REMOVAL ACTION WORKPLAN (RAW) REPORT

Shenandoah Street Elementary School
2450 Shenandoah Street
Los Angeles, California

Prepared for

Los Angeles Unified School District
Office of Environmental Health and Safety
333 South Beaudry Avenue, 21st Floor
Los Angeles, California 90017

January 10, 2020

Project No. 029RC1-191395

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TABLE OF CONTENTS

LIST OF ATTACHMENTS

FIGURES

TABLES

Appendices

1.0 INTRODUCTION

Project Site	Shenandoah Street Elementary School
Property Owner	Los Angeles Unified School District
Chemicals of Concern	Lead and Arsenic
Cleanup Goals	Lead: 80 milligrams per kilogram (mg/kg) Arsenic: 12 mg/kg
Estimated Soil Removal Volume at Completion of PEA Activities	3,417 cubic yards

Shenandoah Street Elementary School (site) is an active elementary school campus made up of two adjacent parcels (Los Angeles County Tax Assessor Parcel Numbers: 4301-018-900 and 4301-017-904), totaling approximately 7.87 acres. The site is bound by single-family residences to the east, west and south. Multi-family residences are located directly north of the subject property.

Preliminary Endangerment Assessment-Equivalent (PEA-E) and soil characterization assessment activities were conducted by Montrose Environmental (Montrose) in the areas located on the northern and southern portions of the site, on behalf of the Los Angeles Unified School District (LAUSD). Soil samples were collected throughout the site at various depths and analyzed for total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), arsenic, lead, and CAM 17 metals. While several analytes were detected at concentrations exceeding laboratory detection limits, only lead and arsenic were detected in soil samples exceeding residential screening levels. Montrose recommended that a Removal Action Workplan (RAW) be developed for the site to address shallow soils impacted with lead and/or arsenic in areas located throughout the campus.

1.1 Objectives of the RAW

This RAW outlines the proposed action at the site which will focus on the removal and disposal of the majority of soils impacted with the contaminants of concerns (COCs) identified during PEA-E activities. The COC's identified at this site are lead and arsenic. Excavation was determined to be the preferred removal action (RA) remedy based on accessibility to the majority of the identified impacted soil.

1.1.1 Removal Action Objectives

Removal Action Objectives (RAOs) have been established for the site; these RAOs are presented below:

- Minimize exposure of humans to the COCs in shallow soil through inhalation, dermal absorption, and ingestion;
- Minimize potential for migration of the COCs from the shallow soil to other media, and;
- Remove the majority of accessible impacted soils that exceed the established site specific cleanup goals.

The remedial goals developed and adopted for contaminated media at the site are responsive to these RAOs.

2.0 SITE INFORMATION

2.1 Site Location and Description

The subject site is located at 2450 Shenandoah Street in the City of Los Angeles, Los Angeles County, California. Ballona Creek is located approximately 3,250 feet southwest of the site, the Santa Monica 10 Freeway is approximately 950 feet southwest of the site, the 405 Freeway is located approximately 2.75 miles east of the site and the Harbor 110 Freeway is located approximately 6.35 miles east of the site. The area surrounding the site is characterized by a combination of residential, commercial/industrial, public park development areas, and public roads and freeways.

A Site Location Map is presented as **Figure 1**. **Figure 2** depicts the soil sampling locations from the PEA-E and identifies the locations where soils are impacted with lead and arsenic above established site specific cleanup goals.

2.1.1 Site Name, Address and Size

Site Name:	Shenandoah Street Elementary School
Site Address:	2450 Shenandoah Street, Los Angeles, California 90011
Site Size:	Approximately 7.87 acres

2.1.2 Mailing Address and Telephone Number

For the purposes of this RAW, the general contact for information is as follows:

Mr. Patrick Schanen
LOS ANGELES UNIFIED SCHOOL DISTRICT
Office of Environmental Health and Safety
333 S. Beaudry Avenue, 21st Floor
Los Angeles, California 90017

2.1.3 EPA Identification Number

The EPA identification (EPA ID) number for the site is CAR000186577. This number will be used for the generation, transportation and off-site disposal of wastes excavated from the site, as applicable.

2.1.4 Assessor's Parcel Number(s) and Maps

The APNs for the site are reportedly 4301-018-900 and 4301-017-904.

2.1.5 Ownership

The site is owned by the Los Angeles Unified School District (LAUSD).

2.2 Operational History and Status

Based on aerial photographs, Sanborn Fire Insurance Maps, building permits, and agency database review, the subject property was used as early as 1923 for agricultural purposes. By 1927, structures were developed on the subject property. By 1983 the subject property was nearly fully developed, with exception of some portable classroom buildings, added later. The subject property has been continuously used as an elementary school.

2.3 Topography

The subject property is situated at an elevation of approximately 117 feet above mean sea level (amsl) in the City of Los Angeles, Los Angeles County, California. The area is characterized by single and multi-family residences, public roads and freeways. Although the topography of the site is relatively flat, the site has a slight topographic gradient to the southeast.

2.4 Geology and Hydrogeology

2.4.1 Site Geology and Soil Types

The site is located approximately 6.25 miles northeast of the Pacific Ocean within the city of Los Angeles, along the boundary of the Central and Santa Monica Basins. The northern part of the Newport-Inglewood Fault Zone (NIFZ) creates a boundary between the Central and Santa Monica Basins. The NIFZ is inferred to be located approximately near the southwest corner of the subject property, as shown on the *Earthquake Zones of Required Investigation, Beverly Hills Quadrangle* (EZRI, 2017) map dated July 2017. The West Pico and the Inglewood Faults are also shown on the EZRI to intersect nearby the subject site.

The Cheviot Hills, located approximately 1 mile west of the subject site, are undergoing active folding due to extension of the NIFZ. A series of north-northwest trending east facing escarpments, known as the West Beverly Hills Lineament, separate the older alluvium of the Cheviot Hills to the west and the younger alluvial plain to the east. The Beverly Hills and Cheviot oil fields are located throughout the Cheviot Hills and Century City.

The Baldwin Hills are located approximately 1.5 miles south of the site and are defined by the NIFZ, which can be traced along the east side of the hills as an escarpment. The NIFZ within the Baldwin Hills has caused structural traps formed by additional faulting parallel and perpendicular to the Newport-Inglewood fault, including the Inglewood Oil Field. Surface drainage of the Baldwin Hills generally flows south and west, into six retention basins which in turn drain into the Los Angeles County storm drainage network including Ballona Creek or Centinela Creek.

During the PEA-E investigation, soil-matrix sampling identified the shallow soils at the site to consist of combinations of silts and sands to the maximum explored depth of 3 feet below ground surface (bgs).

2.4.2 Site Hydrogeologic Setting

According to topographic map interpretation presented in the *Phase I Environmental Site Assessmen*t (ESA) by Montrose (2017), the direction of groundwater in the vicinity of the site is inferred to flow toward the southeast. The Ballona Creek, a concrete-lined channel, is the nearest surface water body and located approximately 0.60 miles to the southeast (USGS, 2012). No settling ponds, lagoons, surface impoundments, wetlands or natural catch basins were observed at the site during this assessment.

Groundwater was not encountered during the PEA-E assessment activities, to an approximate to a depth of 3 feet bgs, the maximum depth explored. Based on a review of groundwater well information available from the Los Angeles County Department of Public Works

(https://dpw.lacounty.gov/general/wells), well 2626P is located approximately 3,183 feet southeast from the subject property, with a groundwater depth of 70 feet bgs, measured on May 1, 2012. Groundwater wells nearby the site were also viewed on the California State Water Resources Control Board, Geotracker website (https://geotracker.waterboards.ca.gov/), with groundwater depths of approximately 24.5 feet bgs, during groundwater monitoring events in June and December of 2016.

2.5 Surrounding Land Use and Sensitive Ecosystems

The subject property is bound to the west by Shenandoah Street, to the south by residences and Beverlywood Street, on the east by Halm Avenue, and to the north by residences and David Avenue further north. No areas of ecological interest were identified on or near the subject property.

2.6 Previous Site Investigations

2.6.1 Phase I ESA

Montrose completed a *Phase I ESA* report dated August 8, 2018. The assessment identified the following evidence of recognized environmental conditions (RECs) associated with the site:

- Due to the age of the on-site structures and historical use of the property for agriculture, it was recommended that soil samples be tested for lead, arsenic, and organochlorine pesticides in accordance with the California Environmental Protection Agency (Cal EPA) and Department of Toxic Substances Control (DTSC), *PEA-E Guidance Manual* (January 1994, Interim Final – Revised October 2013).
- Based on experience at other LAUSD school sites of similar age, the potential exists for residual arsenates in soil and under pavement from application of arsenic based herbicides.
- The boiler room, located in the northwestern portion of the main building, contains environmental hazards such as ACM (boiler insulation) and wastewater contaminants within the clarifier. Soil sampling in the area of the clarifiers was recommended to evaluate the potential for releases of oil or other petroleum based substances, and solvents that may have impacted soil.
- Pad-mounted and pole-mounted transformers were noted on or near the subject property; Due to the known age of the buildings some of these transformers may have been in use prior to 1978, and therefore potentially used polychlorinated biphenyls (PCBs) in their dielectric fluids. Soil sampling in the area of the transformers was recommended to evaluate the potential for release of PCBs.
- The potential for asbestos containing material's (ACM) was identified for the structures built prior to 1977. The presence of ACM should be evaluated and ACM should be remediated by a licensed contractor prior to demolition or abated to manage the hazardous substance.

2.6.2 Preliminary Endangerment Assessment-Equivalent (PEA-E)

The PEA-E sampling and soil characterization activities were conducted between November 2018 through November 2019. The sampling and analysis program consisted of 84 primary borings (SB-1

through SB-84) to evaluate potential COCs concentrations in shallow soils throughout the site (**Figure 2**). Seventy eight (78) additional step-out borings were required to further assess lead and/or arsenic concentrations in shallow soils. The lateral and vertical extent of lead and arsenic concentrations exceeding the Department of Toxic Substances (DTSC) screening levels was successfully defined by step-out and step-down soil sampling, and confirmed by fixed laboratory analysis.

Based on the soil matrix sampling conducted during the PEA, the following conclusions were made:

- Soil samples were collected throughout the site at various depths and analyzed for arsenic by EPA Method 6020, OCP's by EPA Method 8081A and CAM 17 Metals by EPA Method 6010B. Select samples were also analyzed for PCBs by EPA Method 8082. While several analytes were found at levels in excess of laboratory detection limits, only lead and arsenic were identified in soil samples in excess of regulatory and/or LAUSD screening levels.
- Seventy-eight borings contained shallow soil impacted by lead and/or arsenic in excess of regulatory and/or LAUSD screening levels were identified throughout the campus. The shallow step-out soil sampling for lead and arsenic in soil was able to achieve lateral and vertical definition of the areas of impact at the site. The total estimated amount of impacted soil at the site is estimated to be approximately 3,417 cubic yards.

Based on the conclusions of this PEA investigation, Montrose recommended that a RAW be prepared to address shallow soils impacted with lead, and/or arsenic in the areas identified throughout the campus.

3.0 NATURE, SOURCE, AND EXTENT OF ON-SITE CHEMICALS OF CONCERN

3.1 Shallow On-Site Soil

As discussed above, soil samples were collected from various depths across the site and analyzed for potential COCs. The analysis included TPH, VOCs, PCBs, OCPs, arsenic, lead, and CAM 17 metals. While several analytes were found at levels exceeding laboratory detection limits, only lead and arsenic were detected in soil samples exceeding residential screening levels.

3.1.1 COCs in Shallow Soil

Lead-impacted soil appears to be present as a result of historic lead based paint use and/or impacted fill materials. Arsenic impacted soils appear to be present as a suspected result of past use of termiticides around buildings, weed control below pavement, or imported fill soils.

3.2 Extent and Volume of On-Site Soil Removal

Based on the PEA-E and soil characterization investigation findings, the volumes of soil exceeding acceptable screening levels that will need to be removed prior to or concurrent with renovation activities were calculated (**Figure 3**). Considering a potential bulking factor of 10% for the excavated soils, the total estimated volume of impacted soil at the site above current cleanup goals to be excavated is approximately 3,417 cubic yards. A summary of the soil boring area, proposed excavation volume, type of COC impact (i.e., lead and/or arsenic), and the portion of lead-impacted soil that qualifies as California Hazardous (Cal-Haz) lead or arsenic affected soil is presented below.

Boring Area Location	Proposed Excavation Volume (yds^3)	COC Impact	Disposal Classification
SB-1, SB-5, SB-7	43	Lead	Cal Haz
SB-3, SB-15, SB-30, SB-42	27	Lead	Non Haz
SB-37, SB-51/SB-52/SB-53, SB-53, SB-54, SB-57B, SB-69/SB-70	971	Arsenic	Cal Haz
SB-33, SB-37/SB-39/SB-47/SB-48, SB-43/SB-44/SB-33, SB-55/SB-72/SB-74/SB-75, SB-57, SB-63	2,376	Arsenic	Non Haz

Notes: Cal Haz = California Hazardous (Non-RCRA) Disposal Designation
Non Haz = Non Hazardous Disposal Designation
See **Figure 3** for approximate excavation limits;

3.3 Health Effects of Chemicals of Concern

3.3.1 Arsenic

Arsenic can affect receptors when airborne dust is inhaled, ingested, or by passing through the skin. Arsenic is absorbed rapidly after ingestion, but dermal exposure causes smaller quantities of arsenic in the bloodstream. Acute oral intake of arsenic levels at approximately 300 micrograms per liter (µg/L) or more will cause intestinal discomfort, vomiting, and diarrhea. At high levels of exposure, arsenic can ultimately cause death. White and red blood cell production, abnormal heart rhythm, blood-vessel damage, and impaired nerve function are also a result of arsenic ingestion. The human body has the ability to turn some of the arsenic it ingests into an organic form that is excreted through the body's urine, but some will remain for months or more. Chronic exposure through ingestion may increase the risk of kidney, skin, lung, and bladder cancers as well as skin changes, including dark skin tone patterns (hyperpigmentation) and small warts.

3.3.2 Lead

Lead can affect receptors when airborne dust is inhaled, ingested, or by passing through the skin, although the primary routes of exposure are inhalation and ingestion. The main target for lead toxicity in both adults and children is the nervous system. Lead exposure can cause weakness in fingers, wrists, or ankles; increases in blood pressure; and anemia. At high levels of exposure, lead can severely damage the brain and kidneys and ultimately cause death. Children are more sensitive to the health effects of lead than adults. In children, large amounts of lead ingestion may result in anemia, kidney damage, severe stomach pain, muscle weakness, and brain damage, which can ultimately lead to death. At smaller amounts of lead ingestion, less severe impacts to blood, physical development, and behavior may occur. The human body does not change lead into any other form. Following entry to the body, lead travels in the blood to soft tissues and organs, and then moves into the bones. Lead that is not stored in the bones leaves the body through urine and feces.

4.0 RISK EVALUATION AND ON-SITE SOIL CLEANUP GOALS

This section summarizes results from the human health screening evaluation conducted during the PEA-E and presents the cleanup goals for the identified accessible COCs in soil that can be excavated from the site.

4.1 Recommendation for Further Action

Based on analytical data gathered during the PEA-E, Montrose recommends addressing shallow soils impacted with lead and arsenic.

4.2 Cleanup Goals

The COCs for this site soils are lead and arsenic. A summary of the COCs, maximum concentration in each area of concern, and cleanup goals are presented on **Table 1**. The soil cleanup goals are based on residential site screening levels and/or published background concentrations as described below:

- Arsenic: 12 mg/kg based on DTSC's upper bound estimate (95th percentile) for background concentrations in Southern California (DTSC undated).
- Lead: 80 mg/kg based on DTSC-SL for residential land use published in DTSC's HERO Note 3 (DTSC, 2016).

5.0 EVALUATION OF REMOVAL ACTION ALTERNATIVES

Based on the analysis of the nature and extent of contamination, and on the removal action goals established for the site, the following alternatives appropriate for addressing the remedial action objectives were selected for analysis:

- Alternative 1 - No Action
- Alternative 2 - Containment
- Alternative 3 - Excavation and Offsite Disposal

A brief summary of each remedial action alternative, along with a detailed analysis of the excavation approach, is provided in the following section.

5.1 No Action

The *No Action* alternative essentially provides a baseline for comparison to other proposed remedial alternatives. Under a *No Action* alternative, remedial technologies would not be implemented. Impacted soil would remain in place and undisturbed. Since the site is an active school facility scheduled for a comprehensive modernization effort that will include disturbance of subsurface materials during construction, the *No Action* alternative is not a feasible option and is not evaluated further.

5.2 Excavation, Capping and Containment

Containment at the site would consist of excavating the impacted soil to a depth of approximately 1 foot bgs, then capping any remaining impacted areas with a geotextile fabric and compacted soil cover. The cap would be used to prevent a complete exposure pathway to school students and staff.

The containment option would result in the disturbance of the COC impacted soil. Therefore, there is a potential risk to on-site workers and the surrounding public from dust that may be generated during these activities. These risks could be mitigated using personal protective equipment for on-site workers, engineering controls such as dust suppression and additional traffic and equipment operating safety procedures for protection of the surrounding community. The short-term risks associated with this alternative are low.

A surface cap would require long-term inspection and maintenance. Periodic inspections for settlement, ponding of liquids, erosion and penetrations by vegetation or burrowing animals would be required. In addition, precautions would have to be taken to ensure that the integrity of the cap is not compromised by subsequent construction activities. Based on these factors, the effort required to ensure long-term effectiveness is considered moderate.

Containment by surface capping would not reduce the toxicity of the arsenic or lead in soil, but it would limit the mobility of the remaining impacted material. Proper maintenance of the cap would reduce accessibility to the impacted material.

Containment is a relatively simple technology that is easily implemented and offers short installation times. Because the elevated levels of arsenic and lead remain at the site, obtaining regulatory approval may be difficult. Local land use restrictions would also be required to eliminate future disturbances of these areas during school/residential property redevelopment.

This alternative provides good protection of human health if proper long-term operations and maintenance protocols are followed.

Containment technologies costs are typically low to moderate relative to other options. An approximate cost for containment is $909,000 for soil excavation, geotextile fabric for delineation, soil backfill and asphalt or concrete cap. The surface area that would be required for the cap, including an extension over adjacent material, is approximately 93,600 square feet (assuming smaller proposed excavations are removed in entirety to minimize risks in those areas). This results in a cap cost of $733,000. An additional cost of $176,000 will be required for preparation of

mitigation plans, preparation of an Operation and Maintenance Plan, and establishing and recording land use restrictions. The containment option also requires an annual cap inspection, at a cost of about $5,000 per year over approximately 20 years (total of $100,000). A summary of the estimated costs to implement this alternative is presented in **Table 4**.

5.3 Excavation and Offsite Disposal

The soil excavation with disposal alternative would involve excavation of impacted soil exceeding the removal action goals with subsequent disposal at a landfill offsite. Current projections are that up to 3,417 cubic yards of soil exceeding the removal action goals would require removal from the site.

The excavated soil would be segregated in stockpiles and, based on the waste profiles, the impacted soil would be loaded and transported to appropriately permitted landfills for disposal.

The option presented under this alternative assumes that the majority of the soil will be classified as a California regulated, Class 2, non-hazardous waste (approximately 2,403 cubic yards), with some lead and arsenic impacted soil classified as a California regulated, Class 1 hazardous waste (up to 1,014 cubic yards). This is based on previous PEA analytical results, in which lead was detected in multiple locations at elevated concentrations; however, this will be confirmed by additional analyses following soil removal.

After excavation of the impacted soil at the designated locations across the site, confirmation samples would be collected from the bottom and sides of the individual excavations and analyzed. Once the removal of soils exceeding the cleanup goals is completed and confirmed, clean soil will be imported and the excavations will be graded and compacted. The graded and compacted surface would be completed to facilitate future development activities.

After completion of backfilling activities, the site will would be suitable for completion of the comprehensive school modernization and construction activities. A *Remedial Action Completion Report* documenting the soil removal activities would be prepared upon completion of all field activities. No annual inspections are considered necessary. The estimated cost to implement the excavation and offsite disposal option is $902,000.

6.0 COST BENEFIT ANALYSIS

The cost comparison of the actions described above is presented in the table below:

Option	Action Costs	O&M Costs*	Overall Cost	Feasibility
No Action	$0	$0	$0	Not Feasible
Capping & Containment	$609,000	$300,000	$909,000	Feasible
Excavation & Disposal	$902,000	N/A	$902,000	Feasible

*Estimate for 20 years

6.1 Description of Selected Removal Action

Based on analysis above, soil excavation and disposal is the preferred remedial option. Soil excavation at the site will remove soil containing lead and arsenic that exceeds the cleanup goal. The excavation will be performed using heavy equipment consisting of, but not limited to, an excavator, backhoe, loader, and dump truck. Ancillary facilities (i.e., wastewater holding tank) will also be used during the removal action. Excavation operations may generate fugitive dust emissions. Suppressant foam, water spray, and other forms of vapor and dust control may be required during excavation, and workers may be required to use personal protective equipment to reduce exposure to the COCs. The depth of excavations may be limited due to physical constraints associated with the site. Sloping excavation sidewalls and slot cutting may result in increased volume of soil requiring excavation. Confirmation soil sampling and analysis will be conducted to verify soil impact concentrations at the excavation bottom and sidewalls.

LAUSD will strive to have all the excavated soil directly-loaded into waiting dump trucks. However, in the event that a temporarily stockpile is required, the stockpiled soil will be placed on plastic sheeting within an onsite “holding area”. Any temporary soil stockpiles will be properly secured and protected until ready for loading for offsite transportation and disposal. Clean, imported soil or other fill material will be brought to the site to backfill areas where impacted soil was removed. Imported soil and/or other fill material would be accompanied by certificates, analytical data and/or other supporting documents that indicate the import material is in conformance with cleanup criteria.

6.2 Effectiveness

Both short-term and long-term effectiveness is achieved as this removal action alternative involves physical removal of contaminants in the site soils above removal action goals. The excavation and offsite disposal of impacted soil will have an immediate short-term beneficial effect by dramatically reducing the extent of contaminants at the site. The excavation process will increase the potential exposure risks in the short term for workers and the surrounding community to increased noise levels, dust, and air emissions containing the primary constituents of concern (arsenic and/or lead). However, the use of appropriate personal protective equipment by onsite workers and the implementation of appropriate noise control measures, dust control measures, and an air quality monitoring plan would mitigate these problems.

With respect to the long-term effectiveness, excavation and offsite disposal of impacted soil will permanently and significantly reduce the extent of soil contaminants at the site, by removing soil that exceeds the established cleanup goals. Since the excavated areas will also be backfilled with clean imported soil, all hazards otherwise associated with direct exposure, inhalation, and ingestion would be eliminated by the remediation process.

6.3 Reduction of Toxicity, Mobility, or Volume

By excavating, transporting, and disposing of contaminated soil from the site to an offsite location, contaminant volume and toxicity at the site will be reduced. Materials above the cleanup goals will be removed, and will lower the overall toxicity of the site. Additionally, the excavations will be backfilled and compacted with clean imported soil that will provide further protection to the environment by limiting infiltration of surface water and mobility of contaminants remaining. This layer of backfill will also eliminate human contact with any impacted soil remaining.

6.4 Implementability

The excavation and offsite disposal alternative can be implemented with minimal difficulties. Numerous removal actions of similar nature, performed in the past without incident, have demonstrated that the potential for exposure to the soil and airborne contaminants can be mitigated if appropriate best management practices are used. Additionally, there are no land-banned disposal restrictions for the waste, based on the contaminant concentrations reported in the investigative reports. Since the total volume of import and export soil exceeds 1,000 cubic yards, a “haul route permit” will be required from the City of Los Angeles, Department of Building and Safety.

6.5 Cost

For this alternative, the estimated cost for offsite landfill disposal if 2,403 cubic yards (3,364 tons) of non-hazardous soil and up to 1,014 cubic yards (1,420 tons) of California regulated hazardous soil is $902,000 as shown in **Table 4**.

The excavation field work scope is estimated for completion in approximately 30 days. The actual work schedule will be determined by the LAUSD construction schedule and the sequencing of work across the site.

Future liabilities and costs could arise should the chosen disposal site become the subject of a future cleanup action. Current environmental regulations contain provisions that name past users of a hazardous waste disposal site as Potentially Responsible Parties (PRPs), if a fiscally responsible party (i.e., landfill operator) is not able to respond to a cleanup action.

6.6 Regulatory Compliance

This removal alternative will limit exposure and comply with the state regulatory offices with jurisdiction (i.e., DTSC) to protect human health and the environment. The impacted soil will also comply with offsite disposal facility operating permits. This alternative has been implemented with success on previous projects many times in the past and would be acceptable to the. It is not likely that the surrounding community or citizen activist groups will be opposed to this alternative, which has been implemented with success on previous projects in other communities in California.

7.0 REMOVAL ACTION IMPLEMENTATION

7.1 Removal Action Scope

This RAW outlines the remedy for the COCs at the site, and addresses the accessible metals in soil above cleanup goals that can be practically excavated at the site. The estimated volume of impacted soil proposed for the removal action is approximately 3,417 cubic yards, based on the analytical data gathered during the PEA-E by Montrose (Montrose 2019).

7.2 Presumptive Remedy

An immediate soil removal (excavation and offsite disposal) has generally been accepted as the preferred remedial action for similar site conditions at other similar locations (presumptive remedy). As a presumptive remedy excavation and offsite disposal has been determined to be the most effective remedy. Therefore, no other alternative removal options will be considered for the accessible COCs in soil that can be practically excavated at this time.

7.3 Description of Selected Removal Action

7.3.1 Soil Excavation

Soil excavation at the site will remove soil containing the COCs (arsenic and lead) that exceed the cleanup goals listed in **Table 1**. The excavation will be performed using heavy equipment consisting of, but not limited to, an excavator, backhoe, loader, and dump truck. Ancillary facilities (i.e., wastewater holding tank) will also be used during the removal action. Excavation operations may generate fugitive dust emissions. Suppressant foam, water spray, and other forms of vapor and dust control may be required during excavation, and workers may be required to use personal protective equipment to reduce exposure to the COCs. The depth of excavations may be limited due to physical constraints associated with the site. Sloping excavation sidewalls and slot-cutting may result in increased volume of soil requiring excavation. Confirmation soil sampling and analysis will be conducted to verify soil impact concentrations at the excavation bottom and sidewalls as discussed below.

Excavated soil will be either directly-loaded into waiting dump trucks or temporarily stockpiled within an onsite “holding area” using a rubber-tire backhoe or similar equipment (such as wheel loader). Any temporary soil stockpiles will be properly secured and protected until ready for loading for offsite transportation and disposal. Truck loading will take place concurrently with excavation operations, with access of loaders to the stockpile from outside the excavation areas, while excavation operations deposit impacted soil from the excavation areas to the staging areas. Clean, imported soil or other fill material will be brought to the site to backfill areas where impacted soil was removed. Imported soil and/or other fill material would be accompanied by certificates, analytical data, and/or other supporting documents that indicate the import material is in conformance with cleanup criteria.

7.3.2 Offsite Disposal

Offsite disposal involves removing impacted soil from the site and transporting it to an appropriate offsite facility for disposal.

The activities that would be conducted to implement this removal action are described below.

- Excavate approximately 3,417 cubic yards of impacted soil from identified locations.
- If necessary, segregate and stockpile impacted soils.
- Conduct confirmation soil sampling using a fixed-base laboratory and compare confirmation data to cleanup goals.
- Load and transport approximately 3,417 cubic yards of impacted soil to an appropriate disposal facility.
- Grade, backfill and compact previously excavated areas using clean, imported fill material.

8.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Previous investigations of the site indicated the presence of the COCs in soil exceeding the established cleanup goals for this site. The most effective removal action for soil is excavation and offsite disposal. This section discusses the applicable or relevant and appropriate requirements (ARARs) for the proposed soil excavation and offsite disposal.

8.1 Waste Management

An EPA ID number (CAR000186577) has been obtained for proper management of waste generated during soil excavation activities. Based on the laboratory analytical results of soil samples summarized in **Table 2**, a portion of waste has been profiled as a California-hazardous waste. The volume of soil to be excavated is estimated at 3,417 cubic yards. Excavated impacted soils will be transported to a properly certified landfill.

8.2 Health and Safety Plan

All contractors will be responsible for operating in accordance with the most current requirements of 8 CCR, Section 5192 (8 CCR 5192) and Title 29, Code of Federal Regulations (CFR), Section 1910.120 (29 CFR 1910.120), Standards for Hazardous Waste Operations and Emergency Response (HAZWOPER). Onsite personnel are responsible for operating in accordance with all applicable regulations of the Occupational Safety and Health Administration (OSHA) outlined in 8 CCR, General Industry and Construction Safety Orders, and 29 CFR 1910 and 29 CFR 1926, Construction Industry Standards, as well as other applicable federal, state and local laws and regulations. All personnel will operate in compliance with all California Occupational Safety and Health Administration (Cal-OSHA) requirements.

A site specific *Health and Safety Plan* (HASP) has been prepared for the RAW and is included in **Appendix A**. The selected Removal Action Contractor (herein referred to as “RA Contractor”) will prepare their own updated HASP, in general accordance with current federal and OSHA health and safety standards. The provisions of the HASP are mandatory for all personnel and contractors who are at the site. All onsite personnel must read and sign the HASP prior to commencing field activities.

8.3 Quality Assurance Project Plan (QAPP)

Quality assurance and quality control measures that will be used during the project execution are documented in the QAPP, and included as **Appendix C**. The QAPP will assure that site field and analytical data collected meet Data Quality Objectives (DQOs).

8.4 Others

All necessary permits and approvals identified in this RAW will be obtained prior to any removal activities. Removal activities will be performed by a California-certified contractor with supervision from a California- registered professional geologist or professional engineer.

9.0 REMOVAL ACTION IMPLEMENTATION AND REPORTING

9.1 Public Participation Activities

A public participation process has been developed by LAUSD to ensure that the local community has the opportunity to comment and provide input to the decision process adopted for environmental cleanup of their properties. The LAUSD may prepare a Fact Sheet in English and Spanish (which are languages appropriate to the community) to provide general background information for the site, including a description of the planned removal action, public comment opportunities, and the project schedule. The Fact Sheet will be circulated to residences and businesses immediately adjacent to or within line-of-sight of the site.

A public notice will be published in local newspapers for general circulation in English and Spanish in order to inform the community of the proposed removal action and of the availability of the administrative record for public inspection. Copies of the administrative record (i.e., this RAW and related determination letters for the site) will be placed at Information Repositories for access by community members.

LAUSD will then complete a 30-day public review of the RAW and conduct a public meeting at the school site midway through the 30-day public review period.

9.2 Site Preparation and Security Measures

Prior to equipment mobilization for the proposed removal action, site preparation activities will include fieldwork notification, site inspections, delineation of excavation areas and utility connections.

9.2.1 Fieldwork notification

Prior to the removal action field work activities, a field work notice will be delivered to the businesses and residences within line-of-sight of the site. Additionally, the field work notices will be delivered to the administrative staff for delivery to the school faculty and staff and enough notices for the administration to hand out to the students. The field work notice will be on blue paper and double-sided, one side in English and one side in Spanish.

9.2.2 Delineation of Excavation Areas

The lateral limits of excavation will extend to the step-out boring location which confirms soil with COC concentrations are less than cleanup goals (**Figure 3**). The lateral limits of all excavation areas will be delineated and surveyed by the RA Contractor, in consultation with the client before commencement of removal action activities. The areas to have soil removal will be called the "excavation areas," and they will be marked in the field (along with the exclusion zones) by the RA Contractor with high visibility paint. The anticipated excavation boundaries (building walls, utility lines, soil borings with COC concentrations below cleanup goals) along with approximately excavation area dimensions are detailed on **Table 3**.

9.2.3 Utility Clearance

Clearance of utilities and other hazardous underground obstacles will be conducted prior to initiation of any excavation activities. Such possible obstacles may include water, electrical, gas, oil, communication cable, phone cable, TV cable, and/or sewer lines. At a minimum, the utility clearance will include a 48-hour notification of the local Underground Service Alert (USA) and a site visit. In addition, a geophysical survey may be conducted as appropriate to clear each excavation area. Underground utilities will be located and the markings inspected to verify they are visible and properly marked. Field crew, equipment operators, and LAUSD Office of Environmental Health and Safety (OEHS) site representative will be informed of all these locations during a walk-through prior to initiation of any excavation activities.

The excavation areas are intersected by subsurface utilities. In these areas, the contractor will remain at least two feet away from the mapped location of the utility to avoid damage. Post excavation confirmation sidewall samples will be conducted on both sides of the undisturbed utility, to document the soils that are left in place.

9.2.4 Security Measures

This site is bounded by a perimeter fence which will increase the likelihood that the work areas are secure and safe. To ensure that trespassers or unauthorized personnel are not allowed near work areas, security measures may include, but are not limited to:

- Posting notices directing visitors to the site manager.
- Installing barrier fencing around work areas to restrict access to sensitive areas.
- Providing adequate site security to ensure that unauthorized personnel have no access to work areas and/or contaminated materials.
- Maintaining a safe and secure work area, including areas where equipment is stored or placed, at the close of each workday.
- Persons requesting access to the excavation areas will be required to demonstrate a valid purpose for access and if access to work areas and/or contaminated materials is planned, provide appropriate documentation to demonstrate they have received proper training as required by the site specific HASP.

9.3 Excavation

All field work will be completed by properly trained and equipped hazardous waste workers. Impacted soil will be removed with earth moving equipment, as necessary and will involve the use of a backhoe, loader, excavator, and/or shovels. As soil is excavated, it will be loaded directly onto dump trucks to be immediately transported offsite or temporarily stored onsite in staging areas. If temporarily stockpiled onsite, the soil will be placed on and covered with plastic sheeting secured with sandbags. In addition, Cal-OSHA Construction Safety Orders (especially 8 CCR 1539 and 1541) will be followed as appropriate.

In the event that one (1) or more confirmation sample concentrations exceed the cleanup goals from an excavation, the excavation will be extended 5 foot laterally (where feasible), beyond the confirmation sample exceed the cleanup goal and additional confirmation samples will be collected and analyzed. If necessary, the process of additional excavation and confirmation sample collection and analysis will be repeated until all confirmation sample concentrations from the completed excavation are less than the cleanup goal or the boundary of the excavation reaches a subsurface utility, a property boundary, or a site/building feature (i.e. building wall, planter wall, fence line, building staircase or ramp).

9.3.1 Contaminant Control

In order to minimize potential exposure of fugitive dust to the adjacent properties, dust monitoring and if necessary, dust suppression measures will be utilized. Dust suppression measures may consist of spraying water on the excavation area, and other areas susceptible to wind erosion. Care will be taken to avoid excessive water application that could cause a non-storm water runoff condition at the site.

9.3.2 Health and Safety Zones

Health and safety designated locations such as the Exclusion Zone and Support Zone will be established prior to commencement of field activities. The importance of these zones and their locations will be emphasized with all onsite workers during daily health and safety tailgate meeting held before the removal action work activities begin and with each site visitor or worker, as soon as he or she arrives at the site. The onsite RA Contractor may modify the site ingress and egress plan during the field activities for health and safety reasons.

9.3.3 Field Documentation

The RA Contractor will be responsible for maintaining field notes during the removal action activities. The notes will serve to document observations, onsite personnel, equipment arrival and departure times and other vital project information, and will be used in the preparation of the *Removal Action Report*.

9.3.4 Field Logbooks

Field logbooks will be used to document where, when, how, and from whom any vital project information was obtained. Daily logbook entries will be complete and accurate enough to permit reconstruction of field activities. Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in indelible ink, and signed by the individual making the entries. If an error is made, corrections will be made by crossing a line through the error and entering the correct information. Corrections will be dated and initialed. No entries will be obliterated or rendered unreadable.

Entries in the field logbook will include at a minimum the following for each fieldwork date:

- Site name and address
- Recorder's name
- Team members and their responsibilities
- Time of site arrival/entry onsite and time of site departure
- Other personnel onsite
- A summary of any onsite meetings
- Quantity of impacted soil (in terms of non-RCRA and RCRA hazardous waste) excavated
- Quantity of impacted soil (in terms of non-RCRA and RCRA hazardous waste) temporarily stored onsite (if any)
- Quantity of excavated soil in truckloads (in terms of non-RCRA and RCRA hazardous waste) transported offsite
- Names of waste transporters and proposed disposal facilities
- Copies or numbers of manifests or other shipping documents (such as bill of lading) for waste shipments
- Deviations from this RAW and the HASP
- Changes in personnel and responsibilities as well as reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

9.3.5 Chain-of-Custody Records

Chain-of-custody records are used to document sample collection and shipment to the laboratory for analysis. All sample shipments for analyses will be accompanied by a chain-of-custody record. Form(s) will be completed and sent with the samples for each laboratory and each shipment. If multiple coolers are sent to a single laboratory on a single day, chain-of-custody form(s) will be completed and sent with the samples for each cooler. The chain-of-custody record 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 someone’s physical possession, in someone’s view, locked up, or kept in a secured area that is restricted to the authorized personnel. Until receipt by the laboratory, the samples will be the responsibility of the authorized person maintaining custody.

