SAMPLING AND ANALYSIS PLAN
REVISION NO. 1

SYMPHONY PARK
[FORMERLY UNION PARK 61-ACRE SITE]
FORMER UNION PACIFIC RAILROAD
FUELING AND MAINTENANCE YARD
LAS VEGAS, NEVADA
FACILITY ID # H-000557
KLEINFELDER PROJECT NO.: 20154986.001A

February 14, 2017

Reviewed and Approved by:
Nevada Division of Environmental Protection
Nevada Brownfields Program
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Brownfields Contract #DEP14-008
Task #K01R-14-3

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Prepared by:

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EM-2214 (expires 4/14/2017)

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

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February 14, 2017
Kleinfelder Project No.: 20154986.001A

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1 INTRODUCTION

The City Parkway V, Inc. (City Parkway V) is redeveloping the 61-acre site known as Symphony Park located just west of downtown Las Vegas. The site is bounded on the north and west by Grand Central Parkway, on the east by the Union Pacific railroad, and on the south by Bonneville Avenue. The City Parkway V is acting as the master developer. The Symphony Park vision is to develop a new skyline and destination for local residents with mutually supportive mixed uses and not dominated by one or two large uses. All of the infrastructure for the site will be developed by the City Parkway V.

During the course of normal operations, former Union Pacific Railroad (UPRR) operations on the site resulted in releases of petroleum hydrocarbons, various organic and inorganic solvents, and metals. Some of the petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between the Nevada Division of Environmental Protection (NDEP) and UPRR. However, subsequent analysis of soil and groundwater samples has revealed the presence of various contaminants of potential concern. Therefore, in order to have a common procedure to evaluate the materials to be encountered for the various redevelopment activities, the City desires a sampling and analysis plan (SAP) for the entire 61 acres.

This SAP would be used in conjunction with the separate Soil and Groundwater Management Plan (SGMP, Kleinfelder 2016) to provide the project-specific procedures for collecting samples from excavated soil stockpiles and obtaining the analytical data to be used in the decision criteria to be established in the SGMP for soil management. The constituents of concern are: volatile organic compounds (VOCs [alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.]), the Resource Conservation and Recovery Act (RCRA) 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs) as appropriate based on individual project location. The specific analyses for samples taken from the different areas within the 61 acres will be determined by the CEM based on the historical data from past reports.

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Groundwater sampling and analysis is not covered in this SAP. Groundwater should be addressed on a case-by-case basis by the individual contractors depending on whether building construction requires dewatering activities. If groundwater is encountered, it will require management under the SGMP. Sampling and analyses will need to follow the requirements set forth in the National Pollution Discharge Elimination System (NPDES) permitting guidelines. Based on previous projects on the Symphony Park site, it is anticipated that groundwater to be managed on the Symphony Park site can be discharged to the storm sewer requiring NPDES permits. This is further discussed in the SGMP.

1.1. SITE NAME

The sampling of the excavated soils will be located on various parcels and city right-of-ways within the site collectively known as the Symphony Park site in Las Vegas, Nevada.

1.2. SITE LOCATION

The site is located in the northwest ¼ of the northwest ¼ of Section 34, Township 20 South, Range 61 East. A site location map is presented as Figure 1-1. A detailed site layout showing the parcels and right-of-ways is presented as Figure 1-2.

1.3. RESPONSIBLE AGENCY

The field sampling will be performed per this SAP for the City Parkway V, Inc. The SAP was developed by Kleinfelder, under the direction of a Certified Environmental Manager (CEM).

1.4. ROLES AND RESPONSIBILITIES

The roles and responsibilities for the management of soils and groundwater are based upon the 2015 settlement between the City of Las Vegas and UPRR, in which the City of Las Vegas assumes all cost and risk for existing on-site contamination and relieved UPRR of their environmental obligations and are discussed in more detail in Section 3 of the SGMP.

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1.4.1. NDEP

The NDEP is the regulatory agency overseeing the project, and will be involved as appropriate. Unless NDEP specifies otherwise, soil characterization will be performed by the CEM in accordance with this SAP before transportation and disposal/treatment occurs. NDEP will review and approve this SAP prior to its implementation. Soil characterization in accordance with the SGMP and this SAP replaces NDEP approval for individual soil determinations.

1.4.2. City Parkway V, Inc.

City Parkway V will have overall coordination responsibility for the site as a whole and of the rights-of-ways. City Parkway V will designate area(s) for temporary stockpiling of soils.

1.4.3. Certified Environmental Manager

The CEM has the authority to implement the SAP in areas of known and unknown conditions. The CEM shall be present on-site during soil characterization, excavation, and removal activities. The CEM may be provided by City Parkway V or the Developer/General Contractor.

A CEM shall be required to be present during excavation on the Symphony Park Site, regardless of the location of the development relative to the UPRR remediation extents. The UPRR remediation extents shown on Figure 4 and subsequent figures should be considered approximate. It is the developer's responsibility to define or verify the UPRR remediation extents.

1.5. STATEMENT OF THE SPECIFIC PROBLEM

The presence of contaminated soil beneath the Symphony Park has been identified in various previous site characterization studies performed over the past several years. A summary of the relevant findings and conclusions to date is as follows:

- The site was extensively utilized as a fueling and maintenance yard by Union Pacific Railroad for more than a 70 year period, beginning in the early 1900s. The site contained locomotive fueling, service, repair, and cleaning areas, and was also used for

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material storage. From the 1940s to 1991, the property was used for locomotive fueling and maintenance purposes.

