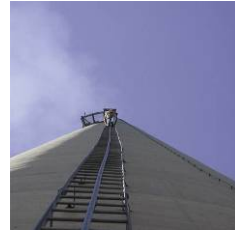
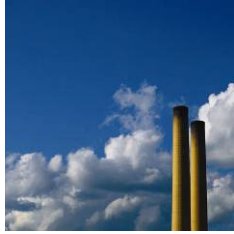


Appendix A

Air Monitoring Plan (AMP)

Prepared for:
PPG Industries, Inc.
Jersey City, NJ



Air Monitoring Workplan for Ground Intrusion Activities at the Garfield Avenue Site in Jersey City, New Jersey

AECOM Environment
April 2, 2012
Document No.: 60149955 – 0405A

Prepared for:
PPG Industries, Inc.
Jersey City, NJ

Air Monitoring Workplan for Ground Intrusion Activities at the Garfield Avenue Site in Jersey City, New Jersey



Prepared By: Leo Gendron



Reviewed By: Anthony Colella

AECOM Environment
April 2, 2012 Document No.: 60149955 – 0405A

Contents

1.0 Introduction	1-1
2.0 Project Objectives.....	2-1
2.1 Air Monitoring Objectives	2-1
2.2 Data Quality Objectives	2-1
3.0 Perimeter Air Monitoring	3-1
3.1 Perimeter Monitoring System.....	3-8
3.1.1 Monitoring System Design	3-8
3.2 Monitoring Operations	3-11
4.0 Action Levels.....	4-1
4.1 Particulates, TVOC and Hydrogen Sulfide	4-1
4.2 Integrated Hexavalent Chromium	4-2
5.0 Sampling Frequency	5-1
5.1 Baseline (Pre-Remedial) Monitoring.....	5-1
5.2 Routine Monitoring.....	5-1
6.0 Sample Locations	6-1
6.1 Continuous and Integrated Air Monitoring Locations	6-1
7.0 Data Validation and Reporting	7-1
7.1 Data Management Overview.....	7-1
7.2 Data Validation.....	7-1
7.3 Data Reporting.....	7-1
7.3.1 Event Documentation Reports	7-2
7.3.2 Monthly Summary Reports.....	7-2
7.3.3 Biweekly Summary Reports	7-3
7.3.4 Weekly Summary Reports.....	7-3
7.3.5 Final Air Monitoring Report.....	7-4
8.0 Equipment QA/QC.....	8-1
8.1 Equipment Calibration and QA/QC Procedures	8-1
8.1.1 PM ₁₀ Monitors	8-1
8.1.2 TVOC Monitors	8-1
8.1.3 Gas Chromatographs	8-1

8.1.4	H ₂ S Monitors	8-2
8.1.5	Integrated PM ₁₀ and Cr+6 Samplers (Perimeter and Exclusion Zone)	8-2
8.1.6	Meteorological Measurement System	8-3
8.1.7	Data Communication Equipment	8-3

List of Figures

Figure 3-1:	Particulates (Hexavalent Chromium/Heavy Metals/PAH) Monitoring and Control Chart	3-5
Figure 3-2:	TVOC Monitoring and Control Chart.....	3-6
Figure 3-3:	Action Level Communication Protocol.....	3-7
Figure 6-1:	Potential Air Monitoring Site Map.....	6-2

List of Attachments

- Attachment A Standard Operating Procedures
- Attachment B Action Level Calculations
- Attachment C Air Monitoring Amendment Form

1.0 Introduction

This Air Monitoring (AM) Plan describes the perimeter AM to be conducted during various ground intrusive remedial phases at the Garfield Avenue site (PPG Site 114) in Jersey City, NJ. Changes to this Plan will be documented as individual Amendments using the form presented in Attachment C.

Perimeter AM will be conducted during all on-site activities. In addition, perimeter monitoring will be conducted for one week (five days) prior to the beginning of ground intrusive activities in order to determine the currently existing baseline levels. Monitoring activities are designed to meet the project objectives defined in Section 2.0 of this Plan.

Previous site investigations on various portions of the site have indicated the presence of volatile organic compounds (VOC), Hexavalent Chromium, heavy metals and polyaromatic hydrocarbons (PAHs). Continuous particulate monitoring will be conducted as a control tool for all fugitive dust emissions resulting from the various site excavations and stabilization/solidification mixture blending activities. Air particulate matter smaller than 10 microns in diameter (PM_{10}) will also serve as a surrogate for compounds like Hexavalent Chromium and other heavy metals plus PAH materials in the perimeter ambient air quality monitoring program. Periodic integrated sampling for airborne PM_{10} and Hexavalent Chromium (Cr+6) will also be performed at a number of the AM locations. Also due to the on-site mixing of concentrated calcium polysulfide and subsequent injection into the local groundwater there is the potential to generate hydrogen sulfide (H_2S). Thus, H_2S will also be measured periodically along the exclusion zone at the site. Further details of the AM program are described in the following sections of this Plan.

2.0 Project Objectives

There are four primary objectives of this Perimeter AM Plan as follows:

- To help protect human health and the environment;
- To use real-time perimeter AM results in conjunction with other on-site worker health and safety programs;
- To evaluate the effectiveness of, and need for, dust and vapor suppression controls; and
- To document air quality during all ground intrusive site activities.

The specific AM and data quality objectives are outlined below.

2.1 Air Monitoring Objectives

Perimeter air quality monitoring will be performed at various locations around the perimeter of all site activities. Perimeter AM will be designed to accomplish the objectives described above, as well as:

- To establish current baseline levels of total volatile organic compounds (TVOC), specific volatile compounds (benzene, toluene, ethylbenzene and xylenes - collectively referred to as BTEX), PM₁₀, and Hexavalent Chromium in ambient air prior to initiation of any site activities;
- To develop site-specific risk-based action levels which are protective of public health at the property line;
- To monitor and document ambient air levels of TVOC (plus BTEX), PM₁₀, H₂S, and Hexavalent Chromium during site activities;
- To continuously monitor the effectiveness of dust and vapor control measures being utilized at the site; and
- To evaluate the need for additional dust and vapor control measures to reduce airborne contaminants.

2.2 Data Quality Objectives

The number of samples collected for field screening depends on the level of data quality that can be expected from the testing method employed. Below is a discussion regarding Data Quality Objectives (DQOs) and the relative quality of the samples needed for types of data to be collected.

DQOs are established to define the quality of the data generated in relation to the methods used to collect the data and the data's anticipated end use. Real-time screening level data and periodic integrated sampling will be collected to evaluate contaminant levels in ambient air.

The following DQO levels will be used during the performance of site actions:

Real-time screening data – Screening data applies to all field screening using equipment such as ambient TVOC, BTEX, particulate /dust, and H₂S monitors. The real-time data collected will also include all QA/QC data and documentation required to support the real-time data collections. The real-time data will be used to document conditions occurring on the site during ground intrusive activities and to determine the need for more aggressive dust and vapor suppression activities or alteration of work activities. In addition, the real-time data will be used to show compliance with the site-specific risk-based action levels proposed in this Plan.

Periodic Integrated data – This data collection applies to analyses performed off-site at an analytical laboratory. The analyses will be conducted in accordance with appropriate US EPA air sampling methods for gravimetric PM₁₀ and Hexavalent Chromium. The data will include the QA/QC elements specified by the appropriate US EPA methods. In general, the integrated samples will be collected on a regular daily basis and analyzed using the appropriate US EPA methods.

3.0 Perimeter Air Monitoring

The perimeter AM system is intended to be protective of public health in the vicinity of the site. The sampling program is designed to provide real-time and periodic AM so that acceptable risks for acute and sub chronic exposures are not exceeded. Perimeter real-time monitoring will be conducted during all soil excavation and surface demolition periods and for one week (five days) prior to the intrusive activities. In accordance with these guidelines, real-time AM will be performed for TVOC (plus periodically for BTEX) and particulate matter 10 micrometers and less in size (PM₁₀). The continuous data collection of PM₁₀ levels will serve as a surrogate for various compounds like Hexavalent Chromium, heavy metals and polyaromatic hydrocarbons (PAH) levels.

An overview of the AM activities is as follows:

The AM Program will consist of two tiers of monitoring operations. The first level of AM (to be used as an early warning indicator) will include AM locations (4) located at the exclusion zone boundary while the second level of AM will be conducted at various locations (8) along the perimeter/fenceline of the site. At least 10 of the 12 AM sites must be in an operational (includes data telemetering to central location plus alarm system operations) status at all times in order for on-site excavation activities to proceed. If more than 2 AM sites are not considered to be operational, all ground intrusive activities will be stopped until such time that at least 10 of the AM units are fully operational.

The following sections detail the AM activities for each of the two AM tiers.

Exclusion Zone Air Monitoring:

Real-time AM for TVOC and PM₁₀ will be collected continuously (5-minute data averages for 8-10 hours per day and 5 days per week) at four exclusion zone locations. The locations of the four exclusion zone mobile monitoring stations will encircle the area where daily site intrusive activity will be performed, and will be relocated as necessary throughout the program. All real-time data from exclusion zone stations will be continuously telemetered to the central AM station (as 5-minute data averages) located on the site property and subsequently compared to the action levels developed for the site (see Section 4.0). The exclusion zone AM will serve as an early warning indicator to help prevent potential elevated concentration issues from reaching the actual perimeter of the site.

In addition to the continuous data collection for TVOC and particulates, daily (5 days per week) 8-10 hour integrated sampling for PM₁₀ and Hexavalent Chromium will be conducted at the four exclusion zone locations.

Hourly exclusion zone perimeter hand-held AM will also be conducted (8-10 hours per day and 5 days per week) at 4-6 additional sampling locations, collecting instantaneous TVOC, PM₁₀, plus H₂S levels.

Perimeter / Fenceline Air Monitoring:

Real-time AM for TVOC (plus periodic BTEX measurements) and PM₁₀ will be conducted continuously (15-minute data averages for 24 hours per day and 7 days per week) at four fixed perimeter locations each day. BTEX will be measured periodically using a gas chromatograph at each of the 4 fixed AM locations. The GC at each site will be automatically triggered into speciation sample mode whenever a TVOC action level has been exceeded at that site. In addition to the 4 fixed AM locations there will also be four mobile perimeter AM locations collecting TVOC and particulate data (15-minute data averages 8-10 hours per day and 5 days per week). All real-time data from the perimeter stations (fixed and mobile) will be continuously telemetered to the central AM station (as 15-minute data averages) located on the site property and subsequently compared to the Alert and Action Levels developed for the site (see Section 4.0). The location of the four fixed AM

locations will remain constant from day to day throughout the program while the four mobile stations will be re-located as needed based on wind conditions and site activity. The goal is to provide one upwind and one downwind AM location at all times during intrusive activities. Monitoring will be conducted using real-time instruments capable of recording 15-minute average data for comparison to Alert and Action Levels.

In addition to the continuous PM₁₀ and TVOC sampling at all eight locations, daily integrated sampling (8-10 hour samples for 5 days per week) will be conducted for PM₁₀ and Hexavalent Chromium.

Meteorological monitoring (10-meter tower collecting 15-minute data averages 24 hours a day and 7 days per week) will also be conducted at the central AM location. The meteorological parameters to be measured are wind speed, wind direction, sigma theta, temperature and dew point temperature (i.e., relative humidity).

Alert and Action Level Responses

Perimeter AM Locations:

- **PM₁₀** at the eight perimeter AM locations will be measured on a continuous basis and reported as 15-minute averages. Dust suppression activities will be initiated if ambient air concentrations at any perimeter station are **250 micrograms per cubic meter (µg/m³) (75% of Action Level 333 µg/m³)** or greater for a 15-minute period, or if airborne dust is observed leaving the property boundaries.
- Work activities will be continued during this time, provided that the 15-minute PM₁₀ concentrations do not exceed the Action Level (**333 µg/m³**) and no visible dust is migrating from the property. See Attachment A (Section 5.0) of this plan for the site-specific Action Level Exceedance Protocols. The Dust Control Plan provides additional information on dust control methodologies, responsibilities and procedures.
- If after implementation of additional dust suppression techniques, 15-minute PM₁₀ concentrations at any perimeter station continue to exceed the **Action Level (333 µg/m³)** for a second consecutive 15-minute period, work shall be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the concentrations to less than **333 µg/m³** at all perimeter stations for 15 minutes and in preventing visible dust from migrating beyond the work site.
- **TVOC** at the eight perimeter AM locations will be measured on a continuous basis and reported as 15-minute averages. Vapor suppression activities will be employed if ambient air concentrations at any perimeter station are **0.7 parts per million (ppm) (75% of Action Level of 0.9 PPM)** or greater for a 15-minute period.
- Work activities will be continued during this time, provided that the 15-minute TVOC concentrations do not exceed the **Action Level (0.9 ppm)**. See Attachment A (Section 5.0) of this plan for the site-specific Action Level Exceedance Protocols.
- If after implementation of vapor suppression techniques, 15-minute TVOC concentrations at any perimeter station continue to exceed the **Action Level (0.9 ppm)** for a second consecutive 15-minute period, work shall be stopped and a re-evaluation of activities initiated. Work will resume provided that vapor suppression measures and other controls are successful in reducing the concentrations to less than **0.9 ppm** at all perimeter stations for 15 minutes.

The decision criteria for evaluating the perimeter location PM₁₀ and TVOC data levels in conformance to site-specific Action Levels and for initiating emission control actions are shown in Figures 3-1 and 3-2 respectively. A project communication flow chart associated with Action Level exceedances is presented as Figure 3-3.

One-Minute Early Warning Alert Level for the Perimeter AM Locations

PPG has implemented the use of PM₁₀ **1-Minute Early Warning Alert Level** of 100 µg/m³ at each of the 8 perimeter/fenceline AMS locations. The addition of this early warning **1-Minute Early Warning Alert Level** at the 8 perimeter/fenceline AMS locations provides site operational staff with a quicker notification of elevated particulate matter levels (versus even the current 5-minute. This quicker notification provides added time for corrective actions to be implemented, if necessary, prior to a 15-minute continuous particulate concentration reaching the Alert and/or Action Levels (250 µg/m³ or 333 µg/m³, respectively) at any of the 8 AMS locations.

Once a **1-Minute Early Warning Alert Level** warning from any of the perimeter/fenceline AMS locations has been received by the on-site air monitoring staff, the appropriate on-site engineering and remedial staff will be notified of the elevated dust concentration. On-site staff will evaluate the warning and implement immediate corrective and dust control actions, as warranted, with the overall goal of correcting the dust generation issues prior to a fenceline 15-minute real-time PM₁₀ average exceeding the Alert and/or Action Level. The verbal reporting of these 1-minute alarms by the air monitoring technicians to the appropriate on-site staff will be continued until such time that the 1-minute alarm ceases.

If a 1-minute data average from any of the 8 perimeter/fenceline PM₁₀ AMS exceeds the **1-Minute Early Warning Alert Level** of 100 µg/m³ during normal working hours, an automatic alarm will be triggered and the following procedure will be followed by the Air Monitoring site technicians:

- The air monitoring technician will confirm the sampler is operating correctly and within calibration specifications.
- The air monitoring Project Manager (or delegated staff) plus the on-site Dust Manager, along with the Engineering and Construction Site Managers, will be notified and will be continually updated until the exceedance ceases.
- The air monitoring technician will make an assessment, using on-site observations and wind data, as to whether the alert exceedance is due to on-site or off-site activities, or meteorological conditions. The Engineering Site Manager will also be advised of the root cause for the elevated concentrations.
- If warranted, particulate (dust) control measures will be undertaken by the Construction/Remediation contractor immediately upon notification.
- If the 15-minute average data from any of the 8 fenceline PM₁₀ monitors exceeds the **Action Level** for two consecutive 15-minute periods, site intrusive activities will be stopped and site activities further evaluated so as to mitigate the particulate exposures at the fenceline AM locations. Remedial activities will not resume until all 8 perimeter AM locations have reported at least one 15-minute concentration below the Action Level.

Exclusion Zone AM Locations:

In the attempt to minimize the number of Action Level exceedances at the perimeter AM locations, the exclusion zone AM will be conducted at four (4) locations to continuously collect particulate and TVOC data (5-minute averages). These continuous data averages will also be compared to the particulate (**250 and 333 µg/m³**) Alert and Action Levels and TVOC (**0.7 and 0.9 ppm**) Alert and Action Levels every 5-minutes with corrective actions being taken if/when any of these locations exceed an Alert and/or Action level. The goal is to take site-specific corrective actions prior to a perimeter/fenceline 15-minute AM concentration approaching and/or exceeding an Action Level.

The hourly hand-held AM at an additional 4-6 exclusion zone locations will collect instantaneous TVOC, particulate and H₂S data and will also further serve as an early warning indicator / detector to help avoid

perimeter 15-minute Action Level exceedances. If any hand-held **H₂S level** exceeds the Active Level of **6 parts per billion (ppb)**, the on-site manager will be notified and H₂S suppression activities will be initiated.

Figure 3-1: Particulates (Hexavalent Chromium/Heavy Metals/PAH) Monitoring and Control Chart

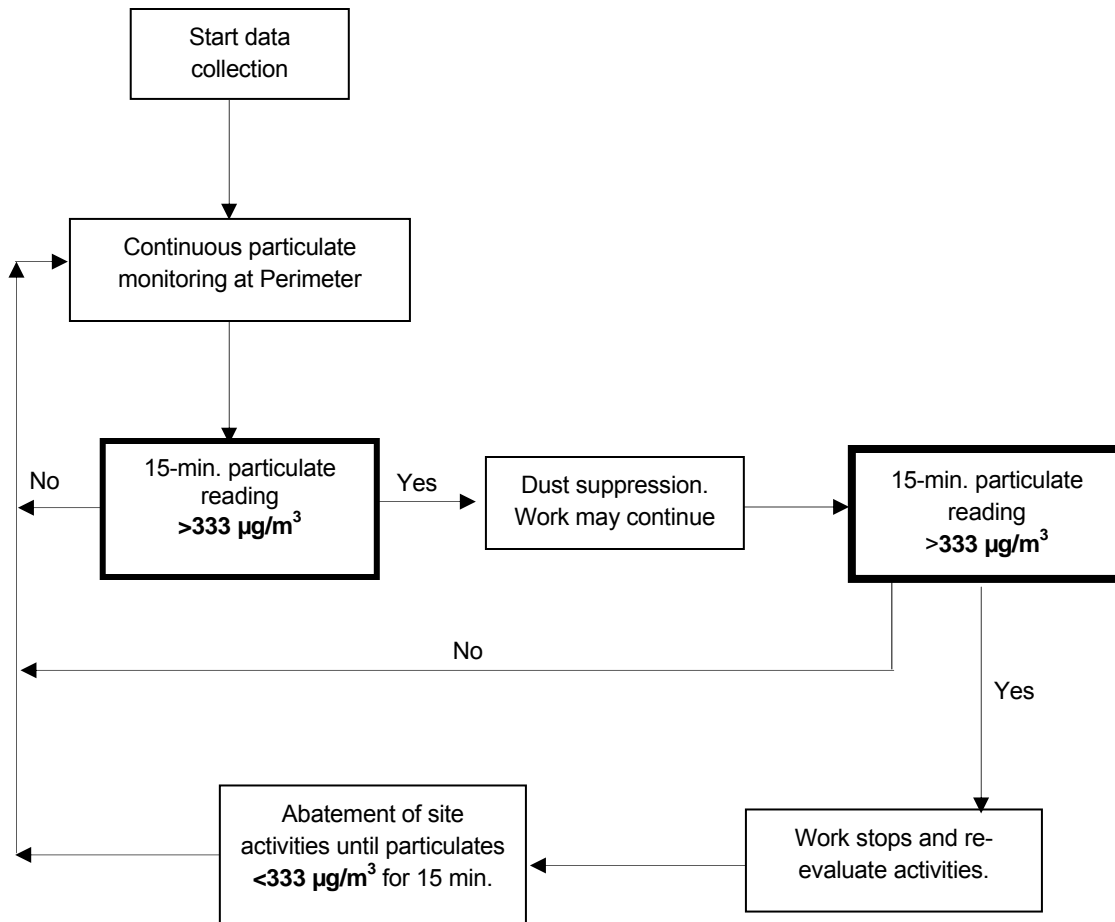


Figure 3-2: TVOC Monitoring and Control Chart

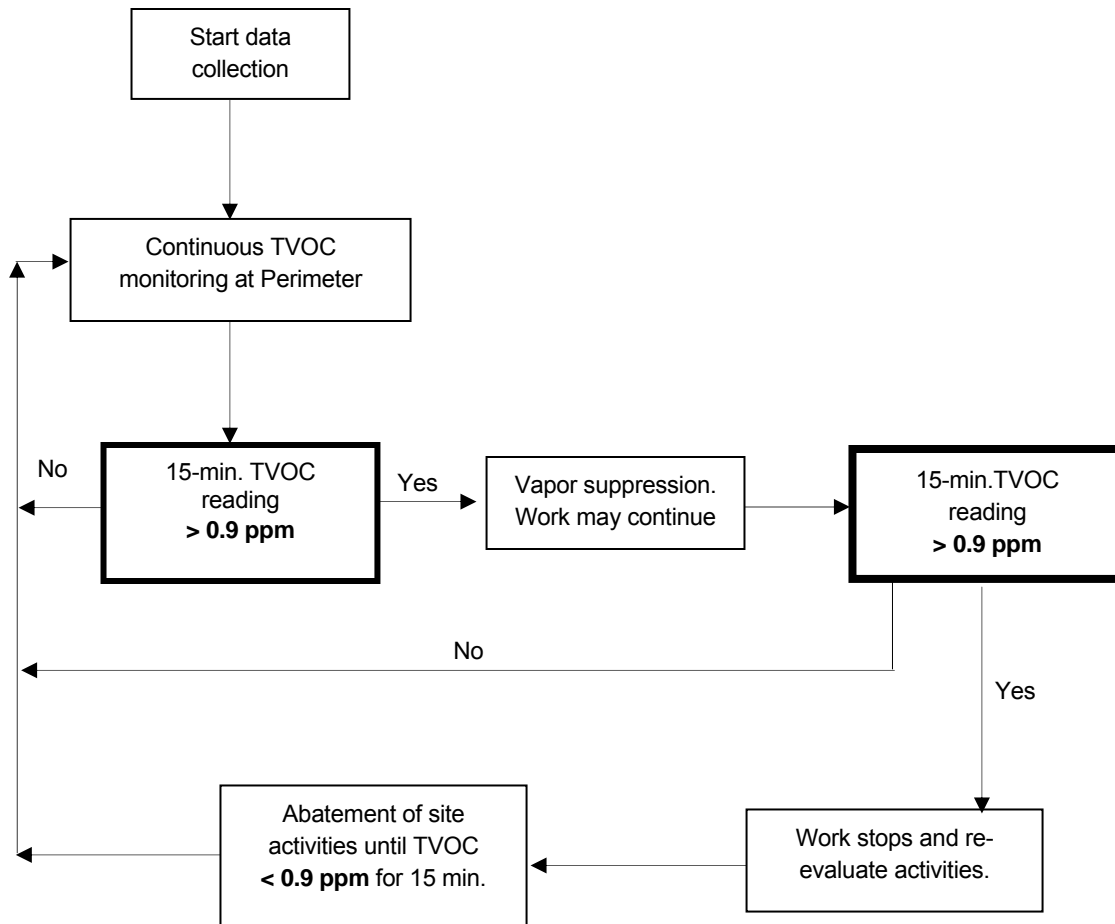
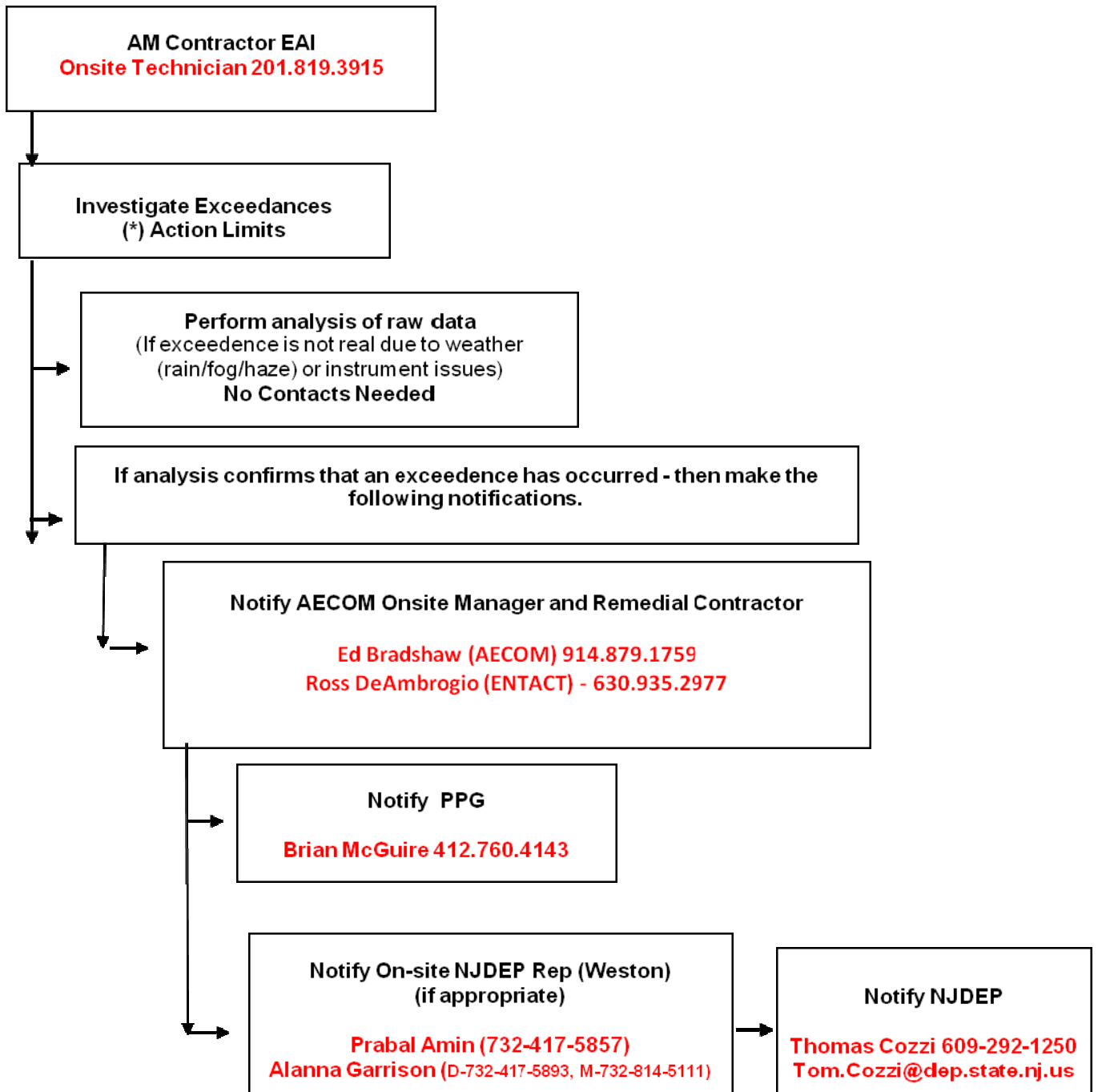