9.3.6 Photographs

Photographs will be taken of the excavation area(s), confirmation sample locations and other areas of interest onsite to document the removal action. They will serve to verify information entered in the field logbook.

When a photograph is taken, the following information will be written in the logbook or will be recorded in a separate field photography log:

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

9.3.7 Permitting and Notifications

As part of the site work, it will be necessary to obtain the following permits and make the following notifications:

- Underground Service Alert (USA);
- Haul Route Permit

Other permits and notifications to complete the work may be required by local, state, or federal agencies. The following subsections describe some of the required permitting activities:

9.3.8 South Coast Air Quality Management District (SCAQMD) Permits

The site is located in jurisdiction of the SCAQMD. The SCAQMD has three rules that address excavation (Rules 1150, 1166 and 1466), and one that addresses fugitive dust (Rule 403).

Rule 1150 applies to the excavation of sanitary landfills and does not apply to this project. Rule 1166 does not apply to this project, because it governs the excavation of soils containing significant concentrations of VOCs, which were not detected during previous site investigations. Rule 1466 does not apply to this project because it governs the excavation of soils identified as toxic air contaminants (TACs) and LAUSD OEHS has completed a health risk assessment (see Appendix D – Rule 1466 Risk Assessment) and the results shown no health risk impacts to students, staff, and construction workers during all soil removal activities presented in this RAW.

Several elements of Rule 403, such as protocols for mitigation of potential fugitive dust emissions, have been incorporated into this RAW. Excavation, loading, and transport of impacted soils will be in compliance with Rule 403 prevention, reduction, and mitigation measures for fugitive dust emissions. Access to the site will be controlled and excavation will not be conducted when wind speed exceeds 15 miles per hour. Notification to the SCAQMD is required only for large operations, disturbing more than 100 acres or moving more than 10,000 cubic yards per day. This project does not qualify as a medium or large operation; therefore, no notification or filing of a *Fugitive Dust Emission Control Plan* is required due to the project size.

9.4 Soil Management

Impacted soils will be stockpiled or direct-loaded onto dump trucks for immediate offsite disposal. The following sections discuss soil and material segregation, stockpile handling, truck loading, and storm water management.

9.4.1 Soil Staging and Storage Operations

If it is necessary to temporarily store the excavated soil onsite until transportation and offsite disposal are available, the following may apply:

- The staging process will be conducted in a manner to minimize the generation of dust. At the staging areas, excavated soil will be placed on an impermeable barrier base (e.g., concrete floor, plastic sheeting) and covered with tarps or other proper materials (e.g., plastic sheeting) to prevent any run-on and/or dust generation. If significant rainfall is anticipated, the staging areas will be bermed to contain any run-off. When possible, excavated soils may be placed in covered roll-off bins or drums, or may be loaded directly onto transportation trucks.
- The temporary onsite storage of excavated soil wastes will be secured until they are ready for loading. Storage of waste for longer than 90 days after its generation is not anticipated.
- Direct loading may take place concurrently with the excavation operations, with access of loaders to the stockpile from outside the excavation areas, while excavation operations deposit impacted soil from the excavation areas to the staging areas.
- During non-excavation hours, excavated soil stockpiles will be covered with plastic sheeting or other proper materials. Additional field applications may involve installation of a temporary canopy, liner, or other physical barrier that minimizes movement of materials from the site by wind, water, or any other mechanism.

9.4.2 Waste Segregation Operations

Prior to stockpiling/staging, the excavated soil will be segregated to the extent possible to avoid any mixture of impacted and non-impacted soils. This segregation will minimize the amount of impacted soils generated and their associated disposal cost. The soil segregation will be based on visual observations, generated laboratory data, and the previous site assessment data.

9.5 Decontamination Methods and Procedures

9.5.1 Decontamination Area

Entry to the contaminated areas should be limited to avoid unnecessary exposure and related transfer of contaminants. In unavoidable circumstances, any equipment or truck(s) should be decontaminated in a designated decontamination area before leaving the site as described below.

9.5.2 Decontamination Procedures

Equipment that comes into direct contact with potentially contaminated soil or water will be decontaminated to assure the quality of samples collected and/or to avoid cross contamination. 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 designated use of a piece of equipment.

Trucks that come into direct contact with potentially contaminated soil or water will be decontaminated before they leave the site to prevent the offsite tracking of contaminated soil. Trucks will be visually inspected before leaving the site and any dirt adhering to the exterior surfaces will be brushed off and collected on plastic sheeting. Track-out will be prevented by washing the wheels of any vehicles before they leave the site. The storage bins or beds of the trucks will be inspected to ensure the loads are properly covered and secured. Excavation equipment surfaces will also be brushed off prior to removal from the exclusion zone.

Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting. Cleaned bulky equipment will be stored on plastic sheeting in uncontaminated areas. Small cleaning equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered. Waste material accumulated during decontamination procedures will be collected and properly stored onsite for disposal.

9.6 Air / Meteorological Monitoring and Dust Control

This section details the air and meteorological monitoring strategy and methodologies that will be used during the soil removal action. Signage will be posted displaying the COCs for the excavation activities, In accordance with SCAQMD Rule 1466; the strategy and methodologies of the monitoring activities are designed to achieve several goals:

- Identify and measure the air contaminants generated during the soil removal and decontamination activities to assign the appropriate personal protective equipment (PPE) and safety systems specified for those activities.
- Provide feedback to site operations personnel regarding potential hazards from exposure to hazardous air contaminants generated through site activities.
- Identify and measure air contaminants at points outside the soil removal and decontamination exclusion zones. Air monitoring will be conducted during work activities to measure potential exposure of sensitive receptors to site chemical constituents as a result of removal activities.

9.6.1 Dust Monitoring

During the excavation activities, dust monitoring will be performed using four (4) 10 micrometers or less (PM_{10}) dust monitors that are identical in make and model, settings, calibration, configuration and calibration, and placed upwind, downwind and perimeter of the excavation area to provide monitoring to minimize offsite emissions of dust potentially containing toxic air contaminants. The PM_{10} dust monitors will be pre-set to record readings at 10-minute intervals. The upwind and downwind monitors will be read by the Air Monitoring Professional on an hourly basis and recorded on air quality monitoring logs.

The hourly averages of dust concentrations the upwind monitor will be calculated in the field using the following:

Average upwind monitor results:

$$\frac{\text{Reading 1 + Reading 2}}{2}$$

The maximum downwind dust concentration for the two-hour period will be used to determine an average dust concentration:

Maximum Downwind – Average Upwind = PM_{10} Concentration

Per Rule 1466, the average of PM_{10} generated from the site over a period of two hours may not exceed 25 micrograms per liter ($\mu g/m^3$). The Air Monitoring Professional will have the authority to stop work in the event that onsite activities generate dust levels which exceed the site or community action levels (see the following chart). In the event the two hour average of 25 $\mu g/m^3$ is exceeded during the excavation activities, the excavation activities will cease and the RA Contractor will use measures including the addition of water to excavated soil to prevent the generation of dust and the covering of stockpiled soil using plastic sheeting.

The Air Monitoring Professional will monitor onsite meteorological instrumentation and/or coordinate with offsite meteorological professionals to identify conditions that require cessation of work, e.g., winds in excess of 25 miles per hour (mph). No specific regulatory wind velocity restrictions for soil excavation were found to exist in the subject area. However, a self-imposed action level for work stoppage will be set at a sustained wind velocity of 25 mph.

9.6.2 Meteorological Monitoring

The ambient weather conditions (wind speed and direction, and relative humidity) will be monitored during the excavation activities for the site using a portable weather station equipped with a data logger. The weather monitor will be read by the Air Monitoring Professional on an hourly basis during the excavation activities and recorded on the air quality monitoring logs to ensure all necessary precautions have been taken.

The RA Contractor will base site safety procedures, including dust control measures, on the action levels and personal exposure limits (PELs) specified in the following chart:

EXPOSURE GUIDELINES FOR DUST

Chemical Name	Cal-OSHA PEL[a]	ACGIH TLV[b]	Site Action Levels	Community Action Level (Fence Line)[d, e]
Total Dust	10 mg/m^3	10 mg/m^3	1.0 mg/m^3	25 $\mu g/m^3$
Lead	0.05 mg/m^3	0.05 mg/m^3	0.005 mg/m^3	1.5 $\mu g/m^3$
Arsenic	0.01 mg/m^3	0.01 mg/m^3	0.001 mg/m^3	0.003 $\mu g/m^3$

Notes:

mg/m^3 = milligrams per cubic meter
$\mu g/m^3$ micrograms per cubic meter
ACGIH = American Conference of Governmental Industrial Hygienists
ppm = parts per million

[a] = PELs per Cal/OSHA Article 107, Table AC1.

[b] = TLVs for Chemical Substances and Physical Agents and Biological Exposure Indices (ACGIH, 1990-1991).

[c] = Site Action Level is calculated as 10 percent of TLV or PEL (as measured by NIOSH methods), whichever is smaller. If a Site Action Level is equaled or exceeded, then additional dust mitigation measures will be implemented. If the site air contaminants cannot be controlled reliably within 15 minutes, then all work will cease and a Certified Industrial Hygienist will be consulted. If Site Action Levels are exceeded on the integrated air monitors, then a Certified Industrial Hygienist will be immediately consulted.

[d] = Community action level calculated based on Proposition 65 No Significant Risk Level divided by 20 m^3 per day (breathing rate) and SCAQMD regulations.

[e] = The National Ambient Air Quality Standard for lead at 1.5 $\mu g/m^3$ is selected as the fence-line community action level. Community Action Level for total dust/particulate is based on SCAQMD regulations. Site dust levels will be measured using real-time aerosol monitors.

9.7 Sampling and Analysis Plan

9.7.1 Waste Profile Sampling

Soil having toxicity characteristic leaching potential (TCLP) metal concentrations greater than corresponding TCLP are classified as RCRA hazardous waste. Soil having total threshold limit concentration (TTLC) or soluble threshold limit concentration (STLC) greater than corresponding TTLCs or STLCs, respectively are classified as non-RCRA (California-listed) hazardous waste.

As shown on **Table 2**, limited soluble analysis was conducted during the PEA-E on selected samples from 48 areas of concern (Montrose 2019). Twenty five of the 48 samples were found to contain total or soluble concentrations of a respective COC that would characterize the impacted soil as a California-listed hazardous waste. None were found to be above federal RCRA hazardous waste limits. It is recommended that the actual determination of waste classification be based on profile samples collected from the soils to be disposed of prior to, or during the implementation of the RA. Copies of the laboratory results are included in the PEA-E (Montrose 2019) and will be provided to the RA Contractor for profiling prior to excavation. Should the disposal facility require additional profile data, the RA Contractor will collect and submit additional soil data for analysis and provide it to the disposal facility for proper characterization of the excavated soil.

9.7.2 Confirmation Sampling

Once complete, each excavation area will be sampled at the bottom and sidewalls to verify remaining contaminant concentrations, if any. Confirmation soil sample locations will be determined in the field, as the excavation progresses.

A 10 foot by 10 foot sampling grid will be established to collect the excavation bottom samples. Sidewall samples will be collected at approximately 20-foot intervals or approximate 10 foot intervals in irregularly shaped excavation areas. In the smaller excavation areas, sampling will be conducted at closer spacings, to ensure adequate confirmation of impacted soil removal, as appropriate. At a minimum, the smaller excavations will have one confirmation sample per sidewall and one confirmation sample from the excavation bottom. Additional confirmation sampling will be implemented if any impacted soil is encountered, based on visual/olfactory field observations.

Arsenic and lead (as applicable) will be analyzed in the field using an X-ray fluorescence (XRF) unit to determine if arsenic or lead detections meet the proposed cleanup goal. Detections will be confirmed with laboratory analysis of the same confirmation sample at the corresponding location.

Confirmation samples for COCs will be collected using a clean trowel or plastic disposable trowels and transferred directly into sampling jars or tubes. The final confirmation samples will be properly covered, labeled and stored onsite in a cooled chest prior to delivery to a California laboratory certified by the Environmental Laboratory Accreditation Program.

Confirmation soil samples will be delivered to the laboratory on the same day collected, if time permits, and no later than the day following collection. The samples will be secured under proper chain-of-custody documentation until delivery.

Confirmation samples will be analyzed as follows.

- Arsenic - U.S. EPA Method 6020
- Lead – U.S. EPA Method 6010

If confirmation sampling results indicate the target cleanup goals have not been attained, further soil sampling and/or soil excavation will be conducted. The excavation will terminate when the cleanup goals are met or it becomes impractical to continue excavating, such as the excavation boundary reaching a subsurface utility, a property boundary, or a site/building feature (i.e. building wall, planter wall, fence line, building staircase or ramp). Detailed information on soil sampling and analysis is provided in the *Quality Assurance Project Plan* (**Appendix B**). The excavated areas will be backfilled in accordance with procedures described below.

9.8 Transportation Plan for OffSite Disposal

As soil is excavated, it will be direct-loaded for transportation offsite or temporarily stockpiled onsite until offsite transportation and disposal can be arranged. Offsite transportation and disposal will typically be conducted during weekdays between 8:00 a.m. and 3:00 p.m. Detailed information on waste transportation and disposal are described in the *Transportation Plan* (**Appendix C**).

The RA Contractor will coordinate transportation and offsite disposal of all wastes generated during the removal action field activities according to local, California, and Federal laws and regulations. Approval of the waste material will be received from the disposal facility before soil is transported offsite for lawful disposition. Once the disposal facility is confirmed, the soil will be transported for disposal. The haul trucks may be loaded only to the maximum tonnage as authorized by the US Department of Transportation (US DOT) to prevent overloading and avoid weight issues.

9.9 Delineation of Remaining Impacted Soil

In the event soils greater than the cleanup goal are encountered deeper than the feasible removal depths for the site, or where the excavation reaches a subsurface utility, a property boundary, or a site/building feature (i.e. building wall, planter wall, fence line, building staircase or ramp) delineation of remaining impacted soil will be required. The remaining impacted soil will be delineated using a geotextile fabric the covers the entire impacted soil area, including the excavation sidewalls and excavation bottoms. If necessary, the remaining impacted soil should be surveyed by a Licensed Surveyor and located on Project Plans for the site, for future planning use and to prevent exposure to site workers.

9.10 Site Restoration

Since the soil excavations from the arsenic and lead impacted soil areas from will be conducted at the start of the construction activities, the excavations will not be backfilled as part of the soil removal activities in this RAW. Once approved by LAUSD-OEHS, the general contractor can re-grade or backfill as needed. If import soil is required to backfill, the imported material will be from an OEHS-approved source, or will be characterized for import in accordance with OEHS Specification 01 4524 for Environmental Import/Export Materials Testing (LAUSD-OEHS, 2018).

OEHS Specification 01 4524 will also be followed to characterize any rinseate or solid waste remaining onsite from decontamination procedures. Once characterized, the wastes will be removed from the site within 30 days of production.

10.0 REPORTING

A report detailing the removal action will be prepared for submittal to LAUSD. The report will document all field activities, including areas of excavation, final disposition of the soil and transport and disposal documentation, results of confirmation soil sampling, dust monitoring and suppression activities, and soil compaction reporting.

As conditions in the field can vary, it may become necessary to implement modifications to soil removal activities as presented in this RAW. These variations will be documented in the final report.

11.0 REFERENCES

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6. DTSC, Undated (accessed September 20, 2016). Determination of a Southern California Regional Background Arsenic Concentration in Soil, http://www.dtsc.ca.gov/upload/Background- Arsenic.pdf.
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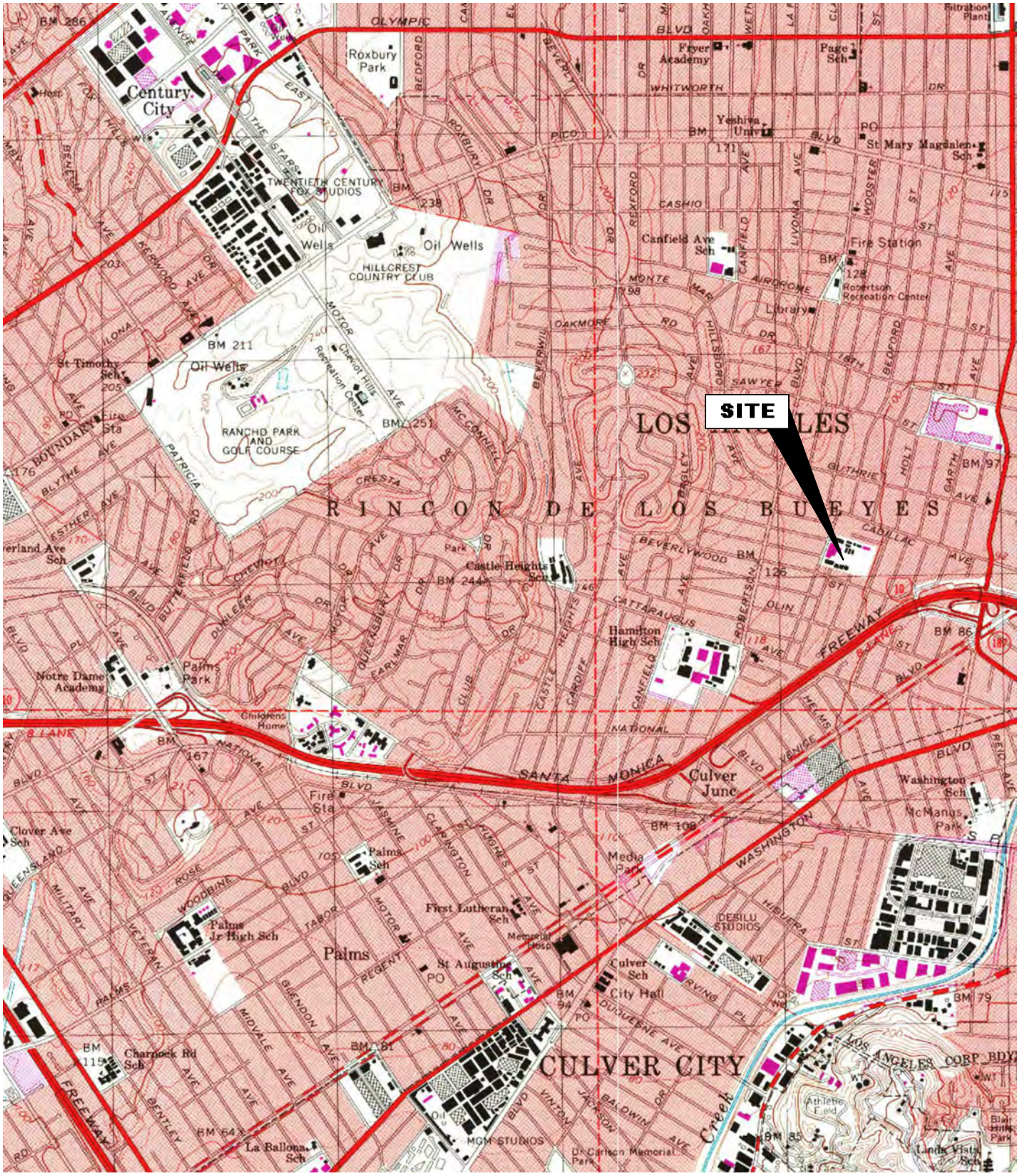
FIGURES



Map Information:
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
34°2'18.6252"N 118°23'2.85"W

MONTROSE ENVIRONMENTAL
1 Park Plaza, Suite 1000, Irvine, CA 92614 | t 714.919.6500 | f 949.988.3514

N

0 2000

APPROX. SCALE: 1" = 2000'

FIGURE 1

SITE LOCATION MAP

Shenandoah Elementary School
2450 Shenandoah Street
Los Angeles, California

DATE DRAWN
10/01/2019

PROJECT NO.
191395

FILE NO.
191395F1-SLM

R:\03_Site Assessment & Remediation\LAUSD\Shenandoah Street Elementary\Figures\191395F1-SLM.dwg

DAVID AVE.

RESIDENTIAL AREA

RESIDENTIAL AREA

RESIDENTIAL AREA

W 24TH ST.

RESIDENTIAL AREA

W 25TH ST.

RESIDENTIAL AREA

SHENADOAH ST.

NORTH BUILDING

BOILER

MAIN BUILDING

PLAY AREA

PARKING

PROPOSED NEW BUILDING FOOTPRINT

PARKING

GRASS AREA

SHENADOAH STREET EARLY EDUCATION CENTER

RESIDENTIAL AREA

RESIDENTIAL AREA

S BEDFORD ST.

S HALM AVE.

BEVERLYWOOD ST.

SB-1, SB-1A, SB-1B, SB-1C, SB-2, SB-3, SB-3A, SB-3B, SB-4, SB-5, SB-5A, SB-5B, SB-5C, SB-6, SB-7, SB-7A, SB-7B, SB-8, SB-9, SB-10, SB-11, SB-12, SB-13, SB-14, SB-15, SB-15A, SB-15B, SB-16, SB-17, SB-18, SB-19, SB-20, SB-21, SB-22, SB-23, SB-24, SB-25, SB-26, SB-27, SB-28, SB-29, SB-30, SB-30A, SB-30B, SB-30C, SB-31, SB-32, SB-33, SB-33A, SB-33B, SB-33C, SB-33D, SB-34, SB-35, SB-36, SB-37, SB-37A, SB-37B, SB-37C, SB-37C2, SB-37C3, SB-37D, SB-37D2, SB-38, SB-39, SB-39A, SB-39B, SB-39D, SB-40, SB-41, SB-42, SB-42A, SB-42A2, SB-42B, SB-42C, SB-42D, SB-42D2, SB-43, SB-44, SB-44B, SB-44D, SB-45, SB-46, SB-47, SB-47B, SB-47C, SB-47D, SB-48, SB-48B, SB-48C, SB-48D, SB-49, SB-50, SB-50A, SB-50A2, SB-50AB2, SB-50B, SB-50B2, SB-50B3, SB-50C, SB-50D, SB-51, SB-51A, SB-51B, SB-51C, SB-51D, SB-52, SB-52A, SB-52B, SB-52C, SB-52D, SB-53, SB-53A, SB-53B, SB-53D, SB-53D2, SB-54, SB-54A, SB-54B, SB-54C, SB-54D, SB-55, SB-55A, SB-55B, SB-55B2, SB-55C, SB-55C2, SB-55D, SB-56, SB-57, SB-57A, SB-57B, SB-57B2, SB-57C, SB-57D, SB-58, SB-59, SB-60, SB-61, SB-62, SB-63, SB-64, SB-65, SB-66, SB-67, SB-68, SB-69, SB-70, SB-71, SB-72, SB-73, SB-74, SB-75, SB-76, SB-77, SB-78, SB-79, SB-80, SB-81, SB-82, SB-83, SB-84

EXPLANATION

- APPROXIMATE SUBJECT PROPERTY LINE
- TRANSFORMER
- PROPOSED NEW BUILDING FOOTPRINT
- SOIL BORING LOCATION 11/19–11/20/2018
- SOIL BORING LOCATION 02/18/2019
- SOIL BORING LOCATION 04/16–04/17/2019
- SOIL BORING LOCATION 06/18–06/19/2019
- SOIL BORING LOCATION 08/30/2019
- SOIL BORING LOCATION 09/21/2019
- SOIL BORING LOCATION 11/02/2019
- TRUCK ACCESS LOCATION

N

0 80 160

APPROXIMATE SCALE (FEET)

1INCH = 80 FEET

MONTROSE ENVIRONMENTAL

1631 E. Saint Andrew Place, Santa Ana, CA 92705 | t 714.919.6500

FIGURE 2

SITE PLAN WITH BORING LOCATIONS

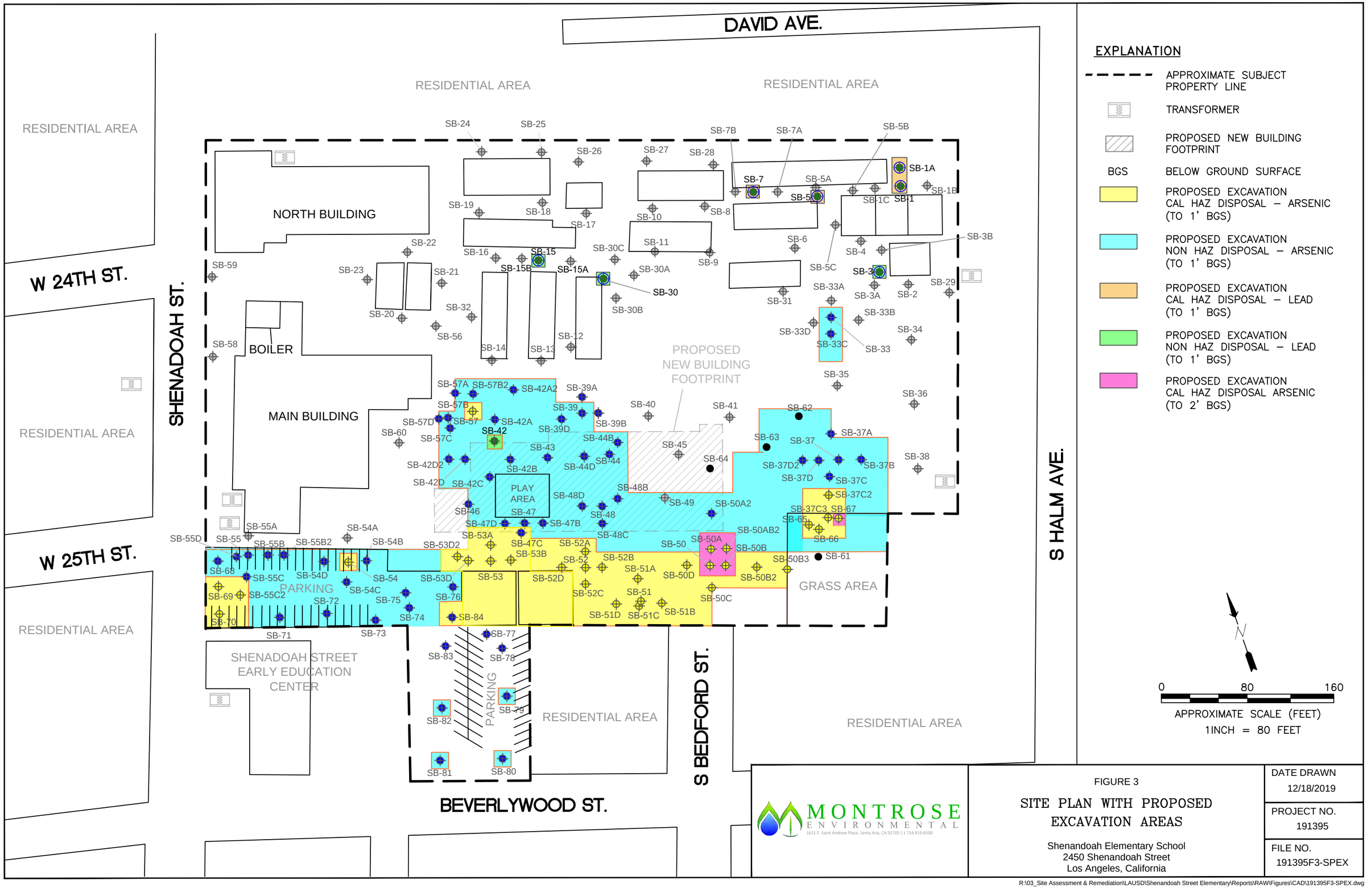
Shenandoah Elementary School
2450 Shenandoah Street
Los Angeles, California

DATE DRAWN
01/07/2020

PROJECT NO.
191395

FILE NO.
191395F2-SPASOB

R:\03_Site Assessment & Remediation\LAUSD\Shenandoah Street Elementary\Reports\PEA-E\Figures\191395F2-SP-updated.dwg



MONTROSE ENVIRONMENTAL
1631 E. Saint Andrew Place, Santa Ana, CA 92705 | t 714.919.6500

FIGURE 3

SITE PLAN WITH PROPOSED EXCAVATION AREAS

Shenandoah Elementary School
2450 Shenandoah Street
Los Angeles, California

DATE DRAWN 12/18/2019

PROJECT NO. 191395

FILE NO. 191395F3-SPEX

R:\03_Site Assessment & Remediation\LAUSD\Shenandoah Street Elementary\Reports\RAW\Figures\CAD\191395F3-SPEX.dwg

TABLES

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-1-0.5	0.5	11/20/2018	**212**	3.72
SB-1-1.5	1.5	11/20/2018	8.62	--
SB-1A-0.5	0.5	2/18/2019	**157**	--
SB-1A-1.5	1.5	2/18/2019	49.6	--
SB-1B-0.5	0.5	2/18/2019	6.23	--
SB-1B-1.5	1.5	2/18/2019	5.02	--
SB-1C-0.5	0.5	2/18/2019	9.84	--
SB-1C-1.5	1.5	2/18/2019	3.62	--
SB-2-0.5	0.5	11/20/2018	8.86	4.05
SB-2-1.5	1.5	11/20/2018	--	--
SB-3-0.5	0.5	11/20/2018	**88.7**	1.624J
SB-3-1.5	1.5	11/20/2018	4.54	--
SB-3A-0.5	0.5	11/20/2018	5.08	--
SB-3A-1.5	1.5	11/20/2018	5.79	--
SB-3B-0.5	0.5	11/20/2018	3.82	--
SB-3B-1.5	1.5	11/20/2018	4.28	--
SB-4-0.5	0.5	11/20/2018	17.3	4.65
SB-4-1.5	1.5	11/20/2018	--	--
SB-5-0.5	0.5	11/20/2018	47.9	3.00
SB-5-0.5 (Dup)	0.5	11/20/2018	**131**	1.932J
SB-5-1.5	1.5	11/20/2018	6.62	--
SB-5A-0.5	0.5	2/18/2019	34	--
SB-5A-1.5	1.5	2/18/2019	6.21	--
SB-5B-0.5	0.5	2/18/2019	12.1	--
SB-5B-1.5	1.5	2/18/2019	5.64	--
SB-5C-0.5	0.5	2/18/2019	6.19	--
SB-5C-1.5	1.5	2/18/2019	5.78	--
SB-6-0.5	0.5	11/20/2018	15.0	5.09
SB-6-1.5	1.5	11/20/2018	--	--
SB-7-0.5	0.5	11/20/2018	**175**	3.14
SB-7-1.5	1.5	11/20/2018	5.53	--
SB-7A-0.5	0.5	2/18/2019	15.6	--
SB-7A-1.5	1.5	2/18/2019	4.36	--
SB-7B-0.5	0.5	2/18/2019	14.2	--
SB-7B-1.5	1.5	2/18/2019	11.2	--
SB-8-0.5	0.5	11/19/2018	6.57	3.57
SB-8-1.5	1.5	11/19/2018	--	--
SB-9-0.5	0.5	11/20/2018	8.34	5.31
SB-9-1.5	1.5	11/20/2018	--	--
SB-10-0.5	0.5	11/19/2018	8.08	7.87

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-10-1.5	1.5	11/19/2018	--	--
SB-11-0.5	0.5	11/20/2018	5.31	5.01
SB-11-0.5 (Dup)	0.5	11/20/2018	5.64	4.01
SB-11-1.5	1.5	11/20/2018	--	--
SB-12-0.5	0.5	11/19/2018	4.92	4.95
SB-12-1.5	1.5	11/19/2018	--	--
SB-13-0.5	0.5	11/19/2018	3.06	5.64
SB-13-1.5	1.5	11/19/2018	--	--
SB-14-0.5	0.5	11/19/2018	1.70	2.15J
SB-14-1.5	1.5	11/19/2018	--	--
SB-15-0.5	0.5	11/20/2018	**112**	5.58J
SB-15-1.5	1.5	11/20/2018	5.73	--
SB-15A-0.5	0.5	2/18/2019	5.24	--
SB-15A-1.5	1.5	2/18/2019	3.09	--
SB-15B-0.5	0.5	2/18/2019	6.58	--
SB-15B-1.5	1.5	2/18/2019	3.90	--
SB-16-0.5	0.5	11/20/2018	12.0	5.09
SB-16-0.5 (Dup)	0.5	11/20/2018	9.88	5.18
SB-16-1.5	1.5	11/20/2018	--	--
SB-17-0.5	0.5	11/19/2018	10.3	4.49
SB-17-1.5	1.5	11/19/2018	--	--
SB-18-0.5	0.5	11/19/2018	28.6	6.62
SB-18-1.5	1.5	11/19/2018	--	--
SB-19-0.5	0.5	11/19/2018	6.31	4.54
SB-19-1.5	1.5	11/19/2018	--	--
SB-20-0.5	0.5	11/19/2018	7.16	5.96
SB-20-1.5	1.5	11/19/2018	--	--
SB-21-0.5	0.5	11/19/2018	20.4	5.97
SB-21-1.5	1.5	11/19/2018	--	--
SB-22-0.5	0.5	11/19/2018	8.57	1.940J
SB-22-1.5	1.5	11/19/2018	--	--
SB-23-0.5	0.5	11/19/2018	19.1	10.4
SB-23-1.5	1.5	11/19/2018	--	--
SB-24-0.5	0.5	11/20/2018	18.8	6.27
SB-24-1.5	1.5	11/20/2018	--	--
SB-25-0.5	0.5	11/20/2018	29.5	4.61
SB-25-0.5 (Dup)	0.5	11/20/2018	56.9	4.73
SB-25-1.5	1.5	11/20/2018	--	--
SB-26-0.5	0.5	11/19/2018	25.8	5.53
SB-26-1.5	1.5	11/19/2018	--	--

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-27-0.5	0.5	11/19/2018	7.18	4.26
SB-27-1.5	1.5	11/19/2018	--	--
SB-28-0.5	0.5	11/19/2018	10.1	3.45
SB-28-0.5 (Dup)	0.5	11/19/2018	21.0	3.92
SB-28-1.5	1.5	11/19/2018	--	--
SB-29-3.0	3.0	11/20/2018	--	--
SB-30-0.5	0.5	11/20/2018	**94.1**	5.23
SB-30-1.5	1.5	11/20/2018	5.17	--
SB-30A-0.5	0.5	2/18/2019	5.04	--
SB-30A-1.5	1.5	2/18/2019	4.62	--
SB-30B-0.5	0.5	2/18/2019	5.04	--
SB-30B-1.5	1.5	2/18/2019	3.65	--
SB-30C-0.5	0.5	2/18/2019	6.64	--
SB-30C-1.5	1.5	2/18/2019	5.13	--
SB-31-0.5	0.5	11/20/2018	6.26	5.02
SB-31-1.5	1.5	11/20/2018	--	--
SB-32-0.5	0.5	11/20/2018	5.55	6.14
SB-32-1.5	1.5	11/20/2018	--	--
SB-33-0.5	0.5	4/16/2019	11.7	**14.4**
SB-33-1.5	1.5	4/16/2019	5.32	5.89
SB-33A-0.5	0.5	6/19/2019	--	5.02
SB-33A-1.5	1.5	6/19/2019	--	--
SB-33B-0.5	0.5	6/19/2019	--	6.18
SB-33B-1.5	1.5	6/19/2019	--	--
SB-33C-0.5	0.5	6/19/2019	--	**29.2**
SB-33C-0.5 (Dup)	0.5	6/19/2019	--	**23.5**
SB-33C-1.5	1.5	6/19/2019	--	--
SB-33D-0.5	0.5	6/19/2019	--	5.45
SB-33D-1.5	1.5	6/19/2019	--	8.75
SB-34-0.5	0.5	4/16/2019	72.2	4.03
SB-34-1.5	1.5	4/16/2019	4.86	5.30
SB-35-0.5	0.5	4/16/2019	9.61	3.93
SB-35-1.5	1.5	4/16/2019	4.12	5.91
SB-36-0.5	0.5	4/16/2019	6.16	5.44
SB-36-1.5	1.5	4/16/2019	7.70	7.54
SB-37-0.5	0.5	4/16/2019	5.68	5.85
SB-37-1.5	1.5	4/16/2019	12.1	**14.8**
SB-37A-0.5	0.5	6/19/2019	--	5.44
SB-37A-1.5	1.5	6/19/2019	--	--
SB-37B-0.5	0.5	6/19/2019	--	**27.5**