- Site characterization studies began in the late 1980s identifying areas of soil and groundwater contamination that included TPH, metals, VOCs, and SVOCs.

- The predominant contaminants at the site are petroleum hydrocarbons. Localized areas of soil are impacted with metals, VOCs, and SVOCs.
  - Eastbound Fueling Area - most of this area is situated on the adjoining property to the north.
  - Day Storage Tank – formerly located on the north end of the site.
  - Diesel Shop Area – formerly located on the center portion of the site.
  - Fuel Storage Area – formerly located on the south central portion of the site.
  - Wash Track Area – formerly located on the southwest portion of the site.
  - Evaporation Pond Area – formerly located on the west-central portion of the site.
  - The former areas where the contamination was found are shown on Plate 1-3 and identified as:
- Hydrocarbon impacted soils were found throughout the site from surface to the groundwater saturated zone. Measurable plumes of free phase floating product existed in the groundwater at the Eastbound Fueling Area, the Diesel Shop Area, and the Fuel Storage Area.

- Lead impacted soils were found in the Wash Track Area but did not extend beneath a depth of six feet below ground surface (bgs).

- VOCs and SVOCs were predominantly found at the Diesel Shop Area and were reported to be minor in extent.

- Contaminated soil (from surface to 2.5 feet bgs) and free product in the groundwater was removed by Union Pacific in the early 1990's, but there are still areas with TPH concentrations exceeding the NDEP action level of 100 mg/kg. There is also some residual free product in the groundwater in the vicinity of the former Fuel Storage Area and Diesel Shop Area.

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Much of this site has been investigated, areas have been remediated, and the extent of remaining impacted soil, as well as areas of impacted groundwater, have been delineated. Those remaining potential areas of contamination have been documented. For those areas outside the UPRR remediation extents, NDEP and City Parkway V have agreed that the soils are *legally clean* based on the No Further Action determination by NDEP following UPRR's remediation activity. However, if during the course of excavation in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, those potentially impacted soils will be evaluated under the stipulations of the SGMP. Additionally, if impacted soils have been discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed. This SAP has been designed so that excavation activities can be subsequently managed per the protocols of a separate soil management plan.

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2 BACKGROUND

The Symphony Park site consists of 21 separate parcels within 61 acres (see Figure 1-2). Upon development, the site will have several right-of-ways extending in an approximate northwest-southeast and northeast-southwest alignment across that include roads and walking promenades. The City Parkway V is acting as the master developer with the intent to develop a new skyline and destination for local residents. The development will have mutually supportive mixed uses and not be dominated by one or two large uses.

As previously described, over 70 years of UPRR operations on the site resulted in releases of petroleum hydrocarbons, various organic and inorganic solvents, and metals during the course of normal operations. Some lead-impacted soil has been removed and some of the petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between NDEP and UPRR. Areas still remain that are impacted by TPH, VOCs, SVOCs, some PCBs, or metals.

2.1. SITE DESCRIPTION

The Symphony Park site consists of 61 acres of land that is partially developed. There are no surface features present that are related to previous rail road operations. Prior to 2007, the land was used in support of nearby construction activities at the World Market Center and the Molasky Corporate Center as construction parking, equipment staging, and construction material lay-down areas. Since the original SGMP was written in 2007, several parcels have been developed. Parcel A1 was developed as the Cleveland Clinic Lou Ruvo Center for Brain Health with Parcel A2 as an associated temporary paved parking area. Parcel H/I was developed as the Smith Center for the Performing Arts, the Discovery Children's Museum, and an associated parking garage. Parcel B has been developed as a paved temporary parking area. Parcels K, L, M4, N, O1 and O2 have been connected as a paved parking area. Parcels M2, and M3 have been developed as green space. The Phase I roadways (Symphony Park Avenue, West Clark Avenue, Promenade Place, and South City Parkway) have been placed and paved. The remaining parcels remain undeveloped, and have been used as construction

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parking, equipment staging, construction material lay-down areas, and stockpile storage containment areas during construction activities since 2007.

2.2. OPERATIONAL HISTORY

The site served as a fueling and maintenance yard for UPRR for over a 70 year period, beginning in the early 1900s. The site contained locomotive fueling, service, repair, and cleaning areas, and was also used for material storage. The property was used for locomotive fueling and maintenance purposes from the 1940s until 1991.

2.3. PREVIOUS INVESTIGATIONS AND REGULATORY INVOLVEMENT

In 1992, remedial activities at the UPRR site began per a NDEP-approved Remedial Action Plan (RAP). Union Pacific negotiated cleanup standards with the NDEP consisting of:

1) Removing all petroleum hydrocarbon impacted soil exceeding 100 milligrams per kilograms (mg/kg), as determined by EPA test method 8015M from the ground surface to a depth of 2.5 feet bgs;
2) Removing all hydrocarbon impacted soil exceeding 10,000 mg/kg regardless of depth;
3) Responsibility for all hydrocarbon impacted soil exceeding 100 mg/kg which would be excavated during future site construction activities (such as the upcoming redevelopment projects);
4) Removing all lead-impacted soil in excess of 1,400 mg/kg; and
5) Recovering free phase hydrocarbon fuel product from the perched groundwater to a thickness of less than ½ inch in the formation.

It should be noted that UPRR remediated only the lighter petroleum hydrocarbons (C23 and lighter) so the presence of heavier petroleum hydrocarbons is possible inside the UPRR remediation extents. Existing treated fill on the Symphony Park site from the UPRR remediation activities is agreed by NDEP and City Parkway V to be *legally clean* based upon the No Further Action determination by NDEP in 1998. However, if indications of potentially impacted soils are observed by the CEM on-site during future development, the potentially impacted soils will be evaluated under the stipulations of the SGMP. Additionally, if impacted soils have been

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discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP.