Figure 3-3: Action Level Communication Protocol



3.1 Perimeter Monitoring System

3.1.1 Monitoring System Design

The perimeter and exclusion zone AM systems (12) will consist of the following components: 4 larger AM shelters and 8 portable AM units, 14 continuous PM₁₀ and TVOC instruments (including 2 spare units each) measuring air quality from approximately 4-6 feet above the ground, two continuous H₂S samplers (includes one spare), 14 MiniVol particulate samplers (includes one collocated and one spare unit) for integrated PM₁₀, 12 MiniVol samplers for integrated Hexavalent Chromium, and a 10-meter meteorological monitoring system. The central AM trailer plus the four fixed perimeter AM locations will be powered by electrical service drops in the area and hard-wire connections while the four mobile perimeter and the four mobile exclusion zone AM locations will be powered by on-site batteries. The 4 fixed AM perimeter locations' enclosure will be sized with adequate interior space to house the TVOC and Particulate monitors, GC and other peripheral data logging and telemetry equipment. To minimize instrument drift, the interior temperature of the enclosures will be regulated between 68 to 75° F when the fixed AM units are in operation.

Each of these system components is described in the following subsections.

3.1.1.1 Continuous Particulates Monitoring

Real-time and hand-held monitoring for Hexavalent Chromium, heavy metals and PAHs will involve the measurement of respirable particulates/dust as a surrogate for ambient levels. Since real-time monitors for these specific compounds are not available, respirable dust levels will be measured on a real-time basis at various locations during excavation activities to evaluate site-related particulate concentrations. The measured levels will then be compared to an Action Level (333 µg/m³) for respirable dust which is based on inhalation impacts from the various compounds listed above exposures. The data from the dust monitoring will also be relayed to the central computer located in the on-site trailer.

A direct reading real-time MIE DataRAM Analyzer or TSI DustTrak Aerosol Monitor, or equivalent (with omnidirectional inlets and PM₁₀ size selective impactor) will be used to monitor for PM₁₀ at a number of locations. The measurement of dust levels is accomplished using infrared electromagnetic radiation to detect airborne particles. The dust meter will be configured to detect only dust particles 10 micron and less in diameter. Readings from all site locations will be compared to the particulate action level within the on-site central AM trailer where visual and audible alarms will be triggered when needed. Figure 3-1 provides the real-time particulate monitoring protocol.

3.1.1.2 Continuous TVOC and BTEX Monitoring

Real-time and hand-held portable perimeter AM systems will be operated at a number of locations to monitor TVOC concentrations associated with the ground intrusive activities. The monitoring systems are designed to be protective of public health against unacceptable exposure. They will provide continuous air quantitative measurements from the various locations around the site and will compare the measurements to action levels established for target contaminants. The real-time TVOC perimeter AM system is set to protect against short-term exposure to levels of volatile organic compounds emitted during the site remedial activities as well as longer-term exposure over the length of the remediation project. If a specific short-term TVOC action level is exceeded, a visual and audible alarm will be triggered within the on-site central AM trailer. If the elevated concentration is measured at one of the 4 fixed perimeter AM locations, the GC at the site will automatically be triggered on for BTEX sampling. In the event of an alarm condition, the site excavation manager will be notified by the AM technician and the two shall identify the source and initiate the controls to mitigate the applicable emissions. Figure 3-2 provides the real-time TVOC monitoring protocol.

Measurements for TVOC will be performed using a RAE portable photo ionization detector (PID), which will be located at each of the AM sites. The PID unit collects and analyzes air continuously.

The monitoring of BTEX shall be accomplished by the use of continuous GCs located within each fixed AM unit with an automatic injection feature. The detector type / method for the GC will be identical to the TVOC monitor at each site location (i.e., a PID). The GC proposed for this program will meet the following demonstrated performance specifications plus local and remote sample specification:

- local and remote automatic calibration check;
- internal and external status flag for speciation and calibration check;
- lowest detection limit will be 10 ppb or better;
- the analytical cycle time for each injection will be 120 seconds or less;
- a minimum of 2 samples shall be collected and analyzed by the GC every 5-minutes; and
- Air carrier gas used must be ultra pure nitrogen.

The GC will be capable of performing daily calibration check automatically; the calibration gases used shall be benzene, toluene, ethylbenzene and xylenes (BTEX). Daily calibration report shall be provided and displayed at the central trailer computer. The GC sampling for BTEX will be conducted whenever any TVOC action level exceedances occur at any of the four fixed perimeter AM locations. Concentrations will be reported as 15-minute average concentrations for each compound of interest (BTEX).

3.1.1.3 H₂S Sampling

It is proposed that the hand-held measurement of H₂S be made on an intermittent basis at the exclusion zone of site remedial activities. This sampling will be achieved using the Arizona Instrument, Jerome Model 631X Hydrogen Sulfide portable, hand-held analyzer.

The Jerome 631X is a fast response, rugged and easy to operate instrument. Its low detection limit for H₂S of approximately 3 ppb and the constant display of concentration which can be updated every 3 seconds are very attractive features for the hand-held AM operational approach. The instrument was designed to perform quick and reliable analysis of H₂S; has a range up to 50 ppm, plus requires limited maintenance during operation. The 631X has been routinely used in a wide variety of applications, including nuisance odor monitoring, ambient air analyses, regulatory compliance monitoring, and leak detection surveillance.

3.1.1.4 Integrated PM₁₀ and Cr+6 Sampling and Analysis (Exclusion Zone and Perimeter Locations)

The AIRMETRICS MiniVol™ portable air sampler will be used for the integrated sampling of PM₁₀ and Cr+6 on 47 mm filters. This will be achieved by using two separate MiniVol samplers, one for PM₁₀ and the other for Cr+6 at each of the 12 AM locations.

For the PM₁₀ sample collections, the MiniVol's will be configured to draw air at approximately 5 liters/minute through a 10 micron particle size separator (impactor) and then through a 47mm filter. The filter will be weighed pre and post-exposure within the AECOM gravimetric lab to determine the final PM₁₀ concentrations (µg/m³). Refer to the gravimetric lab procedure in Appendix D of the Field Sampling Plan/Quality Assurance Project Plan (FSP-QAPP). Samples will be analyzed gravimetrically in order to achieve a particulate concentration over the entire sampling period in accordance with 40 CFR 50 – Appendix J – Reference Method for PM₁₀ Sampling. Sample analysis turnaround is projected to be 10 working days after lab receipt of samples.

A similar set-up will be employed for the sampling of Cr+6, using a 10 micron particle size separator (impactor). The sampling flow rate will also be set at approximately 5 liters/min as specified in the operational specifications for the sampler. The exposed respirable Cr+6 filter will be shipped to an analytical laboratory to analyze for Cr+6 using OSHA method 215 (see attached Hex Chrome lab procedure provided in Appendix D of the FSP-QAPP). Sample analysis turnaround is projected to be 5 working days after lab receipt of samples.

The MiniVol is a self-contained, low maintenance DC or AC operated sampler designed for portable, unattended operation. All electronics are housed in an all weather case. It is mobile, versatile, rugged and easy to use. The sampler could be mounted on an optional 5-foot tripod during sampling, and can be relocated and re-installed easily from site to site. The built-in lithium ion battery can maintain a continuous operation of more than 60 hrs when fully charged. The MiniVol also contains a self-regulated sample pump to control the sampling flow rate at a set point and a programmable 7 day timer. The site operator will be able to program the timer to start and stop a single or multi sampling events at a pre-set time.

3.1.1.5 Meteorological System

A 10-meter meteorological station will be erected at a central location adjacent to the site. The tower will be mounted adjacent to the central trailer 10 meters above ground level, and will be equipped with sensors to measure wind speed and direction, sigma theta, temperature, and relative humidity or dewpoint temperature on a continuous basis during remedial activities. The station will record the data and allow instantaneous determination of the predominant wind direction and speed. A Climatronics EWS/ Wind Mark III system or equivalent is suggested for meteorological measurements.

The EWS/Wind Mark III unit is a completely integrated weather measuring system which includes sensors for measuring wind speed, wind direction, temperature, and relative humidity. The unit also includes an integral data logger which is used to accept all the meteorological signals. Wind speed is sensed by a photo-chopper using a solid-state light source. Wind direction is sensed by a precision potentiometer with 360° output. Temperature is measured using a precision thermistor permitting 1°F accuracy. Relative humidity is measured over the range of 0-100%, as calculated by the on-site data acquisition system. The Wind Mark III system comes integrated with an Odessa Model 3260 data logger, which accepts the analog signals from each of the sensors and converts them to engineering units. The Odessa also provides averaging and storage capabilities for the data.

The data logger also includes a digital standard deviation (sigma) processor which calculates the wind fluctuation (sigma theta). This microprocessor makes no arithmetic assumption and computes a digital standard deviation based on averaging times up to one hour. Sigma theta is an important parameter to observe during remediation activity, so that the potential for the plume to change direction during slow wind periods can be documented. The system specifications for the EWS/ Wind Mark III system are:

Sensor	Range	System Accuracy
Wind Speed	0-100 miles/hr	±0.5 mph or ±1.5%
Wind Direction	0-360°	±3°
Relative Humidity	0-100%	±4%
Temperature	-22 to +122°F	±1.0°F

3.1.1.6 Computer Control /Alarm Systems

A data logger or an equivalent device will be included in each air quality monitoring station, as well as the on-site meteorological monitoring station. The data loggers will be programmed to assimilate data from the continuous air quality monitors and meteorological sensors once every 10 seconds, and store digital data in its internal memory. Fifteen-minute (8 perimeter locations) and/or five-minute (4 exclusion zone locations) data averages will be computed and stored in the data logger at the end of each data period. Once the 5 or 15-minute value is formed, all data averages from each continuous monitoring parameter will be transmitted by a line-of-sight radio transmitter network to a central desktop-based Data Acquisition and Handling System (DAHS). The DAHS will be located in an on-site environmentally controlled shelter. All continuous data

(TVOC, BTEX, particulates, and meteorological) collected will be archived and backed up on a second data base computer to be located within the central AM trailer on the site. In addition, all data will be transferred daily by the AM contractor staff using internet access, to the AM contractor's central data base management facility off-site. Raw data will then be Quality Control checked and the final validated database will reside at the AM contractor's data management facility off-site. The DAHS will be configured to display air quality and meteorological data simultaneously on the central computer monitor. The data presentation will be customized to assist the on-site operator in managing the data effectively. The DAHS will update the displayed data once every 5 or 15 minutes. The data will also be compared automatically with the pre-programmed Action Level concentrations for exceedance conditions.

A visual and audible alarm indicator will be provided at the central on-site shelter where the DAHS will be located. The alarm message indicating the parameters, location and concentration will be displayed on the computer monitor and a hard copy of the alarm message will be generated from a local, dedicated printer.

When an action level is exceeded in the particulate and/or TVOC sampling modes, the system is in an alarm condition and the appropriate visual and audible alarms will be displayed (see Figures 3-1 and 3-2). If the action level is exceeded, visual and audible alarms are illuminated within the central trailer. In addition to the alarms within the central trailer, a 24 hour per day and 7 day per week paging system will be designed in order to notify the on-site technicians when elevated concentration events occur during those normal work times when the technicians are out of the AM trailer or for those non-work nights and weekend times. In the event of an alarm condition, the engineering manager and construction site manager on duty or designated representative will be informed by the AM technician of the exceedance. The on-site site managers or their authorized representatives will then identify the source and initiate mitigating the emission, if the source is associated with on-site activities. When all sites' concentrations drop below the action level, the system will turn the alarms off automatically.

3.2 Monitoring Operations

Monitoring operations will require two full-time technicians (to be provided by the AM contractor) for the routine inspection and testing of the system according to the QA program. The technicians are responsible for the daily system operations and ongoing data review plus inspecting the equipment operation, replacing expendable supplies, testing the AM systems, and notifying the respective contractors of alarm conditions.

Routine operations require the technicians to perform the following functions:

- Provide daily system operations and data review;
- Provide routine calibration and QC documentation for all 12 AM stations;
- Set up the eight perimeter and four exclusion zone integrated sample sites each day, collect all sample media at the end of each day and ship all samples under chain-of-custody to the appropriate labs;
- Relocate daily (or more frequently as needed) the four mobile perimeter AM sites based on wind conditions and site activity locations, note locations on a daily site map;
- Perform hourly hand-held AM at 4-6 additional locations around the exclusion zone boundary plus document the data collection results and the exact locations of the hand-held AM on a daily AM site map;
- Test the alarm system periodically;
- Inform the site manager plus remedial contractor manager of exceedances of Alert and/or Action Levels;
- Inspect the meteorological system for proper operation; and

- Download and ship data and all QC materials to the central data processing center.

All system (PM₁₀, TVOC, BTEX, H₂S, and integrated sampler) calibrations are conducted through routine calibration checks. The PM₁₀, TVOC, BTEX and H₂S systems are designed to provide for daily equipment calibration checks to test the calibration drift. The integrated particulate and Hexavalent Chromium samplers will be fully calibrated quarterly with single point flow checks against a flow standard being performed monthly. Meteorological system maintenance and calibrations are conducted at startup, at takedown and at least every six months during the operational period.

4.0 Action Levels

The site-specific action levels have been developed in compliance with risk assessment procedures. The action levels have been developed to protect off-site receptors from adverse health impacts from TVOC, BTEX, Hexavalent Chromium, heavy metals and PAHs, and particulates for the time frame encompassing the duration of the intrusive activities (See Attachment B of this document for details of Action Level development).

These Action Levels will alert site management to control emissions or curtail operations to maintain off-site exposures at levels below the human health criteria.

The following steps were taken in the Action Level development tasks for TVOC and Particulates:

- Determine the compounds of interest at the site (TVOC, BTEX and Particulates/Hexavalent Chromium/heavy metals/PAHs).
- Evaluate the potential for exposure at the site by identifying human receptors (people living or working near the site). Residents living near the site were identified as the most likely human receptors.
- Determine exposure pathways for the identified receptors. The main exposure pathway for human receptors is inhalation of volatile chemicals or particulates during the site activity.
- Determine action levels based on both exposure and compound-specific toxicity. USEPA has developed compound-specific toxicity values that were used in the calculation of action levels.
- Calculate action levels per USEPA risk assessment guidelines. Action levels were calculated for the various receptor locations in the vicinity of the site.

The approach and methodology used to calculate Action Levels, including all supporting equations and assumptions have been documented (see Attachment B of this plan).

4.1 Particulates, TVOC and Hydrogen Sulfide

Control of Site emissions to assure protection of human health is an important aspect of the remedial program at the Garfield Avenue Site. As presented in Appendix B, an Action Level has been developed to protect off-site receptors from adverse health impacts due to potential exposure to particulates, TVOC and H₂S emanating from the Site.

The Early Warning and Action Levels for the monitoring program are as follows:

Parameter	Early Warning Alert Level Site Fenceline (1-min)	Alert Level Exclusion Zone (5-min) Site Fenceline (15-min)	Early Warning Action Level Exclusion Zone (5-min or Instantaneous)	Action Level Site Fenceline (15-min)
Particulates	100 µg/m ³	250 µg/m ³	333 µg/m ³	333 µg/m ³
TVOC	N/A	0.7 ppm	0.9 ppm	0.9 ppm
H ₂ S	N/A	N/A	0.006 ppm* (6 ppb)	N/A
* based on detection limit of analyzer (3 ppb) and the limit of 4.7 ppb which is the level that 50% of people can detect H ₂ S odors. N/A = Not Applicable				

4.2 Integrated Hexavalent Chromium

PPG (in coordination with NJDEP) has developed a Site-specific Acceptable Air Concentration (AAC) for hexavalent chromium to protect off-site receptors from adverse health impacts associated with potential exposure to hexavalent chromium particulate matter in construction dust. The AAC for hexavalent chromium is calculated as a time-weighted average over the duration of the Site 114 remediation project. Compliance with the AAC ensures that nearby receptors are protected against a one-in-a-million cancer risk as mandated by the State of New Jersey. The calculated Site-specific AAC for the Garfield Avenue Group Sites is **49 nanograms per cubic meter of air (49 ng/m³)** over the project duration, as discussed in **Appendix B**.

Hexavalent chromium concentrations measured at the fenceline of the Site which meet the Site-specific AAC of 49 ng/m³ over the project duration ensure the protection of human health, and serve as a means of evaluating the effectiveness of the Site's dust control program. PPG has also adopted a more conservative shorter-duration rolling averages, to ensure that emissions of hexavalent chromium are maintained below the AAC and minimized to the greatest extent possible. This approach is further discussed in **Section 7.3**.

5.0 Sampling Frequency

As presented in Section 3.0, sampling for respirable dust (PM₁₀) (as a surrogate for Hexavalent Chromium, heavy metals and PAHs) plus TVOC (periodically BTEX) and measurement of meteorological parameters will occur on a daily basis. Sampling for TVOC and particulates will occur 24 hours/day and seven days/week on a real-time basis for the four fixed perimeter AM locations and 8-10 hours per day for five days a week at the four mobile perimeter plus the four mobile exclusion zone AM locations during site excavation activities. Integrated air sampling for particulates and Hexavalent Chromium will occur daily (5 days per week) at the eight perimeter plus the four exclusion zone AM locations.

5.1 Baseline (Pre-Remedial) Monitoring

Prior to the initiation of excavation activities, baseline monitoring will be performed for five consecutive days to quantify the site's existing pre-remedial conditions (i.e., "baseline levels") of site-specific contaminants in addition to allowing a shake-down period for the AM operations. The baseline data collection results are not anticipated to be used to modify the site-specific risk-based action levels to be employed for the site remedial operations. The anticipated 5-day baseline sampling program involves collection of 24-hour perimeter air quality (PM₁₀ and TVOC) data from the four fixed perimeter sampling locations plus 8-10 hour perimeter monitoring at the four mobile perimeter plus four exclusion zone AM locations. The samples will be collected on consecutive days preceding the startup of planned construction/ excavation activities. Integrated particulate and Hexavalent Chromium samples from the eight perimeter and four exclusion zone sampling locations (collected from 8:00 am to 5:00 pm), plus one blank for each of the five days, will be submitted to a laboratory for gravimetric particulate and Hexavalent Chromium analyses. The anticipated lab turnaround time will be 10 working days from the time of sample receipt by the lab. Meteorological data will also be collected (24 hours per day) for the entire 5-day baseline period.

5.2 Routine Monitoring

During ongoing construction / excavation activity periods continuous and integrated air quality and meteorological sampling will be performed as described above and in Section 3.0 of this plan.

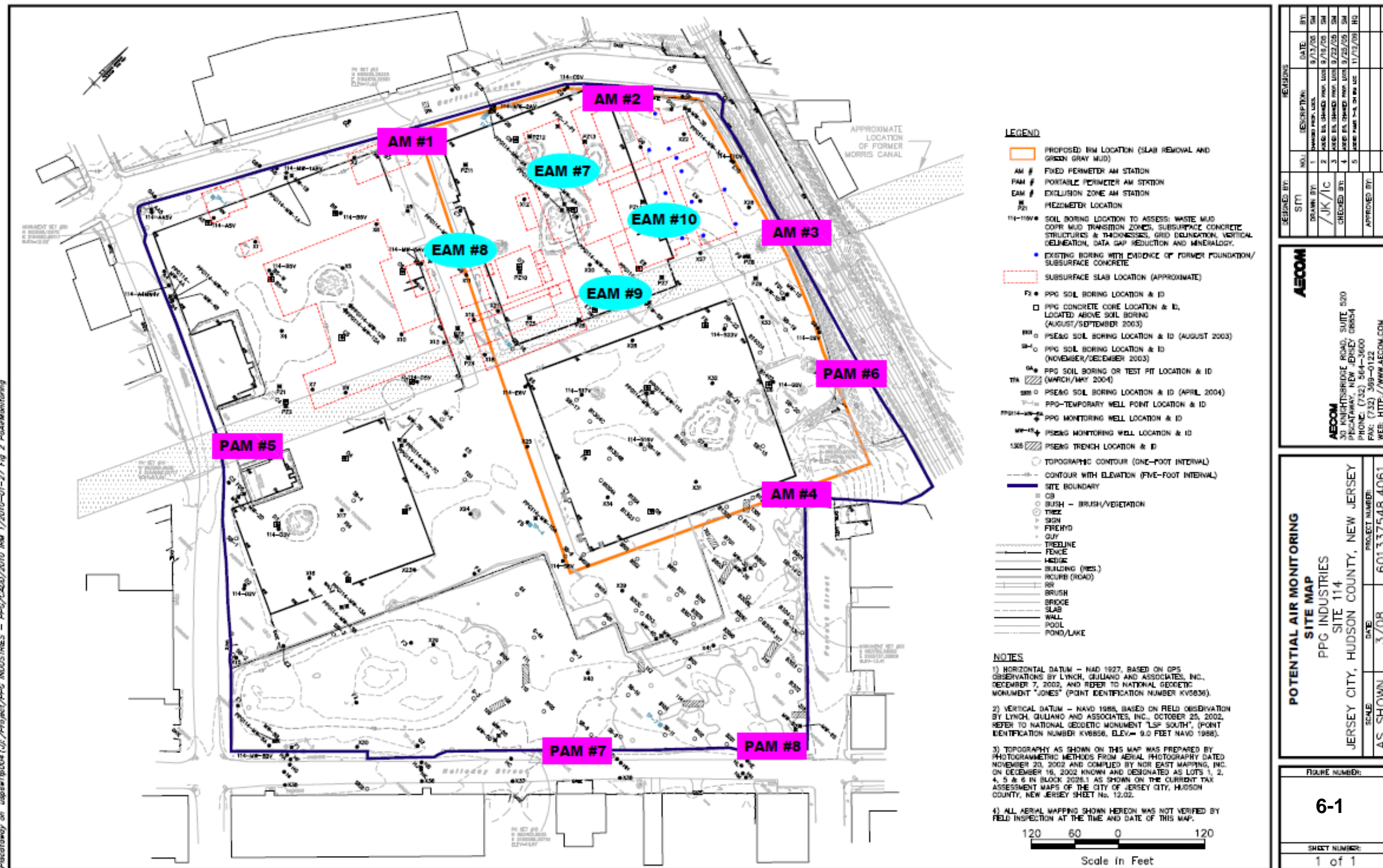
6.0 Sample Locations

6.1 Continuous and Integrated Air Monitoring Locations

As noted previously, continuous PM₁₀ and TVOC AM and integrated particulate and Hexavalent Chromium air sampling will be performed at 12 locations (eight perimeter and 4 exclusion zone AM locations). These stations will generally be situated along the perimeter of site and the exclusion zone respectively, taking into account the location of site intrusive activity and proximity of sensitive receptors in the area. Although it is not possible to precisely identify the location of the 12 air quality monitoring stations at this time, potential locations for Phase I are shown in Figure 6-1. Although the figure depicts the approximate extent of intrusive activities, it is likely that the exclusion zone will be smaller than the extent depicted at any given time and the exclusion zone would be relocated as the activities progress, along with the AM equipment.

