruments are capable of detecting contaminant concentrations in parts per million (ppm). They are used to detect flammable or explosive atmospheres (Combustible Gas Meter), oxygen deficient atmospheres (Oxygen Sensor), certain gases and vapors (Photoionization Detector, Flame Ionization Detector, or Colormetric Detector Tubes), and certain particulates (Infrared Spectrophotometer, Miniram). Direct reading instruments are designed to detect and measure specific classes of chemicals or conditions. Instruments designed for specific substances may also detect other substances that may result in false readings ("false-positives").

Only personnel trained in the use of this equipment and knowledgeable in their limitations will operate these instruments. Data interpretation will be based upon actual field conditions when compared to specific background information. At a minimum, monitoring equipment will be calibrated in the field at the start and end of each day, and whenever equipment operation is questionable. The Site Safety Officer will keep a log of the time and date of all field calibrations.

The Site Safety Officer will utilize a Photoionization Detector (PID) to monitor total volatile organic compounds, and a Particulate Material Sampler to monitor dust particulates. If the PID detects a sustained concentration of total volatile organic compounds above background levels, then additional equipment will be utilized (oxygen sensor, combustible gas meter, etc.).

B. Personal Air Monitoring

Whenever direct monitoring indicates that worker exposure to hazardous substances or physical agents (noise) may be at or above an Action Level (See Subsection C), personal air monitoring methods in accordance with NIOSH/OSHA guidelines will be implemented. Initially, personal air monitoring will be conducted on workers who are most likely to have the highest exposure. If personal air monitoring results indicate exposure levels at or above the PEL, personal air monitoring will be expanded to cover all employees in the work area.

C. Action Levels

If the action levels listed in Table 1 (below) are exceeded in the breathing zone of any worker for a duration of one minute or longer, all workers will be notified and required to leave the excavation area. Personal decontamination procedures may be necessary prior to leaving the area. The Site Safety Officer will brief the OSHA-trained workers prior to returning to the support zone where they will upgrade from Level D to Level C PPE (See Note):

TABLE 1

CONTAINMENT	INSTRUMENT	ACTION LEVEL
Combustible Gas	CG-1	<10% Lower Explosive Limit (LEL) is normal >10 % LEL requires immediate site evacuation
Dusts	Particulate Material Sampler	>2.5 mg/m^3
Noise		>85 decibels requires hearing protection
Oxygen	Oxygen Meter	19.5% to 23% is normal
Volatile Organic Compounds	PID/FID	>10 ppm

If the contaminant concentrations listed in Table 2 are detected in the breathing zone for a duration of one minute, the workers will then upgrade from Level C PPE to Level B PPE.

TABLE 2

CONTAINMENT	INSTRUMENT	ACTION LEVEL
Combustible Gas	CG-1	<10% Lower Explosive Limit (LEL) is normal >10% LEL requires immediate site evacuation
Dusts	Particulate Material Sampler	>5.0 mg/m^3
Noise		>85 decibels requires hearing protection
Oxygen	Oxygen Meter	19.5% to 23% is normal (Note 2)
Volatile Organic Compounds	PID/FID	>50 ppm

Note: Oxygen deficiency is not corrected with Level C air purifying respiratory protection. Only Level B supplied air respiratory protection provides this correction.

D. Community Air Monitoring Program (CAMP)

Based upon the nature of know or potential contaminants at the site, real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the site will be necessary.

Continuous Monitoring

Continuous monitoring will be conducted for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities. Non intrusive activities include the collection of surface soil and sediment samples, the collection of ground water samples from existing monitoring wells, opening a well cap, overturning soil, well bailing/purging, arriving at the site, and prior to leaving the site.

VOC Monitoring, Response Levels and Actions

VOCs will be monitored at the downwind perimeter of the site on a continuous basis during ground intrusive activities. Upwind concentrations will be measured at the start of each workday and periodically afterwards to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contamination known or suspected to be present – Photoionization detector (PID). The PID will be calibrated at a minimum daily using an appropriate surrogate. The PID will be capable of calculating 15-minute running average concentrations, which will be compared to the following action levels:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the site exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downgradient perimeter of the site persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of the vapors identified, corrective actions will be taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the site or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm background for the 15-minute average.

- If the total organic vapor level is above 25 ppm at the perimeter of the site, activities will be shutdown.

All 15-minute readings will be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the site at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes or less for comparison to the airborne particulate actions levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assess during all work activities. The following are the action levels for particulates:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the site, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the site.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentrations to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for State (DEC and DOH) personnel to review.

XI. HEAT STRESS/COLD STRESS MONITORING

1. HEAT STRESS

Due to the additional physical and psychological stress of working, employees will be monitored for signs of stress when the ambient temperature in the work area is 70^o F. Frequency of monitoring for signs of stress shall increase as the ambient temperature increases. In addition, a schedule for working in PPE has been included in the HASP (Table 3) as a guideline for work time duration should work be anticipated above the expected Level D personal protection. There are four levels of heat stress that workers should be aware of. The following summarizes the four levels of heat stress, their symptoms, and treatment.

A. Heat Rash: the inflammation and clogging of the sweat ducts due to overexposure to heat.

Symptoms: Appearance of small red vesicles on the skin.

Treatment: Mild drying of the skin.

B. Heat Cramps: a salt/water imbalance in the body resulting from inadequate replacement of salt in the body after over-exposure to heat.

Symptoms: Uncontrolled spasms and cramps in muscles, especially in the abdomen.

Treatment: Consume salted fluids.

C. Heat Exhaustion: mild shock caused by insufficient water and/or salt when exposed to heat for an extended period of time.

Symptoms: Fatigue, dizziness, weakness, nausea, clammy skin, and paleness.

Treatment: Go to a cool environment, consume salted fluids.

D. Heat Stroke: dangerous rise in body temperature caused by dehydration and/or lack of salt intake.

Symptoms: Nausea, headache, dizziness, delirium, hot and dry skin, and coma

Treatment: Go to a cool environmental, immerse victim in cold/iced water, fan, seek medical attention.

The monitoring of personnel during work activities can greatly reduce the risk of heat stress during hot and humid weather. To prevent workers from being overcome by heat stress, coolers of chilled water and gatorade-type liquids should be made available to the workers throughout the day. Workers should also be advised to utilize sunscreen and be provided with a cool shaded break area. Additional factors that may increase the risk of heat stress include: obesity, old age, and recent illness or alcohol intake.

TABLE 3

RECOMMENDED HEAT STRESS WORK SCHEDULE			
AMBIENT TRANSPORTATION	**PROTECTION LEVEL (USEPA)**	**MAXIMUM WORK* PERIOD (hours)**	**REST* PERIOD (hours)**
Above 90°F	A	.25	.50
	B	.50	.50
	C	.75	.25
85-90°F	A	.50	.25
	B	.50	.25
	C	.75	.20
80-85°F	A	1.0	.25
	B	1.5	.25
	C	2.5	.20
70-80°F	A	1.5	.20
	B	3.0	.15
	C	5.0	.15
60-70°F	A	2.0	.15
	B	4.0	.15
	C	6.0	.15
50-60°F	A	3.0	.15
	B	8.0	0
	C	8.0	0
30-50°F	A	5.0	.10
	B	8.0	0
	C	8.0	0
Below 30°F	A	8.0	0
	B	8.0	0
	C	8.0	0

*Wind chill, relative humidity, work load and physical ability should be taken into consideration.

2. COLD EXPOSURE

Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short period of time may cause severe injury to exposed body surfaces, or result in profound generalized cooling, and causing death. Areas of the body that have high surface area-to-volume ratios, such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: characterized by suddenly blanching or whiting of the skin.
- Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: tissues are cold, pale, and solid; and extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering,
- Apathy, listlessness, and sleepiness, and sometimes rapid cooling of the body to less than 95 degrees,
- Unconsciousness, glassy stare, slow pulse, and slow respiratory rate,
- Freezing of the extremities, and
- Death.

To guard against cold injury, wear, use appropriate clothing including hand, face and foot- wear; have warm shelter readily available; carefully schedule work and rest periods; and, monitor workers' physical conditions. Loosely layered clothing is preferred because of the added insulating properties from entrapped air between the layers. The fingers, toes, nose tips, ears, and cheeks should be periodically exercised to keep them warm and to detect any numb or hard areas indicative of frostbite. However, once frostbite occurs, the preferred method of thawing is gradual rewarming by placing body surfaces against the frostbitten part. Workers should use the "buddy system" to detect signs of frostbite on co-workers.

XII. STANDARD OPERATING SAFETY PROCEDURES & ENGINEERING CONTROLS

All personnel working in the Areas of Environmental Concern will adhere to the items outlined in this HASP. A signature sheet is included at the end of the HASP and will be signed by all personnel indicating they have read and understand the contents. A daily health and safety meeting will be held at the site to discuss concerns or hazards anticipated during the day's activities. Project personnel will notify the Site Safety Officer of any unsafe condition or practices at the site so that the condition or practice can be remedied.

Engineering controls will be utilized whenever possible in order to reduce the potential for exposure to hazards, and so that changes in upgrades of personnel protective equipment and work zone delineation can be prevented. An example of a typical engineering control consists of wetting down soils with water in order to reduce airborne dust generated during construction activities and thereby reducing or eliminating the need for respiratory protection. In addition, having workers stay upwind of potential airborne contaminants is another engineering control utilized to reduce worker exposure.

XIII. SITE CONTROL MEASURES

When air monitoring in the Areas of Environmental Concern identifies airborne concentrations of contaminants above the action level outlined in Section X, restricted access and protective zones will be established with respect to the contamination hazards of the site. These zones will be determined by the Site Safety Officer and/or the Health and Safety Officer. These zones will help minimize the possibility of cross contamination of uncontaminated areas. The establishment of zones will also be used to prevent exposure of project personnel to contaminated materials. In addition, "zones" will be established to control entry by unauthorized and/or untrained personnel into these areas. The health and safety of project related personnel is the overall objective when establishing protective zones.

A. Support Zone

The support zone will be kept free of any contaminated material and is usually used for equipment storage and assembly. Support personnel are staged in this area along with vehicles and equipment not required in the work area that has been designated as contaminated. The location of the support zone will be determined by the Site Safety Officer after he/she evaluates the contaminant hazard, exposure potential, wind direction and speed, topography, visibility, or other factors that may impact personnel located in this zone.

B. Contaminant Reduction Zone

The contaminant reduction zone is the area between the support zone and the area designated as contaminated (exclusion zone). This area is a transition zone and initially is uncontaminated. Decontamination equipment is located in the contaminant reduction zone and decontamination procedures are executed in this zone for all personnel, equipment and materials passing to the support zone. Separate decontamination areas will be provided for personnel and equipment. The contaminant reduction zone will also provide support to non-construction activities such as sample preparation and packaging. The staging of equipment and personnel who will assist workers in the area of contamination also takes place in this zone. No smoking, eating, chewing gum or tobacco, drinking, taking medicine, or application of cosmetics (including chapstick and sunscreen) will be permitted in the contaminant reduction zone. These materials, in addition to lighters or matches will not be allowed in this zone.

C. Exclusion Zone

The contaminated area is known as the exclusion zone and is the area in which actual intrusive activities are performed. No person will be allowed to enter the exclusion zone without authorization from the Site Safety Officer or the Health and Safety Officer. Activities within the exclusion zone will be monitored continuously in order to prevent exposure to contaminants. Entrance and exit to the exclusion zone will be maintained at a single access point whenever practical. All equipment and personnel will enter and exit the exclusion zone through the contaminant reduction zone. In addition, there will be no smoking, eating, chewing gum, chewing tobacco, drinking, taking medicine, or application of cosmetics in the exclusion zone. These materials, in addition to lighters and matches will not be allowed in this zone.

XIV. DECONTAMINATION PROCEDURES

To minimize contact with contaminated substances and lessen the potential for contamination, personnel will make every effort not to walk through areas of obvious contamination (i.e. liquids, discolored surfaces, smoke/vapor clouds, etc.). Personnel will not kneel or sit on the ground in the Exclusion Zone and/or Contaminant Reduction Zone.

Decontamination will be required when the airborne concentration of contaminants exceeds the action levels outlined in Section X, or in the opinion of the Site Safety Officer, significant levels of contamination may be transported off-site or between locations on the site by personnel or equipment. If the site requires the use of disposable protective equipment (Level D or above), a decontamination area will be designated within the contaminant reduction zone prior to commencement of the work.

The decontamination area will be equipped with potable and non-potable water, brushes, soap and solvents for decontamination, first aid kits, including eye wash, extra personal protective equipment, and plastic bags for disposal of contaminated material. A soap (detergent) and water wash/rinse will be used for all protective equipment. A waterless hand cleaner and paper towels may be used for hands, arms, or any skin surface potentially in contact with contaminated material. This area will be manned by personnel dressed in a level of personal protective equipment sufficient to enter the exclusion zone in the case of emergency.

Equipment decontamination may involve an initial hand wash, using a solution of water and Alconox, followed by a clean water rinse, a methanol rinse, and steam cleaning. All decontamination fluids and disposable personnel protective equipment will be collected in the proper containers (i.e., drums, garbage bags), so that they may be disposed of properly at a later time.

XV. EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

In the case of an accident, severe injury, or other medical emergency, medical assistance should be contacted immediately. First aid should be administered on-site only by trained personnel. The Site Safety Officer has been certified in first aid and CPR. In addition, the medical facility that will receive the injured person should be notified as to the condition and the type of injury. A non-severe injury may require transportation in a site vehicle. Directions to the closest hospital and pertinent telephone numbers are listed at the beginning of this HASP. A copy of the HASP should accompany all personnel transported to the hospital in order to provide information for proper diagnosis and medical treatment. The Site Safety Officer, Health and Safety Officer and Project Manager should be notified of the injury. In addition, an Accident Report/Incident Report should be completed as soon as possible by the Health and Safety Manager. A copy of an Accident Report/Incident Report is located in Appendix B.

A. Emergency Medical Equipment

Emergency medical equipment will be kept on-site and shall include at a minimum:

First aid kit
Emergency eye wash

Should an emergency shower be required, potable or non-potable water available at the decontamination areas can be used.

B. Emergency First Aid

The following generalized emergency first aid is intended for cases where the exact cause of the symptoms is not well known.

Exposure	First Aid
Dizziness, headache, nausea	Remove to fresh air. Perform artificial respiration if necessary. Seek medical attention if persists.
Burning sensation (eyes)	Irrigate immediately for 15 minutes. Seek medical attention if persists.
Burning sensation (skin)	Decontaminate with soap and water. Remove wet or contaminated clothing. Seek medical attention if persists.
Ingestion	Get emergency medical help. Induce vomiting if conscious.

C. Personal Injury Within the Exclusion Zone

Upon notification of an injury in the exclusion zone, an emergency signal horn blast will be sounded. All site personnel will assemble in the decontamination area. The Site Safety Officer will evaluate the nature of the injury and if necessary, the affected person will be decontaminated prior to movement. No person will re-enter the Exclusion Zone until after the cause of injury or illness has been determined.

D. Personnel Injury Outside the Exclusion Zone

Upon notification of an injury outside of the Exclusion Zone, the Site Safety Officer will assess the nature of the injury. If the cause of the injury/illness does not affect the performance of site personnel, activities may continue while the injury is handled. If the injury increases the risk to others, an air horn will be sounded and site personnel will move to the decontamination area for further instructions. Activities on-site will stop until the risk has been removed or minimized.

XVI. EMERGENCY RESPONSE PLAN

In the event of an emergency, site control, communications and appropriate evacuation routines will be the responsibility of the Site Safety Officer. Emergency communication with off-site emergency response groups will be via telephone. Telephones will be located in the project trailer and in the vehicles of the Project Manager and Site Safety Officer. For on-site emergency communications, the Site Safety Officer will signal utilizing an air horn located in the trailer. Immediately after sounding the alarm, (one long blast) the Site Safety Officer will telephone all pertinent emergency personnel (ambulance, fire etc.) and notify the Project Manager and Health and Safety Officer. All personnel will leave the area via the safest route and meet at a location designated by the Site Safety Officer. The Site Safety Officer will check to determine that all personnel have been accounted for. If personnel are identified as missing, the Site Safety Officer will contact emergency services for assistance.

Environments characterized as immediately dangerous to life and health (IDLH) are not anticipated to occur at the site and are therefore not covered by this HASP. Unexpected occurrences of such conditions will necessitate immediate evacuation of the area. Emergency situations that may occur under such circumstances include uncontrolled releases of contaminants, severe weather, discovery of drums or other unknown material. These situations may require the involvement of trained and equipped emergency response personnel.

A. Emergency Communications

In the event of an emergency, the Site Safety Officer will alert the construction site by using an air horn. The following signals will be used:

Three short blasts	Personnel injury - Evacuate to designated area
One long blast	Site emergency - Everyone evacuate to designated off-site area.

When working in the Area of Environmental Concern, personnel will use the "buddy" system. Hand signals should be pre-arranged should other means of communications breakdown. The following standard hand signals should be utilized:

Thumbs up	Ok, I'm alright, I understand
Thumbs down	No, negative
Hand gripping throat	Out of air, can't breath
Grip partner's waist, wrist	Leave area immediately, no debate
Hands on top of head	Need assistance

B. Fire and Explosion

Upon notification of a fire or explosion on-site, the emergency signal horn will be sounded and all site personnel will move to the decontamination area or to an area upwind of the fire or explosion. The fire department will then be alerted.

C. Personal Protective Equipment Failure

If any site worker experiences a failure or alteration of personal protective equipment that affects the protection factor, that person and his/her buddy (under modified Level D conditions) will immediately leave the Exclusion Zone and go to the decontamination area where the Site Safety Officer will assess and remedy the situation.

Under Level C conditions (or higher), failure or alteration of personal protective equipment will immediately cause all personnel present in the work area to withdraw with their assigned buddies from the exclusion zone. All personnel will assemble in the decontamination area, where the Site Safety Officer will assess the failure. Re-entry to the exclusion zone will not be permitted until the cause of the failure has been determined and the equipment has been repaired or replaced.

D. Other Equipment Failure

Should other equipment fail to operate properly, the Site Safety Officer and/or the Project Manager will be notified. The effect of equipment failure on continuing operations at the site will then be evaluated. If the failure affects the safety of personnel or prevents completion of tasks, all personnel will leave the Exclusion Zone until the appropriate remedial actions have been taken.

XVII. SPILL CONTAINMENT PROGRAM

If a spill or release of hazardous materials occurs at the site, work will cease and access to the Site will be under the guidance of the Site Safety Officer. The spill area will be identified and made into an exclusion zone. All personnel on-site will be notified of the event and evacuated to an upwind location. An evaluation of the situation will be made in order to determine the identity of the released material, as well as the hazard to the public and on-site personnel. Emergency services will be notified immediately. The Project Manager will be notified immediately of the situation. The Project Engineer will also be notified immediately of the situation in order to allow implementation of protocols within their HASP. The spill or release may also require the notification of the NYSDEC Spill Hotline. All events will be documented in detail by the Site Safety Officer in the project field book.

Once the hazards associated with the release have been recognized, a decision will be made by the Project Manager to determine if sufficient equipment and trained personnel are available on-site to control the release. If the release cannot be controlled with the personnel and equipment available, no action will be taken until appropriate support is available.

Air monitoring will be conducted by the Site Safety Officer, upwind of the spill, in order to determine the hazards associated with the release. Personal protective equipment will be determined based on air monitoring results. If the material is unknown, Level B PPE will be the minimum level of protection utilized. If appropriate equipment is available, samples of the material will be collected by OSHA-trained personnel, and submitted to a certified laboratory for analysis. The Project Manager will review the documentation regarding the spill or release in order to determine if a similar release can be avoided in the future.

XVIII. LOGS, RECORD KEEPING AND INSPECTIONS

The Site Safety Officer will keep a field log in a dedicated field book regarding daily field activities. The daily log will also document equipment calibration that has occurred each day. Copies of the field book logs, or the entire field book, will be given to the Project Manager at the completion of the project for insertion into the project file.

The daily log will also document visitors to the Site. All personnel visiting the Site must check in with the HSO or designee for orientation and briefing of site hazards.

Accidents and incidents will be recorded on an accident/incident report included in Appendix B. The Health and Safety Officer is responsible for filling out the Accident/Incident Report.

The Health and Safety Officer may inspect the site at any time in order to determine if the HASP is being implemented correctly and to determine if the Contractor's personnel are utilizing safe work practices. During the inspection, the Health and Safety Officer will document his/her observations and make notes regarding any potential hazard not addressed in this HASP. Documentation generated during the site inspection will be given to the Project Manager for incorporation into the project file.

XIX. CONFINED SPACE PROCEDURES

A *confined space* is defined as a space that has all of the following features: it is large enough for an employee to enter and perform work; it has limited or restricted entrances or exits; and, it is not intended for continuous employee occupancy. A *permit-required confined space* is a confined space that poses any one of the following hazards: a potentially hazardous atmosphere; a potential for engulfment of an employee; and, an internal configuration, such as a tapered floor, which could cause an employee to become trapped.

A potentially hazardous atmosphere is one that could cause death, incapacitation, injury, acute illness, and impairment of ability to self-rescue, and includes one or more of the following:

a. Flammable gases, vapors, and/or mists in excess of 10% of Lower Flammable Levels (LELs);

b. Airborne combustible dusts in excess of LELs;

c. Oxygen deficiency (<19.5%) or oxygen enrichment (>23.5%);

d. Acutely toxic contaminants at concentrations greater than the Permissible Exposure Limits (PEL) or equivalent; and

e. Any other condition recognized as Immediately Dangerous to Life and Health (IDLH).

If access to a permit-required confined space is necessary in order to perform this project, the Health and Safety Officer must be notified in order that he/she may coordinate a proper permit-required confined space entry program under 29 CFR 1910.146.

APPENDIX A

SIGNATURE OF FIELD TEAM MEMBERS AND OBSERVERS

I have read and understand this Health and Safety Plan.

NAME	SIGNATURE	DATE

APPENDIX B

ACCIDENT/INCIDENT REPORT

NAME: ________________________________DATE: _____________________
EMPLOYER: ___________________________JOB TITLE: _________________
EVENT LOCATION & TIME: ____

****

EVENT DESCRIPTION: ____
____
____
____
____
TYPE: ___Physical ___Chemical ___Biological ___Other
INJURIES: ____
CONTRIBUTING ACTS/CONDITIONS: _______________________________________
____
MEDICAL TREATMENT/LOCATION & TIME: __________________________________
____
____

****

PROJECT MANAGEMENT REVIEW
CORRECTIVE ACTS TO BE TAKEN: ____
____
____

****

SIGNATURES:

____________________ ____________________ _____________________
EMPLOYEE PROJECT MANAGER HEALTH & SAFETY OFFICER

DATE:______________ ___________________ ______________________

APPENDIX C

CALIBRATION LOG SHEET

PROJECT NAME: ____________________
PROJECT NO.: ______________________

INSTRUMENT	DATE	COMMENTS

APPENDIX D

EXCLUSION ZONE SIGN-IN SHEET

NAME/COMPANY	SIGNATURE	DATE	TIME IN	TIME OUT

APPENDIX E

LIST OF ACRONYMS

ACGIH - American Conference of Governmental Industrial Hygienists
AOEC - Area of Environmental Concern
AT&T - American Telephone and Telegraph
CFR - Code of Federal Regulations
CHM - Certified Hazards Manager
CIH - Certified Industrial Hygienist
CL&P - Connecticut Light and Power
ConnDOT - Connecticut Department of Transportation
CPR - Cardiopulmonary Resuscitation
CTDEP - Connecticut Department of Environmental Protection
DEC - Direct Exposure Criteria
FID - Flame Ionization Detector
GA/GAA - a groundwater classification code
GA/GAA PMC - GA/GAA Groundwater Pollutant Mobility Criteria
GB - a groundwater classification code, GB is poorer quality than GA/GAA
GB PMC - GB Groundwater Pollutant Mobility Criteria
HASP - Health and Safety Plan
HAZWOPER - Hazardous Waste Site Operations and Emergency Response
HSM - Health and Safety Manager
HSO - Health and Safety Officer
I/C DEC - Industrial/Commercial Direct Exposure Criteria
IDLH - Immediately Dangerous to Life or Health
LEP - Licensed Environmental Professional
NIOSH - National Institute for Occupational Safety and Health
OSHA - Occupational Safety and Health Administration
PE - Professional Engineer
PEL - Permissible Exposure Limit
PID - Photoionization Detector
PPE - Personal Protective Equipment
ppm - parts per million
RCRA - Resource Conservation and Recovery Act
REL - Recommended Exposure Limit
RES DEC - Residential Direct Exposure Criteria
RSRs - Remediation Standard Regulations
STEL - Short Term Exposure Limit
TBA - To Be Announced
TBD - To Be Determined
TLV - Threshold Limit Value
TPH - Total Petroleum Hydrocarbons
TWA - Time weighted average

U.S. EPA - United States Environmental Protection Agency
VOCs - Volatile Organic Compounds
WPCA - Water Pollution Control Authority

APPENDIX E

Resumes

Mark S. Koellner, PG

PRINCIPAL,
ENVIRONMENTAL SCIENCES

EDUCATION

Bachelor of Science in Geology
Iowa State University, 1983

Masters of Science in Geology
Iowa State University, 1987

REGISTRATION

Professional Geologist: Pennsylvania

RELEVANT PROJECT EXPERIENCE

Due Diligence Audits on 10 Solid Waste Landfills, Various Locations, U. S.