A final closure report prepared in 1997 indicated that the requirements of the remedial action plan had been achieved. The lead-impacted soils were removed by excavation and transported offsite to an authorized disposal facility. Approximately 12,400 tons of lead-impacted soils were removed from the Wash Track Area. The TPH-impacted soils (as defined by the RAP) occurring at the targeted areas were removed by excavation and thermally treated onsite. Following treatment, the thermally treated soils were reused as on-site excavation backfill. According to the closure reports, approximately 26,000 tons of TPH-impacted soil were removed from the Eastbound Fueling Area; approximately 13,500 tons from the Day Storage Tank Area; approximately 25,500 tons from the Diesel Shop Area; approximately 103,000 tons from the Fuel Storage Area; approximately 16,000 tons from the Wash Track; and approximately 49,000 tons from the Evaporation Pond Area. A groundwater recovery system was installed east of the Diesel Shop Area and at the Eastbound Fueling Area. These groundwater recovery systems consist of interceptor trenches that pumped total fluids (groundwater and product) through an oil/water separator to recover the free product. The water was discharged to city drains under a City wastewater permit.

According to results of the on-site groundwater monitoring wells in December 2000 (Converse, 2000), fuel product was measured in one well at the Fuel Storage area at a thickness of 0.19 foot and in 3 wells at the Diesel Shop Area at thickness ranging from 0.04 to 0.53 foot. Fuel product was also measured in wells at the Eastbound Fueling Area. These wells were situated on the adjoining property to the northeast. In addition, low levels of TPH and VOCs (toluene, ethylbenzene, and xylene) were detected in the wells. The monitoring report indicates that no free product was recovered during the second half of 2000 from either the central or eastbound recovery systems. The report stated that very little recoverable petroleum product was left at the site and the recovery systems have since been shut-down (Converse, 2000).

2.4. GEOLOGICAL INFORMATION

The Las Vegas Valley is a topographic basin located in southern Nevada in the Basin and Range Physiographic Province in a transitional area between the “younger” Great Basin of Nevada and Utah and the “older” Basin and Range topography of Arizona and California. The

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Las Vegas Valley is bounded on the west by the Spring Mountains; on the north by the Desert, Sheep, and Las Vegas Ranges; on the east by the Frenchman and Sunrise Mountains; and on the south by the River Mountains and the McCullough Range. The mountains to the north, east, and west consist primarily of Paleozoic and Mesozoic sedimentary rocks. The mountains to the south consist predominantly of Tertiary volcanic rocks overlying Precambrian metamorphic and granitic rocks.

Groundwater is anticipated to initially flow toward the northeast, and then east following local topography and toward the Las Vegas Wash. The Las Vegas Wash lies approximately five miles to the east of the site. During recent activities on Parcel P/Q (February 2015), the depth to groundwater was measured between 24 and 33 feet bgs.

2.5. ENVIRONMENTAL AND/OR HUMAN IMPACT

As part of the due diligence effort, each individual developer on the site is required to evaluate the environmental and human health impact to their project by performing a Human Health Risk Assessment (HHRA). Each evaluation is performed independently and addresses these impacts based on environmental sampling, historical data, site specific data collection, building design and future intended land use. Structures that will be located on or near the areas found to have been of most impacted from past releases may require mitigation measures.

As required under appropriate EPA and OSHA regulations, worker health and safety during construction activities shall be addressed separately by the respective parcel contractors. Information provided in the historical documentation, this SAP and the SGMP shall be used to develop the proper precautions to be set forth related to possible hazardous material exposure.

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3 DATA QUALITY OBJECTIVES

3.1. PROJECT TASK AND PROBLEM DEFINITION

Soil samples will be collected and analyzed to evaluate if the soil being excavated during construction activities can be reused on-site, should be transported off-site for treatment by Las Vegas Paving at their thermal unit, or properly disposed of at an appropriately permitted facility. The CEM will determine the analyses required for each project based on information available from previous investigations. Soil samples may be analyzed for VOCs (EPA 8260), SVOCs (EPA 8270), PCBs (EPA 8082), and RCRA-8 metals (EPA 6010/7470). Additionally, soils may be analyzed for purgeable and extractable TPH (EPA 8015M), for reuse or disposal purposes. Analytical results will be used by the contractors and the CEM to determine the proper destination of the excavated soils.

3.2. DATA QUALITY OBJECTIVES

Four Quality Control (QC) levels are used to define the quality of analytical data:

Level I – Level I data have the lowest level of QC. These data are collected on-site using real-time monitoring equipment, such as portable field instruments.

Level II – Level II data are also collected on-site. However, additional QC procedures are required. Examples of Level II data include survey data or analytical data generated by a mobile laboratory.

Level III – Level III data have an intermediate to high level of QC. Level III data include results of organic and inorganic chemical analyses using laboratory procedures such as SW-846 or hazardous waste characteristic tests. Level III analytical methods are equivalent to those used for Level IV; however, the QC documentation requirements are less stringent.

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Level IV – Level IV data are generated in accordance with EPA Contract Laboratory Program (CLP) protocol. Level IV data are produced using the highest level of QC documentation procedures.

Data quality will be evaluated based on data quality objectives (DQOs), which specify quantitative and qualitative requirements for the data. The required DQOs are based on the end uses of the data, and are determined by the methods of analyses and by the level of QC and documentation that are used to produce the data. The data quality objectives for the sampling of excavated soil per this SAP is Level III, intermediate QC.