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-37B-0.5 (Dup)	0.5	6/19/2019	--	**32.7**
SB-37B-1.5	1.5	6/19/2019	--	--
SB-37C-0.5	0.5	6/19/2019	--	**89.9**
SB-37C-1.5	1.5	6/19/2019	--	7.61
SB-37C2-0.5	0.5	8/30/2019	--	**189**
SB-37C2-1.5	1.5	8/30/2019	--	**38.2**
SB-37C3-0.5	0.5	8/30/2019	--	**136**
SB-37C3-1.5	1.5	8/30/2019	--	**45.3**
SB-37D-0.5	0.5	6/19/2019	--	**31.8**
SB-37D-1.5	1.5	6/19/2019	--	7.90
SB-37D2-0.5	0.5	8/30/2019	--	**57.4**
SB-37D2-0.5 (Dup)	0.5	8/30/2019	--	**48.6**
SB-37D2-1.5	1.5	8/30/2019	--	**35.5**
SB-38-0.5	0.5	4/16/2019	47.0	6.60
SB-38-1.5	1.5	4/16/2019	5.25	6.79
SB-39-0.5	0.5	4/17/2019	24.7	**21.1**
SB-39-0.5 (Dup)	0.5	4/17/2019	12.1	7.98
SB-39-1.5	1.5	4/17/2019	4.60	6.30
SB-39-2.5	2.5	4/17/2019	2.97	9.61
SB-39A-0.5	0.5	6/18/2019	--	6.16
SB-39A-1.5	1.5	6/18/2019	--	--
SB-39A-2.5	2.5	6/18/2019	--	--
SB-39B-0.5	0.5	6/18/2019	--	5.70
SB-39B-1.5	1.5	6/18/2019	--	--
SB-39B-2.5	2.5	6/18/2019	--	--
SB-39D-0.5'	0.5	6/18/2019	--	8.26
SB-39D-1.5'	1.5	6/18/2019	--	--
SB-39D-2.5'	2.5	6/18/2019	--	--
SB-40-0.5	0.5	4/17/2019	7.31	5.66
SB-40-1.5	1.5	4/17/2019	3.98	5.17
SB-40-2.5	2.5	4/17/2019	3.62	7.95
SB-41-0.5	0.5	4/16/2019	3.45	5.94
SB-41-1.5	1.5	4/16/2019	4.59	6.76
SB-41-2.5	2.5	4/16/2019	4.02	8.96
SB-42-0.5	0.5	4/17/2019	**110**	0.448
SB-42-1.5	1.5	4/17/2019	3.86	6.77
SB-42-2.5	2.5	4/17/2019	3.56	9.57
SB-42A-0.5	0.5	6/18/2019	29.0	**99.7**
SB-42A-1.5	1.5	6/18/2019	--	5.39
SB-42A-2.5	2.5	6/18/2019	--	6.81

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-42A2-0.5	0.5	8/30/2019	--	**43.2**
SB-42A2-1.5	1.5	8/30/2019	--	5.37
SB-42B-0.5	0.5	6/18/2019	13.2	**19.1**
SB-42B-1.5	1.5	6/19/2019	--	--
SB-42B-2.5	2.5	6/19/2019	--	--
SB-42C-0.5	0.5	6/19/2019	12.3	**35.6**
SB-42C-1.5	1.5	6/19/2019	--	6.96
SB-42C-1.5 (Dup)	1.5	6/19/2019	--	--
SB-42C-2.5	2.5	6/19/2019	--	7.35
SB-42D-0.5	0.5	6/19/2019	39.5	**33.8**
SB-42D-1.5	1.5	6/19/2019	--	6.72
SB-42D-2.5	2.5	6/19/2019	--	6.66
SB-42D2-0.5	0.5	8/30/2019	--	**61.9**
SB-42D2-1.5	1.5	8/30/2019	--	7.52
SB-43-0.5	0.5	4/17/2019	5.42	6.15
SB-43-0.5 (Dup)	0.5	4/17/2019	4.82	6.76
SB-43-1.5	1.5	4/17/2019	3.58	6.22
SB-43-2.5	2.5	4/17/2019	3.62	7.31
SB-44-0.5	0.5	4/17/2019	16.5	**48.5**
SB-44-1.5	1.5	4/17/2019	3.47	6.72
SB-44-2.5	2.5	4/17/2019	4.00	6.75
SB-44B-0.5	0.5	6/18/2019	--	4.67
SB-44B-1.5	1.5	6/18/2019	--	--
SB-44B-1.5 (Dup)	1.5	6/18/2019	--	--
SB-44B-2.5	2.5	6/18/2019	--	--
SB-44D-0.5	0.5	6/18/2019	--	**15.9**
SB-44D-1.5	2.5	6/18/2019	--	6.66
SB-44D-2.5	2.5	6/18/2019	--	7.19
SB-45-0.5	0.5	4/16/2019	15.0	6.02
SB-45-1.5	1.5	4/16/2019	4.60	5.00
SB-45-2.5	2.5	4/16/2019	7.64	9.83
SB-46-0.5	0.5	4/17/2019	35.6	2.48
SB-46-1.5	1.5	4/17/2019	4.78	5.17
SB-46-2.5	2.5	4/17/2019	5.95	8.21
SB-47-0.5	0.5	4/17/2019	15.0	**25.9**
SB-47-1.5	1.5	4/17/2019	3.38	6.96
SB-47-1.5 (Dup)	1.5	4/17/2019	4.69	6.38
SB-47-2.5	2.5	4/17/2019	6.18	8.97
SB-47B-0.5	0.5	6/18/2019	--	**13.2**
SB-47B-0.5 (Dup)	0.5	6/18/2019	--	**27.0**

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-47B-1.5	1.5	6/18/2019	--	--
SB-47B-2.5	2.5	6/18/2019	--	--
SB-47C-0.5	0.5	6/18/2019	--	**131**
SB-47C-0.5	0.5	7/23/2019		1.45
SB-47C-1.5	1.5	6/18/2019	--	6.28
SB-47C-2.5	2.5	6/18/2019	--	8.30
SB-47D-0.5	0.5	6/18/2019	--	6.18
SB-47D-1.5	1.5	6/18/2019	--	--
SB-47D-2.5	2.5	6/18/2019	--	--
SB-48-0.5	0.5	4/17/2019	11.5	**30.6**
SB-48-1.5	1.5	4/17/2019	5.2	5.69
SB-48-2.5	2.5	4/17/2019	5.95	7.14
SB-48B-0.5	0.5	6/18/2019	--	**15.5**
SB-48B-1.5	1.5	8/13/2019	--	7.35
SB-48B-2.5	2.5	6/18/2019	--	6.59
SB-48C-0.5	0.5	6/18/2019	--	5.90
SB-48C-1.5	1.5	6/18/2019	--	--
SB-48C-2.5	2.5	6/18/2019	--	--
SB-48D-0.5	0.5	6/18/2019	--	**15.3**
SB-48D-1.5	1.5	6/18/2019	--	6.22
SB-48D-2.5	2.5	6/18/2019	--	7.84
SB-49-0.5	0.5	4/17/2019	5.64	6.46
SB-49-1.5	1.5	4/17/2019	4.94	6.30
SB-49-1.5 (Dup)	0.5	4/17/2019	4.15	5.32
SB-49-2.5	2.5	4/17/2019	5.59	8.66
SB-50-0.5	0.5	4/16/2019	21.9	**69.0**
SB-50-1.5	1.5	4/16/2019	56.4	6.98
SB-50A-0.5	0.5	6/19/2019	--	**22.8**
SB-50A-1.5	1.5	6/19/2019	--	6.24
SB-50A2-0.5	0.5	8/30/2019	--	9.94
SB-50A2-0.5 (Dup)	0.5	8/30/2019	--	**14.1**
SB-50A2-1.5	1.5	8/30/2019	--	--
SB-50A2-2.5	1.5	8/30/2019	--	--
SB-50AB2-0.5	0.5	8/30/2019	--	6.34
SB-50AB2-1.5	1.5	8/30/2019	--	6.02
SB-50B-0.5	0.5	6/19/2019	--	**633**
SB-50B-1.5	1.5	6/19/2019	--	**56.6**
SB-50B2-0.5	0.5	8/30/2019	--	**140**
SB-50B2-1.5	1.5	8/30/2019	--	5.62
SB-50B3-0.5	0.5	8/30/2019	--	9.12

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-50B3-1.5	1.5	8/30/2019	--	8.33
SB-50C-0.5	0.5	6/19/2019	--	7.71
SB-50C-1.5	1.5	6/19/2019	--	--
SB-50D-0.5	0.5	6/19/2019	--	**69.0**
SB-50D-0.5 (Dup)	0.5	6/19/2019	--	**32.1**
SB-50D-1.5	1.5	6/19/2019	--	6.39
SB-51-0.5	0.5	4/16/2019	11.4	**218**
SB-51-1.5	1.5	4/16/2019	5.18	10.7
SB-51A-0.5	0.5	6/19/2019	--	**26.8**
SB-51A-1.5	1.5	6/19/2019	--	--
SB-51B-0.5	0.5	6/19/2019	--	**395**
SB-51B-1.5	1.5	6/19/2019	--	11.0
SB-51C-0.5	0.5	6/19/2019	--	**136**
SB-51C-1.5	1.5	6/19/2019	--	8.42
SB-51D-0.5	0.5	6/19/2019	--	**92.9**
SB-51D-1.5	1.5	6/19/2019	--	8.86
SB-52-0.5	0.5	4/16/2019	40.4	**233**
SB-52-1.5	1.5	4/16/2019	5.27	6.30
SB-52A-0.5	0.5	6/18/2019	--	**15.0**
SB-52A-1.5	1.5	6/18/2019	--	--
SB-52B-0.5	0.5	6/18/2019	--	5.52
SB-52B-1.5	1.5	6/18/2019	--	--
SB-52C-0.5	0.5	6/18/2019	--	**27.7**
SB-52C-1.5	1.5	6/18/2019	--	--
SB-52D-0.5	0.5	6/18/2019	--	**23.5**
SB-52D-1.5	1.5	6/18/2019	--	--
SB-53-0.5	0.5	4/16/2019	3.08	**129**
SB-53-0.5 (Dup)	0.5	4/16/2019	44.1	**252**
SB-53-1.5	1.5	4/16/2019	3.54	6.61
SB-53A-0.5	0.5	6/18/2019	--	**54.9**
SB-53A-1.5	1.5	6/18/2019	--	--
SB-53B-0.5	0.5	6/18/2019	--	**65.3**
SB-53B-1.5	1.5	6/18/2019	--	--
SB-53B-1.5 (Dup)	1.5	6/18/2019	--	--
SB-53D-0.5	0.5	6/18/2019	--	**136**
SB-53D-1.5	1.5	6/18/2019	--	--
SB-53D2-0.5	0.5	8/30/2019	--	**118**
SB-53D2-1.5	1.5	8/30/2019	--	7.12
SB-54-0.5	0.5	4/16/2019	23.4	**124**
SB-54-1.5	1.5	4/16/2019	4.93	5.59

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-54A-0.5	0.5	6/19/2019	--	5.35
SB-54A-1.5	1.5	6/19/2019	--	--
SB-54B-0.5	0.5	6/19/2019	--	8.83
SB-54B-1.5	1.5	6/19/2019	--	--
SB-54C-0.5	0.5	6/19/2019	--	5.65
SB-54C-1.5	1.5	6/19/2019	--	--
SB-54D-0.5	0.5	6/19/2019	--	9.40
SB-54D-1.5	1.5	6/19/2019	--	--
SB-55-0.5	0.5	4/16/2019	5.85	**59.7**
SB-55-1.5	1.5	4/16/2019	4.48	6.90
SB-55-0.5 (Dup)	0.5	4/16/2019	2.40	6.16
SB-55A-0.5	0.5	6/19/2019	--	6.41
SB-55A-1.5	1.5	6/19/2019	--	--
SB-55B-0.5	0.5	6/19/2019	--	**87.3**
SB-55B-1.5	1.5	6/19/2019	--	8.35
SB-55B2-0.5	0.5	8/30/2019	--	**86.4**
SB-55B2-1.5	1.5	8/30/2019	--	7.83
SB-55C-0.5	0.5	6/19/2019	--	**55.4**
SB-55C-1.5	1.5	6/19/2019	--	7.75
SB-55C-1.5 (Dup)	1.5	6/19/2019	--	--
SB-55C2-0.5	0.5	8/30/2019	--	**128**
SB-55C2-1.5	1.5	8/30/2019	--	**17.5**
SB-55D-0.5	0.5	6/19/2019	--	**21.1**
SB-55D-1.5	1.5	6/19/2019	--	6.96
SB-56-0.5	0.5	4/17/2019	6.05	6.45
SB-56-1.5	1.5	4/17/2019	3.59	5.90
SB-56-2.5	2.5	4/17/2019	6.20	7.86
SB-57-0.5	0.5	4/17/2019	7.52	**12.5**
SB-57-1.5	1.5	4/17/2019	4.49	5.38
SB-57-2.5	2.5	4/17/2019	4.07	8.23
SB-57A-0.5	0.5	6/18/2019	--	6.03
SB-57A-1.5	1.5	6/18/2019	--	--
SB-57A-2.5	2.5	6/18/2019	--	--
SB-57B-0.5	0.5	6/18/2019	--	**151**
SB-57B-1.5	1.5	6/18/2019	--	5.42
SB-57B-2.5	2.5	6/18/2019	--	--
SB-57B2-0.5	0.5	8/30/2019	--	**99.3**
SB-57B2-1.5	1.5	8/30/2019	--	5.01
SB-57C-0.5	0.5	6/18/2019	--	6.95
SB-57C-1.5	1.5	6/18/2019	--	--

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-57C-1.5 (Dup)	1.5	6/18/2019	--	--
SB-57C-2.5	2.5	6/18/2019	--	--
SB-57D-0.5	0.5	6/18/2019	--	6.86
SB-57D-1.5	1.5	6/18/2019	--	--
SB-57D-2.5	2.5	6/18/2019	--	--
SB-58-0.5	0.5	4/16/2019	16.4	7.17
SB-58-1.5	1.5	4/16/2019	16.4	9.06
SB-58-2.5	2.5	4/16/2019	4.51	6.36
SB-59-0.5	0.5	4/16/2019	44.1	6.22
SB-59-1.5	1.5	4/16/2019	6.12	6.37
SB-59-2.5	2.5	4/16/2019	4.75	6.83
SB-60-0.5	0.5	4/16/2019	41.1	8.51
SB-60-0.5 (Dup)	0.5	4/16/2019	8.64	8.06
SB-60-1.5	1.5	4/16/2019	--	--
SB-61-0.5	0.5	9/21/2019	--	9.85
SB-61-1.5	1.5	9/21/2019	--	6.64
SB-62-0.5	0.5	9/21/2019	--	**14.7**
SB-62-1.5	1.5	9/21/2019	--	8.73
SB-63-0.5	0.5	9/21/2019	--	**25.8**
SB-63-1.5	1.5	9/21/2019	--	8.22
SB-64-0.5	0.5	9/21/2019	--	7.18
SB-64-1.5	1.5	9/21/2019	--	8.81
SB-64-2.5	2.5	9/21/2019	--	9.64
SB-65-0.5	0.5	11/2/2019	--	7.94
SB-65-1.0	1.0	11/2/2019	--	**190**
SB-65-1.5	1.5	11/2/2019	--	11.8
SB-66-0.5	0.5	11/2/2019	--	**33.4**
SB-66-1.0	1.0	11/2/2019	--	**144**
SB-66-1.5	1.5	11/2/2019	--	**12.6**
SB-67-0.5	0.5	11/2/2019	--	**68.8**
SB-67-1.0	1.0	11/2/2019	--	**271**
SB-67-1.5	1.5	11/2/2019	--	**74.4**
SB-68-0.5	0.5	11/2/2019	--	8.18
SB-68-1.0	1.0	11/2/2019	--	9.45
SB-68-1.5	1.5	11/2/2019	--	8.24
SB-69-0.5	0.5	11/2/2019	--	**260**
SB-69-1.0	1.0	11/2/2019	--	8.34
SB-69-1.5	1.5	11/2/2019	--	9.13
SB-70-0.5	0.5	11/2/2019	--	**115**
SB-70-1.0	1.0	11/2/2019	--	6.98

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			80*	12**
SB-70-1.5	1.5	11/2/2019	--	9.27
SB-71-0.5	0.5	11/2/2019	--	**63**
SB-71-1.0	1.0	11/2/2019	--	8.77
SB-71-1.5	1.5	11/2/2019	--	**27**
SB-72-0.5	0.5	11/2/2019	--	**32.1**
SB-72-1.0	1.0	11/2/2019	--	**13**
SB-72-1.5	1.5	11/2/2019	--	**16.7**
SB-73-0.5	0.5	11/2/2019	--	**84.2**
SB-73-1.0	1.0	11/2/2019	--	9.7
SB-73-1.5	1.5	11/2/2019	--	6.59
SB-74-0.5	0.5	11/2/2019	--	**47.1**
SB-74-1.0	1.0	11/2/2019	--	8.41
SB-74-1.5	1.5	11/2/2019	--	**20.9**
SB-75-0.5	0.5	11/2/2019	--	**111**
SB-75-1.0	1.0	11/2/2019	--	9.16
SB-75-1.5	1.5	11/2/2019	--	4.71
SB-76-0.5	0.5	11/2/2019	--	**53.9**
SB-76-1.0	1.0	11/2/2019	--	5.09
SB-76-1.5	1.5	11/2/2019	--	8.73
SB-77-0.5	0.5	11/2/2019	--	5.74
SB-77-1.0	1.0	11/2/2019	--	8.23
SB-77-1.5	1.5	11/2/2019	--	5.3
SB-78-0.5	0.5	11/2/2019	--	5.56
SB-78-1.0	1.0	11/2/2019	--	6.5
SB-78-1.5	1.5	11/2/2019	--	7.22
SB-79-0.5	0.5	11/2/2019	--	9.6
SB-79-1.0	1.0	11/2/2019	--	10.7
SB-79-1.5	1.5	11/2/2019	--	7.53
SB-80-0.5	0.5	11/2/2019	--	**13.4**
SB-80-1.0	1.0	11/2/2019	--	5.84
SB-80-1.5	1.5	11/2/2019	--	7.95
SB-81-0.5	0.5	11/2/2019	--	**18.7**
SB-81-1.0	1.0	11/2/2019	--	**19.8**
SB-81-1.5	1.5	11/2/2019	--	5.68
SB-82-0.5	0.5	11/2/2019	--	**12.1**
SB-82-1.0	1.0	11/2/2019	--	6.78
SB-82-1.5	1.5	11/2/2019	--	4.94
SB-83-0.5	0.5	11/2/2019	--	7.61
SB-83-1.0	1.0	11/2/2019	--	6.99
SB-83-1.5	1.5	11/2/2019	--	7.49

Table 1
Summary of Shallow Soil Sample Lead and Arsenic Results
Shenandoah Street Elementary School
Los Angeles, CA

Boring ID	Depth (ft bgs)	Sample Date	Lead EPA Method 6010B	Arsenic EPA Method 6020
			mg/kg	
Site Screening Levels			**80***	**12****
SB-84-0.5	0.5	11/2/2019	--	**153**
SB-84-1.0	1.0	11/2/2019	--	**71.6**
SB-84-1.5	1.5	11/2/2019	--	10.9

NOTES:
-- = Not Analyzed
Highlighted Value = Exceeds Site Screening Levels
mg/kg = milligrams per kilogram
DUP = Duplicate
Highlighted results exceed the respective Site Screening Levels
ND = Indicated constituent not detected at or above the MDL
J = Result is an estimated value between the Reporting Detection Limit (RDL) and the Method Detection Limit (MDL)
80* = Department of Toxic Substances (DTSC) HERO Note 3 Modified Screening Levels for Residential Soil
12** = Southern California Regional Background Concentration for Residential Soil (DTSC)

Table 2
Summary of Shallow Soil STLC and TCLP Results
Shenandoah Street Elementary School
Los Angeles, CA

Sample ID	Lead TTLC (mg/kg)	Lead STLC (mg/L)	Lead TCLP (mg/L)	Arsenic TTLC (mg/kg)	Arsenic STLC (mg/L)	Arsenic TCLP (mg/L)	Waste Characterization
Hazardous Waste Limits	**1000**	**5**	**5**	**500**	**5**	**5**	
SB-1-0.5	**212**	**13.8**	**0.232**	--	--	--	California Hazardous
SB-1A-0.5	**157**	**24.0**	**0.674**	--	--	--	California Hazardous
SB-3-0.5	**88.7**	**3.5**	--	--	--	--	Non-Hazardous
SB-5-0.5 (Dup)	**131**	**5.95**	**0.035J**	--	--	--	California Hazardous
SB-7-0.5	**175**	**6.72**	**0.028J**	--	--	--	California Hazardous
SB-15-0.5	**112**	**4.25**	--	--	--	--	Non-Hazardous
SB-30-0.5	**94.1**	**0.668**	--	--	--	--	Non-Hazardous
SB-33-0.5	**--**	**--**	--	**14.4**	--	--	Non-Hazardous
SB-33C-0.5	**--**	**--**	--	**29.2**	--	--	Non-Hazardous
SB-33C-0.5 (Dup)	**--**	**--**	--	**23.5**	--	--	Non-Hazardous
SB-37A-1.5	**--**	**--**	--	**14.8**	--	--	Non-Hazardous
SB-37B-0.5	--	--	--	**27.5**	--	--	Non-Hazardous
SB-37B-0.5 (Dup)	--	--	--	**32.7**	--	--	Non-Hazardous
SB-37C-0.5	--	--	--	**89.9**	**4.08**	--	Non-Hazardous
SB-37C2-0.5	--	--	--	**189**	**14.2**	**1.766**	California Hazardous
SB-37C3-0.5	--	--	--	**136**	**10.6**	**2.30**	California Hazardous
SB-37D-0.5	--	--	--	**31.8**	--	--	Non-Hazardous
SB-37D2-0.5	--	--	--	**57.4**	**2.68**	--	Non-Hazardous
SB-39-0.5	--	--	--	**21.1**	--	--	Non-Hazardous
SB-42-0.5	**110**	**0.448**	--	--	--	--	Non-Hazardous
SB-42A-0.5	29	--	--	**99.7**	**4.08**		Non-Hazardous
SB-42B-0.5	--	--	--	**19.1**	--	--	Non-Hazardous
SB-42C-0.5	--	--	--	**35.6**	--	--	Non-Hazardous
SB-42D-0.5	**39.5**	--	--	**33.8**	--	--	Non-Hazardous
SB-42D2-0.5	--	--	--	**61.9**	**2.99**	--	Non-Hazardous
SB-44-0.5	--	--	--	**48.5**	--	--	Non-Hazardous
SB-44D-0.5	--	--	--	**15.9**	--	--	Non-Hazardous
SB-47-0.5	--	--	--	**25.9**	--	--	Non-Hazardous
SB-47B-0.5	--	--	--	**13.2**	--	--	Non-Hazardous
SB-47B-0.5 (Dup)	--	--	--	**27**	--	--	Non-Hazardous
SB-47C-0.5	--	--	--	**131**	**6.98**	**1.45**	California Hazardous
SB-48D-0.5	--	--	--	**15.3**	--	--	Non-Hazardous
SB-50-0.5	**21.9**	--	--	**69.0**	**2.11**	--	Non-Hazardous
SB-50A-0.5	--	--	--	**22.8**	--	--	Non-Hazardous
SB-50B-0.5	--	--	--	**633**	**9.31**	**2.11**	California Hazardous
SB-50B2-0.5	--	--	--	**140**	**7.78**	**1.465**	California Hazardous
SB-50D-0.5	--	--	--	**69.0**	**2.59**	--	Non-Hazardous
SB-50D-0.5 (Dup)	--	--	--	**32.1**	--	--	Non-Hazardous
SB-51-0.5	**11.4**	--	--	**218**	**9.96**	**2.45**	California Hazardous
SB-51A-0.5	--	--	--	**26.8**	--	--	Non-Hazardous
SB-51B-0.5	--	--	--	**395**	**38.10**	**3.85**	California Hazardous

Table 2
Summary of Shallow Soil STLC and TCLP Results
Shenandoah Street Elementary School
Los Angeles, CA

Sample ID	Lead TTLC (mg/kg)	Lead STLC (mg/L)	Lead TCLP (mg/L)	Arsenic TTLC (mg/kg)	Arsenic STLC (mg/L)	Arsenic TCLP (mg/L)	Waste Characterization
Hazardous Waste Limits	**1000**	**5**	**5**	**500**	**5**	**5**	
SB-51C-0.5	--	--	--	**136**	**6.00**	**1.00**	California Hazardous
SB-51D-0.5	--	--	--	**92.9**	**4.24**	--	Non-Hazardous
SB-52-0.5	**40.4**	--	--	**233**	**10.40**	**2.89**	California Hazardous
SB-52A-0.5	--	--	--	**15.0**	--	--	Non-Hazardous
SB-52C-0.5	--	--	--	**27.7**	--	--	Non-Hazardous
SB-52D-0.5	--	--	--	**23.5**	--	--	Non-Hazardous
SB-53-0.5	**3.08**	--	--	**129**	--	--	Non-Hazardous
SB-53-0.5 (Dup)	**44.1**	--	--	**252**	**12.9**	**3.02**	California Hazardous
SB-53A-0.5	--	--	--	**54.9**	--	--	Non-Hazardous
SB-53B-0.5	--	--	--	**65.3**	--	--	Non-Hazardous
SB-53D-0.5	--	--	--	**136**	**8.99**	**1.91**	California Hazardous
SB-53D2-0.5				**118**	**5.30**	**0.907**	California Hazardous
SB-54-0.5	**23.4**	--	--	**124**	**5.09**	**1.04**	California Hazardous
SB-55-0.5	**5.85**	--	--	**59.7**	**2.61**	**0.06**	Non-Hazardous
SB-55B-0.5	--	--	--	**87.3**	**3.76**	--	Non-Hazardous
SB-55B2-0.5	--	--	--	**86.4**	**4.08**	--	Non-Hazardous
SB-55C-0.5	--	--	--	**55.4**	**2.28**	--	Non-Hazardous
SB-55C2-0.5	--	--	--	**128**	**6.67**	1.556	Non-Hazardous
SB-55D-0.5	--	--	--	**21.1**	--	--	Non-Hazardous
SB-57-0.5	--	--	--	**12.5**	--	--	Non-Hazardous
SB-57B-0.5	--	--	--	**151**	**5.60**	**0.79**	California Hazardous
SB-57B2-0.5	--	--	--	**99.3**	**4.93**	--	Non-Hazardous
SB-65-1.0	--	--	--	**190**	**9.43**	**1.689**	California Hazardous
SB-66-0.5	--	--	--	**33.4**	--	--	Non-Hazardous
SB-66-1.0	--	--	--	**144**	**9.39**	**1.815**	California Hazardous
SB-66-1.5	--	--	--	**12.6**	--	--	Non-Hazardous
SB-67-0.5	--	--	--	**68.8**	**2.38**	--	Non-Hazardous
SB-67-1.0	--	--	--	**271**	**16.10**	**3.89**	California Hazardous
SB-67-1.5	--	--	--	**74.4**	**2.70**	--	Non-Hazardous
SB-69-0.5	--	--	--	**260**	**6.67**	**1.157**	California Hazardous
SB-70-0.5	--	--	--	**115**	**6.22**	**1.405**	California Hazardous
SB-71-0.5	--	--	--	**63**	**2.51**	--	Non-Hazardous
SB-71-1.5	--	--	--	**27**	--	--	Non-Hazardous
SB-72-0.5	--	--	--	**32.1**	--	--	Non-Hazardous
SB-72-1.0	--	--	--	**13**	--	--	Non-Hazardous
SB-72-1.5	--	--	--	**16.7**	--	--	Non-Hazardous
SB-73-0.5	--	--	--	**84.2**	**3.58**	--	Non-Hazardous
SB-74-0.5	--	--	--	**47.1**	--	--	Non-Hazardous
SB-74-1.5	--	--	--	**20.9**	--	--	Non-Hazardous
SB-75-0.5	--	--	--	**111**	**4.60**	**0.850**	Non-Hazardous
SB-76-0.5	--	--	--	**53.9**	**2.42**	--	Non-Hazardous

Table 2
Summary of Shallow Soil STLC and TCLP Results
Shenandoah Street Elementary School
Los Angeles, CA

Sample ID	Lead TTLC (mg/kg)	Lead STLC (mg/L)	Lead TCLP (mg/L)	Arsenic TTLC (mg/kg)	Arsenic STLC (mg/L)	Arsenic TCLP (mg/L)	Waste Characterization
Hazardous Waste Limits	**1000**	**5**	**5**	**500**	**5**	**5**	
SB-80-0.5	--	--	--	**13.4**	--	--	Non-Hazardous
SB-81-0.5	--	--	--	**18.7**	--	--	Non-Hazardous
SB-81-1.0	--	--	--	**19.8**	--	--	Non-Hazardous
SB-82-0.5	--	--	--	**12.1**	--	--	Non-Hazardous
SB-84-0.5	--	--	--	**153**	**8.52**	**1.497**	California Hazardous
SB-84-1.0	--	--	--	**71.6**	**3.88**	--	Non-Hazardous

NOTES:
-- = Not Analyzed
Highlighted Value = Exceeds Hazardous Waste Limits
STLC = Soluble Threshold Limit Concentration
TTLC = Total Treshold Limit Concentration
TCLP = Toxicity Characteristic Leaching Procedure
J=concentration is an estimated value between the MDL and the RDL
mg/L = milligrams per liter
mg/kg = milligrams per kilogram

Table 3
Estimated Volumes of Impacted Soil
Shenandoah Street Elementary School
Los Angeles, CA

Assessment Area of Property	Contaminant of Concern	Boring Area	Corresponding Color on Site Plan	Minimum Excavation Depth (ft.)	Approximate Surface Area (ft^2)	Approximate Volume (ft^3)	Approximate Volume (yds^3)	Designated Disposal Scenario
North	Lead	SB-1, SB-5, SB-7	Orange	1.0	1,050	1,050	39	Cal Haz
	Lead	SB-3, SB-15, SB-30, SB-42	Green	1.0	675	675	25	Non Haz
South	Arsenic	SB-37, SB-51/SB-52/SB-53, SB-53, SB-54, SB-57B, SB-69/SB-70	Yellow	1.0	18,835	18,835	698	Cal Haz
	Arsenic	SB-50, SB-67	Pink	2.0	2,500	5,000	185	Cal Haz
	Arsenic	SB-33, SB-37/SB-39/SB-47/SB-48, SB-43/SB-44/SB-33, SB-55/SB-72/SB-74/SB-75, SB-57, SB-63	Blue	1.0	58,340	58,340	2,160	Non Haz
Total Estimated Removal Volume from PEA and Additional Assessments (yds^3)								3,107
Estimated Bulking During Excavation*								10%
Estimated Post Excavation Soil Volume to be Removed and Disposed								3,417

NOTES:
Lead (Pb) Site Screening Level: 80 mg/kg
Arsenic (As) Site Screening Level: 12 mg/kg
ft. = feet
ft^3 = cubic feet
ft^2 = square feet
yds^3 = cubic yards
Non Haz = Non Hazardous Disposal Designation
Cal Haz = California Hazardous (Non-RCRA) Disposal Designation
* = based on a potential bulk factor of 10% for sandy soil

Table 4
Remedial Alternative Cost Summary
Shenandoah Street Elementary School
Los Angeles, CA

Task	Remedial Alternatives		
	1 (No Action)	2 (Containment)	3 (Excavation/Disposal)
Environmental Consultant			
Project Management and Coordination	$0	$5,000	$8,000
Field Preparation, excavation marking, utility check	$0	$8,000	$8,000
Excavation Oversight, dust control, air monitoring	$0	$0	$23,000
Confirmation Sampling (if required)	$0	$0	$6,000
Engineering and Operations & Maintenance Plans, Land Use Restriction	$0	$50,000	$0
Removal Action Completion Report	$0	$10,000	$10,000
Annual Cap Inspection and Reporting for 20 Years	$0	$100,000	$0
Subcontractor Costs			
Excavation and Loading	$0	$200,000	$260,000
Transport and Disposal	$0	$370,000	$430,000
Backfill, Compaction, Asphalt Paving	$0	$150,000	$150,000
Other Direct Costs			
Travel, Permits, Field Supplies	$0	$16,000	$7,000
Totals	**$0**	**$909,000**	**$902,000**

APPENDIX A

Health and Safety Plan

HEALTH AND SAFETY PLAN
for a
REMEDIAL ACTION WORKPLAN

Shenandoah Street Elementary School
2450 South Shenandoah Street
Los Angeles, California
January 3, 2020

Prepared for:

Los Angeles Unified School District
333 South Beaudry Avenue, 21st Floor
Los Angeles, California 90017

Prepared by:

Montrose Environmental
1631 East St Andrew Place
Santa Ana, California 92705
(714) 919-6500

TABLE OF CONTENTS

Page No.

TABLES

FIGURES

LIST OF ATTACHMENTS

1.0 ORGANIZATIONAL STRUCTURE

This section of the Health and Safety Plan (HASP) describes the lines of authority, responsibilities, and means of communication for health and safety functions at this site.

The organizational structure of this HASP is consistent with OSHA requirements in 29 CFR 1910.120(b)(2) and provides the following site-specific information:

- The supervisor who has the responsibility and authority to direct all field operations
- The site health and safety officer who has the responsibility and authority to develop and implement this HASP and verify compliance
- Other roles needed for field operations and emergency response and their general functions and responsibilities
- The lines of authority, responsibility, and communication for safety and health functions

This document will be reviewed and updated as necessary to reflect any updates in the organizational structure at this site.

1.1 Roles and Responsibilities

The purpose of this section is to identify the personnel involved in the development and implementation of the site HASP and to describe their roles and responsibilities. This section also identifies other contractors involved in field operations and establishes the lines of communication among them for safety and health matters.

All personnel and visitors on this site must comply with the requirements of this HASP. The specific responsibilities and authority of management, health and safety, and other personnel on this site are detailed in the following paragraphs.

Project Manager (PM)

The PM has responsibility and authority to direct all work operations. The PM coordinates health and safety functions with the Site Safety and Health Officer (SSHO), has the authority to oversee and monitor the performance of the SSHO, and bears ultimate responsibility for the proper implementation of this HASP.

The specific duties of the PM are:

- Preparing and coordinating the site work plan
- Providing the site supervisor with work assignments and overseeing performance
- Coordinating health and safety efforts with the SSHO
- Ensuring effective emergency response through coordination with the Emergency Response Coordinator (ERC)
- Serving as primary site liaison with public agencies and officials and Site contractors

The qualified alternate Project Manager (PM) for the site should also be identified.

Site Safety and Health Officer (SSHO)

The SSHO has full responsibility and authority to develop and implement this HASP and to verify compliance [Note: if the preceding statement does not apply to the SSHO, be sure that it applies to one of the positions listed here]. The SSHO reports to the Project Manager. The SSHO is on site or readily accessible to the site during all work operations and has the authority to halt site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions on this site
- Serving as the site's point of contact for safety and health matters
- Ensuring site monitoring, worker training, medical surveillance, and effective selection and use of PPE
- Assessing site conditions for unsafe acts and conditions and providing corrective action
- Assisting the preparation and review of this HASP
- Maintaining effective health and safety records as described in this HASP
- Coordinating with the Emergency Response Coordinator (ERC), Site Supervisor(s), and others as necessary for safety and health efforts

The qualified alternate Site Safety and Health Officer (SSHO) for this site should also be identified.

Emergency Response Coordinator (ERC)

The ERC is responsible for assessing site conditions, directing, and controlling emergency response activities and personnel in accordance with the site Emergency Response Plan. The ERC reports to the Project Manager (PM). The ERC will ensure the evacuation, emergency transport, and treatment of site personnel and will notify the appropriate emergency response units and management staff in accordance with the emergency response plan of this HASP. Specific duties of the ERC include:

- Developing and reviewing the emergency response plan
- Conducting emergency response rehearsals
- Ensuring effective emergency response to and evacuation of the site
- Coordinating emergency response functions with the Site Safety and Health Officer (SSHO), and integrating site emergency response plans with the disaster, fire, and/or emergency response plans of local, state, and federal organizations and agencies

The qualified alternate Emergency Response Coordinator (ERC) for this site should also be identified.

Site Supervisor

The Site Supervisor on larger projects is responsible for field operations and reports to the Project Manager (PM). In the case of this field project, the Site Supervisor responsibilities will be merged with the PM responsibilities. The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor are:

- Executing the work plan and schedule as detailed by the PM
- Coordination with the Site Safety and Health Officer (SSHO) on safety and health
- Ensuring site work compliance with the requirements of this HASP

Site Field Staff

Site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the lines of authority established for this project site. The remaining workers on the site will be employees of subcontracted to the prime contractor.

Decontamination Manager

The Decontamination Manager is responsible for decontamination procedures, equipment, and supplies. The specific responsibilities of the Decontamination Manager are:

- Setting up decontamination lines and the solutions appropriate for the type of contamination on site
- Controlling the decontamination of all equipment, personnel, and samples from the contaminated areas
- Assisting in disposal of contaminated clothing and materials
- Ensuring all required equipment is available and in working order
- Providing for collection, storage, and disposal of waste

A qualified alternate Decontamination Manager for this site should also be identified.

Security Officer

The Security Officer for this site is responsible for managing and maintaining site security. The specific responsibilities of the Security Officer are:

- Conducting routine area patrols
- Controlling facility access and egress
- Assisting with communication during an emergency
- Securing accident/incident scenes
- Maintaining a log of site access and egress

The qualified alternate Security Officer for this site should also be identified.