Principal-in-Charge for due diligence assessments of ten solid waste landfills owned by a nationwide company, located across the United States, for submittal to a lending institution. Each facility was inspected, key site personnel interviewed and pertinent files technically reviewed to evaluate permit and regulatory compliance, known environmental concerns, and expansion potential. Summary and comprehensive project reports for all ten sites were prepared and submitted to the client in less than 30 days from project initiation.

Reserve Confirmation and Mine Permit Preparation for Construction Aggregates Producer in South Central Pennsylvania

Principal-in-Charge for an extensive core drilling and geologic analyses that were completed on a 200-acre tract of land to confirm the presence of limestone materials suitable for production of multi-purpose construction aggregates. After the resource analysis was completed, a mining plan for the site was designed, and an application for a permit to mine the resource was prepared and filed with the state environmental regulatory authority. The mine permit application involved erosion and sedimentation control plans, ecological impacts, hydrologic impacts and mine safety and operations plans.

Fuel Study for a Proposed Coal Waste Fired Co-Generation Power Plant, Northeast Pennsylvania

Principal-in-Charge for an international energy development to complete the evaluation of approximately 27 million tons of coal processing waste at four sites for use as fuel in a proposed fluidized bed co-generation power plant. The initial phases of the project included exploration strategy, logistics, testing specifications and site history research. This initial phase was followed by road access construction, arrangements for drilling using the reverse circulation hammer technique, aerial photographic review and drill site preparation. Upon completion of the initial phases, the waste piles were drilled, sampled, and tested. The fuel characteristics of each site were then described and the reserves were calculated using state-of-the-art AutoCAD software and graphics generation.

Mark S. Koellner, PG

CONTINUED

Delineation of Heavy Mineral Prospects, NC

Principal-in-Charge for this heavy minerals project that began with geomorphic and stratigraphic analysis of fall line terrain for the identification of suitable areas for titanium minerals and zircon concentrations for an international mining company. Following lease acquisitions, the most promising areas were auger-drilled and sampled. The samples were delivered to our mid-Atlantic testing laboratory in Harrisburg, Pennsylvania for analyses. Heavy mineral concentrations were extracted with specialized testing equipment and shipped to a titanium metal producer in Canada for further evaluation.

Hydrogeological Investigation of Industrial Sludge Land Application Project

Principal-in-Charge for the completion of a comprehensive hydrological investigation on an 800-acre tract of agricultural land used for the land treatment of industrial sludge. Activities included the installation of 24 monitoring wells, the excavation of approximately 50 soil pits, and the collection of many soil and water samples for chemical analyses. The objective of the investigation was to document site quality conditions and to modify the existing sludge application program. These modifications included the calculation of safe loading rates, the development of monitoring programs, and the filing of reporting documents with state regulators.

Completion of Subsurface Grouting Program at Limestone Quarry

Principal-in-Charge for a major aggregates producer that had approximately 12,000 gallons per minute of ground water entering their limestone quarry. The ground water inflow reached a point in time where the cost to pump the water had risen to an unacceptable level and threatened the financial life of the quarry. BL Companies was contracted to complete a grouting program to reduce the amount of water entering the quarry to an acceptable level. Initial work on the property included fracture trace analyses, field mapping, and dye tracer studies to locate likely positions of major ground water conduits. Drilling operations were completed to confirm the conduit locations and place the grout. Approximately 6,000 cubic yards of a cement/fly ash grout mixture were pumped under pressure into the voids. The effort resulted in an 80 percent reduction in the water entering the quarry and the operation was returned to a profit-making condition.

Phase I Environmental Site Assessments and NEPA Summary Reports Verizon Wireless

Principal-in-Charge for the completion of Phase I ESA and NEPA Summary Reports for 83 sites located throughout IL. The primary objective is to determine the effect the tower would have on historical, natural, and archaeological resources and to insure the client is in compliance with NEPA.

Mark S. Koellner, PG

CONTINUED

NEPA Summary Reports and Environmental Transaction Screens American Towers, Various Locations in Midwest and Northeast Regions
Principal-in-Charge of managing environmental services for over 50 sites in the Midwest and northeast regions in the completion of Environmental Transactions Screens and National Environmental Protection Act (NEPA) Summary Report for proposed telecommunication tower locations. The primary objective is to determine the effect the tower would have on historical, natural, and archaeological resources and to insure the client is in compliance with NEPA.

Ground Water Investigation of an Electronics Manufacturing Facility
Principal-in-Charge for this assignment to conduct a routine divestiture investigation of an existing electronics facility for a Fortune 100 company. During the investigation, significant amounts of chlorinated compounds were detected in both surface and ground water systems occupying the site. Subsequent investigative efforts included the installation of approximately 40 monitoring wells, the computer modeling of the local ground water system, the completion of a detailed source investigation using in-situ sampling and analysis techniques, and the installation of an interim soil and ground water remediation system.

Divestiture Investigation and Ground Water Remediation of an Industrial Facility, PA
Principal-in-Charge for this assignment to conduct a routine divestiture investigation of a 65-acre facility located in south central Pennsylvania for a Fortune 100 company. The primary objective of the investigation was to determine whether past industrial activities had a negative impact on the environmental quality of the site. The project was politically sensitive since the site was to be purchased as a campus by a regional public school district. The detailed investigation performed at the site addressed surface water, stream sediment, on-site soil profile, shallow overburden aquifer system, deep bedrock aquifer system, pump tests, ground water modeling, extraction well installations, and modifications to the on-site stripping tower system.

Pre-Acquisition Site Assessment for a Nationwide Commercial Real Estate Broker
Principal-in-Charge for the investigation of potential contamination on a commercial-industrial property. A nationwide commercial real estate broker who was investing pension funds evaluated the site prior to purchase. The project involved the completion of a Phase I Environmental Assessment, as well as the installation of ten soil borings and four ground water monitoring wells. Soil and ground water samples were collected and analyzed, and it was determined that no contamination existed above regulatory threshold limits. The property was acquired with minimal risk to the pension funds from environmental concerns.

Underground Storage Tanks Removal from a Large Mid-State Industry
Principal-in-Charge for this project involving the permanent closure of 11 underground storage tanks (USTs) at a large manufacturing facility. The project was divided into three phases that were completed over a 2-year period. The USTs were removed according to all applicable local, state and federal regulations. In addition, approximately 2,500 tons of contaminated soil was removed and disposed of off-site. Tasks completed as part of this project included a comprehensive ground water assessment at the site to determine whether the product, which leaked from the USTs, had impacted the local ground water system.

Bioremediation of Petroleum Contaminated Soil at a Manufacturing Facility
Principal-in-Charge for the on-site cleanup of approximately 1,500 tons of soil that had been contaminated with petroleum hydrocarbons from four leaking underground storage tanks. Initially, two landfarming "cells" were constructed on the site to prohibit contamination from leaching into the subsurface during remediation. The contaminated soil was then added to the cells and inoculated with bacteria and nutrients. The soil was tilled almost daily with a tractor-mounted rototiller. Analyses of soil samples collected at regular intervals indicated that the bioremediation was completed in two 7-week cycles. Upon completion of the remediation, the client received a complete release of liability from the state regulatory agency.

Restoration of a Commercial Office Complex Site Utilizing In-Situ Bioremediation to Remediate On-Site Soil and Ground Water
Principal-in-Charge for this project, which addressed the remediation of soils and ground water contaminated by a release of petroleum hydrocarbons from an on-site underground storage tank system. After detection of the leak, which was impacting a small stream and a major river, a ground water assessment was completed to determine the limits of the contaminant plume. Based on that information, a hybrid pump and treat/bioremediation system was designed to remediate the site so that it could ultimately be sold for full commercial value. The project took three years to complete and resulted in complete site restoration.

Advise Major Paper Company on Sale of Property to a Mining Company, GA
Principal-in-Charge on this project involving the technical review of exploration data developed by the potential purchaser (the mining company) and provided to the potential seller (the paper company, our client). Drilling records and laboratory testing were analyzed for compatibility with overall conclusions regarding grade and tonnage given by the mining company. The mineral deposit was also rated for mining feasibility so that the seller could assess the current offer in terms of other short- and long-term offers that might likely occur. The analysis resulted in the decision to accept the offer by the mining company.

Mark S. Koellner, PG

CONTINUED

Development of Industrial Water Supply

Principal-in-Charge for a water exploration study of plant property and the development of a water supply well field for a large industrial company that was in need of a new water supply. Fracture trace analyses and field mapping efforts were completed to locate promising future well positions. Preliminary drilling was completed to confirm the water producing potential of the local aquifers. Large diameter production wells were subsequently installed and pump tests performed. Computer models were used to analyze the pump test data and to predict the long-term safe yields of the new wells. Additional ground water modeling was completed of the property to identify which new wells would be hydrologically impacted by different areas of the plant site should an unexpected future release of a contaminating substance occur.

Karst Hazard Survey of Residential Area

Principal-in-Charge for this project involving a Karst Hazard Survey of an existing residential community experiencing sinkhole problems. The community was located in an area known for the frequent occurrence of large diameter sinkholes. Homeowners were concerned that the unexpected collapse of soil bridges overlying unknown sinkholes would threaten the stability of their houses and nearby schools. Several studies were conducted using surface geophysical techniques including ground-penetrating radar and resistivity to locate incipient sinkholes. Sinkholes found during the study were excavated and plugged.

Preliminary Lake Management Plan

Principal-in-Charge for the development of a preliminary lake management plan for a private lake association. Historical data and information pertaining to the lake were reviewed by our aquatic biologists to determine the source of potential management problems. In addition, a "User Survey" was prepared, distributed and analyzed by our staff to gain a better understanding of the types of activities that occur in the lake. A volunteer monitoring group was organized and trained to collect bi-weekly water samples so that seasonal changes in the lake's water quality could be closely monitored. All of this information was then summarized in a final report and used to develop specific lake management goals. Following the development of these specific goals, a 3-year management plan was implemented.

Wetland Delineation and Endangered Species Surveys along 21 Miles of Natural Gas Pipeline

Principal-in-Charge for the identification and delineation of all jurisdictional wetland habitats existing within a 21-mile pipeline right-of-way according to accepted state and federal techniques. This task involved the collection of vegetative, soil, and hydrologic data and the production of a wetland delineation report suitable for submission to regulatory agencies. In addition, BL Companies performed threatened and endangered plant surveys along this 21-mile pipeline corridor for two species of flora in coordination with regulatory agencies. The tasks in this survey included identifying potential habitat for the species of concern and performing field surveys during the flowering time of the species.

Wetland Delineation/Encroachment Permits

Principal-in-Charge for a wetland delineation that was conducted by BL Companies to accurately delineate the jurisdictional wetlands existing within a proposed residential development. During the field phase of the project, information was collected on the wetland hydrology, soil and vegetation. A report summarizing all of the field information, including a wetland delineation map, was prepared by our office and submitted to the client for use in the development of a final site plan. In order to construct an access road across a small stream in the development, BL Companies completed a Joint Permit Application, Environmental Assessment and Mitigation Plan.

Habitat Assessment and Benthic Macroinvertebrate Study

Principal-in-Charge for a local solid waste authority's annual benthic macroinvertebrate sampling, and to conduct the necessary biological assessments for a landfill expansion permit. The benthic study involved collecting, analyzing and interpreting data from four sampling locations within and adjacent to the landfill discharge. Data analysis and interpretation was completed using the Environmental Protection Agency's Rapid Bioassessment Protocols (RBPs). The U.S. Army Corps of Engineers "Wetland Evaluation Techniques (WET): Volume II Methodology" was used to evaluate the function and value of the wetland resources affected by the proposed expansion. Terrestrial habitats were evaluated using a modified version of the U.S. Fish and Wildlife Habitat Evaluation Procedures (HEP). All of the information gathered during these field surveys was clearly presented in a final report prepared by our office and submitted to the appropriate regulatory agencies.

Planting of a Wetland Treatment Facility

Principal-in-Charge for the provision of labor and materials required to construct a wetland treatment system at a Township Wastewater Treatment Facility. The specific tasks performed during this project included: obtaining plant and shrub material of the quality described in the design specifications; the preparation and planting of the treatment cells; and the maintenance and replacement of plant material as needed for a 1-year period after completion.

SUMMARY OF QUALIFICATIONS

Mark Koellner has more than 17 years of experience in the field of environmental engineering. He has extensive knowledge in virtually every facet of environmental engineering, including Phase I and Phase II Environmental Site Assessments, hydrogeologic investigations, underground storage tank management and bioremediation studies. As the Principal of the Environmental Sciences department, Mark oversees all investigations and remediations that BL Companies performs for clients.

Samuel R. Haydock, LEP, PG

Director, Northeast Environmental Operations

Experience/ Expertise Summary

Samuel Haydock has more than 16 years of experience in environmental and land-use consulting. His technical background includes designing and managing site characterization studies for contaminant investigations, design and management of site remediation and brownfields redevelopment projects, ground water exploration and development, water resource assessment and land-use impact evaluations.

Land-use impact studies have involved wetland studies, habitat evaluation, water budget analyses, assessment of impacts from development on natural and cultural resources, alternative and mitigation analyses, and preparation and submittal of local, state, and federal land-use permit applications. Samuel has conducted extensive mapping programs of surface and subsurface geologic/hydrogeologic resources.

Contaminant experience includes completion of Phase I, II, and III Environmental Assessments and Remedial Investigations (RI)/Feasibility Studies (FS), development of comprehensive site management/work plans, RCRA compliance, interfacing with regulatory agencies, landfill site studies, contaminant source detection/removal and design management of ground water and vapor recovery systems.

Education/ Registration

MS in Geology, University of Vermont, 1988
BA in Geology, University of Pennsylvania, 1984
40-Hour Hazardous Materials Handling, Health and Safety Training

Licensed Environmental Professional: Connecticut – No. 150
Professional Geologist: Kentucky
Certified Environmental Specialist No. 11625, Environmental Assessment Association
Professional Environmental Auditor No. 1001294104, National Association of Safety and Health Professionals (NASHP)

Relevant Experience

- **Downtown Derby Redevelopment, Derby, Connecticut**
  Supervised and managed an extensive Environmental Site Assessment (ESA) and Site Characterization study for the 22-acre Downtown Revitalization Zone (DRZ) in Derby Connecticut. This area of Derby Connecticut, south of Main Street and located at the confluence of the Housatonic and Naugatuck Rivers has long been considered the gateway to the Naugatuck River Valley. The competitive drive that powered the Naugatuck River Valley's rise to industrial prominence in the late 1800's – early 1900's led to the development of this area with factories and mills. The area currently consists of vacant lots, abandoned buildings, and some remaining industrial/commercial uses. A significant component, and one of the first steps, of the proposed redevelopment plan is to assess, remediate and remove the environmental impacts associated with the brownfield sites. BL Companies worked with the City of Derby and the Valley Regional Planning Agency to identify such environmental impacts, and to develop a remedial approach consistent and compatible with the proposed redevelopment plan for the DRZ. The scope of work included completion of a Phase I ESA and an extensive Phase II/III Site Investigation across the entire 22-acre DRZ. A preliminary Remedial Action Plan (RAP) has been prepared to achieve compliance with CT Remediation Standard Regulations, which will be revised and completed upon acceptance of the site redevelopment plan.

- **Downtown Torrington Master Plan, Torrington, Connecticut**
  Supervised and managed an analysis of the potential environmental liabilities and costs associated with a concept plan prepared for the redevelopment and revitalization of downtown Torrington. The Preliminary Environmental Assessment (PEA) included an area comprising approximately 100 acres within the downtown section of the city. The PEA identified and grouped properties as low, moderate, and high risk based on existing and past uses, current regulatory status, and applicability of the Connecticut Transfer Act. The PEA identified potential liabilities and a preliminary estimate of the potential costs to address impacts to soil and ground water with hazardous or regulated substances from current and historic use of the properties within the study area. Preliminary cost estimates for the abatement of hazardous building materials also were included in the PEA.

- **Bridgeport Landing, Bridgeport, Connecticut**
  Managed an analysis of potential environmental impacts and developed a Preliminary Remedial Action Plan for environmental compliance associated with the redevelopment of the Steel Point Peninsula in Bridgeport, Connecticut. The analysis included review of existing environmental studies and development of a preliminary approach for investigation and remediation to achieve compliance with the Connecticut Transfer Act and the Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulations. The analysis also included an evaluation of environmental impacts of the proposed redevelopment of the 50-acre peninsula, as required by the Connecticut Environmental Policy Act. Finally, the analysis included an evaluation of the permitting requirements and obstacles associated with redevelopment of the waterfront for public access and use as a marina, in the context of the CTDEP Office of Long Island Sound Program and the Connecticut Coastal Management Act.

- **Site Assessments / Characterization**
  Supervised the completion of more than 600 Phase I, II, and III Environmental Site Assessments (ESAs) on residential, commercial and industrial properties throughout New England, New York and New Jersey for individuals, developers, financial institutions, attorneys and municipalities. Developed standard protocols for Phase I ESAs, which meet or exceed ASTM and TASA guidelines.

- **NEPA/CEPA Compliance**
  Supervised and managed the completion of several Environmental Impact Evaluations required under the National Environmental Policy Act (NEPA) and state equivalents (Connecticut Environmental Policy Act, etc.) to evaluate potential impacts from State-sponsored urban redevelopment projects, HUD-sponsored Urban Blight Initiatives, highway and transportation improvement projects, and telecommunications tower facilities. Urban redevelopment impact studies have addressed such issues as exposure to pollutants, noise and air quality, impacts to sensitive resources, environmental justice, and socio-economic impacts. Tower siting studies have focused on Section 106 of the National Historic Preservation Act, impacts to parklands, archeological resources, and wetlands and habitat.

- **Land Use Impact Studies, Statewide, Connecticut and Vermont**
  Project Manager for many studies relating to the impact of development and construction to wetlands, rivers, upland streams, animal habitats, ground water and other sensitive receptors in Connecticut and Vermont. Tasks included field sampling, review of available published data, completion of permit applications, presentations at public hearings and interaction with state and local officials.

- **Brownfields Assessments / Redevelopment**
  Brownfields site assessments and redevelopment projects have been recently completed for the Cities of Ansonia, Bridgeport, Derby, Waterbury, and Torrington, and the Valley Regional Planning Agency. The Derby and Torrington projects have involved environmental analysis of large urban tracks with multiple owners and uses. Included was evaluating Connecticut Transfer Act and CTDEP RSR applicability and compliance at individual lots within the study area. Both projects involved establishing baseline conditions, risk analysis, public participation and relations, regulatory (CTA/CTDEP RSR) status, and options for remediation with associated costs.

- **Public High School, No. 2 Heating Oil Recovery System, Westbrook, CT**
  Supervised removal of 15,000-gallon UST and installation of No. 2 heating oil recovery system at a high school in Westbrook. Project tasks included removal of tank, free product in the tank grave, and oil saturated soils; design, installation and operation/maintenance of a combined ground water pump and treat/product recovery system. Upon recovery of free product, installation and operation of air sparging and vacuum extraction system was completed to treat dissolved phase contamination. Interaction with and permitting from both local and state regulatory agencies was required throughout the project.

- **Eveready Manufacturing Facility, New England**
  Directed the development of a site-wide management plan to deal with separate areas of solvent and heavy metal contamination in soil and ground water at Eveready's New England facility. Tasks associated with development of a site-wide management plan, which was approved by the State Department of Environmental Conservation, included determination of aerial and vertical extent of contamination and removal of contaminated soils (source areas); development of a ground water monitoring plan; and recommendation of ground water remedial options.

- **Remedial Investigation/Feasibility Study Assessment, New Jersey**
  Conducted a RI/FS assessment at a former OCF landfill in accordance with the New Jersey Department of Environmental Protection (NJDEP) approved work plan. The landfill contained Kaylo waste, which contained 12-14 percent asbestos and drums of unknown origin. Tasks associated with the assessment included: air photo evaluation; ground water monitoring well installation; ground water, surface water, surface soil and sediment sampling; and data evaluation and reporting. The investigation met the requirements of the NJDEP, demonstrated minimal impact to the environment and allowed OCF to proceed with cap placement and site closure.

- **Underground Storage Tank (UST) Removal / Remediation**
  Directed UST removal at over 25 sites. At leaking UST sites, directed impacted soil removal and confirmation sampling. At many sites, conducted hydrogeological assessment program to determine the extent of petroleum contamination in shallow ground water detected following UST removal. Typical assessment program includes installation of shallow and deep monitoring wells, collection of soil and ground water samples, preparation of geologic cross-sections, installation of free product recovery system, excavation and disposal of petroleum-contaminated soils, interaction with local regulatory agencies and the design of a ground water recovery system for aquifer restoration, as needed.

- **CT Department of Environmental Protection, Storm Water Permitting, Connecticut**
  Project Manager responsible for managing storm water permitting at several industrial sites in Connecticut. Project Management included budget development, client interfacing, storm

water sampling, data analysis and application submittals.

- **Cable Manufacturing Facility, North Haven, CT**
  Supervised full site characterization, remediation and post-remediation monitoring for a cable manufacturing facility. The project involved the installation of 32 shallow and deep monitoring wells, 22 additional soil borings and completion of an 81-point soil gas survey to delineate the source area and plume limits for PCE contamination. Upon removal of source area and completion of post-remediation ground water monitoring, provided LEP verification that the site was investigated and remediated in accordance with Connecticut Department of Environmental Protection Standard Regulations.

- **Construction Services, Various Locations, Connecticut**
  Managed environmental component of construction-related projects for the Connecticut Department of Transportation, the Bridgeport Water Pollution Control Authority and the City of Middletown. Services included pre-construction site characterization, development of work plans, development of Health and Safety plans, Health and Safety monitoring, and handling and disposal of contaminated materials. Assignments also included the treatment and discharge of contaminated ground water at sewer installation and highway improvement projects.

- **Geophysical Study, Torrington Landfill, Torrington, CT**
  Directed geophysical investigations using an EM-34 ground conductivity meter to detect leachate plumes and potential leachate migration routes at industrial (RCRA) and municipal landfills in Torrington, as part of landfill closure. Evaluated surficial soils and bedrock cores in conjunction with geophysical data to determine the potential for plume migration to nearby wells. Also, directed other geophysical investigations utilizing an EM-31 ground conductivity meter and ground-penetrating radar to detect buried metallic objects and underground storage tanks.