Contaminant concentrations relative to the EPA Regional Screening Levels (RSLs), or the site-specific action level in the case or arsenic, are the primary criteria of interest for this project. While the management of soil, based on these levels, is detailed in the SGMP, the contaminants of concern and their action levels are presented in Table 3-1 so that the analytical laboratory method detection limit can be verified for sample testing.

TABLE 3-1

CONTAMINANT ACTION LEVELS

TARGET COMPOUND[1]	EPA RSL[2] (MG/KG)	SITE-SPECIFIC ACTION LEVEL (MG/KG)
Benzene	1.2[3]	None
Toluene	4,900[4]	None
Ethylbenzene	5.8[3]	None
Xylenes	580[4]	None
PCBs (Aroclor 1016)	4.1[4]	None
PCBs (Aroclor 1254)	0.24[3]	None
Arsenic	0.68[3]	15[5]
Barium	15,000[4]	None
Cadmium	71[4]	None
Chromium (total)	None	None
Lead	400[4]	None
Mercury	23[4]	None
Selenium	390[4]	None
Silver	390[4]	None

TABLE 3-1 Notes:

1. The individual compounds most likely to be present in the soil are presented.
2. Based on the overall future use of the project**,** the EPA Regional Screening Levels for Residential Soil are listed (May 2016). Where both are provided, the lesser of the carcinogenic and non-carcinogenic RSL is presented.
3. Carcinogenic RSL.
4. Non-carcinogenic RSL.
5. Kleinfelder 2007d, Document 80359/LVE7L139.

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3.3. DATA QUALITY INDICATORS

Data Quality Indicators (DQIs) for VOCs, SVOCs, PCBs, and metals are presented in Appendix A. These DQIs will be included in the contract with the selected Nevada-certified analytical laboratory. The analytical laboratory used would have to agree to the DQIs set forth in this project.

3.4. DATA REVIEW AND VALIDATION

All data will be initially reviewed and processed by the analytical laboratory's analysts using appropriate methods (e.g., chromatographic software, instrument printouts, hand calculation, etc.). The resulting data set will be transferred into an electronic report form, printed and reviewed by the analyst for accuracy. The data will be forwarded to the laboratory supervisor or the department manager for review and recheck of a minimum of 10% of the calculations. When the entire data set has been found to be acceptable, a final copy of the report will be printed and signed by the laboratory's supervisor, departmental manager or senior laboratory staff. The entire data package will be placed into the appropriate service request file, and an electronic copy of the final data package will be forwarded to the appropriate personnel for archiving.

When the laboratory's analyst determines that the data package has met the data quality objectives of the methods and has qualified any anomalies in a clear, acceptable fashion, the data package will be reviewed by a trained chemist. Prior to release of the report, the project chemist will review and approve the entire report for completeness and to ensure that any and all client-specified objectives were successfully achieved. A case narrative may be written by the project chemist to explain any unusual problems with a specific analysis or sample. The original raw data, along with a copy of the final report, will be filed in project files for archiving.

Upon receipt of the data packages, the integrity of the data will be assessed by the project Quality Assurance Manager. The results of the analysis of method blanks, laboratory control samples, sample duplicates, matrix spiked samples, QC samples, etc. will be assessed.

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3.5. DATA MANAGEMENT

Sample chain-of-custody protocol will be followed throughout the investigation to maintain sample integrity from collection to analysis. For all samples, the chain-of-custody will be maintained during sample collection, transfer of samples between personnel, shipment to the laboratory, handling at the laboratory, and final disposal of the sample. Chain-of-custody forms will be used to document and track samples submitted for laboratory analysis. An example chain-of-custody form is provided in Appendix C.

Chain-of-custody procedures are detailed in Section 9.3, but are summarized below:

- The sampler will be responsible for custody of the samples until they are transported or shipped to the laboratory.
- All samples will be accompanied by a completed chain-of-custody form. The sampler will keep one copy of the completed chain-of-custody form. If transfer of custody is required prior to shipment, the parties relinquishing and receiving the samples will sign, date, and include the time of transfer on the chain-of-custody form.
- Custody during shipping will be maintained by shipping samples in insulated coolers sealed with custody seals. Each cooler will contain a separate signed chain-of-custody form identifying the contents. The completed chain-of-custody form will be placed in a zippered plastic bag inside the cooler. Unless delivered to the lab by the sampler and picked up by the laboratory courier, the cooler lid will be secured with strapping tape by wrapping the cooler completely in at least two locations.
- All sampling will be recorded in the daily field reports, complete with a hand sketch showing the arrangement(s) of the soil piles and the locations where samples were collected.
- The sampler will also record each sample onto the project sample log form. An example daily field report and an example sample log form are provided in Appendix B.
- All field notes, log forms, chain-of-custody forms, will be reviewed on a weekly basis by the Project Quality Assurance Manager to confirm their completeness, consistency, and clarity. The Project Quality Assurance Manager will also review the analytical data reports upon receipt along with the field notes, logs, and chain-of-custody.

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4 SAMPLING RATIONALE

During construction activities on the parcels and the right-of-ways (ROW), materials being excavated may be encountered which may not be suitable for on-site use as fill due to the presence of contaminants exceeding their respective project specific action limits. To evaluate the environmental usability of the material, samples will be collected during excavation activities as described in Section 4.1. The results of the sampling and analysis will be used to manage the soil as prescribed in the Soil and Groundwater Management Plan document.

4.1. SOIL SAMPLING

Two methods of soil assessment are discussed; Stockpile Sampling and Pre-excavation Sampling. City Parkway V has the discretion to determine which method will be implemented.