There will also be a meteorological monitoring station/location which will be located adjacent to the AM Contractor's central data collection trailer which will be located in proximity to other on-site contractors' operational trailers (the location of all trailers to be determined).

Figure 6-1: Potential Air Monitoring Site Map



7.0 Data Validation and Reporting

7.1 Data Management Overview

Data will be transmitted from each site's data collection systems to the central database management system as continuous analyzer readings reduced to digital form in 5 or 15-minute averages. For a data average to be a valid data point, 50% of the data period must be valid. Data editing, validation and reporting should be performed by the AM contractor via PC terminals linked to the project database residing in the on-site central computer. All raw data (TVOC/particulates/meteorological data) being collected will be automatically transferred and backed up on-site by a second computer every 15 minutes. In addition, on a daily basis, a copy of all raw data files will be retrieved via internet access by the AM Contractor's main data base management staff located at their central database management center. Raw data will then be Quality Controlled and a final validated database will reside within the AM contractor's central data management facility off-site.

The line of communications concerning the Perimeter AM Program begins with the on-site field technicians who will perform daily operational tasks plus constant data review and will provide warnings of potential elevated concentration events. The site technicians will notify the AM Contractor's Project Manager plus the AECOM On-site Manager (Site Supervisor) and the on-site Remedial Contractor Manager when/if any elevated concentrations exceed the risk-based action levels (as shown in Figure 3-3). The on-site construction staff will then decide on the appropriate corrective actions to be implemented to address the elevated concentration event. The AECOM On-site Manager will have the responsibility of further notifications to PPG and/or NJDEP as required (**see site-specific communication flow chart in Section 3 of this plan**).

7.2 Data Validation

It is an objective of this QA/QC plan that all ambient AM and sampling data collected in response to this plan will be 90% complete, and that all ambient AM and sampling data collected in response to this plan will be representative of actual conditions at the site perimeter. It is also the objective of this AM plan that all ambient AM and sampling data collected in response to this plan will be expressed in a manner and format that enables direct comparison with the applicable action levels.

For data to be considered valid, they shall be accurate and precise within prescribed limits, represent factual conditions, be obtained from a calibrated well-functioning instrument, from air sampled without interference or obstruction, and be thoroughly documented as to traceability to recognized standards.

Routine calibration of the monitoring and sampling equipment will be consistent with the policies expressed in the sampling and analysis plan, with the respective manufacturer's recommendations and with good quality assurance practices. All calibration standards will be traceable to the National Institute of Standards and Technology (NIST) or other authoritative standard. All real-time PM₁₀ monitoring equipment will be zero checked daily and tested for general upscale responses once per week. The TVOC samplers will be zero checked and calibration checked daily using an isobutylene gas calibration standard. All integrated sampling equipment will be calibrated prior to collection of the initial field samples, following completion of all field sampling activities, and at least every three months or as necessary to meet quality assurance practices. The meteorological systems will be calibrated upon startup, demobilization and every 6 months during site operations. All equipment calibrations will be documented.

7.3 Data Reporting

The data obtained from perimeter AM and sampling will be used to make the following determinations:

- Baseline concentration levels prior to site remediation activities;
- Action Level exceedances at site perimeter (fenceline) locations;
- Effectiveness of corrective actions when an Action Level is exceeded; and
- Effectiveness of the real-time PM₁₀ monitoring as a surrogate when compared to integrated Hexavalent Chromium air sampling and subsequent analysis.

Prior to their use in making the above-mentioned determinations, the data must be evaluated by qualified and experienced personnel to ensure that the data quality objectives have been met. The evaluation process will include, but is not limited to, the following:

- Verifying that all requested analyses are reported;
- Verifying that all real-time PM₁₀, TVOC, BTEX and meteorological instrumentation and sampling equipment has been properly calibrated and maintained;
- Verifying that all samples are analyzed according to the methods specified in the monitoring plan; and
- Verifying that laboratory quality control results fall within the laboratory acceptable criteria.

Environmental data that are not representative of environmental conditions because they were generated through poor field or laboratory practices will not be used in the evaluation process. This determination will be made using the professional judgment of a multi-disciplinary AM contractor team and other personnel with direct experience in the data collection effort. This coordination is essential for the identification and proper evaluation of valid data. After data are evaluated, the data interpretation process may be performed.

Air monitoring data is evaluated on a daily basis, and observations are recorded regarding activities being performed at the site. This strong focus on air monitoring and dust control allows for the consideration for the implementation of corrective actions on an immediate basis.

7.3.1 Event Documentation Reports

Event Documentation Reports (EDR) are produced on a periodic basis to report any continuous or integrated data results greater than 80% of the Action Level or AAC, respectively. These EDRs are produced within 3 days after receipt of the analytical results and submitted to Site Administrator for timely distribution. This reporting protocol provides increased communication to alert stakeholders any time elevated dust concentrations or hexavalent chromium are observed. Regular report submittals beyond the EDR include Weekly, Biweekly and Monthly Summary Reports.

7.3.2 Monthly Summary Reports

Monthly Summary Reports will be completed to provide a comprehensive evaluation of the program-to-date results. These comprehensive reports will be completed within three weeks of the close of each calendar month and will compile/present:

- Integrated PM₁₀ and hexavalent chromium results;
- Real-time TVOC, PM₁₀ results;
- Hand-Held TVOC, PM₁₀ and H₂S results; and
- Meteorological summaries.

Monthly reports focus primarily on hexavalent chromium results in comparison to the AAC, to evaluate the success of the AMP and dust control implementation at the Site.

Several shorter duration average concentrations (including: program-to-date, 90-day, 60-day, 30-day running averages) have been incorporated into the monthly report to help manage operational activities and evaluate the success of onsite emission control responses. The shorter term averages will be compared directly to the list of metrics provided below and may trigger the listed response action.

Metric Observation	Response Action
Cr+6 30-day ¹ TWA concentration $\geq 45 \text{ ng/m}^3$	External meeting (appropriate JCO participants) to review levels, evaluate activities each day when elevated concentrations were observed, and trigger corrective action (defined in the 23 Nov 2010 submission to Hudson County Superior Court).
Cr+6 60-day ¹ TWA concentration $\geq 40 \text{ ng/m}^3$	
Cr+6 90-day ¹ TWA concentration $\geq 35 \text{ ng/m}^3$	
Program-to-date TWA concentration $\geq 30 \text{ ng/m}^3$	
¹ Sampling days.	

Monthly reports will also provide an interpretation of short term trend analysis and air monitoring results with respect to site activities, and corrective measures deployed, if any were necessary. The usefulness of the metrics included in the monthly report will be evaluated and revised as appropriate throughout the duration of the program.

7.3.3 Biweekly Summary Reports

Biweekly Summary Reports will be submitted to provide routine program updates. The biweekly summaries are designed to provide on-site personnel with timely information necessary to manage the level of site activities in order to be protective of the community. These will be prepared and delivered to site personnel, NJDEP and the Site Administrator for operational use. These biweekly summaries will be prepared and delivered every other week, approximately 10 days after the end of 2 week period. These summaries will include daily real-time air monitoring results for the perimeter/fenceline and the exclusion zone perimeter, updated program-to-date average Cr6 and PM10 concentrations, and daily/weekly site maps.

7.3.4 Weekly Summary Reports

Weekly Data Summary Reports will be submitted to provide timely, routine program updates of daily real time fenceline and exclusion zone perimeter air monitoring results, updated program to date average integrated Cr6 and PM₁₀ concentrations, and site activity maps. These weekly summaries of the data will be prepared and delivered after weekly data are downloaded and tabulated (approximately 3 days after prior week end).

7.3.5 Final Air Monitoring Report

A final AM report will be generated and included in the final IRM Report. The final air monitoring report will include a summary of all site activities for the entire period, the time-weighted average hexavalent chromium concentration over the project duration, and a summary of all AM results, including the following:

- Real-time PM₁₀, TVOC (5 or 15-minute), and BTEX data printouts from the 12 AM locations;
- Hand-held instantaneous data printouts from the hourly exclusion zone monitoring (TVOC, PM₁₀, and H₂S);
- Real-time meteorological (15-minute) data printouts along with daily wind roses from the central location;
- Daily site maps indicating the locations of AM stations for each day of AM operations; and
- Data printouts of all integrated Particulate and Hexavalent Chromium sampling results from the daily integrated sampling sessions from the eight perimeter and the four exclusion zone AM locations.

8.0 Equipment QA/QC

The quality assurance and quality control (QA/QC) procedures proposed for this program are described in this section. The QA/QC procedures associated with the air quality measurements program are designed to ensure that data collected at the fence line are accurate and correct. The QA/QC procedures should be conducted so as to not interfere with routine on-site activities and/or data collection during site activities.

8.1 Equipment Calibration and QA/QC Procedures

8.1.1 PM₁₀ Monitors

The MIE DataRAM, TSI DustTrak, or equivalent devices will be used to continuously monitor particulate emissions at the various fence line locations. At a minimum, the monitors will be field checked daily using zero calibration air. At the beginning of each workday (prior to site intrusive activities each day) a calibration zero check will be performed on each unit at the measurement locations. A zero (or particulate-free) test sample, using the appropriate particulate filter supplied by the manufacturer for this purpose, will be placed over the sample inlet. The data output for the monitor will be observed and the response recorded in the AM contractor's field logbook. Once per month each PM₁₀ sampler will be challenged with an unknown upscale amount of particulates in order to verify each sampler's response to upscale particulate levels.

If the field technician determines that the instrument is in some way defective, the unit will be repaired or replaced, whichever takes less time. If a system fails the QA/QC check procedure and cannot be quickly corrected, the site manager will be immediately notified. The site technician will then take immediate measures to remedy the situation.

8.1.2 TVOC Monitors

The calibration of the PID analyzers will be accomplished at the beginning of each day using a cylinder of isobutylene calibration gas. The calibration gas will be used to fill Tedlar bags which will be brought to each PID. The PIDs will be zeroed in the same manner using bags filled with ultra-pure air. The instrument response to the calibration points will be checked to determine instrument performance. The data output will be observed and the response recorded in the field logbook. The field logbook will be maintained on-site throughout the duration of site activities.

If the unit fails to respond properly to the calibration check procedures, it will be calibration adjusted. If the field technician determines that the instrument has a problem that cannot be resolved by adjustment, the unit will be repaired or replaced, whichever takes less time. If at any time a system fails the QA/QC check procedure and cannot be quickly corrected, the site manager will be immediately notified. The site technician will then take immediate measures to remedy the situation. Instrument calibration procedures will be conducted according to the manufacturer's recommendations.

8.1.3 Gas Chromatographs

The daily calibration of each gas chromatograph within each of the 4 fixed perimeter air-monitoring units will be accomplished using a cylinder of BTEX calibration gas. The calibration gas will be automatically injected into the GC for the calibration of the four (4) components (Benzene, Toluene, Ethyl-benzene, and Xylene). The GC will also be zero checked daily prior to any field sample collections.

8.1.4 H₂S Monitors

Prior to each measurement session, an on-site dynamic calibration of the Jerome 631X will be performed against a known H₂S calibration gas. The daily calibration will also include a dynamic zero air check of the instrument.

Specific instrument protocols will be used for this daily on-site calibration and documentation. A Field hand-held AM data sheet for the H₂S measurements will be provided for the program.

On-going field quality assurance and controls (QA/QC) such as routine calibrations, zero checks routine maintenance including leak checks, cleaning, regeneration of the sensor, battery checks, pump testing, and overhauls, will be performed according to manufacturer's recommended procedures and schedule. Records of preventative and corrective maintenance activities will be maintained. Adequate replacement parts and supplies for the 631X will also be stocked on the site.

8.1.5 Integrated PM₁₀ and Cr+6 Samplers (Perimeter and Exclusion Zone)

On-site multipoint calibrations of each MiniVol sampler will be performed during program startup against an NIST traceable flow standard. The calibration will be conducted with a "dummy" filter in place to emulate the load against the sampler pump. The calibration of the flow controllers in the sampler is necessary to establish flow traceability of the field measurement to a primary flow standard. It is suggested that the use of a field flow transfer standard model DC-1 – manufactured by BIOS International or a laminar NIST traceable orifice – be used to calibrate the flow controller. A minimum of five calibration points evenly divided throughout the operation range of the flow controller should be established. Flow set points equivalent to the designated sampling flow rate for each type of sampler will be determined from the multi-point calibrations.

A leak check followed by a single point flow check at the set point will be performed monthly against the flow standard and an independent quarterly flow audit at the sampling set point will be conducted. The multipoint calibration will be repeated whenever the monthly flow check or the flow audit exceeded 7% of the designated sampling flow rate for Cr+6 or the 5.00 liters/min PM₁₀ flow rate.

For routine operations, one round of visual inspections of the operational status of each sampler will be conducted by the field operator during each sampling event. Initial and final flow set point and elapsed time will be recorded. Site temperature and barometric pressure will be measured for correcting flow rates to standard conditions of 25°C and 760 mm Hg.

A specific field data sheet for on-site calibrations, sampling, filter handling and documentation is provided for the routine operation of the PM₁₀ and Cr+6 samplers (see data forms in the SOPs in Attachment A). In addition, a chain of custody (COC) data form will also be used to keep track of each sample's trail of filter handling and processing.

On-going field QA/QC such as flow calibrations, flow audits, routine maintenance including leak checks, cleaning and greasing of the impactor and air inlet, battery checks and 7-day timer calibration, pump testing and overhaul will be routinely performed. Site-specific QA/QC schedules will be provided for the AM program. Records of preventative and corrective maintenance activities will be maintained. Adequate replacement parts and supplies for both types of sampler will be stocked on site.

Collocated sampling of PM₁₀ will be conducted at one of the fixed perimeter AM locations on a one day per week schedule. The fixed perimeter collocated site will remain constant from week to week and will be a site that is in the predominant downwind direction from the site activities. Following the collection of all particulate samples and any collocated samples, the filters will be packaged and sent to the AECOM lab under a chain-of-custody (COC) protocol for immediate gravimetric analyses.

Two **field blanks** (one for each of the two weekly shipments to the lab) for **Cr+6** sampling will be generated per week. The Cr+6 field blank filters will be handled and treated using identical procedures as the field sample except that no sample air will be passed through the blank filter. Following collection of the Cr+6 sample media, along with any blank filter samples, the filters will be packaged with blue-ice in small cooler so as to keep a target temperature of approximately 4° C and will be sent to the analytical laboratory under a COC protocol for immediate extraction and analysis.

8.1.6 Meteorological Measurement System

The on-site meteorological system will continuously measure and report the parameters listed in Section 3.1 of this Plan. QA/QC and calibration procedures will follow the manufacturer's recommendation for meteorological systems. A calibration of each parameter will be conducted on-site at the time of installation of the meteorological tower system and at least every six months thereafter, plus at the end of the program. The calibration results will be noted in the on-site field logbook and provided in the final project report.

8.1.7 Data Communication Equipment

The data communication technology is an important component of this program. In order to ensure that exceedances at the fenceline are quickly and properly reported, the AM contractor will use a communications network that has been designed, tested and proven previously on other programs. A line-of-sight radio frequency transmitter/receiver will be used to communicate data from the fenceline measurement devices and the central operations trailer where visual and audible alarms will be automatically triggered when exceedance conditions occur.

Attachment A

Standard Operating Procedures

Refer to Field Sampling Plan/Quality Assurance Project Plan
(FSP-QAPP) for the following:

FSP-QAPP Appendix B:

POP PPG 018 (Based on Procedure #2000-226), revised June 2010 -
Calibration/Operation/Maintenance of MiniVol™ Tactical Air Sampler (TAS)

POP PPG 019 (based on Procedure #2000-126), revised May 2010 - Sample
Collection of Airborne Hexavalent Chromium using Airmetrics MiniVol Tactical
Air Sampler and OSHA Method ID 215 Version 2

FSP-QAPP Appendix D:

Galson SOP II-CR6PREP - Preparation of PVC Filters for the Determination of
Hexavalent Chromium by IC

Galson SOP II-CR6IC - Analysis of Hexavalent Chromium by Ion
Chromatography

AECOM SOP 2000-105, March 2007, Rev. No. 6 - Filter Processing Method
for the Determination of Suspended Particulates in Ambient Air

Standard Operating Procedures

Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron

SOP No.: PPG-1

Revision: 2

Date: April 2, 2012

1.0 PURPOSE AND SCOPE

- The purpose of this SOP is to provide guidance and direction for field technician personnel who will be responsible for maintaining the fenceline and exclusion zone air monitors at the Garfield Avenue Site in Jersey City, NJ.
- This SOP is to be used along with the instrument and equipment manufacturer's operating manuals. This document assumes that operators who are on-site have been trained to perform the various tasks described in this SOP.

2.0 RESPONSIBILITIES

- The AM Contractor's Project Manager is responsible for providing site operators with the appropriate documents for accomplishing the tasks associated with this SOP.
- The Project Engineer is responsible for providing adequate training to site operators relative to the tasks described in this SOP.
- The site technicians are to read and understand this SOP and use it as a guide for documenting tasks on the checklists associated with this SOP.

3.0 OPERATIONAL CHECKLIST

3.1 Daily/ Weekly/ Monthly Activities

- Perform all main shelter and AM system checks as defined in **Routine Main Site and AM Site Operational Checklists (see attached)**.
- Check that all continuous data (PM₁₀, TVOC, BTEX and meteorological) from all AM sites from the previous day have been telemetered to the central on-site database.
- Visually inspect the wind speed and wind direction sensors at the top of the meteorological tower. The wind vane should be pointing in the direction from which the wind is blowing and the wind speed cups should be turning smoothly. Damaged sensor vane or cups should be noted in the logbook and checklist. The damaged sensor should be repaired as soon as an experienced technician can be scheduled.
- Verify that meteorological parameter values appear reasonable. The wind speed, direction and temperature conditions should be comparable to the value on the computer screen. A further check can be made by consulting the radio weather report.
- Daily set up integrated sampling for particulates and Hexavalent Chromium at eight (8) perimeter and four (4) exclusion zone sites including any collocated samples and/or blanks per the QA/QC requirements

Standard Operating Procedures

Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron

SOP No.: PPG-1

Revision: 2

Date: April 2, 2012

described in Section 8.0 of this Monitoring Plan (see **PM₁₀ and Cr+6 field data sheets** attached to this SOP).

- Perform hourly hand-held AM (TVOC, PM₁₀, and H₂S) at 4-6 additional locations around the exclusion zone boundary plus document the concentrations recorded (**see attached Hand-Held AM Form**) and document the locations of these hand-held AM locations on a daily site map.
- At the conclusion of the daily integrated sampling periods, fill out chain-of-custody (COC) forms for all integrated samples that must be shipped to the labs (**see COC Form attached**).
- At each of the 12 monitoring sites the technician should “down” the PM₁₀ and TVOC data channels by switching the data channel toggle switch to the “DOWN” position. At this point the technician may conduct daily zero and upscale checks for the PM₁₀ and TVOC instruments (Note: upscale checks for the PM₁₀ samplers will only be performed once per week for each sampler).
- Make any adjustments to the instruments, as required.
- Make adjustments to the on-site GCs at the 4 fixed perimeter AM locations based on the automatic BTEX GC calibrations performed each night.
- Before leaving each site, make sure that the data channels’ sample switch is in the “UP” position.
- Notify site supervisor and PM of any non-operational AM sites and/or action level exceedances from the 12 AM sites. Note: Site excavation activities should not proceed unless there are at least 10 of the 12 AM stations are in an operational mode.
- Document daily all pertinent QC information on the daily field station log sheets (**see attached Field Station Log**). The technician should also complete a daily map indicating the locations of all AM sites for each day (including the four portable perimeter and 4 portable exclusion zone plus the 4-6 hourly hand-held exclusion zone AM locations).
- The technician should also:
 - Weekly – Submit all QC documentation, daily hand-held data sheets, daily site maps and field station log sheets to the central data processing center. Fill out chain-of-custody forms and submit any integrated samples to the labs.
 - Perform monthly the continuous PM₁₀ sampler upscale testing at each AM location.
 - Every month / 3 months – Perform field calibrations of the integrated particulate and Hexavalent Chromium samplers.
 - Every six months – Perform field calibrations of the central meteorological system.

Standard Operating Procedures

Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron
SOP No.: PPG-1
Revision: 2
Date: April 2, 2012

4.0 OPERATION DURING SPECIAL CIRCUMSTANCES

4.1 High Humidity

- **PM₁₀**: The PM₁₀ monitor principle of operation is based on near forward light scattering. In ambient situations where there are foggy and/or hazy conditions or if it is raining, the sampler will respond as though there were high particulate loadings. If it is determined that high moisture conditions are resulting in erroneously high PM₁₀ data, then the site manager should be informed immediately. Internal heaters will be used however humidity could still remain as an issue.
- **RAE PID**: The photo-ionization detector within the RAE PID is influenced by ambient conditions when the relative humidity is high. In order to minimize the humidity effects, heaters can be installed on all sample manifolds to avoid condensation; and naïf ion permeation dryers can be installed to remove water vapor. These actions can be successful in minimizing humidity effects, but as the ambient dew point nears 70°F, the RAE PID can display erratic output. This is normally seen as erroneously high data. In those circumstances where this occurs and it can be identified as being induced by high ambient humidity conditions, the site operator should attempt to recalibrate the RAE PID and notify the site remediation manager of the problem.

4.2 Instrument Malfunction

- **PM₁₀**: If there is a malfunction of a PM₁₀ instrument, the sensor should be removed from service and replaced with a spare unit. If a spare unit is not available the site manager should be informed that the site is not in full operation.
- **RAE PID**: If it is determined that a RAE PID instrument is not operating properly (i.e., it cannot be zeroed or calibrated), the instrument should be shut down and replaced with a spare unit. If a spare unit is not immediately available at the site, the site manager should be informed.
- The site manager should be informed whenever any sensor or AM site/sites become non-operational and no site excavation activities should take place unless there are at least 10 of the 12 AM stations operable.