- **Harbor Road Bridge Replacement, Fairfield, CT**
  Environmental Manager during the permitting, design and replacement of the Harbor Road Bridge in Fairfield, Connecticut. This unique project involved the replacement of a two span historic bridge located at the confluence of the Mill River and Southport Harbor, and was complicated by the need to preserve a residence and office located in the middle of the river, between the two spans, and a stone dam and sluiceway constructed in the late 1800s and located beneath the bridge. Project planning included interfacing and coordinating with the Town of Fairfield, the ConnDOT, the Army Corps of Engineers (ACOE), and the local neighborhood preservation groups. Project tasks included identifying and surveying wetlands and sensitive habitat adjacent to and downstream of the bridge, sampling sediments in the work zone for the presence of regulated compounds, developing a sediment disposal work plan, preparing a CTDEP Structures Dredge and Fill Permit Application, preparing a ACOE Individual Permit Application, and developing a construction management plan to protect the wetlands and sensitive habitat.

Nicholas C. Tsacoyannis, CPG, LEP

Project Manager

Experience/ Expertise Summary

Nick has a strong background conducting site investigations to determine the extent and concentration of soil and ground water contamination. He has supervised the design and installation of treatment systems at petroleum release sites; managed routine operation, maintenance and environmental monitoring activities at remediation sites; and prepared air and water discharge permits; execution and analysis of pump, vapor extraction, slug and pneumatic slug tests. Nick has extensive experience with the State of Connecticut Department of Environmental Protection Underground Storage Tank Petroleum Clean-Up Fund.

Education/ Registration

BA in Geology, Hunter College, C.U.N.Y., 1987
40-Hour Hazardous Materials Handling, Health and Safety Training
24-hour Asbestos Inspector Training

Professional Geologist: Tennessee
Certified Professional Geologist: American Institute of Professional Geologists
Licensed Environmental Professional: Connecticut – No. 445

Relevant Experience

- **Underground Storage Tank (UST) Removal / Remediation**

Supervised/monitored UST removals at over 20 sites. Directed impacted soil removal and conducted confirmation sampling for closure activities. Managed Phase II and III investigations at leaking UST sites. Managed aquifer testing at release sites for remedial design.

- **Bedford Middle School, Westport, Connecticut**

Project manager for hydrogeologic study of proposed middle school site. Hydrogeologic study was related to complaints from neighbors that development activities in the area caused residential basement flooding. Study was also performed to determine subsurface site conditions related to proposed construction activities. Managed ground water monitoring program after construction of school to monitor groundwater levels at the perimeter of the site.

- **Wolcott, Connecticut**

Managed field operations for hydrogeologic site assessment at gasoline station. Project included installation of monitor well clusters, soil and groundwater sampling, interpretation of groundwater flow directions and gradients and permeability testing by pump and slug test methods.

- **Long Island, New York**

Performed borehole gamma-ray and resistivity geophysical logging of sand and gravel production wells for golf course water supply system. Interpreted screen setting and well design.

- **Fairfield and Ansonia, Connecticut**

Designed, managed and implemented dewatering operation for installation of underground storage tanks at gasoline stations, including groundwater treatment system, secured the necessary EPA, DEP and local permits, and conducted all field activities associated with environmental monitoring during the dewatering operation, tank removal and installation operation.

- **Stamford, Connecticut**

Project manager for subsurface investigation to determine extant of contamination related to underground storage tank operation. Activities included drilling of test borings, installation of overburden and bedrock monitoring wells and preparation of a report detailing remedial alternatives. Activities conducted in response to State Notice of Violation.

- **Durham, Connecticut**

Project manager for a specific phase of a hydrogeologic investigation at a Superfund Site to define source and extent of solvent contamination from industrial manufacturer. Project included monitor well installation in shallow, intermediate and deep aquifers, and soil and groundwater sampling.

- **Shelton, Connecticut**

Project manager for hydrogeologic site assessment at gasoline station. Project included installation of monitor wells, soil and groundwater sampling, interpretation of groundwater flow directions and gradients and permeability testing by pump and slug test methods.

- **Project Manager, Major Oil Company, Connecticut Sites**

Managed a portfolio of 81 gasoline service station sites. 30 of the sites had ground water impact for a major international gasoline marketer. Responsibilities included evaluation of quarterly monitoring data, budget management, and providing technical recommendations regarding investigation and closure assessments. Managed field personnel performing ground water sampling and site inspections. Assisted in applications to the Connecticut UST Reimbursement Board for the reimbursement of funds.

Carole A. Tomlins
The Data Quality Indicator & Associates, Inc.

AREAS OF EXPERIENCE/EXPERTISE

Interpretation of laboratory analytical data, analytical method design/evaluation, sampling techniques and design, project quality assurance/quality control, laboratory auditing, data validation/integrity/usability, and laboratory program management.

EDUCATION

MA in National Security (Concentration in Terrorism) – anticipated graduation date 2006;
American Military University
MBA (Global Management) - anticipated graduation date January 2008; University of Phoenix
BS (Biology/Ecology) 1986; State University of New York at Plattsburgh
AA (Chemistry) 1986; State University of New York at Plattsburgh
AA (Environmental Science) 1986; State University of New York at Plattsburgh
AA (Coral Reef Productivity); 1984/1985 and 1985/1986 State University of New York, Overseas Program in Oceanography – San Salvador, Bahamas

CERTIFICATIONS/REGISTRATIONS

USEPA Data Quality Objectives (February 1997)
USEPA Integrating Quality Assurance into Project Development (March 1998)
USEPA Orientation to Quality Assurance (February 1997)
EPA Region II Inorganic Data Validation (March 1995)
EPA Region II Organic Data Validation (October 1994)
OSHA 40-Hour Hazardous Waste Operations Safety Training
OSHA 8-Hour Supervisor Training
New York State Emergency Medical Technician (#137223)
Standard First Aid and CPR
PADI Open Water Diver (#87233839)
Hewlett Packard GC/MS Training (July 1993)
Restek's Capillary Chromatography Seminar (September 1992)
Hewlett Packard GC/MS and other hyphenated techniques (January 1991)

MEMBERSHIPS/POSITIONS

Appointed by the Dutchess County Legislature to the Board of Directors - Resource Recovery Agency
Business Advisory Council: Recipient of the 2004 Ronald Reagan Republican Gold Medal
Business Advisory Council: Recipient of the 2004 Businesswoman of the year (New York)
Member of the Mid-Hudson World Affairs Council (pending)
Poughkeepsie Area Chamber of Commerce

PROFESSIONAL SOCIETIES

American Society for Quality (member)

Courses Completed:
Basic Skills Used in Auditing

Internal Auditing Basics
Auditing Fundamentals I
Auditing Fundamentals II
Process Auditing Techniques

CONFERENCES

"Fecal Coliform Collection and Data Interpretation": Presented at the Mississippi Water Environment Association, Jackson, MS (June 2002).

PUBLICATIONS

"How to Hire an Environmental Testing Laboratory": Featured in *The Environmental Manager's Compliance Advisor* (Issue EM 559, January 21, 2002).

"Drinking Water Labs Face Stricter Regs- Recommendations to Improve Operations and QA/QC": Featured in *The Environmental Manager's Compliance Advisor* (Issue EM 566, May 6, 2002).

GENERAL EXPERIENCE

Environmental Laboratory

Performed laboratory analyses in Inorganic and Organic parameters, including classical chemistry, metals, volatiles, semivolatiles, pesticides, herbicides, and PCB analyses. Additionally, served in management and Quality Assurance Officer roles within laboratories.

A/E Engineering-Consulting

Performed the following: data validation and usability reports for State and Federal Programs, expert reports for purposes of litigation, on-site project specific laboratory audits, field sampling collection, and project design to meet discharge permit requirements, quality assurance manager, and company Data Quality Assurance expert.

DETAILED EXPERIENCE

2002 to Date The Data Quality Indicator & Associates, Inc.

- **Hudson River PCBs Site.** Assisted in the preparation of the Quality Assurance Project Plan for the Design Support Sediment Sampling and Analysis Oversight. Assisted MPI, EPA, and USACE with the following: document review of laboratory specific extraction/analysis SOPs for PCB homolog analysis; performed three separate on-site audits of the government oversight laboratory; and performed data validation of over 250 split sediment samples analyzed via EPA Method 680 using data validation guidelines developed by General Electric.
- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Pearl River and South Independent Stream Basins (Non-Contact Recreational Season – Nov-Dec 2000). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.

DETAILED EXPERIENCE (Continued)

- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Pearl River and South Independent
- Stream Basins (Contact Recreational Season – Sept-Oct 2001). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.
- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Yazoo River Basin (Contact Recreational Season – Sept-Oct 2001). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.
- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Pearl River and South Independent Stream Basins (Non-Contact Recreational Season – Nov-Dec 2001). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.
- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Yazoo River Basin (Non-Contact Recreational Season – Nov-Dec 2001). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.
- **Mississippi Department of Environmental Quality.** Contracted to evaluate Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Pascagoula, Pearl, Tombigbee, Big Black, Tennessee and Northern Independent Stream Basins (Non-Contact Recreational Season – Nov 2001-Feb 2002). Data assessment consisted of precision measurements and statistical examination of fecal coliform data.
- **Philips Lighting Company:** Contracted by Hampton-Clarke to review approximately 250 arsenic, lead, and mercury data to determine the health risk evaluation and environmental impacts. Data validation performed in accordance with EPA Region III - Innovative Approaches to Data Validation finalized June 1995.
- **Former Metal Finishing Corporation Site (Toa Baja, Puerto Rico):** Contracted to review total metals data in soil and groundwater to determine the health risk evaluation and environmental impacts.
- **Quality Electroplating Corporation Site (Toa Baja, Puerto Rico):** Contracted to review total metals, semivolatiles, and pesticide/PCB data in soil and groundwater samples to determine the health risk evaluation and environmental impacts.
- **City of Sacramento:** Contracted to assist in the preparation of a technical memorandum to investigate potential sources of cyanide contamination at WWTP within the City of Sacramento County, Ca.
- **New Rochelle:** Contracted to review classical chemistry and organic analysis on a quarterly basis to monitor environmental conditions in groundwater samples due to contaminated from Underground Storage Tanks.

DETAILED EXPERIENCE

1995 to 2002 Malcolm Pirnie, Inc.

- **Former Olathe Naval Air Station (NAS) Site Investigation (FUDS):** Responsible for data validation of more than 60,000 data records resulting from a site investigation of 32 areas of concern. Matrices sampled included soil, water (surface and groundwater), concrete, and sediment; analyses included volatiles, semivolatiles, metals, pesticides, PCBs, herbicides, total recoverable petroleum hydrocarbons, and water quality parameters. Duties included coordinating efforts of other data validators and writing/compiling final data validation reports for submittal to the client. Also developed a separate Quality Control Summary Report (QCSR) as part of data validation efforts. Validation was performed in accordance with National Functional Guidelines and qualifiers applied were those established by EPA Region VII.

- **Data Validation on Services at Aberdeen Proving Ground MD:** Responsible for technical review of third-party Contract Laboratory Protocol (CLP) data validation of analytical data from remedial investigations. Results from soil, sediment, surface water, and groundwater sampling were analyzed for metals, phosphorus, volatiles, semivolatiles, pesticides, PCBs, explosives, sulfur compounds, thiodiglycol, radiologicals, and IMPA/MPA. The validation was performed according to the U.S. EPA National Functional Guidelines with Region III modifications. More than 200 samples from four areas of concern were validated.

- **Quality Assurance Program Plan (QAPP) for Environmental Investigations at Fort Drum NY:** Task manager responsible for preparation and implementation of an installation-wide QAPP for all investigations expected to be performed at the Fort Drum military installation by all architect-engineers working at the site. The QAPP covers sampling of soil, sediment, surface water, groundwater, air, and dust, and analysis for metals, phosphorus, petroleum hydrocarbons, volatiles, semivolatiles, pesticides, herbicides, and dioxins.

- **Sampling and Analysis Services at Fort Drum NY:** Responsible for data validation of analytical data from sampling of soil, groundwater, sediment, pure product, dust, and paint chips. Data validation performed in accordance with U.S. EPA National Functional Guidelines with Region II modifications and adapted to New York State analytical protocols and SW-846 methodologies.

- **Laboratory Audits:** Responsible for auditing the technical capabilities and regulatory status of numerous Corps-validated analytical laboratories used for projects with the Kansas City, Baltimore, Philadelphia, and New York Districts of the Corps.

- **Quality Assurance Program Plan (QAPP) for Environmental Investigations at the Defense Personnel Support Center, Philadelphia PA:** Site Chemist responsible for preparation and implementation of a facility-wide QAPP for all investigations expected to be performed at the facility by all architect-engineers working at the site. The QAPP covers sampling of soil, sediment, surface water, groundwater, air, and dust/bulk for DDX analysis.

- **Merritt Smith Consulting:** Served as on-site consultant to evaluate laboratory facilities located in San Francisco Wastewater Treatment Plants; prepared a technical set of QA guidelines for labs to follow.

DETAILED EXPERIENCE (Continued)

- **Envirosource:** Performed a number of litigation support services for a hazardous waste landfill's lawsuit with the local government. Activities included review of laboratory files for accuracy of reporting and analysis, performing field studies on groundwater collected on-site to demonstrate that the presence of radiological parameters was associated with sediments and not the aqueous fraction of the sample, assisted in preparing and reviewing expert reports for the defendant, reviewed and commented on reports prepared by the plaintiff.

- **Naval Facilities Engineering Command, Northern Division:** Performed an Environmental Baseline Survey for the Prison Complex, which included data validation and evaluation of data associated with sampling events conducted to evaluate potential storage, release, or disposal of hazardous substances or petroleum products in or around the subject property.

- **Naval Facilities Engineering Command, Northern Division:** Performed an Environmental Baseline Survey for the Prison Complex, which included a survey covering all buildings associated with activities related to the prison complex area.

- **North East Ohio Regional Sewer District – Southerly WWTP:** As part of a long-term cyanide monitoring protocol of the plant influent and effluent, served as site chemist to evaluate and address cyanide analytical methods and concentrations. Developed and oversaw standard operating procedures for two different cyanide methods (EPA 1677 and SM 4500).

- **Quality Assurance Project Plan (QAPjP) for Fried Industries Superfund Site, New Jersey:** Site Chemist responsible for preparation and implementation of an work plans, which covered sampling of soil, sediment, surface water, groundwater, air, and dust/bulk.

- **Puerto Rico Aqueduct and Sewer Authority – Ocean Outfall for the Ponce Regional Wastewater Treatment Plant:** Quality Assurance Manager for all activities conducted as part of the 301(h) waiver decision developed to monitor the impact of the approved discharge on the marine biota. Responsible for the following: field and laboratory audits, oversight of field sample collection techniques, data validation, evaluation, and usability of biological and laboratory analytical data, review of subcontract agreements for all laboratory subcontractors on this project, and monitoring of overall quality of the project activities.

- **USACE, Baltimore District: Fort Drum RCRA Closure Building T-4819:** Served as site chemist for a RCRA plan closure of interim-permitted hazardous waste storage building. Performed data validation on floor rinsate, surface soil, and wipe samples (volatiles, semivolatiles, pesticides, PCBs, and metals) and provided usability summary of the data for the building closure.

- **New York City Department of Environmental Protection: Odor Control Design Evaluation for the Manhattan & Bronx Grit Chambers of the Wards Island Water Pollution Control Plant / Bronx NY.** Performed data validation, evaluation, and usability analysis of laboratory-generated data analyses submitted from sample collection of hydrogen sulfide (H2S) emissions study for off-site grit chamber facilities serving the plant. The data were used to develop H2S emissions estimates from various unit processes for use in developing building ventilation/odor control scenarios, and to evaluate potential off-site impacts using ambient air modeling. In addition, performed an on-site visit to laboratory facility to resolve laboratory data issues.

DETAILED EXPERIENCE (Continued)

- **New York City Department of Environmental Protection: VOC & Odor Emissions Studies at Dewatering Facilities / New York NY.** Performed data validation, evaluation, and usability analysis of laboratory-generated data analyses submitted from sample collection of odor control systems at Wards Island, Tallman Island, and Jamaica Water Pollution Control Plants. Building and process air entering and exiting the wet scrubbers and activated carbon vessels were analyzed for hydrogen sulfide, odorous organic compounds, VOCs, and ammonia. The efficiency and performance of the odor control systems were evaluated on the basis of the analytical data. In addition, performed an on-site visit to laboratory facility to resolve laboratory data issues.
- **New York City Department of Environmental Protection: Engine Emissions Studies / New York NY.** Performed data validation, evaluation, and usability analysis of on-site and off-site laboratory-generated data analyses submitted from sample collection of engine testing program at the Tallman Island and Coney Island Water Pollution Control Plants. Data analyses consisted of methods performed to determine the emissions of criteria pollutants and VOCs from internal combustion engines burning digester gas, natural gas, and diesel fuels. Testing results were used in Title V permitting development.
- **New York City Department of Environmental Protection: Kensico Flow Control Modifications – Aerator No. 2 (Delaware Aerator) / Town of Mt. Pleasant NY.** Prepared a Sampling and Analytical Plan (SAP) describing field tasks required to compete the Supply and Discharge Conduit assessment located at Aerator No. 2, Kensico, New York. The SAP outlined field activities, laboratory analyses, and control and disposal of contaminated materials.
- **NYC Transit Authority: Kingsbridge – Phase II.** Conducted a Phase II investigation of a vehicle storage lot to be acquired by NYC Transit. Prepared a Field Work Plan, over-sighted the direct push contractor, collected subsurface soil and groundwater samples, and validated analytical data. Assisted with preparation of findings report that summarized field observations and compared detected contaminant concentrations to state regulatory standards.
- **Puerto Rico Aqueduct and Sewer Authority: Title V Services for 14 Facilities / PR.** Performed data validation, evaluation, and usability analysis of laboratory generated data analyses submitted from sample collection of 12 wastewater treatment plants, 2 water treatment plants, and 2 maintenance facilities owned by the Authority. The data were used to evaluate the applicability of Title V regulations to each facility (major and nonmajor source status). In addition, performed an on-site visit to laboratory facility in San Juan, PR to resolve laboratory data issues.

- **Mississippi Department of Environmental Quality.** Responsible for evaluating Bacteriological data generated from sampling conducted at Targeted Pathogen TMDL Locations in the Pearl River and South Independent Stream Basins. Data assessment consisted of precision measurements and statistical examination of fecal coliform data.

- **USACE, Baltimore District: Remedial Investigation at the Skaneateles Weekend Training Site for the 77th Regional Support Command:** Served as site chemist performing laboratory coordination, site sampling, and data validation for activities related to historical release from gasoline underground storage tanks.

DETAILED EXPERIENCE (Continued)

- **USACE, Baltimore District: Remedial Investigation/Remedial Design, Hancock Field Army Complex:** Coordinated and assisted with soil, surface water, and groundwater field investigations. Performed data validation and data usability reports, and, prepared final investigation reports.

- **USACE, Baltimore District: Sampling and Analysis at Fort Drum:** Responsible for data validation of analytical data from sampling of soil, groundwater, sediment, pure product, dust, and paint chips. Data validation was performed in accordance with USEPA National Functional Guidelines with Region II modifications and adapted to NYS analytical protocols and SW-846 methodologies.

- **USACE, Fort Worth District: Fort Wingate Depot: Soil Background Investigation:** Served as site chemist for an investigation of background concentrations of 30 constituents in the surface soil at a 22,000-acre former munitions storage facility. Prepared Chemical Data Acquisition Plan, performed data validation of over 100 samples (total metals, total phosphorus, nitrate/nitrite, total kjeldahl nitrogen, ammonia-nitrogen, sulfate, and pH), and prepared the Quality Control Summary Report of that investigation. In addition, provided support regarding usability of the data to the USACE statistician.

- **USACE, Fort Worth District: Lone Star Army Ammunition Plant, G and O Pond Units – Affected Property Assessment:** Served as site chemist for a RCRA facility investigation to further characterize the G and O Pond Units. Prepared Chemical Data Acquisition Plan, performed data validation of over 200 samples (total recoverable metals, total metals, SPLP metals, cyanide, hexavalent chromium, TOC, TOX, phenols, explosives, volatiles, semivolatiles, nitrate, nitrite, sulfate, and chloride), and prepared the Quality Control Summary Report of that investigation.

- **USACE, Kansas City District: Brewster Wellfield Superfund Site: Groundwater Treatment and Design:** Performed a bench-scale study of viable treatability technology for groundwater softening. The study included the use of raw groundwater from the site in order to set up the bench-scale process. Rigorous sampling was conducted and field kits were used to assess design parameters.

- **USACE, Kansas City District: Sampling and Analysis at Fort Drum:** Project leader for a responsive sampling and analysis services project. The work consisted of: Proposal preparation for numerous sampling assignments; Coordination of field sampling personnel and analytical laboratory; Collection of samples for evaluation under RCRA and New York State guidelines for hazardous waste; and Analysis of chemical data and report preparation.

- **USACE, Omaha District: Former Glasgow Air Force Base: Remedial Investigation:** Evaluated analytical data collected during remedial activities at 16 former tank sites to evaluate the aerial and vertical extent of contaminated soils and groundwater, resulting from past use of the underground and aboveground storage tanks at the former tank locations. Performed data validation and usability summaries and prepared a Quality Control Summary Report for the USACE.

DETAILED EXPERIENCE (Continued)

- **USEPA, Region 2: Franklin Burns Superfund Site:** During the RI/FS, evaluated dioxin-furan groundwater data.
- **USEPA, Region 2: White Chemical Corporation Superfund Site:** During the RI/FS, evaluated dioxin-furan data.
- **USEPA, Region 2: ARCS Preremedial Program:** Compilation of the information/data gathered into a sire inspection prioritization (SIP) report for submittal to the USEPA. A recommendation was provided based on existing data stating whether the site needed further investigation.
- **USEPA, Region 2: ARCS Preremedial Program:** Performance of sampling activities which included the collection of surface soil samples to determine the absence or presence of contamination on-site.
- **USEPA, Syosset Landfill TMA Investigation:** On this controversial project, evaluated data to identify whether trimellitic anhydride (TMA) was being emitted from the Syosset Landfill, a former Superfund Site, and poisoning local residents. Worked with the EPA and OSHA to develop a modified protocol which could detect TMA at low levels. Assisted in the report preparation process.
- **City Of White Plains: Drum Investigation Activities:** Responsible for the following: define data quality objectives, procurement of certified laboratory, drum sampling, data validation and usability of analytical data, and preparation of final Report of Findings including recommendations to the NYSDEC.
- **City Of White Plains: Drum Removal Activities:** Removal of over 45 hazardous and non-hazardous drums. As task leader, responsible for the following: define data quality objectives, procurement of certified laboratory, prepared specifications for drum removal and soil removal activities, provided oversight of all field activities, pre and post excavation sampling, data validation and usability of analytical data, and preparation of final Report of Findings to the NYSDEC.
- **Central Contra Costa Sanitary District (CCCSD):** Cyanide Assessment: Served as chemist to evaluate and address cyanide analytical methods and concentrations within CCCSD's WWTP.
- **Cytec Industries: NPDES Permit Issues:** Evaluated usability of analytical laboratory data in accordance with the methods performed.
- **Stone & Webster Environmental Technology and Services: FUSRAP Maywood Superfund Site, PDI Work Plan: Preliminary Design Investigation Work Plan:** Twenty-four commercial and government properties, which potentially contained deposits of radioactive residues and/or hazardous chemicals in surface and subsurface soil. The PDI plan was developed to identify all data gaps and summarize the field activities necessary to acquire the additional information necessary to complete the remedial design action for each property. Site-specific information, including civil/property surveys, foundation designs, underground utilities, safety and logistical issues were examined. Radiological, chemical, geotechnical, and design gaps were identified. Properties were grouped into clusters and maps were prepared. To fill data gaps, specific methods and quantities of predesign data collection activities were developed for each cluster. Performed an RPD comparison study measuring reproducibility between the on-site and offsite laboratory data.

