Environment

Prepared for:
PPG Industries
Allison Park, Pennsylvania

Prepared by:
AECOM
Piscataway, NJ
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PCB Soil and Concrete Sampling and Analysis Plan

Non-Residential Chromate Chemical Production Waste Site 114
Jersey City, New Jersey

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Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

This Sampling and Analysis Plan (SAP) was developed for in-place characterization of polychlorinated biphenyls (PCBs) in the vicinity of a historical release at 2 Dakota Street – PPG Site 114 in Jersey City, New Jersey. PCB concentrations were detected above the TSCA threshold of 50 milligrams per kilogram (mg/kg) in a soil sample collected from the area of proposed Interim Remedial Measures #2 (IRM#2). Additional in-place characterization and remediation are required to be in compliance with TSCA regulations. This document presents the following information:

- Brief background of the site,
- Information on previous PCB sampling at PPG Site 114,
- Review of TSCA regulatory considerations, and
- Sampling and analysis plan for in-place characterization of the PCB hot spot.

1.1 Site Background

The Site is a 16.6 acre property formerly used for the processing of chromium ore and manufactured gas. The western half of Site 114 was the location of a former chromate production facility that operated between approximately 1911 and 1963. The chromate operation included a chromate chemical production waste (CCPW) storage pile located at the southeastern quadrant of Site 114. The locations of the plant and CCPW storage pile were previously determined from aerial photographs and a more detailed discussion of chromate plant production processes are provided in the April 2003 Remedial Investigation Work Plan (RIWP; ENSR, 2003). In the northeastern portion of Site 114, a former manufactured gas plant (MGP) facility operated between 1886 to the mid-1930s. The topography of the Site is relatively flat, with ground surface elevation ranging from 12 to 16 feet above mean sea level (ft msl).

Subsequent to 1963, the property was sold or changed hands several times and three warehouses were built. In the late summer of 2002, PPG Industries, Inc. (PPG) began demolishing the warehouses. The demolition was completed in early 2003. At the present, the site remains vacant with three warehouse slabs and approximately 4 acres of paved areas (roadways and parking), including Dakota Street, which bisects the Site in an east-west direction starting at Garfield Avenue. Dakota Street is not currently a public right of way; it is a vacated street currently included within the fenced area of the Site. The IRM#2 Area, also referred to as the 2 Dakota Street slab, is the northeastern-most slab. Site 114 is currently completely enclosed by a barrier fence and remains secure.

Previous soil sampling for PCB analysis was conducted across the site in 2003, which is discussed in greater detail in Section 1.3. One of the 357 soil samples analyzed for PCBs had a PCB concentration above the TSCA regulatory threshold of 50 mg/kg. Sample B1302 (0-0.5 ft) contained 2,800 mg/kg of PCBs (Aroclor 1254). Sample B1302 was collected on August 15, 2003. The sample is located at the southeast end of IRM#2 (see **Figure 1**, Total PCBs in Soil). Additional in-place characterization of PCBs in the vicinity of the hot spot will be necessary prior to excavation of this section of IRM#2, in accordance with TSCA regulations. Currently, there are ongoing remedial activities associated with the CCPW material, part of which will include the area where PCBs have been detected.

The former one-story concrete warehouse building was located adjacent to sample location B1302. The concrete building foundation remains at the site and is between three and four feet above the ground surface. Based on visual inspection, there is no evidence of staining on the foundation wall or slab. Photographs of the concrete foundation taken on January 5, 2011 are provided in **Figure 2**.

1.2 Information on Historic Releases of Transformer Oil

Review of historic spill release records obtained from Public Service Electric & Gas Company (PSE&G) and the New Jersey Department of Environmental Protection (NJDEP) indicated that two separate incidents of transformer oil releases (both in 1995) have occurred on Site 114. Based on the information provided in the reports, the incidents do not appear to be related to the PCB hot spot. One of the incidents was located near the northeastern corner of the former building; however, it was reportedly a non-PCB oil release.

1.3 Information on Previous PCB Sampling at Site

ENSR (now AECOM) conducted extensive soil sampling across the Site in 2003 as part of the remedial investigation. The investigation activities were conducted to further characterize soil and groundwater impacts at the Site associated with historical operations, and were performed in compliance with the NJDEP-approved RIWP (ENSR, 2003) and the 2002 Preliminary Assessment Report / Site Investigation / Remedial Investigation Workplan (PAR/SI/RIWP) by Harding ESE (Harding, 2002).

PPG completed this work pursuant to Section III of the Administrative Consent Order (ACO), issued by the New Jersey Department of Environmental Protection (NJDEP) and agreed to by PPG on July 19, 1990. As described in the ACO, PPG is required to conduct remedial investigations at this Site and other non-residential sites in Hudson County, NJ that contain chromite ore processing residue, and also to investigate additional constituents that may have been associated with historic operations on Site 114.

More than 350 soil and concrete core samples were collected in August and September 2003 from over 100 sample locations and were analyzed for PCBs (Aroclors) using EPA Method 8082 in addition to other constituents. Analyses of the samples collected by ENSR personnel were performed by Accutest Laboratories in Dayton, NJ (NJ certification 12129) and Columbia Analytical Services in Rochester, NY (NJ certification ID NY004). The analyses were performed in accordance with EPA- and NJDEP-approved analytical protocols. Quality assurance analytical measures were implemented in accordance with the *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E; TRSR) and complied with the requirements for a NJDEP-certified laboratory. The data generated were found to be reliable and acceptable for use.

Soil borings were advanced at the Site using direct-push drilling methods (GeoProbe®) where possible. Conventional drill rig techniques (hollow stem auger [HSA] or mud rotary [MR]) were used when direct-push methods encountered refusal. Multiple samples were collected from each sample location, with samples depths ranging from 0 feet to 45 feet below ground surface (bgs).

PCBs were not detected in the majority of the samples (349 out of 357 samples), with detection limits ranging from 0.033 mg/kg to 0.95 mg/kg. Of these samples, there was only one sample (B1302) in which the PCB concentration exceeded the TSCA regulatory threshold of 50 mg/kg. **Figure 1** shows the 2003 soil sampling locations, and any results that exceeded the NJDEP residential direct contact soil remediation standard of 0.2 mg/kg.

The PCB (Aroclor 1254) concentration was 2800 mg/kg in the soil sample collected at B1302 from a depth of 0-0.5 ft bgs. The source of the PCB detected at B1302 is not known. Four soil samples were collected at this location. In addition to the surface soil sample, samples were collected at depth intervals of 10-10.5, 12–12.5 and 17-17.5 feet bgs. PCBs were not detected in the 10-10.5 and 17-17.5 feet bgs intervals, at detection limits of 0.82 mg/kg and 0.80 mg/kg, respectively. PCBs were detected at a concentration of 2.4 mg/kg at the sample collected at a depth of 12-12.5 feet bgs. This sample result was likely caused by cross-contamination from the mechanism of GeoProbe® sample collection. The other detections of PCBs adjacent to B1302 (samples B803, TT1308 and TT319) were all in the 0-0.5 foot depth interval, not in any deeper intervals.

As part of the in-place characterization sampling program described in this work plan (Section 2.0), AECOM will resample the 12-14 and 14-16 foot depth intervals at location B1302.

1.4 Review of TSCA Regulatory Considerations

AECOM determined that the soil sample with 2,800 mg/kg PCB meets the definition of a *PCB Remediation Waste* under TSCA and that the TSCA Spill Policy applies at Site 114. The options to proceed under TSCA with the assessment of the extent of PCB impacts are also presented in this section.

1.4.1 PCB Remediation Waste

Under TSCA, a PCB Remediation Waste is defined (40 CFR §761.3, Definitions) as follows:

> *PCB remediation waste* means waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations:
>
> > Materials disposed of prior to April 18, 1978, that are currently at concentrations ≥50 parts per million (ppm) PCBs, regardless of the concentration of the original spill;
> >
> > Materials which are currently at any volume or concentration where the original source was ≥500 ppm PCBs beginning on April 18, 1978, or ≥50 ppm PCBs beginning on July 2, 1979; and
> >
> > Materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under this part.
>
> PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, including, but not limited to:
>
> > (1) Environmental media containing PCBs, such as soil and gravel; dredged materials, such as sediments, settled sediment fines, and aqueous decantate from sediment.
> >
> > (2) Sewage sludge containing < 50 ppm PCBs and not in use according to §761.20(a)(4); PCB sewage sludge; commercial or industrial sludge contaminated as the result of a spill of PCBs including sludges located in or removed from any pollution control device; aqueous decantate from an industrial sludge.

(3) Buildings and other man-made structures (such as concrete floors, wood floors, or walls contaminated from a leaking PCB or PCB-Contaminated Transformer), porous surfaces, and non-porous surfaces.

The second provision above applies to the PCB soil sampling results for Site 114. While the PCB concentration of the original release is not known with certainty, it must have been higher than 50 or 500 ppm PCBs to result in a soil concentration of 2,800 ppm.

Under a strict interpretation of this definition, any concentration of PCBs above 1 ppm (the EPA cleanup level with no restrictions or further conditions) could be considered a PCB Remediation Waste. In practice and in most EPA regions, the EPA typically considers 50 mg/kg to be the TSCA threshold level. The 2,800 mg/kg soil PCB concentration represents a PCB Remediation Waste, and additional characterization of extent of PCBs is required.

1.4.2 TSCA Spill Policy

Subpart G of TSCA is the Spill Cleanup Policy, which contains the criteria which the EPA uses to evaluate the adequacy of the cleanup of spills resulting from the release of materials containing PCBs at concentrations of 50 ppm or greater. The policy was intended for small spills from electrical equipment with impacts limited to areas that are 20 feet in diameter. It's applicable to spills which occur after May 4, 1987. However, the Spill Policy applies to recent spills only, and it requires that the spill cleanup begin within 48 hours of a transformer spill (40 CFR§761.125(c)(1)). Because the source of the PCB concentration was prior to 2003 when the sample from B1302 was collected, the TSCA Spill Policy is not applicable for this release.

1.4.3 Approaches to Characterization and Cleanup Under TSCA

There are three approaches possible under TSCA for the characterization, cleanup and disposal of *PCB Remediation Waste*, which are the self-implementing approach (40 CFR§761.61(a)); the performance-based approach (40 CFR§761.61(b)); and the risk-based approach (40 CR 761.61(c)).

The self-implementing approach has detailed requirements for in-place PCB characterization, management and disposal of PCB Remediation Waste, decontamination procedures, labeling and post-excavation confirmation sampling. The PCB characterization sampling must be conducted in-place prior to any excavation, and is based on a 10 foot by 10 foot sampling grid (maximum spacing) with a maximum sampling depth interval of 2 feet. Subpart N of TSCA details the characterization sampling and analytical methodology. The acceptable extraction methods are USEPA SW-846 (Test Methods for Evaluating Solid Waste) Method 3500B/3540C or Method 3500B/3550B from EPA's SW-846. The acceptable analytical methodology is SW-846 Method 8082 (gas chromatography), which quantitates the PCBs as Aroclors.

For concrete sampling of building foundations or pads, core samples must be collected (wipe samples are not acceptable). More information on concrete and soil sampling is provided in Section 2.0.

The post-excavation sampling requirements under the self-implementing approach are based on a 1.5 meter grid. This stage of sampling is not included in this work plan. TSCA also specifies the decontamination methods for sampling equipment and the management of decontamination wastes.

The in-place characterization sampling may be conducted without agency notification or approval. However, the agency must be notified at least 30 days prior to conducting the cleanup. The submittal requirements for EPA notification of a TSCA cleanup under the self-implementing approach are provided in 40 CFR§761.61(a)(3), and include providing site information, background data, nature and extent of PCB impacts, the planned remedial approach, certifications from the laboratory and property owner, and a proposed schedule. The EPA has 30 days to respond in writing to the notification.

The performance-based approach only addresses the disposal of PCB Remediation Waste, and does not address characterization and confirmation sampling requirements. This approach specifies what disposal technologies can be used for treatment and/or disposal of PCB Remediation Wastes. EPA notification is not needed for disposal of *PCB Remediation Waste* under the performance-based approach; however, no PCBs above 1 ppm may be left at the site.

The risk-based approach allows greater flexibility for conducting in-place characterization, management and disposal of wastes, and post-cleanup confirmation sampling. However, this method requires agency review and approval. The EPA PCB Q&A Manual (January 2009) states that the agency recommends allowing at least 180 days for the review process. In practice, the review and approval process typically has a duration of several years.

Due to the need to address the PCB impacts in a shorter time frame at Site 114, AECOM recommends proceeding with a self-implementing approach. Section 2.0 provides a soil and concrete sampling and analysis plan for the characterization of the historic PCB hot spot in the vicinity of sample B1302.

1.5 Health and Safety Plan and Quality Assurance Project Plan

PPG had previously prepared a Health and Safety Plan (“HASP”) and a Field Sampling Plan-Quality Assurance Project Plan (FSP-QAPP). These documents are included by reference in **Appendices A and B**, and are available under separate covers. These two documents describe the health and safety protocols and the quality assurance requirements applicable to remedial investigations at non-residential CCPW sites for which PPG has responsibility.

The HASP (referenced in **Appendix A**) establishes general health and safety protocols to be followed by site personnel during implementation of the SAP. The HASP describes training, medical surveillance, personnel hygiene practices, hazard exposure monitoring, and monitoring equipment maintenance requirements. It is a dynamic document, which will be updated as needed to address issues that may be encountered during the RI.