5.0 ALERT and ACTION LEVEL EXCEEDANCE PROTOCOLS

5.1 Particulates (PM₁₀)

If any of the 5-minute or instantaneous data averages from the exclusion zone monitors exceed the Alert or Action Level (250 or 333 $\mu\text{g}/\text{m}^3$), the AECOM On-Site Manager and Remedial Contractor should be informed and corrective actions should be undertaken. If **15-minute average** data from any of the eight perimeter PM₁₀ monitors exceed 250 or 333 $\mu\text{g}/\text{m}^3$ then an automatic alarm is triggered and the following procedure will be followed:

- The AM Contractor will confirm the sampler is operating correctly.

Standard Operating Procedures

Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron
SOP No.: PPG-1
Revision: 2
Date: April 2, 2012

- The AM Contractor PM plus AECOM On-site Manager and the Remedial Contractor site managers will be notified and will be continually updated until the exceedances cease.
- The AM Contractor will make an assessment as to whether the exceedance is due to on-site or off-site activities. The AECOM On-site Manager will also be advised.
- Particulate control measures will be undertaken by the Construction/Remediation contractor.

If the **15-minute average** data from any of the PM₁₀ monitors exceeds **333 µg/m³** for two consecutive 15-minute periods, all site intrusive activities must be stopped and site activities must be further evaluated so as to mitigate the particulate exposures at the fenceline AM locations.

One-Minute Early Warning Alert Level for the Perimeter AM Locations

PPG has implemented the use of PM₁₀ **1-Minute Early Warning Alert Level** of 100 µg/m³ at each of the 8 perimeter/fenceline AMS locations. The addition of this early warning **1-Minute Early Warning Alert Level** at the 8 perimeter/fenceline AMS locations provides site operational staff with a quicker notification of elevated particulate matter levels (versus even the current 5-minute). This quicker notification provides added time for corrective actions to be implemented, if necessary, prior to a 15-minute continuous particulate concentration reaching the Alert and/or Action Levels (250 µg/m³ or 333 µg/m³, respectively) at any of the 8 AMS locations.

Once a **1-Minute Early Warning Alert Level** warning from any of the perimeter/fenceline AMS locations has been received by the on-site air monitoring staff, the appropriate on-site engineering and remedial staff will be notified of the elevated dust concentration. On-site staff will evaluate the warning and implement immediate corrective and dust control actions, as warranted, with the overall goal of correcting the dust generation issues prior to a fenceline 15-minute real-time PM₁₀ average exceeding the Alert and/or Action Level. The verbal reporting of these 1-minute alarms by the air monitoring technicians to the appropriate on-site staff will be continued until such time that the 1-minute alarm ceases.

If a 1-minute data average from any of the 8 perimeter/fenceline PM₁₀ AMS exceeds the **1-Minute Early Warning Alert Level** of 100 µg/m³ during normal working hours, an automatic alarm will be triggered and the following procedure will be followed by the Air Monitoring site technicians:

- The air monitoring technician will confirm the sampler is operating correctly and within calibration specifications.
- The air monitoring Project Manager (or delegated staff) plus the on-site Dust Manager, along with the Engineering and Construction Site Managers, will be notified and will be continually updated until the exceedance ceases.
- The air monitoring technician will make an assessment, using on-site observations and wind data, as to whether the alert exceedance is due to on-site or off-site activities, or meteorological conditions. The Engineering Site Manager will also be advised of the root cause for the elevated concentrations.
- If warranted, particulate (dust) control measures will be undertaken by the Construction/Remediation contractor immediately upon notification.
- If the 15-minute average data from any of the 8 fenceline PM₁₀ monitors exceeds the **Action Level** for two consecutive 15-minute periods, site intrusive activities will be stopped and site activities further evaluated so as to mitigate the particulate exposures at the fenceline AM locations. Remedial activities

Standard Operating Procedures

Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron

SOP No.: PPG-1

Revision: 2

Date: April 2, 2012

will not resume until all 8 perimeter AM locations have reported at least one 15-minute concentration below the Action Level.

5.2 Total Volatile Organic Compounds (TVOC)

If any of the 5-minute or instantaneous data averages from the exclusion zone AM stations exceed 0.7 or **0.9 ppm**, the AECOM On-site Manager and Remedial Contractor manager should be informed and corrective actions should be undertaken. If 15-minute average data from any of the eight perimeter TVOC monitors exceed 0.7 or **0.9 ppm**, then an automatic alarm is triggered and the following procedure will be followed:

- The AM Contractor will confirm the sampler is operating correctly.
- The AM Contractor PM plus AECOM On-site Manager and the Remedial Contractor manager will be notified and will be continually updated until the exceedances cease.
- The AM Contractor will make an assessment as to whether the exceedance is due to on-site or off-site activities. The AECOM On-site Manager will also be advised.
- Vapor control measures will be undertaken by the Construction/Remediation contractor.

If the **15-minute average** data from any of the TVOC monitors exceeds **0.9 ppm** for two consecutive 15-minute periods, all site intrusive activities must be stopped and site activities must be further evaluated so as to mitigate the TVOC exposures at the fenceline AM locations.

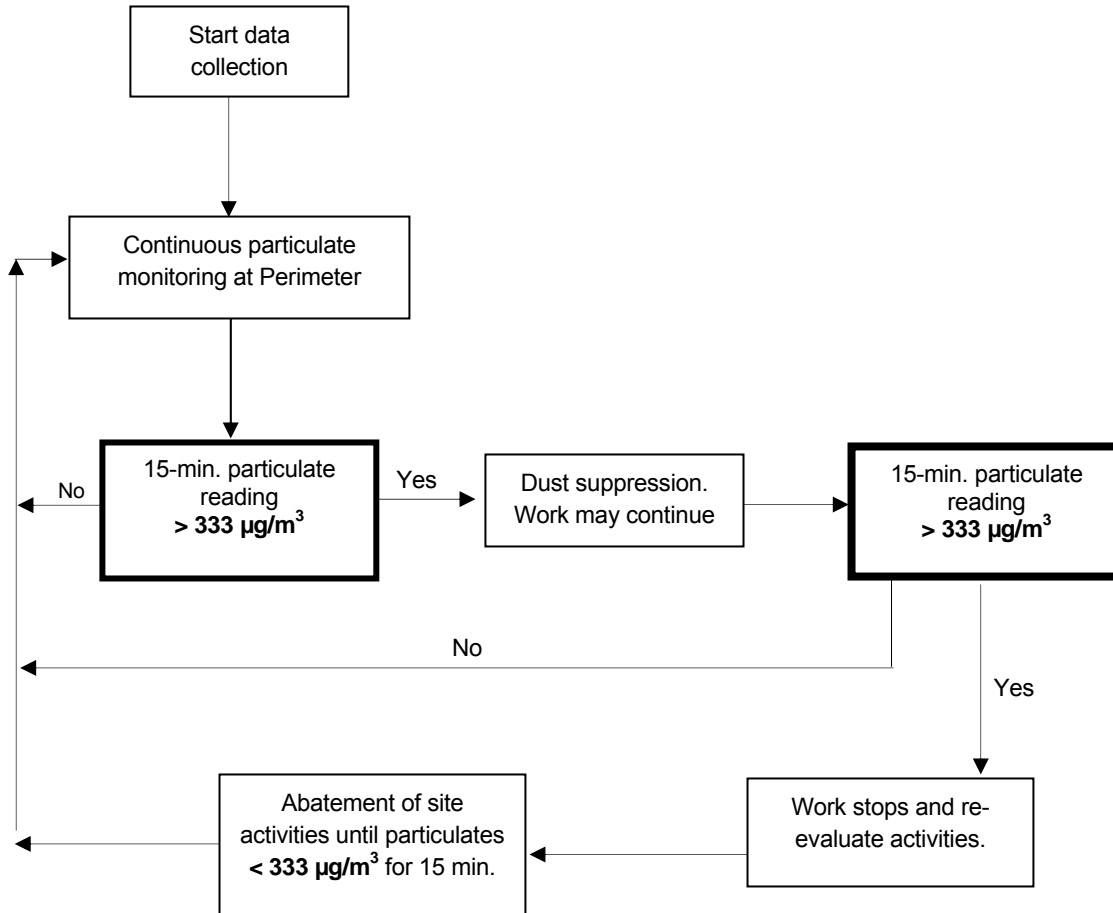
5.3 Hydrogen Sulfide (H₂S)

If any hand-held H₂S instantaneous levels exceed the Action Level of **6 ppb**, the AECOM On-site Manager and Remedial Contractor Manager will be notified and H₂S suppression activities will be initiated.

Standard Operating Procedures
 Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron
 SOP No.: PPG-1
 Revision: 2
 Date: April 2, 2012

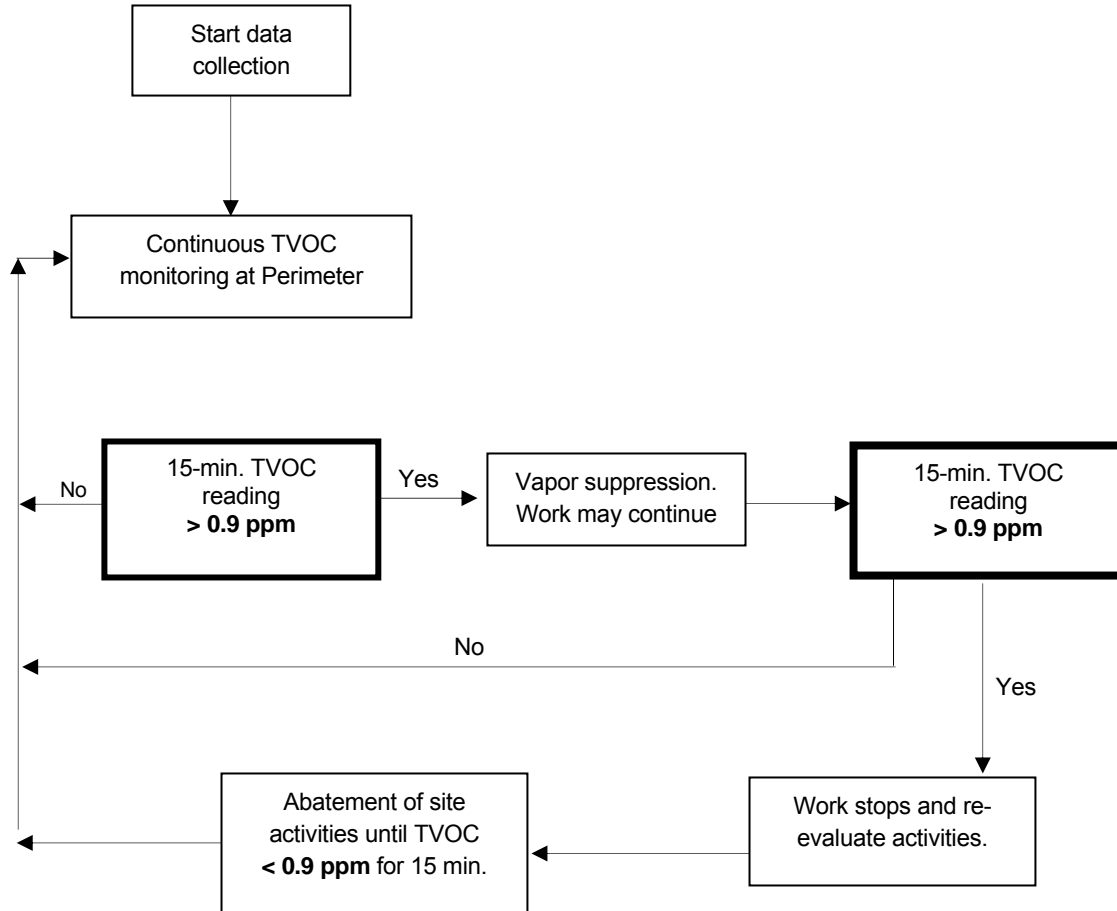
Particulates (Hexavalent Chromium/Heavy Metals/PAH) Monitoring and Control Chart



Standard Operating Procedures
 Operation and Maintenance of Fenceline Air Monitoring Systems

Author: Leo Gendron
 SOP No.: PPG-1
 Revision: 2
 Date: April 2, 2012

TVOC Monitoring and Control Chart



Attachment B

Action Level Calculations

1.0 Derivation of Action Levels for Particulates and Total VOCs

1.1 Soil Concentration-Toxicity Screen

AECOM selected a surrogate, or indicator chemical, to be used in the derivation of the action levels for particulates and for total VOC (TVOC) at the Site via a hazard indication/toxicity assessment. The purpose of the hazard identification/toxicity assessment, commonly referred to as a concentration-toxicity screen, is to review and evaluate available information regarding a chemical's potential to cause adverse effects. As the level of exposure to the chemical increases the likelihood or probability of an adverse effect (response) occurring also increases. This dose-response relationship is used in the concentration-toxicity screen to provide a ranking of potential chemical hazards.

The concentration-toxicity screen was performed following the USEPA guidance (USEPA, 1989) in order to select a surrogate, or indicator chemical, for the derivation of action levels. Consideration was given to the detection frequency and concentrations detected in soil in the IRM area, the overall quality of the data, and the specific toxicity of the individual chemicals. Using laboratory results obtained from soil samples collected within the IRM area and chemical-specific dose-response parameters, along with discussions of the frequency of detection, the goal of the hazard identification/toxicity assessment is to prioritize the chemicals detected in at the Site with regard to potential adverse health risks during upcoming remediation activities. Compounds that were considered essential human nutrients or that are generally considered to be relatively "non-toxic" were from this assessment. It should be noted since chemicals detected infrequently in Site soils are unlikely to comprise a significant portion of the ambient particulate matter or VOCs generated during intrusive activities in the IRM area, the concentration-toxicity screen was performed with consideration to analytes that were detected in at least 80% of the samples analyzed. This consideration is felt to focus the concentration-toxicity screen on only those analytes that are likely to pose a hazard during remediation activities.

The concentration-toxicity screen for non-volatile parameters including metals, inorganics, semi-volatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs) detected frequently in Site IRM area soil is provided in Table 1. The concentration toxicity screen for VOCs detected frequently in Site IRM area soil is provided in Table 2. A Noncancer Risk Factor (unitless) was calculated for non-volatile analytes and VOCs detected frequently ($\geq 80\%$) in Site soil based on the average detected soil concentrations and the chemical-specific chronic inhalation Reference Concentration (RfC) using the following relationship:

$$\text{Noncancer Risk Factor} = \text{Average Detected Conc.} / \text{RfC}$$

The toxicity factors used in this evaluation were obtained from Oak Ridge National Laboratory's online Risk Assessment Information System (RAIS, 2010) since this database includes toxicity information obtained from the USEPA (including: the Integrated Risk Information System online database, Provisional Peer Reviewed Toxicity Values, and Health Effects Assessment Summary Tables) and relevant state agencies (including the California EPA). If a toxicity factor could not be obtained from RAIS, a toxicity factor was obtained from the Massachusetts Department of Environmental Protection Agency's 2008 Risk Assessment ShortForms (MADEP, 2008). Since the purpose of the action levels is to protect the general public from potential health risks from particulate matter and VOCs generated in ambient air during the remediation activities, the concentration-toxicity screen utilized the RfC as the chemical-specific toxicity factor. If a chronic RfC was not available it was calculated from the chronic oral Reference Dose (RfD) assuming an inhalation rate of 20 m³/day by a 70 kg individual.

Table 1 – Concentration-Toxicity Screen for Nonvolatile Parameters Detected Frequently in Soil Samples in IRM Area

Analyte	Number Samples	Number Detection	Freq. of Detection	Min Detected Conc	Average Detected Conc.	Max Detected Conc.	Oral RfD (mg/kg)	Oral RfD Reference	RfC (mg/m ³)	RfC Reference	Noncancer Risk Factor
CHROMIUM (HEXAVALENT COMPOUNDS)	448	374	83.5%	2	5184.5982	54300	3.0E-03	IRIS	1.0E-04	IRIS	51,845,982
COBALT	384	313	81.5%	1.4	63.3638	264	3.0E-04	PPRTV	6.0E-06	PPRTV	10,560,633
MANGANESE	384	376	97.9%	6	524.7229	4250	1.4E-01	IRIS	5.0E-05	IRIS	10,494,458
ALUMINUM (FUME OR DUST)	384	377	98.2%	496	15057.4324	46000	1.0E+00	PPRTV	5.0E-03	PPRTV	3,011,486
NICKEL	386	369	95.6%	1.1	221.7676	872	2.0E-02	IRIS	9.0E-05	ATSDR	2,464,084
ARSENIC	421	287	68.2%	0.51	10.7091	136	3.0E-04	IRIS	1.5E-05	CALEPA	713,940
LEAD	396	356	89.9%	1.6	226.6224	28900	7.5E-04	MADEP	1.0E-03	MADEP	226,622
BARIIUM	393	339	86.3%	3.5	78.5973	631	2.0E-01	IRIS	5.0E-04	HEAST	157,195
ANTIMONY	403	241	59.8%	0.58	176.0849	1390	4.0E-04	IRIS	1.4E-03	CALC	125,775
CADMIUM	393	127	32.3%	0.06	1.237	5.6	1.0E-03	IRIS	1.0E-05	ATSDR	123,700
NAPHTHALENE	99	40	40.4%	0.051	118.8936	3700	2.0E-02	IRIS	3.0E-03	IRIS	39,631
IRON	384	379	98.7%	1660	36841.1082	154000	7.0E-01	PPRTV	2.5E+00	CALC	15,037
VANADIUM (FUME OR DUST)	390	337	86.4%	2.5	224.9369	2250	5.0E-03	RAIS	1.8E-02	CALC	12,854
2-METHYLNAPHTHALENE	98	28	28.6%	0.044	169.2738	4100	4.0E-03	IRIS	1.4E-02	CALC	12,091
CHROMIUM	401	400	99.8%	10.9	13340.5385	153000	1.5E+00	IRIS	5.3E+00	CALC	2,541
DIBENZOFURAN	99	26	26.3%	0.054	8.2193	150	1.0E-03	RAIS	3.5E-03	CALC	2,348
PHENANTHRENE	99	58	58.6%	0.025	112.7239	5500	3.0E-02	MADEP	5.0E-02	MADEP	2,254
MERCURY	390	255	65.4%	0.004	0.4621	8.3	1.6E-04	CALEPA	3.0E-04	IRIS	1,540
ACENAPHTHYLENE	99	25	25.3%	0.03	30.3104	570	3.0E-02	MADEP	5.0E-02	MADEP	606
CHRYSENE	100	48	48.0%	0.041	25.9992	1000	3.0E-02	MADEP	5.0E-02	MADEP	520
PYRENE	99	53	53.5%	0.0336	52.3578	2200	3.0E-02	IRIS	1.1E-01	CALC	499
BENZO(A)ANTHRACENE	99	45	45.5%	0.046	24.7217	890	3.0E-02	MADEP	5.0E-02	MADEP	494
COPPER	384	358	93.2%	2.2	57.2848	1950	4.0E-02	HEAST	1.4E-01	CALC	409
FLUORENE	99	31	31.3%	0.034	57.2453	1500	4.0E-02	IRIS	1.4E-01	CALC	409
BENZO(A)PYRENE	99	47	47.5%	0.044	17.2428	630	3.0E-02	MADEP	5.0E-02	MADEP	345
ACENAPHTHENE	99	37	37.4%	0.04	66.9474	2100	6.0E-02	IRIS	2.1E-01	CALC	319
FLUORANTHENE	99	52	52.5%	0.0446	41.2494	1700	4.0E-02	IRIS	1.4E-01	CALC	295
BENZO(K)FLUORANTHENE	99	44	44.4%	0.047	12.5272	430	3.0E-02	MADEP	5.0E-02	MADEP	251
ZINC	386	376	97.4%	2.8	226.7572	3530	3.0E-01	IRIS	1.1E+00	CALC	216
BENZO(G,H,I)PERYLENE	99	42	42.4%	0.046	9.0345	280	3.0E-02	MADEP	5.0E-02	MADEP	181
BENZO(B)FLUORANTHENE	99	45	45.5%	0.049	8.9393	290	3.0E-02	MADEP	5.0E-02	MADEP	179
INDENO(1,2,3-CD)PYRENE	99	41	41.4%	0.054	7.8033	230	3.0E-02	MADEP	5.0E-02	MADEP	156
DIBENZO(A,H)ANTHRACENE	99	27	27.3%	0.029	5.5074	100	3.0E-02	MADEP	5.0E-02	MADEP	110
ANTHRACENE	99	40	40.4%	0.053	46.6164	1600	3.0E-01	IRIS	1.1E+00	CALC	44
BIS(2-ETHYLHEXYL)PHTHALATE	99	23	23.2%	0.042	0.7825	9.1	2.0E-02	IRIS	7.0E-02	CALC	11
CALCIUM METAL	384	371	96.6%	113	79973.7844	590000					
FERROUS IRON	21	11	52.4%	1.8	247.9545	1730					
MAGNESIUM	384	358	93.2%	89.9	19264.374	126000					
POTASSIUM	384	267	69.5%	16.1	1301.382	5440					
SODIUM	384	335	87.2%	35.9	4925.814	49700					

Notes:
 CALC - Calculated from Oral RfD assuming inhalation rate of 20 m3/day by 70 kg individual.
 CALEPA - California Environmental Protection Agency.
 IRIS - Integrated Risk Information System, U.S. EPA.
 MADEP - Massachusetts Department of Environmental Protection's Risk.
 PPRTV - Provisional Peer Reviewed Toxicity Value, U.S. EPA.
 RAIS - Risk Information System, Oak Ridge National Laboratory.
 RfC - Chronic Inhalation Reference Concentration.
 RfD - Chronic Oral Reference Dose.
 Noncancer Risk Factor - Calculated as Average Detected Concentration divided.
 1. All concentrations expressed in milligrams per kilogram (mg/kg).

Table 2 – Concentration-Toxicity Screen for Volatile Organic Compounds Detected Frequently in Soil Samples in IRM Area

Analyte	Number Samples	Number Detection	Freq. of Detection	Min Detected Conc	Average Detected Conc.	Max Detected Conc.	Oral RfD (mg/kg)	Oral RfD Reference	RfC (mg/m ³)	RfC Reference	Noncancer Risk Factor
BENZENE	94	26	27.7%	0.01	1.7767	13	4.0E-03	IRIS	3.0E-02	IRIS	59.2
ETHYLBENZENE	94	33	35.1%	0.0036	27.5864	380	1.0E-01	IRIS	1.0E+00	IRIS	27.6
O-XYLENE	72	27	37.5%	0.0016	14.734	160	2.0E-01	IRIS	7.0E-01	IRIS	21.0
TETRACHLOROETHENE	94	25	26.6%	0.01	4.8726	110	1.0E-02	IRIS	2.7E-01	ATSDR	18.0
M+P-XYLENE	88	25	28.4%	0.0019	10.0044	100	2.0E-01	IRIS	7.0E-01	IRIS	14.3
1,1-DICHLOROETHYLENE	94	19	20.2%	0.01	0.0634	0.5	5.0E-02	IRIS	2.0E-01	IRIS	0.3
1,1,1-TRICHLOROETHANE	94	22	23.4%	0.01	0.205	1.6	2.0E+00	IRIS	5.0E+00	IRIS	0.0

Notes:

CALC - Calculated from Oral RfD assuming inhalation rate of 20 m³/day by 70 kg individual.
 CALEPA - California Environmental Protection Agency.
 IRIS - Integrated Risk Information System, U.S. EPA.
 MADEP - Massachusetts Department of Environmental Protection's Risk Assessment ShortForm (<http://www.mass.gov/dep/service/compliance/riskasmt.htm>).
 PPRTV - Provisional Peer Reviewed Toxicity Value, U.S. EPA.
 RAIS - Risk Information System, Oak Ridge National Laboratory.
 RfC - Chronic Inhalation Reference Concentration.
 RfD - Chronic Oral Reference Dose.
 Noncancer Risk Factor - Calculated as Average Detected Concentration divided by RfC.
 1. All concentrations expressed in milligrams per kilogram (mg/kg).