DETAILED EXPERIENCE (Continued)

- **New York City Department of Environmental Protection: Newtown Creek Water Pollution Control Plant Upgrade: Aquifer Pumping Tests:** Evaluated data collected from a series of aquifer pumping tests which were conducted at the former Exxon, Mobil, and Williamburg Steel sites.

- **USACE, Kansas City District: Fried Industries Superfund Site – Remedial Design Investigation and Conceptual Design:** Evaluated soil and groundwater data collected from areas of concern.

1994 EA Engineering, Science, and Technology

As Scientist II:

- **USACE, Baltimore District, Fort Drum NY (Gasoline Alley):** Responsible for preparation of Chemical Data Acquisition Plan in accordance with the USCOE's technical guidelines.

- **USACE, Kansas City District, Ellsworth Air Force Base NE:** Responsible for validating organic, inorganic, and miscellaneous analyses using the National Functional Guidelines for Organic and Inorganic Data Review.

- **USACE, Baltimore District, Fort Drum NY:** As field chemist, provided support during on-site investigation. Responsible for on-site laboratory setup, maintenance and troubleshooting, sample analysis, sample reporting, and data review and interpretation.

- **Idaho National Environmental Laboratory:** Responsible for preparing in-house data validation guidelines for polychlorinated dibenzo-p-dioxin (PCDD) and dibenzofuran (PCDF) analyses.

1990-1993 Pace, Inc.

- **As Gas Chromatography/Mass Spectrometry (GC/MS) Supervisor:** Provided technical training and support in areas of troubleshooting, data review, and spectral interpretation.

- **As GC/MS Volatile/Semivolatile Analyst:** Performed a wide spectrum of volatile and semivolatile analyses using state-of-the-art analytical instrumentation.

November 1987-March 1990 Nanco Environmental Services, Inc.

- **As Metals Analyst:** Performed analysis of heavy metals for diverse sample types including drinking water, groundwater, core samples, and soil samples.

June-November 1987 Institute of Ecosystem Studies
The New York Botanical Garden

- **As Research Assistant I:** Responsible for inorganic analysis of on-going acid rain study conducted on the Hubbard Brook Ecosystem samples using a wide range of analytical equipment.

APPENDIX F

Standard Operating Procedures

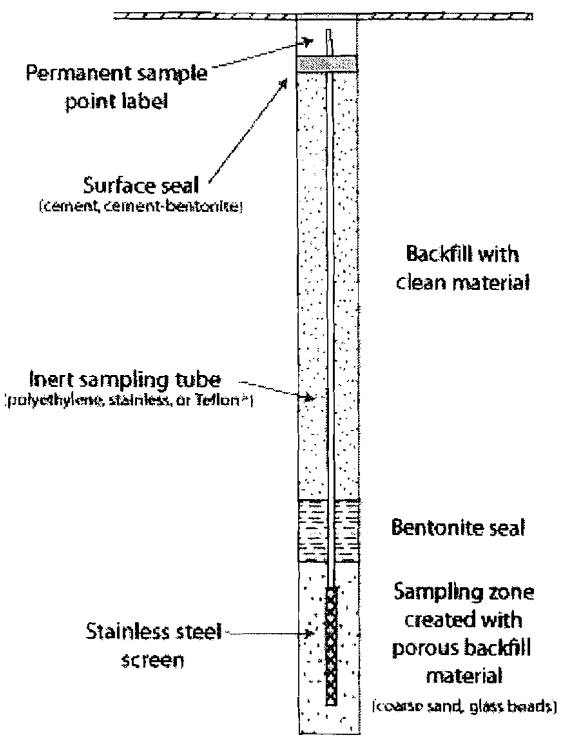
2.7.1 Soil vapor

Soil vapor probe installations [Figure 2.2] may be permanent, semi-permanent or temporary. In general, permanent installations are preferred for data consistency reasons. Soil implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

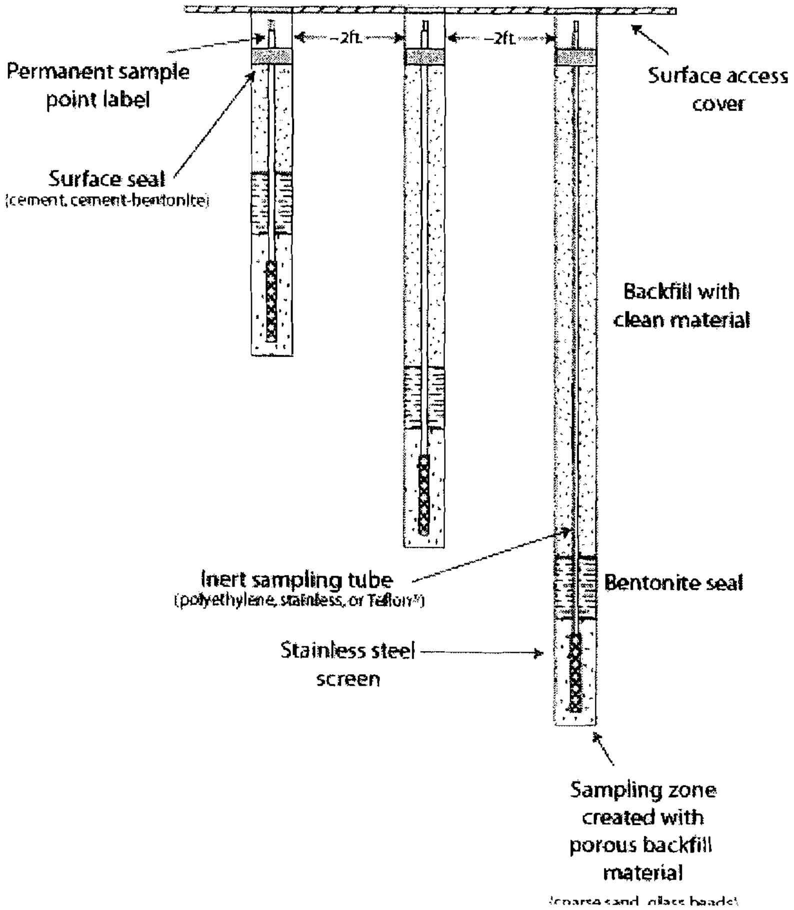
a. implants should be installed using direct push technology or, if necessary to attain the desired depth, using an auger;
b. porous backfill material (e.g., glass beads or coarse sand) should be used to create a sampling zone 1 to 2 feet in length;
c. implants should be fitted with inert tubing (e.g., polyethylene, stainless steel, or Teflon®) of the appropriate size (typically 1/8 inch to 1/4 inch diameter) and of laboratory or food grade quality to the surface;
d. soil vapor probes should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material;
e. for multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones; and
f. for permanent installations, a protective casing should be set around the top of the probe tubing and grouted in place to the top of bentonite to minimize infiltration of water or outdoor air, as well as to prevent accidental damage.

Figure 2.2 Schematics of a permanent soil vapor probe and permanent nested soil vapor probes

Permanent Soil Vapor Probe



Permanent Nested Soil Vapor Probes



Soil vapor samples should be collected in the same manner at all locations to minimize possible discrepancies. The following procedures should be included in any sampling protocol:

a. at least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;
b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling;
c. samples must be collected, using conventional sampling methods, in an appropriate container — one which meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), meets the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and is certified clean by the laboratory;
d. sample size depends upon the volume of sample required to achieve minimum reporting limit requirements [Section 2.9]; and
e. a tracer gas (e.g., helium, butane, or sulfur hexafluoride) must be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring) [Section 2.7.5]. Once verified, continued use of the tracer gas may be reconsidered.

When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

a. if sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;
b. outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor ambient air sample locations (if applicable), and compass orientation (north);
c. weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) should be noted for the past 24 to 48 hours; and
d. any pertinent observations should be recorded, such as odors and readings from field instrumentation.

The field sampling team must maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling depth,
d. identity of samplers,
e. sampling methods and devices,
f. purge volumes,
g. volume of soil vapor extracted,
h. if canisters used, the vacuum before and after samples collected,
i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
j. chain of custody protocols and records used to track samples from sampling point to analysis.

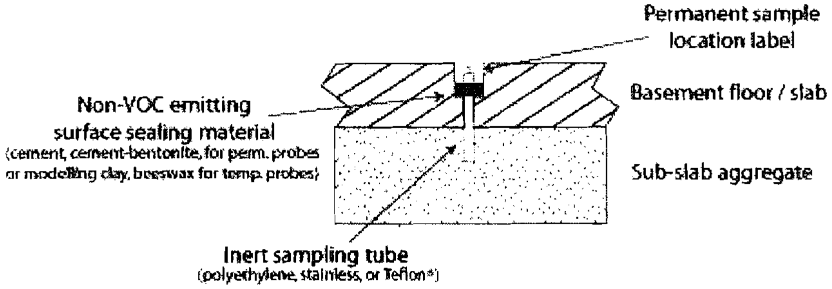
2.7.2 Sub-slab vapor

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 — 75 °F) for at least 24 hours prior to and during the scheduled sampling time. Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

Sub-slab vapor probe installations [Figure 2.3] may be permanent, semi-permanent or temporary. Sub-slab implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

a. permanent recessed probes must be constructed with brass or stainless steel tubing and fittings;
b. temporary probes must be constructed with polyethylene or Teflon® tubing of laboratory or food grade quality;
c. tubing should not extend further than 2 inches into the sub-slab material;
d. coarse sand or glass beads should be added to cover about 1 inch of the probe tip for permanent installations; and
e. the implant should be sealed to the surface with permagum grout, melted beeswax, putty or other non-VOC-containing and non-shrinking products for temporary installations or cement for permanent installations.

Figure 2.3 Schematic of a sub-slab vapor probe



Sub-slab vapor samples should be collected in the following manner:

a. after installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;
b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling; and
c. samples must be collected, using conventional sampling methods, in an appropriate container — one which meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation), meets the requirements of the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and is certified clean by the laboratory;
d. sample size depends upon the volume of sample required to achieve minimum reporting limit requirements [Section 2.9], the flow rate, and the sampling duration; and
e. ideally, samples should be collected over the same period of time as concurrent indoor and outdoor air samples.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. if sampling within a commercial or industrial building, uses of volatile chemicals in commercial or industrial processes and/or during building maintenance, should be identified;
b. the use of heating or air conditioning systems during sampling should be noted;
c. floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), and any other pertinent information should be completed;
d. if possible, photographs should accompany floor plan sketches;
e. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations (if applicable), compass orientation (north), footings that create separate foundation sections, and paved areas;
f. weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and

ventilation conditions (e.g., heating system active and windows closed) should be reported;

g. smoke tubes or other devices should be used to confirm pressure relationships and air flow patterns, especially between floor levels and between suspected contaminant sources and other areas; and
h. any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

The field sampling team must maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling depth,
d. identity of samplers,
e. sampling methods and devices,
f. soil vapor purge volumes,
g. volume of soil vapor extracted,
h. if canisters used, vacuum of canisters before and after samples collected,
i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
j. chain of custody protocols and records used to track samples from sampling point to analysis.

Table of Contents

BL Companies
Standard Operating Procedures

Revision Date: January 2001

Section 1. Statement of Purpose

This manual of Standard Operating Procedures (SOPs) has been prepared in order to provide employees of BL Companies a guidance document to utilize during certain field investigations. This document is intended for use by employees of BL Companies only, although material contained herein is considered to be standard in the business and represents the current trend of best available technology. New sections will be added as they become available.

The intent of this manual is to provide guidance on a broad range of field activities. The manual often suggests several ways to collect a sample, all of which may be scientifically correct under specific, varied, circumstances. All methodologies presented in this manual may not be applicable to specific site situations; a certain procedure, though included in the manual, may be disallowed, should it be inappropriate in a particular situation.

This manual has been prepared in an effort to represent the best available technology for field sampling activities of hazardous site investigations. Procedures outlined herein have been developed through extensive literature research, practical field application, and analysis of data from a quality assurance perspective. It is recognized that alternate innovative procedures are continually being developed. This document will therefore remain dynamic and will be updated to reflect the best current technology available.

Section 2. Quality Assurance/Quality Control

A. Introduction

This section of the manual provides the user with quality assurance requirements and procedures for conducting environmental measurement sampling episodes. In order to generate analytical data of known and defensible quality, adherence to established quality assurance protocol is necessary. This will ensure that samples obtained in the field are representative of the particular environment from which they have been collected and are of satisfactory quality and quantity to meet the project objectives.

The importance of the environmental sample collection process and associated analytical data is demonstrated through integration of this information into the decision-making process. All phases of site remediation rely on the provision of accurate analytical data. These phases include an initial site evaluation, remedial investigation and design phases, human and environmental risk assessments, determination of treatment effectiveness, remedial alternative selection and cost/benefit analysis, and finally, monitoring the results of the remedial action selected.

The following quality assurance requirements have been established to maintain sample integrity to as great an extent as possible and are applicable for most site investigations. Their prime objective is maintaining the physical form and chemical composition of the sample and preventing contamination from other sources or changes in contaminant concentration. To meet this objective there must be a measure of control over all sample handling procedures beginning with sample container cleaning procedures and ending with laboratory analysis. This section focuses on the first half of the control process; the procedures leading up to and ending with sample packaging and transport to the laboratory.

B. Sample Containers

Prior to the collection of a sample, consideration must be given to the type of container that will be used to store and transport the sample. The laboratory performing the analysis is usually responsible for providing proper sample containers. This selection is based on the sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. Selection of appropriate sample containers should also be based upon review of the criteria listed below.

1. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous materials, glass is recommended because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plastisizers to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of glass containers in an aqueous matrix, plastic bottles must be used for these types of samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used.

2. Volume of the Container

The volume of sample to be collected will be dictated by the analyses being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analyses. In most cases, the methodology dictates the volume of sample material required to complete the analyses. However, individual labs may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other quality control checks.

To facilitate transfer of the sample from the sampler into the container and to minimizes spillage and sample disturbance, wide-mouth containers are recommended. Aqueous volatile organic samples must be placed into septum vials. Non-aqueous volatile organic samples should be collected in the same type of vial or in wide-mouth jars provided by the laboratory.

3. Color of Container

Whenever possible, amber glass container should be used to prevent photodegradation of the sample, except when samples are being collected for metals analyses. If amber containers are not available, then containers holding samples should be protected from light.

4. Container Closures

Container closures should screw on and off the containers and form a leak-proof seal. Closures should be constructed of a material which is inert with respect to the sampled material. Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFF sheeting.

5. Decontamination of Sample Containers and Chain of Custody

Sample containers must be cleaned. The cleaning procedures are dictated by the specific analyses to be performed on the sample. The person responsible for cleaning the sample container should record the procedure used and initiate the chain of custody. This chain of custody accompanies the bottles during transportation to the field, sample collection, transportation back to the lab, analysis, and final disposal of the sample. The sample bottles should be prepared fro shipment accompanied by the chain of custody and the cooler or shuttle containing them should be custody sealed. When collecting a sample, sampling personnel should record the seal number associated with each sample shuttle or cooler and record whether the seal was intact upon arrival in the field. This assures the sample containers were not tampered with in the time between their preparation and their arrival in the field. After sample collection, the bottles again should be sealed into the shuttle or cooler and the seal number should be recorded. Upon arrival at the lab, the person receiving the sample should note the number and condition of the custody seal.

6. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the lab waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles, or coolers, and sample bottles themselves must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross contamination.

C. Decontamination of Sampling Equipment
(See Page 40)

D. Measures of Quality Assurance and Quality Control (QA/QC)

QA/QC samples are intended to provide control over the collection of environmental measurements and subsequent review, interpretation, and validation of generated analytical data. The various types of blank samples with related QA/AC concerns such as packaging, handling, preparation and actual procurement of samples from field locations are discussed below.

1. Trip Blanks

The primary purpose of this type of blank is to detect additional sources of contamination that might potentially influence contaminant values reported in actual samples both quantitatively and qualitatively. The following have been identified as potential sources of contamination.

- Laboratory reagent water
- Sample containers

- Cross contamination in shipment
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory
- Laboratory reagents used in analytical procedures

A trip blank consists of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. This water must originate from one common source and physical location within the laboratory and must be the same water as the method blank water used by the laboratory performing the analysis. Trip blanks should be handled, transported, and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, they just travel with the shipment or two day sampling event. Each sample matrices and associated blanks must be packaged in separate sample shuttles prior to shipment back to the lab. Trip blanks must return to the lab with the same set of bottles they accompanied to the field.

The purpose of a trip blank is to place a mechanism of control on sample bottle preparation and blank water quality as well as sample handling. The trip blank travels to the site with the empty sample bottles and back from the site with the collected samples in an effort to simulate sample-handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality.

2. Field Blank

The primary purpose of this type of blank is to provide an additional check on possible sources of contamination beyond that which is intended for trip blanks. A field blank serves the same purpose as a trip blank and is also used to indicate potential contamination from ambient air (field blank) and from sampling instruments used to collect and transfer samples from point of collection into sample containers.

A field blank is conducted using two identical sets of laboratory cleaned sample containers. One set of containers is empty and will serve as the sample containers to be analyzed. The second sets of containers are filled at the laboratory with laboratory demonstrated analyte free water (documentation to be made available upon request). This water must originate from one common source and physical location within the laboratory and must be the same water as the method blank water used by the laboratory performing the analysis. Field blanks should be handled, transported, and analyzed in the same manner as the samples acquired that day. At the field location, in the most contaminated area, this analyte free water is passed through clean sample equipment and placed in the empty sample container for analysis. (Note: It may be necessary for the lab to provide extra, full volatile organic vials to ensure sufficient volume of blank water to eliminate headspace.) The reason for performing field blanks in the most contaminated area is to attempt to simulate a worst-case scenario regarding ambient air contributions to sample contamination. Field blanks must be performed at a rate of one per day per sample matrix regardless of whether samples are shipped that day. Field blanks must return to the lab with the same set of sample bottles they accompanied to the field. Field blanks must be packaged with their associated matrix.

The purpose for field blanks is to place a mechanism of control on sample handling, storage, and shipment. The field blank travels and is stored with the samples, and is thereby representative of affects on sample quality. By being opened in the field and transferred over a cleaned sampling device (where applicable), the field blank is also indicative of ambient conditions and/or equipment conditions that may potentially affect the quality of the associated samples. When field blanks are required for samples collected directly into laboratory provided sample containers, the full set of blank water containers should be poured directly into the identical empty set of containers.

3. Analytical Requirements for Blank Samples

   a. Trip Blanks – Trip blanks for all matrices must be prepared and analyzed for volatile organics. If samples collected that day are not being analyzed for volatile organics or if other parameters are of concern, then the inclusion of a trip blank and selection of analytical parameters is at the discretion of the project manager.

   b. Field Blanks – Field blanks for all matrices must be analyzed for the same parameters as the sample collected that day.

It is important to note that both trip blanks and field blanks are only capable of determining that contamination of samples may have occurred from additional sources other than the actual environmental matrix being investigated and cannot identify, but may suggest, possible sources of additional contaminant contribution to the reported analytical values.

4. Additional QA/QC

   Additional parameter blanks may be required in specific cases.

   a. Method Blanks – Non-Aqueous Matrices - The use of solid method blank for volatiles and organic extractables is unacceptable to USEPA. Method blanks associated with non-aqueous samples should consist of laboratory demonstrated analyte free water (documentation available upon request) which is prepared and analyzed in the same manner as the samples.

   b. Duplicate Samples Obtained in the Field – Collection of duplicate samples provides for the evaluation of the laboratory's performance by comparing analytical results of two samples from the same location. Duplicate samples are to be included for each matrix at a minimum rate of five percent. If less than twenty-five samples are collected during a particular sampling episode, then one duplicated should be performed. Duplicate requirements may be waived depending on the particular regulatory program or remedial phase involved.

i. Aqueous Matrix

Duplicate of water samples should be obtained by alternately filling sample containers from the same sampling device for each parameter. Samples for volatile organics analysis from monitor wells should be filled from the same bailer full of water whenever possible and be the first set of containers filled. When other devices are used (bladder pumps), the vials for volatile organics should be alternately filled.

ii. Non-Aqueous Matrix

Obtaining duplicate samples in a soil or sediment matrix required homogenization of the sample aliquot prior to filling sample containers. Regardless, volatile organic samples must always be taken from discrete locations or intervals prior to compositing of mixing the sample. This practice is necessary to prevent loss of volatile constituents and to preserve, to the extent practicable, the physical integrity of the volatile fraction. Homogenization of the sample for remaining parameters is necessary to generate two equally representative samples. Moisture content, particle size, and adsorption properties of various soils, sediments, and waste materials may inhibit the ability to achieve complete mixing prior to filling sample containers.

c. Background Samples – When background samples are required for comparison of site conditions to the surrounding environment they should be collected and handled in the same manner as all other samples. Requirement for inclusion of background samples are determined on a program and/or case-by-case basis.

E. Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under two scenarios:

- Sample bottles are preserved at the laboratory prior to shipment into the field or,
- Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample was able to be collected, resulting in too much preservative for the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to the chemical reactions caused by the addition of sample liquids to pre-preserved bottles. Field sampling teams should always be prepared to add additional preservatives to samples if the aforementioned situations should occur. However, most preservatives will be added to containers prior to arriving at the site.

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Section 3. Documentation

Proper documentation of site activities is a crucial part of the field investigation process. The details of all activities whether part of the site inspection or a sampling episode must be recorded in the field log book. When samples are collected, additional documentation, in the form of chain of custody and sample analysis request forms, must be completed. Proper completion of these forms and the field log book are necessary to support the final work product. Documentation must be prepared to "stand alone" and be sufficient to prove that the evidence was gathered and handled properly. A case in a formal hearing or criminal prosecution often hinges on the evidence gathered.

A. Field Log Books

Field log books must be bound and have numbered, water resistant pages. Pertinent information regarding the site and sampling procedures must be documented. Notations should be made in log book fashion, noting the time and date of all entries. Information recorded in this notebook should include, but not be limited to, the following: name and exact location of site of investigation of interest; date and time of arrival and departure; affiliation of persons contacted; name of person keeping log; names of all persons on site; purpose of the visit; available information on site (processes or products, waste generation, nature of spilled material); composition and concentration of substance, if known; description of sampling plan; field instrument calibration information; location of sampling points (including justification); number of samples taken, volume of samples taken; method of sample collection and any factors that may affect its quality; name of collector; sample identification numbers; description of samples; weather conditions; and any field observations.

B. Documenting Sampling Points

Sampling points should be documented as to their exact location for purposes of future sampling. This is accomplished through the use of standard surveying methods. A stationary reference point should be chosen at each site from which all sampling points can be measured.

If a building or other stationary structure exists, its corner may act as a reference point. If no such monument already exists, it will be necessary to create your own. A stake or hub should be hammered into the ground to almost ground level to define the sampling point, making it difficult to remove and thus assuring its permanence. The stake should then be marked with flagging tape or fluorescent paint. When measuring the distance and direction of the sampling point, two points of reference are to be used. A traditional survey should be used for the locations and elevations, if needed, of the sampling points.

When establishing a sampling point, follow this procedure:

- When first establishing the sampling point, record the survey information from the stationary reference point to the exact sampling point in the field notebook.
- In the future, field investigating teams should have no difficulty finding the exact locations from which previous samples were taken when they are provided with the survey information

C. Photo-Documentation

Sampling points should be documented with photographs. Photographs taken to document sampling points should include two or more reference points to facilitate relocating the point at a later date.

Keeping a record of photographs taken is crucial to their validity as a representation of an existing situation. Therefore, for each photograph taken, several items should be noted in the field notebook:

1. Date
2. Time
3. Photographed by (signature)
4. Name of site
5. Job number
6. General direction faced and description of the subject taken
7. Sequential number of the photograph and the roll number

This information is to be transposed on the back of the print of the photograph. If video coverage of the investigation is required, a specific plan should be written for its use.