The FSP-QAPP (AECOM, 2010) referenced in **Appendix B**) establishes the overall quality assurance (“QA”) objectives for the RI program and documents sampling and analytical procedures to be used for collecting and analyzing environmental samples. It describes procedures for equipment decontamination, sample handling, sample chain-of-custody protocols, and standard QA procedures for conducting the RI. The FSP-QAPP will be updated as conditions warrant. The FSP-QAPP was prepared to address the requirements presented within Appendix C of the 1990 ACO.

This SAP documents the type, number, and frequency of samples to be collected, but in general, will refer to the FSP-QAPP when specifying sampling procedures, analytical methods, drilling techniques, or other procedures that will be employed throughout the program.

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2.0 Soil and Concrete Sampling and Analysis Plan

This SAP describes the field and laboratory methodology that will be used to characterize the *in situ* PCB concentrations in soil and potential concrete in the vicinity of the historic PCB hot spot at Site 114. The purpose of the SAP is to complete the collection of soil and potential concrete analytical data in accordance with the requirements for in-place characterization according to the self-implementing approach as included in section 761.61(a) of 40 CFR Part 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (PCB Rule), and Subpart N, Cleanup Site Characterization Sampling for PCB Remediation Waste in Accordance with 761.61(a)(2).

2.1 Utility Protection

Subsurface utilities were mapped for Site 114 prior to the implementation of IRMs to excavate and remove CCPW from the site (**Appendix C**). Background information indicates that the storm sewers are the only active subsurface utilities at Site 114, although abandoned utilities are expected to be present. Prior to conducting any intrusive operations at any site, existing drawings and other available documentation will be reviewed to evaluate whether potential conflicts with underground utilities exist. New Jersey One Call will be contacted by the drilling contractor at least three and not more than ten business days prior to the start of drilling.

Additionally, existing work plans for current work in the vicinity of IRM#2 will be reviewed to evaluate if underground utilities have been identified in the proposed sampling area.

2.2 Ambient Air Monitoring: Dust Control and Monitoring

The potential for dust generation during the PCB investigation activities is considered moderate. The primary activities which may generate dust are breaking through concrete for sampling as well as coring through the concrete for soil boring advancement. Dust may also be generated during movement of heavy equipment in areas that are not paved and subsurface drilling. A water spray will be utilized during these activities, as needed, to reduce the potential for dust generation. Dust monitoring and control measures are described in the project HASP (**Appendix A**) and in the NJDEP-approved Air Monitoring Work Plan (**Appendix D**) and Dust Control Plan (**Appendix E**). The Air Monitoring Work Plan describes the robust air monitoring program at the site which includes real time monitoring and laboratory analytical backup. The Dust Control Plan specifies the significant measures being implemented to control dust generated as a result of intrusive activities.

2.3 Soil and Concrete Sampling

This section describes the soil and potential concrete in-place characterization sampling that will be conducted at IRM#2. Soil sampling will be conducted first, as described below. Concrete sampling of the building foundation is conditional upon the results of the soil sampling, and will be conducted only if PCBs equal to or greater than 1 ppm are detected in soil samples adjacent to the building foundation. Concrete sampling (if conducted) would incur additional soil sampling beneath the building foundation as well.

2.3.1 Establishing the Sample Grid

In accordance with 40 CFR §761.265, a sample grid will be established for the *in situ* characterization of PCBs. Sample location B1302 will be the approximate center of the sampling grid. Section 761.265 specifies a maximum grid interval of 3 meters (10 feet). The grid will be established on ten foot spacing extending to 20 feet away from the center in three directions, as shown on **Figure 3**. The concrete building foundation, which stands three to four feet above grade, is adjacent to the center of the grid. Note that the locations along grid row 10 (see Figure 3 are on the concrete building slab, and no samples will be collected from these locations during this IRM investigation (see Section 2.4.4, below).

The grid will be established in the field based on taped measurements from existing surveyed monitoring wells and other structures at the site. The transects on the X and Y axes will be marked with alternately colored wooden stakes. The grid will be labeled in an alpha-numeric scheme, as shown on **Figure 3**.

2.3.2 Soil Sampling

Soil sampling will be conducted in accordance with *POP 005, Surface and Subsurface Soil Sampling Procedures (June 2010)*, as provided in the QAPP. Soil samples in the unpaved area (southeast of the building foundation in IRM#2) will be collected for PCBs analysis at ten foot spacing on the sampling grid. In addition, bias soil samples will be collected in areas that contain obvious signs of staining. A GeoProbe® will be used to collect soil samples within each grid. Samples will be collected from three depth intervals, from 0-2, 2-4, and 4-6 feet bgs; however, discrete soil samples will be collected over six inches from each interval (i.e., 0-0.5, 2.5-3, and 5-5.5 feet bgs). Samples will also be collected at location B1302 at two depth intervals, 12-14 and 14-16 feet, to determine if PCBs are present at that depth, as discussed in Section 1.3 above. Soil samples will be collected from six inch discrete samples from the two depth intervals at B1302. If there is evidence of staining in other portions of the two foot depth interval, bias soil samples will also be collected. Soil sample locations are indicated on **Figure 3**.

Soil samples from all locations will be collected during one mobilization. However, samples from B1302 (12-14 and 14-16 feet) and the samples closest to B1302 will be analyzed initially, at the 0-2 and 2-4 foot depths. If the results from these intervals exceed 1 ppm, samples from farther grid spacing (i.e., at 20 feet from B1302) and/or at the 4-6 foot depth will then be analyzed. **Figure 3** shows the sample locations to be analyzed first (6 locations, blue dots) and the subsequent sample locations (9 locations, green dots) to be analyzed based on the results of the first grid spacing locations. **Table 1** summarizes the samples to be collected and analyzed per location and based on immediate and contingent sampling.

For each soil sample collected for PCB analysis, the soil will be placed in a stainless steel bowl and mixed to homogenize the sample. Any debris (e.g., rocks, roots, metal, wood, etc.) will be removed. Once homogenized, an aliquot of soil will be transferred to an 8 ounce (oz) amber glass jar, and any remaining soil will be placed in labeled 55-gallon drums. The labeling will indicate that the soil is potentially PCB-containing waste. Sample jars will be and stored and shipped in an ice-filled cooler to the analytical laboratory under chain-of-custody protocol.

Sampling procedures will also be in accordance with Subpart N of TSCA (*Cleanup Site Characterization Sampling for PCB Remediation Waste in Accordance with §761.61(a)(2)).* Sampling equipment will be decontaminated as described in Section 2.4 prior to initial use and between sampling locations.

As discussed above, two soil samples will be collected at location B1302. Samples will be collected from all 15 grid locations with three samples collected at each location, which equals 45 soil samples. This work plan estimates that up to 47 soil samples will be collected, not including field duplicates, equipment (field) blanks, and and matrix spike/matrix spike duplicates. The analysis of these samples will be conducted sequentially and as needed, as described above.

2.3.3 Concrete Sampling

Soil sampling will be conducted initially at IRM#2, and concrete core sampling will only be conducted if warranted based on the results of the soil sampling. Sample location B1302 is located approximately 4 feet away from the concrete building foundation, which extends from three to four feet above the ground surface (see **Figure 2**). If the soil sampling results from the gridline closest to the foundation (I11 through M11, **Figure 3**) indicate that PCB concentrations are less than 1 ppm (EPA cleanup level with no conditions or restrictions*)*, then the concrete foundation will not require sampling. If PCBs are detected in soil samples adjacent to the foundation at concentrations equal to or greater than 1 ppm, then the sidewall of the concrete foundation will be sampled adjacent to any soil exceedances as well as the adjacent nodes on the sidewall grid. One discrete soil sample will also be collected beneath the foundation at each location where sidewall concrete samples are collected. The PCBs are not expected to have migrated through the building walls and into the building. Therefore, samples will not be collected into the building (i.e., grid row 10, heading west-northwest) on the 10 ft sampling grid.

AECOM will collect concrete core samples of the foundation sidewall at intervals of 1 inch, 3 inches and 6 inches of penetration into the concrete, spaced approximately ten feet apart along the sidewall. Core samples will be taken at the ground surface, the midpoint of the sidewall (approximately 1.5 feet above ground), and 1.5 feet below the ground surface (in the foundation footing) at up to five grid nodes. The extent of the core sampling is dependent upon laboratory results of soil and concrete sampling, and will be adjusted in the field as necessary to adequately characterize the PCBs. This work plan estimates that up to 50 concrete core samples may be collected, including field duplicates and matrix spike/matrix spike duplicates.

Soil samples will be collected at the same three depths as described in Section 2.3.2 (0-2, 2-4 and 4-6 feet bgs) at each grid node where concrete core samples are collected. Therefore, up to 17 additional soil samples (5 locations at 3 depths, plus QA/QC samples) may be collected as part of this program.

The approach of incrementally sampling into the sidewall (rather than extending the grid ten feet into the building foundation – i.e., into grid row 10) was discussed with an EPA Region 2 TSCA staff person (Vickie Pane) in a telephone call on January 3, 2011. Concrete core sampling will be conducted using the EPA *SOP #2011, Chip, Wipe and Sweep Sampling* and the *EPA Region 1 Draft SOP for Sampling Concrete in the Field* (refer to **Appendix F**). Note that *POP 010 Chip Sampling and POP 012 Concrete Core Sampling* from the project QAPP are not applicable sampling methods for compliance with the TSCA regulations. AECOM personnel will use the following procedure to collect discrete concrete core samples:

- Following a dry sweep of the area to be sampled, an approximate 15- by 15-inch square will be marked on the surface in the center of the grid to identify the limits of the sample collection area.
- If an epoxy or other surface covering is present, the covering will be removed with a hammer drill/chisel bit and expose the concrete surface. The epoxy will be removed to prevent contamination of the concrete sample with constituents that may be a component of the epoxy.

- The removed covering (if present) will be collected and containerized using a broom and dustpan. The sample collection area, and the area immediately surrounding the sample collection area, will be vacuumed prior to collecting the concrete sample. The collected debris will be placed in labeled 55-gallon drums for proper disposal.
- The surface of the concrete will be scarified using the hammer drill with a chisel bit (to reduce heat generation) in an approximate grid pattern, to a depth of approximately 1-inch, or as necessary to accumulate sufficient sample weight for the required laboratory analyses. (Typically, four to five holes are drilled to accumulate adequate sample volume, which is 30 grams. As this is a minimal mass for analysis, additional sample weight will be required for samples designated for MS/MSD analysis.)
- The concrete chips/particles will be collected from within the sample area using the disposable paintbrush and stainless steel trowel or “scoopula.”. On sidewall surfaces, a piece of dedicated plastic (polyethylene) liner may be placed below the location of the coring and taped to the sidewall to collect concrete powder. The concrete powder will be placed into the laboratory supplied sample containers (2-oz or 4-oz amber glass jar). Additional scarifying of the concrete surface will be done if additional sample weight is required.
- Once the required sample volume is collected, the area will be cleaned of excess concrete particles, which will be placed in labeled 55-gallon drums for proper disposal.
- The chisel bit and stainless steel trowel will be cleaned between each sample location using an initial soap and water wash followed by a potable water rinse, in accordance with the EPA Region 1 Core Sampling SOP. The plastic liner will be disposed of following the collection of each sample.
- The concrete sample will be placed in laboratory-provided sample containers and stored and shipped in an ice-filled cooler to the analytical laboratory under chain-of-custody protocol.

Due to the logistical difficulties, and health and safety considerations of field personnel using a hammer drill to remove up to six inches of concrete, AECOM will use a GeoProbe® to remove a core of concrete above the 3 inch and 6 inch sampling depths. A hammer drill will then be used to generate the concrete core samples at the prescribed depths, in accordance with the EPA SOPs and 40 CFR §761.286. **Table 2** summarizes the samples to be collected and analyzed per location and based on immediate and contingent sampling.

AECOM recommends that the concrete GeoProbe® drilling be conducted during one mobilization, i.e., the 3 inch core and the 6 inch core will be removed (concurrently with the 1-inch core) from the three elevations at each grid location. The 1 inch and 3 inch core samples will be manually collected with a drill hammer. The 1 inch samples will be analyzed by the laboratory initially. If these samples results are less than 1 ppm PCBs, no additional analysis or sampling will be conducted. If there are PCB detections equal to or greater than 1 ppm in the 1 inch core samples, then the 3 inch core samples will be analyzed. If there are PCB detects equal to or greater than 1 ppm in the 3 inch core samples, then the 6 inch core samples will be collected and analyzed. If PCB concentrations exceed 1 ppm in the 6 inch core samples, AECOM will prepare a work plan addendum for additional concrete core sampling. This additional sampling is not part of this work plan.

Note that the sample methodology for collecting the sub-slab sample below grade is not provided at this time. If concrete sampling is required, the sampling technique will be evaluated based on field conditions.

2.4 Equipment Decontamination

Equipment decontamination is an integral part of the data collection and QA process. Proper equipment decontamination is essential to prevent cross-contamination and to protect personnel from exposure to hazardous substances. All field and sampling equipment will be decontaminated prior to initial use and after each sample location, in accordance with the PPG QAPP (AECOM, 2010) and with Subpart S of TSCA 40 CFR §761. TSCA specifies that sampling equipment must be decontaminated and tested before leaving the site, per 40 CFR §761.79, Decontamination Standards and Procedures. The decontamination standard for unrestricted use of non-porous surfaces (i.e., drill rod or excavator bucket) in contact with non-liquid PCBs (i.e., soil or concrete) is cleaning to *Visual Standard No. 2, Near-White Blast Cleaned Surface Finish*, of the National Association of Corrosion Engineers (NACE). AECOM will verify compliance with standard No. 2 by visually inspecting all cleaned areas.