As presented in Table 1, hexavalent chromium in Site IRM area soil presents the greatest Noncancer Risk Factor for non-volatile analytes and benzene presents the greatest Noncancer Risk Factor for VOC in Site IRM area soil. As such, hexavalent chromium and benzene were used to calculate action levels for particulates and TVOC, respectively. The inorganics calcium, iron, magnesium and potassium were not included in this evaluation since they are essential human nutrients and/or are generally considered relatively “non-toxic”. It should be noted that although AECOM utilized the average detected soil concentration for this evaluation, hexavalent chromium and benzene still presented the greatest non-volatile Noncancer Risk Factors when the maximum detected soil concentrations were used in the concentration-toxicity screen.

An action level for particulates was calculated based on the presence of hexavalent chromium in soil. An action level for TVOC was calculated based on benzene. The action levels were calculated assuming that a residential or commercial receptor is present at their residence or workplace over the duration of the remediation. The calculation for particulates was initially conducted by the New Jersey Department of Environmental Protection (NJDEP) (as discussed in the December 20, 2007 meeting between PPG and NJDEP). This action level has been modified as presented below based on the assumed likely duration of the planned remediation activities and other considerations as directed by the NJDEP. In addition, the final action levels considered the potential for dispersion of particulates and TVOC in air as they migrate off-site toward nearby receptors, as discussed below.

1.2 Dispersion Factor to Adjust for Worst-Case Off-site Exposure

The direct application of risk based concentrations includes the conservative and highly unrealistic assumption that the maximum monitored concentration is also representative of the exposure to receptors at the fence line over the duration of remedial activity. To account for these factors the NJDEP Bureau of Technical Services (BTS) developed a dispersion factor of 5.3 to be incorporated into the calculation of site action levels. BTS modeled the Phase I excavation area shown in the 11/15/06 proposal with the ISCST3 model with the standard 54 combinations of wind speed and stability (the same combinations used in SCREEN3) along each 10 degree radial extending from the center of this site.

The dispersion modeling shows that the average emission-normalized concentration at the border of the Phase I excavation area is approximately 5 times greater than any concentration 50 meters from the excavation area. The dispersion factor for the Garfield Avenue site ranges from a conservative value of 4.2 when using the maximum remedial activity impact and maximum concentration at 50 meters, to 5.8 when assuming there are no emissions during E and F (nighttime) stability conditions. Thus, BTS determined that it would be appropriately protective to apply a dispersion factor of 5.3 to an action level for remedial activity anywhere on the Garfield Avenue Site.

1.3 Particulate Action Levels Based on Hexavalent Chromium

Particulate action levels were calculated assuming that 100% of the hexavalent chromium in soil would become airborne; in other words, the concentrations of hexavalent chromium in particulates would mirror the concentrations in soil. NJDEP’s AM committee has derived the particulate action level and acceptable air concentration for hexavalent chromium as discussed below.

The Acceptable Air Concentration (AAC) and Action Level (AL) values shown below, as developed for Garfield Avenue Group activities, were calculated using site-specific numerical inputs based upon work duration, projected schedule of intrusive activities, maximum soil concentrations for hexavalent chromium, and relative proximity of residential populations. These AAC and AL values apply ONLY to work performed at the Garfield Avenue Group sites.

1. An AAC of 9.27 nanograms per cubic meter (ng/m³) was developed for hexavalent chromium. This AAC for hexavalent chromium is based upon a risk factor of 1×10^{-6} , as calculated below.

AAC for hexavalent chromium =

$$\frac{70 \times 25,550 \times 10^{-6}}{0.832 \times 8 \times 138 \times 5 \times 42}$$

$$= 9.27 \text{ ng/m}^3$$

Where:

70	= default body weight for an adult (in kilograms)
25,550	= number of days in an average lifetime
10^{-6}	= cancer risk mandated by New Jersey regulation
0.832	= inhalation rate of 20 m ³ per day for a 24 hour day
8	= exposure time of 8 hours per work day
138	= average work days per year (exposure duration)
5	= years of intrusive activity
42	= cancer slope factor

A dispersion factor of 5.3 (see below) shall be applied for the development of a site-specific AAC. Therefore, the site-specific AAC for hexavalent chromium is:

$$9.27 \text{ ng/m}^3 \times 5.3 = \mathbf{49 \text{ ng/m}^3}$$

The AAC for hexavalent chromium is a time-weighted average over the project duration that provides a one in a one million (1E-06) excess cancer risk to nearby residents due to exposure to Cr6 emanating from the site.

2. The following equation shall be used to develop an action level for particulates, based upon the actual concentration of hexavalent chromium in the site soils:

$$\begin{aligned} \text{Particulate Action Level} &= \frac{1,000,000}{\text{soil concentration (95\% UCL)} \times \text{safety factor}} \times \text{Exposure limit} \\ &= \frac{1,000,000}{15,000 \text{ mg/kg} \times 2} \times 0.01 \text{ mg/m}^3 \\ &= 0.333 \text{ mg/m}^3 = \mathbf{333 \text{ micrograms per cubic meter (ug/m}^3)} \end{aligned}$$

This equation assumes a safety factor of 2, a 95 % upper confidence limit concentration of 15,000 mg/kg hexavalent chromium in soil, and an exposure limit of 0.01 milligrams per cubic meter (mg/m³) (ACGIH TLV value). This equation precludes the use of an air dispersion factor.

1.4 TVOC Action Level

An action level for TVOC was derived based on risk calculations for benzene. NJDEP's AM committee has derived the TVOC action level as discussed below.

1. A non-carcinogenic endpoint (non-chronic) equation was used to determine the action level for TVOCs as follows:

$$\begin{aligned} \text{TVOC Action Level} &= \frac{\text{Non-chronic RfC (30 ug/m}^3\text{)}}{8\text{ hr / 24 hr} \times 63\text{ days / 365 days}} \\ &= 521.43 \text{ ug/m}^3 = 0.163 \text{ ppm} \end{aligned}$$

A dispersion factor of 5.3 (see below) shall be used to develop the site-specific action level for TVOC as follows:

$$0.163 \text{ ppm} \times 5.3 = \mathbf{0.9 \text{ ppm}}$$

References

- MADEP. 2008. Massachusetts Department of Environmental Protection Agency. Risk Assessment ShortForms. [URL: <http://www.mass.gov/dep/service/compliance/riskasmt.htm>]. Accessed 1/10/2010.
- RAIS. 2010. Risk Information System. Oak Ridge National Laboratory online database. [URL: <http://rais.ornl.gov/>]. Accessed 1/10/2010.
- USEPA. 2010. Integrated Risk Information System (IRIS). Environmental Criteria and Assessment Office. U.S. Environmental Protection Agency, Cincinnati, OH. [URL: <http://www.epa.gov/iris/index.html>] Accessed 1/10/2010.
- USEPA. 1989. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. December 1989. EPA/540/1-89/002.

Attachment C

Air Monitoring Amendment Form



AECOM
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Air Monitoring Plan Amendment 01

Client:	Amendment No.:
Location:	Date:
Amendment Description:	
Reason for Amendment:	

Signature for AECOM:

Date:

Signature for PPG:

Date:

Signature for NJDEP Representative:

Date:

Signature for Site Representative:

Date:



AECOM
 250 Apollo Drive
 Chelmsford, MA 01824

978.905.2100 tel
 978.905.2101 fax

Air Monitoring Plan Amendment 01

Client: PPG Industries	Amendment No.: 01 – Air Monitoring and Sampling for TEP Excavation
Location: Jersey City, NJ	Date: December 1, 2011
<p>Amendment Description:</p> <p>This AMP amendment describes the changes to the AMP for ground intrusive activities at the Garfield Avenue Group Sites in Jersey City, New Jersey dated May, 2011 during the Technical Execution Plan (TEP); Southwestern Area Soil Excavation. During the TEP excavation, two additional FAM stations will be added to the fenceline of Site 114 to provide additional continuous (24 hours per day and 7 days per week) monitoring.</p> <p>The two additional fixed fenceline air monitoring stations will include a FAM station along with integrated samplers for Cr6 and PM₁₀. Monitoring and sample collection, QA/QC, and reporting will be conducted as currently documented in the most recent version of the AMP.</p> <p>Monitoring and sampling will include the following at each of the two additional air monitoring stations:</p> <ul style="list-style-type: none"> • Continuous/real-time 15-minute average PM₁₀ and TVOC concentrations (FAM stations operate 24 hours per day and 7 days per week); • Periodic real-time constituent specific VOC sampling for BTEX compounds (BTEX monitoring only if the TVOC Action Level is exceeded at any of the FAM stations); and • Integrated 8-hour PM₁₀ and Cr6 sampling and subsequent laboratory analyses. <p>The location of the two additional FAM stations (FAM-5 and FAM-6) are shown in Figure 1. The added Cr6 (C18 and C19) and PM₁₀ (P18 and P19) samplers will be collocated with the two additional FAM stations.</p>	
<p>Reason for Amendment:</p> <p>The AMP was initially designed for the excavation activities associated with the remediation of IRM 1 at Site 114. TEP excavation will largely be focused on the southwestern portion of the Garfield Avenue Group Sites north of Carteret Street (shown in Figure 1).</p>	

 Signature for AECOM:

 Date:

 Signature for PPG:

 Date:

 Signature for NJDEP Representative:

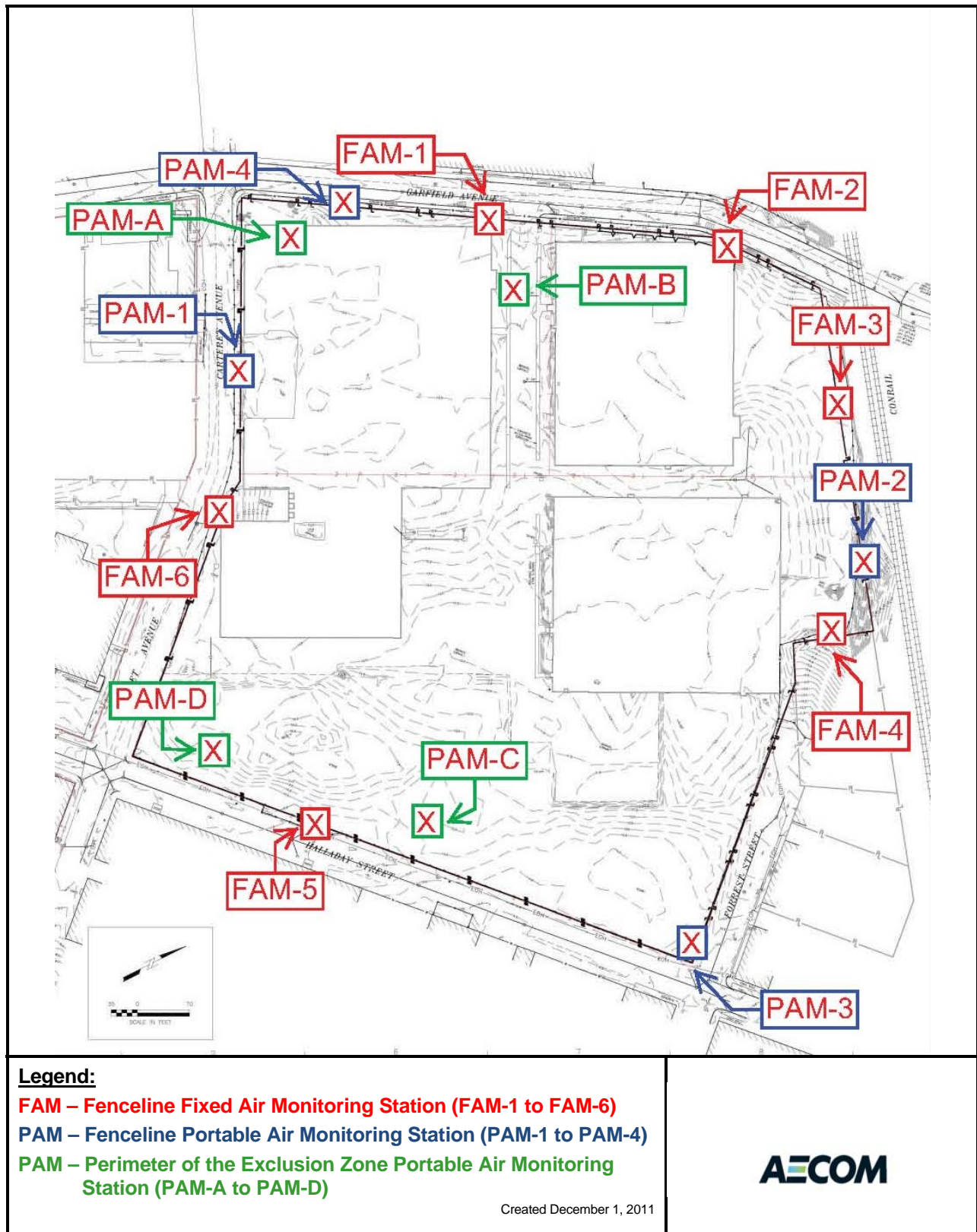
 Date:

 Signature for Site Representative:

 Date:

To enhance and sustain the world's built, natural and social environments

Figure 1: Preliminary Site Map North of Carteret Street – TEP Excavation





AECOM
 250 Apollo Drive
 Chelmsford, MA 01824

978.905.2100 tel
 978.905.2101 fax

Air Monitoring Plan Amendment 02

Client: PPG Industries	Amendment No.: 02 – Air Monitoring and Sampling for Phase 2 Excavation
Location: Jersey City, NJ	Date: March 28, 2012
<p>Amendment Description:</p> <p>This AMP amendment describes the changes to the AMP for ground intrusive activities at the Garfield Avenue Group Sites in Jersey City, New Jersey dated May, 2011 during the Phase 2 excavation activities. During the Phase 2 excavation, one additional FAM stations will be added to the eastern fencelines of Site 114 to provide additional continuous (24 hours per day and 7 days per week) monitoring.</p> <p>The additional fixed fenceline air monitoring station will include a FAM station along with integrated samplers for Cr6 and PM₁₀. Monitoring and sample collection, QA/QC, and reporting will be conducted as currently documented in the most recent version of the AMP.</p> <p>Monitoring and sampling will include the following at each of the three additional air monitoring stations:</p> <ul style="list-style-type: none"> • Continuous/real-time 15-minute average PM₁₀ and TVOC concentrations (FAM stations operate 24 hours per day and 7 days per week); • Periodic real-time constituent specific VOC sampling for BTEX compounds (BTEX monitoring only if the TVOC Action Level is exceeded at any of the FAM stations); and • Integrated 8-hour PM₁₀ and Cr6 sampling and subsequent laboratory analyses. <p>The location of the additional FAM station (FAM-7) are shown in Figure 1. The added Cr6 (C20) and PM₁₀ (P20) samplers will be collocated with the additional FAM station.</p>	
<p>Reason for Amendment:</p> <p>The AMP was initially designed for the excavation activities associated with the remediation of IRM 1 at Site 114. Phase 2 excavation will largely be focused on the eastern half of the Garfield Avenue Group Sites north of Carteret Street (shown in Figure 1). Impacted materials on this portion of the site include MGP impacted materials commonly associated with VOC and PAH concentrations in addition to Cr6 impacted materials. Therefore, one air monitoring station will be added to the program along the eastern fenceline.</p>	

 Signature for AECOM:

 Date:

 Signature for PPG:

 Date:

 Signature for NJDEP Representative:

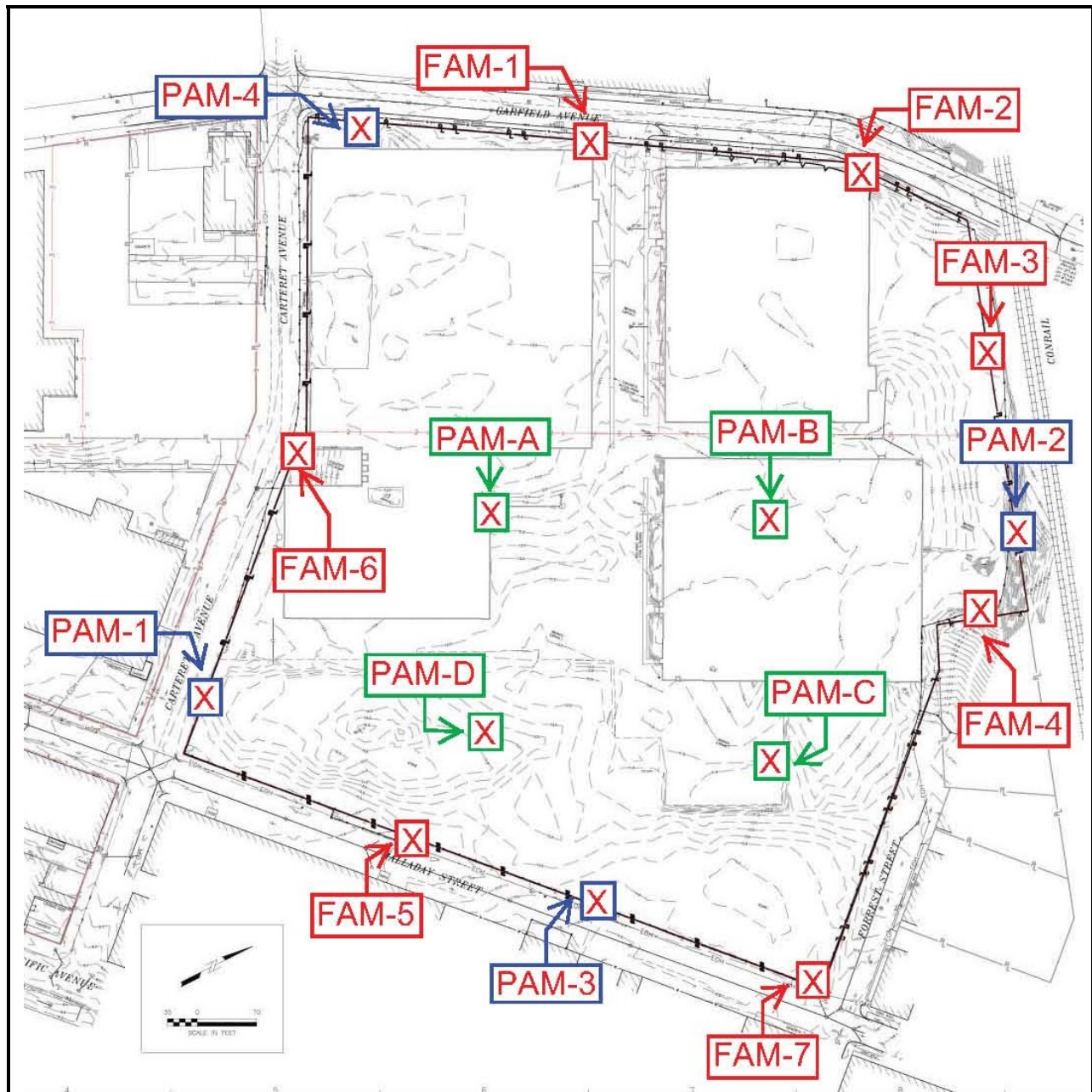
 Date:

 Signature for Site Representative:

 Date:

To enhance and sustain the world's built, natural and social environments

Figure 1: Preliminary Site Map North of Carteret Street – Phase 2 Excavation



Legend:

FAM – Fenceline Fixed Air Monitoring Station (FAM-1 to FAM-6)

PAM – Fenceline Portable Air Monitoring Station (PAM-1 to PAM-4)

PAM – Perimeter of the Exclusion Zone Portable Air Monitoring Station (PAM-A to PAM-D)

Created March 28, 2012



To enhance and sustain the world's built, natural and social environments

Air Monitoring Plan Amendment 04

Client: PPG Industries	Amendment No.: 04 – H ₂ S Air Monitoring for the Morris Canal Excavation
Location: Jersey City, NJ	Date: April 27, 2012
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes the changes to the AMP dated May, 2011 for ground intrusive activities at the Garfield Avenue Group Sites in Jersey City, New Jersey during the activities proposed in the Excavation Plan and Backfill Amendment for the Morris Canal dated February 2012. The Excavation Plan and Amendment for the Morris Canal includes the use of FerroBlack-Hybrid (an iron sulfide material for reducing Cr6 to Cr3) as a backfill amendment. The New Jersey Department of Environmental Protection (NJDEP) has requested that the AMP be modified regarding hydrogen sulfide (H₂S) monitoring at the site as it relates to the new scope of work. The current AMP (revised May 2011) for the Garfield Avenue Remediation Project site presents an Exclusion Zone Perimeter approach with an Early Warning Action Level for H₂S of 0.006 parts per million (ppm), or 6 parts per billion (ppb). This air monitoring approach plus Action Level were based on the detection limit of the real time monitor (3 ppb) and an assumed odor recognition threshold of 4.7 ppb. Since the current H₂S sampling approach (Exclusion Zone only) and the respective Action Level is not health-based, and since the sense of smell for H₂S rapidly fatigues, AECOM has revised the H₂S monitoring approach to include additional monitoring at the site fenceline and corresponding Action Level at the Site fenceline and a modified Early Warning Action Level at the Perimeter of the Exclusion Zone. A description of this new proposed strategy follows.</p> <p><u>Fenceline H₂S Monitoring</u></p> <p>Fenceline H₂S monitoring will be conducted 24 hours per day at three (3) of the current FAM locations in the direction of the prevailing winds and/or sensitive receptors when FerroBlack is being used. H₂S monitoring will be conducted using the Jerome Model 631-X programmed to collect a discrete air sample every 15-minutes. The H₂S monitors will be set to log each of the 15-minute concentrations which will then (after manual data download at the end of each sampling day) be converted into running 24-hour averages. The running 24-hour averages will then be compared to the H₂S health-based 24-hour action level of 20 parts per billion (ppb).</p> <p>A site map indicating the approximate area of excavation and the fenceline monitoring locations is shown in Figure 1. The H₂S Fenceline Action Level is shown in Table 1. The derivation for the Fenceline Action Level is presented in the following section.</p> <p><u>Fenceline Action Level</u></p> <p>The Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Level (MRL) of 28 micrograms per cubic meter [ug/m³], or 20 ppb, for intermediate duration exposure to hydrogen sulfide will be employed. This particular MRL falls within the central range of the other potential hydrogen sulfide criteria. Compliance with the MRL will be measured as a 24-hour average concentration at each of the three fenceline monitoring locations.</p>	

Perimeter of the Exclusion Zone Monitoring

Hand-held H₂S monitoring will be conducted routinely during periods of ground intrusive and FerroBlack handling activities at the perimeter of the exclusion zone at a rate of 4 times per day (or once approximately every two hours). Hand-held H₂S monitoring will be conducted at 4 to 6 locations at the perimeter of the Exclusion Zone (around the active work area).

A site map indicating the approximate area of excavation and the minimum number of H₂S monitoring locations is shown in **Figure 1**. The proposed Early Warning Action Level for the proposed H₂S monitoring program is shown in **Table 1**. The derivation for the Early Warning Action Level at the perimeter of the Exclusion Zone is presented in the following section.

Exclusion Zone Early Warning Action Level

The Occupational Safety & Health Administration (OSHA) has established a Permissible Exposure Limit (PEL) for H₂S of 20 ppm as a Ceiling (not to be exceeded) concentration. Based on this PEL, and incorporation of a safety factor of 2, the Health & Safety Plan for the site has established an Action Level within the Exclusion Zone of 10 ppm. By incorporating an additional safety factor of 10, an Exclusion Zone perimeter Early Warning Action Level of **1 ppm (1,000 ppb) (instantaneous)** has been derived to serve as an early warning to help prevent potential elevated H₂S concentration issues from reaching the actual fence line of the site.

Reason for Amendment:

The AMP was initially designed for the excavation activities associated with the remediation of IRM 1 at Site 114 where H₂S impacts were expected to be minimal. Based on the planned excavation of the Morris Canal and the use of FerroBlack-Hybrid AECOM has revised the H₂S monitoring approach to include added fence line H₂S monitoring and a revised Early Warning Action Level at the perimeter of the Exclusion Zone.