D. Sample Collection Paperwork

1. Sample Analysis Request

In order to assure that the proper analysis is performed on the samples, additional paper work may need to be filled out, as required by the lab performing the analysis and/or the regulatory agency involved. Such a form identifies samples by number, location, and time collected and allows the collector to indicate the desired analysis. This form should act as a supplement/confirmation to lab contacts made prior to the sample event initiation. This form should also allow the collector to record important information about sample matrix, collection techniques and field conditions at the time of collection.

2. Chain of Custody

When samples are collected for chemical analysis, additional documentation procedures are required. The Chain of Custody (COC) form is intended as a legal record of possession of the sample. The COC is initiated at the lab with bottle preparation and shipment to the site. The COC remains with the sample at all times and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and appropriate handling of the bottles and samples. When the form is complete it should indicate that there were no lapses in sample accountability.

The format of the COC forms may vary, depending upon the source of the sample bottles. The COC record is the form utilized to assure secure handling and transfer of samples.

Section 4. Subsurface Boring and Monitoring Well Installation Procedures

A. Boring Layout/Survey

1. Preliminary Boring Layout/Survey

Pre-location of all borings for each individual site investigation shall be determined by a boring location program. The borings will be located prior to any site activities.

The method preferred for preliminary location shall be a tape measure mark from known points, locations or structures to the proposed boring. Accurate field notes shall be kept as to any angle or distance measured in the field. Boring locations will be marked with one of the following:

- Steel spike with orange paint and survey tape
- Survey stake, painted and labeled, with survey tape indicator, or
- Survey hub stake, painted and labeled with survey tape indicator.

All road or concrete locations shall be marked by a paint dot. White paint shall be applied as a circle around the dot and the boring number painted next to the circle.

All other borings shall have a stake or hub driven into the ground surface. Stakes shall be driven a minimum of eight inches and hubs a minimum of five inches into the ground. Boring numbers should be put on the stake or hub, however, labeling survey tape is acceptable. The survey tape should be wrapped around the stake or hub and tied off. Ends of the stake or hub shall be painted orange for ease of visibility.

Once a boring is complete the stake or hub should be placed back in the boring for final survey location. Completed borings in a lot, street, or covered land surface should be repainted white, with a boring number also for final survey locations. Boring locations which become monitoring wells need to be remarked with white or orange paint. In addition, all borings and monitor well installations, well be assigned a vertical elevation based on a datum, obtained from a permanent bench mark.

2. Final Boring Survey

Field location of all borings and monitoring wells completed for each project shall be traditional ground survey methods.

A final "boring location plan" will be prepared showing the boring locations superimposed on an existing topographical map of the site area. The borings will have assigned horizontal locations and vertical elevations as determined by local survey standards.

The elevations will be taken on the tip of the inner well PVC casing. The actual point where the elevation is taken and assigned will be clearly and permanently marked.

B. Boring Program and Soil Sampling

1. Drilling

Augers shall be advanced by drilling through earth or other materials to such depth below the surface of the ground as required to maintain the sides of boreholes or as directed by the field inspector. Holes shall be advanced using hollow-stem auger flights capable of accommodating the applicable split spoon samplers. An inner rod-center plug assembly shall be used to prevent disturbed soil form entering the stem.

When the boring is completed, the soil cuttings shall be collected on a polyethylene sheet and the polyethylene sheet shall be folded over the soils so that the cuttings become temporarily encapsulated. The sheet shall be secured properly so it does not blow open. These soils shall remain encapsulated until the results of environmental laboratory testing are available. If the soil cuttings are contaminated, the disposal of the cuttings shall be by approved methodologies.

2. Split Spoon Sampling

Split spoon drive samples shall be obtained at intervals not to exceed five feet unless otherwise directed. At these points, advancement of the borehole shall be stopped, and all material removed from inside the casing or borehole.

Approved chopping bits, augers, or sampling spoons may be used for cleaning the casing or borehole prior to taking split spoon samples. The introduction of water into the borehole for cleaning or stabilization of hydrostatic imbalance is usually prohibited unless otherwise directed. If the use of water is approved, a sample will be obtained at the point of discharge into the borehole to assess the environmental impact from introduction of water.

The re-use of wash water will not be permitted except in unusual cases. The samples shall be obtained by driving a split tube sampler 24 inches into the undisturbed material below the bottom of the casing or borehole using a 140 or 300 pound hammer, having a 30 inch drop. The number of blows for each six inches of penetration and the weight of the hammer shall be recorded as well as a description of each sample recovered.

3. Soil Sampling

Soil samples will be characterized and field screened for volatile organic compounds by an organic vapor analyzer (OVA) as split spoon samplers are removed from the borehole. Samples will be collected and then sent to the office for log-in and depending upon the job further tested by a portable gas chromotograph or for storage until shipped to a certified laboratory. Trip and field blanks will be prepared and analyzed as a quality control check on field and laboratory procedure.

4. Decontamination

The steam cleaning of the drilling rig and equipment prior to set up at each individual borehole location is the usual method of decontamination used, thought manual scrubbing may also be used if directed. This cleaning shall include, but not limited to the drill rods, augers, casing, drilling table, Kelly bar, boom, wrenches and miscellaneous tools.

Steam cleaning locations and procedures shall be according to the site specific Health and Safety Plan. The steam cleaning set up will usually include, for example, a wooden pallet, a polyethylene sheet placed over the pallet and a sorbent boom placed around the pallet to contain any oils, grease, or other contaminants.

5. Grouting of Boreholes Upon Completion

All land boring holes shall be tremie filled with cement grout upon completion except those developed as monitoring wells. Back filling of boring holes is prohibited unless otherwise directed. Grout shall be a mixture of one 94-pound sack of Portland cement Type I or II and 8 gallons of water. The grout mixture shall be pumped into the bottom of the borehole through the drill rods until the return of grout is level with the ground surface. The boreholes will then be refilled with cement grout mixed at 94 pounds of cement to 6 gallons of water to ground surface within 48 hours of the initial grouting to alleviate any setting that may have occurred. All roadway borings shall be tremie filled in the same fashion and, if directed, the final capping shall be of the same material the roadway is constructed of.

C. Boring and Soil Description

Type of Method:

1. Drill rigs are positioned so the auger is over the pre-located boring location and the auger or casing is advanced through the earth or other materials. Measurements of thickness of the organic soil, concrete, or asphalt, etc. shall be made and recorded on the boring log.

2. The first sample recovery of borings of such a depth to require a drill rig are generally a minimum of one foot below ground surface (i.e. 1' – 3' below grade) then at intervals not to exceed five feet below grade (unless otherwise directed) to the end of the boring. All borings, monitor wells, and depths shall be pre-determined prior to the field work depending on each individual project.

3. At each sampling point, advancement of the borehole is stopped and all material removed from inside the auger or casing. It is not anticipated that water will be needed to clean the borehole or stabilize hydrostatic imbalance.

Samples shall be obtained by driving a split spoon 24 inches into the undisturbed material below the bottom of the borehole using a 140-pound hammer (or 300-pound hammer, as directed). Split spoons shall have a reliable check valve and a minimum inside sampling length of 24 inches and minimum inside diameter of 1-3/8 inches, the diameter of the split spoon is dependent on the amount of soil needed for lab analysis or the amount of recovered soil from previous split spoons. The number of blows for each six inches of penetration shall be recorded by the field inspector as well as a description of the soil.

D. Soil Descriptions

The following is a general outline of soil classification.

Soils Classification – When classifying the materials recovered by sampling operations the following general classes will be used:

- Coarse-grained soils – these soils are arbitrarily classed according to grain size.
  - Boulders – particles larger than 6 inches
  - Cobbles – particles varying in size from 3 to 6 inches
  - Gravel – particles varying in size from 2 mm to 3 inches
  - Sand – particles varying in size from .06 to 2 mm

- Fine-grained soils (inorganic)
  - Silt – a non-plastic soil which can be distinguished from very fine sand by the gritty texture always present in sands

  - Clay – an extremely fine-grained soil which exhibits plasticity when combined with water

- Organic soils
  - Organic silt – a tidal area deposit (gray to black in color) or fine grained particles and organic matter. If found with an admixture of fibers or roots, the classification is peaty organic silt
  - Peat – vegetable matter of very open structure, containing plant leaves, roots, and fibers in varying degrees of decomposition (dark brown to black in color)

- Fill – soils or materials deposited by man. Fill is identified by its composition, as follows:
  - Rubble, broken brick or concrete, building materials, etc.
  - Rock and rip rap
  - Garbage, ashes, or refuse
  - Cinders
  - Soil materials – sand, silt, clay, etc.

In describing the materials encountered or recovered during boring operations the field inspector should do their best to furnish clear, concise and exact description. Stick to technical terms which have an exact connotation, avoiding such lay terms as muck, meadow mat, rock flour, or topsoil. A good classification is one which will be understood by others both in the office and outside of our organization - use this test: A full description of a soil sample includes the following items:

- **Color** – is an indication of the degree of decomposition or oxidation of a soil. Frequently it also indicates the principle mineral constituent of the parent material. Color is described as the predominant color unless variation in shade is known to be significant.

- **Gradation** – sands and gravels are described in terms of coarseness giving the coarsest fraction first. The gradation terms used are coarse, medium, fine, and very fine. Gradation terms are used to describe any fraction more than 10% . If the range of gradation is wide, it is described as "well graded". If a predominant amount of the sample falls into a narrow range of gradation the sample is described as "uniform".

- **Material** – sample recovery is described as the principle constituent, qualified by the admixtures. If the admixture comprises 20 to 30% of the sample, and adjective is used to describe this material (i.e. silty sand, gravelly sand, etc.). If the material contains approximately equal amounts of two classes of soil, the term "and" is used (i.e. coarse to fine brown sand ad silt- the predominant material being sand). If the admixture is estimated at 1 to 10% it is described as "trace" (i.e. medium to fine red sand, trace silt).

- **Relative Density** – relative density is used in reference to coarse-grained soils. Generally it is estimated from the number of blows per foot required to drive a standard sampling spoon with a hammer falling 30 inches (the hammer weight shall be determined depending on field conditions, a 140-pound hammer is most common).

Relative Density	Blows/Feet
Very Loose	0-4
Loose	4-10
Medium	10-30
Dense	30-50
Very Dense	over 50

- **Laminated and Varved Soils** – because of their manner of deposition, fine-grained soils will frequently exhibit varves. During the glacier period when these soils were being deposited in fresh water lakes, the coarser-grained soils settled out during the spring thaw while the clay fraction remained in suspension until the water cooled the following winter. The result is a soil deposit of alternating thin layers of slit (or very fine sand) and clay. Varved soils frequently display disconcerting engineering characteristics (i.e. an extremely low superimposed load). Varves can usually be readily detected by shearing the sample in the vertical direction with a knife. When a varved soil is encountered, the field inspector should make a careful classification of the material on the Boring Report and also bring it to the immediate attention of the Soils Engineer.

E. Boring Logs

Concurrent with subsurface sampling operations, the field personnel will maintain an accurate log of borings including the following information as a minimum.

- Name and location of job
- Date of boring – start and finish
- Boring number and coordinate, if available
- Surface elevation, if available
- Sample number and depth
- Method of advancing sampler, penetration and recover lengths
- Type and size of sampler
- Description of soil sample
- Thickness of layer
- Depth to water surface; to loss of water; to artesian head; time at which reading was made
- Type and make of machine

- Size of casing, depth of cased holes
- Names of crewmen
- Weather, remarks

F. Monitoring Well Installation

Groundwater observation wells shall be installed and developed at certain borehole locations as pre-determined at each individual site. Drilling and sampling shall be as previously described.

1. Augers used to drill a standard well shall have a minimum I.D. of 3-1/2 inches for wells 2 inches in diameter. Larger diameter augers will be used, as directed, for larger diameter wells.

2. Solid PVC pipe shall be used to construct the well casing to the depths indicated in the site specific work plan. Pipe joints shall be flush screw-type couplings.

3. The well screen section shall be constructed using slotted PVC pipe, generally with .010-inch openings or as otherwise directed. The screen shall be installed to depths which correspond to a minimum of one foot above the existing groundwater interface and maximum of ten feet below groundwater, or as indicated by the inspector in the field. The bottom of the well shall be capped with a solid base.

4. Filter sand, with a size corresponding to the slotted well screen, shall be placed in the borehole to provide support for the well screen. In addition, the filter sand shall be carefully poured into the annulus spacing around the well until it has achieved a final elevation that is one to two feet higher than the top of the well screen or as directed by the field inspector. The filter sand shall be tamped from the surface, if possible.

5. Bentonite pellets or powder shall be placed and tamped into place above the backfill to create an impervious seal between depths of one to three feet.

6. A grout mixture (similar to that used for backfilling boreholes) shall be placed above the bentonite seal to the ground surface, to support the well cap.

7. A protective seal pipe cap with lock and key shall be set into the grout, as directed by the field inspector. If the well is located in a roadway, the steel cap shall be a flush-mounted road-box type. If in a landscaped area, the steel cap shall stick up above the ground surface less than two feet. The solid PVC well casing shall terminate within two inches below the top of the steel cap. Steel caps shall be painted fluorescent orange, and the

keys for each well shall be submitted to the field inspector and logged in the field book for future use.

8. Well development is generally accomplished by using the air surging method. In using this method, air must be pushed at no greater than 40 psi at the start to allow movement of water but prevent well blowout. Air pressure can generally be increased to a maximum of 60 psi. As air is forced down the center casing, the casing is lifted and lowered slowly to allow air to surge beneath the water column and force it to rise. Well development is normally complete after five or six volumes of water from the well have been removed. If a well has not been adequately flushed, development will need to be continued, as determined in the field by the inspector. Well water should be contained as best feasible by use of a T-joint or equal. Water shall be collected into mud tub and then removed as indicated, unless otherwise directed.

   Should an alternate development method such as an air lift pump or submersible pump be desired, the pump should be capable of being lowered into a minimum 2" I.D. well (usually a 1.66" O.D. pump is standard). In both cases, dedicated polyeurethane tubing is required. Water is lifted by the pump through the tubing, placed directly into a collection tank or drum, and discharged into one of the on site holing tanks. All equipment and methods for the development of monitoring wells shall be pre-determined prior to site activities, or as determined in the field by the inspector.

9. Water level measurements will be taken after time has allowed the water level to stabilize with a down hole water level indicator.

10. The top of the PVC casing will be surveyed for elevation.

Revision Date: January 2001

Section 5. Ground Water and Non-Aqueous Phase liquid (NAPL) Gauging in Monitoring Wells

A. Purpose: to determine the depth to water, NAPL thickness and well depth using reel meters.

B. Equipment:

1. Water Level Meter: Solinst electronic water level meter with 100 ft. plastic tape with divisions to 0.05 ft.
2. Interface probe: Keck Instruments with 200 ft. steel tape with oil resistant coating and divisions to 0.01 ft.
3. Total Vapor Analyzers.

C. Procedure:

1. Note the stick-up distance for the well so that the ground surface can be approximated. Note any signs of well/lock damage.
2. Open well and take off watertight seal. Place total vapor analyzer inlet over well and record detector reading. Concentrations above background require NAPL assessment.
3. Turn on interface probe or water level meter and check light/battery.
4. Lower the meter's probe into the well and note the distance to the water surface. Solid tone will sound for water with water level indicator and for NAPL with interface probe. Interrupted tone will sound for water with the interface probe.
5. Record well depth, static water level, and NAPL thickness. Note the reference point for measurements.

D. Reporting

1. All reporting will be completed on the "Water and Vapor Sampling Report Form" attached to this protocol.

E. QA/QC

1. Clean all equipment as per decontamination protocol.
2. Tapes should periodically be checked against new tapes for evidence of stretching. Any stretched tape should be discarded.

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Section 6. On-Site Measurement for Temperature, pH and Conductivity

A. Purpose: to determine field parameters temperature, pH, and conductivity on ground water samples collected from wells.

B. Equipment:

1. Markson Model 6099 pH meter.
2. pH electrode
3. YSI Temperature/Conductivity meter and probe.
4. Wide-mouth jar.
5. Calibration fluids (pH 4, 7, 10 buffer solutions, conductivity solutions)

C. Procedure:

1. Standardize equipment using calibration fluids. For pH, this entails standardizing meter with pH 7 and with either a pH 4 or pH 10 fluid. Various salinity/conductivity fluids can be used to calibrate YSI meter. Follow standardization procedures described in the operator's manual.
2. Transfer a ground water sample into a clean, wide-mouth jar.
3. Rinse pH electrode and conductivity probe with distilled water and shake off excess. Place pH electrode and conductivity probe into jar. Turn on meters and wait for stable readings.
4. Record readings. Temperature readings should be recorded quickly since temperature may shift from temperature in the well to temperature on the ground surface.
5. Thoroughly rinse probes with distilled water after sampling.

D. Reporting

1. All results will be recorded on the water sampling form.
2. Any problems with the meters will be recorded on the form.
3. The type of field analysis conducted will be reported on the form.

E. QA/QC

1. Calibration will be conducted in the field prior to any analysis.
2. Calibration fluids should be analyzed at least once during the day to check on any shift in the instrument calibration. This information should be recorded on the sampling form.

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Revision Date: January 2001

Section 7. Ground Water Purging

A. Purpose: To remove stagnant water and/or free product from wells prior to sampling. Note: if free product is present, it may be difficult to obtain a meaningful sample of the well water.

B. Equipment

1. Submersible or Vacuum Pump;
2. Hand Pump;
3. Bailer: various sizes;
4. Calibrated 5 gallon bucket.

C. Procedure

1. From water level data and well depth data, calculate the volume of water in the monitoring well. Record this information. Use table below for calculation.

Well Diameter: (Inches)	¾	1	1 ½	2	3	4	6
Volume per Foot of water (Gallons):	0.023	0.04	0.09	0.16	0.37	0.67	1.47
(Liters):	0.087	0.15	0.34	0.62	1.40	2.53	5.56

2. Purge at least three bore volumes before sampling, using either pumps or bailers.

3. Alternate method: If the well goes dry, allow sufficient time for well to recover, note the recovery time, and collect the sample.

4. Dispose of purge water responsibly. Take all precautions possible to ensure that purge water containing hazardous compounds remains on the site where it originated. If drums are available, place purge water into drums.

D. Reporting

1. Note the purging method, purging volumes, whether odors or sheens are observed, and all other pertinent observations on the water sampling form.

E. QA/QC

1. Clean all purging equipment between wells.

Section 8. Ground Water Sample Collection and Handling

A. Purpose: to collect representative ground water samples for chemical analysis to assess ground water quality.

B. Materials:

1. Nylon cord/rope.
2. Bailers: either dedicated PVC or stainless steel.
3. Sample containers: labeled.
4. Filtration apparatus/filters.
5. Coolers: various sizes.
6. Ice or refrigerant.
7. Bioinhibitor: concentrated hydrochloric acid, sodium bisulfite.
8. pH adjusters: nitric acid, sodium hydroxide

C. Procedure:

1. Following well purging, determine order of sample collection for various laboratory analyses. The preferred order of sampling is as follows:
    1. Volatile Organics (VOA)
    2. Total Organic Halogens (TOX)
    3. Total Organic Carb-on (TOC)
    4. Extractable Organics
    5. Total Metals
    6. Dissolved Metals
    7. Phenols
    8. Cyanide
    9. Sulfate and Chloride
    10. Turbidity
    11. Nitrate and Ammonia
    12. Radionuclides
2. Attach a clean nylon cord or monofilament to the bailer and carefully lower it below the surface of the water.
3. Withdraw bailer and fill containers.

4. Field Filtering:

Field filtering procedures and/or the addition of chemical preservatives to water samples are dependent upon the special requirements of each sampling project. If field filtering or pH adjustments are indicated in the sampling instructions for a project, consult with the project manager or the RCRA Ground Water Monitoring Technical Enforcement Guidance Document for Proper Procedures.

5. Preserve sample if necessary; use appropriate acids/bases or bioinhibitor as a sample preservative as per project manager's instructions. The following preservatives are suggested:

Parameter	Preservative
Volatile Organics	Cool 4^0C acid*
Semi-volatile Organics	Cool 4^0C acid
Pesticides	Cool 4^0C
Oil and Grease	Cool 4^0C/acid
TOC/TOX	Cool 4^0C'
Dissolved Metals	Filter, nitric acid**
cr+o	Filter, cool 4^0C
Total Metals	Nitric acid
Hardness	Filter
Nitrate	Cool 4^0C
Alkalinity	Cool 4^0C
Chloride	None
Fluoride	Cool 4^0C
Cyanide	Sodium Hydroxide
Phosphate	Filter 4^0 C
Coloi/turbidity	Cool 4^0 C
Bacteria	Cool 4^0C
Radon	4^0C
Gross Alpha	Nitric Acid
Gross Beta	Nitric Acid
Gamma	Nitric Acid

*One drop of concentrated hydrochloric acid. (Zero headspace)
**Nitric acid should be added after filtering.

6. Decontaminate sampler/bailer.

7. For tap samples from domestic wells, choose a sampling point before any water filters/softeners. Remove the aerator if there is one. Open faucet and allow well to purge for ten minutes, note purge time on water supply sampling record.

8. For surface water/springs, collect samples with appropriate containers. The container should be plunged down into the water with the container positioned into the stream current. If the water is static, the container should be moved away from the sampler's body.

D. Reporting

Note the sampling method, location, whether odors or sheens are observed, and other details on the water sampling form and the time of sampling on the chain of custody form. Note well specifics for domestic water well sampling on separate form (attached).

E. QA/QC

1. Fill out chain of custody accurately; call Project Manager if you have questions.

2. Transfer sample custody to the lab or to a transporter from a lab. Transfers must be carefully documented with signatures, times and dates.

3. Chain of custody must be maintained until completion of analysis and reporting of the results.

4. Project Managers are responsible for completing the following sections of the chain of custody:

   Project Name
   Project Location
   Project Manager
   BL Companies Job Number
   Analysis Status
   Equipment Borrowed
   Sample ID
   Sample Matrix
   Preservation
   Analysis Requested
   Quote Status (if used)

5. The field technician is responsible for completing the following information on the chain of custody:

   Date
   Time
   Containers
   Relinquished by
   Make adjustments to the form reflecting work actually done.

6. Prepare blanks as per Project Manager's instructions, if requested. The following quality control samples should be prepared with distilled organic free water as follows:

    a. Prepare trip blanks by filling sample containers prior to going into the field. They are not opened in the field but are carried with the environmental samples in the sample cooler.

    b. Prepare field blanks by pouring distilled, organic free water from a clean container into a clean sample container in the field at the time of sample collection.

    c. Prepare equipment blanks in the field. They are prepared following decontamination by pouring distilled, organic free water into the bailer and, to the greatest extent possible, are processed as if they were environmental samples.

7. Spiked samples and duplicate samples can also be prepared for checks on laboratory accuracy.

F. References

EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD): EPA #OSWER 9950-1.

Garrett, Peter., 1988, How to Sample Ground Water and Soils: National Water Well Association, Dublin, Ohio.

Section 9. Hydrocarbon Vapor Analysis with Total Organic Vapor Analyzers

A. Purpose

Use of hydrocarbon vapor analyzers in sampling serves two purposes: protection of worker health, and screening of environmental samples to determine the approximate volatile hydrocarbon concentration. Environmental samples include soil, water, and air samples.

B. Equipment

1. Photoionization Detector (PID): Photovac Instruments TIP 11; MicroTIP photoionization detector. Both instruments equipped with 10.6 eV lamp.
2. Flame Ionization Detector (FID): Thermoelectron Instruments Model 710. Equipped with hydrogen fuel tank.
3. Calibration Gases: for PID, 100 ppm isobutylene is used. For FIP, 10 ppm methane is used.
4. Tedlar bags: used for calibration gases and soil gas sampling. Various sizes (with septum ports) are used.
5. Battery Pack: Lead/Acid (Gel Cel) battery pack provided by Photovac for use with the PID.
6. Containers: can include "Ziploc" bags, Mason jars, or other containers depending on sample application.