Decontamination fluids generated during equipment decontamination will be containerized and managed according to the Investigative Derived Waste (IDW) requirements of the IRM Work Plan (POP 014, Decontamination of Field Equipment) and Subpart §761.378.

2.5 Sample Identification and QA/QC Procedures

All soil samples will be identified with a unique sample identification (ID) based on the grid cell and depth of the sample location, proceeded by “114” to denote Site 114. Following the site identification, a hyphen will be used followed then by the letter “P” to indicate PCB. Following the letter “P”, the grid cell location will be designated. A hyphen and the depth interval will then be identified. For consistency, all number designations will consist of two numerals (i.e., 08 not 8). Sample depth will be indicated at the top of the discrete sampling interval as follows:

00 = 0 – 0.5 feet bgs

02 = 2.5 – 3 feet bgs

05 = 5 – 5.5 feet bgs

A soil sample collected in grid cell K12 at a depth of 0-0.5 feet would be labeled as “114-PK12-00.” If a biased sample is collected (i.e., based on field personnel noting visual staining, as discussed in section 2.3.2), the sample will be identified by the appropriate grid cell and depth, along with a “BS” extension to indicate that it is a bias sample (e.g., 114-PK12-00-BS).

Concrete sample IDs will use the same grid notation. Samples collected from ground surface will be coded as “GS,” samples collected from the midpoint will be coded as “MP,” and samples from 1.5 feet below the ground surface will be coded as “BGS.” The coring depth will be indicated as follows:

01 = one inch sample

03 = three inch sample

06 = six inch sample

A core sample collected from the ground surface at grid node K11 at a depth of 3 inches will be identified as “114-PK11-GS-01.” Soil samples collected beneath the concrete locations will be coded as “SB” and will use the sample depths provided as above for soil locations (e.g., 114-PK11-SB-00).

Equipment (field) blank samples will be identified as “EB” followed by the date the blank was collected in MMDDYY format (e.g., EB-021511). Per the QAPP, equipment blanks will be collected at a frequency of either one blank per day or 10% of the total number of samples collected, but not more than 1 per day.

Blind field duplicate samples will be identified by adding “Z” to the sample ID, to indicate that it is the field duplicate of the sample from that location (e.g., 114-PK12-00-Z or 114-PK11-GS01-Z). Per the QAPP, field duplicate samples will be collected at a frequency of 1 per 20 field samples or 5%.

Samples submitted for matrix spike/matrix spike duplicate (MS/MSD) analyses will not be given a separate identification, but will have “MS/MSD” recorded in the comments column of the chain-of-custody record. Per the QAPP, MS/MSD samples will be collected at a frequency of 1 per 20 samples or 5%.

Immediately after collection, all samples will be labeled with an adhesive label which includes the sample ID, analysis to be performed, preservation, sample collection date and time, and initials of the sampler.

2.6 Analytical Methods and Holding Times

Samples will be analyzed in an iterative process, beginning with eight soil samples collected closest to sample location B1302 (6 grid samples and 2 samples at depth). If exceedances of the EPA standard for PCBs (1 ppm) are found in a sample, then the samples adjacent to the exceedance will be analyzed.

All PCB samples will be extracted using either Method 3500B/3540C (manual Soxhlet extraction) or Method 3500B/3550B (ultrasonic extraction) from EPA SW-846, Test Methods for Evaluating Solid Waste, and analyzed according to SW-846 Method 8082A. Analyses will also be performed in accordance with the project QAPP.

Soil samples will be collected in 8 oz amber glass jars. Concrete samples will be collected in 4-oz. glass jars. Aqueous samples (i.e., equipment blanks) will be collected in two-1-Liter (L) amber glass bottles. Soil PCB samples must be extracted within 14 days from sample collection, and extracts must be analyzed within 40 days of extraction. Aqueous PCB samples must be extracted within 7 days from sample collection, and extracts must be analyzed within 40 days of extraction. All soil and aqueous samples will be stored on ice while in the field and during transportation to the laboratory.

2.7 Project Action Limits and Reporting Limits

There are two project action limits (PAL) for the PCB assessment and potential remediation at Site 114: 1 ppm total PCBs for the in-place characterization samples and post-excavation sidewall and bottom samples under the TSCA program, and 0.2 ppm total PCBs for the NJDEP Default Impact to Groundwater Screening Level . The 1 ppm PAL represents the EPA’s high occupancy/no further restrictions standard for PCBs in soil and concrete under TSCA.

Accutest’s reporting limit (RL) for PCBs in soil is 0.034 mg/kg (prior to adjustment for any dilutions and percent moisture), which provides for proper *in situ* characterization of the PCB concentrations in soil or concrete. All soil and concrete sample concentrations will be reported on a dry weight basis in accordance with the QAPP and CFR Title 40 §761.274.

3.0 Waste Characterization Sampling

After review of the laboratory analyses from the samples collected for the in-place characterization of PCBs, AEOCM personnel will collect samples for waste characterization and disposal, in anticipation of off-site disposal of PCB Remediation Waste. The characterization parameters and the number of waste characterization samples will be determined based on the laboratory results and the estimated volume of proposed PCB Remediation Waste and the requirements of the receiving facility. Further details will be provided in a subsequent remediation work plan. The cost for this sampling is not included in the proposed budget for this phase of field work.

4.0 Project Schedule

Key target dates for the PCB investigation activities at Site 114 include the following:

- Field Work: Field work will be initiated in early February 2011 and is expected to be completed within five to seven days.
- Analytical Results: Receipt of soil and concrete analytical results is expected in mid February 2011.
- Summary Report: Submittal of the final Report to the client is scheduled for late February 2011.

5.0 References

ACO, 1990. Administrative Consent Order in the Matter of Hudson County Chromate Chemical Production Waste Sites and PPG Industries, Inc. July 19, 1990.

AECOM, 2010a. Updated "*Field Sampling Plan-Quality Assurance Field Sampling Plan / Quality Assurance Project Plan Non-Residential Chromium Sites, Hudson County, New Jersey,"* December 2010*.*

AECOM, 2010b. "*Health & Safety Plan, Environmental Site Investigations, PPG Sites, Hudson County, New Jersey,"* September 2010.

AECOM, 2010c. "*Air Monitoring Workplan for Ground Intrusion Activities at the Garfield Avenue Site in Jersey City, New Jersey*," July 2010.

AECOM, 2010d. "*Final Dust Control Plan – Interim Remedial Measures & Pilot Tests Garfield Avenue – Site 114 Jersey City, New Jersey*," June 2010.

AECOM, 2009, *Integrated Remedial Investigation Report – Sites 114, 132, 133, 135, 137 and 143, Jersey City, New Jersey. December 2009.*

ENSR, 2003, *Remedial Investigation Workplan (RIWP), Site 114. April, 2003.*

ENSR, 2006a, *Remedial Investigation Report, PPG Site 114 – Garfield Avenue, Jersey City, New Jersey. March, 2006.*

ENSR, 2006b, *Non-Residential Chromate Chemical Production Waste Sites - Sites 121, 132, 133, 135, 137 and 143, Jersey City, New Jersey. September, 2006.*

JCO, 2009. Judicial Consent Order for the PPG Sites. June 26, 2009.

Tables

Table 1

Site 114 PCB Sample Summary - Soil

PPG Non-Residential Chromium Remediation Project

Soil				
Sample/Grid Location	**Field Samples**			**Sample Name[3]**
	Immediate[1]	**Contingent[2]**	**Total**	
B1302	2	0	2	114-PB1302-xx
L11	2	1	3	114-PL11-xx
L12	2	1	3	114-PL12-xx
K11	2	1	3	114-PK11-xx
K12	2	1	3	114-PK12-xx
J11	2	1	3	114-J11-xx
J12	2	1	3	114-J12-xx
M11	0	3	3	114-M11-xx
M12	0	3	3	114-M12-xx
M13	0	3	3	114-M13-xx
L13	0	3	3	114-L13-xx
K13	0	3	3	114-K13-xx
J13	0	3	3	114-J13-xx
I11	0	3	3	114-I11-xx
I12	0	3	3	114-I12-xx
I13	0	3	3	114-I13-xx
Total	***14***	***33***	***47***	

Notes:

[1] Immediate analyses are 12-14 and 14-16 ft bgs at B1302, and 0-2 and 2-4 ft bgs at all other locations.

[2] Contingent analyses are 4-6 ft bgs at all immediate locations (except B1302) and all depths from other grid locations.

[3] Sample nomenclature: "114" for Site 114, (hyphen), "P" for PCB, Grid Location, (hyphen), depth to top of discrete sample interval (xx).

Field duplicate samples will be collected at a frequency of 1 per 20 field samples.

Matrix Spike/Matrix Spike Duplicates will be collected at a frequency of 1 per 20 field samples. No additional sample volume is required for MS/MSD analysis.

Equipment (field) blank samples will be collected at a frequency of one per day or 10% of the total number of samples collected.

Table 2

Site 114 PCB Sample Summary - Concrete

PPG Non-Residential Chromium Remediation Project

Concrete				
Sample/Grid Location	Field Samples			Sample Name[3]
	Immediate[1]	Contingent[2]	Total	
I11	3	6	9	114-PI11-GS-xx 114-PI11-MP-xx 114-PI11-BGS-xx
J11	3	6	9	114-PJ11-GS-xx 114-PJ11-MP-xx 114-PJ11-BGS-xx
K11	3	6	9	114-PK11-GS-xx 114-PK11-MP-xx 114-PK11-BGS-xx
L11	3	6	9	114-PL11-GS-xx 114-PL11-MP-xx 114-PL11-BGS-xx
M11	3	6	9	114-PM11-GS-xx 114-PM11-MP-xx 114-PM11-BGS-xx
Total	***15***	***30***	***45***	

Notes:

[1] Immediate analyses are the 1 inch penetration cores from the the ground surface, midpoint, and 1.5 foot below grade locations.

[2] Contingent analyses are the 3 inch and 6 inch penetration cores from the ground surface, midpoint, and 1.5 foot below grade locations. Does not include soil boring beneath foundation.

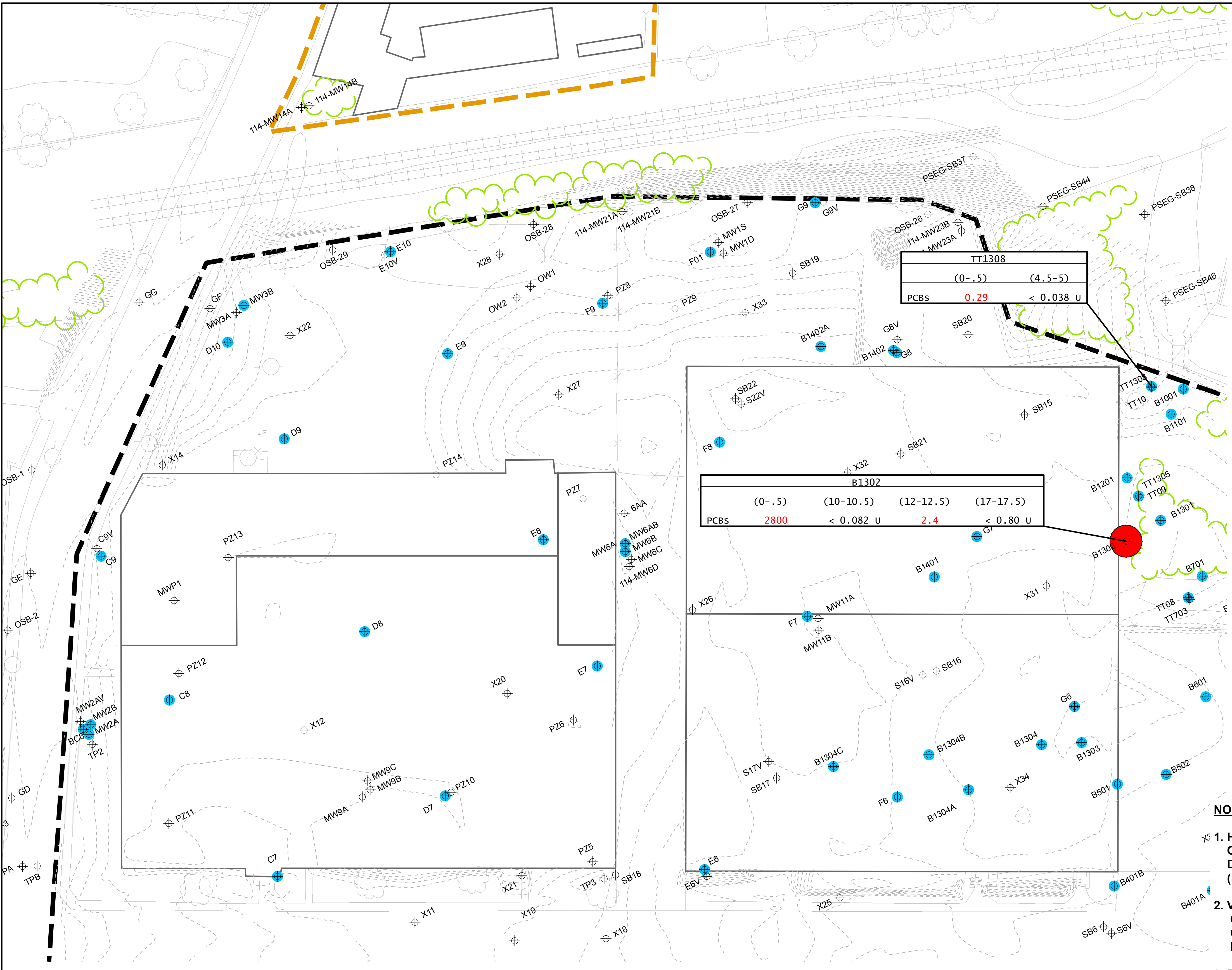
[3] Sample nomenclature: "114" for Site 114, (hyphen), "P" for PCB, Grid Location, (hyphen), "GS" for ground surface" or "MP" for midpoint or "BGS" for below ground surface, (hyphen), depth to top of discrete sample interval (xx).