1.2 Identification of Other Site Contractors

The contractors, consultants and subcontractors on this site who could be affected by the tasks and operations associated with the workplan and this HASP are listed in **Table 1**, below.

Table 1 - Other Site Contractors and Subcontractors

Company	Function
Excavation (Prime) Contractor	*Excavation, loading, backfilling (if necessary)*
Environmental Consultant	*Confirmation sampling, atmospheric monitoring*
Disposal Site	*Destination for excavated material*
Trucking Firm	*Soil/rinseate transport for disposal*

The prime contractor on the project may decide to operate under their company HASP. If so, the prime contractor will integrate health and safety procedures in this HASP with critical elements in their own HASP. If any decontamination water is produced and contained in drums, another firm may be selected to pick up the drums for disposal.

1.3 Local/State/Federal Agency Representatives

Local/state or federal oversight will not be performed during this project. The environmental aspects of the project will be managed by the Office of Environmental Health and Safety (OEHS) at LAUSD. The Project Manager at OEHS will be Mr. Steven Morrill. He will be reviewing the RAW and will be familiar with the work being performed. He may be present at the site while field tasks are being performed.

2.0 SITE CHARACTERIZATION AND JOB HAZARD ANALYSIS

This section of the HASP identifies and describes safety and health hazards associated with site work, in compliance with 29 CFR 1910.120(b)(4)(ii)(A), 1910.120(c) and 1910.120(i). The purpose of characterization and job hazard analysis is to identify and quantify the health and safety hazards associated with each site task and operation, and to evaluate the risks to workers. With this information, risks are then eliminated if possible, or effectively controlled. The information contained in this section of the HASP is essential to effective preparation of all other sections of the HASP. This section of the HASP includes:

- Site history
- Job hazard analysis
- Chemical and biological hazard information
- Employee notification of hazards

2.1 Site History

Current Use of the Property

The subject property is developed on the elementary school location with school related structures and equipment including two permanent buildings and 20 portable structures used as classroom buildings, a lunch pavilion, three separate playgrounds, a parking lot and a grassy area located in the southeast corner of the subject property. The entrance to the elementary school is located at the Main Building accessible by Shenandoah Street. The main campus of the elementary school is separated from the Shenandoah Street Children's Center (a pre-school) by fencing. The preschool campus will not be accessed during the removal action activities.

Past Uses of the Property

Historical records indicate that the subject property parcel was developed as early as 1927 with residential homes in the southern portion of the subject property and the Shenandoah Street Elementary School in the northeastern portion of the subject property. Prior to 1927, the subject property was used as farm field as noted in the 1923 aerial photograph. Based on the review of the Sanborn Fire Insurance Maps and the Aerial photographs, residential homes occupied the southwestern portion of the subject property until approximately 1970. The Shenandoah Street Children's Center replaced a portion of the residential homes. Re-development of the school was continuous throughout the school's existence as described in the Phase I Environmental Site Assessment dated August 8, 2017. By 1977, the remaining residential homes were removed and the subject property in its entirety was being used as an elementary school and a preschool.

The previous use, storage and disposal of hazardous materials and/or solvents by tenants at the subject property is unknown. Minor stained pavement presumed from leaking automobiles was observed in the parking spaces during the subject property visit, as discussed below.

General Description of Structures and Roads

Two parcels make up the subject property (APN – 4301-018-900 and APN – 4301-017-904). The subject property is currently developed with three permanent buildings and twenty portable buildings. The remaining structures on the subject property are semi-permanent and portable buildings used as classroom buildings.

Two parking lots are located in the southern portion of the campus. The parking lot for the elementary school is located north of the preschool, and is accessed from Shenandoah Street. The preschool parking lot is located east of the preschool playground, and is accessed from Beverlywood Street. There is also an access to the school playground from South Bedford Street.

2.2 Job Hazard Analysis

The excavation and oversight activities at the site may result in exposure to biological, chemical, and physical hazards. Preparation of this HASP was based on review of the RAW.

The chemicals of concern (COCs) in soil may result in toxicological exposure hazards and enter the body primarily via inhalation, ingestion. Less likely routes include skin absorption, and/or injection. The permissible exposure limit (PEL) for a chemical is defined by the California Department of Occupational Safety and Health (CAL/OSHA) in the California Code of Regulations (CCR), Title 26, Section 5155, and other sections where necessary. A PEL refers to the airborne concentration of a substance that an adult worker may be repeatedly exposed to for eight hours per day, for a 40-year working lifetime, without adverse effect. Most PELs are expressed as time-weighted averages. CAL/OSHA has also promulgated short-term exposure limits (STEL; usually 15 or 30 minutes) for certain substances. A few substances have ceiling concentration (the highest allowable concentration in the workplace) that cannot be exceeded, even instantaneously. Substances that can enter the body in a gaseous form through the skin are denoted by CAL/OSHA with an "s."

Variations in individual susceptibility may result in a small number of workers experiencing discomfort to some or all chemicals at concentrations equal to or below the PEL. A smaller percentage of individuals may be affected more seriously from exposures at or below the PEL due to aggravation of a pre-existing condition or by development of an occupational illness. The PEL is based on research conducted by the National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) and are based on the best available information from industrial experience, animal studies, and other sources.

Listed below are the types of physical hazards that may be present during activities at the site:

- Slip, Trip, or Fall - These types of hazards result from unleveled surfaces, slippery surfaces, and hard-to-see objects located across walking paths (e.g., rope, cords, etc.). They are responsible for over 60% of work-related injuries.
- Housekeeping and Sanitation - In order to permit safe and efficient work conditions, all work areas will be kept clean and free from debris. All hand tools will be kept in storage until they are needed for use. Trash containers will be leak proof, clean, and maintained in a sanitary condition. If vermin are encountered, an approved extermination method will be initiated. Potable water will be used for first aid, drinking, and personal hygiene purposes. Ground surfaces will be kept free from standing water. Disposable drinking cups will be provided, along with water coolers. Community drinking cups will not be permitted.
- Falling Objects - Hard hats, safety glasses, and steel-toed footwear will be required for personnel in all work areas.

- Traffic Safety - During normal business hours, there may be a significant level of traffic coming to and from the site. Pedestrian traffic on the site and on bordering public streets may be at risk as traffic enters and exits the site.
- Noise - High noise levels (in excess of 85 decibels [db] for extended periods) can result in temporary and permanent loss of hearing. Areas where noise levels exceed 85 db will be designated and hearing protection will be provided and worn.

Table 2 contains the job hazard analysis information for this site and the planned hazard controls. Specific job safety analyses are also provided in **Attachment D**. The chemical hazards are identified for each distinct combination of location and task. Based on the task at a particular location, anticipated physical hazards are also identified. Safety data sheets for specific chemicals determined to be present at the job site are included in **Attachment E.** Based on the best available knowledge of how that task/operation will be performed, the likelihood of exposure to the hazards identified for the task/operation at that location is indicated. The final section in **Table 2** lists the control measures implemented to protect employees from the hazards identified. The information provided here is designed to satisfy the job hazard analysis requirements of 1910.120(b)(4)(ii)(A) and the workplace hazard assessment requirements of 1910.132(d).

Table 3 summarizes health hazard information for COCs listed in **Table 2**. **Table 2** will be modified by the Project Manager or the Site Safety and Health Officer when:

- The Scope of Work is changed by adding, eliminating, or modifying tasks
- New methods of performing site tasks are selected
- Observation of the performance of site tasks results in a revised characterization of the hazards
- New chemical, biological, or physical hazards are identified
- Exposure data indicate changes in the concentration and/or likelihood of exposure
- New/different control measures are selected

These tables summarize the information used to select and implement the specific exposure controls identified in the remainder of the HASP. If the tables are modified, related provisions elsewhere in the HASP will also be modified.

Table 2: Site-Specific Job Hazard Analysis

JHA Number:	Task/Operation	Location Where Task/Operation Performed
1	Soil Excavation/Transport	Three locations, center and west campus
Date of JHA:	**Employee Certifying this JHA** (in accordance with 1910.132(d)(2))	
1/3/20	**Print Name:** **Chris Guesnon**	**Signature**

Chemical Hazards

Chemical Name	Source	Concentration	Exposure Potential during Task
Arsenic (soil)	Non-point release to soil	0.488 to 633 (average: 29.8) mg/kg	likely
Lead (soil)	Non-point release to soil	1.7 to 212 (average: 18.1) mg/kg	likely

Biological Hazards

Name of Biological Hazard	Source	Concentration	Exposure Potential during Task
None			N/A

Physical Hazards

Name of Physical Hazard	Source	Exposure Potential during Task
Noise	Operation of saws, excavation/loading equipment	likely
Slip, trip, fall	Adjacent to operating equipment, decontamination areas with spilled water	likely
Falling objects	Equipment falling off of drill rig	unlikely
Traffic	Traffic on surrounding streets	likely
Housekeeping/sanitation	Not maintaining a clean work area and not observing worker decontamination practices	unlikely
Shock hazard	Electrical saws	likely

Control Measures Used

Engineering Controls: (*if feasible, list/describe)*

Turn engines off when not equipment is not in use. All electric plugs and cords will be checked for wear, and will be kept out of any spilled water.

Work Practices: (*describe*)

All workers will wear hearing protection and hard hats. Work areas will be dried to prevent slipping. No unused equipment will be left on the ground in work areas or at locations where they may fall onto workers. Traffic delineators will be placed around the work area, which will be well lighted if work continues into evening. Workers will clean hands before eating or drinking. Rest rooms will be available for workers.

PPE: Level D

Table 3 – Summary of Primary Hazardous Substances

Hazardous Substance Name	Characteristics of Substance	Route(s) of Entry	Target Organ(s) Effected	Exposure Limits	Exposure Signs & Symptoms
Arsenic	Naturally-occurring metalloid, found and used in organic and inorganic compounds. No odor, taste or color at expected concentrations.	Inhalation, ingestion	Carcinogen, liver, kidney, skin, bladder, lungs, heart, especially acute in pregnant women and children	PEL and TLV: 0.01 mg/m^3 (TWA)	Skin pigmentation changes and lesions, vomiting, abdominal pain, diarrhea, tingling of extremities, cramping.
Lead	Naturally-occurring metalloid, found and used in organic and inorganic compounds. No odor, taste or color at expected concentrations.	Inhalation, ingestion	Cardiovascular, respiratory, kidney, mental functions, especially acute in pregnant women and children	PEL and TLV: 0.05 mg/m^3 (TWA)	Headache, abdominal pain, fatigue, irritable, loss of appetite, tingling of extremities

3.0 WORKER TRAINING

Worker training includes 40-Hour Hazardous Waste Operations and Emergency Response, (HAZWOPER), 8-Hour HAZWOPER annual refresher training, and first aid training. All subcontractors within the work area are required to have current HAZWOPER training. Project specific training is evaluated prior to the initialization of new projects, and additional training is completed as necessary.

4.0 MEDICAL SURVEILLANCE

All workers who could potentially be exposed to concentrations of contaminants above the OSHA Permissible Exposure Limits (PELs) for 30 days per year or more are included in a Medical Surveillance Program. No prime contractor or subcontracted personnel on this project are expected to fall within this group.

5.0 SITE CONTROL

Simplified site control procedures, as required by 29 CFR 1910.120(d), will be implemented before the start of site tasks to control potential worker and public exposures to contaminants.

5.1 Work Zones

Work Zones at each location will be determined at the site by the PM. In general, it is anticipated that the work zones will be defined relative to the location of the work activity. The Exclusion Zone (EZ) is considered the area within a 10-foot distance of the excavations and the routes for the local transport of soil to the truck loading area. The Contamination Reduction Zone (CRZ) is considered to be the area within a 20-foot diameter of the excavations and the routes for the transport of soil to the truck loading area. The Decontamination Zone (DZ) will be located at the CRZ.

5.2 Buddy System

When required by contract or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented. These conditions are not expected on this project.

5.3 Site Access

Access to designated project areas will be controlled using a sign in/sign out procedure.

5.4 Communications

Onsite communications will be conducted through the use of verbal, hand signals, and cellular phones. Offsite communications will be conducted through the use of cellular phones. Personnel shall check in with their home office personnel each day before starting work, in the middle of the day, and at the end of the day.

5.5 General Work Safe Practices

General safe work practices to be implemented during work activities at this site are summarized below.

- Minimize contact with contaminated materials. Do not place equipment on the bare ground. Do not sit or kneel on potentially contaminated surfaces.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- In an unknown situations, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the PM to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.

6.0 HAZARD ANALYSIS

Pertinent site information (e.g. records of identified chemicals) and previous sampling data (e.g., soil analyses) have been reviewed to determine the chemicals of concern for the project.

A hazard analysis, including chemical (health, fire, and reactive), physical, and biological hazards, has been conducted for anticipated tasks associated with the project per 29 CFR 1910.120(c). Health hazards will be controlled by implementing personal protective equipment (Section 8.0). Fire, reactive, physical, and biological hazards shall be controlled by utilizing Specific Safe Work Practices (Section 9.0).

7.0 HEAT AND COLD STRESS

Due to the site location and time of year, cold stress is not expected to be experienced by field personnel. However, heat stress may be experienced. The PM will confirm that all project personnel have the necessary training to prevent personnel injury due to heat, as dictated by weather conditions. The PM will record ambient conditions at the site and inform site personnel of the anticipated forecast for each day. Field personnel will be instructed to dress appropriately but protectively for the conditions expected to be encountered.

Because the scope of field services primarily involves equipment operations and manual work activity with intermittent exposure to ambient weather conditions, heat and cold stress are not expected to present a serious concern. The manual tasks predominately include manual excavation near buildings and utility trenches as needed, which will require minimal physically strenuous activity. In most cases, field staff will be at periodically rest and can take shelter in the shade or vehicles, and they will be in Level D PPE appropriate for the work. If transition to Level C or greater PPE is dictated, the guidance below will be revised by the PM to reflect the additional heat burden of outer protective clothing.

7.1 Cold Stress

As stated above, cold stress is not expected to be experienced by field personnel during this project.

7.2 Heat Stress

Heat stress can be a major hazard for field personnel, especially those wearing PPE. Depending upon the ambient conditions and the work being performed, the onset of heat stress can be rapid. Since the work to be performed is generally anticipated to only include intermittent, light work in Level D PPE, heat-related impacts are not expected. However, symptoms and measures for dealing with heat-related impacts are included below for general knowledge and monitoring.

Early signs of heat stress include heat rash, heat cramps (muscle spasms), discomfort, and drowsiness. Continued heat stress can result in heat exhaustion, with symptoms including

pale, cool, moist skin; heavy perspiration; dizziness; nausea; and fainting.

Extreme heat stress can result in heat stroke, as body temperature regulation fails and the body temperature rises to critical levels. Symptoms of heat stroke include red, hot, usually dry skin; absence of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma.

Measures to prevent the occurrence of heat stress consist of acclimatization; avoiding overprotection; training and monitoring of personnel wearing PPE; scheduling of work and rest periods; and frequent replacement of fluids.

The ambient temperature will be monitored by the PM. If the ambient temperature is above 85°F, assuming 50/50 work/rest cycles and a light workload, then ACGIH procedures will be followed, including increasing the percent of rest. If symptoms of heat stress are exhibited by workers, worker pulse rates will be monitored during all tasks (as deemed appropriate by the PM).

During periods of extreme heat, a normal resting pulse rate will be determined prior to start of work. The pulse rate will be monitored as soon as possible at the beginning of a rest period. If the rate exceeds the determined normal resting pulse rate by 40 beats per minute (BPM), the next work period will be shortened by one-third without changing the rest period. If the pulse rate is greater than 40 BPM above the resting pulse rate at the start of the next rest period, the following work cycle will be shortened again by one-third. This will be repeated until the pulse rate at beginning of the rest period is less than 40 BPM above resting pulse rate.

8.0 PERSONAL PROTECTIVE EQUIPMENT

A description of the potential levels of personal protection is provided in **Attachment C**. Level D personal protective equipment (PPE) is expected to be required on this project. The level of protection may be upgraded or downgraded according to the action guidelines provided in Section 6.0 and **Attachment A**. PPE levels used shall be indicated in the Field Logbook. When using PPE, workers must adhere to the Personal Protective Equipment Program (29 CFR 1910.120[g] and 29 CFR 1910 Subpart I). If respirators are worn, workers must adhere to the Respiratory Protection Program (29 CFR 1910.134). Beards (e.g., facial hair interfering with the respirator seal) are not allowed when respirators are worn.

9.0 SPECIFIC SAFE WORK PRACTICES

Workers shall follow the Specific Safe Work Practices that have been developed for each hazard associated with each task as identified in **Attachment A**. Additionally, biological hazards are discussed in **Attachment B**.

10.0 DECONTAMINATION

PPE shall be decontaminated as per 29 CFR 1910.120(k). The decontamination procedures, equipment, and decontamination solution required for each task are provided in **Attachment C**.

Re-usable safety gear will be washed with detergent and water prior to re-use or removing from the work zone. Shovels and other hand tools will also be decontaminated with detergent and water, or as directed by the PM. All purge water and decontamination fluids will be handled in collected in 55-gallon drums for sampling and disposal later upon receipt of the analytical results. Safety gear or garb that cannot be decontaminated will be disposed of as an investigative derived waste (IDW) in accordance with application local, state, and federal regulations.

11.0 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j).

11.1 Site Map

Figure B1 provides directions to the nearest hospital. All personnel should call 911 and have an ambulance/emergency medical teams dispatched in the event of an emergency in lieu of trying to drive the nearest hospital.

11.2 Emergency Contacts

A list of contacts and telephone numbers for the applicable offsite emergency responders is provided below. The nature of the site work and contaminants of concern should be reviewed, and the ability of offsite responders to respond to reasonably anticipated emergencies should be confirmed. If there are any concerns with offsite responsibilities, the appropriate individuals should be contacted directly to clarify their responsibilities.

- Fire Department: 911
- Hospital: 911
- Police Department: 911
- Emergency Medical Services (EMS): 911
- Fire Department: 911
- Client Contact (Steven Morrill) Office: 213-241-4672
- Client Contact (Steven Morrill) Cell: 626-808-3405
- Prime Contractor Project Manager Cell:
- Prime Contractor Project Manager Office:
- Prime Contractor Environmental Health & Safety Officer Cell:
- Other: Ambulance 911

11.3 Emergency Response Equipment

The following emergency response equipment will be maintained in the project vehicle or at the project site and shall be readily available to all personnel.

- Field First Aid Kit
- Fire Extinguisher – Type ABC
- Eyewash (Note: Capable of 15 minutes of free-flowing fresh water)
- Other: Half-face Respirator

11.4 Safety Orientation Meeting

All field personnel will attend a safety orientation meeting before beginning fieldwork. The meeting will be conducted by the PM and SSHO. Notes from the meeting will be recorded in the field notebook. Safety meetings will be held daily and if any changes are made to the HASP. New personnel will also be briefed regarding safety procedures

11.5 Communication

The emergency response communication system for the site will incorporate:

- Verbal
- Cellular telephone and local communication devices
- Hand signals

  Hand gripping throat: Can't breathe

  Grip partner's wrist or both hands around waist: Leave area immediately

  Hands on top of head: Need assistance

  Thumbs up: OK, I am all right, I understand

  Thumbs down: No, negative

11.6 Emergency Response Procedures

In the event that an onsite emergency develops, notifications listed in Section 11.2 are to be followed immediately. Work will not continue after the emergency. The PM and/or SSHO will accompany the individual if he leaves the site. If the injury is to a subcontractor, the subcontractor's office will be notified by the PM or SSHO if other subcontractor personnel are not able to provide this notification.

Further general procedures are provided below:

- The PM, SSHO and ERC should be immediately notified via the onsite communication system. The ERC assumes control of the emergency response.
- The PM notifies the client contact of the emergency. The PM shall then contact the Environmental Health and Safety Officer.
- If applicable, the ERC shall notify offsite emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team

as to the nature and location of the emergency onsite.

- If applicable, the ERC or PM evacuates the site. Site workers should move to a predetermined evacuation point.
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use the eyewash and/or shower.
- If a worker is injured, first aid shall be administered by a certified first aid provider.
- Before continuing site operations after an emergency involving toxic gases, the onsite field supervisor shall don a SCBA and utilize appropriate air monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- After the response, the onsite field supervisor shall follow-up with the required company reporting procedures, including the Incident Response Form (**Attachment E**).

11.7 Personnel Conduct

All personnel will conduct themselves in a manner that will allow the most effective completion of the project goals. No actions either onsite or offsite will interfere with completion of the project. Therefore, it is the responsibility of all personal to ensure that they are prepared to perform their assigned tasks when they arrive at the site. The SSHO will assess during the safety meeting whether all personal are prepared to work.

Activities that might reduce effectiveness include:

- Consumption of alcohol, illegal or other controlled substances
- Use of certain prescription or over-the-counter medicines
- Altered mental state
- Personal injury reducing physical capabilities
- Fatigue

Any individual found to be unfit for work will be prevented from entering the work area until they are found to be fit to return. The SSHO will record the incident and notify the PM. The subcontractor providing the person will be notified and allowed to replace the individual.

12.0 CONFINED SPACE ENTRY

The tasks for the anticipated projects do not involve confined space entry. If confined space entry is required in the future, then a specific health and safety procedure will be developed and employees will be properly trained for confined space entries.

13.0 SPILL CONTAINMENT

The tasks for this project involve the use of powered equipment. In the event a fuel spill occurs, the work area will have granular absorbent material to place over the spill and absorbent pads or booms will be placed downgrade from the spill to assist in collection. The used cleanup materials will be containerized and properly disposed according to local, state, and federal guidelines.

14.0 HAZARD COMMUNICATION

The following procedures shall be followed for all chemicals expected to be used on this project (e.g., decontamination solution, sample preservatives, etc.):

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive, etc.).
- Workers have received training on the hazards of these chemicals.
- Material Safety Data Sheets (MSDS) for chemicals and products used on the project will be kept onsite and will be reviewed by employees using the products. The type of chemicals used is generally limited to products such as decontamination products and pH buffers.
- If new chemicals are used, the MSDS is added to the file, and the employees will be trained on the chemical's characteristics.

15.0 DOCUMENTATION

Records documenting the site safety program will be maintained. This will include information about medical clearance for each individual working at the site, training, safety briefing, distribution of the HASP, incidents, safety completion report, and posting requirements. Records will be maintained in a health and safety logbook and appropriate health and safety forms.

Records will be kept consistent with all applicable CAL/OSHA regulations. The following records will be maintained at the offices of each subcontractor:

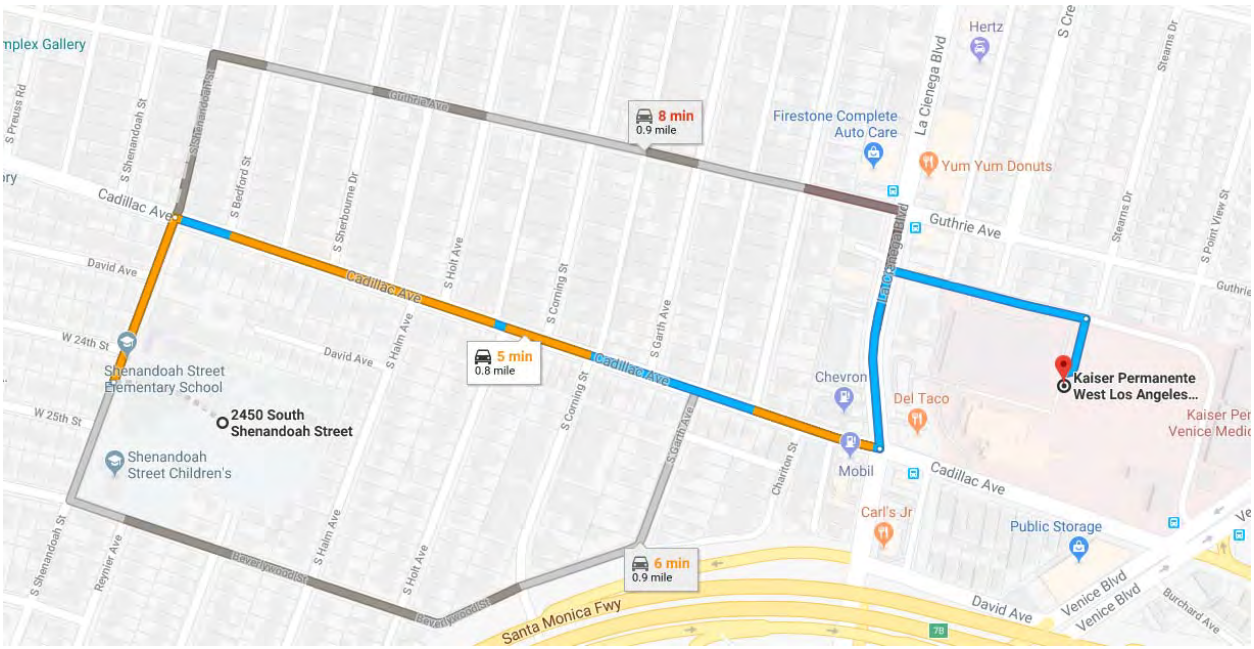
- Hazard communication training
- Respiratory protection training
- Respiratory assignment
- Medical surveillance
- Safety inspection records
- Personal monitoring records
- Accident logs
- CAL/OSHA logs (200 form or equivalent)

The PM will maintain the following records at the Site.

- Persons onsite, their affiliation, and purpose
- Telephone conversations
- Excavation activities
- Work progress
- Site safety inspection records
- Tailgate safety meeting forms
- Worker illness/injury reports
- Copies of the RAW and this HASP
- Daily work activities and conditions
- Accident log

The subcontractors will maintain a log of excavation volumes and worker activities.

Route Map to Local Hospital



Kaiser Permanente West Los Angeles Medical Center
6041 Cadillac Ave, Los Angeles, CA 90034
(323) 857-2000
0.8 Miles (6min)

Directions:

-Head north on South Shenandoah Street toward West 24th Street	**(0.1 mi)**
-Turn right onto Cadillac Avenue	**(0.4 mi)**
-Turn left onto La Cienega Blvd	**(0.1 mi)**
-Turn right	**(0.1 mi)**
-Turn right (Destination will be on your left)	**(194 ft)**

Non Life-threatening Injury:

******Please note that if that the injury or hospital visit is not an emergency, medical care will go through Montrose Environmental's health provider, Axiom. *Please call Axiom Medical at (877) 502-9466* and email safety@montrose-env.com with a brief description of the situation as quickly as possible.**

Figure B-1

ATTACHMENT A

TASK SPECIFIC SAFE WORK PRACTICE FOR EXCAVATION TASKS

HAZARD IDENTIFICATION

Hazards generally encountered during excavation tasks include the following:

- Exposure to exhaust while advancing the excavations and loading soil.
- Back strain due to lifting tools and other equipment.
- Slipping on wet or muddy surfaces created by spilled or released water.
- Electrical hazards associated with use of electrical equipment around water or wet surfaces.
- Possible fluids splashing in eyes during decontamination tasks.
- Noise hazards from created from sawing or excavation equipment.
- Possible burst hydraulic hoses during excavation and loading.

HAZARD PREVENTION

- Workings will station themselves upwind or at a distance to limit exposure to exhaust fumes.
- Back strain will be avoided by employing proper lifting techniques. Equipment will only be lifted by the legs, preferably using two or three personnel for heavier or larger equipment.
- Slipping can be prevented by cleaning spilled or released water promptly and placing any used absorbent in drums for removal. Also, boots with good treads will be worn. All personnel will be alert of where others are walking to decrease the chance of slipping.
- Ground fault interrupters will be used in the absence of properly grounded circuitry, or when lights are used around wet conditions.
- Electrical extension cords should be protected or guarded from damage (i.e., cuts from other machinery) and be maintained in good condition.
- Eye protection should be worn as appropriate to prevent water from splashing into eyes.
- Hardhats will be worn when work is being performed with overhead equipment.
- Hearing protection will be worn when working near the drilling equipment for extended periods of time.
- Except of person operating equipment, other personnel will not be present immediately near pressurized hoses while the hydraulic equipment is in operation.

ATTACHMENT B

TASK SPECIFIC SAFE WORK PRACTICE FOR BIOLOGICAL HAZARDS

GENERAL BIOLOGICAL HAZARDS

SNAKES

Normally snakes avoid people and areas where people are working. However, when encountered, snakes may become aggressive. Remain alert for snakes and avoid areas that would make a good habitat for snakes. While not all snakes are poisonous, if bitten by a snake, seek immediate medical attention. Do not try to capture or kill the snake. It could may the situation worse or get other personnel bitten. There are venomous snakes in the state of California, namely rattlesnakes. Snake venom has a local effect, causing swelling, fluid retention, and bruising. It affects the blood by causing problems with clotting, and it has systemic effects, causing nausea, vomiting, seizures, and unconsciousness. Workers on this project are not expected to encounter snakes in the expected work areas.

OTHER ANIMALS

Normally wildlife avoids people and areas where activities are ongoing. Small animals, such as raccoons, infected with rabies or when cornered, may become aggressive. When working, remain alert for likely locations that animals inhabit. Avoid nests, dens, and holes in the ground that may be an animal's home. If bitten by an animal, seek medical attention immediately. Do not try to capture the animal; you may only get other personnel bitten.

TICK BITES

The Center for Disease Control (CDC) has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever (RMSF), which are caused by bites from infected ticks that live in or near wooded areas, tall grass, or brush. Ticks are small, ranging in size of a comma up to about one quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer. When embedded in the skin, they may look like a freckle.

Lyme Disease - Lyme Disease has occurred in 43 states, with the heaviest concentrations in the Northeast (Connecticut, Massachusetts, New Jersey, New York, Pennsylvania), the upper Midwest (Minnesota, Wisconsin), and along the Northern California coast. It is caused by deer ticks and the lone star ticks which have become infected with spirochetes. Male deer ticks are smaller, and completely black. Lone star ticks are smaller and chestnut brown in color.

Rocky Mountain Spotted Fever - Rocky Mountain Spotted Fever (RMSF) has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain Wood ticks, and dog ticks which have become infected with rickettsia. Both are black in color.

Symptoms - The first symptoms of either disease are flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short period. If not treated, more serious symptoms can occur.

Treatment - If you believe you have been bitten by a tick, or if any of the signs or symptoms noted above appears, contact the Project Manager, who will authorize you to visit a physician for an examination or possible treatment.

Protective Measures - Standard field gear (work boots, socks and work uniform) provides good protection against tick bites, particularly if the openings are taped. However, when working in the field, the following precautions should be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower leg areas covered with hair.
- Spray outer clothing, particularly your pant legs and socks, BUT NOT YOUR SKIN, with an insect repellant that contains permethrin.
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- If you find a tick, remove it by pulling on it gently. If the tick resists, cover the tick with salad oil for about 15 minutes to asphyxiate it, then remove it with tweezers.
- Do not use matches, a lit cigarette, nail polish, or any other type of chemical to "coax" the tick out.
- Be sure to remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal.
- For several days to several weeks after removal of the tick, look for the onset of the signs of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center.
- Also, look for the onset of RMSF, such as inflammation that is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

While tick bites related to relapsing fever have been reported in Los Angeles County, they have only occurred in the San Gabriel Mountains. Encounters with ticks are not expected in the urban work area.

BEES, HORNETS, AND WASPS

Contact with stinging insects like bees, hornets, and wasps may result in site personnel experiencing adverse health effects that range from mild discomfort to life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects.

Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests of the insects are frequently found in remote wooded, grassy areas where many waste sites are located.
- The nests can be situated in trees, rocks, and bushes or in the ground, and are usually difficult to see.
- Accidental contact with these insects is highly probable, especially during warm weather conditions when insects are most active. If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention.
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life- threatening condition known as anaphylactic shock.
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth, and respiratory passages.
- The hypersensitivity needed to cause anaphylactic shock, can in some people accumulate over time and exposure, therefore, even if someone has been stung previously, and has not experienced an allergic reaction, there is no guarantee they will not have an allergic reaction upon receipt of another sting.

Protective Measures

With these things in mind and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bees, wasp or hornet stings, they must inform the PM of this condition prior to participation to site activities.
- All site personnel will be watchful for the presence of stinging insects in their nests, and will advise the PM or onsite field supervisor if a stinging insect nest or presence of a swarm of bees is located or suspected in the area.
- Any nests located onsite will be flagged off and site personnel will be notified of its presence.
- If stung, personnel will immediately report the Pm or onsite field supervisor to obtain treatment and he/she will observe them for signs of allergic reaction.
- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times.

BITING INSECTS

Many types of biting insects such as mosquitoes, flies, and fleas may be encountered onsite. The use of insect repellant will be encouraged, if deemed necessary. The biting insects of greatest concern are spiders, especially the black widow and the brown recluse. These spiders are of special concern due to the significant adverse health effects that can be caused by their bite.

Black Widow Spider - The black widow is a coal-black bulbous spider 3⁄4 to 11⁄2 inches in length, with a bright red hourglass on the underside of the abdomen. The black widow is usually found in dark, moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or burning sensation at the time of the bite.
- Appearance of small punctures (but sometimes none are visible)
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by a profuse sweating, ridged abdominal muscles, muscle spasms, breathing difficulties, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

Brown Recluse and other Recluse Spiders - The brown recluse is brownish to tan in color, rather flat, 1/2 to 5/8 inches long with a dark brown "violin" shape on the underside. It may be found in trees, or in dark locations. Victims of a brown recluse bite may exhibit the following signs or symptoms:

- Blistering at the Site of the bite, followed by a local burning at the site of the bite 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, postulating lesion with a bulls-eye appearance.
- Systemic affects may include generalized rash, joint pain, chills, fever, nausea, vomiting; and pain may become severe after 8 hours, with the onset of tissue necrosis.

Tegenaria (Hobo/Aggressive House Spider) - The Tegenaria spider is brown without any distinguishing marks. It measures 10-15 mm in diameter including the legs. The Tegenaria is an outdoor spider, referred to as a funnel spider, for the shape of its web.

Victims of the Tegenaria spider may exhibit the following signs or symptoms:

- Sensation or pinprick at the location of the bite.
- Forming of a hard lesion surrounded by a pale halo (similar to a brown recluse bite).
- Ensuing blister will measure two to six inches and take months to heal.
- Bite may leave a permanent scar.

Treatment For Spider Bites - There is not effective first aid for these bites. Except for very young, very old, or very weak victims, these spider bites are not considered to be life threatening. However, medical treatment must be sought to reduce the extent of damage caused by the injected toxins. If either of these spiders are suspected or known to be onsite, the PM or onsite field supervisor will brief the site personnel as to the identification and avoidance of the spiders. As with stinging insects, site personnel should report the PM or onsite field supervisor if they locate either of these spiders onsite or notice any type of bite while involved in site activities.

POISONOUS PLANTS

Poisonous plants are poisonous in different ways and cause symptoms depending if they are touched or consumed. Workers are not expected to consume plants during performance of their duties. Therefore, this procedure only discusses the side effects and first aid treatment of touching poisonous plants. Poison Ivy, Poison Oak, and Poison Sumac are the most common plants that cause a reaction in sensitive people.

Symptoms which occur after exposure to poisonous plants included severe redness and intense burning at the Site of exposure and blisters may occur. Wash the affected area as soon and as thoroughly as possible. You want to remove as much poison residue as possible. Use large quantities of water. Use calamine lotion or a thick paste of baking soda and water on the affected area. You can also soak in a tub with a good quantity of baking soda in the water. A hydrocortisone cream can also help to control the rash and itching. A systemic antihistamine such as Benadryl will help to control the swelling and itching. Do not pop blisters, and try not to scratch. Seek medical attention of the conditions worsen or if other symptoms occur.

Poisonous plants are not expected to be encountered in this urban work environment.

ATTACHMENT C

DECONTAMINATION PROCEDURES AND EQUIPMENT

Since no highly-impacted soil or water is expected to be produced in the work area, Level D protection will be used within the work area. However, gloves will be worn while working in the area of the excavations. Goggles are recommended while performing excavations tasks.

The following constitute the standard Level D equipment for this project.

1. Coveralls
2. Gloves
3. Boots/shoes, chemical-resistant steel toe and shank
4. Safety glasses or chemical splash goggles
5. Hard hat

Decontamination of personnel will consist of washing hands with detergent and water when leaving the work area. Hand tools will be decontaminated in a series of tubs. One tub will be filled with potable water and detergent for washing the tools and rod. The two remaining tubs will be filled with potable water for rinsing equipment. The equipment will be air-dried.

Excavation equipment will be cleaned of accumulated soil prior to leaving the site. This will include scraping of loose material and washing areas if deemed necessary by the PM.