4.1.1. Stockpile Sampling

Soil shall be placed in stockpiles based on the location of the soil in the excavation, for example: Stockpile 1 could contain soil excavated between grid lines A and B and from depths of zero to three feet below ground surface. The original location of the soil in the stockpile will be recorded by the on-site CEM, and the CEM will mark the stockpiles with stakes indicating their assigned number and date of excavation.

The purpose of sampling the stockpiles is to obtain information for deciding whether the soil can be reused on the property, or whether the soil must be transported off-site for disposal or treatment and recycling. This determination is based upon the collection and analyses of samples obtained from the excavated material, is dependent upon the contaminant(s) of concern and the parcel (or location within a parcel) from which the material was excavated, and any specific testing requirements by the desired end user(s).

The number of samples required for each soil stockpile sampling event will be based upon the estimated quantity of the soil stockpile. Table 4-1 will be used as a guide in determining the appropriate number of minimum samples collected. Based on site observations, the on-site

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CEM can modify this frequency to a more strict frequency for all or part of the project site. This change will be documented as described in Sections 9 and 11 of this document.

Unless the on-site CEM observes conditions that would in his/her judgment require collecting a sample from a different depth, samples will be collected as 'grab' samples from a depth of between 6-inches and one (1) foot into the excavated material to preserve VOCs that may be present in the stockpiled soil. Locations will be selected by the on-site CEM based on their observations at the time of the sampling event, with the intent to evenly distribute the locations across the stockpile based on the stockpile dimensions.

Depending on the soil quantity, the 'grab' samples shall be collected at the frequency listed in Table 4-1 and composited for analysis by the analytical laboratory at the direction of the CEM.

TABLE 4-1

STOCKPILE SAMPLE FREQUENCY

ESTIMATED SOIL QUANITITY IN STOCKPILE (YD^3)	SAMPLE TYPE	
	NUMBER OF GRAB SAMPLES COLLECTED	NUMBER OF COMPOSITE SAMPLES CREATED FROM GRAB SAMPLES
0-200	4	1
200-300	8	2
300-400	8	2
400-500	8	2
500-800	12	3
800-1000	12	3
>1000 (per each 200 yd^3)	4	1

Based on the Minnesota Department of Agriculture Soil Sampling Guidance (2011).

To collect the 'grab' samples, the CEM will visually divide the stockpile into sections based on the number of 'grab' samples required. The CEM will then use a hand auger or other hand sampling tool to collect one to three subsamples at various depths within a single stockpile section, which will then make up the 'grab' sample for that stockpile section. Subsamples will be collected from depths within the stockpile greater than one foot, and the CEM will ensure that all depths and locations within the stockpile are sampled. Example stockpile sampling locations are presented in Figure 4-1, as recommended by the Minnesota Department of Agriculture (2011).

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The constituents of concern are: VOCs (alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), SVOCs, and PCBs as appropriate based on individual project location. The samples will collected per the sample collection techniques discussed in Sections 6 and 7.

4.1.2. Pre-excavation Sampling

At the discretion of City Parkway V, the Developer/General Contractor with the assistance of the CEM shall characterize the subsurface soils to be excavated, prior to excavation activities, by creating a three-dimensional grid of the soil area to be excavated. In this case, samples will be collected from an excavation footprint rather than from a stockpile.

For those instances, to allow for contractor planning, the sampling will be performed in advance of the scheduled excavation. Pre-excavation sampling will be accomplished through the use of test pits, trenches, or boreholes. The contractor will need to provide a trackhoe or backhoe and operator for the pre-excavation sampling event to occur. If a trackhoe or backhoe and operator are not available, or the depth of planned excavation exceeds the reach of the excavator, other sampling techniques could be used, as coordinated with the contractor (such as a phased excavation schedule).

The number of samples required for each pre-excavation sampling event will be based upon the excavation footprint and the quantity of soil planned to be removed. Table 4-2 shall be used as a guide in determining the appropriate number of minimum samples collected. Based on the excavation footprint location and its dimensions, the on-site CEM can modify this frequency to increase, but not decrease, the number of samples. This change will be documented as described in Sections 9 and 11 of this document.

All samples will be collected as ‘grab’ samples from a depth of at least one foot beneath the planned excavation area (i.e., not surface samples); and if the planned excavation extends past three feet beneath grade, additional samples would be collected for each three feet of depth, or fraction of a three-foot depth interval, to the final excavation depth. A depth interval of three feet was chosen to roughly equate to the stockpile sampling frequency presented in Table 4-1.

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As with stockpiling samples, the pre-excavation sample locations selected by the on-site CEM would be collected based upon the contaminants of concern, the parcel (or location within a parcel) being excavated, any specific testing requirements by the desired end user(s), and the depth of planned excavation. The intent is to distribute the locations across the pre-excavation print in a random pattern. Depending on the footprint dimensions, the 'grab' samples shall be collected at the frequency listed in Table 4-2. If the excavation footprint is greater than 1,000 square feet, the grab samples would be composited into one sample for analyses by the analytical laboratory. Figure 4-2 provides a graphical example of the sampling of the pre-excavation scenario.