Field duplicate samples will be collected at a frequency of 1 per 20 field samples.

Matrix Spike/Matrix Spike Duplicates will be collected at a frequency of 1 per 20 field samples. Additional sample volume is required for MS/MSD analysis.

Equipment (field) blank samples will be collected at a frequency of one per day or 10% of the total number of samples collected.

Figures



LEGEND

⌖ SAMPLE LOCATION

EXCEEDANCE IN SOIL

●

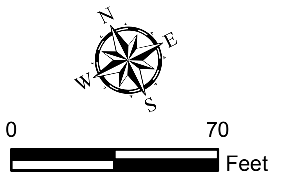
🟥 TOTAL PCBs

● NOT EXCEEDED

SAMPLE ID	
(DEPTH IN FEET)	
ANALYTE NAME	RESULTS

NOTES:

1. HORIZONTAL DATUM - UPDATED TO NAD 1983 FROM NAD 1927, BASED ON GPS OBSERVATIONS BY LYNH, GIULINA AND ASSOCIATES, INC., DECEMBER 7, 2002, AND REFER TO NATIONAL GEODETIC MONUMENT "JONES" (POINT IDENTIFICATION NUMBER KV5836).
2. VERTICAL DATUM – NAVD 1988, BASED ON FIELD OBSERVATION BY LYNH, GIULINA AND ASSOCIATES, INC., OCTOBER 25, 2002, REFER TO NATIONAL GEODETIC MONUMENT "LSP SOUTH", (POINT IDENTIFICATION NUMBER KV6856, ELEV.=9.0 FEET NAVD 1998).
3. DATA ARE COMPARED TO THE MOST STRINGENT OF THE NJDEP RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARDS ("RDCSRS") AND THE NON-RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARDS ("NRDCSRS").



AECOM

PPG INDUSTRIES
IRM #1 AND IRM #2 AREAS
JERSEY CITY, NEW JERSEY
60149955.4011.1A

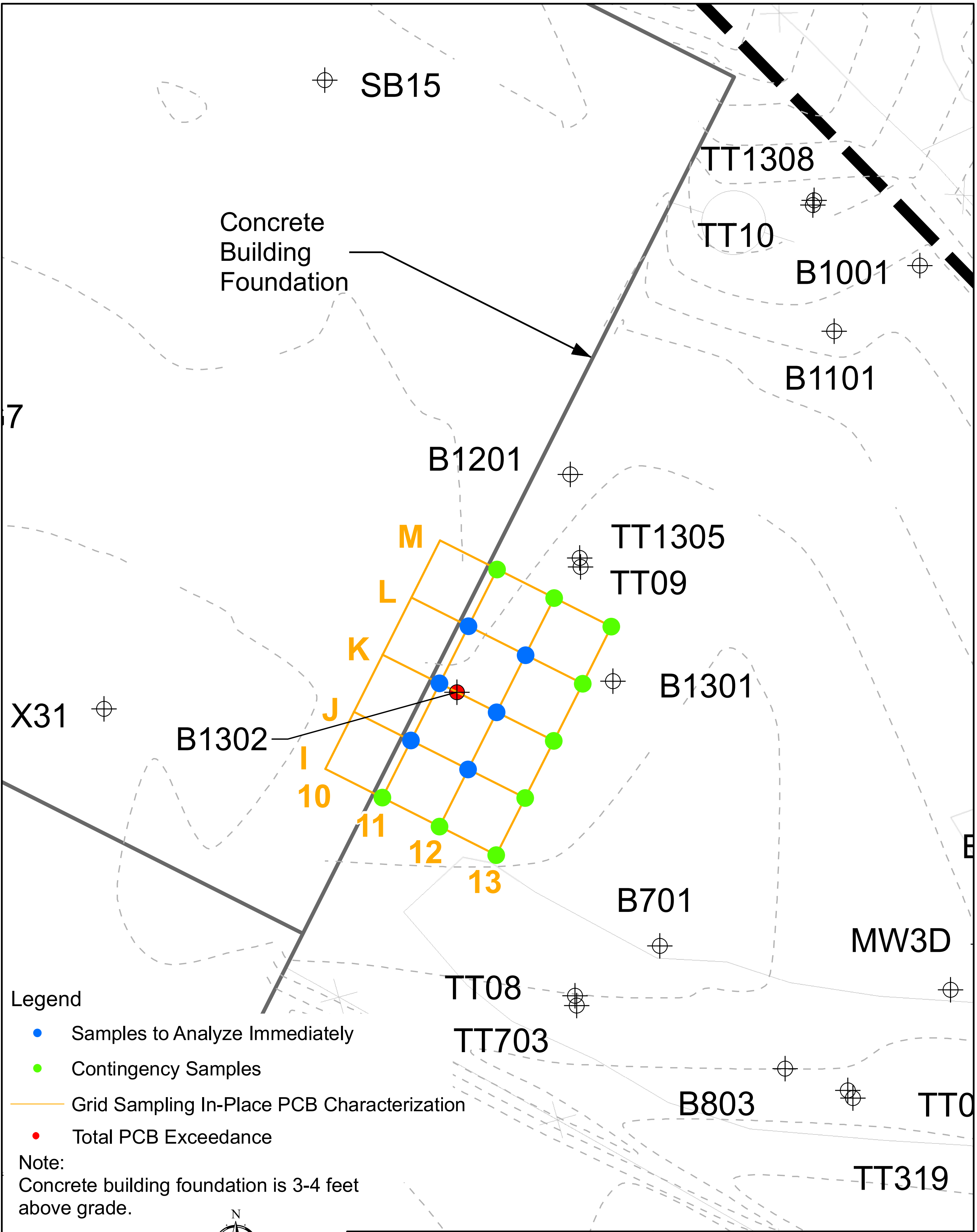
TOTAL PCBs IN SOIL

DATE: 01/12/11 | DRWN: J.E.B. | FIGURE 1

J:\Water\ProjectFiles\P50\05510 PPG\100_JerseyCity\GIS\Projects\Grid Sampling for In-Place PCB Characterization\Figure 1 Total PCBs in Soil.mxd

Figure 2
Building Foundation at PPG Site 114
Jersey City, NJ

2 Dakota St Slab (IRM#2), looking from east to west.



Legend

- ● Samples to Analyze Immediately
- ● Contingency Samples
- ― Grid Sampling In-Place PCB Characterization
- ● Total PCB Exceedance

Note:
Concrete building foundation is 3-4 feet above grade.

AECOM

PPG INDUSTRIES
SAMPLING GRID FOR IN-PLACE PCB CHARACTERIZATION
JERSEY CITY, NEW JERSEY
60149955.4011.1A

SAMPLING GRID FOR
IN-PLACE CHARACTERIZATION

DATE: 01/17/11	DRWN: J.E.B.			FIGURE 3

J:\Water\ProjectFiles\P50\05510 PPG\100_JerseyCity\GIS\Projects\Grid Sampling for In-Place PCB Characterization\Figure 3 Sampling Grid for In-Place PCB Characterization.mxd

Appendices

Appendix A

Health and Safety Plan

The project HASP was submitted under a separate cover and is available on request.

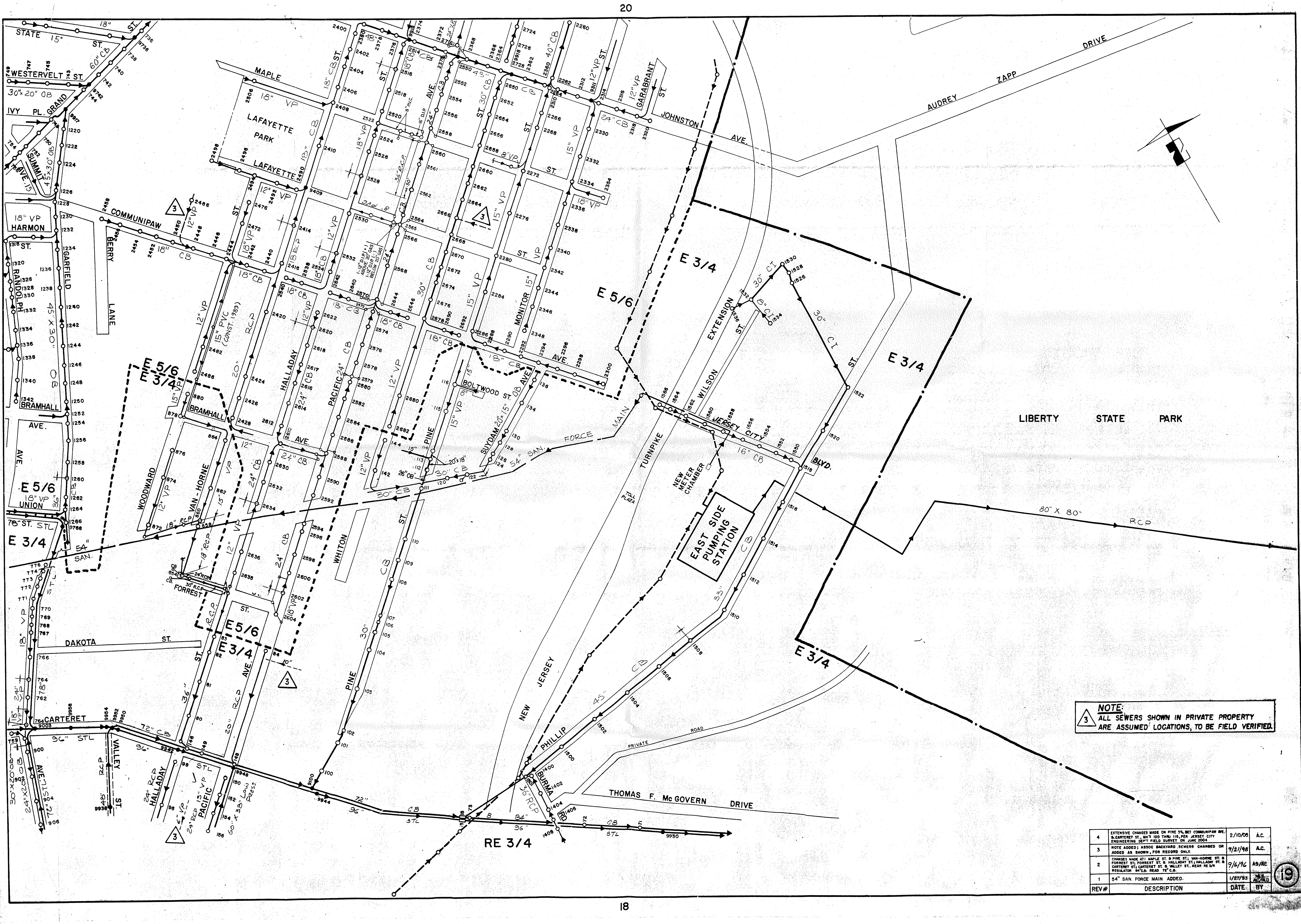
Appendix B

Field Sampling Plan – Quality Assurance Project Plan

The project FSP-QAPP was submitted under a separate cover and is available on request.