ATTACHMENT D

JOB SAFETY ANALYSES

Mob-Demob Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☐ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Mob-Demob**	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __A__HARD HAT __R__GLOVES: **ANSI Cut Level 4** __A__SAFETY GLASSES _____GOGGLES _____FACE SHIELD	__A__ HEARING PROTECTION __R__SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____Dust Mask ____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: ____ Air Supplied Respirator ____SCBA ____Air-line	Additional PPE/Notes: As per defined in the job/site specific Health and Safety Plan (HASP) wear PPE at all times when performing site work.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Inspect vehicle and equipment prior to mobilizing to and from site	a. Vehicle failures.	a1. Inspect tires and lights regularly. a2. Inspect gas tank level. a3. Walk around vehicle and note any hazards with vehicle and report to the appropriate employee/supervisor.
2) Loading/ unloading at office or jobsite	a. Cut/pinched fingers or toes; and strained muscles. b. Vehicle parked in high traffic area.	a1. See PPE Quick Summary. a2. Use proper lifting techniques and 2-man rule when moving heavy objects (>40 lbs). b1. Make sure vehicle is parked in an area that limits the employee from crossing roads or intersections. b2. Use high-visibility cones around vehicle if need.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
3) Driving	a. Incidents.	a1. Adjust mirrors and be familiar with controls before driving vehicle. a2. Pay attention to the task at hand. a3. Avoid/defer cell phone until destination is reached (or while not driving). Take note of jurisdictional laws pertaining to cell phone usage. a4. Obey traffic laws and drive defensively.
	b. Flat tire/engine trouble.	b1. If the problem requires you to stop the vehicle, make sure the vehicle is in a safe spot on the shoulder of the road. b2. Use flashers to alert other vehicles. b3. Only make repairs to the vehicle if the work can be done in a safe manner and away from traffic.
4) Arrival at site	a. Site conditions changed from plan.	a1. Observe traffic flow. a2. Modify traffic control plan if necessary. a3. Back into parking spots whenever possible. Employee spotter if available.
5) Inspect vehicle equipment	a. Vehicle failures.	a1. Inspect fluids, tires, connections and safety equipment regularly. a2. Inspect gas tank level. a3. Note any hazards with vehicle and report to the appropriate employee.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1. Vehicle rolling: unattended.	a. When parked on slope or with engine idling.	a1. When parking on a hill or stopping with the engine idling, use parking brakes, parking gear if available, and use chocks immediately upon leaving the driver's compartment. If other personnel are available ask them do the chocking before the driver exits the vehicle, then the driver should double-check the chocks.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

Driving Company Vehicle Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Driving Company Vehicle**	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE
	OSC	

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

___ REFLECTIVE VEST ____HARD HAT ____GLOVES: **ANSI Cut Level 4 & 5 Kevlar** ____SAFETY GLASSES _____GOGGLES _____FACE SHIELD	____ HEARING PROTECTION ____SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☐ NA _____Dust Mask ____½ face Air Purifying Respirator (APR) ____X_Particulate Mask: ☒ PM100 ☐ PM95 ____X_ Cartridge: ☒ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE: .

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Have correct directions and know best route of travel to make it safely to intended destination.	a. Getting lost in a bad area or showing up at the wrong location. Having doubt about where you are exactly supposed to be could cause undo stress while driving.	a1. Ask questions and get safest route if destination is not known, use map quest or other online locators to assist with travel plans. Give other people your travel plans with addresses and phone numbers so you can be contacted.
2) Knowing what ES's driving rules and policies are before getting behind the wheel on company time.	a. Driver using excuse that they didn't know the rules or policies and following common bad practices while driving.	a1. Strong Driver Training and Driving Safety Stewardship prior to personnel driving company owned vehicles or driving personal vehicles on company time. Certification of understanding through training documentation.
3) Vehicle walk around and perimeter check.	a. Trip, slip, fall and possible human contact from unknown assailants. Also be aware of other vehicle activity in surrounding areas.	a1. Visual verification that vehicle tires are in safe working condition and that there are no sharp objects or foreign debris under the tires. Check for possible unsafe human interaction in the surrounding area and be conscious of other vehicle activity close by.

Driving Company Vehicle Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
4) Unlock and open vehicle door, enter the vehicle and secure seatbelts.	a. This activity leaves driver open for a pinch or crush hazard if hand or fingers are not secured inside the vehicle before shutting vehicle door.	a1. Ensure driver's seatbelt is functioning properly and verify that passenger's seatbelt is also in good working condition then buckle up. If assessed lock vehicle doors once inside as added protection factor.
5) Interior visual inspection, rearview mirror, and visual checks of both side mirrors.	a. In areas of high crime, be sure to lock vehicle doors after entering besides that there aren't many other hazards during this activity.	a1. Ensuring that mirrors are properly adjusted to maximize visual indications of approaching vehicles from the rear, and checking for identified blind spots. Lock doors in areas of identified questionable areas for safety reasons.
6) Ensure mobile phone has been deactivated.	a. Drivers are easily distracted by mobile phones, either by answering or making calls.	a1. According to Montrose company vehicle policy, all mobile phones be turned off prior to any vehicle trips, no exceptions.
7) If driving a company vehicle or personal vehicle on company time the headlamps will be turned on at all times. Also headlamps are required by CA Law to be activated if foul weather conditions warrant their use.	a. If driving in foul weather conditions such as heavy rain, fog or dusk, vehicles without headlamps on are more difficult to see.	a1. The Montrose company vehicle policy requires all employees driving company vehicles or personal vehicles on company time to have their headlamps on. No exceptions. This activity gives an extra line of defensive visual identification by allowing other vehicles to better see oncoming traffic that might otherwise blend into the poor weathered gray backgrounds.
8) Traveling safely at posted speed limits and following all road rules while driving on roadways or freeways.	a. Not obeying posted speed limits and following road rules can result in traffic violations and vehicle accidents involving all motor vehicle maneuvers. Watch for slower moving and fast approaching vehicles in roadway.	a1. Driver must maintain the Montrose company policy of allowing a 4 second gap between vehicles while driving. This supersedes California's DMV Best Practice of following a 3 second gap. Keep good visual contact of all lanes and identifying an out in case of emergency maneuver due to other vehicle hazards and poor driving.
9) Merging while entering multi-lane freeways and making lane changes while traveling on multi-lane freeways.	a. Struck from side, rear contact with other vehicles, struck from behind.	a1. Use vehicle signals, look over shoulder, check mirrors, be aware of fast approaching or slower moving vehicles and maintain speed while initiating merge, maintain speed and repeat same steps with all lane changes.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
10) Exiting off of multi-lane freeways.	a. Changing the flow of traffic speed, slowing down to exit off ramps.	a1. Use vehicle signals, look over shoulder, check mirrors, be aware of fast approaching or slower moving vehicles and maintain speed while initiating merge. Slow at a gradual pace and maintain enough space between the vehicles in front of you to mitigate the necessity of braking quickly.
11) Stopping at posted stop signs, signal controlled intersections and cross walks while yielding right away to all oncoming traffic.	a. By not allowing enough space, a vehicle can be struck and pushed into an intersection or crosswalk, striking other vehicles or pedestrians.	a1. Keeping a full vehicle length away from intersections, crosswalks and stop signs gives a driver that extra cushion needed in case there is a strike from behind, pushing the vehicle forward.
12) Proceeding through marked or signal controlled intersections or crosswalks after coming to a full stop.	a. Driver should use good visual eye contact of all directions to the left and right and allow another vehicle to proceed first before accelerating forward. Watching for other vehicles crossing into other lanes.	a1. The driver carefully looking left and right should maintain lane selection through the intersection and proceed forward remaining in the same lane they stopped in. This prevents rear-end striking and side striking accidents and allows for better adjustments if a possible hazard is identified.
13) Staying aware of oversized and wide vehicles making wide and slow turns through intersections and regular turning maneuvers.	a. There are numerous blind spots that the driver of a loaded Semi has to deal with. They can occur at the beginning or the finishing of the turning maneuver.	a1. Using a 4 second rule while following a Semi is a must and leaving enough extra space to the sides and rear of the Semi when stopping behind it will prevent an avoidable strike from the trailer due to blind spots created by wide and large loaded vehicles.
14) Staying constantly aware of all surroundings and keeping identified routes of escape open when traffic conditions warrant added attention.	a. When driving a vehicle on roadways or freeways, we do not have control over all the other drivers in vehicles around us, therefore we must keep constant attention elevated to the poor driving skills of others.	a1. Understanding Montrose Environmental's company policy follow identified driving best practices and keep full attention of driving safely without rushing to get to destinations.
15) Reaching final destination in vehicle and coming to a complete stop while parking.	a. Striking other parked vehicles or striking a pedestrian walking, or the vehicle engine not completely stopping causing the vehicle to lunge forward.	a1. Pay full attention to the new surrounding areas where you'll park, ensure vehicle's engine has completely stopped and the parking break has been set. Look outside vehicle before jumping out into street traffic or parking lot traffic.

Driving Company Vehicle Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
16) Opening vehicle door and exiting.	a. Struck by other vehicles stepping onto uneven surface, approached by someone unwanted.	a1. Take a good look at surrounding areas and make sure there are no signs of oncoming traffic, take a look outside at the ground before you step out making sure surface is level and object free, keep aware of unwanted approaching personnel.

LOCATION(S) WHERE HAZARD IS TO BE EXPECTED		**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

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LIMITATION: As part of Montrose's EHS Policy, a JSA is provided by Montrose for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get Montrose and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. Montrose recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under Montrose's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for Montrose or its customers in accordance with Montrose's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HSP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Work Area and Exclusion Zone Set-up**	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

"ES APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL DATE

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

R REFLECTIVE VEST R HARD HAT R GLOVES **ANSI Cut Level 4** R SAFETY GLASSES _____GOGGLES _____FACE SHIELD	A HEARING PROTECTION R SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☐ NA _____Dust Mask _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 ____ Cartridge: ☐ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: ____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Pre-start Meeting and Site Safety Analysis	a. Bad organization creating confusion and hazard	a. Arrive at site prior to planned start time to evaluate vehicle and pedestrian traffic flow in the work area and in the site vicinity. a.. Review site plan with traffic control set-up. a. Identify staging area with good access lateral and vertical for loading and unloading of trucks. a. Identify material and equipment laydown areas.
2. Exclusion Zone Set-up	a. Physical injury or equipment damage from onsite and offsite traffic flow.	a. Use the 'buddy system (one person watching traffic, one person working) when working in a high-use traffic area. a. Use of cones/delineators and caution signs to alert foot traffic moving about the site of potential trip hazards. a . Utilize snow fencing, barricades, delineators, cones and caution tape to provide exclusion zone around proposed work locations. Set-up exclusion zone in accordance with Montrose's Exclusion Zone Set-up procedures.
3. Control of Work Area and Exclusion Zone	a. Delivery vehicles b. Personnel/vehicle entry onto site c. Fatigue d. Noise and flying debris	a. All vehicles moving on site shall use reverse beepers or flaggers. b. Set-up fencing around entire site with gated entry points. Limit access to staging area by keeping gate to work area closed and check documents of all vehicles entering work area. b. Use visitor check-in log and allow no-one into an exclusion area with out proper PPE as designated on this JSA. b. All person onsite must wear proper work and protective clothing (long pants, sleeved-shirt, steel-toed boots, safety vest, safety glasses, and safety helmet, ANSI cut level 4 Kevlar gloves) at all times while on jobsite. b. Limit number of times materials, equipment and debris are handled by staging as close to work area as possible. c. Watch on-site personnel for signs of fatigue (shuffling, disorientation, small mistakes, sloppiness, etc.) and have them go to a shaded, protected area where they can rest and rehydrate. c. Set up and maintain rehydrating station. d. Always wear safety glasses and hearing protection working around operating heavy equipment.

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) **Montrose / LAUSD Shenandoah Elementary / LA, CA**	DATE PREPARED FOR HSP:	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): **Work Area and Exclusion Zone Set-up**	List of Contractor(s) and key work activity:	

4. Clean-up and overnight/over weekend storage	a. Slips, trips, and falls b. Bad organization creating confusion and hazard c. Run-off and soil cross-contamination d. Site Security and Anti-Thievery	a.Clean-up work area as you go. Maintain a clean, unobstructed work area by good house keeping and placing unused equipment away from work area. b. Delineate and block access to open pits/trenches with snow-fencing, delineators, and caution tape as a warning and prevent persons from falling into these items overnight. c. Place debris/detritus areas away from soil stockpile for future use. d. Do not leave expensive equipment in open. d. Lock all vehicles and large equipment. Do not leave keys in vehicles.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

Field Notes:

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Heavy Equipment and/or Vehicles Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Heavy Equipment and/or Vehicles**	List of Contractor(s) and key work activity):	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

'ES HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __R__ HARD HAT __A__ GLOVES: **ANSI Cut Level 4** __R__ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	__A__ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____ Coveralls ____ Tyvek Suit ____ Nomex ____ Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____ Dust Mask _____ ½ face Air Purifying Respirator (APR) _____ Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ P100-Multigas ☐ _____ _____ Full face ARP; specify cartridge type: ____ Air Supplied Respirator ____ SCBA ____ Air-line	Additional PPE:

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-up Activities	a. Lack of concentration or focus.	a1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. a2. Conduct safety tailgate meeting with contractor personnel prior to beginning work activities. Review the site safety hazards and work precautions.
	b. Fire and explosion.	b1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels.
	c. Malfunctioning heavy equipment safety devices.	c1. Inspect equipment to determine if in good condition. Perform all equipment and safety device checks prior to event startup (per operating manual).

Heavy Equipment and/or Vehicles Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Heavy Equipment and/or Vehicles	a. Physical injury from falling or flying objects.	a1. Always conduct Safe Performance Self-Assessment (SPSA) prior to start of, or change in each work procedure or task. a2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	b. Noise.	b1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB.
	c. Being struck by moving vehicles or equipment onsite.	c1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. c2. Vehicles shall use reverse beepers or flagmen.
	d. Cut/pinched fingers or toes; and strained muscles.	d1. See PPE Quick Summary.
	g. Slips, trips, and falls.	g1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	h. Materials loading/unloading.	h1. Identify truck ingress/egress lanes. Keep loading area clear of debris and obstructions (including parked cars and overhead obstructions).
	i. Unauthorized personnel in exclusion zone.	i1. Use visitor check-in log and allow no-one in exclusion area without proper PPE (as defined on this JSA) and training documentation (e.g., HAZWOPER, other as defined in the HASP).

Heavy Equipment and/or Vehicles Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
3) Clean-Up	a. Slips, trips, and falls.	a1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

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LIMITATION: As part of Montrose's EHS Policy, a JSA is provided by Montrose for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get Montrose and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. Montrose recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under Montrose's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for Montrose or its customers in accordance with Montrose's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:	
Excavation and Trench		

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __R__ HARD HAT __R__ GLOVES: **Kevlar ANSI Cut Level 4 & 5** __R__ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	__A__ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ P100-Multigas ☐ _____Full face ARP; specify cartridge type: ____ Air Supplied Respirator ____SCBA ____Air-line	Additional PPE: .

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-Up Activities	a. Lack of concentration or focus.	a1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. a2. Conduct safety tailgate meeting with subcontractor personnel prior to beginning work activities.
	b. Fire and explosion.	b1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters.
	c. Electric shock/ electrocution.	c1. Review the Pre-Job Safety Briefing for minimum approach distances on cranes and excavators.
	d. Malfunctioning heavy equipment safety devices.	d1. Inspect heavy equipment to determine if in good condition. Perform all equipment and safety device checks prior to event startup (per operating manual).

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Excavation of Soil	a. Physical injury from falling or flying objects.	a1. Stay out of the immediate excavation area and the excavator swing radius. a2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	b. Noise.	b1. All personnel will use hearing protection within work area while heavy machinery is operating >85dB.
	c. Being struck by moving vehicles or equipment onsite.	c1. Always wear at a minimum, Class II safety vest, establish eye with operators utilizing flag men wear appropriate. c2. Vehicles shall use reverse beepers or flagmen. c3. Face the direction of oncoming traffic during work activities when possible.
	d. Cut/pinched fingers or toes; and strained muscles.	d1. See PPE Quick Summary.
	e. Equipment tip over.	e1. Watch equipment location & swing points; monitor live & dead loads. e2. If a crane is being used, make sure to take away from the operation at all times when the crane is in use.
	f. Toxic or explosive atmosphere.	f1. Periodically monitor ambient atmosphere with PID or LEL meter. upwind if concentrations are detected above HASP defined action levels.
	g. Slips, trips, and falls.	g1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	h. Cave-in	h1. Follow Montrose's Excavation and Trench Program. h2. Never enter an excavation without the proper training, and a competent person documenting and monitoring the excavation. h3. Excavations must have be properly sloped or have shorting installed. Never enter an excavation that does not have either of these two engineering controls in place, and a documented and approved engineering drawings.
3) Staging and Dumping of HC Impacted Soil	a. Bad organization creating confusion and hazard.	a1. keep area clear of parked vehicles or stored materials/equipment. a2. Identify truck ingress/egress lanes and keep clear.
	b. Slips, trips, and falls.	b1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.

	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

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Soil/Debris Loading Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:	
Soil/Debris Loading		

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __R__ HARD HAT __R__ GLOVES: **ANSI Cut Level 4 & 5 Kevlar** __R__ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	__A__ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☐ NA __A__ ½ face Air Purifying Respirator (APR) ____X__ Particulate Mask: ☒ PM100 ☐ PM95 ____X__ Cartridge: ☒ P100-Multigas ☐ _____ _____ Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE: Level C PPE for asbestos debris handling (Asbestos trained workers only)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-up Activities	a. Lack of concentration or focus.	a1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. a2. Conduct safety tailgate meeting with subcontractor personnel prior to beginning work activities. Explain the site safety hazards and work precautions outlined in the HASP and obtain signatures indicating the HASP was discussed.
	b. Fire and explosion.	b1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels. b2. Deploy 2-20lb ABC Fire extinguishers in accordance site safety officer's direction.
	c. Malfunctioning heavy equipment safety devices.	c1. Inspect drill rig to determine if in good condition. Perform all equipment and safety device checks prior to event startup (per operating manual).

Soil/Debris Loading Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Staging Soil	a. Bad organization creating confusion and hazard.	a1. Identify staging area with good lateral and vertical access for loading and unloading of trucks.
	b. Physical injury from falling or flying objects.	b1. Always conduct Safe Performance Self-Assessment (SPSA) prior to start of, or change in each work procedure or task. b2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	c. Noise.	c1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB.
	d. Being struck by moving vehicles or equipment onsite.	d1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. d2. Vehicles shall use reverse beepers or flagmen. d3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. d4. Face the direction of oncoming traffic during work activities when possible.
	e. Equipment tip over.	e1. Watch equipment location & swing points; monitor live & dead loads. e2. Use a crane that is adequate for the load (Check loading capacity with operator and manual).
	f. Toxic or explosive atmosphere.	f1. Periodically monitor ambient atmosphere with PID or LEL meter. Shut down job and move personnel and equipment upwind if concentrations are detected above HASP defined action levels.
	g. Slips, trips, and falls.	g1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	h. Unauthorized personnel in exclusion zone.	h1. Use visitor check-in log and allow no-one in exclusion area without proper PPE (as defined on this JSA) and training documentation (e.g., HAZWOPER, other as defined in the HASP).
3) Loading of Hydrocarbon Impacted Soil/Debris	a. Physical injury from falling or flying objects.	a1. Always conduct Safe Performance Self-Assessment (SPSA) prior to start of, or change in each work procedure or task. a2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	b. Noise.	b1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB.

Soil/Debris Loading Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
3) Cont'd	c. Being struck by moving vehicles or equipment onsite.	c1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. c2. Vehicles shall use reverse beepers or flagmen. c3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. c4. Face the direction of oncoming traffic during work activities when possible.
	d. Cut/pinched fingers or toes; and strained muscles.	d1. See PPE Quick Summary. d2. Use proper lifting techniques and 2-man rule as outlined in TRC's Employee IIPP Handbook and "Back Safety: A User's Guide" training module" handbook, when moving heavy objects (>40 lbs).
	e. Equipment tip over.	e1. Watch equipment location & swing points. Monitor live & dead loads adjacent to the excavation. e2. Maintain 2-foot safety buffer at edge of excavation.
	f. Toxic or explosive atmosphere.	f1. Periodically monitor ambient atmosphere with PID or LEL meter. Shut down job and move personnel and equipment upwind if concentrations are detected above HASP defined action levels.
	g. Slips, trips, and falls.	g1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	h. Unauthorized personnel in exclusion zone.	h1. Use visitor check-in log and allow no-one in exclusion area without proper PPE (as defined on this JSA) and training documentation (e.g., HAZWOPER, other as defined in the HASP).
4) Clean-up	a. Slips, trips, and falls.	a1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	b. Storm water run-off.	b1. Cover all impacted spoils piles and berm to contain storm water run-off.
	c. Soil cross contamination.	c1. Ensure downhole sampling equipment is cleaned between samples. c2. Create a clean sample collection area with removable poly sheeting/aluminum foil or other method ensure a clean work surface that is refreshed between each sample.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Soil/Debris Loading Job Safety Analysis (JSA)

Field Notes:

LIMITATION: As part of Montrose's EHS Policy, a JSA is provided by Montrose for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get Montrose and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. Montrose recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under Montrose's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for Montrose or its customers in accordance with Montrose's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Soil Sampling Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		

JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:
Soil Sampling	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __R__ HARD HAT __R__ GLOVES: **ANSI Cut 4 Kevlar** __R__ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	__A__ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____Dust Mask _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 _____ Cartridge: ☐ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE/Notes:

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-up	a. Slips, trips, and falls.	a1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	b. Being struck by moving vehicles or equipment onsite.	b1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. b2. Vehicles shall use reverse beepers or flagmen. b3. Face the direction of oncoming traffic during work activities when possible.
	c. Contamination.	c1. Wear nitrile or latex gloves with ANSI cut level 4 Kevlar gloves underneath when handling soil.
	d. Fire and explosion.	d1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels.

Soil Sampling Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Soil Sampling	a. Slips, trips, and falls.	a1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	b. Being struck by moving vehicles or equipment onsite.	b1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. b2. Vehicles shall use reverse beepers or flagmen. b3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. b4. Face the direction of oncoming traffic during work activities when possible.
	c. Contamination.	c1. Wear nitrile or latex gloves with ANSI cut level 3 or 4 Kevlar gloves underneath when handling soil. Wear Safety glasses with splash guards when handling groundwater.
	d. Potential cross-contamination of soil sampling equipment	d1. Collect soil samples (if possible) from mounded soil that is not in contact with metal. d2. Ensure soil samples are capped and placed in a clean, secure area after collection
	c. Fire and explosion.	c1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels. c2. Deploy 10 or 20lb ABC Fire extinguishers.
	d. Inhalation/ingestion/ thermal contact	d1. No food or drinks in work zone.
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:_____

_____

Backfilling and Compaction Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Backfilling and Compaction**	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE
	OSC	

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __R__ HARD HAT __R__ GLOVES: **ANSI Cut Level 4 & 5 Kevlar** __R__ SAFETY GLASSES _____ GOGGLES _____ FACE SHIELD	__A__ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☐ NA __A__ Dust Mask __A__ ½ face Air Purifying Respirator (APR) __X__ Particulate Mask: ☒ PM100 ☐ PM95 __X__ Cartridge: ☒ P100-Multigas ☐ _____ _____ Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA ____Air-line	Additional PPE: .

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-up Activities Backhoe/ Excavator (Compactor & Material Delivery)	a. Lack of concentration or focus.	a1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. a2. Conduct safety tailgate meeting with subcontractor personnel prior to beginning work activities. Explain the site safety hazards and work precautions outlined in the HASP and obtain signatures indicating the HASP was discussed.
	b. Fire and explosion.	b1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels. b2. Deploy 2-20lb ABC Fire extinguishers in accordance site safety officer's direction.
	c. Electric shock/ electrocution.	c1. De-energize all circuits/power sources and follow Montrose's Lockout-Tagout Program for circuits within 3-feet of boring location or 10-feet' of overhead utilities.
	d. Malfunctioning heavy equipment safety devices.	d1. Inspect drill rig to determine if in good condition. Perform all equipment and safety device checks prior to event startup (per operating manual).

Backfilling and Compaction Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW
Montrose / LAUSD Shenandoah Elementary / LA, CA		☒ REVISED
JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:	
Backfilling and Compaction		

1) Cont'd	e. Being struck by moving vehicles or equipment onsite.	e1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. e2. Vehicles shall use reverse beepers or flagmen. e3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. e4. Face the direction of oncoming traffic during work activities when possible.
	f. Bad organization creating confusion and hazard.	f1. Identify staging area with good lateral and vertical access for loading and unloading of trucks.
2) Compacting Soil	a. Physical injury from equipment.	a1. Wear appropriate ANSI cut level 4 Kevlar gloves when working around moving equipment.
	b. Physical injury from falling or flying objects.	b1. Always conduct Safe Performance Self-Assessment (SPSA) prior to start of, or change in each work procedure or task. b2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	c. Being struck by moving vehicles or equipment onsite.	c1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. c2. Vehicles shall use reverse beepers or flagmen. c3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. c4. Face the direction of oncoming traffic during work activities when possible. d1. Review and use hazard communications contained HASP to prepare for working in loud or hazardous environment.
	d. Poor or miscommunications.	e1. See PPE Quick Summary.
	e. Cut/pinched fingers or toes; and strained muscles.	e2. Use proper lifting techniques and 2-man rule as outlined in Montrose's Manual Lifting Policy and "Back Safety: A User's Guide" training module", when moving heavy objects (>40 lbs).

Backfilling and Compaction Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Cont'd	f. Equipment tip over.	f1. Watch equipment location & swing points; monitor live & dead loads. f2. Use a crane that is adequate for the load (Check loading capacity with operator and manual).
	g. Noise.	g1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB.
	h. Cuts and abrasions.	H1. Wear ANSI cut level 4 or 5 Kevlar gloves when working with hand tools or picking up debris.
	b. Physical injury from equipment.	b1. Wear appropriate ANSI cut level 4 Kevlar gloves when working around moving equipment.
	i. Backfilling and compaction.	i1. Clear unusable detritus (roots, trash, concrete chunks, etc.) from soil to be reused as backfill to allow for proper compaction. i2. Support all exposed utilities and hand fill around piping runs. i3. When backfilling, place at least 1-foot of backfill over utility line before compacting to prevent crushing/breaking utility line. i4. Wet soil down to properly compact, do not over saturate.
	j. Back strain, muscle fatigue objects.	j1. Use proper lifting techniques and 2-man rule when moving heavy objects (>40 lbs). j2. When hand digging, use the leverage in the shovel handle to break the soil loose, and don't force it out.
	d. Cut/pinched fingers or toes; and strained muscles.	d1. See PPE Quick Summary. d2. Use proper lifting techniques and 2-man rule as outlined in TES's Manual Lifting Policy and "Back Safety: A User's Guide" training module", when moving heavy objects (>40 lbs).
3) Clean-up and Overnight/ Over Weekend Storage	a. Slips, trips, and falls.	a1. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area.
	b. Bad organization creating confusion and hazard.	b1. Identify staging area with good lateral and vertical access for loading and unloading of trucks.
	c. Run-off.	c1. Cover all soil stockpiles with plastic-sheeting overnight. c2. Delineate and block access to open pits/trenches with snow-fencing, delineators, and caution tape. c3. Cover open trenches with plastic sheet and berm around to reduce water run-off in the case of rain.

Backfilling and Compaction Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

_____

_____

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Compaction Testing Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description): **Compaction Testing**	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

ES : HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE
	OSC	

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

R REFLECTIVE VEST R HARD HAT R GLOVES: **ANSI Cut Level 4 & 5 Kevlar** R SAFETY GLASSES GOGGLES FACE SHIELD	A HEARING PROTECTION R SAFETY SHOES: Protective Toe 5pt.HARNESS / LANYARD PPE CLOTHING: Coveralls Tyvek Suit Nomex Other (specify):	RESPIRATORY PROTECTION: ☐ NA R ½ face Air Purifying Respirator (APR) X Particulate Mask: ☒ PM100 ☐ PM95 X Cartridge: ☒ P100-Multigas ☐ _____ Full face ARP; specify cartridge type: Air Supplied Respirator SCBA Air-line	Additional PPE/Notes: As per defined in the job/site specific Health and Safety Plan (HASP) wear PPE at all times when performing site work.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Set-up Activities (Compactor & Material Delivery)	a. Physical Injury or equipment damage from lack of concentration or focus. b. Lack of concentration or focus. c. Physical injury from equipment.	a1. Review all plans (HASP, Work, Utility Plans, etc.) and logs in field notebook prior to starting a new task. b1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. b2. Conduct safety tailgate meeting with subcontractor personnel prior to beginning work activities. Explain the site safety hazards and work precautions outlined in the HASP and obtain signatures indicating the HASP was discussed. c1. Wear appropriate ANSI cut level 4 Kevlar gloves when working around moving equipment.

Compaction Testing Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1) Cont'd	b. Being struck by moving vehicles or equipment onsite.	b1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. b2. Vehicles shall use reverse beepers or flagmen. b3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. b4. Face the direction of oncoming traffic during work activities when possible.
	c. Bad organization creating confusion and hazard.	c1. Identify staging area with good lateral and vertical access for loading and unloading of trucks.
2) Compaction Testing	a. Physical injury from falling or flying objects.	a1. Always conduct Safe Performance Self-Assessment (SPSA) prior to start of, or change in each work procedure or task. a2. Wear appropriate PPE including hardhats, safety glasses, and any additional PPE as directed by the SSO.
	b. Being struck by moving vehicles or equipment onsite.	b1. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. b2. Vehicles shall use reverse beepers or flagmen. b3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. b4. Face the direction of oncoming traffic during work activities when possible.
	c. Poor or Miscommunications.	c1. Review and use hazard communications contained HASP to prepare for working in loud or hazardous environment.
	d. Cut/pinched fingers or toes; and strained muscles.	d1. See PPE Quick Summary. d2. Use proper lifting techniques and 2-man rule as outlined in Montrose's Manual Lifting Policy and "Back Safety: A User's Guide" training module", when moving heavy objects (>40 lbs).
	e. Equipment tip over.	e1. Watch equipment location & swing points. Monitor live & dead loads adjacent to the excavation. e2. Maintain 2-foot safety buffer at edge of excavation.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
2) Cont'd	f. Noise.	f1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB.
LOCATION(S) WHERE HAZARD IS TO BE EXPECTED		**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

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COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED:	☐ NEW ☒ REVISED
Montrose / LAUSD Shenandoah Elementary / LA, CA		
JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:	
55 Gallon Drum Transport/Handling		

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

"ES APPROVED" JSA DEVELOPMENT TEAM	POSITION / TITLE	APPROVAL DATE

Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

__R__ REFLECTIVE VEST __A__ HARD HAT __R__ GLOVES: **ANSI Cut Level 4 & 5 Kevlar** __R__ SAFETY GLASSES _____GOGGLES _____FACE SHIELD	____ HEARING PROTECTION __R__ SAFETY SHOES: Protective Toe _____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ____Tyvek Suit ____Nomex ____Other (specify):	RESPIRATORY PROTECTION: ☒ NA _____½ face Air Purifying Respirator (APR) _____Particulate Mask: ☐ PM100 ☐ PM95 ____ Cartridge: ☐ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: _____ Air Supplied Respirator ____SCBA _____Air-line	Additional PPE:

Always perform a Safety Assessment: 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1. Setup	a. Slip/trips/falls	a. Maintain a clean, unobstructed work area by good house keeping. Move unused equipment away from designated work area.
	b. Drum Condition	b. Inspect all drums prior to use. Make sure that drums do not have any defect and lids fit tightly.
2. Drum opening/ closing	a. Cut/pinched fingers or toes	a. Utilize proper PPE (see above), ANSI cut level 4 or 5 Kevlar gloves, safety shoes and safety glasses are minimum required protection. a. Wear ANSI cut level 4 or 5 Kevlar gloves during the opening and closing of drums to protect fingers.
3. Transport/handling drums	a. Physical injury (back strain, moving vehicles, pinch points)	a. Make sure to utilize drum dolly when handling drums with soil, grout, concrete or water (or any other material). a. If moving drum on an uneven, inclined or declined surface, utilize a spotter to assist. a. Have one person watch traffic while the other exits exclusion zone. a. Always wear safety vest, establish eye contact with vehicle/equipment operators, utilizing flag men where appropriate.
	b. Environmental Hazard	b. Once material is placed in drum, inspect for leaks. b. Before transporting/handling drum, make sure that the lid is fully secure. b. Make sure to properly label drum (i.e., hazardous, non-hazardous labels, etc.)
4. Drum Storage	a. Security	a. Drums that are left onsite need to be stored in safe location (i.e., away from traffic, pedestrian walkways, etc.). Do not leave drums in handicap parking stalls. a. If drums are stored in an area that is accessible, delineate storage area with caution tape.

LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	POTENTIAL HAZARD	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1.	a.	a.
2.	a.	a.
3.	a.	a.

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PRE-JOB SAFETY BRIEFING

Daily Pre Job Safety Briefing

Project Name: Shenandoah Elementary School Project Number: _____

Work Location: 2450 South Shenandoah Street, Los Angeles Date: _____

Tasks Performed: _____ Time: _____ AM PM

Client Name: LAUSD Submitted By: _____

HASP Available Onsite: Yes ☐ No ☐ Emergency Meeting Location: _____

Emergency Facility(s): Kaiser Permanante Medical Center Number(s): (323) 857-2000

Physical Address: 6041 Cadillac Avenue, Los Angeles

First Aid/CPR Persons: _____

For Emergencies Dial 911/For Non-Emergencies Dial WorkCare (888) 449-7787

Personal Protective Equipment Required	Yes	No	Type
Fall Protection	☐	☐	_____
body harness, lifelines, barricades, other (specify)			
Eye/Face	☐	☐	_____
goggles, face shield, hood, other (specify)			
Respirator	☐	☐	_____
SCBA, supplied air, HEPA, dust, other (specify)			
Foot Protection	☐	☐	_____
safety toe, EH rated, rubber boots, other (specify)			
Hand Protection	☐	☐	_____
leather, cut resistant, chemical, EH, other (specify)			
Head Protection	☐	☐	_____
hard hat, helmet, electrical hazard, other (specify)			
Clothing	☐	☐	_____
coveralls, welding, sleeves, rain, FR, reflective vest,			
chemical, other (specify)			
Hearing Protection	☐	☐	_____

Procedures/Programs Required	Yes	No
Hot Work	☐	☐
LOTO/Energy Control	☐	☐
Trenching/Excavation	☐	☐
Signs/Barricades	☐	☐
Confined Space	☐	☐
Cranes/Critical Lifts	☐	☐
Line Breaking/Hot Tap	☐	☐
Scaffolds/Aerial Lifts	☐	☐
System Testing/ Grounding	☐	☐
Employee Certification/Training Required		
Crane Operator	☐	☐
Forklift Operator	☐	☐
Mobile Equipment Operator	☐	☐
Railroad/eRailsafe	☐	☐
OSHA 10/30	☐	☐
HAZWOPER	☐	☐
MSHA	☐	☐

Additional Considerations

Work Procedures:

☐ Check for utility clearance ☐ Adequate work zone

☐ Vehicle grounds ☐ Working clearances

☐ Discuss potential exposure to hazards

People: ☐ Worker fatigue ☐ Other work groups

☐ Public safety ☐ Pedestrian control ☐ Experience

☐ Traffic control ☐ Other utilities ☐ Spec. Training

Tools/Equipment: ☐ Inspection of drilling equipment

☐ Inspection of hoses

☐ Inspection of tools

☐ Specialized tools/equipment

☐ Correct tool/equipment for the job

Special Precautions: ☐ Adjacent structures

☐ Condition of structures ☐ Weather conditions

☐ Lighting conditions ☐ Terrain ☐ Water bodies

☐ Spills and leaks ☐ Environmental ☐ Cultural

Other: _____

If Conditions CHANGE…Stop Work, Review, and Revise the Plan!!

Daily Pre Job Safety Briefing

Hazards Associated with the Job (focus on the GEMS)				
Gravity	**Electrical**	**Mechanical**	**Kinetic**	**Other/Environmental**
☐ Falling from a height ☐ Falling objects ☐ Falling structures ☐ Climbing obstructions ☐ Dangerous trees	☐ Electrical contact ☐ Flash potential ☐ Induced voltage ☐ Utility strike	☐ Equipment failure ☐ Cable tension ☐ Moving parts ☐ Crane/Rigging	☐ Traffic ☐ Driving conditions ☐ Moving/Shifting loads ☐ Rotating machinery ☐ Vehicle stability ☐ Heavy equip. operation	☐ Asbestos/Lead ☐ Animals/Insects ☐ Confined space ☐ Excavations ☐ Heat/Cold ☐ Poisonous Plants

List all hazards associated with this task	**Signatures of Crew Members Present**	**Post Task Safety Analysis**
		Did any injuries or incidents occur today? If yes, explain.
		☐ Yes ☐ No
Barriers to eliminate/control above hazards?		Was the injury or incident reported to the safety department?
		☐ Yes ☐ No ☐ N/A
		What problems did you have with today's work assignment?
	OSHA's Unqualified Minimum Clearances	
	Powerline Voltage Phase to Phase (kV) / **Minimum Safe Clearance (ft.)**	
	50 or below / **10**	
	Over 50 to 200 / **15**	What can we do tomorrow to improve performance?
	Over 200 to 350 / **20**	
	Over 350 to 500 / **25**	
	Over 500 to 750 / **35**	
Supervisor Signature Date	**Over 750 to 1,000** / **45**	

WORKCARE PROGRAM INFORMATION

WorkCare® Making Health Count

FACT SHEET

EARLY INCIDENT INTERVENTION®

Immediate Access to Medical Advice for Work Related Incidents

(888) 449-7787

INTRODUCTION

WorkCare, Inc. (WorkCare) and TRC have partnered together to promote Incident Intervention®, a resource designed to support company safety goals/targets—while reducing runaway-costs associated with workplace injuries and illnesses.