TABLE 4-2

PRE-EXCAVATION SAMPLING FREQUENCY

AREA OF EXCAVATION FOOTPRINT (FT^2) PER 3-FOOT DEPTH INTERVAL	GRAB SAMPLES COLLECTED PER EACH 3-FOOT DEPTH INTERVAL	COMPOSITES CREATED FROM GRAB SAMPLES PER EACH 3-FOOT DEPTH INTERVAL
0 to 1,500	4	1
1,500 to 2,500	8	2
2,500 to 3,500	8	2
3,500 to 4,500	8	2
4,500 to 7,500	12	3
7,500 by <10,000	12	3
Greater than 10,000	4 per each 1,500 ft^2 area	1 per each 1,500 ft^2 area

Adapted from the Minnesota Department of Agriculture Soil Sampling Guidance (2011).

The constituents of concern are: VOCs (alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), SVOCs, and PCBs as appropriate based on individual project location. The samples will collected per the sample collection techniques discussed in Sections 6 and 7.

4.1.3 Excavation Monitoring and Screening

During ongoing excavation activities in areas where contamination is anticipated to be encountered, or which during excavation activities, soils (or the excavation face) exhibit evidence of odors, staining, or vapors; the on-site CEM may, at his/her discretion decide to screen the soils for the purpose of stockpile segregation. Screening would consist of one or more of the following techniques: Petroflag kit, PID readings, or visual observations for

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hydrocarbons, or field testing for arsenic, lead or PCBs. Field testing, if done, would follow the procedures discussed in Section 6.2

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5 REQUEST FOR ANALYSES

5.1. ANALYSES NARRATIVE

Each soil sample submitted for analyses will be analyzed for BTEX, RCRA 8 metals, and other VOCs, SVOCs, and PCBs as shown in Table 5-1. Four ounce (4 oz) wide mouth glass jars will be used for soil sampling containers. Upon collection and labeling as described in Sections 7 and 9, the samples will be placed immediately into an ice chest to be chilled to four degrees Celsius (ºC). Samples will be analyzed under a normal turnaround time (TAT) typically between five and seven days. A quicker TAT can be coordinated if results are needed sooner.

TABLE 5-1

LABORATORY ANALYSIS PROTOCOL

ANALYSIS / METHOD	BOTTLE SIZE / TYPE	NO. OF BOTTLES	PRESERVATION	HOLDING TIME
TPH Full Range/EPA 8015M	4oz. WMGJ	1	Cool, 4º C	14 Days
Volatiles/EPA8270	4oz. WMGJ	1	Cool, 4º C	14 Days
Semi-Volatiles/EPA 8270	4oz. WMGJ	1	Cool, 4º C	14 Days for extraction/ 40 Days for analysis
PCBs/EPA 8082	4oz. WMGJ	1	Cool, 4º C	14 Days for extraction/ 40 Days for analysis
RCRA 8 Metals/EPA 6010/7470	4oz. WMGJ	1	Cool, 4º C	6 Months
All of the Above	4oz. WMGJ	2	Cool, 4º C	14 Days

WMGJ – Wide Mouth Glass Jar

If one or more metal analyte results exceeds the action level and the soil will be transported off-site for recycling or disposal, it may be necessary to request soil sample(s) be additionally run for Toxicity Characteristic Leaching Procedure (TCLP) analyses, as determined by use of the 20 times rule for metals. While this is a soil management plan component, and should be discussed in that plan, it is also discussed in this section because it is includes an analytical procedure component.

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Comparing the total metals analyte sample results to their respective 20 times characteristic hazardous waste concentration provides the criteria as to whether TCLP needs to be run and forms the basis for whether further action is recommended. The 20 times factor is used because for solids, Section 2.2 of SW846 1311 indicates "*…The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase.*" It is the extraction that is analyzed during TCLP analyses, and the TCLP limits are based upon the extraction. Therefore, the total analyte result for a soil sample is compared to 20 times their respective TCLP limits (40CFR 266 Appendix VII), listed in Table 5-2.

According to the Nevada Administrative Code (NAC) 445A.2272 "Contamination of soil: Establishment of Action Levels," the state of Nevada has adopted by reference the Toxicity Characteristic Leaching Rule, 40 CFR Part 261.24. The Toxicity Characteristic Leaching Procedure (TCLP) criteria is a part of this rule and has been established as USEPA SW846 Analytical Method 1311 (Method 1311). Within Method 1311, Section 1.2 of SW846 1311 indicates "*If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are in such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.*"

The verbiage "*total analysis of the waste*" would refer to the total metals analyses of the soil samples to be collected and analyzed by USEPA SW846 Analytical Methods 6010/7470. The verbiage "*analytes are not present in the waste, or that they are in such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run."* means that if an analyte is reported by the analytical laboratory as below the reporting limit, or at levels less than the concentration that defines the material as a hazardous waste, then that analyte would not need to be further analyzed by TCLP analysis. If there is a detection of a metal that could characterize the excavated soil as *RCRA hazardous*, the CEM will make the determination if TCLP analysis is necessary to characterize the soil as either *contaminated, non-hazardous* or *RCRA hazardous* under the SGMP.

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TABLE 5-2

TCLP CRITERIA FOR RCRA 8 METALS

ANALYTE	TCLIP LIMIT (MG/KG)	20 TIMES TCLP CRITERIA (MG/KG)
Arsenic	5.0	100
Barium	100	2000
Cadmium	1.0	20
Chromium	5.0	100
Lead	5.0	100
Mercury	0.2	4.0
Selenium	1.0	20
Silver	5.0	100

5.2. ANALYTICAL LABORATORY

The laboratory selected by the City Parkway V, the CEM, or the Developer/General Contractor is required to meet all appropriate requirements at this SAP including method detection limits and the criteria stipulated in the DQIs presented in Appendix A.