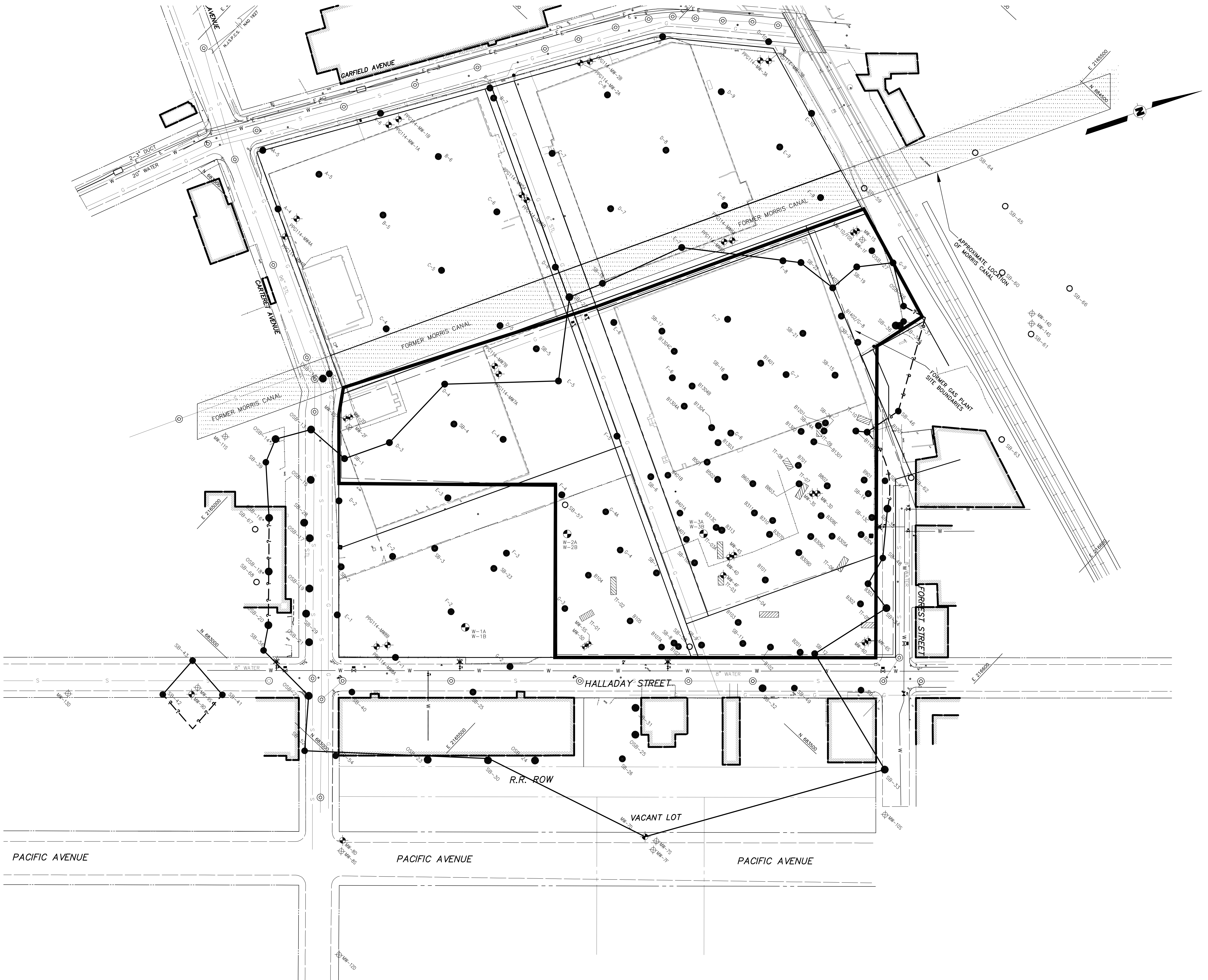
Appendix C

Utility Maps



NOTE:
3 ALL SEWERS SHOWN IN PRIVATE PROPERTY ARE ASSUMED LOCATIONS, TO BE FIELD VERIFIED.

REV#	DESCRIPTION	DATE	BY
4	EXTENSIVE CHANGES MADE ON PINE ST. BET COMMUNIPAW AVE. & CARTERET ST., MH'S 100 THRU 116, PER JERSEY CITY ENGINEERING DEP'T FIELD SURVEY ON JUNE 2004	2/10/05	A.C.
3	NOTE ADDED; ASSOC BACKYARD SEWERS CHANGED OR ADDED AS SHOWN, FOR RECORD ONLY.	9/21/98	A.C.
2	CHANGES MADE AT: MAPLE ST. & PINE ST.; VAN-HORNE ST. & FORREST ST; FORREST ST. & HALLADAY ST.; HALLADAY ST. & CARTERET ST.; CARTERET ST. & VALLEY ST.. NEAR RE 3/4 REGULATOR 84"C.B. READ 72" C.B.	9/6/96	AS/AC
1	54" SAN. FORCE MAIN ADDED.	1/27/93	[illegible] AC/RLD



LEGEND

——— -- ———	LOT BOUNDARY LINE
—x—x—	FENCE
◎	MANHOLE
╪══╪	CONRAIL
	FIREHYD
—W—	UNDERGROUND UTILITY LINE (WATER)
—G—	UNDERGROUND UTILITY LINE (GAS)
—E—	UNDERGROUND UTILITY LINE (ELECTRIC)
—S—◎—	UNDERGROUND UTILITY LINE (SANITARY)
	EXISTING BUILDINGS
■	STORM INLET
⧗ G	GAS VALVE
⋈ W	WATER VALVE
W-1A	MONITORING WELL BY OTHERS
MW-1S	COMPLETED MONITORING WELL LOCATION
MW-7F	PROPOSED MONITORING WELL LOCATION
● SB-1/B201	COMPLETED SOIL BORING LOCATION
○ SB-59	PROPOSED SOIL BORING LOCATION
WP-5	TEMPORARY WELL POINT BT OTHERS
▨ TT-01	COMPLETED TEST TRENCH LOCATION
⁀?‿	HORIZONTAL LIMIT OF OM NOT DELINEATED
■	APPROXIMATE AREA OF OM

SOURCES: BASEMAP INCLUDING UTILITIES, BUILDINGS, AND LOT BOUNDARIES ADAPTED FROM "NON RESIDENTIAL SITES CHROMIUM REMEDIATION PROJECT HUDSON COUNTY, NEW JERSEY. REVISED DRAFT REMEDIAL INVESTIGATION WORK PLAN GROUP 7 SITE 114-GARFIELD AVENUE SITE" PREPARED BY IT CORPORATION OCTOBER 1991.

LOCATIONS OF MONITORING WELLS PPG114-MW1A THROUGH PPG114-MW8B PROVIDED BY ENSR CORPORATION FOR PPG. NOT ALL WELLS INCLUDED ON THIS DRAWING.

LOCATIONS OF MONITORING WELLS MW-1D/MW-1S THROUGH MW-9D AND LOCATION OF PACIFIC AVENUE SURVEYED BY SCHOOR DEPALMA.

LOCATIONS OF BORINGS WITH "OSB" PREFIX AND MONITORING WELLS WITH "PPG114" -PREFIX HAVE NOT BEEN SURVEYED.

REFERENCE:
METES AND BOUNDS AREA ARE BASED FROM HANSON ENGINEERING DATED 9-24-03
TOPOGRAPHY MAP IS BASED FROM ENSR ENGINEERING DATED 9-24-03.

NOTE:
1.) SOURCE: "NON-RESIDENTIAL SITES CHROMIUM REMEDIATION PROJECT HUDSON COUNTY, NEW JERSEY. REVISED DRAFT REMEDIAL INVESTIGATION WORK PLAN GROUP 7 SITE 114 GARFIELD AVENUE SITE" PREPARED BY IT CORPORATION, OCTOBER 1991.

REVISION NO.	DATE	REVISION

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THIS DRAWING MAY NOT BE COPIED, REUSED, DISCLOSED, DISTRIBUTED OR RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF SCHOOR DEPALMA INC.

60 0 60 120
GRAPHIC SCALE IN FEET

SCHOOR DEPALMA
Engineers and Consultants
Cert. Of Authorization 24GA27926200
MANALAPAN • WHITE PLAINS • EGG HARBOR • BRICK • CLINTON • EXTON • KULPSVILLE
PARSIPPANY • PHILADELPHIA • FALLS • STAFFORD • VOORHEES

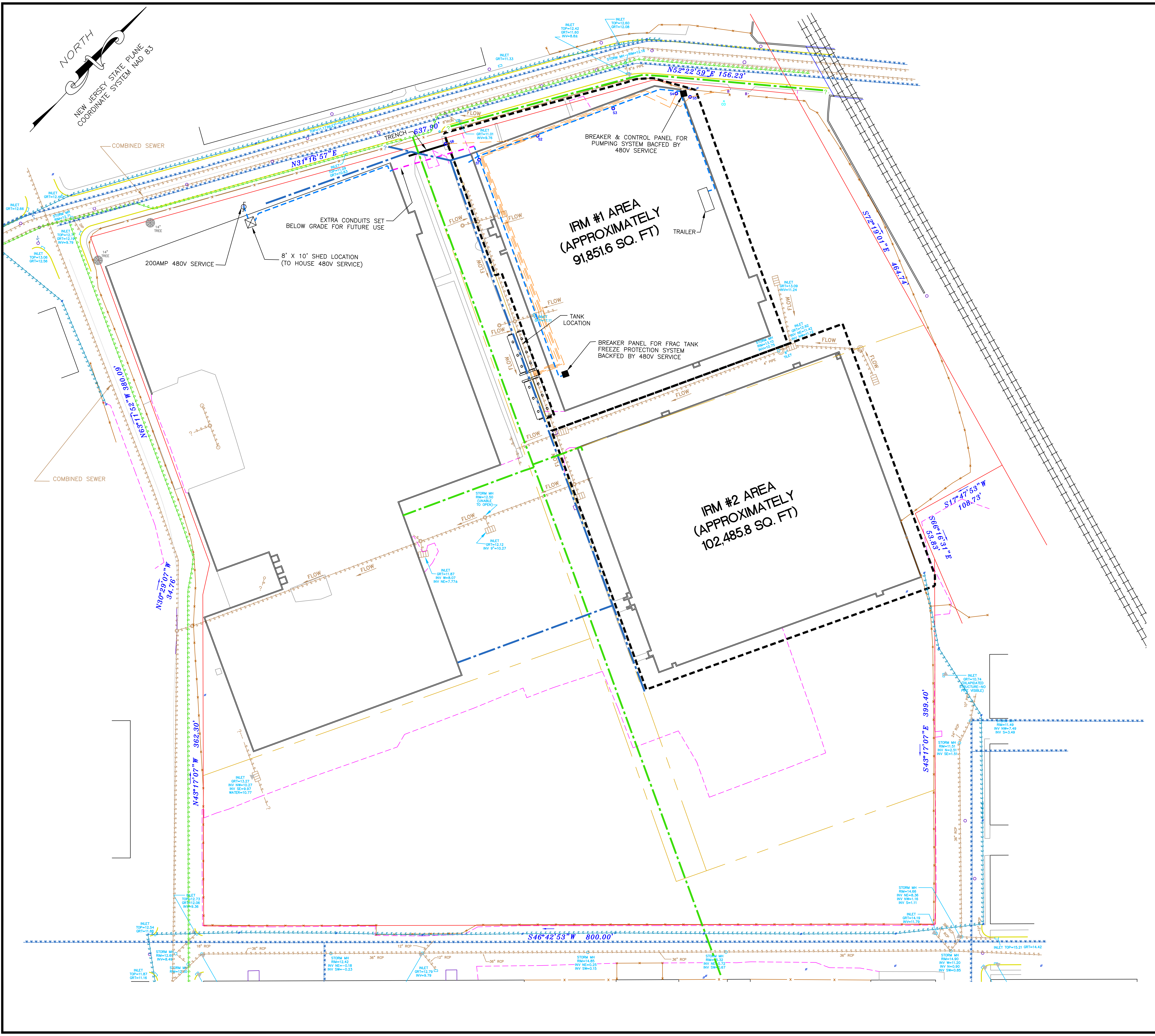
200 STATE HIGHWAY NINE
P.O. BOX 900
MANALAPAN, NJ 07726
TEL (732)577-9000
FAX (732)577-9888

FIGURE 1
PROPOSED SOIL BORING & MONITORING WELL LOCATIONS
FORMER HALLADAY STREET GAS WORKS

JERSEY CITY HUDSON COUNTY NEW JERSEY

PROJECT NO	DATE
020667601	07/03/07
DRAWN BY	DESIGNED BY
SVJ	JMS
SCALE	CHECKED BY
1"=60'	JMS

SCHOOR DEPALMA
SHEET NO. 1 of 1



LEGEND

- SEEP COLLECTION PIPING RUN
- SITE BOUNDARY
- LOT BOUNDARIES
- ABOVE GRADE ELECTRICAL CONDUIT SEEP COLLECTION
- BELOW GRADE ELECTRICAL CONDUIT
- APPROXIMATE LOCATION OF OVERHEAD ELECTRICAL
- —S—S—S— APPROXIMATE LOCATION OF SEWERLINE
- —W—W—W— APPROXIMATE LOCATION OF WATER LINE
- APPROX. LOCATION ABANDONED WATER LINE
- APPROX. LOCATION ABANDONED GAS LINE
- —G—G—G— APPROXIMATE LOCATION OF GAS LINE
- CATCH BASIN
- UTILITY POLE
- MANHOLE
- EDGE OF PAVEMENT
- CURB
- FIRE HYDRANT
- —W— WATER MARK—OUT
- o WV WATER VALVE
- —G— GAS MARK—OUT
- o GV GAS VALVE
- o CO SANITARY CLEANOUT
- —T— TELEPHONE MARK—OUT
- MONITORING WELL
- • B BOLLARD
- CHAIN LINK FENCE
- RAILROAD TRACKS

BOUNDARY SURVEY BY BORBAS SURVEYING AND MAPPING PRINT DATED NOVEMBER 16, 2006. THE MAPPING IS SUBJECT TO THE FOLLOWING NOTES:

NOTES:

1) BOUNDARY INFORMATION AND LOT GEOMETRY IS TAKEN FROM A SURVEY BY YANNACCONE, VILLA & ALDRICH, LLC DATED APRIL 8, 2004. A TITLE ABSTRACT/COMMITMENT HAS NOT BEEN SUPPLIED. THIS SURVEY IS SUBJECT TO THE FINDINGS OF A COMPLETE TITLE SEARCH.