Signature for AECOM:

Date:

Signature for PPG:

Date:

Signature for NJDEP Representative:

Date:

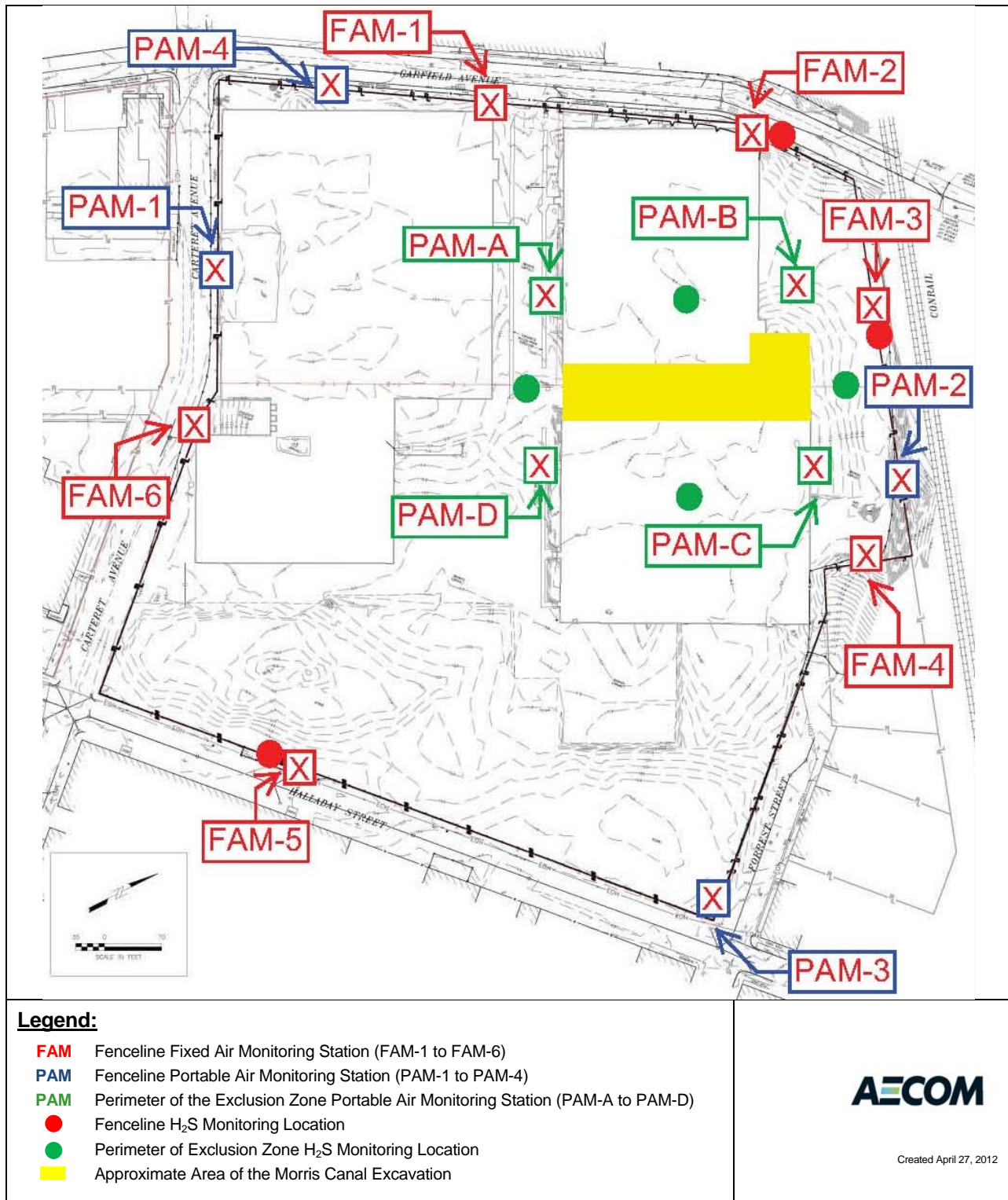
Signature for Site Representative:

Date:

Table 1: Revised Early Warning, Alert and Action Levels

Parameter	Early Warning Alert Level Site Fenceline (1-min)	Alert Level Exclusion Zone (5-min) Site Fenceline (15-min)	Early Warning Action Level Exclusion Zone (Instantaneous)	Action Level Site Fenceline (24-Hour Average)
H ₂ S	N/A	N/A	1.0 ppm	0.020 ppm** (20 ppb)
<p>N/A = Not Applicable</p> <p>*Early Warning Action Level at the Exclusion Zone is based on the Exclusion Zone Action Level included in the AECOM Health & Safety Plan for the site of 10 ppm. By incorporating an additional safety factor of 10 AECOM developed the Early Warning Action Level at the Exclusion Zone of 1 ppm (instantaneous concentration).</p> <p>**Action Level at the Site Fenceline is based on the ATSDR MRL of 28 µg/m³, or 20 ppb, for intermediate duration exposure to H₂S.</p>				

Figure 1: Preliminary Site Map for the Morris Canal Excavation

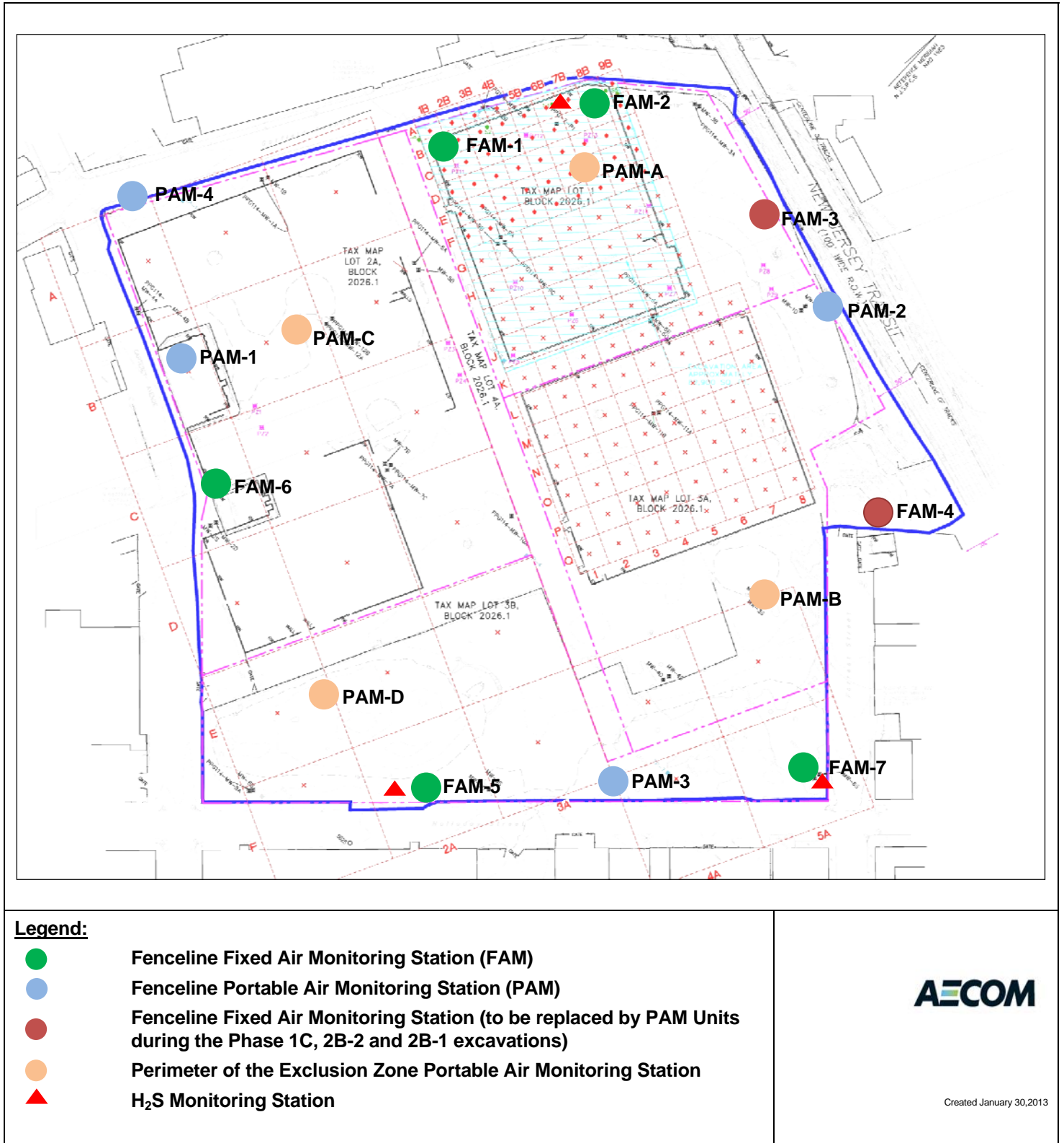


To enhance and sustain the world's built, natural and social environments

Air Monitoring Plan Amendment 06

Client: PPG Industries	Amendment No.: 06 – Phase 1-C, 2B-2 and 2B-1 Excavation												
Location: Jersey City, NJ	Date: February 15, 2013												
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes the changes to the AMP dated May, 2011 for ground intrusive activities at the Garfield Avenue Sites during remedial activities proposed in Phases 1-C, 2B-2 and 2B-1. This amendment is necessary due to the need to change the configuration of select AM stations in response to changing remedial activities. The modifications are set forth in this amendment are designed so that the AMP remains protective of the surrounding community and site workers. In order to achieve the greatest removal of chromium impacts, the limit of excavation in the above-referenced Phases extends beyond the northern property line of Site 114. As a result, the excavation limits will encompass areas where some of the current AM stations are located. With the extension of the excavation limits northward, in order to perform the remediation safely in this area, the hard-wire electrical lines that currently feed Fixed AM stations FAM-3 and FAM-4 will be removed along the northern perimeter of the site prior to beginning the shoring and excavation for these 3 phases. Since hard-wire electrical service will no longer be feasible in this area, AECOM proposes to collect data at the previous FAM-3 and FAM-4 locations using the PAM stations during the excavation of Phase 1-C, 2B-2 and 2B-1. The FAM stations will be returned to service at the conclusion of these phases. These changes will impact the current air monitoring and sampling strategy in the following ways:</p>													
<table border="1"> <thead> <tr> <th>Current AM Approach</th> <th>Proposed AM Approach</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (24-hours a day, 7-days a week) at FAM-3 and FAM-4. </td> <td> <ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (during work days, Monday to Friday, 7AM to 5PM) at the same locations using PAMs. </td> </tr> <tr> <td> <ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Level is exceeded) conducted at FAM-3 and FAM-4 in station GCs. </td> <td> <ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Levels is exceeded) conducted via a bag air sample and analyzed at a central GC location. </td> </tr> <tr> <td> <ul style="list-style-type: none"> Continuous real-time H₂S monitoring (24-hours a day, 7-days a week) at FAM-3. </td> <td> <ul style="list-style-type: none"> Relocate the real-time H₂S monitoring (24-hours a day, 7-days a week) from FAM-3 to FAM-7. </td> </tr> <tr> <td> <ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at FAM-3 and FAM-4. </td> <td> <ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at same locations using PAMs. </td> </tr> <tr> <td> <ul style="list-style-type: none"> Integrated 24-hour (or 72-hour) Cr₆ sampling at FAM-3 . </td> <td> <ul style="list-style-type: none"> Relocate the integrated 24-hour (or 72-hour) Cr₆ sampling from FAM-3 to FAM-5 for the remainder of the program.¹ </td> </tr> </tbody> </table>		Current AM Approach	Proposed AM Approach	<ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (24-hours a day, 7-days a week) at FAM-3 and FAM-4. 	<ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (during work days, Monday to Friday, 7AM to 5PM) at the same locations using PAMs. 	<ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Level is exceeded) conducted at FAM-3 and FAM-4 in station GCs. 	<ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Levels is exceeded) conducted via a bag air sample and analyzed at a central GC location. 	<ul style="list-style-type: none"> Continuous real-time H₂S monitoring (24-hours a day, 7-days a week) at FAM-3. 	<ul style="list-style-type: none"> Relocate the real-time H₂S monitoring (24-hours a day, 7-days a week) from FAM-3 to FAM-7. 	<ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at FAM-3 and FAM-4. 	<ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at same locations using PAMs. 	<ul style="list-style-type: none"> Integrated 24-hour (or 72-hour) Cr₆ sampling at FAM-3 . 	<ul style="list-style-type: none"> Relocate the integrated 24-hour (or 72-hour) Cr₆ sampling from FAM-3 to FAM-5 for the remainder of the program.¹
Current AM Approach	Proposed AM Approach												
<ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (24-hours a day, 7-days a week) at FAM-3 and FAM-4. 	<ul style="list-style-type: none"> Continuous real-time PM₁₀ and TVOC monitoring (during work days, Monday to Friday, 7AM to 5PM) at the same locations using PAMs. 												
<ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Level is exceeded) conducted at FAM-3 and FAM-4 in station GCs. 	<ul style="list-style-type: none"> Periodic constituent specific VOC monitoring for BTEX compounds (BTEX monitoring conducted only if TVOC Action Levels is exceeded) conducted via a bag air sample and analyzed at a central GC location. 												
<ul style="list-style-type: none"> Continuous real-time H₂S monitoring (24-hours a day, 7-days a week) at FAM-3. 	<ul style="list-style-type: none"> Relocate the real-time H₂S monitoring (24-hours a day, 7-days a week) from FAM-3 to FAM-7. 												
<ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at FAM-3 and FAM-4. 	<ul style="list-style-type: none"> Integrated 8-hour PM₁₀ and Cr₆ sampling (during work days, estimated to be Monday to Friday, 7AM to 5PM) at same locations using PAMs. 												
<ul style="list-style-type: none"> Integrated 24-hour (or 72-hour) Cr₆ sampling at FAM-3 . 	<ul style="list-style-type: none"> Relocate the integrated 24-hour (or 72-hour) Cr₆ sampling from FAM-3 to FAM-5 for the remainder of the program.¹ 												
<p>¹ The 24-hour FAM-3 sampling location was selected based on the excavation of IRM1. With additional areas of excavation onsite this is a good opportunity to relocate this sample to a location that is more downwind of current and future areas of site excavation (i.e., FAM-5).</p>													
<p>Reason for Amendment:</p> <p>The current remedial approach includes excavation beyond current AM station locations. Overhead electrical lines will be removed along the northern perimeter of the site prior to shoring and excavation in this area. As a result, AECOM will install and operate PAMs at the current locations of FAM-3 and 4 during excavation of Phase 1-C, 2B-2 and 2B-1.</p>													

Figure 1: Preliminary Site Map for the Phase 1-C, 2B-2, and 2B-1 Excavation

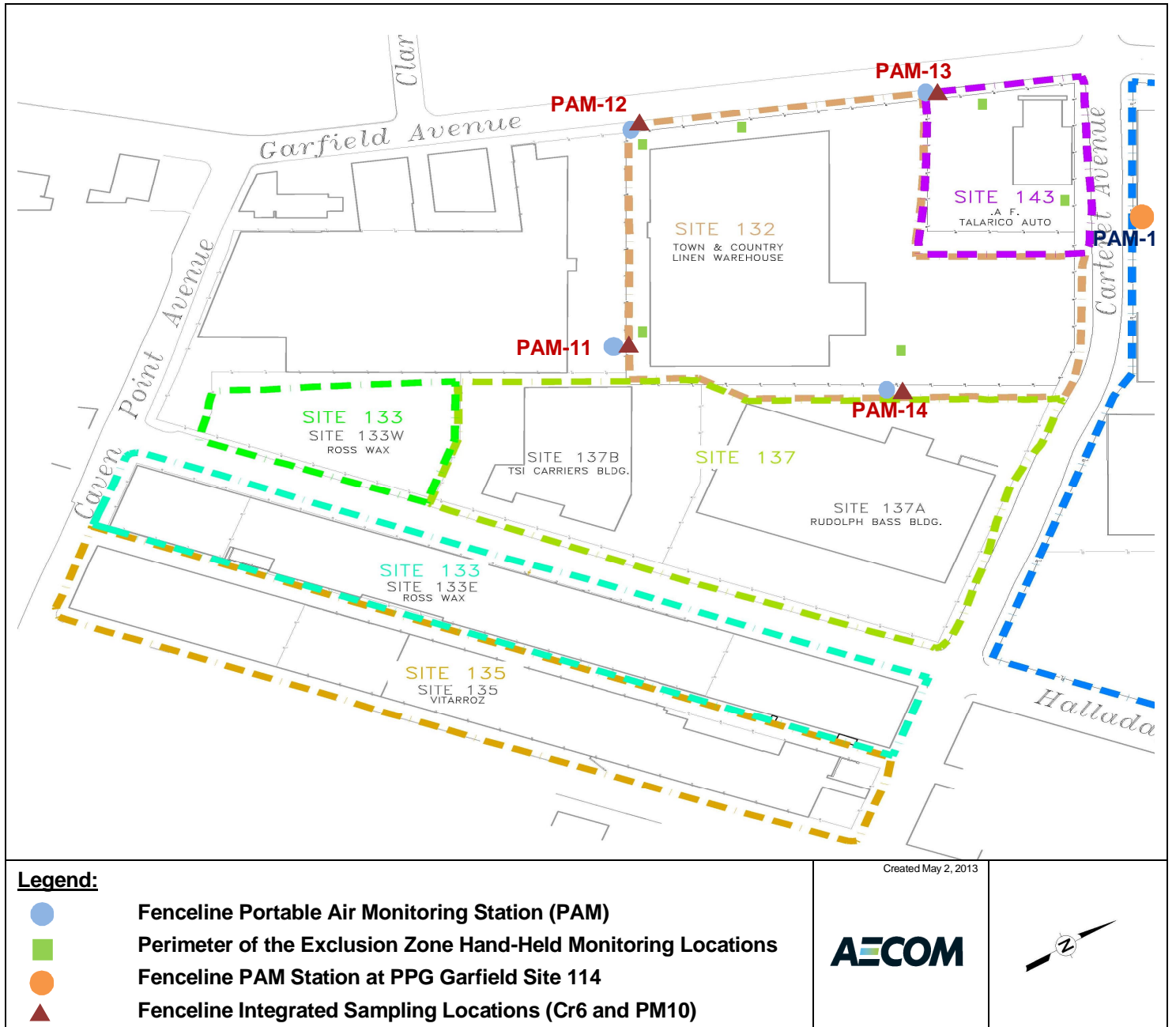


To enhance and sustain the world's built, natural and social environments

Air Monitoring Plan Amendment 07

Client: PPG Industries	Amendment No.: 07 ----- Site 132 and 143 Building Demolition
Location: Jersey City, NJ	Date: May 31, 2013
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes air monitoring to be performed during the demolition of the existing buildings on the Garfield Ave Group Sites 132 and 143.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. During the building demolition phase covered by this amendment, the building superstructures will be raised to the existing foundation slabs. This amendment describes air monitoring at these sites during building demolition activities only; a future amendment will be submitted for air monitoring at these sites during ground intrusive activities (including foundation removal, where applicable). Building demolition is expected to occur in phases as full access to these properties is provided, prior to any ground intrusive activities. Buildings on Site 132 and 143 are expected to be demolished simultaneously. Demolition of the buildings has the potential to create fugitive dust emissions; however, dust is not expected to contain Hexavalent Chromium but to be as protective as possible, integrated sampling for particulates and Hexavalent Chrome will be performed at the various AM locations.</p> <p>AECOM has developed a relatively simplistic yet conservative air monitoring approach to address concerns associated with the potential for fugitive dust emissions. AECOM will provide a two tiered approach:</p> <ul style="list-style-type: none"> • Perimeter of the Work Zone Monitoring – Data collected during periodic hand-held PM₁₀ monitoring will be recorded every two hours at 4-6 locations around the work zone during periods of active work. • Fenceline Monitoring – Real-time continuous PM₁₀ monitoring will be performed daily at four (4) Portable Air Monitoring (PAM) stations at the site perimeter at upwind and downwind directions. • Fenceline Sampling – Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at all four (4) of the PAM stations at the site perimeter. <p>A conceptual Site map for the simultaneous building demolition for Sites 132 and 143 is provided in Figure 1.</p>	
<p>Reason for Amendment:</p> <p>Building demolition results in a potential for the generation of fugitive dust. This Amendment describes the increased monitoring that is proposed during demolition work anticipated at the Garfield Ave Group Sites (Sites 132 and 143).</p>	

Figure 1: Conceptual Site Map for Building Demolition at Site 132 and Site 143 (Adjacent Building Demolition example)





Air Monitoring Plan Amendment 08

Client: PPG Industries	Amendment No.: 08 – Site 186 Excavation
Location: Jersey City, NJ	Date: May 30, 2013
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes Air Monitoring to be performed at Site 186 during remedial activities at that site. The Garfield Avenue Sites AMP dated May 2011 was used as a basis for Air Monitoring at Site 186 in accordance with the Remedial Action Work Plan (RAWP) dated May 2013.</p> <p>Excavation of Site 186 is expected to be limited to a short duration (less than 1week); therefore, AECOM has developed a relatively simplistic yet conservative air monitoring approach to address concerns associated with fugitive emissions. AECOM will provide a two tiered approach:</p> <ul style="list-style-type: none"> • Perimeter of the Exclusion Zone Monitoring – Periodic hand-held PM₁₀ monitoring will be recorded every half hour at 4-6 locations during periods of active work. • Fence line Monitoring – Real-time continuous PM₁₀ monitoring plus 8-hour integrated sampling and analyses for Cr6 and PM₁₀ will be performed at two (2) PAM stations located in the upwind and downwind directions. <p>Monitoring as described above plus compliance with site specific alert and action limits (including the no visible dust requirement) will be performed in accordance with the AMP for the Garfield Avenue Sites. A conceptual Site map is provided in Figure 1. Due to the short duration of the excavation activities at Site 186, and the fact that the Site boundary is not contiguous with Site 114, reporting for the Site 186 Air Monitoring program will be performed separately but consistent with the data reporting currently being performed for the Garfield Ave Site. AECOM will provide a final report of the air monitoring results as part of the Construction Completion Report.</p>	
<p>Reason for Amendment:</p> <p>The RAWP includes an area of excavation outside the boundary of the Garfield Ave Site 114 previously defined. The Amendment describes the increased monitoring that is proposed for the remedial work anticipated at Site 186.</p>	

Figure 1: Preliminary Site Map for the Site 186 Excavation



Legend:

-  Site Boundary
-  Fence line Portable Air Monitoring Station (PAM)
-  Perimeter of the Exclusion Zone Hand-Held Monitoring Locations

Created April 30, 2013



Air Monitoring Plan Amendment 09

Dust Control Plan Amendment 01

Client: PPG Industries	AMP Amendment No.: 09 DCP Amendment No.: 01 Modify and clarify the AMP and DCP documents as they relate to QA/QC and reporting requirements.
Location: Jersey City, NJ	Submission Date: 7/24/13
<p>Amendment Description:</p> <p>This amendment serves to modify and provide clarification to Garfield Ave Air Monitoring Plan (AMP) dated May 2011 and the Dust Control Plan (DCP) dated April 2012 surrounding the quality assurance / quality control (QA/QC) documentation generated as part of the air monitoring database. The changes presented herein were implemented on July 3, 2013.</p> <ul style="list-style-type: none"> • The PPG Dust Control Manager (“DCM”) and Air Monitoring (AM) Technicians will record details of their activities throughout the day in individual field log books. E.g., <ul style="list-style-type: none"> <i>09:40 – 09:50 - Walked Phase 1C, observed sheeting being installed. Observed dry conditions on haul route and requested that ENTACT mobilize water truck to area. ENTACT applies water @ 09:50.</i> • The PPG DCM will add more detail to observations that are recorded on the Daily Dust Suppression Inspection Form. E.g., the DCM may clarify an observation by adding footnotes to a “Y/N” entry in the ‘Notes’ section and specifying something atypical that was observed, and/or clarify specifically how and/or where an observation was made. • During completion of the ‘Other’ section of the Daily Dust-Generating Activity Tracking log, the PPG DCM will list specific Site activities such as “metal torching, cutting or welding”, when and where it is observed. • The PPG DCM will notify PSEG/AMEC if elevated AM levels are measured at AM stations on the PSEG side of the site. The PPG DCM is not responsible for active monitoring (i.e., site walks, inspection forms, visual inspection) of work being performed by PSEG on the eastern portion of Site 114. However, during the routine site walks on the PPG portion of the property, if the PPG DCM notices that dust is being generated on the PSEG portion of the property, the PPG DCM will contact PSEG/AMEC to collect and record information on the PSEG activities in the field notes and on the inspection forms. PSEG activities are regulated directly by NJDEP under their Memorandum of Agreement, and PSEG is solely responsible for dust control for their activities. • EDRs will be distributed to the Site Administrator with the applicable field QA/QC documentation (e.g., AM field station logs, AM field logs, AM hand-held data listing, AM site map, DCM field logs, DCM daily dust suppression form, and DCM daily dust-generating activity tracking log). • The DCM Daily Dust Suppression Form has been modified as attached. 	