C. Procedure

1. Record the code number, serial number and other identifying information of the instrument (type of detector, energy levels of lamps, etc.).
2. Check the instrument battery and/or battery pack to verify that it is fully charged.
3. Turn on the instrument and detector allowing a minimum warm-up time of five minutes.

4. Connect and/or insert probe into calibration gas vessel.

5. Set the instrument to the appropriate scale and adjust meter read-out to the value specified for the calibration gas used.

6. Switch from the calibration gas to zero-air (hydrocarbon free) and verify that the meter reads zero; if not, it should be adjusted to zero.

7. Alternately record instrument meter readings, at least 4 times, using the calibration gas and zero air. For each measurement, the time R takes to reach 98% of the stable reading should be noted.

8. Once calibrated, the instrument is ready for analysis. When time permits, the Polyethylene Bag Method (Robbins et al., 1989) is preferred for soil and water screening. However, sampling methods can be altered for customized analyses. See Mass DEP procedures for alternative strategies.

9. Connect probe to sample container and monitor detector response. Record the highest stable reading relative to background reading.

10. Disconnect probe. Let detector reach background levels prior to analysis of next sample.

D. Data Recording/Documentation

All data are recorded on the attached form. Background information is accurately recorded. Sample ID and possibly sample depth are recorded with corresponding background response and detector response. Important comments describing sample location, stains and odors on samples, instrument problems or other pertinent information are also recorded.

E. QA/QC Procedures

1. Calibration should be conducted in the field prior to use. The instrument should be recalibrated at least one additional time during a day of field screening.

2. All results of calibrations should be recorded along with sample readings on the reporting form.

3. Equipment blanks should be tested as necessary.

F. References

Photovac, Inc., (1986); TIP 11 Users Manual Photovac International: Huntington, NY.

Thermo Electron, (1988); Model 710/712 Operations Manual.

Robbins, G. A., Bristol, Robert D., Roe, Valarie D. (1989). A field screening method for gasoline contamination using a polyethylene bag sampling system, Ground Water Monitoring Review, P. 87-97.

Massachusetts DEP, (1989), Management Procedures for Excavated Soils Contaminated with Virgin Petroleum Oils Policy #WSC-89-001.

TOTAL VAPOR ANALYSIS REPORTING FORM:

Client: ____________________ Job No.: __________
Site Location: ____________________
Date of Sampling: ____________________
Instrument Used: ____________________
Purpose of Sampling: ____________________
Date of Instrument Calibration: ____________________
Field or Office Screening: ____________________
Temperature: ____________________

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Section 10. Inspection During Test Pit Investigations

A. Purpose: to determine subsurface characteristics of overburden sediments for contaminant investigations or to subsurface disposal system designs, or to investigate anomalies identified during geophysical studies

Note: BL Companies utilizes qualified excavation subcontractors for soil/sediment investigations using accepted methods. BL Companies personnel work with these subcontractors to collect appropriate samples. BL Companies supervises and directs the subcontractor throughout the investigation.

BL Companies is responsible for accurately describing subsurface conditions, collecting and screening subsurface sediment samples and documenting that test pits were completed according to BL Companies specifications.

B. Equipment

1. Decontamination equipment
2. Sample containers: labeled
3. Coolers for sample storage/transport
4. Handlens (optional)
5. Munsell color chart (optional)
6. Grain size chart (optional)
7. Field screening equipment (see FS protocols)
8. Disposable sampling spatulas
9. Camera (optional)

C. Procedure

1. Show sub-contractor the test pit location. Locations should be determined by the project manager prior to site work or modified base on filed observations by BL Companies personnel. Potential test pit locations will either be marked with white paint on asphalt or with a white-tipped stake as per Connecticut DIG-SAFE regulations.

2. Visually describe and record the observations type(s) of soils or anomalies within the test pit, including the following information:

    a. soil color; use Munsell color charts if necessary;

    b. grain size; use grain size charts if necessary;

    c. composition of grains; use handlens if necessary;

    d. any layering in the test pit;

    e. any presence of water relative to the overburden water table surface;

    f. signs of soil staining or contamination;

3. Collect samples as per specification or field personnel discretion.

4. Screen sample for volatile content as instructed in field screening protocols.

5. Collect representative sample: using disposable soil spatula, collect sample from each sediment type exposed in the spoon. Transfer sediment to an appropriate sample container. Label the container with appropriate designation.

6. Decontaminate sampling equipment, if scheduled for reuse.

D. Reporting

1. Reporting will be completed on a standard test pit log or in an approved field book. Logs or notes are to be completed in the field and copied/proofed in the office following the completion of the field activities.

2. Make measurements relative to surveyed locations or easily identified landmarks.

3. Optional: Photograph significant findings and location of test pits.

E. QA/QC

1. Clean all equipment that contacts contaminated soil or ground water as per decontamination protocol.

Section 11. Field Decontamination of Equipment

A. Purpose: to decontaminate field equipment including soil samplers, soil-gas probes, ground water samplers and pumps.

B. Equipment:

1. Garden hand sprayers.
2. Rigid brushes.
3. Buckets or other decontamination vessels.
4. Alconox: non-phosphate detergent solution.
5. Acid Rinse: 10% nitric or hydrochloric acid solution from reagent grade nitric/hydrochloric acid and dionized water.
6. Solvent Rinse: Pesticide grade isopropanol, hexane, or methanol.
7. Tap water rinse: from uncontaminated source.
8. Dionized Organic Free Water Rinse: organic free reagent grade or equivalent.
9. Inert wrap (plastic or aluminum foil).

C. Procedure

1. Dismantle field equipment: take apart bailers in sections, empty out all water from bailers, take apart samplers.
2. Wash equipment with detergent solution (Alconox) and rinse with dionized water.
3. Scrub all accessible sample-contacting surfaces.
4. Rinse with acid desorbing agent (this step may be deleted if samples are not to be submitted for inorganic analysis).
5. Rinse with tap water.

6. Rinse with solvent desorbing agent (this may be omitted if samples will not undergo organic chemical analyses).

7. Rinse with dionized or distilled water.

8. Allow equipment to air dry prior to next use.

9. Wrap equipment with inert material for transport.

D. Reporting

1. Note all cleaning methods on the appropriate sections of the water sampling report form.

E. QA/QC

1. Equipment blanks may be requested by the project manager to document the effectiveness of field decontamination.

2. All cleaning materials/fluids should be appropriately handled on-site.

F. References

ASTM # D5088-90, 1990, Standard Practice for Decontamination of Field Equipment Used at Non-radioactive Waste Sites. Annual Book of ASTM Standards, Philadelphia, PA.

Garrett, Peter, 1988, How to Sample Ground Water and Soils., National Water Well Association, Dublin, Ohio.

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Section 12. Collection of Surface Soil Samples

I. Purpose

To insure a standard procedure for collection of surface soil samples for the identification of chemical parameters.

II. Scope

The following procedure describes the logistics, chain-of-events, collection techniques, and documentation requirements for collecting surface soil samples designated for chemical analysis.

III. Responsibility

Project Manager – First
Field Chemist, Geologist, or Engineer – Second

IV. Supporting Procedure

Sample Chain of Custody Procedure

V. Required Forms

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington

VI. Procedure

A. Selection of Sampling Locations

The selection of sampling locations in and around a project site will be based on a review of existing site data, the site topography and surface features, results of preliminary site surveys using portable geophysical and air monitoring equipment, and the initial estimates as to the extent of and migration pathways of the waste present. At the start of the investigation, a number of surface soil samples are usually allocated. Only after initial field reconnaissance are the final locations selected. At a minimum, the following should be included as sampling points:

- Upgradient soil surfaces to determine background levels.
- Soil surfaces within the immediate area of contamination.

- Downgradient soil surfaces to determine any spread of contamination resulting from storm water runoff.

Sampling locations may be selected in the following areas at the site:

- Areas where chemicals may have been stored, handled, or disposed.
- Areas where motor vehicles hauling chemicals may have traveled on the site.
- Areas where water may have ponded during storm events.

B. Equipment List

The following is to be considered a minimum listing of required field equipment for collecting soil samples. Other tools required for accessing soils beneath paved area, etc. should be included when necessary.

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Sample container – 1 each 1-liter glass jar with Teflon-lined cap.
- Teflon coated or stainless steel sample spoons.
- Wooden stakes and spray paint (highly visible).
- Field notebook.
- Sample bottle labels.
- Chain of custody forms.

C. Order of Samples

Surface soil samples should be taken in all locations prior to all other site sampling events. This is to prevent the possibility of cross-contamination between sampling points by site personnel or equipment (backhoe, drill rigs, equipment vehicles, etc). For consistency with other sampling programs, the upgradient samples should be collected first.

D. Location and Collection of Samples

Surface soils, depending upon the contaminants of interest, can be either individual or composite samples. Composites represent samples taken from a number of individual locations which are equally blended to form a sample representing a larger area. Certain state agencies are discouraging the use of composite samples when looking for aromatic volatile and halogenated volatile organic components because of dilution and the difficulty of forming a "true" composite. Therefore, prior to sampling, the use of composites should be checked with the agency which will have final approval of actions regarding a site in which surface soil samples are used in developing certain actions regarding clean up.

If statistical techniques are to be employed in collecting surface soil samples using a random grid, the procedure provided in Chapter 5 of Methods of Soil Analysis, Part I by C.A. Black et al, American Society of Agronomy, Academic Press, N.Y. 1965 and Section I of EPA-SW 846 Test Methods for Evaluating Solid Waste.

Once the general locations have been chosen, sampling can begin. Normally a sample representing the top 3 to 6 inches of soil is taken. Samples are collected using a dedicated, pre-cleaned stainless steel or Teflon spoon and immediately stored in the glass jar. Organic debris (i.e. leaves, twigs, bark) along with large pieces of gravel should be avoided. The sample should be representative of the area soil; it is best represented by the finer grains of the topsoil. The jars must be filled completely so as to avoid creating head space where volatiles may escape. After each jar is filled the threads should be wiped clean so that the cap can be threaded on without creating an air gap.

Latex or rubber gloves should be worn to protect the sampling person and to avoid cross contamination through handling.

All filled jars must be labeled with the following as a mininimum:

- Project number
- Sampling time and date
- Sample number
- Analysis
- Collector's initials

The sample chain of custody form is then immediately filled out and kept with the sample. The sample is then stored in a refrigerated container until delivery to the analytical lab.

The location, depth of sample, sample type, time of sample, and other associated data (i.e. organic vapor readings, color of the ground, odors, texture, etc.) will be documented in the field notebook when the sample is taken. If sampling is performed under a paved area or in fill, a description of these unique areas will also be included.

E. Sample Verification

After each sample of soil is taken, an indicator should be used to mark the location in the event it will be surveyed at a later time. Once all the surface soil samples are collected, the sample numbers and locations should be reviewed before leaving the site or progressing to other tasks in a program. All used sampling devices will be kept together, separate from clean tools, so that they can be cleaned according to appropriate decontamination and cleaning procedure. In no event will a used sampling device be used for two or more samples without full cleaning between samples.

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Section 13. Documentation of Subsurface Conditions During Test Borings and Well Drilling

I. Purpose

To insure a standard procedure for the documentation of sub-surface conditions encountered during test borings and well drillings.

II. Scope

The following procedure details a method for recording sub-surface conditions in test borings and well drill holes during site contamination, hydrogoelogical, and geotechnical investigations. An optional procedure for photographing samples is included.

III. Responsibility

Project Manager – first
Supervising Field Geologist/Engineer – second

IV. Supporting Procedures

ASTM Designation D 1586 – Standard Method for Penetration Test and Split-Barrel Sampling of Soils.

ASTM Designation D 2488 – Standard practice for Description and Identification of Soils (Visual-Manual Procedure).

V. Required Forms

Field Notebook No. 351 (published by J.L. Darling Corp., Tacoma, Washington)
Atlantic Boring Log Form

VI. Procedure

A. Pre-drilling Requirements

When conducting borings at any location, local or on-site buried utilities must be cleared through the appropriate engineering departments of each utility serving the area. At least a 48-hour notification shall be made to the utilities prior to drilling. The ticket numbe or call number given by the utility must be logged in the field notebook. This will protect the drilling supervisor from any liability associated with damaging a public utility.

The supervising geologist/engineer shall record the name of the drilling firm and the names of the driller and his assistant. The date, project location, project number, an weather conditions shall also be recorded.

An accurate time log of drilling activities shall be kept. This log shall be kept in the field notebook and shall include, at least the following:

- Time driller and rig on site
- Time drilling begins
- Any delays in the drilling activities, and the cause of such delays
- Time drillers leave the site

B. Test Borings and Well Drilling Subsurface Sampling Methods

Test borings and monitoring well drilling can be conducted by a variety of drilling methods. The drilling method is not as critical to the documentation of the subsurface conditions as the soil and rock sampling techniques. However, the drilling method and type of drill rig shall be documented.

Where details of subsurface conditions are necessary, soil sampling shall be conducted using a split spoon penetration sampler driven with a 140-pound hammer at a height of 30-inches. The standard method of soil sampling as described in ASTM Designation D 1586 shall be used as a guide.

The supervising geologist/engineer shall record, at a minimum, the weight of the hammer, the length of the split spoon sampler, and the number of hammer blows on the spoon per 6-inches of penetration. Upon removal of the sampler, the earth materials shall be logged in accordance with Section C of this document.

Rock sampling will be conducted using a double barrel core sampler. The supervising geologist/engineer shall record the length of the core barrel, the diameter of the barrel, the rate of penetration, and the down pressure torque and rotation of the sampler.

C. Logging of Unconsolidated Deposits

Vertical measurements in a boring shall be made from the original ground surface. Split spoon samples are typically taken in 2-foot intervals, or at changes in lithology through unconsolidated materials. The supervising geologist/engineer shall monitor drill cuttins and maintain communication with the driller (Re: down pressure, drilling rates, resistance, etc.) to determine where changes in lithology occur.

During sampling, the hammer blows per 6-inches of sampler penetration, and the depth at which the sample was taken shall be recorded. Blow counts over 50 per 6-inches of penetration shall constitute sampler refusal. Upon extraction of the sampler moisture conditions on the drill rods shall be noted. Upon opening of the sampler the percent recovery shall be recorded as the length of sample retained over the length of sampler penetration. Changes in lithology, color, or moisture conditions in the spoon are measured and recorded prior to emptying the spoon. If the sample is to be retained, a sample number is assigned and recorded in the field log and on the sample container. The sample container will also include the project name, boring number, location, depth, date, and person collecting the sample.

The supervising geologist/engineer will log the soil sample in the field notebook. The soil description shall include, at a minimum, the following information:

- Color
- Mineral or rock content
- Grain size, in order from most predominant to least predominant using the proportions:
  - Trace = 0 to 10%
  - Little = 10 to 20%
  - Some = 20 to 35%
  - And = 35 to 50%
- Density, descriptions based upon blow counts as follows:
  - Cohesionless Soils (primarily sand and gravel)
    0 to 10 blows = Loose
    10 to 30 blows = Medium Compact
    30 to 50 blows = Dense
    50 plus blows = Very Dense
  - Cohesive Soils (primarily Silt and Clay)
    0 to 2 blows = Very Soft
    2 to 4 blows = Soft
    4 to 8 blows = Medium
    8 to 15 blows = Stiff
    15 to 30 blows = Very Stiff
    30 plus blows = Hard
- Moisture Content
- Structure

- Other (mottling, odor, instrument readings, etc.)

A sample soil log is shown in figure 13-1.

When the technical specifications of a soil sampling program require soil descriptions to conform to the "Unified Soils Classification" the soils shall also be classified according to the ASTM Standard Designation D 2488. Figure 13-2 shows this classification.

D. Logging Bedrock Cores

The supervising geologist/engineer on a drilling program is responsible for logging and recording geologic and geotechnical information from rock cores. The following information shall be included in a rock core run log:

- The depth and length of the core run.
- The coring rate, down pressure, torque and rotation speed. This information can be obtained from the driller.
- The color of the core wash water. Any changes or loss of return water will be noted.
- The recovery of the core run recorded as length of rock recovered over the length of the core run.
- The Rock Quality Designation (RQD) of the run. RQD is reported as the sum of inches of all rock core pieces larger than four inches over the total number of inches in the run.
- The rock type(s) and their location in the core run, rotating color, mineralogy, texture, fossil content, effervescence in HCl and any other data of geologic significance.
- Any structure in the core, including fractures, clay seams, vuggs, bedding, fissility, and any other geologic or geotechnical significance.

Rock cores shall be stored in a core box in the exact sequence they were removed from the ground. Core runs will be separated by wooden blocks clearly marked with the depth of the run. The core box shall be marked with the project name, location, project number, boring number, data, and the depths of the core runs in that box.

E. Photographing Rock and Soil Samples from Borings

Soil samples should be photographed while still in the split spoon sampler. If smearing of the sample has occurred, a fresh exposure can be made by scraping with a pen knife or other similar object. The spoon and sample should be placed in a good light preferable against a solid colored background. A ruler for scale, and a tag identifying the sample number, depth, and project name or number written so as to be legible should also be located in the photograph. Any photographs taken must be recorded in the field notebook.

Rock core samples are photographed in the wooden core box. The rock should be wetted to enhance the color and textual changes in the rock. Due to the relatively large size of most core boxes, the photographer (whenever possible) should stand up on a chair, tail gate, car bumper, or other perch in order to photograph the box from directly above, and get the entire box in the camera's field view. Somewhere in the photograph must be an identifier tag indicating the project name or number, the boring number, the date, and the depths of the various core runs.

Figure 13-1

Figure 13-2

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Section 14. Documentation of Subsurface Conditions Encountered During Test Pit Excavations

I. Purpose

To insure a standard procedure for the documentation of subsurface conditions encountered during test pit excavations.

II. Scope

The following procedure details a method for conducting and recording subsurface conditions in test pits during site contamination, hydrogeological, and geotechnical investigations. A standard procedure for photographing samples and excavations is also included.

III. Responsibility

Project Manager – first
Field Operations Manager – second
Field Geologist/Engineer – third

IV. Supporting Procedures

None

V. Required Forms

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington

VI. Procedure

A. Safety Considerations

Test pit excavations are used to evaluate subsurface conditions of soils, groundwater, and buried materials during certain types of field investigations. Since they are normally dug using heavy equipment and result in a deep pit in the ground, the following safety rules will be applied:

1. All buried utilities will be cleared by calling and scheduling at least 48 hours in advance the local "Dig Safe" service. Also BL Companies will confirm

clearance of utilities by contacting the property owner and those people most familiar with the site. At the discretion of the BL Companies project manager, BL Companies will use its cable location tool to verify the presence of absence of buried utilities.

2. The backhoe operator will take directions directly from the BL Companies supervisor. Hand signals will be used to communicate instructions mainly because background noise is often very loud.

3. No one will be allowed to enter a test pit greater than 3-feet in depth.

4. All spoils removed will be placed far enough away from the sides of the test pit to prevent slumping of the pit.

5. Test pits will be terminated either at refusal, at the water table, or when a buried utility line is uncovered.

6. In no case will an open excavation be left unattended. After logging the soil borings the test pit will be immediately backfilled.

7. During all excavation work, the supervisor will make all attempts to stand in front of the operator and away from the bucket arm.

B. Logging of Soils

Vertical measurements in the excavation shall be made from the top of the test pit at a spot representative of the original grade. If ground water levels are to be measured over time, a reference point (wooden stake, nail, etc.) shall be established at the original grade. If the test pit is to be surveyed after backfilling, a flagged stake shall be established at the pit o ground representative or the original grade.

A fresh exposure of soil is made at the side of the pit (preferably facing the sun) in an area most representative of the overall soil profile. This exposure is made by having the backhoe take a smooth, clean scraping off the entire side wall.

The soil profile log is recorded in the field notebook. Each test pit log shall be preceded by the following general information.

- Date
- Client, and BL Companies Project Number
- Location of Project Site
- Weather Conditions
- Time Excavation Started
- Test Pit ID Number and Specific Location
- Person Logging Pit

The soil profile is logged from the top down starting with the 'A' horizon (top soil). A metal or fiberglass tape or surveyors stadiarod should be used to measure all of the soil horizons. The description of each horizon shall include the following information:

- Textual description of grains (i.e. fine to medium). This is used mostly when describing sands and gravels.
- The predominant grain size (clay, silt, sand, or gravel).
- The secondary grain size using the proportions "trace" (0-10%), "little" (10-20%), "some" (20-35%), and "and" (35-5-%).
- The relative density and consistency of the soil using the descriptions fro cohesionless soils (sands and gravels) of very loose, loose, medium, dense, and very dense. For cohesive soils (silts and clays) the consistency descriptions of very soft, soft, medium, stiff, very stiff, and hard shall be used.
- The moisture content of the soil using the relative descriptions dry, damp, wet, and saturated.
- The structure of the soil (i.e. blocky, granular, prismatic); if no structure is evident, make a note of it.
- Note the presence or absence of any mottling and the depth at which it starts and ends.
- Record the depth of seepage into the pit.
- Record the total depth of the pit and note if this was a refusal point where farther excavation was limited by rock, concrete, or other tough surfaces.
- Describe any bedrock encountered in the excavation.

The above listed requirements for a test pit log are considered as a minimum. Any additional observations that are pertinent to the interpretation of the subsurface conditions should be recorded. Certain projects may require that specific data analysis be conducted in the test pit. These requirements shall be detailed in the site sampling plan and presented to the field personnel, in writing, prior to the commencement of the field operations.

C. Photographing Test Pit Excavations and Samples

Whenever possible, the subsurface conditions shall be documented with a photograph. Photographs should be taken with a 35-mm camera on color slide film. The field personnel taking photographs shall log all photos in the field notebook.

Photographs of test pits should be taken in good light, preferable during mid-day when the sun is high. A flash attachment should be made available if ambient light is too weak. The photo should be taken of the side of the pit most exposed to sunlight. Prior to taking the photo, some sort of identification must be placed into the photo. This is best done by writing the test pit ID in bold letters on a clipboard and placing it within the field of view of the camera. Other forms of identification can be used (i.e. building in background, etc.) but must be documented in the test pit log. In all photos, an object must be placed in the photo for scale. A scale is particular useful in close-up photos.

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Section 15. Chain of Custody

I. Purpose

To provide the project manager with a record of the custody of any environmental field sample from time of collection to final analysis.

Once the sample has been submitted to the laboratory, internal laboratory chain-of-custody will take over in the form of "Request for Analysis" forms, analytical notebooks, and "Reports of Analysis" forms.

II. Scope

This procedure details how a sample is traced through the Chain-Of-Custody-Form.

III. Responsibility

Project Manager – First
Field Supervisor – Second
Field Technician – Third

IV. Supporting Procedures

None

V. Required Forms

Sample Chain-of Custody Form

VI. Procedures

This procedure describes the use of a Chain-of-Custody Form to accompany all sample containers from the time of collection to submission to the analytical laboratory.

For sampling programs where a large number of samples are to be collected or where various laboratories will be receiving the samples, a Chain-of Custody Form is to accompany ach group of samples (see attached form). This form presents general sample information in tabular form listing sample number, date and time of sampling, whether the sample was a composite or grab and information regarding the number of containers, size of container and preservative used for each. If for instance a sample consisted of two 40 ml. Vials with no preservation and one 500 ml vial preserved with nitric acid, the number of containers box would designate three while the first diagonal box would list 40ml vial/PRSV.-NONE and the box beneath listing two and the second diagonal box listing 500 ml glass jar/PRSV.-HNO3 and the box beneath listing one.

The bottom of the form is the chain-of-custody with dates and times of transfer indicated with the appropriate signatures. The sample collector is always the first signature while the analytical laboratory is the final. Theoretically all the individuals handling the samples between collection and laboratory should sign the form. However if a common carrier (i.e. Federal Express, Purolator) is used for shipping only one signature is required.