PURPOSE

Early Incident Intervention provides TRC employees with **IMMEDIATE** telephonic access to WorkCare clinicians at the time of a presumed, non-emergency workplace injury or illness. Clinicians provide expert guidance on the evaluation of symptoms, appropriate first aid, and the need for additional medical evaluation or treatment.

When utilizing this service within the first hour of an incident, known as the "Golden Hour," licensed medical staff can guide the case so that medical evaluation and treatment are rendered appropriately.

> ***"…helps the worker traverse the unpredictable terrain of work-related injuries and illness."***

PRINCIPLES OF EARLY INCIDENT INTERVENTION

- Utilizes principles of the "Golden Hour."
- Provides workers immediate clinician support at the time of an incident.
- Focuses on providing the right care, at the right time in the proper setting.

BENEFITS FOR EMPLOYEES

- Instant access to a medically qualified professional for evaluation of symptoms and possible outcomes.
- Professional guidance on appropriate first aid measures and medications.
- Professional advice regarding the need for additional medical evaluation or treatment.

BENEFITS FOR TRC

- Point of contact for emergency and non-emergency medical clinicians.
- Triages the incident to determine risk and urgency, delivering interventions that are consistent with medical guidelines for the specified injury and illness.
- Maintains communication with clinicians to ensure accurate and timely reporting.

TRENCH AND EXCAVATION PROGRAM

1. PURPOSE

ES's Trench and Excavation Compliance Program has been developed based on the Occupational Safety and Health Administration (OSHA) standards for the construction industry (29 CFR 1926, Subpart P – Excavations).

2. SCOPE

This Compliance Program applies to all open excavations made in the earth's surface. Excavations are defined to include trenches. These guidelines apply to all Operating Unit facilities and project sites.

3. DEFINITIONS

Accepted engineering practices: Those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring: A pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole: A type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system): A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in: The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person: One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces: The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or Sides: The vertical or inclined earth surfaces formed as a result of excavation work.

Failure: The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere: An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kick-out: The accidental release or failure of a cross brace.

Protective system: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp: An inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer: A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Sheeting: The members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system): A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring system): A structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation, and which is designed to prevent cave-ins.

Sloping (Sloping system): A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock: Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp: A ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system: A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data: Tables and charts approved by a registered professional engineer, and used to design and construct a protective system.

Trench (Trench excavation): A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box: See Shield.

Trench shield: See Shield.

Type A soil: Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam, and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hard pan are also considered Type A. However, no soil is Type A if:

- The soil is fissured.
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects.
- The soil has been previously disturbed.
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater.
- The material is subject to other factors that would require it to be classified as a less stable material.

Type B soil**:** Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; granular cohesion less soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and in some cases, silty clay loam and sandy clay loam; previously disturbed soils except those that would otherwise be classed as Type C soil; soil that meets the unconfined compressive strength or cementation requirements for Type A but is fissured or subject to vibration; dry rock that is not stable; material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C soil: Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; granular soils, including gravel, sand, and loamy sand; submerged soils, including soil from which water is freely seeping; submerged rock that is not stable; material in a sloped, layered system where the layers dip into the excavation at a slope of four horizontal to one vertical (4H:1V) or steeper.

Uprights**:** The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales: Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

4. RESPONSIBILITIES

4.1 ES's National Safety Director is responsible for establishing the Trench and Excavation Program requirements and providing/communicating them to the Health and Safety Network. The National Safety Director will review contract documents as required that include project and Client-Specific Requirements.

4.2 The Health and Safety Network is responsible for the Trench and Excavation Program implementation including, but not limited to:

- Qualifying or identifying Competent Person(s) for trench and excavation safety.
- Training new and existing ES employees.
- Communicating and coordinating ES's Trench and Excavation Program requirements with all ES subcontractors, including identification of Subcontractor(s) Competent Person(s).
- Procuring ES health and safety equipment (harnesses, lanyards, vertical and horizontal lifeline and other materials).
- Working in conjunction with identified Competent Person(s) to provide on-site direction on Trench and Excavation issues.
- Leading all investigations along with the Competent Person, Project Manager, Field Team Leader, and subcontractor health and safety representative or their designees, if a Trench and Excavation Program violation occurs on-site.
- Assisting in Trench and Excavation Program audits in conjunction with on-site ES subcontractor, and the health and safety representatives or their designees.
- Maintaining records for health and safety activities on-site including equipment inspections and procedural audits of employee Trench and Excavation Program implementation.
- Coordinating assistance during emergency situations.

4.3 OSHA defines a Competent Person as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, who has authorization to take prompt corrective measures to eliminate them (29 CFR 1926.32[f]). By way of training and/or experience, a Competent Person is knowledgeable of applicable standards, and is capable of identifying workplace hazards related to the specific operation. Under ES's Trench and Excavation Program the Competent Person will:

- Perform all duties as specified in the Trench and Excavation Program.

- Review and approve all Health and Safety Plans (HASPs) and Job Safety Analyses (JSAs) that include work in and around trenches and excavations.
- In the event of simultaneous operations, cooperate fully with the Subcontractor's Person in Charge.
- Communicate with performing authorities (i.e., employees working in or around trenches or excavations) regarding the presence of other operations on-site.
- Work with Project Manager and/or Field Team Leader to identify and manage the risks associated with the project site.
- Assist in the training of employees who will be performing tasks in and around a trench or excavation.
- Ensure that a rescue plan is established by working with the Project Manager and/or facility safety personnel prior to any employees entering or working around a trench or excavation.
- Provide guidance as required for Trench and Excavation Program issues and questions.
- Coordinate with Project Managers and Health and Safety Network on trench and excavation audits.
- Observe the implementation of Trench and Excavation Program and conduct audits as required or directed.

4.4 The Project Manager is responsible for assisting the Health and Safety Network in the implementation of the Trench and Excavation Program. Project Managers must hold all TRC and other project employees working on-site accountable (zero tolerance policy) for maintaining a safe work environment.

4.5 Project Managers and site employees shall be held accountable for performing work in a safe manner according to the requirements of the Trench and Excavation Program.

4.5.1 The Field Team Leader shall:

- Participate in Trench and Excavation Awareness training.
- Confirm that Competent Personnel prepared and/or reviewed the Site-Specific Rescue Plan if required.
- When required, confirm that everyone working under a specific permit adheres to the permit's documented conditions.

5. PROCEDURE

5.1 General Requirements Permit labor

The following guidelines establish the minimum requirements of the applicable state and federal safety regulations for all work in excavations and trenches that might expose employees to the hazards of moving ground:

- All surface encumbrances adjacent to an excavation that might create a hazard to employees must be removed, secured, or supported as necessary to protect employees.
- The estimated location of underground installations, such as sewer, telephone, electric, water, or other underground utilities must be identified before opening an excavation. Utility companies, owners, and local One Call locator services must be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations before the work begins.
- When excavations approach the estimated location of underground installations, the exact location is determined by probing or hand digging, as necessary, to prevent accidental contact with the underground installations. While the excavation is open, underground installations that create a hazard to employees will be supported, protected, or removed as necessary to protect employees.

5.1.1 Access and Egress - Structural ramps.

- Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
- Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.
- Structural members used for ramps and runways shall be of uniform thickness.
- Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments o the top surface to prevent slipping.
- Appropriate access and egress in the form of a stairway, ladder, or ramp must be provided in all excavations deeper than 4 feet (1.23 m). In trenches, the stairway, ladder, or ramp must be installed so that a worker does not have to travel farther than 25 feet (7.62 m) in any direction to exit.

- Employees exposed to vehicular traffic must wear safety vests or other equivalent apparel marked with or made of reflectorized or high-visibility material.
- No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.
- A warning system must be provided when mobile equipment is operated adjacent to an excavation and the operator does not have a clear and direct view of the edge of the excavation. The warning system may include barricades, signals, stop logs, or other authorized methods. If possible, the grade should be away from the excavation.
- When deemed necessary by a competent person, excavations where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
- Emergency rescue equipment, such as rescue breathing apparatus, a safety harness and line, or a basket stretcher must be available where a hazardous atmosphere exists or could be expected to develop in an excavation.
- Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
- Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

- If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.
- Inspection of an excavation shall be made by a competent person when accumulation of water is present.
- If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.
- The stability of adjacent structures, such as buildings, walls, and sidewalks must be maintained using a support system as necessary to protect employees.
- Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:
    - A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
    - The excavation is in stable rock; or
    - A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
    - A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.
- Sidewalks, pavements and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.
- Employees must be protected from loose rock or soil that could fall or roll into the excavation by placing and keeping such material at least 2 feet (0.61 m) from the edge of the excavation.
- A competent person must make daily inspections of excavations to identify and eliminate conditions that could result in cave-ins, failure of support systems, hazardous atmospheres, or other unsafe conditions. Inspections must be conducted before the start of work each day and after every rainstorm or other occurrence that might increase the hazard of moving ground. If problems are found, provisions should be made for immediate removal of personnel.

- Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.
- Where employees or equipment are allowed or required to cross over excavations that are 6 feet
- (1.83 m) or greater in depth, appropriate fall protection in the form of walkways or bridges with standard guardrails must be provided.
- An open excavation or trench that is left open overnight must be barricaded, covered, and secured in a manner that prevents anyone from entering the excavation intentionally or accidentally.

5.2 Protective Systems

Sloping, shoring, or shielding will be provided in excavations, except where the excavation is made in stable rock or the excavation is less than 5 feet (1.52 m) deep and an examination by a competent person does not indicate a potential for cave-in.

5.3 Sloping

When sloping or benching is chosen as the method to protect employees in an excavation, one of the following optional designs of sloping and benching systems must be used:

- Option 1 – Slope the excavation at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal).
- Option 2 – Perform a soil classification and determine the acceptable slopes required.
- Option 3 – Use a project-specific design prepared by a registered professional engineer.

  Engineered designs must be in writing, be rubber stamped, and must include the name and registration number of the engineer, detailed plans, the calculations used in the design, the magnitude of slopes, and the configurations determined to be safe. A copy of the design will be maintained at the jobsite during the use of the engineered system.

5.4 Shoring or Shielding

Only the following methods for support systems, shield systems, and other protective systems can be used at a ES ; jobsite:

- Option 1 – Perform a soil classification and determine the appropriate support, shield or other protective system configuration using the shoring manufacturer's tabulated data.

When using the manufacturer's tabulated data, the shoring system must be installed in accordance with all the specifications, recommendations, limitations, or approvals to deviate issued by the manufacturer. The manufacturer's tabulated data, specifications, recommendations, limitations, and any approval to deviate must be in writing, and maintained at the jobsite during the use of the shoring system.

- Option 2 – Use a project-specific design prepared by a registered professional engineer.

  Engineered designs must be in writing, be rubber stamped, and include the name and registration number of the engineer, detailed plans, the calculations used in the design, and the sizes, types, and configurations of materials to be used in the support system. A copy of the design must be maintained at the jobsite during the use of the engineered system.

5.5 General Guidelines

The materials and equipment used for protective systems must be free of damage or defects that might impair their proper functions. Manufactured materials and equipment must be used and maintained in accordance with the recommendations of the manufacturer. If material or equipment used in a protective system is damaged, it must be inspected by a competent person before being reused.

The installation and removal of protective systems must be performed in accordance with all of the following guidelines:

- Members of support systems must be securely fastened together to prevent sliding, falling, kick-outs, or other predictable failures.
- Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or being struck by members of the support system.
- Individual members of support systems must not exceed their design capacities.
- Before individual members can be removed, additional precautions must be taken to protect employees, including installing other structural members to support any additional load imposed on the support system.
- Removal begins at, and progresses from, the bottom of the excavation. Members must be released slowly to reduce the likelihood of failure of the remaining members or a cave-in.
- Backfilling must progress with the removal of support systems.
- Support systems must be coordinated with the excavation of trenches and must extend to within 2 feet (0.61 m) of the bottom of the trench, but only if the system is designed to resist the forces calculated for the full depth of trench, and there is no indication of a loss of soil from behind or below the bottom of the support system.

- Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
- Shield systems must not be subjected to loads exceeding their design capacities. Shields must be installed in a manner that restricts lateral or hazardous movement in the event that a lateral load is applied suddenly. Employees must be protected when entering or exiting the areas protected by a shield. Employees are not allowed within the shield during installation, removal, or vertical movement.
- When shield systems are used in trenches, excavation of material may proceed 2 feet (0.61 m) below the bottom of the shield only if the shield is designed to resist the forces calculated for the full depth of trench and there is no indication of a loss of soil from behind or below the bottom of the shield.

5.6 Soil Classification

This section describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits.

- Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C, in accordance with the definitions set forth in this compliance program.
- Soil and rock deposits are classified based on the results of at least one visual and one manual analysis. These analyses must be conducted by a competent person using the tests described in this chapter or other approved methods of soil classification, such as those adopted by the American Society for Testing Materials (ASTM) or the United States Department of Agriculture (USDA).
- The methods used for visual and manual analyses must provide quantitative and qualitative information sufficient to identify the properties, factors, and conditions of the deposits.
- A layered system must be classified based on the weakest layer. However, each layer may be classified individually when a more stable layer lies below a less stable layer.
- If, after classifying a deposit, the properties, factors, or conditions change in any way, the changes must be evaluated by a competent person. The deposit must be reclassified as necessary to reflect the new circumstances.

5.7 Visual Analysis

The visual analysis is conducted to collect qualitative information about the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the excavation, and soil samples taken from the excavated material. The visual analysis includes:

- Observing samples of the soil that are excavated and soil in the sides of the excavation to estimate the range of particle sizes and the relative amounts of particle sizes. Fine-grained material is cohesive.
- Observing the soil as it is excavated to determine if it stays in clumps. Soil that breaks up easily and does not stay in clumps is granular.
- Observing sides of the opened excavation and the surface area adjacent to the excavation to identify tension cracks or fissured material.
- Observing the area adjacent to the excavation and the excavation itself to identify existing underground utilities, structures, or previously disturbed soils.
- Observing the opened sides of the excavation to identify layered systems. Examine layered systems to determine if the layers slope toward the excavation, and to estimate the degree of slope in the layers.
- Observing the area adjacent to the excavation and the areas within the excavation to identify potential sources of vibration that might affect the stability of the excavation.
- Observing the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the water table.

5.8 Manual Analysis

Manual analysis is conducted to collect quantitative and qualitative information about the properties of the soil, and to provide more information to properly classify the soil. The manual analysis includes some or all of the following methods:

- Evaluating the plasticity of the soil by molding a moist or wet sample of soil into a ball and attempting to roll it into threads as thin as 1/8 inch (0.32 cm) in diameter. Cohesive material can be rolled into a thread at least 2 inches (5.08 cm) long without crumbling or breaking.
- Evaluating the cohesiveness of the soil. If the soil is dry and crumbles into individual grains or fine powder with little or moderate pressure, it is granular. If the soil is dry and falls into clumps that break into smaller clumps but the smaller clumps can only be broken up with difficulty, it might be clay in combination with gravel, sand, or silt. If the dry soil breaks into small clumps that can only be broken with difficulty and there is no visual indication the soil is fissured, the soil may be considered unfissured.

- Applying the thumb penetration test to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb and can be molded by light finger pressure.
- The thumb test should be conducted on an undisturbed soil sample, such as a large clump of soil, as soon as possible after excavation to minimize the effects of drying. If the excavation is later exposed to rain, flooding, or other moisture, the classification of the soil must be changed accordingly.
- Estimating the unconfined compressive strength of soils by using a pocket penetrometer or a hand-operated shear vane in accordance with the manufacturer's recommendations.
- Performing a drying test to differentiate among cohesive material with fissures, unfissured cohesive material, and granular material. After thoroughly drying a sample of soil that is approximately 1 inch (2.54 cm) thick and 6 inches (15.24 cm) in diameter, evaluate the results as follows:
    - If the sample develops cracks as it dries, significant fissures are indicated.
    - If the sample dries without cracking and can be broken by hand, then the material is either unfissured cohesive or fissured cohesive.
    - If considerable force is necessary to break the sample, the soil has significant cohesive material content. The soil can be classified as unfissured cohesive material, and the unconfined compressive strength should be determined.
    - If the sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

5.9 Sloping and Benching Specifications

This section contains the specifications for using sloping and benching to protect employees working in excavations.

- These slope and bench specifications only apply if a soil classification has been conducted and the excavation will be 20 feet (6.10 m) deep or less.
- Determine the maximum allowable slope and configuration based on the soil classification by using the information in table(s) 1, 2 and 3.

Table 1 Maximum Allowable Slope Based on Soil Classification

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)[1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP[3]
STABLE ROCK	VERTICAL (90º)
TYPE A[2]	3/4:1 (53º)
TYPE B	1:1 (45º)
TYPE C	1½:1 (34º)

1. The numbers shown in parentheses next to the maximum allowable slopes are angles expressed in degrees from the horizontal. The angles have been rounded off.
2. A short-term, maximum slope of 1/2:1 (63 degrees) is allowable in excavations in Type A soil less than 12 feet (3.66 m) deep. The short-term maximum allowable slopes for excavations deeper than 12 feet (3.66 m) is 3/4 (53 degrees).
3. Sloping or benching for excavations deeper than 20 feet (6.10 m) must be designed by a registered professional engineer.

Table 2 Excavations in Type A, B, and C Soils

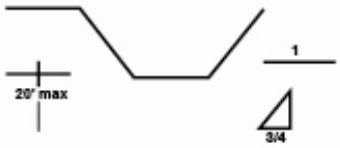
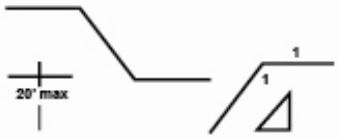
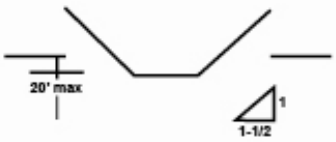
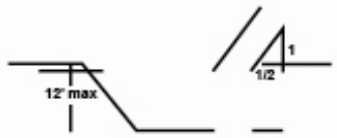
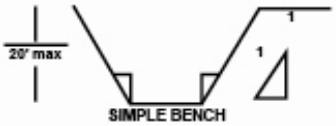
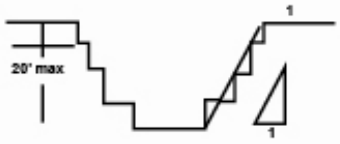
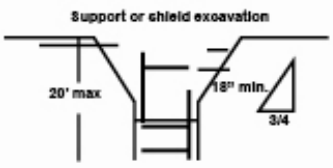
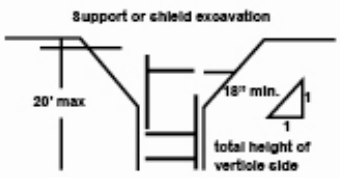
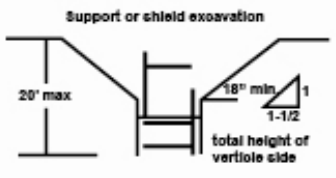
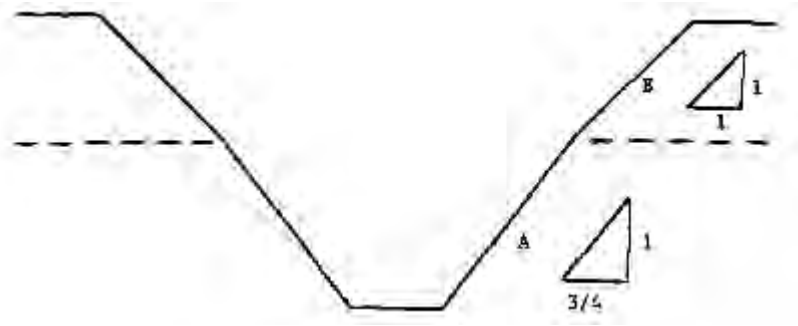
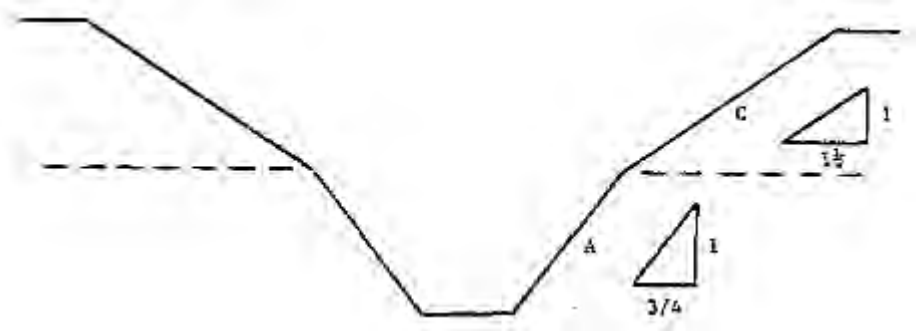
EXCAVATIONS IN TYPE A SOIL	EXCAVATIONS IN TYPE B SOIL	EXCAVATIONS IN TYPE C SOIL
SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1  SIMPLE SLOPE	SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1  SIMPLE SLOPE	SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1-1/2:1  SIMPLE SLOPE
EXCEPTION: SHORT-TERM SIMPLE SLOPES LESS THAN 12 FEET DEEP HAVE A MAXIMUM SLOPE OF 1/2:1  SIMPLE SLOPE SHORT-TERM		
BENCHED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1  SIMPLE BENCH	BENCHED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1  SIMPLE BENCH	BENCHED EXCAVATIONS ARE NOT ALLOWED
 MULTIPLE BENCH	 MULTIPLE BENCH	BENCHED EXCAVATIONS ARE NOT ALLOWED
SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1.  SUPPORTED LOWER PORTION	SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1.  SUPPORTED LOWER PORTION	SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1-1/2:1.  SUPPORTED LOWER PORTION
THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.	THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.	THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.

Table 3 Excavations Made in Layered Soils

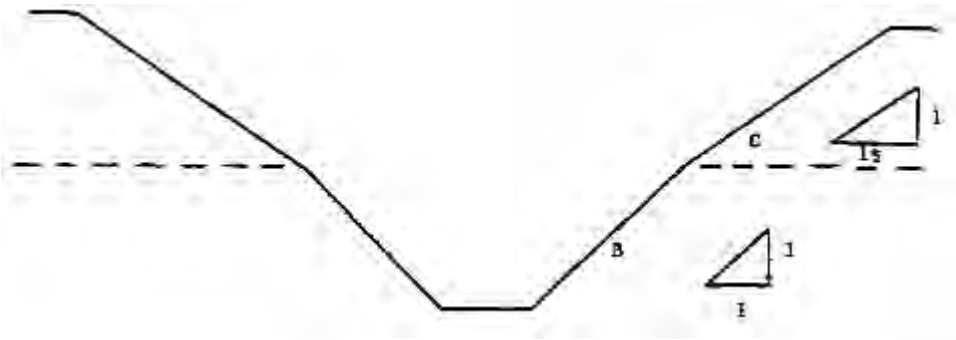
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



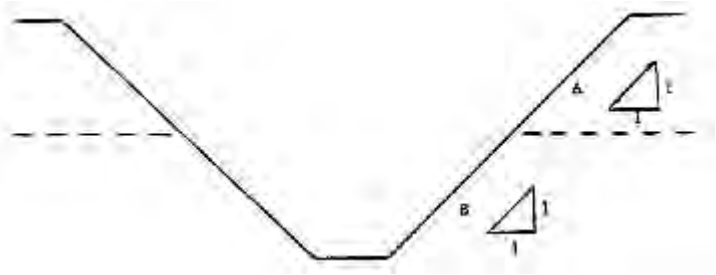
B OVER A



C OVER A



C OVER B



A OVER B

A OVER C

B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

6. REFERENCES / RELATED DOCUMENTS:

29 CFR 1926 Subpart P, Excavations

CP002 – Risk Analysis Site Specific Health and Safety Program

CP003 – Personal Protective Equipment Program

CP008 – Confined Space Entry Program

CP009 – Health and Safety Training Program

7. APPENDICES

Forms

A. ES's Site-Specific Excavation Plan
B. ES's Pre-Excavation Checklist
C. ES's Excavation Inspection Form
D. ES's Protective Systems Selection Flow Chart

FORMS

A. ES's SITE-SPECIFIC EXCAVATION PLAN
B. ES's PRE-EXCAVATION CHECKLIST
C. ES's EXCAVATION INSPECTION FORM
D. ES's PROTECTIVE SYSTEMS SELECTION FLOW CHART

Site Specific Excavation Plan

Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

Surface Encumbrances

Have Surface encumbrances that may create a hazard been removed or supported?

☐ Yes

☐ N/A

Underground Installations

Have Utility companies or owners been contacted? ☐ Yes ☐ N/A

By whom: Work Order #: Date:

When excavation operations approach the estimated location of underground installations, how will the exact location of the installations shall be determined?

☐ Probing ☐ Hand digging ☐ Detecting equipment ☐ Other

How will underground installations be protected?

☐ Support ☐ Removal ☐ Other

Access and Egress

Will structural ramps be used? ☐ Yes ☐ N/A

Designed by a competent person? ☐ Yes ☐ N/A

Will excavations be 4 feet in depth or more? ☐ Yes ☐ N/A

Means of egress (requiring no more than 25 feet of lateral travel) ☐ Yes ☐ N/A

☐ Stairway(s) ☐ Ramp(s) ☐ Ladder(s) ☐ Other

Exposure to vehicular Traffic? ☐ Yes ☐ N/A (If yes workers shall wear warning vests or other suitable garments.)

Exposure to falling loads? ☐ Yes ☐ N/A

☐ No workers permitted underneath loads

☐ Workers shall be required to stand away from any vehicle being loaded or unloaded. (Operators may remain in cabs)

Warning System for Mobile Equipment

Will mobile equipment operated adjacent to, or approaching the edge of, excavations have a clear and direct view of the edge of the excavation?

☐ Yes ☐ N/A If yes what warning system will be utilized?

☐ Barricade(s) ☐ Hand Signals ☐ Stop logs ☐ Other

Hazardous Atmospheres

Can oxygen deficiency or a hazardous atmosphere reasonably be expected to exist? ☐ Yes ☐ N/A

If yes, how will atmospheres in excavations greater than 4 feet in depth be tested?

If atmospheres contain less than 19.5% oxygen or other hazardous substance how will it be remediated?

When controls are intended to reduce the level of contaminants to acceptable levels, testing shall be conducted:

☐ Continuously ☐ Periodically

Will emergency rescue equipment be utilized? ☐ Yes ☐ N/A If yes what type?

☐ SCBA ☐ Harness and line ☐ Basket stretcher ☐ Other

Site Specific Excavation Plan

Water Accumulation

Will workers work in excavations in which there is accumulated water? ☐ Yes ☐ N/A

If yes is water controlled or prevented from accumulating by water removal equipment? ☐ Yes ☐ N/A

Equipment type: Competent Person:

Does excavation work interrupt the natural drainage of surface water (such as streams)? ☐ Yes ☐ N/A

Method used to divert water:

Stability of Adjacent Structures

Will the stability of adjacent structures be endangered by excavation operations? ☐ Yes ☐ N/A

If yes, what type of support structure will be used?

☐ Shoring ☐ Bracing ☐ Underpinning ☐ Other

If yes, but support structures will not be used, one of the following must apply:

☐ The excavation is in stable rock

☐ A registered professional engineer has determined that such work will not pose a hazard.

Name of registered professional engineer:

Protection from Loose Rock or Soil

How will workers be protected from materials or equipment that could fall or roll into excavations?

☐ Material placed > 2 feet from edge Retaining devices

Inspections

☐ Inspections of all excavations, adjacent areas and protective systems shall be made by a competent person.

☐ Inspections shall be conducted by the competent person daily, prior to the start of work and as needed throughout the shift. Inspections shall be documented on a Daily Excavation Inspection Form.

☐ Inspections shall be made after every rainfall or other hazard increasing occurrence.

☐ Where the competent person finds evidence of hazardous conditions, workers shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Fall Protection

Will excavations be 6 feet or greater in depth? ☐ Yes ☐ N/A

If yes, fall protection will consist of:

☐ Barricades ☐ Fall restraint ☐ Harness ☐ Other

Will workers be required or permitted to cross over excavations? ☐ Yes ☐ N/A

If yes, guardrails shall be provided.

SIGNATURES

Supervisor General Supervisor

Project/Construction Manager Safety Representative

Pre-Excavation Checklist

Project Name: **Project #:**

Location: **Date:**

Company: **One Call #**

Submitted By:

The following procedures are mandatory. Failure to complete this check list could result in disciplinary action or termination:

Complete a pre-excavation walk-out of the entire job site. Your objective is to visually inspect the dig area to ensure all utilities are marked. Look for obvious signs of utilities in the immediate work area that may not be marked such as, above-ground pedestals, gas meters, man-hole covers, drains, or utility poles with cable risers. If you find these indicators and suspect that there is an unmarked utility DO NOT PROCEED**. Call your General Foreman or Locate Ticket Coordinator immediately.**

When you have completed your walk-out, complete the following check list:

1. Verify that the One-Call ticket covers the 'Scope of work' and 'Work to begin' date:

   I have verified the One-Call ticket covers the 'Scope of work' &'Work to begin' date ☐

2. What marked utilities did you observe?

   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)

3. Based on visual observation, did you see any obvious signs of unmarked utilities in the immediate work area?

   ☐Yes ☐No If Yes, please identify?

   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)

4. I have notified my Supervisor and Locate Ticket Coordinator ☐

5. Photograph the entire proposed work area including all locate marks.

   I have photographed the entire site including existing locate/markings prior to excavation ☐

6. Advise your crew members of the following: If they have to cross a marked Utility they must HAND DIG ONLY within 18" of the locate marks. For gas lines add half the diameter of the buried facility to the 18''. If necessary, dig a test-hole (pothole) using hand tools to determine the location of the facility.