2) THIS MAP REFLECTS SITE CONDITIONS AS THEY EXISTED AT THE TIME OF THE FIELD SURVEY. THE FIELD SURVEY OBSERVATIONS WERE OBTAINED BETWEEN SEPTEMBER 12, 2006 AND SEPTEMBER 20, 2006.

3) THE BASIS OF BEARING IS THE NEW JERSEY STATE PLANE COORDINATE SYSTEM NAD 83 DETERMINED BY DIFFERENTIAL GPS ON DECEMBER 22, 2005. REFERENCE MONUMENTS ARE NGS COR STATIONS NJI2, SHK1 AND LAMT.

4) THE PROJECT COMBINED GRID SCALE FACTOR IS 0.999920497 AT THE PROJECT CENTROID (N: 682981.62, E: 611168.7492 ELEV. 15.17)

5) COORDINATE VALUES SHOWN HEREON ARE IN US SURVEY FEET

6) THE VERTICAL DATUM IS THE EXISTING SITE DATUM AS SHOWN ON UNTITLED PLAN PROVIDED BY CLIENT. HELD PK 12 ELEVATION 11.48 (THE SITE DATUM IS 1.2' HIGHER THAN NAVD 88 AND 0.8' HIGHER THAN NGVD 29).

7) THE UTILITIES SHOWN HAVE BEEN LOCATED FROM EVIDENCE OBSERVED ON THE SURFACE ONLY. THE SURVEYOR MAKES NO GUARANTEES THAT THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN—SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

8) TOTAL LOT AREA = 709,022 SQ.FT. = 16.28 ACRES

9) LOT CORNERS ARE TO BE SET.

REFERENCES:

1) "SURVEY OF LOTS 1, 2, 4, 5 & 6 — BLOCK 2026.1 CITY OF JERSEY CITY, HUDSON COUNTY, NEW JERSEY" DATED APRIL 8, 2004 PREPARED BY YANNACCONE, VILLA & ALDRICH, LLC, CHRISTOPHER J. ALDRICH, PLS.

2) DEEDS:

DBK 3089 PG 387 — BLOCK 2006.1 PART OF LOT 1, AND LOTS 2 & 3
DBK 3117 PG 1124 — BLOCK 2006.1 LOT 1
DBK 3176 PG 929 — BLOCK 2006.1 LOT A2
DBK 4458 PG 265 — BLOCK 2007 LOTS 22 TO 26 AND LOTS 30 TO 35
DBK 3382 PG 453 — BLOCK 2017 PART OF LOT H
DBK 4748 PG 200 — BLOCK 2017 LOTS 1 TO 25
DBK 3671 PG 18 — BLOCK 2026.1 LOT 1
DBK 3360 PG 320 — BLOCK 2028 LOTS C2 & A7
DBK 3360 PG 320 — BLOCK 2029 LOTS A3 & A7

3) UTILITIES ADAPTED FROM "NON RESIDENTIAL SITES CHROMIUM REMEDIATION PROJECT HUDSON COUNTY, NEW JERSEY, REVISED DRAFT REMEDIAL INVESTIGATION WORK PLAN GROUP 7 SITE 114—GARFIELD AVE SITE" PREPARED BY IT CORPORATION OCTOBER 1991.

50 25 0 50
Scale in Feet

DRAFT

NO.:	DESCRIPTION:	DATE:	BY:
	REVISIONS		

DESIGNED BY: HQ
DRAWN BY: /jk
CHECKED BY: C.M.
APPROVED BY:

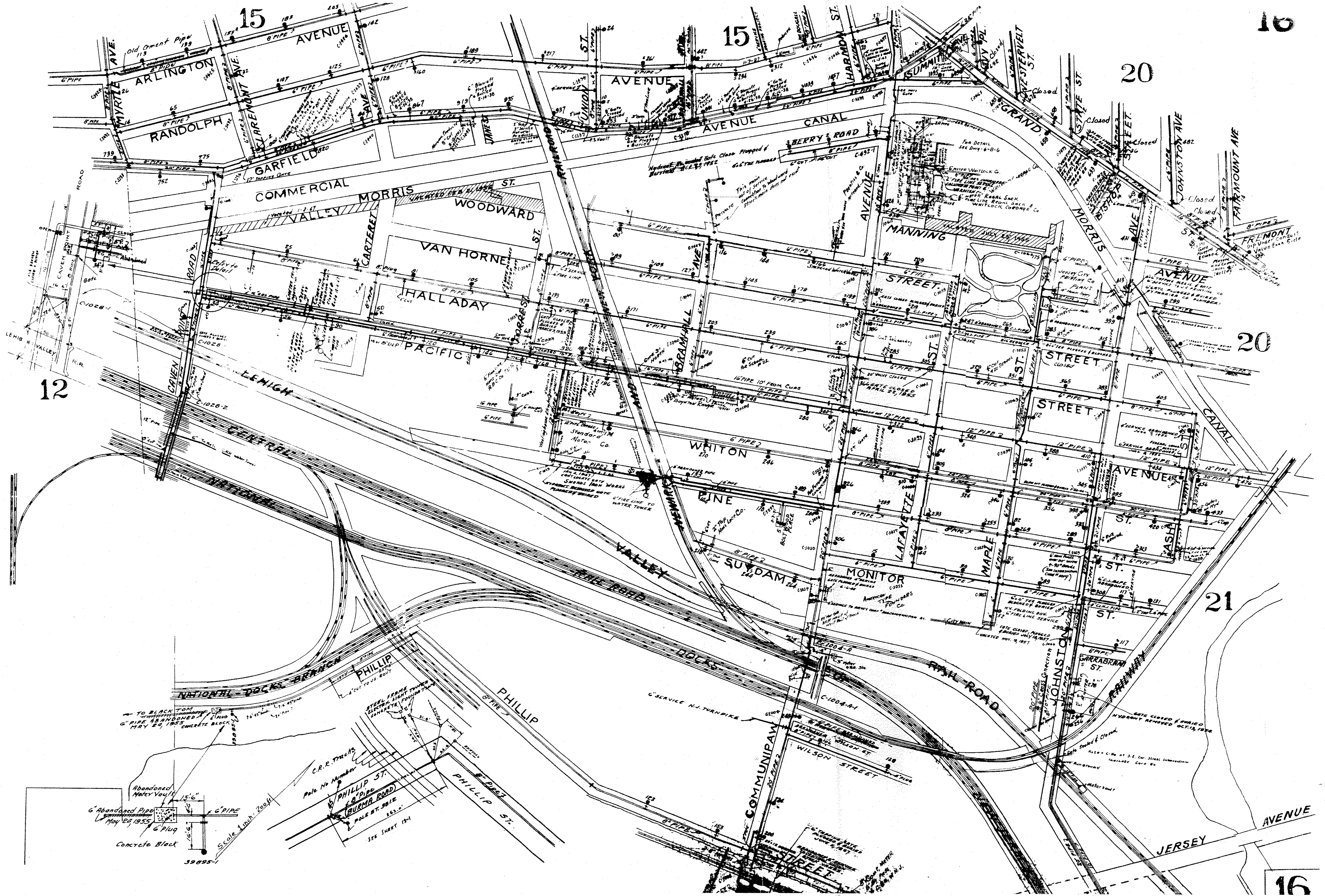
AECOM
30 KNIGHTSBRIDGE ROAD, SUITE 520
PISCATAWAY, NEW JERSEY 08854
PHONE: (732) 564-3600
FAX: (732) 369-0122
WEB: HTTP://WWW.AECOM.COM

UTILITIES MAP
PPG INDUSTRIES
SITE 114
JERSEY CITY, HUDSON COUNTY, NEW JERSEY

SCALE: AS SHOWN
DATE: 04/13/10
PROJECT NUMBER: 60149955.4061

DRAWING NUMBER:

SHEET NUMBER:
—


15
15
16
20
20
21
12
16
ARLINGTON
AVENUE
RANDOLPH
GARFIELD
AVENUE
CANAL
BERRY ROAD
COMMERCIAL
MORRIS
ST.
WOODWARD
VALLEY
VAN HORNE
HALLADAY
PACIFIC
CARTERET
ST.
FORREST ST.
MYRTLE AVE.
CLAREMONT AVE.
UNION ST.
HARMON ST.
SUMMIT
GRAND
ST.
MESERVELT ST.
STATE ST.
JOHNSTON AVE
FAIRMOUNT AVE
FREMONT
MORRIS
CANAL
AVENUE
MANNING
AVENUE
STREET
STREET
STREET
AVE
CAVEN POINT ROAD
CAVEN POINT RD.
LEHIGH VALLEY R.R.
LEHIGH
CENTRAL
NATIONAL
VALLEY
RAIL ROAD
NEWARK AVE
BRAMHALL AVE
WHITON
PINE
SUYDAM
MONITOR
LAFAYETTE
MAPLE
ST.
AVENUE
ASIA
ST.
ST.
JOHNSTON
CARRABRANT ST.
RAILWAY
DOCKS
RAIL ROAD
NATIONAL DOCKS BRANCH
PHILLIP
PHILLIP
PHILLIP ST.
PHILLIP ST.
BURMA ROAD
COMMUNIPAW
WILSON STREET
STREET
JERSEY
AVENUE
6" PIPE
12" PIPE
16" PIPE
Standard Motor Co.
Abandoned
Gate
Closed
Old Cement Pipe
6" SERVICE N.J. TURNPIKE
TO BLACK TOM
6" PIPE ABANDONED MAY 24, 1955
CONCRETE BLOCK
Abandoned Water Vault
6" Abandoned Pipe May 24, 1955
6" Plug
6" PIPE
Concrete Block
15'-6"
Scale 1 inch = 200 ft.
C.R.R. Tracks
Pole No Number
Pole ST. 3012
See Sheet 13-1
39895-1
C-1028-1
C-1028-2
C-1004-A
C-1004-A-1

Appendix D

Air Monitoring Work Plan

The Air Monitoring Work Plan was submitted under a separate cover and is available on request.

Appendix E

Dust Control Plan

The Dust Control Plan was submitted under a separate cover and is available on request.

Appendix F

EPA SOPs for Concrete Sampling

CHIP, WIPE, AND SWEEP SAMPLING

SOP#: 2011
DATE: 11/16/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) outlines the recommended protocol and equipment for collection of representative chip, wipe, and sweep samples to monitor potential surficial contamination.

This method of sampling is appropriate for surfaces contaminated with non-volatile species of analytes (i.e., PCB, PCDD, PCDF, metals, cyanide, etc.) Detection limits are analyte specific. Sample size should be determined based upon the detection limit desired and the amount of sample requested by the analytical laboratory. Typical sample area is one square foot. However, based upon sampling location, the sample size may need modification due to area configuration.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Since surface situations vary widely, no universal sampling method can be recommended. Rather, the method and implements used must be tailored to suit a specific sampling site. The sampling location should be selected based upon the potential for contamination as a result of manufacturing processes or personnel practices.

Chip sampling is appropriate for porous surfaces and is generally accomplished with either a hammer and chisel, or an electric hammer. The sampling device should be laboratory cleaned and wrapped in clean, autoclaved aluminum foil until ready for use. To collect the sample, a measured and marked off area is chipped both horizontally and vertically to an even depth of 1/8 inch. The sample is then transferred to the proper sample container.

Wipe samples are collected from smooth surfaces to indicate surficial contamination; a sample location is measured and marked off. While wearing a new pair of surgical gloves, a sterile gauze pad is opened, and soaked with solvent. The solvent used is dependent on the surface being sampled. This pad is then stroked firmly over the sample surface, first vertically, then horizontally, to ensure complete coverage. The pad is then transferred to the sample container.

Sweep sampling is an effective method for the collection of dust or residue on porous or non-porous surfaces. To collect such a sample, an appropriate area is measured off. Then, while wearing a new pair of disposable surgical gloves, a dedicated brush is used to sweep material into a dedicated dust pan. The sample is then transferred to the proper sample container.

Samples collected by all three methods are then sent to the laboratory for analysis.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples should be stored out of direct sunlight to reduce photodegredation, cooled to 4°C and shipped to the laboratory performing the analysis. Appropriately sized laboratory cleaned, glass sample jars should be used for sample collection. The amount of sample required will be determined in concert with the analytical laboratory.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

This method has few significant interferences or problems. Typical problems result from rough porous surfaces which may be difficult to wipe, chip, or sweep.

5.0 EQUIPMENT

Equipment required for performing chip, wipe, or sweep sampling is as follows:

C Lab clean sample containers of proper size and composition
C Site logbook
C Sample analysis request forms
C Chain of Custody records
C Custody seals
C Field data sheets
C Sample labels
C Disposable surgical gloves
C Sterile wrapped gauze pad (3 in. x 3 in.)
C Appropriate pesticide (HPLC) grade solvent
C Medium sized laboratory cleaned paint brush
C Medium sized laboratory cleaned chisel
C Autoclaved aluminum foil
C Camera
C Hexane (pesticide/HPLC grade)
C Iso-octane
C Distilled/deionized water

6.0 REAGENTS

Reagents are not required for preservation of chip, wipe or sweep samples. However, reagents will be utilized for decontamination of sampling equipment.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Mark all sampling locations. If required the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

7.2 Chip Sample Collection

Sampling of porous surfaces is generally accomplished by using a chisel and hammer or electric hammer. The sampling device should be laboratory cleaned or field decontaminated as per the Sampling Equipment Decontamination SOP. It is then wrapped in cleaned, autoclaved aluminum foil. The sampler should remain in this wrapping until it is needed. Each sampling device should be used for only one sample.