This form can be used as a legal document to guarantee samples were not mishandled and hat they were delivered to the laboratory within the time frame necessary to start analysis.

On occasion, the analytical laboratory will provide their own Chain-of-Custody form. Usually the same information is included but may be in a different format from the sample form. Chain-of-Custody forms from the analytical laboratories are acceptable documentation.

Since these forms are basically sample transmittal documents a copy of the form should remain with the sampling personnel. Upon completion of the analysis the laboratory will provide a complete set of all Chain-of-Custody forms for inclusion with analytical reports.

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Section 16. Collection of Surface Water

I. Purpose

To insure a standard procedure for collection of surface water (streams, ponds, lakes, impoundments) and sediments for the identification of chemical composition.

II. Scope

The following procedure describes the logistics, chain-of-events, collection techniques and documentation requirements for collecting surface water and sediment samples designated for chemical analysis.

III. Responsibility

Project Manager – First
Field Supervisor – Second
Field Sampling Technicians – Third

IV. Supporting Procedures

Decontamination Procedure for Sampling Devices
Sample Chain-of-Custody Procedure

V. Required Forms

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma Washington

VI. Procedure

A. Selection of Sampling Locations

The selection of sampling locations in and around a project site will be based on a review of existing data, the site topography and surface features, results of preliminary site surveys using portable geophysical and air monitoring equipment and the initial estimates as to the extent of the waste. At the start of the investigation, a nu7mber of surface water and sediment samples are usually allocated. Only after initial field reconnaissance are the final locations selected. At a minimum the following should be included as sampling points.

- Upstream and upgradient of the waste site to determine background levels or pollutants.
- In leachate, runoff or intermittent flow paths passing through or from the site.
- In downgradient streams, swales, runoff channels or sewers draining the site to determine limits of surficial deposition.

B. Equipment List

The following lists are examples of equipment to be used for sampling. Site specific checklists of equipment should be designed based on the characteristics of each sample and location.

C. Surface Water Sampling

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Sample containers (depending on sample requirements of the analytical laboratory) may include for each location:
    - 4 each 1 liter glass jar with teflon lined caps
    - 8 each 40 ml. Glass vials with teflon lined septas.
    - 1 each 500 ml. plastic container for metal analysis
    - 1 each 500 ml. plastic container for mercury analysis.

- Wooden stakes and spray paint.
- Stainless steel Kemmerer bottle, Van Dorn bottle or sterile glass samplers (if required)
- Remote samplers
- Field Notebook
- Sample bottle labels
- Chain-of-custody forms

D. Sediment Sampling

- Boots, latex gloves, chemical resistant gloves, appropriate level of protection.
- Dedicated stainless steel spoons (tablespoon size)
- Dedicated teflon spoons (if required)
- Sample containers for each sample
    - 1 each 1 liter glass jars with teflon lined caps
- Wooden stakes and spray paint.
- Field Notebook
- Sample bottle labels
- Chain-of-custody forms

E. Order of Samples

If both stream sediment and water samples are to be collected concurrently, the water samples should be taken first in order to avoid introducing pollutants in the water column from sediment collection activities.

In flowing streams or runoff channels, samples should be collected from the furthest downstream point first. The remaining samples will be taken progressing upstream.

F. Sample Collection

a) Surface Water Samples

Surface water samples are collected in a manner to be representative of the water column from which the samples are taken. A two man team is required for the collection as a safety precaution. The person collecting the samples in most cases will have entered the water body. For flowing streams this will necessitate the donning of boots or waders and wearing latex inner gloves and chemical resistant outer gloves. All samples n flowing water bodies will be taken facing upstream. Samples taken from small lakes or ponds should be taken from a small boat using a Kemmerer of teflon lined Van Dorn bottle. Samples taken from standing puddles, pools, drainage ditches should be taken without disturbing the sediments. This may be accomplished by the use of a remote sampler, e.g. a sample bottle held on along pole with a gimbaled yoke.

For pre-preserved sample containers the following procedure will be followed:

- Prior to collecting any water samples, place a waterproof sample label on each container which specifies the following:
  - Sample number
  - Date
  - Time
  - Analysis
  - Preservative
  - Project number
  - Initials of the collector

Fill in the information with a waterproof ink pen. This will prevent difficulty in filling out the labels on a wet jar after it is filled.

- Face upstream, wearing gloves, take a 1 liter glass container with no preservative and submerge it closed to mid-depth.
- Open the jar with the mouth facing upstream, fill it and close it while submerged.
- Take the filled jar and use it to fill the 40 ml. vials making sure no air is trapped in the vials.

- Repeat steps 1 and 2 with the same container and fill those containers having preservatives avoiding any overflow since this will dilute the preservative.
- Repeat steps 1 and 2 with the same container and fill the remaining sample containers. The last container filled, will be the original container used to fill the other jars.
- If dissolved metals analyses are required, an extra bottle (no preservative) will be filled and the metals container (pre-preserved with nitric acid) will remain empty. Only after the water sample is field-filtered will it be poured into the pre-preserved metals container.
- Place all sample containers into a sample shipping container, cool with ice packs and fill in the chain of custody form.
- Detail in the field notebook the following:
    - Sample identification number
    - Location of the sample (sketch of the sample point)
    - Time and date sample was taken
    - Personnel performing the task
    - Visual or sensory description of the sample (color, odor, turbidity, etc.)
    - Weather conditions
    - Runoff conditions
    - Other pertinent observations
- Place a wooden stake at the edge of the stream or near the sample point with the sample number on it. The stake may be located by survey for inclusion on a site map.

Note:

It is understood that all sample containers and collection devices will be cleaned prior to filed use following the appropriate cleaning procedures depending on the type of analysis to be performed. If sampling devices are to be dedicated to a particular sample location, they will be placed in a plastic bag after its use and marked or tagged "Dedicated to project no. ____ sample location no. ____."

b) Sediment Samples

Stream sediment samples are collected in a manner to be representative of deposits of sediment carried off of a site. Again the use of protective boots and gloves will be necessary. All priority pollutant and organic analysis of sediments can be performed on a 1-liter sample. The following procedure will be followed:

- Select a sample location that is representative of sediment depositional areas. This might mean a sandbar in the middle of a stream, the inside corner of a stream bed in a meander, or a deep pool where water velocities are reduced.

- Place a waterproof sample label on the glass container which specifies the following:

  - Sample number
  - Date
  - Time
  - Preservative
  - Project number
  - Initials of the collector

  *Fill in the information with a waterproof ink pen prior to collecting the sample

- Use either a pre-cleaned dedicated stainless steel spoon or Teflon coated spoon that will fit inside the sample jar to collect a sample.

- All samples should be taken within the tip 3-inches of the stream bed. Remove any vegetation debris along with any large stones from the sample so that only the finer soil material is collected.

- Fill out the chain-of-custody form and place the sediment sample into the shipping container. Cool as required.

- Detail in the field notebook the following:
  - Sample identification number
  - Location of the sample (sketch of the sample point)
  - Time and date the sample was taken
  - Personnel performing the task
  - Visual or sensory description of the sample
  - Brief sediment descriptions (color, texture, appearance)
  - Weather conditions during sampling
  - Runoff or flow conditions
  - Other pertinent observations

- Place a wooden stake at the edge of the stream or near the sample point with the sample number on it. This stake will be located by survey for including a site map.

c) General Site Rules

Surface water and sediment samples, depending on the particular site, can be collected from a variety of locations. Instead of having a procedure for each type of location, the following general rules should be used for any site.

  - The sample must be representative of the water body or sediments deposited in an area.

- Avoidance of cross contamination between sampling points can be accomplished by the use of dedicated sampling devices.

- Care must be taken to not disturb the sample location conditions or chemistry, e.g. facing upstream in a river, collecting sediments from areas not stepped on by the collectors

- In lakes or ponds, samples of the water column, at a minimum, will be a composite of surface, mid-depth, and bottom (1-foot above floor) samples. Sediments need only be sampled by grab method.

- Only pre-cleaned sampling devices and sample containers are to be used.

- Proper field documentation and chain-of-custody procedures must be followed.

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Section 17. Collection of Subsurface Soil Samples

I. Purpose

To insure a standard procedure for collection of subsurface soil samples during site contamination studies for the determination of chemical parameters.

II. Scope

The following procedure describes the method, materials and documentation requirements for collection of subsurface soils from test pits and split spoon samplers for eventual analysis by chemical laboratory.

III. Responsibility

Project Manager – First
Field Operations Manager – Second
Field Staff – Third

IV. Supporting Procedures

Sample Chain-of-Custody Procedure

V. Required Forms

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington

VI. Procedure

A. Introduction

During a site investigation where test pits, exploratory borings, monitoring wells, test trenches and other forms of excavation are performed it is often planned that soils or buried waste materials are to be collected. For most drilling operations split spoon samples are used to collect discrete samples from known depths using samplers ranging in length from 2 feet to 5 feet. Usually not all samples from these split spoons are designated for analysis, therefore the containerization and handling of samples from split spoons may be different depending on their ultimate purpose.

Samples from test pits and test trenches may also be collected for chemical analysis. These samples can only be taken using a remote sampler from the side walls of each pit. Samples taken from the bucket of the backhoe are harder to identify especially their actual vertical position beneath the ground surface.

The following is to be used as a general guide in collecting samples from either test pits or split spoons.

B. Split Spoon Sampling

After logging a split spoon sample, the sample is then identified for either analysis by a laboratory or storage until further decisions are made. If the sample is to be stored, a clean glass jar, preferably new one liter size, will be used to store the sample. In many cases the driller will provide these to the field team. However, in no case shall used or dirty soils jars be used to hold samples. If the driller does not have the proper jars, new clean "mason type" jars may be used. A label must be affixed to these storage jars identifying the boring number, sample depth, date of sample and project number on it for future reference. If soil samples are to be sent for analysis then only properly cleaned or laboratory supplied sample containers are to be used.

The collector must take the following steps when preparing the samples:

1. Always follow designated safety precautions in terms of level or protection. At a minimum, samples must always be handled using latex or chemical resistant gloves. This protects the collector and prevents cross-contamination between samples.

2. Do not use the top one to two inches of recovered sample in the split spoon. This usually consists of washings and cave-in soils from higher in the boring that fell into the bottom of the augers.

3. Use a properly cleaned stainless steel spoon (tablespoon size) to remove the soils from the split spoon.

4. When possible, try to fill each sample container so that no air space is allowed. This will prevent volatiles from escaping. If a number of containers are to be used then evenly divide the sample between containers.

5. Avoid getting soils on the threads of the soil containers. Use a clean paper towel to wipe off the threads to insure a good seal.

6. Fill out the sample labels on each jar including the following:

   -sample number

-sample depth
-date and time of sample
-analysis
-preservation
-initials of the sample collector

7. Fill in the chain-of-custody form for each sample. If a confining layer is to be sampled to determine whether contamination from a shallower zone is migrating down, care should be exercised in collecting these samples. In many instances ground water will fill the auger and the split spoon will travel through the water before being pushed into a deeper zone, there is no guarantee that soils in the split spoon haven't been contaminated with standing water in the auger. To insure a "pure" sample, the drilling procedure may have to be modified to seal off the upper zone from the lower zone using casing and washing the interior of the casing clean. These operations must be detailed in the site sampling plan.

After each split spoon sample is collected, BL Companies personnel will maintain custody and keep refrigerated (when necessary) until shipment to the laboratory. The stainless steel sampling spoon is then decontaminated in accordance with company procedures before the next sample is taken.

C. Sampling Soils from Test Pits

As mentioned before, soils designated for analysis must be collected directly from the side walls of the test pits. A remote sampler is basically a stainless steel scoop that can swivel so that it can be pushed against the side wall and hold soils in a trap at it's base. The scoop is attached to a light weight telescoping aluminum rod which will have a maximum 10 foot reach.

The depth of sample must be noted in the field notebook. The sample is then handled the same as the split spoon samples following the same safety precautions. After the sample is taken, the remote sampling tool will be decontaminated before obtaining the next sample.

The bottom of the form is the chain-of-custody with dates and times of transfer indicated with the appropriate signatures. The sample collector is always the first signature while the analytical laboratory is the final. Theoretically all the individuals handling the samples between collection and laboratory should sign the form. However if a common carrier (i.e. Federal Express, Purolator) is used for shipping only one signature is required.

This form can be used as a legal document to guarantee samples were not mishandled and hat they were delivered to the laboratory within the time frame necessary to start analysis.

On occasion, the analytical laboratory will provide their own Chain-of-Custody form. Usually the same information is included but may be in a different format from the sample form. Chain-of-Custody forms from the analytical laboratories are acceptable documentation.

Since these forms are basically sample transmittal documents a copy of the form should remain with the sampling personnel. Upon completion of the analysis the laboratory will provide a complete set of all Chain-of-Custody forms for inclusion with analytical reports.

BL Companies
Standard Operating Procedures

Revision Date: March 2004

Section 18. Preservation of Solid and Liquid Samples

I. Purpose

To insure a standard for procedure for preservation of solid and liquid samples collected at a site for hazardous waste determination.

II. Scope

The following procedure is established to provide a set of standards which follow recommended EPA preservation techniques and holdings times for various analytical groups.

III. Responsibility

Project Manager – First
Field Operations Manager – Second
Field Staff – Third

IV. Supporting Procedures

Field Procedures for Collection of Surface Soil Samples
Field Procedures for Collection of Subsurface Soils
Field Procedures for Collection of Surface Water and Sediment Samples for Hazardous Waste Determination
Field Procedures for Collection of Groundwater Samples for Hazardous Waste Determination
Shipping Procedures for Environmental Field Samples

V. Required Forms

1. Field Notebook No. 351. Published by the J.L. Darling Corp., Tacoma, Washington
2. Master Sample Log

VI. Procedure

1. General Procedure

   All sample preservations will be preformed in the field as soon after sample collection as possible. In many instances sample containers supplied by the analytical laboratory will be pre-preserved so that no additional preservations will be required. In the event preservations are required, BL personnel will use the following format:

a) For those water samples requiring priority pollutant analysis (i.e., the list of 128 compounds on EPA's list). The procedures in Table 6-1 will be followed.

b) All glass or plastic containers must be cleaned prior to sampling according to appropriate cleaning procedures. In no case will sample containers be rinsed with a sample before the actual sample is containerized.

c) In no case shall methylene chloride be used as a cleaning agent in any glassware or field equipment used on a site investigation. Methylene chloride is a listed waste and if used, cleaning may cause errors in evaluating field data.

d) All soils samples collected for priority pollutant analysis will be placed in a one liter glass jar with Teflon lined cap. This jar also must be cleaned prior to sampling according to appropriate cleaning procedure. To avoid losing volatile organics to the head space within a jar, all soil jars will be filled completely. Care must be taken to avoid getting soil on the threads of the sample jar. This will cause a faulty seal.

e) All samples will be held in insulated shipping containers and kept cool to a temperature of 4°C until they are delivered to the analytical laboratory.

f) When samples are preserved in the field, the type of preservation will be listed on the label along with all other appropriate label information. Also the details of each sample will be logged in the Master Sample Log, maintained at the field office.

g) If BL personnel plan to perform field preservations the analytical laboratory must be consulted to verify those particular procedures to be followed. In some instances, different laboratories may require more sampling volume than those listed or wish no preservative be used.

h) Tables 6-1, 6-2 and 6-3 are provided as a general guideline for preserving primarily water samples. Soils rarely require preservation and the laboratory should always be consulted before collecting soil samples. These tables are referenced to their EPA source. Occasionally, EPA may update the holding times and this can be found by calling the EPA Quality Assurance Director for the region where sampling is to take place.

i) All field preservations should be performed using proper safety precautions especially when handling acids and caustics. A reference for proper chemical handling techniques is found in <u>Basic laboratory Skills</u> for Water and Wastewater Analysis by Douglas W. Clark, New Mexico Water Resources Research Institute, Report No. 125, 1980. Also latex or chemical resistant gloves should be worn during all field preservations. Proper ventilation is necessary when performing preservations in enclosed areas.

2. Sample Preservation for Priority Pollutant Analysis

Table 6-1 provides a schedule for sampling, preservation, and holding times for samples being analyzed for complete priority pollutant determination. Here the organic analysis is preformed using GC-MS. For large field programs it should be noted that cyanide and phenol have short holding times, therefore speed is essential when shipping samples to the laboratory.

3. Sample Preservations for Organic Analysis Using GC

Samples collected for organics analysis using gas chromatography are usually handled differently from samples analyzed by GC/MS techniques. Note in this section, holding times to the start of sample extraction are given in some cases and not for the start of analysis. The field personnel are only responsible for getting samples to the laboratory within the holding time for extraction.

If one sample is being analyzed for more than one group of parameters, then the sample containers within the one sample can be grouped according to preservation. For instance, a water sample taken for Methods 8010 and 8020 analysis can be collected in one set of 40 ml. vials instead of one set for each method. Again the field personnel should consult with the laboratory regarding the final procedure prior to the start of sampling.

4. Sample Preservations for Conventional Pollutants

Water and wastewater samples collected for conventional parameters are listed in Table 6-3 taken from EPA Test Methods "Technical Additions to Methods for Chemical Analysis of Water and Wastes", EPA-600 14-82-055 December, 1982.

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Standard Operating Procedures

Revision Date: March 2004

Section 19. Restoration of Hydraulic Conductivity of Subsurface Materials

I. Purpose

To insure the natural hydraulic conductivity of the subsurface materials hsve been restored and all foreign sediment removed to ensure turbid-free ground water samples.

II. Scope

The following procedure describes the methods for monitoring well development and the conditions for which the methods are best suited. The procedure also includes a method for determining whether the development is sufficient for monitoring wells used for RCRA ground water monitoring programs.

III. Responsibility

Project Manager- First
Field Operations Manager- Second
Field Staff- Third

IV. Supporting Procedures

Field Procedures for Logging Subsurface Conditions During Test Boring and Well Logging

Cleaning Procedure for Sampling Devices used in Environmental Site Investigations

Field Procedures for Determination of In-situ Hydraulic Conductivity with Single Well Hydraulic Tests

V. Required Forms

Field Notebook No. 351, published by J.L. Darling Corp., Tacoma, Washington (or equivalent)

VI. Procedure

Well development is a means to restore the natural hydraulic conductivity of the subsurface materials surrounding a monitoring well and ensure a turbid-free ground water sample. There are a variety of well development techniques, all of which require reversals or surges in flow to avoid bridging by particles, which is common when flow is continuous in one direction. The in-situ ground water should be used for surging the well. If the well yields an insufficient quantity of water to use, an outside source of water (preferably tap water) may be used. If the source of the outside water is unknown (not tap water), a sample should be chemically analyzed to determine whether the water may have an impact on the in-situ water quality.

The following applies to all methods described below:

*All materials including submersible pumps, suction lines, surge blocks, and lines used to pump water or compressed air into a well should be decontaminated in accordance with BL Procedures.

* Field notes should be kept to record the following information:

- initial static water level
- method of well development
- average discharge rate and corresponding drawdown
- any measurable recovery or information regarding yield of monitoring well
- any noticeable changes in ground water quality resulting from well development

* The well development should continue until the discharge runs sediment free after 20 strokes of the surge block. A clear glass jar of distilled water should be used as a reference. Discharge from the pump should be checked periodically by collecting some of the discharge in a clear glass jar and comparing to the distilled water reference.

A. Surge Block Method

This method is best suited for monitoring wells that will yield at least ½-gallon per minute (gpm) while being pumped with a vacuum lift pump (centrifugal pump). It can be used on wells with yield of less than ½-gpm, but may require the introduction of water from an outside source.

A surge block is a piston-like device with an outside diameter that is just smaller than the inside diameter of the well and used by stroking the block up and down in the well. On the downstroke, water is forced outward into the subsurface materials, and on the upstroke, water, silt, and fine sand are pulled in through the screen. This results in sediment filling in the well screen, which must be periodically removed.

The surge block for 2-inch wells consists of two rubber stoppers with a ½-inch pipe passing through the rubber stoppers. The stoppers are held in place with washers and nuts; the nuts can be tightened or loosened to expand he stoppers to get a good fit inside the well. The surge block is attached to either ¾-inch or 1-inch rigid polypropylene tubing. This tubing is rigid enough that it can be used to stroke the surge block. This tubing is then attached to a centrifugal pump with a valve on the discharge side to control the pumping rate from the well.

The surge block should be kept above the screen if sufficient water is above the well screen. If necessary, the block may be stroked in the well screen, however, care should be exercised so not to damage the well screen and the slot sizing. Periodically, the surge block should be lowered to the bottom of the well to remove the sediment that has accumulated at the bottom.

The same methodology applies to wells with yields less than ½-gpm except that water may have to be introduced occasionally because the well may dewater. The discharged water from the well should be used if at all possible; if not, tap water is the next choice of an outside source of water. When developing the low yielding wells, keep the discharge rate to a minimum, and if necessary, stop pumping for a short period of time while stroking the surge block.

B. Overpumping/Backwashing Development Method

This method can be used for wells that yield either less than or more than ½-gpm. Any number of pieces of equipment can be used to develop wells with this method. In general, the method involves overpumping a well so that it dewaters the well and then introducing a slug of water back into the well. As mentioned at the beginning of the procedure, it is preferred to use the discharge water when backfilling into the well. If that is not available, tap water is the next preferred source of water.

Any means of pumping water quickly out of a well may be used to overpump the well. However, there should be some means of removing the sediment that has flowed into the well. To this end a centrifugal pump will both pump quickly (will lift water up to about 25-feet of head) and remove the sediment from the bottom of the well. Most forms of submersible pumps are not designed to pump solids and will quickly become inoperative.

Backwashing the well is performed either by pumping the water back into the well quickly or pouring the water back into the well.

C. Air Development Method

The air development method consists of lowering a line (usually solid pvc pipe) down the well and, using compressed air, blowing air into the well that literally lifts the water up and out of the well. This method is not well suited for low yielding wells since one has to wait for the well to recover before purging more water. The one major disadvantage to this method is that most air compressors have trace amounts of petroleum mixed in the sir to keep equipment lubricated. These trace amounts of petroleum can easily compromise the quality of the water in the well. There are some compressors which filter the air so there is no petroleum mixed in, however, these are not commonly available.

There should be a "U" shaped fitting at the bottom of the line placed in the well. This will direct the air in an upward direction, rather than blowing the air down, and subsequently, out into the subsurface materials. Without this U-shaped fitting, fine-grained materials may be pushed into the well screen producing the opposite of the desired effect. It is important that the air compressor be adequately sized so that it will produce sufficient pressure to lift the column of water out of the well (the longer the column, the more pressure that is required).

D. Jetting Development Method

This method can be used for both high and low yielding wells. It involves the pumping of water into the well through "jetting" nozzles (pointed directly at the well screen) and simultaneously pumping the well. The pumping pulls water into the well, and the jetting pushes water out through a small length of screen at a high velocity. This provides both a reversal and surge of water through the well screen. This may require the use of an outside source of water, particularly in low yielding wells. If an outside source is required, it preferably should be tap water.

BL Companies
Standard Operating Procedures

Revision Date: March 2004

Section 20. Cleaning Sampling Devices

I. Purpose

To insure a standard procedure for cleaning sampling devices for use on site investigations.

II. Scope

This procedure is to be used during site investigations for the cleaning of split spoons, sampling spoons, well bailers, remote samplers, sampling dredges and all devices used to collect a sample or transfer a sample of soil or liquid into it's shipping container. Following this general procedures will prevent the likelihood of cross-contamination between samples.