   I have advised my crew of this rule ☐

7. When possible, all directional boring / drilling routes must be potholed every 50-80 feet prior to drilling.

   I have advised my crew accordingly and test-holes (potholes) have been dug ☐

~~~~~~~~~~~~~~~~~~~~~~~~~~~~ RESPECT THE MARKS! ~~~~~~~~~~~~~~~~~~~~~~~~~~~~

IN THE EVENT OF DAMAGE

- Notify your Supervisor and Locate Ticket Coordinator
- Complete the ES Incident Notification Form
- Photograph entire area and damage location

PHOTOGRAPHY TIPS

- Make sure the correct date & time stamp is active on your camera
- Photograph the excavation itself (damage location) and cable depth (include tape measure in hole)
- Take photos from multiple vantage points and of surrounding area (360 degrees)
- If the utility was miss-marked, photograph the locate marks/flags (include tape measure in photo)
- If the utility was not marked, photograph the entire area and approaches to the cut site
- Show a quantifiable location/address (street sign, house number, mail box number etc.)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Excavation Flow Diagram

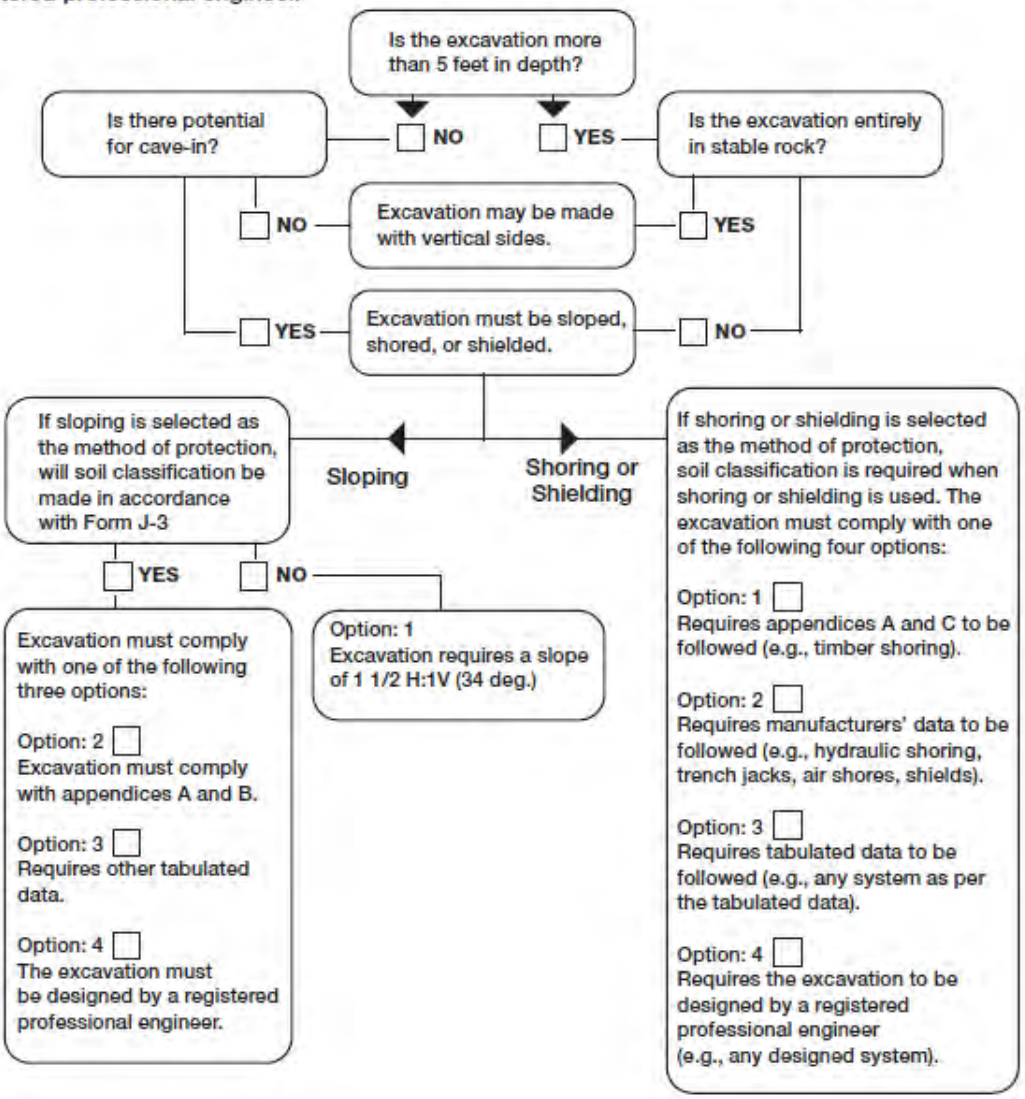
Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

The following is a graphic summary of the requirements for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer.



Excavation Daily Inspection

Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

Depth: _____ **Width:** _____ **Date Opened:** _____

Soil classification: ☐ A ☐ B ☐ C

Indicate how the classification was made:

Manual test(s)

a) plasticity	_____	_____	_____
b) dry strength	_____	_____	_____
c) thumb penetration	_____	_____	_____
d) pocket penetrometer	_____	_____	_____
e) other	_____	_____	_____

Visual test(s) **Do as many as possible**	**Cohesive Soil**	**Granular Soil**
a) Spoil pile	☐ **Remains in clumps**	☐ **Breaks up easily**
b) Trench Side	☐ **Stands vertical >2 hours**	☐ **Sloughs into trench**

The excavation is properly (circle one):

Shored/Shielded	**(indicate type of shoring)**	☐ **closed**	☐ **open**	☐ **wood**	☐ **metal**	☐ **shield**
Sloped/benched	**(indicate the slope)**	☐ **vertical sides**	☐ **3/4:1**	☐ **1:1**	☐ **1 1/2: 1**	☐ **2:1**

Excavation Checklist:	Morning	Mid-Day	Afternoon
Time:	_____	_____	_____
Weather:	_____	_____	_____
Was atmospheric testing required?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Was atmospheric testing done?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is the spoil pile back 2' from the edge?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Have surface encumbrances been removed?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Are there any signs of sloughing or cave-in?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is there water accumulation in the bottom?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Are there vibration sources near the excavation?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is there adequate access/egress (ladder, ramp, etc.)	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Has the soil been disturbed previously?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Sides	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Top	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
If the excavation is > 20 feet deep, have engineering designs been documented and complied with?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**

SIGNATURES

Supervisor

General Supervisor

Project/Construction Manager

Safety Representative

SAFETY DATA SHEETS

SECTION 1: IDENTIFICATION

1.1. Product Identifier

Product Form: Substance

Product Name: Lead Metal

Formula: Pb

Synonyms: Soft Lead, Chemical Lead, Pure Lead, Copper Bearing Lead

1.2 Intended Use of the Product

Use of the substance/mixture: Commercial/Industrial - For professional use only.

1.3 Name, Address, & Telephone of the Responsible Party

Company

Vulcan Global Manufacturing Solutions, Inc.
1400 W. Pierce Street
Milwaukee, WI 53204
414-645-2040

1.4 Emergency Telephone Number

Emergency Number: 414-645-2040, 414-573-7373

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture

This product is an article as sold. Grinding, sawing, drilling cutting, sanding, machining, welding, thermal cutting, soldering of this product may produce airborne contaminants that are hazardous. The following classification information is for the hazardous substances in the dust or fumes that could be released or generated from such processes.

Classification (GHS-US):

Carcinogenicty, Cateogry 1A
Toxic to Reproduction, Category 1A
Specific Target Organ Toxicity-Repeated Expsoure (STOT-RE), Category 1
Hazardous to the Aquatic Environment- Acute, Category 1
Hazardous to the Aquatic Environment- Chronic, Category 1

2.2 Label Elements:

Signal Word (GHS-US): **Danger**

Hazard Pictograms (GHS-US):

Hazard Statements (GHS-US):

H350 – May cause cancer
H360- May damage fertility or the unborn child
H362- May cause harm to breast-fed children
H372- Causes damage to organs (nervous system, kidney, blood-forming tissues) through prolonged or repeated via ingestion or inhalation
H400 – Very toxic to aquatic life
H410- Very toxic to aquatic life with long lasting effects
H412 - Harmful to aquatic life with long lasting effects.

Precautionary Statements (GHS-US):

P102- Keep out of reach of children
P201 – Obtain special instructions before use.
P202 – Do not handle until all safety precautions have been read & understood.
P260- Do not breathe dust or fumes
P263- Avoid contact duirng pregnancy or while nursing
P264 Wash skin throughly after handling
P270 Do not eat, drink or smoke when using this product
P271 Use only outdoors or in a well-ventilated area
P273 - Avoid release to the environment.
P280 - Wear protective gloves, clothing gloves.
P314- Get medical attention if you feel unwell
P391 Collect spillage

P405 - Store locked up.
P501 - Dispose of contents/container in accordance with local, regional, national, & international regulations.

2.3 Other Hazards

Risk of thermal burns on contact with molten product.

2.4. Unknown Acute Toxicity (GHS-US)

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance Lead Metal

Name	Product Identifier	%	Classification (GHS-US)
Lead	(CAS No) 7439-92-1	>99	Carc. 1A, H350

Full text of H-phrases: see section 16

3.2. Mixture Not applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of First Aid Measures

No first aid is likely to be needed when the product is handled as sold. The following first aid measures may be needed if dust or fume generating processes such as grinding, sawing, drilling cutting, sanding, machining, welding, thermal cutting, soldering are performed on the product.

First-aid Measures General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label if possible).

First-aid Measures After Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists.

First-aid Measures After Skin Contact: Cool skin rapidly with cold water after contact with molten product. Removal of solidified molten material from skin requires medical assistance. Seek medical attention for thermal burns.

First-aid Measures After Eye Contact: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention.

First-aid Measures After Ingestion: Do NOT induce vomiting. Rinse mouth. Immediately call a POISON CENTER or doctor /physician

4.2 Most important symptoms and effects, both acute and delayed

Symptoms/Injuries after Inhalation of Ingestion: Lead: High acute dose or through chronic exposure to inhaled or ingested lead dust or fumes may cause the following symptoms: headaches, lassitude, insomnia, abdominal pain, anorexia, constipation, colic, gingival lead line, tremor, hypotension, memory loss, kidney failure, anemia, change in skin tone or pallor, reproductive problems, weakness, pain, or tingling in the extremities. May harm the unborn child. May cause cancer.

Arsenic: Prolonged exposure to arsenic may cause lung or skin cancer, irritation of the skin and mucous membranes and brain/nervous system effects. Acute high exposures may cause severe gastritis or gastroenteritis. Tin dust may cause eye, skin and respiratory irritation. Antimony: May cause skin and upper respiratory tract irritation. Respirable sized particles of antimony trioxide powders have been associated with cancer in animal studies.

Symptoms/Injuries After Skin Contact: Risk of thermal burns on contact with molten product.

Symptoms/Injuries After Eye Contact: Dusts generated during handling or processing may cause physical eye irritation.

Chronic Symptoms: May cause cancer. Repeated or prolonged exposure to lead dust or fumes may damage the kidneys, blood forming tissue, nervous system, reproductive system or cardiovascular system. Prolonged exposure to arsenic may cause lung or skin cancer, irritation of the skin and mucous membranes and brain/nervous system effects.

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

If you feel unwell, seek medical advice (show the label where possible).

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire. Application of water stream to hot product may cause frothing and increase fire intensity.

5.2 Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not flammable.

Explosion Hazard: Product is not explosive.

Reactivity: In molten form may react violently with water.

5.3 Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire. Under fire conditions, hazardous fumes will be present.

Firefighting Instructions: Use water spray or fog for cooling exposed containers.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Other Information: Refer to Section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Avoid contact with skin, eyes, or clothing. Avoid breathing dust or fumes generated from processes such as grinding, sawing, drilling cutting, sanding, machining, welding, thermal cutting, soldering.

6.1.1 For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2 For Emergency Responders

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself & the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit.

6.2 Environmental Precautions: Prevent entry to sewers and public waters. Notify authorities if product enters sewers or public waters.

6.3 Methods and Material for Containment and Cleaning Up

For Containment: If metal is in molten form allow to cool and collect as a solid. If metal is in solid form collect for recycling.

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. Recover the product by vacuuming, shoveling or sweeping. HEPA vacuum clean-up for dust spills is preferred. If sweeping is required use a dust suppressant. Contact competent authorities after a spill.

6.4 Reference to Other Sections

See Heading 8. Exposure controls and personal protection. For further information refer to section 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for Safe Handling: Use safe furnace practices when using this product.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water after handling and before eating, drinking or smoking and when leaving work.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations.

Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep/Store away from Incompatible materials.

Incompatible Products: Strong acids. Strong bases. Strong oxidizers. In molten form: moisture.

7.3 Specific End Use(s): For professional use only.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

For substances listed in section 3 that are not listed here, there are no established exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), or OSHA (PEL).

Lead (7439-92-1)

USA ACGIH	USA ACGIH	0.05 mg/m³
USA NIOSH	USA NIOSH	0.050 mg/m³
USA IDLH	USA IDLH	100 mg/m³
USA OSHA	USA OSHA	50 µg/m³ (0.05 mg/m³)

8.2 Exposure Controls

Appropriate Engineering Controls: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below the occupational exposure limits.

Hand Protection: If a risk assessment indicates that such protection is necessary, wear gloves to protect hands from molten metal, hot objects or sharp edges.

Eye Protection: If a risk assessment indicates that such protection is necessary, use safety eyewear.

Skin and Body Protection: Wash hands with soap and water after use or handling. If a risk assessment indicates that other parts of the body may be exposed, use appropriate coveralls, suits, aprons and/or footwear.

Respiratory Protection: If a risk assessment indicates that such protection is necessary, a NIOSH approved respirator should be used. Respirator selection must be based on known or anticipated employee exposure levels and the capability of the respirator that is selected. If an air purifying respirator is selected, the device should be capable of removing particulates.

Thermal Hazard Protection: Fire retardant clothing and gloves, as well as safety shoes are required for safe furnace work

Environmental Exposure Controls: Do not allow the product to be released into the environment.

Consumer Exposure Controls: Do not eat, drink or smoke during use.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

Physical State	Solid
Appearance	Bluish-gray soft metal
Odor	No data available
Odor Threshold	No data available
pH	No data available
Evaporation Rate	No data available
Melting Point	621 °F (327 °C)
Freezing Point	No data available
Boiling Point	3164 °F (1740 °C)
Flash Point	No data available
Auto-ignition Temperature	No data available
Decomposition Temperature	No data available
Flammability (solid, gas)	No data available
Vapor Pressure	1 mm Hg @ 973 °C (1783 °F)
Relative Vapor Density at 20 °C	No data available
Specific Gravity	11.3
Solubility	Not soluble in water
Partition Coefficient: N-Octanol/Water	No data available
Viscosity	No data available

9.2. Other Information: No additional information available.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: In molten form may react violently with water.

10.2 Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

10.3 Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

10.4 Conditions to Avoid: Incompatible materials. In molten form: moisture.

10.5 Incompatible Materials: Strong acids, strong bases, strong oxidizers.

10.6 Hazardous Decomposition Products: Thermal decomposition generates: lead fumes.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on Toxicological Effects

This product is an article as sold. Grinding, sawing, drilling cutting, sanding, machining, welding, thermal cutting, soldering of this product may produce airborne contaminants that are hazardous. The following classification information is for the hazardous substances in the dust or fumes that could be released or generated from such processes.

Acute Toxicity: Not classified

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity:

Lead (7439-92-1)	
IARC group	2A
National Toxicology Program (NTP) Status	Reasonably anticipated to be Human Carcinogen.

Reproductive Toxicity: Lead is a productive toxin

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Lead: Repeated or prolonged exposure to lead dust or fumes may damage the kidneys, blood forming tissue, nervous system, reproductive system or cardiovascular system. Lead may cause the following symptoms: headaches, lassitude, insomnia, abdominal pain, anorexia, constipation, colic, gingival lead line, tremor, hypotension, memory loss, kidney failure, anemia, change in skin tone or pallor, reproductive problems, weakness, pain, or tingling in the extremities. May harm the unborn child. May cause cancer. Arsenic: Prolonged exposure to arsenic may cause lung or skin cancer, irritation of the skin and mucous membranes and brain/nervous system effects. Acute high exposures may cause severe gastritis or gastroenteritis. Antimony: Respirable sized particles of antimony trioxide powders have been associated with cancer in animal studies.

Aspiration Hazard: Not classified

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecology: This material is very toxic to aquatic life on an acute and chronic basis Harmful to aquatic life.

12.2. Persistence and Degradability No additional information available.

12.3. Bioaccumulative Potential: No additional information available.

12.4. Mobility in Soil: No additional information available.

12.5. Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, & international regulations.

Ecology – Waste Materials: Avoid release to the environment.

SECTION 14: TRANSPORT INFORMATION

14.1. In Accordance with DOT Not regulated for transport.

14.2. In Accordance with IMDG Not regulated for transport.

14.3. In Accordance with IATA Not regulated for transport.

SECTION 15: REGULATORY INFORMATION

15.1 US Federal Regulations

LEAD	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard
Lead (7439-92-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	0.1 %

15.2 US State Regulations

Lead (7439-92-1)	
U.S. - California - Proposition 65 - Carcinogens List, Developmental Toxicity, Reproductive Toxicity – Female and Reproductive Toxicity - Male	⚠ **WARNING**: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.
Lead (7439-92-1)	
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List	

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date: 04/09/2018

Other Information: This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Safety Data Sheet

In accordance with CFR 1910.1200 (OSHA HCS)

SDS No. 143 Date of review: July 7, 2017

1 Identification of substance and company

Product name: ***Arsenic metal***

Product code: 11173, 14178, 18516, 18828

Relevant use and restrictions on use: Research and product development

Manufacturer/Supplier: Noah Technologies Corporation
1 Noah Park
San Antonio, Texas 78249-3419
Phone: 210-691-2000
Fax: 210-691-2600
Web site: www.noahtech.com

Emergency information: CHEMTREC
800-424-9300

2 Hazards identification

Emergency Overview:

Signal word(s): Danger

Pictogram(s): Skull and crossbones
Health hazard
Environment

Hazard statements: H302 Harmful if swallowed
H331 Toxic if inhaled
H410 Very toxic to aquatic life with long lasting effects

Precautionary statements: P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P264 Wash skin thoroughly after handling
P270 Do not eat, drink or smoke when using this product
P271 Use only outdoors or in a well-ventilated area
P273 Avoid release to the environment
P280 Wear protective gloves/protective clothing/eye protection/face protection
P301+312+330 IF SWALLOWED: Call a PISON CENTER/doctor if you feel unwell. Rinse mouth.
P304+340+311 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P391 Collect spillage
P403+233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up
P501 Dispose of contents/ container to an approved waste disposal plant

Hazards not otherwise classified: None

GHS Classification: Acute toxicity, Oral - 4
Acute toxicity, Inhalation - 3
Acute aquatic toxicity - 1
Chronic aquatic toxicity - 1

HMIS ratings (scale 0-4):

Health hazard:	2*
Flammability:	0
Physical hazard:	0

3 Composition/Information on ingredients

Chemical name: Arsenic metal

Designation:

CAS number: 7440-38-2

EC number: 231-148-6

Formula: As

Synonyms: None known

4 First aid measures

After inhalation: Move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

After skin contact: Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water.

	Consult a physician.
After eye contact:	Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician
After ingestion:	Rinse out mouth with water. Never give anything by mouth to an unconscious person. Consult a physician.
Information for doctor:	Show this safety data sheet to the doctor in attendance
Symptoms/effects; acute and delayed:	Ingestion may result in nausea, cold sweats, vomiting, diarrhea, bloody stools, collapse, and shock. chronic poisoning may manifest itself in a loss of appetite, cramps, jaundice, skin abnormalities. Gastrointestinal, nervous system, liver and kidney problems. After exposure have a urine test. Poison by subcutaneous, intramuscular and intraperitoneal routes. An experimental teratogen and tumorigen with mutagenic data. Human systemic skin and gastrointestinal effects by ingestion.
Immediate medical attention and special treatment needed:	Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

5 Fire-fighting measures

Suitable and unsuitable extinguishing agents:	Water spray, alcohol-resistant foam, dry chemical or carbon dioxide
Special hazards caused by the material, its products of combustion or resulting gases:	Arsenic fumes, oxides of arsenic
Special fire fighting procedures:	Wear self-contained breathing apparatus and fully protective fire fighting equipment/clothing
Unusual fire and explosion hazard:	Can be heated to burn in air with bluish flame, giving off an odor of garlic and dense white fumes of As_2O_3

6 Accidental release measures

Person-related safety precautions:	Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Measures for environmental protection:	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
Measures for cleaning/collecting:	Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for proper disposal.
Additional information:	See Section 7 for information on safe handling See Section 8 for information on personal protective equipment See Section 13 for information on disposal See Section 15 for regulatory information

7 Handling and storage

Information for safe handling:	Avoid contact with skin and eyes. Avoid dust formation. Provide appropriate exhaust ventilation.
Information about protection against explosions and fires:	No data available
Storage requirements to be met by storerooms and containers:	Keep container tightly closed in a dry and well-ventilated place
Incompatibility (avoid contact with):	Strong acids and oxidizers. Halogens, bromine azide, dirubidium acetylide, zinc, nitrogen trichloride, nitrates, sodium peroxide, platinum oxide
Further information about storage conditions:	Heated arsenic in contact with acid or water vapor can produce highly toxic fumes

8 Exposure controls/personal protection

Ventilation requirements:	Local exhaust, chemical fume hood
Components with exposure limits that require monitoring:	OSHA PEL: TWA 0.01 mg(As)/m3 NIOSH REL: CL 0.002 mg/m3; Potential Occupational Carcinogen, 15 minute ceiling value ACGIH TLV: TWA 0.01 mg(As)/m3; Lung cancer, confirmed human carcinogen ACGIH BEI: 35 ug(As)/L in urine; End of the workweek (After four or five consecutive working days with exposure)
Additional information:	No additional data available
General protective and hygienic measures:	The usual precautionary measures for handling chemicals should be adhered to Keep away from foodstuffs, beverages and food Instantly remove any soiled and impregnated garments Wash hands during breaks and at the end of the work Avoid contact with the eyes and skin
Personal protective equipment:	
Respiratory protection: **(Use only NIOSH or CEN approved Equipment)**	Filter-dust, fume, mist; respirator equipped with HEPA
Hand protection:	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique.
Eye protection:	Safety glasses, goggles
Skin protection:	Completely covering work attire with full length apron
Additional protective equipment:	Sufficient to prevent contact. Emergency eyewash and safety shower
Precautionary labeling:	Wash thoroughly after handling Do not get in eyes, on skin or on clothing Do not breathe dust, vapor, mist, gas Keep away from heat, sparks, and open flames Empty container may contain hazardous residues

9 Physical and chemical properties

Physical state:	Powder or pieces
Color:	Silver to gray-black
Odor:	Odorless

Odor threshold:	No data available
Molecular Weight (Calculated):	74.92
pH	No data available
Melting point/freezing point/range:	818 C at 36 atm
Boiling point/range:	No data available
Sublimation temperature/start:	615 C without melting. Vaporization becomes apparent at 100 C and is already rapid at 450 C.
Decomposition temperature:	No data available
Flammability (solid, gas):	Can be heated to burn in air with bluish flame, giving off an odor of garlic and dense white fumes of As_2O_3
Flash point:	No data available
Autoignition temperature:	No data available
Danger of explosion:	No data available
Flammable limits:	
Lower:	No data available
Upper:	No data available
Evaporation Rate:	No data available
Vapor pressure (mm Hg):	1 mmHg @ 372 C
Vapor density:	No data available
Specific gravity:	5.727
Bulk density:	No data available
Solubility in/Miscibility with water:	Insoluble
Partition coefficient n-octanol/water:	No data available
Viscosity:	No data available
Other information:	No additional data available

10 Stability and reactivity

Reactivity:	No data available
Chemical stability:	Stable under recommended storage conditions
Possibility of hazardous reactions:	Heated arsenic in contact with acid or water vapor can produce highly toxic fumes
Conditions to be avoided:	Heat, open flames, contact with incompatibles, moisture
Materials to be avoided:	Strong acids and oxidizers. Halogens, bromine azide, dirubidium acetylide, zinc, nitrogen trichloride, nitrates, sodium peroxide, platinum oxide
Dangerous reactions:	Violent reaction with zinc, platinum oxide, nitrogen trichloride, bromine azide
Hazardous decomposition products: (thermal and other)	Arsenic fumes, oxides of arsenic

11 Toxicological information

LD/LC50 values that are relevant for classification:	oral-rat LD_{50}: 763 mg/kg oral-mouse LD_{50}: 145 mg/kg
Irritation or corrosion of skin:	No data available
Irritation or corrosion of eyes:	No data available
Primary irritant or corrosive effect:	
on the skin:	No data available
on the eye:	No data available
Sensitization:	No data available
Potential health effects:	
Inhalation:	No data available
Ingestion:	Stomach irregularities based on human evidence
Skin:	No data available
Eyes:	No data available
Signs and symptoms of exposure:	Ingestion may result in nausea, cold sweats, vomiting, diarrhea, bloody stools, collapse, and shock. chronic poisoning may manifest itself in a loss of appetite, cramps, jaundice, skin abnormalities. Gastrointestinal, nervous system, liver and kidney problems. After exposure have a urine test. Poison by subcutaneous, intramuscular and intraperitoneal routes. An experimental teratogen and tumorigen with mutagenic data. Human systemic skin and gastrointestinal effects by ingestion. To the best of our knowledge the acute and chronic toxicity of this substance is not fully known
Carcinogenicity:	EPA-A: Human carcinogen: sufficient evidence from epidemiologic studies IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity NTP-1: Known to be carcinogenic: sufficient evidence from human studies OSHA specifically regulated carcinogen ACGIH-A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies
Additional information:	RTECS contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product

12 Ecotoxicological information

Toxicity:	
Toxicity to fish:	Fathead minnow LC_{50}: 9.9 mg/L:96H
Toxicity to daphnia and other aquatic invertebrates:	Daphnia magna EC_{50}: 3.8 mg/L:48H
Toxicity to algae:	No data available
Persistence and degradability:	
Biodegradability:	No data available
Bioaccumulative potential:	

Bioaccumulation:	No data available
Mobility in soil:	No data available
Other adverse effects:	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal
	Very toxic to aquatic life with long lasting effects

13 Disposal considerations

Recommendation:	Consult state, local or national regulation for proper disposal
	Allow professional disposal company to handle waste
	Must be specially treated under adherence to official regulations
Unclean packagings recommendation:	Disposal must be made according to official regulations

14 Transport information

Land transport DOT

Proper shipping name:	Arsenic
DOT Hazard Class:	6.1
UN Identification number:	UN1558
Label(s):	Toxic & Marine Pollutant
Packing group:	II
Reportable quantity (RQ):	0.454 kg
North American Emergency Response Guidebook No.:	152

Air transport ICAO-TI and IATA-DGR:

Proper shipping name:	Arsenic
DOT Hazard Class:	6.1
UN Identification number:	UN1558
Label(s):	Toxic & Marine Pollutant
Packing group:	II
Reportable quantity (RQ):	0.454 kg
North American Emergency Response Guidebook No.:	152
Notes:	FedEx requires DOT-SP-8249

UPS Ground / FedEx Ground

Proper shipping name:	Arsenic
DOT Hazard Class:	6.1
UN Identification number:	UN1558
Label(s):	DOT-SP-8249 & Marine Pollutant
Packing group:	II
Reportable quantity (RQ):	0.454 kg
North American Emergency Response Guidebook No.:	152
Notes:	DOT-SP-8249; MP2A, 3 or 4; 173.21

UPS Air

Proper shipping name:	Arsenic
DOT Hazard Class:	6.1
UN Identification number:	UN1558
Label(s):	DOT-SP-8249 & Marine Pollutant
Packing group:	II
Reportable quantity (RQ):	0.454 kg
North American Emergency Response	

Guidebook No.:	152
Notes:	DOT-SP-8249; Max Qty 25 kg; MP 2A

15 Regulatory information

SARA Section 302 Extremely Hazardous components and corresponding TPQs:	Not subject
SARA Section 311 / 312 hazards:	Acute Health Hazard, Chronic Health Hazard
SARA Section 313 components:	This product contains chemical(s) subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right-to-know Act of 1986 and 40CFR372
California Proposition 65 components:	WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm
TSCA:	Product is listed on TSCA Inventory

16 Other information

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulation are subject to change and the conditions of handling and use, or misuse are beyond our control. NOAH MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON.
User should satisfy himself that he has all current data relevant to his particular use.

APPENDIX B

Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

for a

REMOVAL ACTION WORKPLAN

Shenandoah Street Elementary School
2450 Shenandoah Street
Los Angeles, California

January 10, 2020

Prepared for:

Los Angeles Unified School District
Office of Environmental Health and Safety
333 South Beaudry Avenue, 21st Floor
Los Angeles, California 90017

Prepared by:

Montrose Environmental
1631 East Saint Andrew Place
Santa Ana, California 92705
(714) 919-6500

TABLE OF CONTENTS

Page No.

1.0 PURPOSE OF THIS DOCUMENT

The purpose of this Quality Assurance Project Plan (QAPP) is to describe the procedures and methodologies used to generate data of known and suitable quality. The data generated will allow a trustworthy assessment to be performed of the progress of the remedial actions taken at the site. These remedial actions are described in the Removal Action Workplan (RAW) for the Comprehensive Modernization project at the Shenandoah Street Elementary School.

2.0 SITE DESCRIPTION

The Shenandoah Street Elementary School is located on a 7.6-acre parcel (Assessor Parcel Number [APN] 4301-018-900) property located at 2450 Shenandoah Street, Los Angeles, California (**Figures 1 and 2**). The Comprehensive Modernization project will include construction of new school facilities, improvements to existing school facilities, placement of interim facilities during construction, and the demolition of certain aging and deteroriated facilities.

The school is currently open and will remain open during the construction activities. The removal of the arsenic and lead impacted soil outlined in the RAW will be conducted as the first phase of the construction project.

3.0 SCOPE OF WORK

The scope of work for this project consists of the excavation and offsite disposal of shallow soils impacted by lead and arsenic (**Figure 3**). The lead and arsenic impacted soil is generally located at the north part of the campus and the arsenic impacted soil is located in the south portion.

When complete, confirmation soil samples will be collected from the excavations. In general, a 10 foot by 10 foot sampling grid will be established to collect the excavation bottom samples and sidewall samples will be collected at approximately 20-foot intervals or approximate 10 foot intervals in irregularly shaped excavation areas. In the smaller excavation areas, sampling will be conducted at closer spacings, to ensure adequate confirmation of impacted soil removal, as appropriate. At a minimum, the smaller excavations will have one confirmation sample per sidewall and one confirmation sample from the excavation bottom.

4.0 ORGANIZATION AND RESPONSIBILITIES

All onsite personnel will have a role in implementing the QAPP. The Project Manager (PM) will have the primary responsibility for organizing tasks related to quality assurance. The PM's responsibilities include:

- Informing field personnel regarding their role in providing quality assurance
- Notifying the laboratory regarding project data quality goals
- Checking chain-of-custody records and field logs
- Reviewing the field and laboratory data to determine if data quality objectives were met.

The prime contractor responsible for excavation tasks will designate a Field Manager (FM) to communicate information regarding the QAPP. The responsibility of the prime contractor's FM will include:

- Reviewing and implementing roles described in the QAPP
- Reviewing field logs during injection to allow verification of injected product volumes to proper locations
- Notifying the PM regarding any variances from procedures in the QAPP

Soil samples will be collected from the excavation bottoms and sidewalls to confirm that the remaining soil has arsenic and lead concentrations below Site Specific Cleanup Goals (SSCGs). The samples will be analyzed on-site for arsenic and lead (where applicable) using a field x-ray fluorescence (XRF) instrument. Samples will also be collected and transported to a state-certified laboratory for confirmation of the field results. The off-site laboratory confirmation analyses will be conducted for arsenic and lead (where applicable) using USEPA Method 6020. The field XRF will have a detection level of 5 milligrams per kilogram (mg/kg). Laboratory reporting limits of 1 mg/kg for arsenic and 5 mg/kg for lead will be required for the confirmation samples analyzed off-site.

The prime contractor and subcontractor field personnel also have a role in maintaining quality. They include:

- Reviewing and implementing roles described in the QAPP
- Maintaining proper field documentation
- Completing field logs during injection
- Maintaining control of samples until they are properly delivered and released
- Notifying the PM regarding any variances from procedures in the QAPP

5.0 DATA QUALITY OBJECTIVES

The Department of Toxic Substances Control (DTSC) requires that the Los Angeles Unified School District (LAUSD) and their contractors incorporate specified protocols to document the quality of the data collected during the implementation of the RAW. While DTSC is not overseeing this mitigation project, LAUSD is expecting their contractors to perform their tasks in accordance with DTSC requirements. Therefore, confirmation soil samples will be collected in compliance with U.S. Environmental Protection Agency (EPA) SW-846. Analyses will be performed by laboratories that are certified in the State of California for the analyses requested. The laboratory detection limits are included in **Table 1**. The use of these Data Quality Objectives (DQOs) for school study sites, including this Site, is intended to produce data that are suitable for use in a final Removal Action Completion Report (RACR). In the case of this project, the confirmation data will be generated to justify the completion of excavation activities in both a vertical and horizontal direction, and should conform with analytical data generated during the PEA-E.

The data generated for the RACR and other reports should be of sufficient quantity and quality to assess changes in the concentrations of chemicals of concern in the areas sampled. Precision, accuracy, completeness, representativeness and comparability are used to consider data quality.

Precision is the reproducibility of measurements under a given set of conditions. For larger data sets, precision may be expressed as the variability of a group of measurements compared to their average value. Variability may be attributable to changes in field practices or chemical analyses. Precision is determined by calculating a Relative Percentage Difference (RPD) of laboratory duplicates, matrix spike/matrix spike duplicate pairs, surrogate spikes and field duplicate samples:

$$RPD = 100 \times (X_1 - X_2)/((X_1 + X_2/2) \qquad \text{Equation 1}$$

Where: RPD = Relative Percent Difference
X_1 = the larger of two observed values
X_2 = the smaller of two observed values

Accuracy is the degree of agreement of a measured value with a true or reference value. Accuracy can be measured using percent recovery data in the laboratory using spiked concentrations. Accuracy is a statistical measurement of correctness and includes components of random error and systematic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ within acceptable limits from the true value or the known concentration of a spike or standard.

The accuracy of laboratory analyses is assessed by laboratory control samples, surrogate standards, matrix spikes, and initial and continuing calibrations of instruments. Laboratory accuracy is expressed as the percent recovery (%R). Accuracy limits are statistically generated by the laboratory and are required by specified EPA methods. Surrogate percent recovery and control limits will be provided in laboratory reports in the RACR and other reports. If the percent recovery is determined to be outside of acceptance criteria, data will be qualified as described in the applicable validation procedure.

The calculation of percent recovery is provided below:

$$\%R = (C_1\text{-}C_0)/C_t*100 \qquad \text{Equation 2}$$

Where: %R = percent recovery
C_1 = measured concentration, spiked sample aliquot
C_0 = measured concentration, unspiked sample aliquot
C_t = concentration of spike added

Completeness is the percent of measurements made which are judged to be valid. Completeness can be measured by dividing the number of samples that are judged to be valid by the number of total samples.

For all confirmation sampling, the goal is for 100 percent of the measurements to be valid and acceptable.

Comparability is a qualitative parameter that evaluates the confidence with which one data set can be compared to another. Comparability can be enhanced by using standard analytical methods performed by the same certified laboratory.

Representativeness is the degree to which the sample data represent the characteristics of a population. Representativeness is a qualitative parameter that addresses the design of a sampling program. An example of representativeness is to evaluate if the number and locations of samples are sufficient for the purposes of an investigation/confirmation. In the case of this project, a sufficient number of soil analyses from the walls and floors of the three excavations to confirm that the impacted material has been removed.

Representativeness is also ensured through the following practices:

- Selecting the necessary number of samples, sample locations and sampling procedures that will depict as accurately and precisely as possible the matrix and conditions measured,
- Developing protocols for sample storage, preservation and transport that preserves the representativeness of the collected samples,
- Using documentation methods to ensure that protocols have been followed and that the samples are properly identified to maintain integrity and traceability, and
- Using standard, well-documented analytical procedures to ensure consistent, representative data.

Since none of the above practices provide quantification of representativeness, quality control (QC) samples will be collected to assess factors that may be impacting representativeness and sample integrity. The following QC samples will be collected:

- Field blank - One field blank will be collected each sampling day to assess the contribution of contamination in samples through ambient conditions.
- Field duplicates - One field duplicate will be collected for approximately 10% of soil samples collected.
- Field equipment blank - One equipment blank from the hand auger or other field sampling equipment will be collected each day of sampling.

6.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES AND PROCEDURES

The designated PM will coordinate with the analytical laboratory to provide empty sample bottles coolers, icepacks, chain-of-custody forms, and custody seals. Upon completion of sampling, the chain-of-custody will be filled out and shipped with the samples to the laboratory. An important consideration for the collection of environmental data is the ability to demonstrate that the analytical samples have been obtained from predetermined locations and that they have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal must be documented to accomplish this goal. Documentation will be accomplished through a chain-of-custody record that records each sample and the names of the individuals responsible for sample collection, transport, and receipt. A sample is considered in custody if it is:

- in a person's actual possession,
- in view after being in physical possession,
- sealed so that no one can tamper with it after having been in physical custody; or is
- in a secured area, restricted to authorized personnel.

The recording of sample custody will be initiated by field personnel upon collection of samples. The samples will be packaged to prevent breakage or leakage during transport, and will be taken to the laboratory by sampling personnel the day of collection or the following morning.

6.1 Sample Identification

A discrete sample identification number will be assigned to each sample. These discrete sample numbers will be placed on each sample container and will be recorded on a site plan; other pertinent data will be recorded in a field notebook dedicated to the project. The sample identification label will designate the specific bottom confirmation soil sample location (i.e. B-1), or specific sidewall confirmation soil sample location at soil boring (i.e. SW-1). The date and time the soil sample is collected will be added to the soil sample label.

Duplicate samples will be collected in the field at the rate of one per 10 samples, excluding quality control samples, and analyzed for the same suite of analyses as their corresponding sample Field duplicates will be submitted as blind samples (samples identified by increasing whole numbers, without reference to location or QC samples) to the analytical laboratory. Additional designations may be provided for samples collected from the excavation, if necessary.

6.2 QA/QC Samples

The following QA/QC samples will be collected:

- Field blank - One field blank will be collected each sampling day to assess the contribution of contamination in samples through ambient conditions.
- Equipment Rinseate Blank (Equipment Blank) - One equipment blank will be collected each sampling day.
- Sample Duplicates - One duplicate will be collected for approximately 10% of confirmation soil samples collected. Daily information regarding sample collection will be recorded in field logbooks. Sample media (soil), sample identification numbers, and collection times will be recorded on chain-of-custody forms and/or in the field logbook.

Equipment blank samples will be collected daily for each type of reusable sampling equipment and analyzed for the same primary parameters (arsenic and lead) as the soil samples being analyzed on that day. In this case, the equipment blank will be collected from dedicated sampling equipment. To collect an equipment blank sample, distilled or deionized water will be carefully poured over or through the recently cleaned equipment, and collected directly into an appropriate sample container. Equipment blank samples will be stored and processed in the same manner as all other samples.

Duplicate soil samples will be collected and analyzed at a frequency of approximately 10% of the primary samples. The duplicate sample will be analyzed for the same primary parameters as the primary sample (arsenic and lead). Duplicate samples will be collected simultaneously with a standard sample from the same source under the same conditions. These samples will be taken through the same steps of sampling and analytical procedures. The duplicate sample will be submitted as a duplicate to the laboratory. The purpose of the duplicate sample is to assess laboratory performance through comparison of results with the original sample. Samples will be transferred under chain of custody control and will be subject to the laboratory's conventional QA/QC analytical procedures, including method blanks, laboratory control samples, and sample duplicate analyses.

6.3 Laboratory QA/QC Procedures

Laboratory QA/QC procedures will include the following:

- Laboratory analyses will be performed within the required holding time for all samples;
- Appropriate minimum reporting limits (RLs) will be used for each analysis;
- A state-certified testing laboratory will conduct the analysis;
- The signed laboratory report will include the following QA/QC data:
  - Method blank data;
  - Collection date, surrogate recovery, matrix spike, matrix spike duplicate, and calibration data;
  - The sample designation or locations, date of sample, type of sample, analysis, laboratory analytical method employed, sample volume, and the minimum detection limits (MDLs).
  - Analytical data will be validated according to a Level I data review and the results of the validation will be included in each report.

7.0 CONFIRMATION SAMPLING AND ANALYSIS

7.1 Analytical Methods

The analytical methods for the analysis of the confirmation soil samples include the following:

- Arsenic – EPA Method 6020
- Lead – EPA Method 6010B

A direct read x-ray fluorescent (XRF) instrument will be used to screen excavation bottoms and sidewalls before confirmation sample collection.

7.2 Field Instrumentation

Various field instruments will be used during field activities at the Site including a dust/particulate monitors, wind speed indicator, and XRF direct read instrument. Field instrument maintenance will be documented in the field data sheet for each field instrument used during field activities. Field equipment will be maintained when routine inspections indicate the need for maintenance. In the event that a piece of equipment needs repair, a list of the field equipment manufacturers' addresses, telephone numbers, and points of contact will be maintained on Site during field activities. Field equipment routine maintenance may include:

- Calibrating equipment according to manufacturer's directions
- Removing surface dirt and debris
- Replacing/cleaning filters when needed
- Ensuring proper storage of equipment