Reason for Amendment:

This amendment to the AMP and the DCP was produced to clarify AMP and DCP procedures and capture recent process improvements.

Daily Dust Suppression Inspection Form

PPG Site 114 (Garfield Ave, Jersey City)

Date:	Dust Control Manager:
Air Monitoring Specialists:	Dust Control Technicians:
Weather:	

ACTIVITY*	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	If NA, please explain.
Truck Washing/Decontamination Stations											
1. Sufficient water supply available											
2. Dust visible as trucks enter/exit wash/decon station											
3. Personnel able to keep pace with trucks											
Excavation and Loading Areas											
1. Sufficient water supply available											
2. Sufficient additive(s) supply available, as needed											
3. Dust visible during excavation/loading activities											
4. Suppression personnel able to keep pace with equip.											
Hauling Lanes											
1. Sufficient water supply available											
2. Sufficient additive/emulsifier supply available											
3. Dust visible during hauling activities											
4. Truck speeds acceptable (max. 5 mph)											
5. Suppression personnel able to keep pace with traffic											
6. Soil spills on the hauling lanes?											
Stockpile Areas											
1. Inactive stockpiles covered with liners											
2. Sufficient water supply available for active stockpiles											
3. Sufficient additive(s) supply available, as needed.											
4. Dust visible from active stockpiles											

* - The Dust Control Plan requires that the Dust Control Manager complete inspections every two hours.
 Every attempt will be made to perform and record observations of hourly inspections.

Was dust visible during site activities? If yes, please explain when, where, why, and what controls were applied.

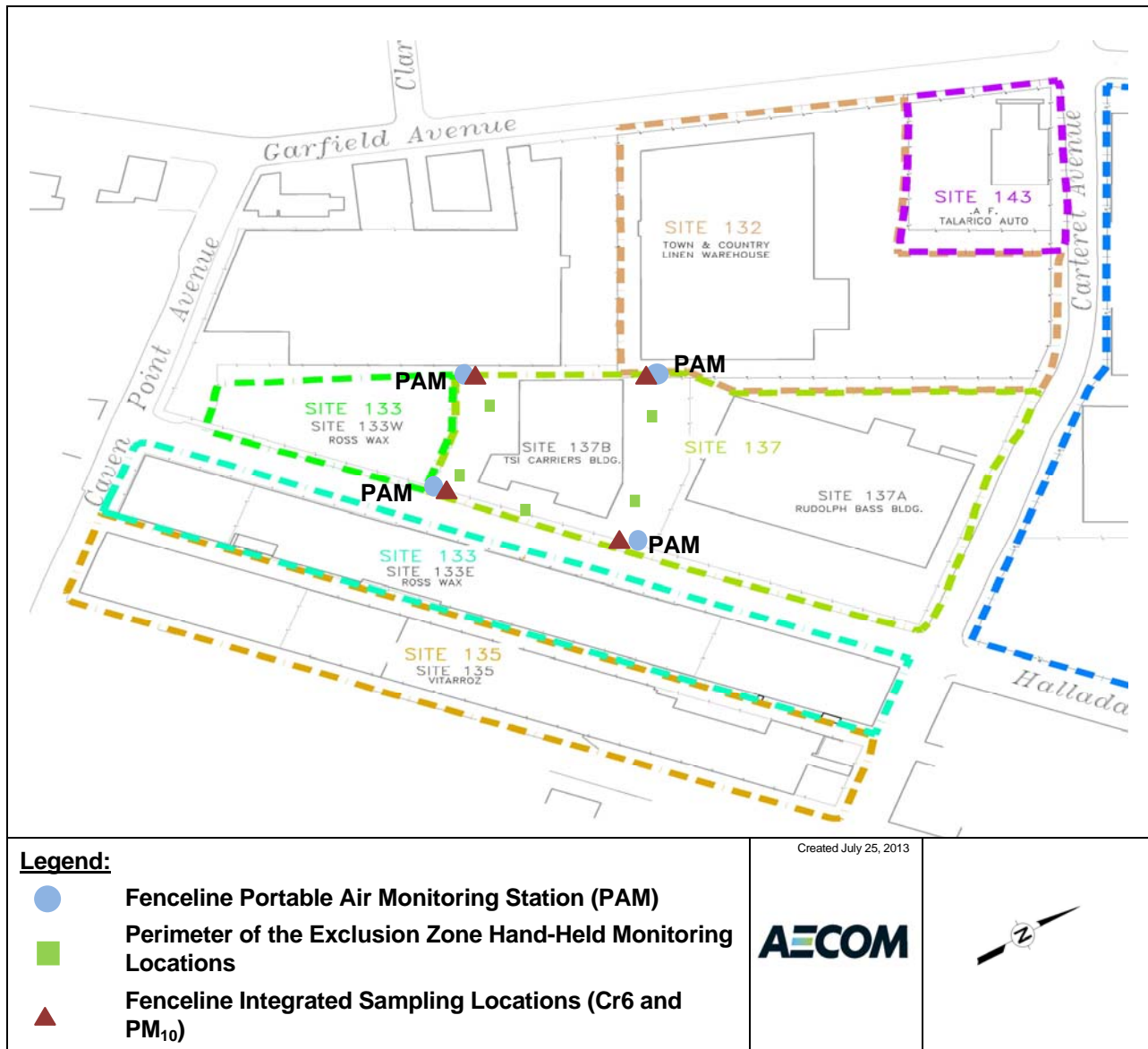
Were site activities shutdown during the day? If yes, please explain when, why, and duration.

Notes:

Air Monitoring Plan Amendment 10

Client: PPG Industries	AMP Amendment No.: 10 – Site 137B Building Demolition
Location: Jersey City, NJ	Submittal Date: 8/19/13
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes air monitoring to be performed during the demolition of the existing buildings on the Garfield Ave Group Site 137B.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. During the building demolition phase covered by this amendment, the building superstructure will be razed to the existing foundation slab. This amendment describes air monitoring at this site during building demolition activities only; a future amendment will be submitted for air monitoring at this site for the ground intrusive activities (including foundation removal, where applicable). Demolition of the building has the potential to create fugitive dust emissions; however, dust is not expected to contain Hexavalent Chromium (Cr6) but to be as protective as possible, integrated sampling for particulates and Cr6 will be performed at the various AM locations.</p> <p>AECOM has developed an air monitoring approach to address concerns associated with the potential for fugitive dust emissions. A conceptual Site map for the building demolition for Site 137B is provided in Figure 1. AECOM will provide a two tiered approach during remedial periods (assumed to be Monday through Friday each week):</p> <ul style="list-style-type: none"> • Perimeter of the Work Zone Monitoring – Data will be collected daily during periodic hand-held PM₁₀ monitoring and will be recorded every 30 minutes at 4-6 locations around the work zone. • Fenceline Monitoring – Real-time continuous PM₁₀ monitoring will be performed daily at four (4) Portable Air Monitoring (PAM) stations (8-10 hours per day) at the site perimeter at upwind and downwind directions. • Fenceline Sampling – Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the four (4) PAM stations at the site perimeter. <p>Air monitoring at Site 137B will be conducted in accordance with the Garfield Ave AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> • Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute); • Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 114; • Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and • The same reporting protocols as Site 114. <p>The Dust Control Manager at Site 114 will make periodic (at least every two hours) to the Site 137B demolition area for the purpose of assessing Site conditions and identifying the need for dust suppression. Additionally, AECOM will have a dedicated full-time field technician at Site 137B during demolition activities to conduct the air monitoring and sampling discussed herein.</p>	
<p>Reason for Amendment:</p> <p>Building demolition results in a potential for the generation of fugitive dust. This Amendment describes the increased monitoring that is proposed during demolition work anticipated at the Garfield Ave Group Site 137B.</p>	

Figure 1: Conceptual Site Map for Building Demolition at Site 137B



Air Monitoring Plan Amendment 11

Client: PPG Industries	Amendment No.: 11 Excavation of Phase 3A (Site 132 and 143)
Location: Jersey City, NJ	Submittal Date: 9/10/13
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes air monitoring to be performed during Phase 3A excavation at the Garfield Ave Group Sites 132 and 143. Air monitoring at Site 132 and 143 will be conducted in addition to the air monitoring currently being performed at Site 114.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. The air monitoring described herein will be performed during the excavation of contaminated soils described in the Technical Execution Plan to be submitted shortly. Excavation of contaminated soils has the potential to create fugitive dust emissions. Dust generated has the potential to contain Hexavalent Chromium (Cr6); therefore, to be as protective as possible, integrated sampling for particulates and Cr6 will be performed at the various air monitoring locations.</p> <p>AECOM has developed the following air monitoring approach to address concerns associated with the potential for fugitive dust emissions. The approach listed below is consistent with the approach used at Garfield Site 114. AECOM will provide a two tiered approach including monitoring and sampling at the perimeter of the exclusion zone and at the Site fenceline. The following sections describe the monitoring and sampling approach.</p> <p><u>Fenceline</u></p> <ul style="list-style-type: none"> Real-time continuous 15-minute average PM₁₀ monitoring will be performed daily at four (4) air monitoring stations at the site perimeter in the upwind and downwind directions. Three (3) Portable Air Monitoring (PAM) stations (operating 8-10 hours per day) and one (1) Fixed Air Monitoring (FAM) station (operating 24 hours per day and 7 days per week). Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the four (4) air monitoring stations at the site perimeter. <p><u>Perimeter of the Exclusion Zone</u></p> <ul style="list-style-type: none"> Real-time 5-minute average PM₁₀ monitoring will be performed daily at three (3) PAM stations during periods of active work (operating 8-10 hours per day). Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the three (3) exclusion zone PAM locations during. Periodic hand-held PM₁₀ monitoring will be conducted and recorded approximately once per hour at 4-6 locations around the work zone during periods of active work. <p>Air monitoring during Phase 3A will be conducted in accordance with the Garfield Avenue (Site 114) AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute at the Site fenceline and 1-minute and 5-minute at the perimeter of the exclusion zone); Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 	

114;

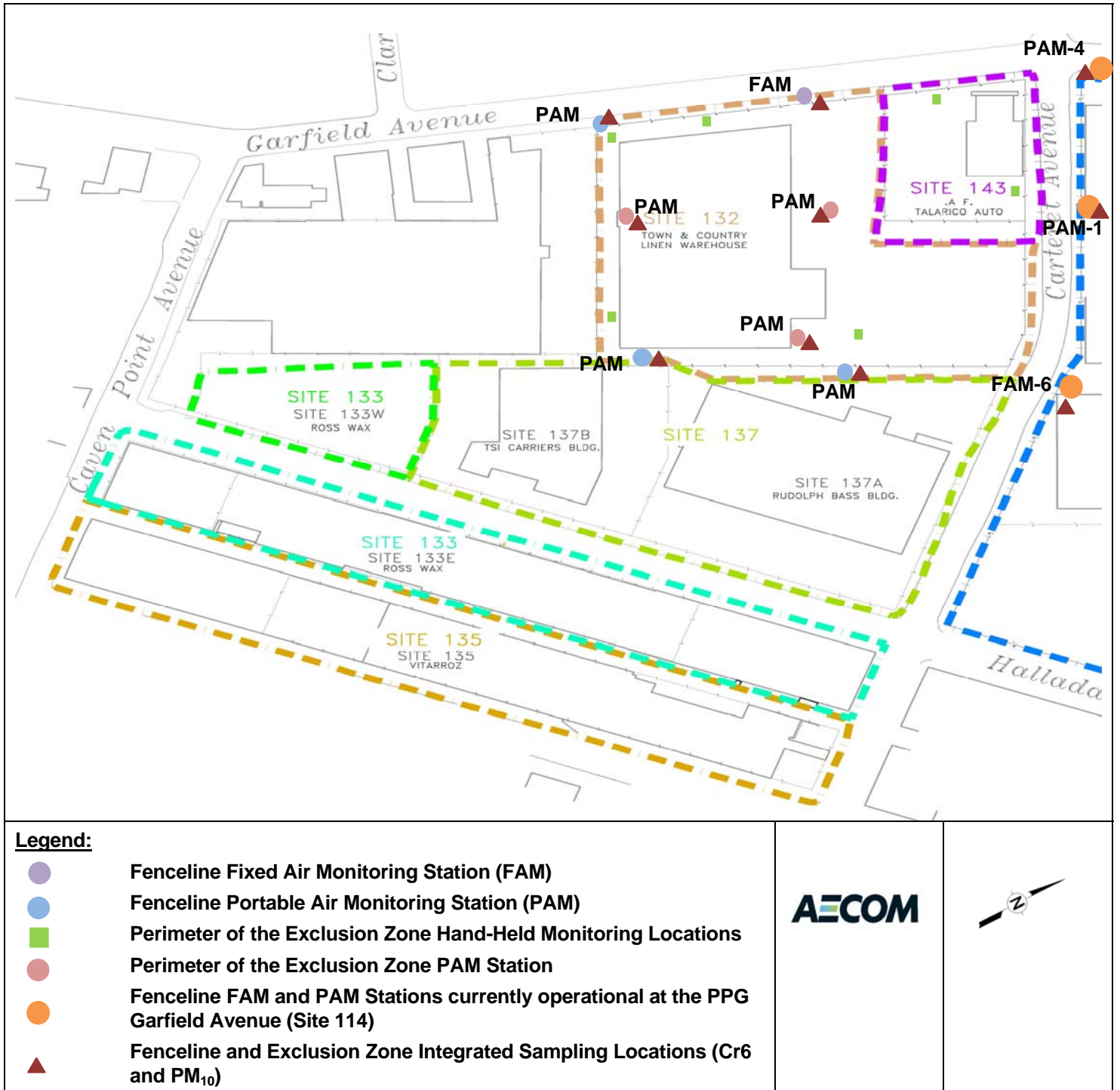
- Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and
- The same reporting protocols as Site 114.

A conceptual Site map showing the locations of the air monitoring stations is provided in **Figure 1**. The air monitoring locations for Site 114 along Carteret Avenue are also shown on **Figure 1** and will provide coverage on the northern border of Site 132 and 143. The Site configuration shown assumes that Carteret Avenue will be closed to through traffic during the Phase 3A excavation.

Reason for Amendment:

Excavation of contaminated soils results in the potential for the generation of fugitive dust. This amendment describes the increased monitoring that is proposed during the Phase 3A excavation of contaminated soils at the Garfield Ave Group Sites (132 and 143).

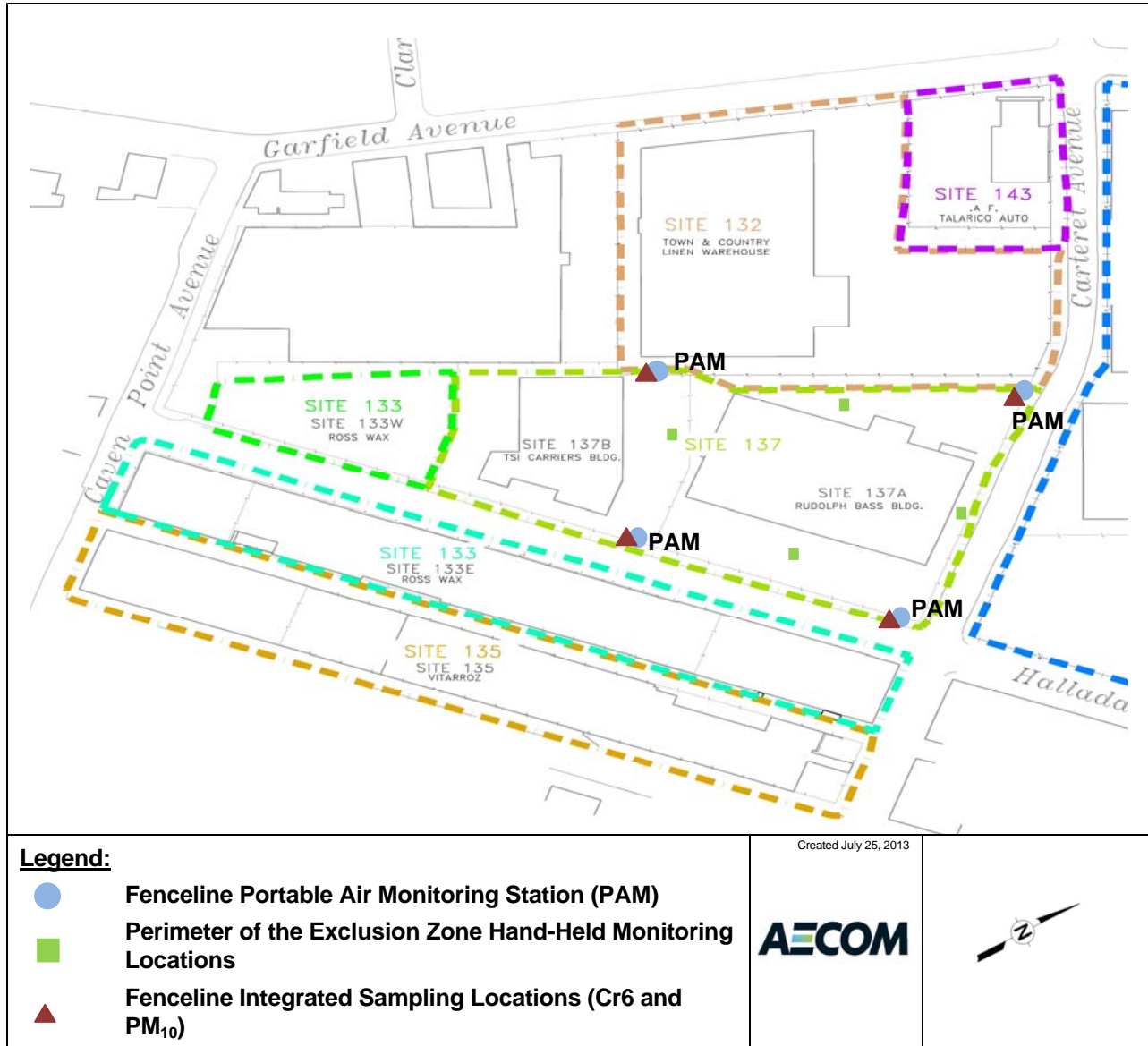
Figure 1: Conceptual Site Map for Phase 3A Excavation



Air Monitoring Plan Amendment 12

Client: PPG Industries	AMP Amendment No.: 12 – Site 137A Building Demolition
Location: Jersey City, NJ	Submittal Date: October 30, 2013
<p>Amendment Description:</p> <p>This Air Monitoring Plan (AMP) amendment describes air monitoring to be performed during the demolition of the existing buildings on the Garfield Ave Group Site 137A.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. During the building demolition phase covered by this amendment, the building superstructure will be razed to the existing foundation slab. This amendment describes air monitoring at this site during building demolition activities only; a future amendment will be submitted for air monitoring at this site for the ground intrusive activities (including foundation removal, where applicable). Demolition of the building has the potential to create fugitive dust emissions; however, dust is not expected to contain Hexavalent Chromium (Cr6) but to be as protective as possible, integrated sampling for particulates and Cr6 will be performed at the various AM locations.</p> <p>AECOM has developed an air monitoring approach to address concerns associated with the potential for fugitive dust emissions. A conceptual Site map for the building demolition for Site 137A is provided in Figure 1. AECOM will provide a two tiered approach during remedial periods (assumed to be Monday through Friday each week):</p> <ul style="list-style-type: none"> • Perimeter of the Work Zone Monitoring – Data will be collected daily during periodic hand-held PM₁₀ monitoring and will be recorded every 30 minutes at 4-6 locations around the work zone. • Fenceline Monitoring – Real-time continuous PM₁₀ monitoring will be performed daily at four (4) Portable Air Monitoring (PAM) stations (8-10 hours per day) at the Site perimeter at upwind and downwind directions. • Fenceline Sampling – Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the four (4) PAM stations at the Site perimeter. <p>Air monitoring at Site 137A will be conducted in accordance with the Garfield Ave AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> • Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute); • Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 114; • Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and • The same reporting protocols as Site 114. <p>The Dust Control Manager at Site 114 will make periodic (at least every two hours) to the Site 137A demolition area for the purpose of assessing Site conditions and identifying the need for dust suppression. Additionally, AECOM will have a dedicated full-time field technician at Site 137A during demolition activities to conduct the air monitoring and sampling discussed herein.</p>	
<p>Reason for Amendment:</p> <p>Building demolition results in a potential for the generation of fugitive dust. This Amendment describes the increased monitoring that is proposed during demolition work anticipated at the Garfield Ave Group Site 137A.</p>	

Figure 1: Conceptual Site Map for Building Demolition at Site 137A



Air Monitoring Plan Amendment 13 – Revision 01

Client: PPG Industries	Amendment No.: 13 Excavation of Phase 3B (Site 137 and 133W)
Location: Jersey City, NJ	Submittal Date: 11/20/13
<p>Amendment Description:</p> <p>This revised Air Monitoring Plan (AMP) Amendment responds to comments provided by the New Jersey Department of Environmental Protection (NJDEP) via email on November 14, 2013.</p> <p>This AMP amendment describes air monitoring to be performed during Phase 3B excavation at the Garfield Ave Group Sites 137 and 133W. Air monitoring at Sites 137 and 133W will be conducted in addition to the air monitoring currently being performed at Phase 3A and Garfield Avenue Site 114.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. The air monitoring described herein will be performed during the excavation of contaminated soils described in the Technical Execution Plan to be submitted shortly. Excavation of contaminated soils has the potential to create fugitive dust emissions. Dust generated has the potential to contain Hexavalent Chromium (Cr6); therefore, to be as protective as possible, integrated sampling for particulates and Cr6 will be performed at the various air monitoring locations.</p> <p>AECOM has developed the following air monitoring approach to address concerns associated with the potential for fugitive dust emissions. The approach listed below is consistent with the approach used at Garfield Site 114. AECOM will provide a two tiered approach including monitoring and sampling at the perimeter of the exclusion zone and at the Site fenceline. The following sections describe the monitoring and sampling approach.</p> <p><u>Fenceline</u></p> <ul style="list-style-type: none"> • Real-time continuous 15-minute average PM₁₀ monitoring will be performed daily at six (6) air monitoring stations at the Site fenceline in the upwind and downwind directions. Four (4) Portable Air Monitoring (PAM) stations (operating 8-10 hours per day) and two (2) Fixed Air Monitoring (FAM) stations (operating 24 hours per day and 7 days per week). • Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the six (6) air monitoring stations at the Site fenceline <p><u>Perimeter of the Exclusion Zone</u></p> <ul style="list-style-type: none"> • Real-time 5-minute average PM₁₀ monitoring will be performed daily at three (3) PAM stations during periods of active work (operating 8-10 hours per day). • Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the three (3) exclusion zone PAM locations during periods of active work. • Periodic hand-held PM₁₀ monitoring will be conducted and recorded approximately once per hour at 4-6 locations around the work zone during periods of active work. <p>Air monitoring during Phase 3B will be conducted in accordance with the Garfield Avenue (Site 114) AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> • Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute at the Site fenceline and 1-minute and 5-minute at the perimeter of the exclusion zone); • Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 	

114;

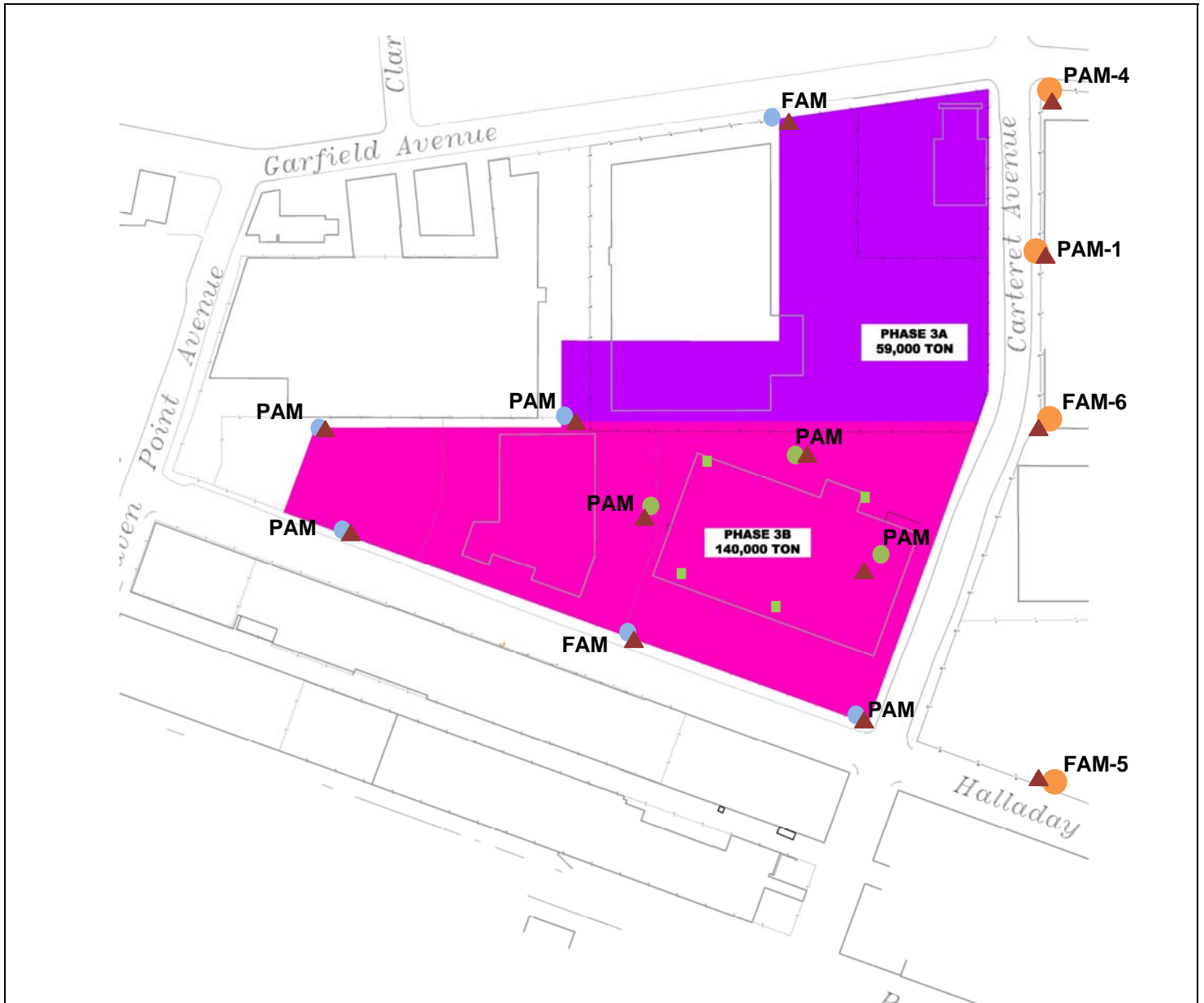
- Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and
- The same reporting protocols as Site 114.