III. Responsibility

Project Manager – First
Field Operations Manager – Second
Field Staff – Third

IV. Supporting Procedures

None

V. Required Forms

None

VI. Procedure

A. Materials Selection

All field sampling equipment that contacts the solid or liquid media being collected for eventual chemical analysis should be made of stainless steel or teflon. These materials are easily cleaned and relatively inert when containing the sample. Materials such as neoprene fittings, tygon tubing, silicon rubber bladders, PVC, polyethylene and viton are not acceptable. Also, stainless steel aircraft cable should be used for raising and lowering bailers into monitoring wells. Sampling equipment should be cleaned beforehand and dedicated to individual samples taken in the field. If this is not possible, a cleaning procedure must be followed between each sample. The following presents the procedures for the sampling of organic and inorganic constituents:

B. Procedure for Materials in Contact with Media to be Analyzed for Organics

1. Scrub the device with nonphosphate/low sudsing detergent in a stainless steel basin. This type of basin is easily cleaned and thus prevents the buildup or organic contaminants.
2. Rinse it thoroughly with tap water to remove all suds.
3. Rinse it three times with distilled water using a plastic squeeze bottle.
4. Finally, rinse it three times with chromatograph grade methanol using a teflon squeeze bottle to remove nonpolar compounds.
   Allow to air dry and wrap in aluminum foil until use.

Note: Solvent resistant gloves should be worn when rinsing with organic solvents to prevent contamination of the equipment and for personal safety. Use aluminum foil to provide a clean surface if the equipment is set down during the cleaning procedure.

C. Procedure for Materials in Contact with Media to be Analyzed for Inorganics

1. Scrub the device with nonphosphate/low sudsing detergent in a HDPE (high density polyethylene) basin using a plastic brush.
2. Rinse it thoroughly with tap water to remove all suds.
3. Rinse it with dilute (0.1N) HC1 and/or HN03 using prerinsed plastic squeeze bottles.
4. Rinse three times with deionized distilled water. Air dry and wrap in plastic.

Note: Any acid resistant disposable gloves can be used in this cleaning procedure. Plastic sheeting should be available to provide a clean surface if the equipment is set down during the cleaning procedure.

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Revision Date: March 2004

Section 21. Calibration and Operation of the PID

A. Purpose

To insure a standard procedure for the calibration and operation of the Photoionizer (PID) Model PI-101.

II. Scope

The following procedure details those steps necessary for the collection and operation in the survey mode of the PID. A listing of calibration data needed for proper documentation is supplied at the end of this procedure.

III. Responsibility

Project Manager – first
Field Operations Manager – second
Field Staff – third

IV. Supporting Procedures

None

V. Required Forms

Field Notebook No.351, published by J.L. Darling Corp., Tacoma, Washington (or equivalent), or a conventional paper, bound laboratory notebook

VI. Procedure

A. General Description

The PID is a survey tool for determining general levels of organic vapor in air. The instrument is comprised of a readout module which contains all controls and the battery power supply and a photoionizer probe which contains terminals for connection to a recorder. This module is carried by a strap held across the shoulder while the probe is held by hand.

B. Instrument Startup

First, connect the probe unit to the readout module by attaching and turning the connector terminal. Note this fitting is "keyed" and must be attached in only one orientation.

Second, turn the main switch to battery. The needle should deflect to the upper end of the green scale. If it doesn't deflect into the green area, or is at the low end of the scale, the instrument needs to be charged. A battery charger is located in the instrument cover and it plugs into the side of the readout module. For a full day's operation, the battery should be charged overnight.

Third, turn on the main switch to any range. Look into the probe through the sample tube and observe the violet light of the photo cell. If the light is not on, check the following:

1. Make sure the probe is attached properly to the readout module.
2. An etch mark should be scribed on the probe where it can be unscrewed to replace the photo cell. This mark shows the exact position that the top of the probe takes so that the air inlet ports are lined up. If not lined up, unscrew the probe and assemble it properly.
3. Check the photo cell lamp and replace it if necessary. Once the battery and photo cell are operating, perform a calibration.

C. Calibration

The PID is designed for trace gas analysis in ambient air and is calibrated with certified standards of benzene, vinyl chloride, and isobutylene.

Some general points to consider when calibrating the PID are that the analyzer is designed for operation at ambient conditions and therefore the gas standards used for calibration should be delivered to the analyzer at ambient temperatures and pressure and at the proper flow rates. The PI 101 is a non-destructive analyzer; calibrations using toxic or hazardous gases must be done in a well ventilated area.

The frequency of calibration should be twice daily as a minimum. The instrument should be calibrated at the beginning of the day (or when sue of the instrument is first turned on) and at the end of the day (or when use of the instrument is completed). If the instrument is turned off during the day for any significant length of time, it should be calibrated when turned on. An accurate and reliable method of calibration check is to use analyzed gas cylinders of "hydrocarbon-free" air and isobutylene (prepared by HNu).

Step 1. Zero set – Turn the function switch to STANDBY. In this position the lamp is OFF and no signal is generated. Set the zero point with the ZERO set control. The zero can also be set with the function switch on the Xl position and using a "Hydrocarbon-free" air. In this case "negative" readings are possible if the analyzer measures a cleaner sample when in service.

Step 2. 0-20 or 0-200 range - For calibrating on the 0-20 or 0-200 range only one gas standard is required. Turn the function switch to the range position and note the meter reading. Adjust the SPAN control setting as required to read the ppm concentration of the standard. Recheck the zero setting (STEP 1). If readjustment is needed, repeat Step 2. This fives a two-point calibration; zero and the gas standard point.

D. Documentation

In the field notebook, or in the bound laboratory notebook, at the start of the project (or if there is a change in instruments), record the following:

1. Site name
2. Instrument model and serial number S/N
3. Types of calibration gases
4. Note the size of the phot cell lamp sued in the particular probe. This is useful to know which organic compounds the Hnu is sensitive toward.

In the field notebook, or in the bound laboratory notebook, at the start of each calibration, record the following:

1. Date
2. Time
3. Name of person performing the calibration
4. Span setting before beginning calibration
5. That the instrument was zeroed, and whether the instrument was on standby or if "hydrocarbon-free" air was used.
6. The new span setting, if necessary, to calibrate instrument reading
7. Repeat Step 5 if span was adjusted during Step 6
8. Note that the second calibration reading was correct

BL Companies
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Section 22. Air Surveillance

A. Definition and Objectives
Air surveillance consists of air monitoring and air sampling. Air monitoring uses direct reading instruments capable oaf providing real-time indications of air contaminants. Air sampling collects air on an appropriate media or in a suitable sampling container followed by laboratory analysis. The objective of air surveillance during a response is to determine the type of chemical compound and quantity of airborne contaminants on-site and off-site and changes in air contaminants that occur over the lifetime of the incident.

Technical questions which need to be addresses at each site are:

- Is the contaminant a gas, particulate or aerosol?
- Is the contaminant combustible and/or ionizable?
- To what class of compounds does the contaminant belong? Any special properties?
- At what level can your instrumentation detect contaminants (%, ppm, ppb)?

B. Types of Situations Encountered
As part of the initial hazard evaluation, direct reading instruments, visible indicators (signs, labels, placards, container types) and other information (manifests, inventories, agency records, etc.) are used to evaluate the presence or potential for air contaminate release. Limited air sampling may also be conducted. Based on an assessment of this preliminary information, a more comprehensive air surveillance strategy is developed and implemented. Two general types of situation are encountered.

1. Environmental Emergencies – including chemical fires, spills or other releases of hazardous materials which occur over a relatively short period of time. Air sampling is generally limited unless the release continues long enough for appropriate equipment to be brought in and you can afford to wait for lab analysis.

2. Monitoring of Long Term Cleanups and Site Inspections – including planned removals and remedial actions at abandoned waste sites as well as restoration after emergencies. During this period workers and the public may be exposed to a wide variety of airborne materials over a longer period of time. Air sampling is to be implemented as part of the site specific Health and Safety Plan.

C. General Surveillance Methods

A variety of air surveillance programs can be designed to detect a wide range of airborne compounds. To implement any program a number of factors must be considered including type of equipment, costs, personnel required, accuracy of analysis, time required to obtain results, and availability of analytical laboratories, but most of all importantly the purpose or objective in sampling.

The selection of a sampling strategy capable of meeting the program's objectives is very important to the success of any program. Parameters which must be specified include:

- Sampling locations
- Number of samples, volumes and time periods of samples to be taken at each location
- Meteorological parameters to be monitored and dependency of sampling strategy on these parameters

The development of a sampling strategy can be simple or complex depending on objectives. The selection of an optimal air surveillance plan must take into account the:

- Locations of stationary as well as mobile sources
- Transport characteristics of pollutants from these sources and the influence of meteorology and topography on these characteristics
- Spatial resolution required to meet objectives
- Availability of space and utilities for operating sampling equipment at sites

1. General Procedure

This procedure is used for most cases. Since each incident is unique modifications may be needed.

a. Organic Gases and Vapors

The sequence for monitoring organic gases and vapors consists of several steps:

i. Determine Total Background Concentration

Background readings of total organic gases and vapors using direct reading instruments are made upwind of the site in areas not expected to contain air contaminants.

ii. Determine Total Concentrations On-Site

The on-site area is monitored using direct reading instruments (DRIs) for total gas/vapor concentrations, measured at both ground and breathing zone levels. The initial walk-throughs are to determine general ambient concentrations and to locate higher than ambient concentrations or hot-spots.

iii. Collect On-Site Area Samples

Sampling stations can be located throughout the site. The number and locations depend on evaluating several factors including hot spots, active work areas, potential for high concentrations, and wind direction. As a minimum, stations should be located in a clean off-site area 9control or background sample) the exclusion area and downwind from the site. As data are accumulated, locations, number of stations, and frequency of sampling can be adjusted.

iv. Identify Specific Contaminants – Lab Analysis

Lab results are used for a number of different purposes:

- To identify and measure organic gases and vapors collected during the sampling period.

- To compare lab chromatographs and field chromatographs. If only a few peaks are seen on each chromatograph an identified on the lab sample it may be reasonable to assume (until all standards are run) that peaks on the field chromatograms are of the same materials.

- To identify major contaminants on lab samples and determine what standards to prepare for the field GCs. The field GCs can then be used to identify and quantify the air contaminants.

b. Particulates and Inorganic Gases and Vapors

Sampling for particulates and inorganic gases is not done on a routine basis. If these types of contaminants are known or suspected a sampling program is instituted for them. Incidents where these contaminants might be present are:

- Fires involving pesticides or chemicals
- Incidents involving heavy metals, arsenic or cyanide compounds
- Mitigation operations that create dust

Sampling media and analytical methods for these air contaminates should follow guidance given in the NIOSH Manual of Analytical Methods.

D. Media For Collecting Air Samples

Abandoned waste sites and hazardous material incidents involve thousands of potentially harmful compounds – gases, vapors, and aerosols. A variety of collection media (liquids and solids) are used to trap these substances. The sampling system includes a gas moving device which draws air into a selected trapping device. Some of the most common types of samples and the collection media are listed below:

1. Organic Vapors

   a. Activated Carbon – an excellent absorbent for most organic vapors. Other solid absorbents such as tenax, silica gel, and florisil are routinely used to sample specific organic compounds or classes that do not absorb or absorb well on activated carbon (see NIOSH Manual for specific compounds). Activated carbon is used to collect organic vapors with boiling points above zero degrees centigrade.

   b. Carbotrap - an excellent absorbent for a wide range of airborne organic contaminants. Carbotrap is a high purity, graphitized carbon black. Due to its hydrophobic nature, its performance is unaffected by humidity. It is not susceptible to solvent degradation.

   c. Tenax or Chromosorb – to collect substances such as high molecular weight hydrocarbons, organophosphorous compounds and the vapors of certain pesticides. Some of these porous polymers absorb organic materials at low ambient temperatures more efficiently than activated carbon.

   d. Silica Gel – to collect organic vapors or polar compounds; such as aromatic amines and alcohols.

   e. Florisil - to collect polychlorinated biphenyls.

f. Colorimetric Detector Tubes – can also be used with a sampling pump when monitoring for some specific compounds. Passive organic vapor monitors can be substituted for active systems if the passive monitors are available for the types of materials suspected.

2. Inorganic Gases

The inorganic gases present at a waste site would be primarily polar in nature like haloacid gases. They can be absorbed on silica gel and analyzed by ion chromatography or collected by impinger with selected liquid reagents (see NIOSH Manual of Methods for specific compound). Colorimetric detector tubes can also be used with a sampling pump when monitoring for some specific compounds with an accuracy of + or – 30%.

3. Aerosols

Aerosols (solid or liquid particles dispersed in air) that may be encountered at an Incident include contaminated dust, heavy-metal particulates, pesticide dust and droplets of organic or inorganic liquids. A good method of collection is on a particulate filter of the glass or membrane type. Colorimetric detector tubes can also be used with a sampling pump when monitoring for some specific compounds. There are also direct reading continuous analyzers.

E. <u>Collection and Analysis</u>

1. Sorbent Samples

The sorbent material chosen, the amount used, and the volume will vary according to the types and concentrations of substances anticipated at a particular site. Polar solvent materials such as silica gel will collect polar substances not absorbed well on charcoal and the porous polymers.

Activated carbon and porous polymers will collect a wide range of compounds.

Exhaustive analysis to identify and quantify all the collected species can be prohibitively expensive. Therefore samples can be analyzed for principal hazardous constituents. The selection of these compounds should be based upon the types of materials expected from records and from information collected at the initial site survey. To aid in selection of these critical compounds samples should be colleted in air bags to be run later by portable GC or run on site. The resulting analysis may help in selection of major constituents.

Special absorbents and sampling conditions cab be used for specific compounds (see NIOSH Manual for the specific compound).

2. Aerosols

Samples of aerosols should be taken at relatively high flow rates (about two liter/min) using a standard industrial hygiene pump and filet assembly. To collect total particulates, a membrane filter having a 0.8 micron pore size is common. The sample can be weighed to determine total particulates, then analyzed destructively or non-destructively for organics and inorganics.

F. Calibration

The total air sampling system shall be calibrated rather that the pump alone. Proper calibration is essential for correct operation and for accurate interpretation for resultant data. As a minimum, the system should be calibrated twice, once prior to use and again after use. The frequency of calibration will depend upon the general handling and use of a given sampling system. Pump mechanisms should be recalibrated after repair, when newly purchased and following suspected abuse.

G. Meteorological Considerations

Meteorological information is an integral part of an air surveillance program. Data concerning wind speed and direction, temperature, barometric pressure, and humidity are needed for:

- Selecting air sampling locations
- Calculating air dispersion
- Calibrating instruments
- Determining population at risk or environmental exposure from airborne contaminants

Knowledge of wind speed and direction is necessary to effectively place air samples. In source-oriented ambient air sampling, samples need to be located downwind (at various distances) of the source while others need to be placed upwind to collect background samples. Shifts in wind direction must be known and samplers relocated or correction made for the shifts. In addition, atmospheric simulation models for predicting contaminant dispersion and concentration need wind speed and direction as input for predictive calculations.

Information may be needed on the velocity and direction of the wind, thus wind direction must be continually monitored.

Air sampling systems need to be calibrated before us and correction in the calibration curves made for temperature, pressure and humidity. After sampling, sample volumes are corrected for temperature and pressure variations. This requires monitoring these parameters.

APPENDIX G

Whole Foods Market Brooklyn Site
Public Fact Sheet and Press Release (October 2004)

WHOLE FOODS MARKET

BROOKLYN, NEW YORK

Fact Sheet
October 2004

What is Whole Foods Market?

Whole Foods Market is a uniquely mission-driven company committed to offering wholesome foods and natural products to its customers, empowering its employees in a team-oriented workplace, and actively involving itself in the communities it serves. This three-pronged commitment is directly reflected in the Whole Foods Market motto: "Whole Foods, Whole People, Whole Planet."

The world's largest retailer of natural and organic foods, with 162 stores in North America and the United Kingdom, Whole Foods currently operates two stores in New York City – a 60,000 square-foot Market at Columbus Circle and a 34,000 square foot Market on 7th Avenue in Chelsea.

What are Whole Foods Market's plans for Brooklyn?

Whole Foods Market is in contract to purchase a 2.1 acre site located at Third Avenue and Third Street in Brooklyn and will develop an as-of-right natural food store. The property will feature a 49,000 square-foot store, on-site parking for 177 cars, and a new, publicly-accessible waterfront esplanade along the Gowanus Canal. Whole Foods Market will create 300 construction jobs and approximately 400 high-quality, permanent jobs in Brooklyn, 90% of which are full-time positions.

Site location

The property, at the intersection of Third Avenue and Third Street and abutting the Gowanus Canal, is located between the neighborhoods of Park Slope and Carroll Gardens in an area populated primarily by commercial and light industrial uses. The Whole Foods site most recently was home to a variety of auto related uses, including a radiator repair shop and a warehouse.

Customers will access the Whole Foods parking lot via an entrance and an exit on Third Street. In addition, pedestrians will be served by a covered walkway from Third Street to the store's main entrance onto the parking lot. Parking will be both at-grade and in an additional lot on top of the store, accessible via a ramp from the parking lot. Deliveries will be made to the store at a loading dock located on the Third Avenue side, at the southwest corner of the site.

Store design

Not only will the Whole Foods Market become an active and involved member of the surrounding community, but the store itself has been designed specifically for this Brooklyn neighborhood. Featuring large windows into the store on both the Third Street and Third Avenue elevations, the Whole Food Market will maintain a pedestrian-friendly, active and accessible streetscape. The building's façade will be a combination of brick and other textures found elsewhere in the neighborhood. In addition, the two-story, 19th century brick building situated at the property's corner at Third Avenue and Third Street will remain in place. The Whole Foods Market will "jog" around the existing building at that corner.

Store features

Like all Whole Foods Markets, the Brooklyn store will be designed as a food 'experience', featuring approximately 29,000 square feet of retail area displaying a wide range of products, including produce, meat, poultry, fish, dairy, and health and beauty products. Throughout the store, specialty counters will offer a wide variety of prepared foods, ranging from soups, pizza, and sushi to salads and coffee. The prepared food can either be taken home or eaten in one of the in-store eating areas. There will even be a specialty area offering fresh cut flowers.

A 9,900 square foot first floor will contain an eating area with seating for approximately 140 people and a 'Community Room' that will overlook Third Street. Offices for store employees and regional staff will also occupy the First Floor, facing Third Avenue.

The retail and food preparation areas, totaling 38,169 square feet, will be partially 'sunken' below grade to reduce the visual bulk of the store and to maintain a roof line below that of the existing 19th century building on the corner.

Site improvement and waterfront esplanade

Whole Foods Market will seek entrance into the New York State Department of Environmental Conservation's "Brownfield Cleanup Program" as a volunteer in an effort to ensure that this former industrial site is comprehensively cleaned and re-developed in the most environmentally responsible manner possible. The soil on the site currently contains petroleum-based compounds and other pollutants as a result of its industrial past. Whole Foods Market will work closely with the DEC to ensure that the cleanup is completed within the agency's stringent requirements.

Along with cleaning up a currently polluted piece of property, Whole Foods Market will significantly improve the site by developing a publicly-accessible waterfront esplanade along the property's Gowanus Canal frontage. The 40 foot wide esplanade, extending the entire canal frontage, will feature benches, landscaped walkways and other amenities for public use.

Store operations

It is expected that the Whole Foods Market in Brooklyn will be open from 8:00 a.m. to 10:00 p.m., seven days a week. In order to better serve the surrounding neighborhoods, the store will feature convenient home delivery service. The store anticipates receiving approximately one tractor trailer delivery each day, along with various small vendor trucks. Truck deliveries are typically made in the early mornings.

What kind of community benefits will the new Whole Foods Market generate?

Create jobs

Construction of the Brooklyn Whole Foods Market will take an estimated 13 months and will create approximately 300 construction jobs. The store also will create approximately 400 permanent jobs, ranging from cashiers to store management. Whole Foods Market strives to create an environment in which people are treated with respect and are highly motivated to excel. Employees are offered great benefits, with a full complement of affordable medical benefit options, insurance, retirement, paid time off, and one of the highest store discounts in the industry. Of the 400 permanent jobs, it is anticipated that approximately 90% will be full-time positions and 10% part-time. The average wage at an established store ranges between $13 - $14 an hour. Whole Foods Market understands the importance of local hiring and will work with local groups and officials to ensure that the surrounding community is informed about the job opportunities coming to the neighborhood.

Clean up polluted site and return to community use

As a volunteer in the state's new Brownfield Cleanup Program, Whole Foods Market is committed to cleaning up and re-developing this site in the most comprehensive and effective manner possible. The community will benefit not only from the arrival of a high-quality, highly-respected natural foods store, but will enjoy access to the property's new 12,230 square foot waterfront esplanade.

Invest in the community

Whole Foods Market is a company with a conscience, and believes passionately in supporting the communities it serves. From sponsoring blood donation drives and local Habitat for Humanity projects to giving explanatory tours about food production to local school groups, Whole Foods Markets have an indelible impact on their surrounding neighborhoods. In addition, we pledge to donate at least five percent of our annual net profits to not-for-profit or educational organizations resulting from sales generated on five various days throughout the year.

Construction schedule & development team

Demolition, cleanup and environmental remediation are expected to begin on the site in January 2005 and will take approximately three months. Construction of the store will then begin in June of 2005, with a projected store opening in Fall of 2006.

The property and the store will be owned by Whole Foods Market and will be developed in conjunction with Cypress Equities, a national retail development company and an affiliate company of Staubach Retail.

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WHOLE FOODS MARKET

For Seventh Straight Year, Whole Foods Market Team Members Place Company on "100 Best Companies to Work For" List

27,000 Team Members Vote on Benefits Package, Underscoring Whole Foods Market's Unique Culture and Team Member Inclusion at All Levels

Austin, TX — January 6, 2004. Whole Foods Market (NASDAQ: WFMI), the world's largest natural and organic foods supermarket is proud to announce that its Team Members have rated their company as one of Fortune magazine's "100 Best Companies to Work For" for the seventh consecutive year. Ranked at number 47 this year, Fortune cited the company's PPO health coverage for both full- and part-time Team Members, the fact that 85 percent of the company's stock options are held by non-executives and the company's gainsharing plan that adds another 6 percent to wages, among the reasons for its ranking. Whole Foods Market is the only national supermarket retailer on the list and one of only 24 companies to make the list every year since its inception.

"My business philosophy since I began this company more than 23 years ago has focused on the fundamental importance of Team Member happiness. The job of the company's leadership is to empower Team Members and to help them learn, grow, and flourish," said John Mackey, Whole Foods Market CEO, president, chairman, and co-founder. "Along with our great performance for 2003, making the Fortune list once again illustrates that our everyday aspirations to be one of the best companies in the country to work for go hand in hand with our business success and shareholder satisfaction."

2003 was a particularly spectacular year at Whole Foods Market as it relates to Team Member inclusion and empowerment. In an unprecedented move, the company opened up all of the benefit options for a company-wide vote. Full-time and part-time Team Members were given the opportunity to vote on benefits ranging from health insurance to discounts on items purchased at Whole Foods Market stores. The innovative idea came to Mackey after touring the company's stores from coast to coast in the past year and listening to Team Member concerns and questions. Team Members were asked to share ideas about benefits they would like the company to offer and, through three subsequent votes, the benefit package was finalized, allowing each Team Member the unique opportunity to actively participate in the process. Whole Foods Market expects to repeat this benefits vote every three years.

"It is this sort of democracy in action that really sets Whole Foods Market apart and makes it a great place to work," said Cindy Bradley, vice president of human resources and Team Member services. "This vote is a great example of how making information available to Team Members so they can make intelligent decisions in the workplace is one of the ways that we share power on a daily basis."

For over 23 years, Whole Foods Market has worked hard to create an exciting, open work environment of self-empowerment where Team Members can excel and reach their highest potential. In 2003, Whole Foods Market was also one of the first companies in the United States to implement a progressive healthcare program that gives Team Members a monetary allowance prompting them to make the kinds of self-empowered healthcare decisions that directly impact their lives.

APPENDIX H

New York State Department of Health Generic Community Air Monitoring Plan

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

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