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6 FIELD METHODS AND PROCEDURES

6.1. FIELD EQUIPMENT

Soil samples may be collected using stainless steel shovels, stainless steel and/or disposable trowels or spoons. Other field equipment will include coolers, buckets, brushes, detergent, distilled water, zip-lock bags, photo-ionization detector (PID), and personal protective equipment (PPE) such as steel-toed boots, nitrile gloves, hard hats, and safety glasses.

6.2. FIELD SCREENING

A PID may be used on-site as a possible field screening tool to determine how to best segregate piles, if necessary. The PID will not always detect TPH in soil, especially at lower concentrations or with heavier end hydrocarbons. However, it can be used at the discretion of the CEM when soils have higher concentrations and when workers can smell petroleum and/or organic odors. The PID will be calibrated according to manufacturer's instructions and guidelines before every day of field use. Petroflag kits and field testing for arsenic, lead, or PCBs may also be used to screen soil. Field testing procedures for arsenic, lead or PCBs may be used primarily for segregation purposes and will follow the manufacturer's recommended procedures.

6.3. SOIL SAMPLE COLLECTION

Soil samples will be collected primarily from excavated piles using a shovel or hand trowel to dig into the pile to the desired depth as discussed in Section 4. If samples are collected from a pre-excavation area sampling event, samples will be collected from the excavation bucket, or auger flights. Once the number of samples to be collected and their locations have been determined based on the rationale provided in Section 4, each sample will be collected and packaged into four-ounce jars per Sections 5 and 9. The jars will be placed together in labeled zip-lock bags and placed into the ice chest. The sample log, field report, and chain-of-custody will be filled out after sample collection from each stockpile.

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For example, a soil stockpile to be sampled that is between 100 and 200 cubic yards in size will have three distinct grab sample locations. The sampler will label each set of two jars following the guidance set forth in Section 9.2, collect a sample at the first location and place it into the first set of jars, then repeat for the other two grab sample locations. After the three locations are sampled, the sampler will place each set of two jars into zip-lock bags and then into the cooler on ice. The sampler will then:

- Fill out the sample log with the sample identification numbers, date, and time of sampling;
- Record the sampling on the daily field report showing a sketch of the pile location on the site and the locations of the grab samples, and their identification numbers; and
- Fill out the chain-of-custody form indicating to the lab to create a composite sample from the three grab samples for each of the analyses to be performed.

6.4. SEDIMENT SAMPLING

This section is not applicable to this project.

6.5. GROUNDWATER SAMPLING

Based on previous projects at the Symphony Park site, it is anticipated that groundwater to be managed on the Symphony Park site will be discharged to the storm sewer requiring NPDES permits. It is not known if groundwater will be encountered during the planned construction activities on the site. Therefore, groundwater will be addressed on a case-by-case basis by the individual contractors depending on whether building construction on their sites warrant dewatering activities. This should be further discussed in a separate project specific soil and groundwater management plan.

The individual contractors will be responsible for acquiring the appropriate NPDES permits for discharging groundwater to the storm sewer. If groundwater is to be encountered and managed on the site, the sampling and analyses will follow the requirements set-forth in the NPDES permitting guidelines and the NDEP Bureau of Water Pollution Control.

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6.6. BIOLOGICAL SAMPLING

This section is not applicable to this project.

6.7. DECONTAMINATION PROCEDURES

The decontamination procedures that will be followed are in accordance with generally followed industry procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. Any equipment (shovels, trowels, spoons) that comes into contact with potentially contaminated soil will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and spoons, will be decontaminated in sequence, according to the following procedures.

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Distilled water rinse

Equipment will be decontaminated in a predesignated area on plastic sheeting. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

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7 SAMPLE CONTAINERS, PRESERVATION, AND STORAGE

The number of sample containers, the required sample volumes, the preservation, and the holding times are listed in Section 5.0. The sample containers shall be provided by the contracted analytical laboratory. The containers should be pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added to the containers by the laboratory prior to shipment prior to use in the field.

7.1. SOIL SAMPLES

Soil samples will be analyzed for VOCs, RCRA-8 metals, SVOCs, and PCBs as appropriate based on individual project location. The samples will be collected as specified in Section 6 and placed into four-ounce (oz), wide-mouth glass jars. For each sample location, two 4-oz wide-mouth glass jars will be collected to satisfy the volume needed for the analyses. Upon collection, the samples will be labeled and packaged per Sections 6 and 9 and placed into an ice chest to be chilled for preservation purposes. Samples will be controlled under a chain of custody and will be in the sampler's possession unless under custody seal. Samples will be submitted to the analytical laboratory the same day of collection, or first thing the following day.

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8 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples at Symphony Park during the site excavation, the sampling team will generate different types of potentially contaminated investigation-derived waste (IDW) that include the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan follows the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02* (May 1991), which provides guidance for the management of IDW.

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.

- Decontamination fluids that will be generated in the sampling event will consist of deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) may be poured onto the stockpile.

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9 SAMPLE DOCUMENTATION AND SHIPMENT

9.1. FIELD NOTES

9.1.1. Field Logbooks

As appropriate, the following information will be legibly recorded using ink (not pencil or erasable ink) during the collection of each sample:

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Type of sample (soil, sediment or water)
- Type of sampling equipment used
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet)
- Sample preservation, if any
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Name(s) of recipient laboratory(ies)

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In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Date and weather conditions
- Time of arrival/entry on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with city, contractor, or state agency personnel
- Deviations from the SAP, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

9.1.2. Photographs

Photographs will be taken at the sampling locations and at other areas of interest on site or sampling area. If the camera being used has a date/time stamp function, that function should be used. Photographs will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

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9.2. LABELING

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. The samples will have preassigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: location, date of collection, analytical parameter(s), and method of preservation. Every sample will be assigned a unique sample number. Sample labeling format is discussed in the following subsections.