A conceptual Site map showing the locations of the air monitoring stations at the Garfield Avenue Group Sites for Phase 3B is provided in **Figure 1**. The air monitoring locations for Garfield Avenue Site 114 along Carteret Avenue are also shown on **Figure 1** and will provide coverage on the northern border of Site 137. The Site configuration shown assumes that Carteret Avenue and Halladay Street will be closed to through traffic during the Phase 3B excavation. Phase 3B excavation is expected to begin prior to the completion of the excavation of Phase 3A; therefore, the Phase 3A Site fenceline was expanded eastward to encompass the Phase 3A and Phase 3B areas of excavation resulting in two (2) added air monitoring stations and the relocation of another (the resulting locations are shown in **Figure 1**). Locations of the air monitoring stations are subject to change based on ongoing activities at the Garfield Avenue Group Sites. Changes to the locations will be subject to NJDEP approval prior to the start of excavation activities.

Reason for Amendment:

Excavation of contaminated soils results in the potential for the generation of fugitive dust. This amendment describes the increased monitoring that is proposed during the Phase 3B excavation of contaminated soils at the Garfield Ave Group Sites (137 and 133W).

Figure 1: Conceptual Site Map for Phase 3B Excavation



Legend:

- Fenceline Fixed and Portable Air Monitoring Station (FAM and PAM)
- Perimeter of the Exclusion Zone PAM Station
- Perimeter of the Exclusion Zone Hand-Held Monitoring Locations
- Fenceline FAM and PAM Stations currently operational at the PPG Garfield Avenue (Site 114)
- ▲ Fenceline and Exclusion Zone Integrated Sampling Locations (Cr6 and PM₁₀)



Air Monitoring Plan Amendment 14 – Revision 02

Client: PPG Industries	AMP Amendment No.: 14 – Site 133E Building Demolition
Location: Jersey City, NJ	Submittal Date: 1/15/14
<p>Amendment Description:</p> <p>This revised Air Monitoring Plan (AMP) Amendment responds to comments provided by the New Jersey Department of Environmental Protection (NJDEP) via email on December 4, 2013 and further comments on January 3, 2014.</p> <p>This AMP Amendment describes air monitoring to be performed during the demolition of the existing buildings on the Garfield Avenue Group Site 133E.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. During the building demolition phase covered by this amendment, the building superstructure will be razed to the existing foundation slab. This amendment describes air monitoring at this Site during building demolition activities only; a future amendment will be submitted for air monitoring at this Site for the ground intrusive activities (including foundation removal, where applicable). Demolition of the building has the potential to create fugitive dust emissions; however, dust may contain Hexavalent Chromium (Cr6); therefore, integrated sampling for particulates and Cr6 will be performed at the various air monitoring locations.</p> <p>AECOM has developed an air monitoring approach to address concerns associated with the potential for fugitive dust emissions. AECOM will provide a two tiered approach during demolition periods (assumed to be Monday through Friday). The following sections describe the monitoring and sampling approach.</p> <p>Fenceline:</p> <ul style="list-style-type: none"> • Real-time continuous PM₁₀ monitoring will be performed daily at four (4) Portable Air Monitoring (PAM) stations (8-10 hours per day) at the Site perimeter at upwind and downwind directions. • Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the four (4) PAM stations at the Site perimeter. <p>Perimeter of the Work Zone:</p> <ul style="list-style-type: none"> • Periodic hand-held PM₁₀ monitoring will be performed approximately every 30 minutes at 6-8 locations around the demolition zone. <p>Air monitoring at Site 133E will be conducted in accordance with the Garfield Avenue AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> • Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute); • Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 114; • Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and • The same reporting protocols as Site 114. <p>The Dust Control Manager (DCM) at Site 114 will make periodic (at least every two hours) visits to the Site 133E demolition area for the purpose of assessing Site conditions and identifying the need for dust suppression. Additionally, AECOM will have a dedicated full-time field technician at the Garfield Avenue Group Sites during demolition/excavation activities to conduct the air monitoring and sampling discussed herein.</p>	

A conceptual Site map for the building demolition for Site 133E is provided in **Figure 1**. During the building demolition at Site 133E Carteret Street and Halladay Street are expected to be closed to through traffic. Therefore, more concentrated monitoring will be provided along the eastern perimeter of the demolition. The current program design was based on assumptions made based on the current program understanding. However, AECOM understands that potential modifications may be required. The table below includes the assumptions and the potential modifications required if the assumptions are not true during the demolition activities.

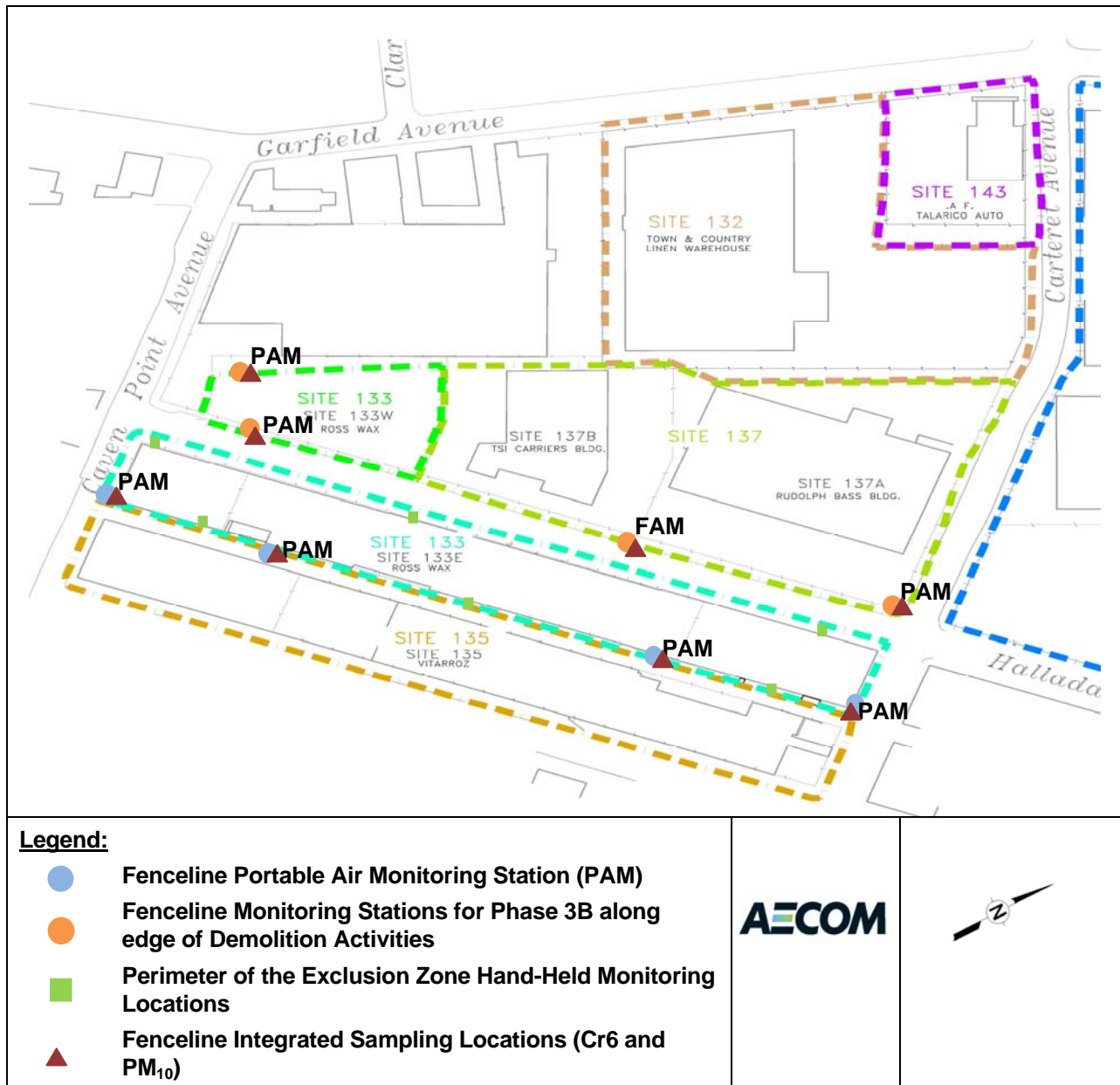
Assumptions	Potential Program Modifications
Carteret Street will be closed to through traffic.	No changes.
Halladay Street will be closed to through traffic.	If Halladay Street remains open to through traffic; AECOM shall provide an additional PAM station along the southwestern corner of Site 133E and increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.
Air monitoring will be ongoing at the western fenceline as part of Phase 3B excavation.	If air monitoring associated with Phase 3B is not ongoing; AECOM shall provide an additional PAM station along the southwestern corner of Site 133E and increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.
Site 135 will not be occupied.	If Site 135 is occupied during the demolition activities; AECOM shall increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.

Locations of the air monitoring stations are subject to change based on changes to the assumptions listed above and ongoing activities at the Garfield Avenue Group Sites. Changes to the locations will be subject to NJDEP approval prior to the start of demolition activities.

Reason for Amendment:

Building demolition results in a potential for the generation of fugitive dust. This Amendment describes the increased monitoring that is proposed during demolition work anticipated at the Garfield Avenue Group Site 133E

Figure 1: Conceptual Site Map for Building Demolition at Site 133E



Air Monitoring Plan Amendment 15 – Revision 02

Client: PPG Industries	Amendment No.: 15 Excavation of Phase 3C (Site 133E)
Location: Jersey City, NJ	Submittal Date: 1/15/14
<p>Amendment Description:</p> <p>This revised Air Monitoring Plan (AMP) Amendment responds to comments provided by the New Jersey Department of Environmental Protection (NJDEP) via email on December 4, 2013 and further comments on January 3, 2014.</p> <p>This AMP Amendment describes air monitoring to be performed during Phase 3C excavation at the Garfield Avenue Group Site 133E. Air monitoring at Site 133E will be conducted in addition to the air monitoring currently being performed at Site 114 and the Garfield Avenue Group Sites Phase 3A and Phase 3B.</p> <p>Air monitoring described herein will be conducted in general accordance with the Garfield Avenue AMP dated May 2012. The air monitoring described herein will be performed during the excavation of contaminated soils described in the Technical Execution Plan for Site 133E to be submitted shortly. Excavation of contaminated soils has the potential to create fugitive dust emissions. Dust generated has the potential to contain Hexavalent Chromium (Cr6); therefore, to be as protective as possible, integrated sampling for particulates and Cr6 will be performed at the various air monitoring locations.</p> <p>AECOM has developed the following air monitoring approach to address concerns associated with the potential for fugitive dust emissions. The approach listed below is consistent with the approach used at Garfield Site 114. AECOM will provide a two tiered approach including monitoring and sampling at the perimeter of the exclusion zone and at the Site fenceline. The following sections describe the monitoring and sampling approach.</p> <p><u>Fenceline</u></p> <ul style="list-style-type: none"> Real-time continuous 15-minute average PM₁₀ monitoring will be performed daily at six (6) air monitoring stations at the Site perimeter in the upwind and downwind directions. Four (4) Portable Air Monitoring (PAM) stations (operating 8-10 hours per day) and two (2) Fixed Air Monitoring (FAM) stations (operating 24 hours per day and 7 days per week). Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the six (6) air monitoring stations at the Site perimeter. <p><u>Perimeter of the Exclusion Zone</u></p> <ul style="list-style-type: none"> Real-time 5-minute average PM₁₀ monitoring will be performed daily at three (3) PAM stations during periods of active work (operating 8-10 hours per day). Integrated 8 to 10-hour Cr6 and PM₁₀ samples will be collected daily at each of the three (3) exclusion zone PAM locations during. Periodic hand-held PM₁₀ monitoring will be conducted and recorded approximately once per hour at 4-6 locations around the work zone during periods of active work. <p>Air monitoring during Phase 3C will be conducted in accordance with the Garfield Avenue (Site 114) AMP. This includes but is not limited to:</p> <ul style="list-style-type: none"> Collection of multiple real-time PM₁₀ averages (1-minute and 15-minute at the Site fenceline and 1-minute and 5-minute at the perimeter of the exclusion zone); Comparison of real-time PM₁₀ concentrations to the Alert and Action Levels as determined for Site 	

- 114;
- Comparison of the project-average Cr6 concentrations to the Acceptable Ambient Concentration (AAC) as determined for Site 114; and
- The same reporting protocols as Site 114.

A conceptual Site map showing the locations of the air monitoring stations at the Garfield Avenue Group Sites for Phase 3C is provided in **Figure 1**. The Site configuration shown assumes that Carteret Avenue and Halladay Street will be closed to through traffic during the Phase 3C excavation. It's likely that Phase 3C excavation will begin prior to the completion of the excavation at Phase 3A and 3B; therefore, Phase 3A/3B Site fenceline was expanded eastward to encompass the entire area of excavation (Phase 3A, 3B and 3C) resulting in the relocation of three of the air monitoring stations to the eastern most fenceline.

The current program design was based on assumptions made based on the current program understanding. However, AECOM understands that potential modifications may be required. The table below includes the assumptions and the potential modifications required if the assumptions are not true during the Phase 3C excavation activities.

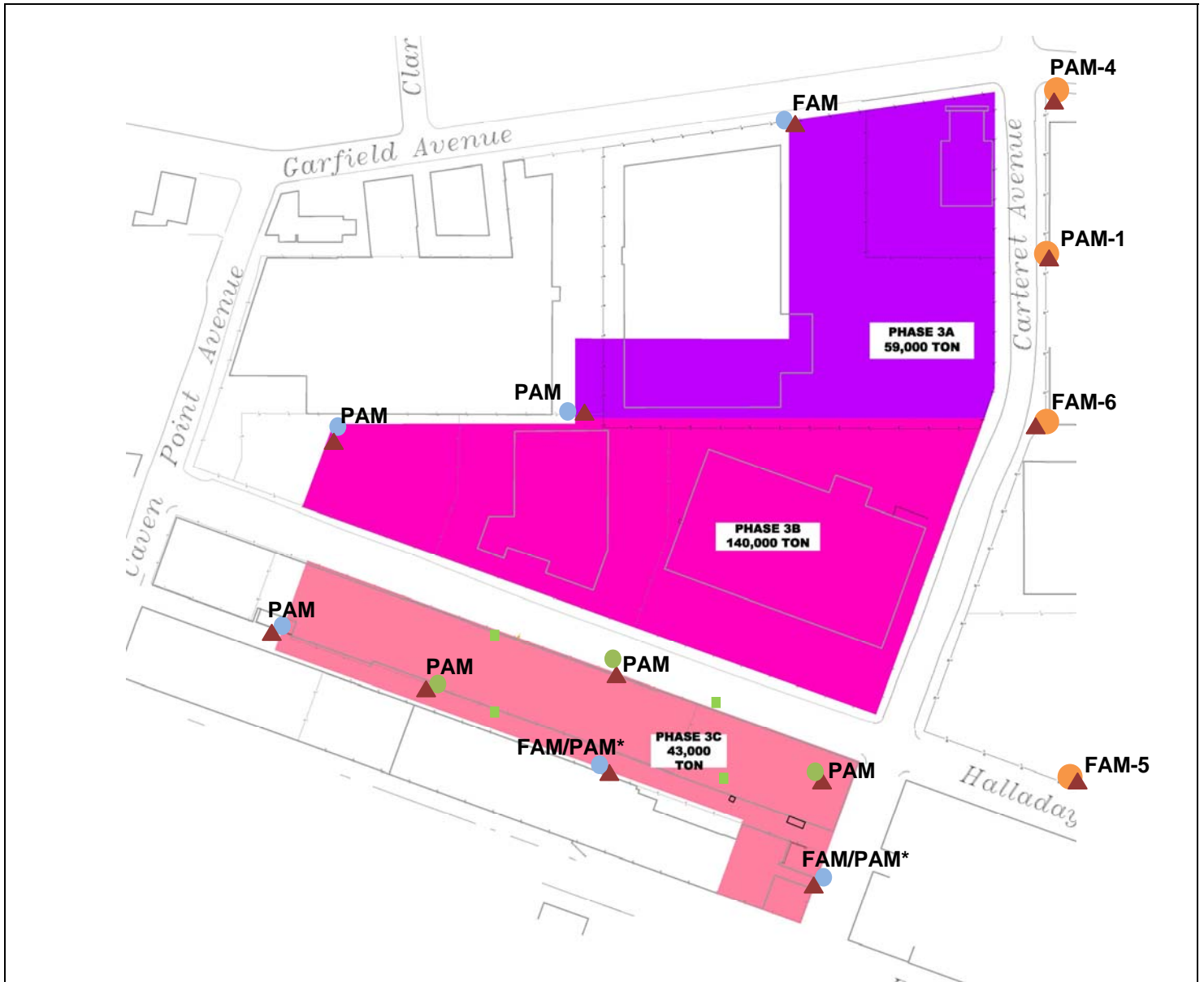
Assumptions	Potential Program Modifications
Carteret Street will be closed to through traffic.	No changes.
Halladay Street will be closed to through traffic.	If Halladay Street remains open to through traffic; AECOM shall provide an additional PAM station along the southwestern corner of Site 133E and increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.
Air monitoring will be ongoing at the western fenceline as part of Phase 3A and/or Phase 3B excavation.	If air monitoring associated with Phase 3B is not ongoing; AECOM shall provide an additional PAM station along the southwestern corner of Site 133E and increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.
Site 135 will not be occupied.	If Site 135 is occupied during the demolition activities; AECOM shall increase the frequency of hand-held monitoring and DCM inspections to 15-minute and 1-hour intervals, respectively.

Locations of the air monitoring stations are subject to change based on changes to the assumptions above and ongoing activities at the Garfield Avenue Group Sites. Changes to the locations will be subject to NJDEP approval prior to the start of excavation activities.

Reason for Amendment:

Excavation of contaminated soils results in the potential for the generation of fugitive dust. This amendment describes the increased monitoring that is proposed during the Phase 3C excavation of contaminated soils at the Garfield Avenue Group Site (133E).

Figure 1: Conceptual Site Map for Phase 3C Excavation



Legend:

- Fenceline Fixed or Portable Air Monitoring Station (FAM or PAM)
- Perimeter of the Exclusion Zone PAM Station
- Perimeter of the Exclusion Zone Hand-Held Monitoring Locations
- Fenceline FAM and PAM Stations currently operational at the PPG Garfield Avenue (Site 114)
- ▲ Fenceline and Exclusion Zone Integrated Sampling Locations (Cr6 and PM₁₀)



* AECOM will provide one (1) FAM and one (1) PAM based on where electricity is available. The availability of electric power to operate a FAM station is unknown at this time and will be evaluated closer to the start of the Phase 3C excavation.



AECOM
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Air Monitoring Plan Amendment 16 – Revision 01

Client: PPG Industries	Amendment No.: 16 Western Sliver Excavation
Location: Jersey City, NJ	Submittal Date: 2/11/14
Amendment Description: <p>This revised Air Monitoring Plan (AMP) Amendment responds to comments provided by the New Jersey Department of Environmental Protection (NJDEP) via email on February 7, 2014.</p> <p>This Air Monitoring Plan (AMP) amendment describes air monitoring to be performed during the excavation proposed in the PPG Site 114, Western Sliver Remediation Plan submitted January 10, 2014. Air monitoring described herein will be conducted in addition to and in general accordance with the Garfield Avenue AMP dated May 2012. Excavation of contaminated soils has the potential to create fugitive dust emissions. Dust generated has the potential to contain Hexavalent Chromium (Cr6).</p> <p>AECOM has developed the following air monitoring approach to address concerns associated with the potential for fugitive dust emissions and the proximity of this work to the Site fenceline along Garfield Avenue. FAM-1 and FAM-2 are located about 30 feet east of the western fenceline due to the availability of space and the current slope of the Site. The actual remedial work will occur to the west of these air monitoring stations along the Garfield Avenue fenceline (shown in Figure 1).</p> <p>In order to provide adequate coverage of the western fenceline along Garfield Avenue AECOM will provide hand-held monitoring every 30-minute at 4 to 6 locations along the perimeter of the Site during the excavation of the Western Sliver. Additionally, AECOM will relocate PAM-4 from its current location to the secured sidewalk outside the property fenceline, on the border of remediation cells 6B and 7B, to provide continuous real-time PM₁₀ and TVOC monitoring and integrated Cr6 and PM₁₀ sampling during work hours. A conceptual Site map showing the revised locations of the air monitoring stations at the Garfield Avenue Site 114 is provided in Figure 1.</p> <p>The locations of the air monitoring stations and hand-held monitoring locations are subject to change based on ongoing activities and health and safety considerations for the air monitoring technician and equipment. Changes to the locations will be subject to NJDEP approval prior to the start of excavation activities.</p>	
Reason for Amendment: <p>Excavation of the Western Sliver of the Garfield Avenue Site 114 will be performed at the Site fenceline; therefore, AECOM has increased the air monitoring performed along this portion of the fenceline to provide additional air monitoring coverage.</p>	

Figure 1: Conceptual Site Map for Western Sliver Excavation