1. Choose appropriate sampling points; measure off the designated area. Photo documentation is optional.

2. Record surface area to be chipped.

3. Don a new pair of disposable surgical gloves.

4. Open a laboratory-cleaned chisel or equivalent sampling device.

5. Chip the sample area horizontally, then vertically to an even depth of approximately 1/8 inch.

6. Place the sample in an appropriately prepared sample container with a Teflon lined cap.

7. Cap the sample container, attach the label and custody seal, and place in a plastic bag. Record all pertinent data in the site logbook and on field data sheets. Complete the sampling analysis request form and chain of custody record before taking the next sample.

8. Store samples out of direct sunlight and cool to 4EC.

9. Follow proper decontamination procedures then deliver sample(s) to the laboratory for analysis.

7.3 Wipe Sample Collection

Wipe sampling is accomplished by using a sterile gauze pad, adding a solvent in which the contaminant is most soluble, then wiping a pre-determined, pre-measured area. The sample is packaged in an amber jar to prevent photodegradation and packed in coolers for shipment to the lab. Each gauze pad is used for only one wipe sample.

1. Choose appropriate sampling points; measure off the designated area. Photo documentation is optional.

2. Record surface area to be wiped.

3. Don a new pair of disposable surgical gloves.

4. Open new sterile package of gauze pad.

5. Soak the pad with solvent of choice.

6. Wipe the marked surface area using firm strokes. Wipe vertically, then horizontally to insure complete surface coverage.

7. Place the gauze pad in an appropriately prepared sample container with a Teflon-lined cap.

8. Cap the sample container, attach the label and custody seal, and place in a plastic bag. Record all pertinent data in the site logbook and on field data sheets. Complete the sampling analysis request form and chain of custody record before taking the next sample.

9. Store samples out of direct sunlight and cool to 4ºC.

10. Follow proper decontamination procedures, then deliver sample(s) to the laboratory for analysis.

7.4 Sweep Sample Collection

Sweep sampling is appropriate for bulk contamination. This procedure utilizes a dedicated, hand held sweeper brush to acquire a sample from a pre-measured area.

1. Choose appropriate sampling points; measure off the designated area. Photo documentation is optional.

2. Record the surface area to be swept.

3. Don new pair of disposable surgical gloves.

4. Sweep the measured area using a dedicated brush; collect the sample in a dedicated dust pan.

5. Transfer sample from dust pan to sample container.

6. Cap the sample container, attach the label and custody seal, and place in a plastic bag. Record all pertinent data in the site log book and on field data sheets. Complete the sampling analysis request form and chain of custody record before taking the next sample.

7. Store samples out of direct sunlight and cool to 4EC.

8. Leave contaminated sampling device in the sample material, unless decontamination is practical.

9. Follow proper decontamination procedures, then deliver sample(s) to the laboratory for analysis.

8.0 CALCULATIONS

Results are usually provided in mg/g, µg/g, mass per unit area, or other appropriate measurement. Calculations are typically done by the laboratory.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The following general quality assurance procedures apply:

1. All data must be documented on standard chain of custody forms, field data sheets or within the site logbook.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

The following specific quality assurance activities apply to wipe samples:

For wipe samples, a blank should be collected for each sampling event. This consists of a sterile gauze pad, wet with the appropriate solvent, and placed in a prepared sample container. The blank will help identify potential introduction of contaminants via the sampling methods, the pad, solvent or sample container. Spiked wipe samples can also be collected to better assess the data being generated. These are prepared by spiking a piece of foil of known area with a standard of the analyte of choice. The solvent containing the standard is allowed to evaporate, and the foil is wiped in a manner identical to the other wipe samples.

Specific quality assurance activities for chip and sweep samples should be determined on a site specific basis.

10.0 DATA VALIDATION

A review of the quality control samples will be conducted and the data utilized to qualify the environmental results.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow EPA, OSHA and corporate health and safety procedures.

12.0 REFERENCES

U.S. EPA, A Compendium of Superfund Field Operation Methods. EPA/540/5-87/001.

NJDEP Field Sampling Procedures Manual, February, 1988.

REGION I, EPA-NEW ENGLAND

DRAFT
STANDARD OPERATING PROCEDURE FOR SAMPLING CONCRETE IN THE FIELD

U.S. EPA-NEW ENGLAND
Region I
Quality Assurance Unit Staff
Office of Environmental Measurement and Evaluation

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Region I, EPA New England

Standard Operating Procedure for Sampling Concrete in the Field

Table of Contents

Region I, EPA New England

Standard Operating Procedure for Sampling Concrete in the Field

1.0 Scope and Application

The following Standard Operating Procedure (SOP) describes a concrete sampling technique which uses an impact hammer drill to generate a uniform, finely ground, powder which is easily homogenized, extracted and analyzed. This procedure is primarily geared at providing enough sample for one or two different analyses at a time. That is, the time required to generate sufficient sample for a full suite of analyses may be impractical. The concrete powder is suitable for all types of environmental analyses, with the exception of volatile compounds, and may be analyzed in the field or at a fixed laboratory. This procedure is applicable for the collection of samples from concrete floors, walls, and ceilings.

The impact hammer drill is far less labor intensive than previous techniques using coring devices, or hammers and chisels. It allows for easy selection of sample location and sample depth. Not only can the project planner control the depth to sample into the concrete, from surface samples (0 - ½ inch) down to a core of the entire slab, but the technique can also be modified to collect samples at discrete depths within the concrete slab.

Another issue with concrete sampling is the fact that the amount of time spent drilling translates into the weight of sample produced. Thus, to maximize sampling time, it is important to know the minimum amount of sample required for each analysis. To do this, the project planner should take the following steps: 1) Use the Data Quality Objective (DQO) process and familiarity with the site to develop the objectives of the sampling project and the depth(s) of sample to be collected. 2) Review the site history and any previous data collected to determined possible contaminants of concern. 3) Establish the action levels for those possible contaminants and determine the appropriate analytical methods (both field and/or fixed laboratory) to meet the DQOs of the project. 4) Based on the detection limits of these methods, determine the amount of sample required for each analysis and the total sample weight require for each sample location (including quality control samples).

As with any environmental data collection project, all aspects of a concrete sampling episode should be well thought out, prior to going out in the field, and thoroughly described in a Quality Assurance Project Plan (QAPP). The QAPP should clearly state the DQOs of the project and document a complete Quality Assurance/Quality Control program to reconcile the data generated with the established DQOs. For more information on these subjects, refer to EPA documents QA/R-5, EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, and QA/G-4, Guidance for the Data Quality Objective Process.

2.0 Method Summary

A one-inch diameter carbide drill bit is used in a rotary impact hammer drill to generate a fine concrete powder suitable for analysis. The powder is placed in a sample container and homogenized for field or fixed laboratory analysis. The procedure can be used to sample a single depth into the concrete, or may be modified to sample the concrete at distinctly different depth zones. The modified depth sampling procedure is designed to minimize any cross contamination between the sampling zones. If different sampling depths are required, two different diameter drill bits and a vacuum sampling apparatus are employed.

3.0 Health and Safety

Eye and hearing protection are required at all times during sample drilling. A small amount of dust is generated during the drilling process. Proper respiratory protection and/or a dust control system must be in place at all times during sampling.

4.0 Interferences and Potential Problems

Since this sampling technique produces a finely ground uniform powder, physical matrix effects from variations in the sample consistency (i.e., particle size, uniformity, homogeneity, and surface condition) are minimized. Matrix spike analysis of a sample is highly recommended to monitor for any matrix related interferences.

As stated in Section 1.0 above, this sampling procedure is not recommended for volatile organic compound (VOC) analysis. The combination of heat generated during drilling and the exposure of a large amount of surface area will greatly reduce VOC recovery. If low boiling point semi-volatile compounds (i.e., naphthalene) are being analyzed, then the drill speed should be reduced to minimize heat build-up.

5.0 Equipment and Supplies

5.1 Single Depth Concrete Sampling

5.1.1 Rotary impact hammer drill
5.1.2 1-inch diameter carbide drill bits
5.1.3 Stainless steel scoopulas
5.1.4 Stainless steel spoonulas (for collecting sample in deeper holes, >2-inches)
5.1.5 Rectangular aluminum pans (to catch concrete during wall and ceiling sampling)
5.1.6 Gasoline powered generator (if alternative power source is required)

5.2 Multiple Depth Sampling (in addition to all the above)

5.2.1 ½ inch diameter carbide drill bits
5.2.2 Vacuum/sample trap assembly (see Section 7.2 and Figure 1)

5.2.2.1 Vacuum pump
5.2.2.2 2-hole rubber stopper
5.2.2.3 Glass tubing (to fit stopper)
5.2.2.4 Large glass test tubes, or Erlenmeyer flasks, for sample trap (several are suggested)
5.2.2.5 Polyethylene tubing for trap inlet (Tygon tubing may be used for the trap outlet)
5.2.2.6 Pasture pipets
5.2.2.7 Pipe cleaners
5.2.2.8 In-line dust filter (glass fiber filter, or equivalent)

6.0 Sample Containers, Preservation, and Storage

Concrete samples must be collected in glass containers for organic analyses, and may be collected in either glass or plastic containers for inorganic analyses. In general, a 2-ounce sample container with Teflon-lined cap (wide-mouth jars are preferred) will hold sufficient volume for most analyses. A 2-

ounce jar can hold roughly 90 grams sample. Note, samples which require duplicate and/or matrix spike/matrix spike duplicate analyses may require a larger sample container, or additional 2-ounce sample containers.

Organic samples are to be shipped on ice and maintained at 4°C (± 2°C) until the time of extraction and analysis. Inorganic samples may be shipped and stored at room temperature. Refer to 40 CFR Part 136 for guidelines on analysis holding times.

To maintain sample integrity, chain-of-custody procedures must be implemented at the time of sampling to 1) document all sample locations and associated field sample identification numbers, 2) document all quality control samples taken, including field duplicates, split samples for confirmatory analyses, and PE samples, and 3) document the transfer of field samples from field sampler to field chemist or fixed laboratory.

7.0 Procedure

7.1 Single Depth Concrete Sampling

Lock a 1-inch diameter carbide drill bit into the impact hammer drill and plug the drill into an appropriate power source. (A gasoline generator will be needed if electricity is not available.) For easy identification, sample locations may be pre-marked using a crayon or a non-contaminating spray paint. (Note, the actual drilling point must not be marked.) Depending on the appearance of the sample location, or the objectives of the sampling project, it may be desired to wipe the concrete surface with a clean dry cloth prior to drilling. All sampling decisions of this nature should be noted in the sampling logbook. Begin drilling in the designated location. Apply steady even pressure and let the drill do the work. Applying too much pressure will generate excessive heat and dull the drill bit prematurely. The drill will provide a finely ground concrete powder that can be easily collected, homogenized and analyzed. Having several decontaminated impact drill bits on hand will help expedite sampling when numerous sample locations are to be drilled.

Sample Collection

A ½-inch deep hole (using a 1-inch diameter drill bit) generates about 10 grams of concrete powder. Based on this and the action levels for the project, determine the sampling depth, and/or the number of sample holes to be composited, to generate sufficient sample volume for all of the required analyses. (Note, with the absorbency of concrete, a ½-inch deep hole can be considered a surface sample.)

A decontaminated stainless steel scoopula can be used to collect the sample. The powder can either be collected directly from the surface of the concrete and/or the concrete powder can be scraped back into the hole and the less rounded back edge of the scoopula can be used to collect the sample. For holes greater than 2-inches in depth, a stainless steel spoonula will make it easier to collect the sample from the bottom of the hole.

To ensure collection of a representative sample when multiple analyses are required, a concrete sample should always be collected and homogenized in a single container and then divided up into the individual containers for the various analyses or split samples. This is particularly important when sample holes are deep, or when several holes are drilled adjacent to each other to form a sample composite.

Wall and Ceiling Sampling

A team of two samplers will be required for wall and ceiling sampling. The second person will be needed to hold a clean catch surface (i.e., an aluminum pan) below the drill to collect the falling powder. For wall samples, a scoopula, or spoonula, can be used to collect remaining concrete powder from within the hole. For ceiling holes, it may be necessary to drill the hole at an angle so the concrete powder can fall freely in the collection plan (and avoid falling on the drill). Another alternative might be to use the chuck-end of the drill bit and punch a hole through the center of the collection pan. The drill bit is then mounted through the pan and into the drill. Thus, the driller can be drilling straight up while the assistant steadies the pan to catch the falling dust. As a precaution, it may be advantageous to tape a piece of plastic around the drill, just below the chuck, to avoid dust contaminating the body of the drill and entering the mechanical vents. (Note, the plastic should deflect dust from the drill, but be loose enough underneath to allow for proper ventilation.)

7.2 Multiple Depth Concrete Sampling

The above method for concrete sampling can also be used to collect samples from different depths within the concrete. To do this, two different sized drill bits (i.e., ½ inch and 1 inch) and a simple vacuum pump with a vacuum trap assembly is required (see Figure 1). First, the 1 inch drill bit is used to drill to the first level and the concrete sample is collected as described in Section 7.1. The vacuum pump is then turned on and the hole is cleaned out using the vacuum trap assembly. The drill bit is then changed to the ½ inch bit and the next depth is drilled out (the ½ inch bit is used to avoid contact with the sides of the first hole). A clean tube or flask is placed on the vacuum trap, and the sample from the second drilling is collected. To go further, the 1 inch drill is used to open up the hole to the second level, the hole is cleared, and then the ½ inch drill is used again to go to a third level, etc. Note, the holes and concrete surface should be vacuumed thoroughly to minimize any cross-contamination between sample depths.