9.2.1. Stockpile Sample Labeling

The stockpile labeling system will be based on the location ID of the excavation, the sample date, stockpile number, and the grab sample number, as follows:

Stockpile Soil Samples: Location ID – Date – Stock Pile Number – Sample Number

For Example: A1 - 031507 - 3 - 1: **A1** denotes the location (i.e. parcel number), **031507** identifies the sample collection date (March 15th, 2007), **3** indicates the stock pile number, and **1** denotes the grab sample number.

9.2.2. Pre-Excavation Soil Sample Labeling

As presented in Section 4, it may become necessary to sample an area in-situ before it is excavated in order to plan for coordinating proper handling or disposal of potentially contaminated soils during the excavation. In this event, the labeled sample identification will be represented in the following manner:

Pre-excavation Soil Samples: Location ID – Date – pre-excavation hole number – Depth interval

For Example: M4 – 040107 – PRE 2 – 3-6: **M4** denotes the location (i.e. parcel number), 0**40107** identifies the sample collection date (April 1st, 2007), **PRE 2** represents the pre-excavation hole number (hole #2), and **3-6** indicates the sample depth.

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9.2.3. Drilled Shaft Spoils Sample Labeling

Drilled shaft spoils samples will be labeled in the following manner:

Drilled Shaft Samples: Location ID – Date – Shaft ID - Depth Interval

For Example: L – 042016 – ShaftA – 0-10: L denotes the location (i.e. parcel number), **042016** identifies the sample collection date (April 20th, 2016), **ShaftA** represents the drilled shaft number, and **0-10** indicates the depth interval from which the spoils were generated.

9.3. SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

Chain-of-custody record forms are used to document sample collection and shipment to laboratories for analysis.

All sample shipments for analyses will be accompanied by a chain-of-custody record. An example of the form is found in Appendix C. Form(s) will be completed and accompany the samples for each shipment (i.e., each day). If multiple coolers are sent to the laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in their physical possession, in their view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the sampler. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number, if appropriate.

The sample numbers for field collected quality control samples will also be documented on this form. Before submittal, a photocopy will be made of the form for the project files.

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9.4. PACKAGING AND SHIPMENT

All sample containers will be placed in a sturdy ice-filled cooler and delivered to/picked up by the laboratory. If samples are to be shipped to an analytical laboratory, the following outlines the packaging procedures that will be followed:

1. When ice is used, pack it in zip-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
2. The bottom of the cooler should be lined with bubble wrap to prevent sample container breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Affix sample labels onto the containers with clear tape.
5. Wrap glass sample containers in bubble wrap to prevent breakage.
6. Seal sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.
7. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.
8. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage of sample containers during shipment.
9. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
10. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

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Records will be maintained by the sample custodian of the following information:

- Sampling contractor's name
- Name and location of the site or sampling area
- Total number(s) by estimated concentration and matrix of samples shipped to each laboratory
- Carrier, air bill number(s), method of shipment (priority next day)
- Shipment date and when it should be received by lab
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be shipped or if this is the last shipment.

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10 QUALITY CONTROL

10.1. FIELD QUALITY CONTROL SAMPLES

Field quality control (Field QC) samples will be collected and used to help evaluate conditions resulting from field activities. Field QC Samples are intended to accomplish two primary goals, the evaluation of field contamination and the evaluation of sampling variability.

10.1.1. Field Contamination Evaluation (Blanks)

Field contamination arising from inadequately decontaminated sampling equipment will be evaluated through the use of equipment blanks collected in the field.

10.1.1.1. Equipment Blanks

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring commercially available distilled water over the decontaminated sampling equipment. A minimum of one equipment rinsate blank will be collected each day with one per 20 samples collected while sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed forRCRA-8 metals, VOCs, PCBs, and SVOCs

The equipment rinsate blanks will be preserved, packaged, and sealed as described in Section 9.

10.1.1.2. Field Blanks

No field blanks will be collected for this project.

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10.1.1.3. Trip Blanks

Unless water samples are collected, no trip blanks will be included as part of this project.

10.1.1.4. Temperature Blanks

Temperature blanks will not be included with the samples. For each cooler that is shipped or transported to an analytical laboratory, the laboratory will take a temperature reading of the cooler interior. This temperature reading will be used by the sample custodian to check the temperature of samples upon receipt.

10.1.2. Field Variability Evaluation (Field Duplicate or Co-located Samples)

At the discretion of the on-site CEM, duplicate soils samples may be collected at sample locations of moderate contamination.

10.2. BACKGROUND SAMPLES

No background samples are planned to be collected as part of this project.

10.3. FIELD SCREENING AND CONFIRMATION SAMPLES

No field screening or confirmation samples will be collected as part of this project.

10.4. LABORATORY QUALITY CONTROL SAMPLES

Full 4-oz sample jar of soil contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected.

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11 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the designated QA representative will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

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12 FIELD HEALTH AND SAFETY PROCEDURES

Field Health and Safety procedures shall need to be developed for implementation of this SAP, based upon the site specific hazards.

These procedures shall contain the components specified in 29 CFR 1910 and 29 CFR 1926 for environmental and construction activities.

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FIGURES

APPENDIX A
DATA QUALITY INDICATORS

APPENDIX B
EXAMPLE DAILY FIELD REPORT
AND SAMPLE LOG FORM

APPENDIX C

EXAMPLE CHAIN-OF-CUSTODY FORM