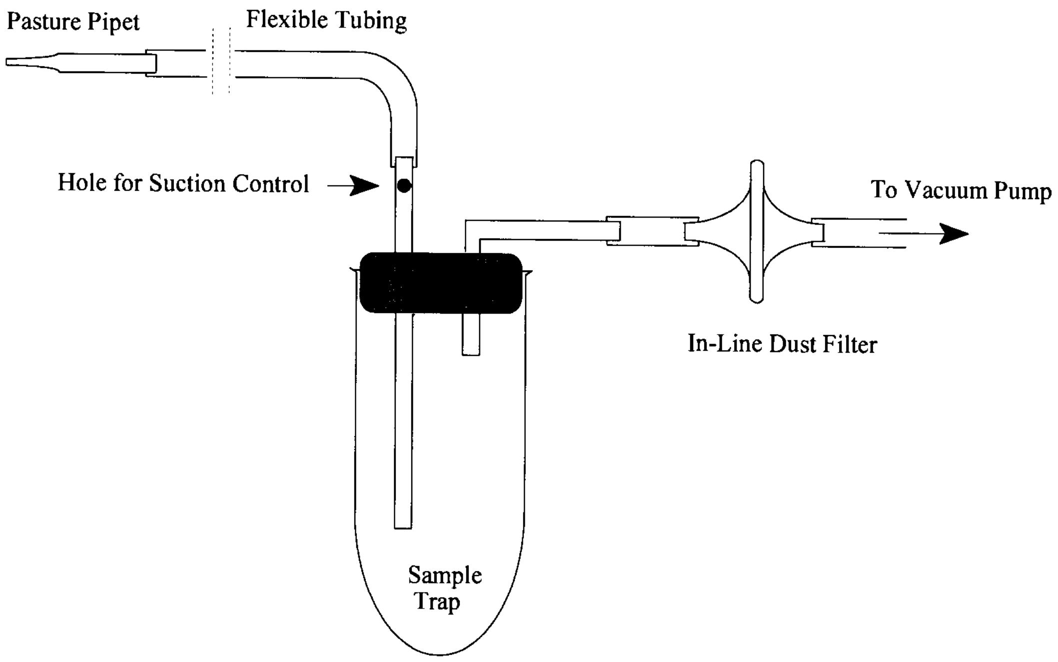
Vacuum Trap Design and Clean-out

The trap presented in Figure 1 is a convenient and thorough way for collecting and removing concrete powder from drilled holes. The trap system is designed to allow for control of the suction from the vacuum pump and easy trap clean-out between samples. Note, by placing a hole in the inlet tube (see Figure 1), a finger on the hand holding the trap can be used to control the suction at the sampling tip. Thus, when this hole is left completely open, there will be no suction, and the sampler can have complete control over where and what to sample. To change-out between samples the following steps should be taken: 1) The pasture pipet and piece of polyethylene tubing at the sample inlet should be replaced with new materials, 2) the portion of the rubber stopper and glass tubing that was in the trap should be wiped down with a clean damp paper towel (wetted with deionized water) and then dried with a fresh paper towel, 3) a clean pipe cleaner should be drawn through the glass inlet tube to remove any concrete dust present, and 4) the glass tube or flask used to collect the sample should swapped out with a clean decontaminated sample trap. Having several clean tubes or flasks on hand will facilitate change-out between samples.

7.3 Decontamination Procedure

Necessary supplies for decontamination include: two small buckets, a scrub brush, potable water, deionized water, a squirt bottle for the deionized water, and paper towels. The first bucket contains a soap and potable water solution, and the second bucket contains just potable water. Place all used drill bits and

Figure 1



utensils in the soap and water bucket. Scrub each piece thoroughly using the scrub brush. Note, the concrete powder does cling to the metal surfaces, so care should be taken during this step, especially with the twists and curves of the drill bits. Next, rinse each piece in the potable water bucket, and follow with a deionized water rinse from the squirt bottle. Place the deionized water rinsed pieces on clean paper towels and individually dry and inspect each piece. Note, all pieces should be dry prior to reuse.

8.0 Field Documentation

All Site related documentation and reports generated from concrete sampling should be maintained in the central Site file. If personal logbooks are used, legible copies of all pertinent pages must be placed in the Site file.

8.1 Field Logbooks

All field documentation should be maintained in bound logbooks with numbered pages. If loose-leaf logsheets are used to document site activities, extra care should be taken in keep track of all logsheets. The original copy of all logsheets should be maintained in the central Site file. Note, all sample locations must be documented by tying in their location to a detailed site map, or by using two or more permanent landmarks. The following information should be documented in the field logbooks:

- Site name and location,
- EPA Site Manager,
- Name and affiliation of field samplers (EPA, Contractor company name, etc.),
- Sampling date,
- Sample locations and IDs,
- Sampling times and depths, and
- Other pertinent information or comments

8.2 Sample Labeling and Chain-of-Custody

8.2.1 Sample Labels

Sample labels will be affixed to all sample containers. Labels must contain the following information:

- Project name,
- Sample number, and/or location
- Date and time of sampling,
- Analysis,
- Preservation, and
- Sampler's name.

8.2.2 Chain-of-Custody

All samples must be traced from collection, to shipment, to laboratory receipt and laboratory custody. The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. The COC form is signed by all individuals responsible for sampling, sample transport, and laboratory receipt. (Note, overnight deliver services, often used with sample transport, are exempt from having to sign the COC form. However, copies of all shipping invoices must be kept with the COC documentation.) One copy of the COC is retained by the field sampling crew, while the original (top, signed copy) and remaining carbonless copies are placed in a zip-lock bag and taped to the inside lid of the shipping cooler. If multiple coolers are required for a sample shipment to a single laboratory, the COC need only be sent with one of the coolers. The COC should state how many coolers are included with the shipment. All sample shipments to different laboratories require individual COC forms. The original COC form accompanies the samples until the project is complete, and is then kept in the permanent project file. A copy of the COC is also kept with the project manager, the laboratory manager, and attached to the data package.

8.2.3 Custody Seal

The Custody seal is an adhesive-backed label which is also part of the chain-of-custody process. The custody seal is used to prevent tampering with the samples after they have been collected in the field and sealed in coolers for transit to the laboratory. The Custody seals are signed and dated by a sampler and affixed across the opening edges of each cooler containing samples. Clear packing tape should be wrapped around the cooler, and over the Custody seal, to secure the cooler and avoid accidental tampering with the Custody seal.

9.0 Quality Assurance and Quality Control (QA/QC)

A solid QA/QC program is essential to establishing the quality of the data generated so that proper project decisions can be made. The following are key quality control elements which should be incorporated into a concrete sampling and analytical program.

9.1 Equipment Blanks

An equipment blank should be performed on decontaminated drill bits and collection utensils at a frequency of 1 per 20 samples or 1 per day, whichever is greater. To prepare the equipment blank, place the decontaminated drill bit and utensils in a large clean stainless steel bowl. Pour sufficient deionized water into the bowl to fill all of the required sample containers. Next, stir the drill bit and utensils in the bowl with a clean utensil to thoroughly mix the blank. Finally, decant off the equipment blank into the sample containers. Note, a clean funnel may help to pour off the equipment blank into the containers.

9.2 Field Duplicates

Field duplicates are samples collected adjacent to each other (collocated) at the same sample location (not two aliquots of the same sample). Field duplicates not only help provide an indicator of overall precision, but measure the cumulative effects of both the field and analytical precision, and also measure the representativeness of the sample. Field duplicates must be prepared and analyzed at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater. An example of a non-related concrete matrix might be the investigation of two different types of chemical spills.

Calculate the Relative Percent Difference (RPD) between the sample and its duplicate using Equation 1.

Equation 1

$$RPD = \frac{|S - D|}{\frac{(S + D)}{2}} \; x \; 100$$

Where:

S = Original sample result
D = Duplicate sample result

The following general guidelines have been established for field duplicate criteria:

- If both the original and field duplicate values are ≥ practical quantitation limit (PQL), then the control limit for RPD is ≤50%,
- If one or both values are < PQL, then do not assess the RPD.

If more rigorous field duplicate criteria are needed to achieve project DQOs, then that criteria should be documented in the project QAPP.

If the field duplicate criteria specified above are not met, then flag that target element with an "*" on the final report for both the original and field duplicate samples. Report both the original and field duplicate analyses; do not report the average. Field duplicate samples should be indicated on the sample ID. For example, the sample ID can contain the suffix "FD."

9.3 Laboratory Duplicates

Laboratory duplicates are two aliquots of the same sample that are prepared, homogenized and analyzed in the same manner. (Note, proper sample homogenization is critical in producing meaningful results.) The precision of the sample preparation and analytical methods is determined by performing a laboratory duplicate analysis. Laboratory duplicates can be prepared in the field and submitted as blind samples, or the laboratory can be requested to perform the laboratory duplicate analysis. In the case of laboratory prepared duplicates, the field sampling team must be sure to provide sufficient sample volume. Laboratory duplicates must be prepared and analyzed at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater.

Calculate the RPD between the sample and its duplicate using Equation 1. The following general guidelines have been established for laboratory duplicate criteria:

- If both the original and laboratory duplicate values are ≥ PQL, then the control limit for RPD is ≤25%,
- If one or both values are < PQL, then do not assess the RPD.

If duplicate criteria are not met, then flag that target element with an "*" on the final report for both the original and duplicate samples. Report both the original and duplicate analyses; do not report the average.

9.4 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate samples (MS/MSDs) are two additional aliquots of a sample which are spiked with the appropriate compound(s) or analyte(s) of concern and then prepared and analyzed along with the original sample. (Note, proper sample homogenization, prior to spiking, is critical in producing meaningful results.) MS/MSDs help evaluate the effects of sample matrix on the analytical methods being used. The field sampling team must provide sufficient sample volume such that the field or fixed laboratory can prepare and analyze MS/MSDs at a frequency of 1 per 20 samples or 1 per non-related concrete matrix, whichever is greater.

Calculate the recovery of each matrix spike compound or analyte using Equation 2.

Equation 2

$$MSR = \frac{SSR - SR}{SA} \times 100$$

Where,

MSR = Matrix Spike Recovery,
SSR = Spiked Sample Result,
SA = Spike Added
SR = Sample Result

Calculate the relative percent difference (RPD) between the recoveries of each compound or analyte in the matrix spike and matrix spike duplicate using Equation 3.

Equation 3

$$RPD = \frac{|MSR - MSRD|}{\frac{(MSR + MSRD)}{2}} \times 100$$

Where,

MSR = Matrix Spike Recovery
MSRD = Matrix Spike Duplicate Recovery

9.5 Performance Evaluation Samples

In accordance with the EPA Region I Performance Evaluation Program Guidance, performance evaluation (PE) samples should be submitted for each type of analysis to be performed in the field or by the fixed laboratory performing full protocol EPA methods. PE samples provide information on the quality of the individual data packages. PE samples are certified standard reference materials (SRMs) from a source other than that used to calibrate the instrument. If both field and fixed laboratories are being used to analyze samples, at least one solid PE sample should undergo both field analysis and confirmatory full protocol EPA method analysis to facilitate data comparability. A copy of the certified values for the SRM must be submitted with the final data packages to facilitate data evaluation.

9.6 Data Verification and Validation

All field data and supporting information (including chain-of-custody) that is collected during a concrete sampling episode should be verified daily, by a person other than that performing the work, to check for possible errors.

During the project planning process, a plan for data validation should be established for all data, both for field and fixed laboratories. All data must be validated to assure that it is of a quality suitable to make project decisions. For help in developing a data validation program refer to Region I, EPA New England, Data Validation Functional Guidelines for Evaluating Environmental Analyses.

9.7 Audits

9.7.1 Internal Audits

As part of the Quality Assurance/Quality Control Program for any sampling project, a series of internal audit checks should be instituted to monitor and maintain the integrity of the sample collection process. Timely internal reviews will insure that proper sampling, decontamination, chain-of-custody and quality control procedures are being followed. Also, the internal audit review is there to monitor any corrective actions taken, and/or institute corrective actions that should have been taken and were not. All corrective actions taken must be documented in an appropriate logbook, and if any corrective actions impact the final data reported, then they must also be documented in the final report narrative. The results of all internal audits must be documented in a report, and copies of the report issued to the Project Manager and the Quality Assurance Manager. The original copy of any audit report must remain with the main project file and be available for review.

9.7.2 External Audits

The Agency reserves the right to perform periodic field audits to ensure compliance with this SOP.

10.0 References

1) Guidance for the Data Quality Objective Process, QA/G-4, EPA/600/R-96/055, September 1994.

2) EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, QA/R-5, Interim Final, October 1997.

3) Guidance for the Preparation of Standard Operating Procedures for Quality-related Operations, QA/G-6, EPA/600/R-96/027, November 1995.

4) Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, July 1996.

5) EPA Region I Performance Evaluation Program Guidance, July 1996.

6) U.S. EPA Code of Federal Regulations, 40 CFR, Part 136, Appendix B, Revised as of July 1995.