- Inspecting instruments prior to use
- Charging battery packs when not in use
- Maintaining spare and replacement parts in the field to minimize downtime

Methods for calibration of field instruments will follow the specific instrument manufacturer's recommendations. All field instruments will be calibrated before each day of use and a calibration check at the end of the day will be performed to verify that the instrument remained in good working condition throughout the day. If the calibration check at the end of the day does not meet acceptance criteria, then the day's data will be flagged and the instrument calibration checks will increase to the operator's satisfaction that the instrument remains true to the initial calibration.

7.3 Bench Laboratory Procedures and Calibration

A number of bench laboratory samples will be analyzed that is equivalent to 10 percent of the total number of the field XRF analyses. In addition to the analysis of QC samples described above, the offsite laboratories will perform, at a minimum, additional standard internal QC checks as follows:

- use of standard analytical reference materials for traceability of independent stock solutions prepared for calibration stocks, control spike stocks, and reference stock solutions;
- verification of initial calibration curves with independent reference stock solutions;
- verification of initial calibration curves with daily calibration standards according to;
- verification of continued calibration control by analysis of calibration standards to document calibration drift;
- analysis of control spikes to document method performance and control with respect to recent performance.

An attempt will be made to analyze all samples within the calibrated range of the analytical method. Dilution of a sample extract with extracting solvent, or of the original sample matrix with distilled/de-ionized water, will be performed if the concentration of an analyte is greater than the calibrated range of the method. This is not expected to be observed at this location.

Laboratory control samples will be used by the laboratory to assess analytical performance under a given set of standard conditions. These samples will be specifically prepared to contain some of the analytes of interest at known concentrations. The samples will be prepared independently of the calibration standards. Types of laboratory control samples that may be used are laboratory duplicates, matrix spikes, matrix spike duplicates, and surrogate spikes. The matrix spike/matrix spike duplicate samples will be used to evaluate precision according to Equation 1 in Section 4. Analysis of laboratory control samples will be used to estimate the analytical bias and accuracy by comparing measured results obtained during analysis to theoretical concentrations. This comparison will be measured using Equation 2 as presented in Section 4. The accepted range of RPD values for *matrix spike/matrix spike duplicate* samples for each laboratory analysis will be included in the individual *Analytical Results Report*. Stock solutions used to spike QC samples will be prepared independently of stocks used for calibration as required by appropriate EPA methods. Validation of spiked solutions will be performed on a regular basis before the solution is used.

7.4 Data Reduction and Validation

This subsection describes procedures for reducing, validating, and reporting data. All validated analytical data generated within the off-site laboratories will be extensively checked for accuracy and completeness by laboratory and project personnel. Records will be kept throughout the analytical process, during data generation, and during reporting so that adequate documentation to support all measurements is available. Record keeping, data reduction, validation, and reporting procedures are discussed in this section.

Data reduction will follow the requirements contained in the SW-846 and U.S. EPA analytical methods cited previously. Reduction involves the reformatting of data to present the desired end-product, *i.e.*, the concentrations of the contaminants. Reformatting will involve the process of performing calculations on the raw data and presenting all values in appropriate units. The information generated by the data reduction step will be used in the interpretation of the data qualifiers.

The responsibility for data acquisition and reduction of raw data resides with the individuals who perform the analysis. Raw data for the quantitative VOC analysis procedures used during this project will consist of peak areas for surrogates, standards, and target compounds. Analytical results will be reduced to concentration units appropriate for the medium being analyzed, i.e. milligrams per kilogram (mg/kg) for soil samples.

Table 1 – List of Compounds for Analyses

Parameter	LCS% Recovery Limits	Laboratory Replicates (RPD)	Matrix Spikes % Recoveries	Matrix Spikes Duplicates (RPD)	Reporting Limits (µg/L)
Arsenic	70-130%	40%	70-130%	40%	1 µg/L
Lead	85-115%	20%	70-130%	20%	5 µg/L

Data validation involves a review of the QC data and the raw data in order to identify any qualitative, unreliable, or invalid measurements. As a result, it will be possible to determine which samples, if any, are related to out-of-control QC samples. Laboratory data will be screened for inclusion of and frequency of the necessary QC supporting information, such as detection limit verification, initial calibration, continuing calibration, duplicates, matrix spikes, surrogate spikes, and the method and preparation blanks. QC supporting information will be screened to determine whether any datum is outside established control limits. If out-of-control data are discovered, appropriate corrective action will be determined by the lab based upon QC criteria for precision, accuracy, and completeness. Any out-of-control data without appropriate corrective action will be cause to qualify the affected measurement data.

The generated data will receive Level II data validation. For Level I field screening data quality, a data "package" including the results from sample blanks, method blanks, and supporting calibration information, will be recorded in a logbook maintained by the lab. The extent of contamination and the achievement of detection limits can be determined from this information. The sample results and QC parameters will be routinely evaluated by site personnel, and 10% of the analytical raw data results will be reviewed by the lab director to verify sample identity, instrument calibration, quantification limits, numerical computation, accuracy of transcriptions, and calculations.

At a minimum, the following data validation procedures will be followed. Each data package will be reviewed and the data validated prior to release. Checklists will be used to demonstrate that the data review was accomplished. The Laboratory Manager or a designee will perform the data review and validation.

The data review will include, but not be limited to, the following subjects:

- Completeness of laboratory data
- Evaluation of data with respect to reporting limits
- Evaluation of data with respect to control limits
- Review of holding time data
- Review of sample handling
- Correlation of laboratory data from related laboratory tests
- Comparison of the quality of the data generated with DQOs as stated in this document (on a daily basis, during routine analyses, and during internal laboratory audits)
- QC chart review, performed weekly, following receipt of control charts for analyses performed the previous week. Review shall consist of assessing trends, cycles, patterns, etc. This review shall also assess whether control corrective actions have been implemented.

The elements of data validation shall include, but not be limited to, the following items:

- Examination of chain of custody records to assess whether custody was properly maintained
- Comparison of data on instrument printouts with data recorded on worksheets or in notebooks
- Comparison of calibration and analysis dates and assessment of whether the same calibration was used for all samples within a lot
- Examination of chromatographic outputs for manual integrations, and documentation of the reasons for any manual integrations
- Comparison of standard, sample preparation, and injection records with instrument output to assess whether each output is associated with the correct sample
- Examination of calibration requirements, as specified in the methods
- Use of a hand-held calculator to perform all calculations on selected samples to assess the correctness of results
- Examination of all papers and notebooks to ensure that all pages are signed and dated, that all changes are initialed, dated, have sufficient explanation for the change, and that all items are legible.

The laboratory will retain all samples and sample extracts for at least six weeks following the data report submittal.

The results for each analyte in spiked QC samples will be determined using the same acceptable calibration curve that is used for environmental samples in the lot. Values above the practical quantitation limit (PQL) shall be reported as the found value. To correlate with past methods of reporting, raw values that fall below the method detection limit (MDL) will not be reported as "less than" the PQL. Values above the method detection limit (MDL) and less than the PQL will not be flagged with a "J". Results for QC samples will not be corrected, except as described below. Based on previous analyses on samples from the site, no dilutions should be required. Data will be reported using the correct number of significant figures.

Each day of analysis, the analyst will quantify each analyte in the method blank and spiked QC samples. A new lot of samples will not be introduced into the analytical instrument until results for QC samples in the previous lot have been calculated, plotted on control charts as necessary, and the entire analytical method shown to be in control. If time is a constraint, the calculation of associated environmental sample results may be postponed until a later date. The analyst will maintain control charts by the instrument so that the results of QC samples can be hand-plotted, in order to have an early indication of problems.

Data from the method blank will be reported, usually as less than the MDL for each analyte. Any values above the MDL shall be reported as the found value. Corrections to the QC samples, necessitated by background levels in the method blank, will be performed using instrument response values and not the found values calculated from the linear calibration curve. Reported entries will be in terms of concentration. The importance attached to finding measurable concentrations in the method blank is dependent on analyte and method. Identification of measurable concentrations in the method blanks will be reported in writing to the Lab Director for possible corrective actions.

All data will be reported, and numerical results will be reported, in terms of concentration in the environmental sample. Resultant found concentrations will be adjusted for dilution, etc. before being reported, and both the raw data and correction factors (*e.g.*, dilution factor) will be recorded in the data package submitted. Laboratory comments on the usability of the data will also be included.

APPENDIX C

Transportation Plan

TRANSPORTATION PLAN

for a

REMOVAL ACTION WORKPLAN

Shenandoah Street Elementary School
2450 Shenandoah Street
Los Angeles, California

January 10, 2020

Prepared for:

Los Angeles Unified School District
Office of Environmental Health and Safety
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TABLE OF CONTENTS

1.0 PURPOSE OF THIS DOCUMENT

The purpose of this Transportation Plan is to ensure the lead- and arsenic-affected soils excavated from the Shenandoah Street Elementary School Comprehensive Modernization Project site are properly and legally handled and disposed of at an offsite disposal facility.

2.0 SITE DESCRIPTION

The Shenandoah Street Elementary School is located on a 7.6-acre parcel (Assessor Parcel Number [APN] 4301-018-900) property located at 2450 Shenandoah Street, Los Angeles, California (**Figures 1 and 2**). The Comprehensive Modernization project will include construction of new school facilities, improvements to existing school facilities, placement of interim facilities during construction, and the demolition of certain aging and deteroriated facilities.

The school is currently open and will remain open during the construction activities. The removal of the arsenic and lead impacted soil outlined in the RAW will be conducted as the first phase of the construction project.

Truck access locations are available through the parking entrance along Shenandoah Street, the parking entrance along Beverlywood Street and the access gate at South Bedford Street (see access points on Figure 2). Final truck entrace/exit points and truck loading areas will be determined based upon construction site layout and schedule and will be provided to the remediation contractors prior to construction activities.

3.0 SCOPE OF WORK

The scope of work for this project consists of the excavation and offsite disposal of shallow soils impacted by lead and arsenic. The lead impacted soil is generally located at the north part of the campus and the arsenic impacted soil is located in the south portion (**Figure 3**). The material will be staged and loaded at a location near the access gate to the campus from South Bedford Street. The excavated materials will be direct loaded or covered and stockpiled for transportation.

All excavated soils will be shipped to a proper disposal facility in sealed or covered end-dump trucks by appropriately licensed/registered and insured waste hauler under manifests or proper shipping documents. All removal, transportation, disposal, and site restoration activities will be performed in accordance with all applicable federal, state, and local laws, regulations, and ordinances.

4.0 WASTE CHARACTERIZATION AND QUANTITY

Excavated soils are the primary waste to be transported from the site for disposal. Fluids produced during decontamination procedures may also require transportation from the school and will be contained temporarily in 55-gallon drums, pending disposal.

The primary chemical of concern is arsenic. A smaller portion of the arsenic-impacted material is also impacted by lead. The soil sample analytical results are presented in **Table 1**.

4.1 Waste Management

Hazardous waste is regulated under both the Resource Conservation and Recovery Act (RCRA) and the California Health and Safety Code (H&SC). RCRA regulatory levels for D-listed wastes, using the Toxicity Characteristic Leaching Procedure (TCLP), are listed under Title 22 of the California Code of Regulations, Section 66261.24(a)(1) (22 CCR 66261.24(a)(1)). Non-RCRA hazardous waste is regulated only under H&SC and 22 CCR. The Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values for certain chemicals are listed under 22 CCR 66261.24(a)(2). The TCLP and STLC limits for hazardous waste classification are 5 milligrams per liter for arsenic and lead.

The assessment activities determined exceedances of the TTLC concentration in 6 boring areas. The STLC limits for lead were exceeded in 4 samples collected and analyzed (soil samples SB-1-0.5, SB-1A-0.5, SB-5-0.5 (Dup) and SB-7-0.5); the TCLP limits for lead were not exceeded. Therefore, the STLC results exceeding the threshold of 5 mg/L for lead indicate approximately 43 cubic yards (yds^3) are acceptable for Non-RCRA (California-regulated) hazardous waste disposal and approximately 27 yds^3 of lead impacted soil can be disposed of as non-hazardous waste. The STLC and TCLP results are presented in **Table 2**.

The STLC limits for arsenic were exceeded in 21 soil samples (samples SB-37C2-0.5, SB-37C3-0.5, SB-47C-0.5, SB-50B-0.5, SB-50B2-0.5, SB-51-0.5, SB-51B-0.5, SB-51C-0.5, SB-52-0.5, SB-53-0.5 (Dup), SB-53D-0.5, SB-53D2-0.5, SB-54-0.5, SB-55C2-0.5, SB-57B-0.5, SB-65-1.0, SB-66-1.0, SB-67-1.0, SB-69-0.5, SB-70-0.5 and SB-84-0.5). The TCLP limits for arsenic were not exceeded (**Table 2**). Therefore, the STLC results exceeding the threshold of 5 mg/L indicate approximately 971 yds^3 of arsenic impacted soil can be disposed of as California-regulated hazardous waste disposal and approximately 2,376 yds^3 of arsenic impacted soil can be disposed of as non-hazardous waste.

Since the soil to be excavated during this removal action has been characterized as a California-regulated hazardous waste, a U.S. Environmental Protection Agency (USEPA) identification number for the site is expected to be required from the California Department of Toxic Substances Control (DTSC) for proper waste management. Compliance with DTSC requirements of hazardous waste generation, temporary onsite storage, transportation, and disposal is required. The EPA identification (EPA ID) number for the site is CAR000186577. This number will be used for the generation, transportation and off-site disposal of wastes excavated from the site, as applicable.

4.2 Contaminated Soil Control

After the delineated areas of impacted soil, shown on **Figure 3**, have been excavated to the appropriate depths, confirmation soil samples will be collected from the bottom and sidewalls of the excavations, as described in the RAW. The cleanup goals for the site are also discussed in the RAW.

The truck loading area at South Bedford Street is immediately south of the largest excavation, and immediately north of the exit gate for the trucks. This will simplify loading trucks or bins during excavation or soon thereafter. The material from the smaller excavations at the north part of the site will require transport to the truck loading area to the south. Since these excavations are smaller volumes, the use of seven cubic yard bins is suggested for containing and moving the material to the truck loading area. The bins can be loaded and moved using conventional excavation equipment. The truck access locations are shown on **Figure 2**.

4.3 Waste Quantity

An estimated 3,107 cubic yards (in place) of soil is present above screening levels. These areas are depicted in **Figure 3**. Using a bulk factor of 10%, an estimated surface volume of 3,417 cubic yards of material will be transported from the project area under this recommended scenario. Based on an estimated density for moist, silty sand of 2,800 pounds per cubic yard, this volume of soil would weigh approximately 4,784 tons. The impacted soil volume for each initial boring location is provided in **Table 3**.

An estimated 217 trucks will be required to transport the material for disposal. Because of logistics, it is assumed the excavation, loading and transportation activities will take approximately 15 days to complete.

4.4 Import Fill Material

A classroom building is proposed to be constructed for the school. Footing excavations for the building will generate excess soil that can be used as backfill material, if approved by the Project Geotechnical Engineer. Therefore, an estimated 3,150 cubic yards of imported material will be required to backfill the excavations. The imported material will be from an OEHS-approved source, or will be characterized for import in accordance with OEHS Specification 01 4524 for Environmental Import/Export Materials Testing (LAUSD-OEHS, 2018).

OEHS Specification 01 4524 will also be followed to characterize any rinseate or solid waste remaining onsite from decontamination procedures. Once characterized, the wastes will be removed from the site within 30 days of production.

5.0 SOIL LOADING

Soil will be removed with excavators or other types of earth moving equipment, as necessary. As soil is excavated, it will be loaded directly into transportation trucks for offsite disposal whenever possible. If temporary stockpiling is necessary, the excavated soil will be covered and may be stored in soil staging areas onsite.

5.1 Truck Loading Operations

In most cases it is anticipated that trucks will be loaded directly, at or near the areas of excavation and driven to the designated disposal facility. While the soil is being loaded into the trucks, dust suppression will be performed by lightly spraying or misting the work areas with water. Water mist may also be used on soil placed in the transport trucks. After the soil is loaded into the transport trucks, the soil will be covered and otherwise contained to prevent soil from blowing or spilling out of the truck during transport to the disposal facility.

All vehicles will be cleaned of loss material prior to leaving the work area, as described in the RAW. The dump truck or roll-off bin portion of the truck will then be covered to prevent soil and/or dust from spilling out of the truck during transport to the disposal facility. Prior to leaving the loading area, each truck will be inspected by the onsite project manager to ensure that the payloads are adequately covered, the trucks are cleaned of loose soil and the shipment is properly manifested.

5.2 Working Hours and Duration

During school operation, trucking times must be pre-approved by LAUSD. In most cases, excavation may be conducted between 7:00 AM to 3:00 PM. In this case the work areas must be isolated from school operations with fencing. During school non-operational days, truck loading and unloading may also be conducted between 7:00 AM to 3:00 PM daily. It is expected that loading operations will require approximately 20 days to complete. If needed, excavation, truck loading, and unloading and offsite transport to the licensed disposal facility may be conducted on Saturdays from 8:00 AM to 3:00 PM.

6.0 TRANSPORTATION CONTROL

6.1 Dust Control During Transportation

Soil for offsite disposal will be transported in covered trailers/trucks, drums, or roll-off bins to an approved land disposal facility. All waste hauler vehicles will be cleaned of loose material prior to leaving the work area. Imported clean fill materials will be transported in covered trailers/trucks to the site. If necessary, a street sweeper will be operated on the local streets adjacent to the Site to mitigate any potential residual dust or track out of soils.

6.2 Traffic Control

Prior to loading or unloading at the site, all trucks will be staged onsite as much as possible to avoid impacts on the local streets. This will require that the school not be in session, and the use of the south gate from South Bedford Street to the playground area. Careful coordination of trucks will be exercised to help avoid staging offsite and long wait times for trucks. Trucks will not be allowed to sit idling more than five minutes to avoid unnecessary exhaust fumes.

Preparation for trucks will include establishing no parking areas along the curbs near the designated gates to provide safer ingress and egress.

Trucks to be loaded or unloaded at the site will only access the designated truck staging area through the west gate or east gate pre-designated by the Contractor and LAUSD. Waste hauling vehicles will not be able to enter other areas of the campus. A flag person will be located at the gates to assist the truck drivers to safely enter and depart the site.

Traffic will be coordinated in such a manner that, at any given time, no more than two transportation trucks will be onsite to reduce truck traffic on surrounding surface streets and reduce dust generation during onsite transportation.

While on the site, all vehicles are required to maintain a speed of 5 miles per hour (mph) or less, for safety purposes and for dust control measures. While on streets or freeways, all transporters will follow the speed limit requirements and defensive driving techniques (over traffic or road conditions) for traffic safety.

6.3 Transportation Routes

There are numerous alternate routes that can be taken to potential land disposal facilities. The remediation contractor will submit a truck route to LAUSD for approval prior to any construction activities. With the exception of traffic conditions encountered during hauling, in the event that an alternate route is taken, the Contractor will also verify the new truck route with OEHS prior to initiating field activities.

Before leaving the site, the truck driver will be instructed to notify the Contractor Site Manager. The truck driver will be provided with the cellular phone number for the Contractor Site manager. It will be the responsibility of the truck driver to contact the Contractor Site Manager if problems arise after leaving the site. It will be the responsibility of the Contractor Site Manager to notify the LAUSD-OEHS of any unforeseen incidents.

The Los Angeles County Service Authority for Freeway Emergencies (SAFE) was created pursuant to California Streets & Highways Code Section 2550 et. seq. The SAFE is responsible for the operation and maintenance of the Los Angeles County Call Box System. There are more than 4,400 call boxes located throughout the Los Angeles County. These call boxes are situated at roadside locations along the truck route described above. The call boxes were placed to report roadside emergencies to the California Highway Patrol (CHP) dispatch center. The truck driver will be instructed to report any roadside emergency to the CHP using the Call Box System and also to notify the Site Manager.

Since the total volume of import and export soil exceeds 1,000 cubic yards, a “haul route permit” will be required from the City of Los Angeles, Department of Building and Safety.

Transportation of impacted soils or fill materials will be on arterial streets and/or freeways, approved for truck traffic, to minimize any potential impact on the local neighborhood. Moving along the proposed transportation routes, all street intersections (except those marked on the transportation route map) are controlled by traffic lights or stop signs. For those gates to and from the school, a flag person of the Contractor will be required during all trucking/hauling activities. The number of daily truckloads during implementation of the RAW is not expected to cause a disruption in local traffic.

Street Maintenance: All street surfaces adjacent to the school will be routinely inspected. The number of daily truckloads during implementation of the RAW is not expected to cause damage to surface streets. The Contractor is responsible for cleaning streets or school yards from spilled soils and the final cleanup after completion of field activities, such as washing paved areas.

7.0 OFFSITE SOIL DISPOSAL FACILITIES

Based on the results of waste profile and classification, the excavated non-hazardous waste will be transported under non-hazardous waste manifests to a proper offsite disposal facility. Once the facility has provided written acceptance, copies of waste profile reports used to secure disposal permission from the landfill will be provided to OEHS.

Compliance with the land disposal restrictions, as necessary, will be documented and provided to LAUSD-OEHS once written acceptance from the landfill is obtained. While remaining in California, all wastes will be properly managed, manifested, and transported by a registered waste hauler to a proper waste management facility. Based on the results of waste profile and classification, approximately 1,014 yds^3 of lead and arsenic impacted California-regulated hazardous waste soil will be transported under non-hazardous manifests or proper shipping documents to a proper offsite treatment facility in California.

California hazardous (non-RCRA) lead-impacted soil may be transported to:

1. South Yuma County Landfill (owned by CR&R Incorporated)
   19536 South Avenue 1 E
   Yuma, Arizona 85365
   Phone: (928) 341-9300

   Kettleman Hills Facility
   35251 Old Skyline Road
   Kettleman City, CA 93239
   (559) 309-7688

Others locations may be used but must be pre-approved by LAUSD-OEHS Environmental Compliance Manager.

Based on the results of waste profile and classification, approximately 2,403 yds^3 of lead and arsenic impacted soil will be transported under non-hazardous manifests or proper shipping documents to a proper offsite treatment facility in California. The non-hazardous soil may be transported to the following facilities:

1. Waste Management - Simi Valley Landfill
   2801 Madera Road
   Simi Valley, California
   Phone: (805) 579-7267

2. Chiquita Canyon Landfill
   29201 Henry Mayo Drive
   Castaic, California 91384
   Phone: (661) 257-3655

3. Sunshine Canyon Landfill
   14747 San Fernando Road
   Sylmar, California 91342
   Phone: (818) 362-2124

Others locations must be pre-approved by LAUSD-OEHS Environmental Compliance Manager.

8.0 RECORD KEEPING

The Contractor will be responsible for maintaining a field logbook during the RAW activities. The field logbook will serve to document observations, onsite personnel, equipment arrival and departure times, and other vital project information. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry noted. All entries will be legible, written in black ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions or other terminology that might prove inappropriate. If an error is made, corrections will be made by crossing a line through the error and entering the correct information. Corrections will be dated and initialed.

8.1 California Hazardous Waste Shipment

The Uniform Hazardous Waste Manifest form will be used to track the movement of hazardous waste soils from the point of generation to the point of ultimate disposition. Prior to transporting the excavated soil off site, an authorized representative of LAUSD or its designated representative will sign each hazardous waste manifest. The hazardous waste hauler will then sign the manifest and distribute one signed copy to the Contractor's Site Manager. The Contractor's Site Manager will maintain a copy of the hazardous waste manifest for each truckload until completion of the excavation.

8.2 Non-Hazardous Waste Shipment

The Uniform Non-Hazardous Waste Manifest form will be used to track the movement of soil sent offsite as from the point of generation to the point of ultimate disposition.

The manifests will include information such as:

- Name and address of the generator, transporter, and the destination facility
- U.S. Department of Transportation (DOT) description of the waste being transported and any associated hazards
- Waste quantity
- Name and phone number of a contact in case of an emergency
- Other information required either by USEPA and DTSC

Before transporting the excavated soil offsite, an authorized representative of LAUSD will sign each waste manifest. The Contractor's Site manager will maintain one copy of the waste manifest onsite. Copies of the waste manifests, signed by the receiving facilities, will be included in the Removal Action Completion Report (RACR). While at the disposal facility, the truck will be weighed before offloading the payload. Weight tickets or bills of lading will be provided to the Contractor after the material has been shipped offsite.

9.0 HEALTH AND SAFETY

A site-specific health and safety plan (HASP) has been prepared and included in the RAW. Prior to the commencement of each day's activities, a tailgate health and safety meeting will be held. Everyone working at the site will be required to be familiar with the HASP and attend the daily tailgate meetings or health and safety briefings. Everyone working at the site will be required to sign the site-specific HASP to demonstrate that they are familiar with the HASP and that they participated in, or were briefed on, the daily tailgate meeting. The Contractor's Site Manager will maintain this signature sheet.

10.0 REQUIREMENTS OF FILL MATERIALS

If needed, fill materials will be secured with LAUSD's approval. Selection of fill materials shall follow the latest revision of LAUSD's specification for Environmental Import/Export Materials Testing (Section 01 4524). All sources shall be approved by LAUSD prior to importing the fill materials to the site. The same procedure will apply for all exported materials.

11.0 REQUIREMENTS OF TRANSPORTERS

Qualified transporters will be hired for hauling the excavated soil away or hauling fill materials to the site.

11.1 License and Insurance

The selected haulers will be fully licensed and insured to transport the excavated soils or fill materials. Hazardous wastes must be shipped by a registered hazardous waste hauler. Prior to hiring, the Contractor shall verify the status of the registrations and insurance policies of the selected transporters.

11.2 Contingency Plan

Each transporter is required to have a contingency plan prepared to deal with the following conditions:

- When there are emergency situations (vehicle breakdown, accident, waste spill, waste leak, fire, explosion, etc.) during transportation of excavated soils from the Site to the destined disposal facility or during transportation of fill materials from a source to the Site;
- When the volumes of excavated soil change; or
- When waste characteristics change.

The Contingency Plan will be prepared in accordance with DTSC's guidance for preparing transportation plans for site remediation (DTSC, May 1994). Once the transporter is selected, a copy of its contingency plan will be attached to this Transportation Plan.

APPENDIX D

RULE 1466 Risk Assessment

INTER-OFFICE CORRESPONDENCE
Los **A**ngeles **U**nified **S**chool **D**istrict
Office of Environmental Health and Safety

TO: Steven Morrill, Project Manager **DATE:** October 16, 2020
Office of Environmental Health and Safety

FROM: Bill Piazza, Environmental Assessment Coordinator BP73.
Office of Environmental Health and Safety

SUBJECT: SHENANDOAH STREET ELEMENTARY SCHOOL – HEALTH RISK ASSESSMENT FOR RULE 1466 COMPLIANCE

This technical memorandum was prepared in response to your request to address the potential for exposure and subsequent risk to students and staff from on-site soils containing detectable concentrations of arsenic.

Introduction

In July 2017, the South Coast Air Quality Management District (SCAQMD) established Rule 1466 (*Control of Particulate Emissions from Soils with Toxic Air Contaminants*) to promote the reduction of off-site fugitive dust emissions resulting from earth-moving activities, including, excavating, grading, handling, treating, stockpiling, transferring and removing soil that contains specified toxic air contaminants (TACs) from sites that meet certain applicability requirements.

Applicable sites are those conducting earth-moving activities where the soil contains specified TACs as determined and designated by the U.S. Environmental Protection Agency, California Department of Toxics Substances Control, State Water Resources Control Board or Regional Water Quality Control Board. The rule also applies to agencies such as environmental health departments, planning departments, fire departments and public health offices with jurisdiction to supervise, oversee or approve a site investigation and/or remedial action at a hazardous materials release site. The rule contains an additional provision for SCAQMD's Executive Officer to identify sites, based on specified criteria, to be subject to the requirements of the rule. Of relevance is a provision which allows the submission of health risk assessment information to demonstrate that such earth-moving activities will not expose individuals to TAC emissions that exceed regulatory thresholds.

Notwithstanding, the rule establishes special provisions whereby earth-moving activities at a school, early education center, joint use agreement property or adjacent athletic area are limited to construction outside the hours of 7:30 a.m. and 4:30 pm when the school or early education center are in session. Earth-

moving activities would be prohibited during sponsored events or youth organized sports activities while individuals participate on-site. Restrictions associated with stockpiling and loading would additionally apply.

In 2014, the Board of Education approved the School Upgrade Program (SUP) and a funding allocation of 7.8 billion dollars to support the creation of projects that will modernize, build and repair school facilities to improve student health, safety and educational quality. An additional allocation of 528 million dollars was made in 2015 to further improve critical school safety conditions, technology infrastructure and accessibility improvements to comply with the Americans with Disabilities Act (ADA).

In order to meet aggressive timelines to complete these projects, it is anticipated that some construction related activities will occur while schools are in session. Although most projects identified under the SUP will not be under regulatory oversight which limits applicability of Rule 1466, the Office of Environmental Health and Safety (OEHS) in consultation with the Facilities Services Division, have determined that potential exposures to identified TACs be assessed so as not to present an endangerment to the health of students and staff that may be present during earth-moving activities.

Based upon this consideration, a health risk assessment was prepared to assess the impact of TACs on individuals who utilize/access the school site. The analysis also serves to provide a nexus between identified impacts and the effectiveness of available mitigation measures.

The assessment and dispersion modeling methodologies used in the preparation of this report were composed of all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency, California Environmental Protection Agency and SCAQMD. The methodologies and assumptions offered under this regulatory guidance were used to ensure that the assessment effectively quantified pollutant exposures associated with the generation of contaminant emissions from earth-moving activities. This report summarizes the protocol used to evaluate contaminant exposures and presents the results of the health risk assessment.

Project Description

The proposed project consists of the construction of new school facilities, improvements to existing school facilities and the demolition of certain aging and deteriorated structures. The project would include removal of 33 classrooms currently in portable buildings and the construction of a new two-story classroom building approximately 32,290 square feet with 19 general and kindergarten classrooms with instructional support accommodations. Campus-wide ADA compliance improvements which are legal requirements mandated by the Division of State Architect (DSA) will also be incorporated into the project's design.

Shenandoah Street Elementary School is located at 2450 Shenandoah Street in the City of Los Angeles, California. The site is bound by Cadillac Avenue to the north, Beverlywood Street to the south, South Halm Street to the east and South Shenandoah Street to the west. Figure 1 presents an aerial photograph of the project location and adjoining elementary school campus.

Figure 1
Site Location / Vicinity Aerial Photograph

Source Identification

A Preliminary Environmental Assessment Equivalent (PEA-E) report and subsequent Removal Action Workplan (RAW) were prepared by Montrose Environmental in December 2019 and January 2020, respectively. On-site soil sampling identified detectable arsenic concentrations within the central and southern portions of the school campus. As such, excavation and off-site removal of the impacted soil was recommended as the preferred remedial action.

Due to the identified detections and spatial variability across each source area, U.S. Environmental Protection Agency guidance recommends using the average concentration to represent a reasonable estimate of the concentration at a given location. However, the agency

further recommends that due to the uncertainty associated with estimating a true average concentration, the 95 percent upper confidence limit (UCL) of the arithmetic mean be used for this value. As a result, a data evaluation was conducted to identify the 95 percent UCL for the arsenic dataset. Results of this computational effort produced a concentration value of 45.01 milligrams per kilogram (mg/kg). This value exceeds the school-based screening threshold concentration of 12 mg/kg and was used to assess student and staff exposures. The 95 percent UCL statistical data worksheet is presented in Attachment B.

Source Characterization

For the inhalation pathway, ambient concentrations generated from the entrainment of surface soils via off-road equipment removal activities were developed through a review of published estimating guidance for aggregate handling operations associated with heavy construction operations (U.S. EPA, AP-42, Section 13.2.4).

Contaminant emissions were determined by first generating a mass particulate (PM_{10}) emission rate. This value was then utilized along with the identified contaminant concentration to produce a discrete flux rate. Collectively, the upper-bound volume of arsenic impacted soil is approximately 3,347 cubic yards with an estimated removal duration of ninety days. Attachment C presents the emission calculation worksheet which identifies the methodology and assumptions utilized to produce the contaminant flux rate for the identified area source locations.

Exposure Quantification

In order to assess the impact of emitted compounds on individuals who reside within and/or access common areas throughout the school campus, air quality modeling utilizing the AMS/EPA Regulatory Model AERMOD was performed to assess the downwind extent of fugitive emissions. AERMOD is a steady-state Gaussian plume model applicable to directly emitted air pollutants that employs best state-of-practice parameterizations for characterizing meteorological influences and atmospheric dispersion. AERMOD is the U.S. Environmental Protection Agency guideline model for the assessment of near-field pollutant dispersion.

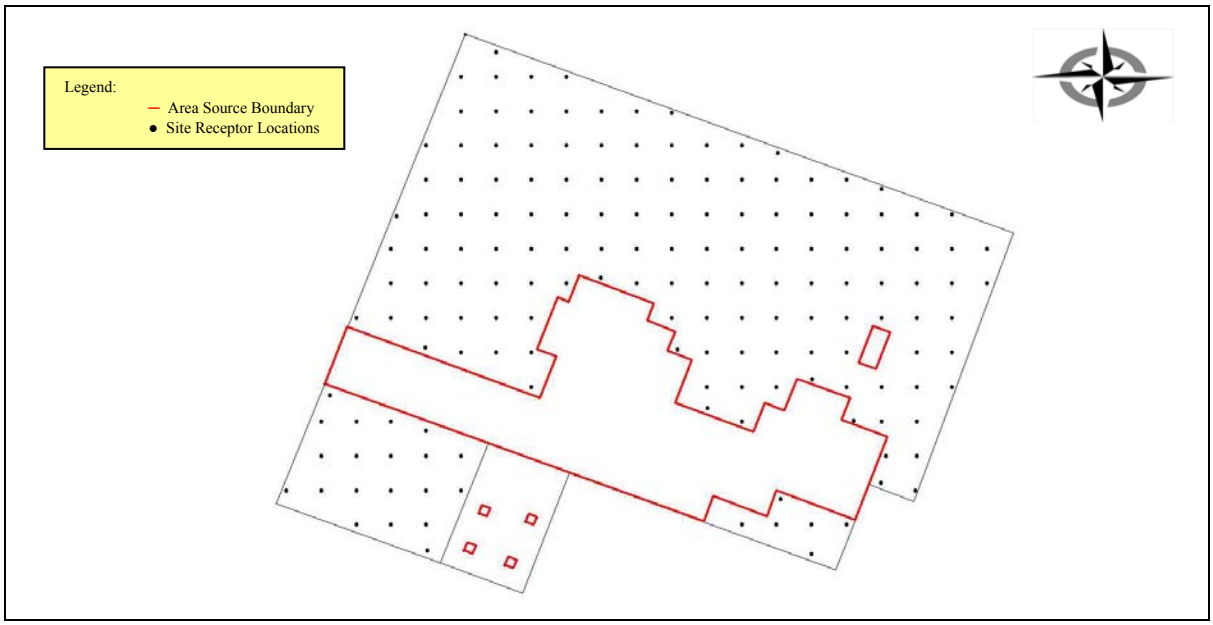
Source treatment outlined in SCAQMD guidance for conducting a Localized Significance Threshold (LST) analysis was utilized whereby fugitive dust emissions were treated as a ground-based source with a one meter vertical dimension incorporating source area size and configuration. Plume depletion due to dry removal mechanisms was assumed (DRYDPLT). Entrained or fugitive emissions were separated into three aerodynamic diameter sizes of 1.0, 2.5 and 10 microns (µm) with weight fractions of 0.0787, 0.1292, and 0.7922, respectively. A particle density of 2.3 grams per cubic centimeter was assigned to all size bins.

Air dispersion models require additional input parameters including pollutant emission data and local meteorology. Due to their sensitivity to individual meteorological parameters such

as wind speed and direction, the U.S. Environmental Protection Agency recommends that meteorological data used as input into dispersion models be selected on the basis of relative spatial and temporal conditions that exist in the area of concern. In response to this recommendation, meteorological data from the SCAQMD Santa Monica Municipal Airport monitoring station (Source Receptor Area 2) was used to represent local weather conditions and prevailing winds. To assess maximum exposures, five years of available AERMOD meteorological data was reviewed to identify the calendar year which produced the highest pollutant concentrations. Model scalar options were additionally invoked to address emissions generated during daytime hours and commensurate with on-site construction activity (i.e., ending hours 9 to 16).

To ensure a conservative assessment, the spatial distribution for construction related activities were assumed concurrent and uniform across each source area. To accommodate a Cartesian grid format, direction dependent calculations were obtained by identifying the universal transverse mercator (UTM) coordinates for the area source configurations. On-site receptors were uniformly placed to provide discrete coverage throughout the elementary school and adjoining early education center campus. A two meter flagpole height was assumed and assigned to each receptor location. A graphical representation of the source-receptor grid network is presented in Figure 2.

Figure 2
Source-Receptor Grid Network



Due to the relatively low contaminant emission rate and the limitation of the dispersion model output file to report *de minimis* ground level concentrations, a graphics file was produced which was programmed to report values in scientific notation to identify the resultant concentrations. Results of the dispersion analysis produced maximum 1 and 8-hour

contaminant concentrations of 1.15428E-05 and 6.66631E-06 micrograms per cubic meter ($\mu g/m^3$), respectively. A copy of the dispersion model output and graphics files are provided in Attachment D.

Risk Characterization

Based upon the limited duration of earth-moving activities, an evaluation of the potential noncancer effects for short duration (i.e., 1 and 8-hour) exposures was conducted. Under a deterministic approach (i.e., point estimate methodology), adverse health effects are evaluated by comparing a compounds concentration to a defined Reference Exposure Level (REL). The RELs utilized in the assessment were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*.

To quantify noncarcinogenic impacts, the hazard quotient approach was used. The hazard quotient assumes that subthreshold exposures adversely affect a specific organ or organ system (i.e., toxicological endpoint). To calculate the hazard quotient, the pollutant concentration or dose is divided by its chemical toxicity value. Should the total equal or exceed one (i.e., unity), a health hazard is presumed to exist. No exposure frequency or duration adjustments are considered for noncarcinogenic exposures.

Attachment A, Tables A1 and A2, column e present the RELs for the assessment of short duration exposures. Columns f-n identify the hazard quotient for each endpoint for the maximum exposed receptor location.

Results

For short duration exposures, the hazard quotient for the identified averaging times did not exceed unity for the respective toxicological endpoints. Therefore, noncarcinogenic hazards were predicted to be within acceptable limits. As such, the health risk assessment demonstrates that earth-moving activities associated with the proposed project will not present an endangerment to the health of students and staff whereby the restriction of construction hours is not warranted.

I can be reached at (213) 392-1879 should you have any questions or require additional information.

Attachment A: Noncarcinogenic Hazard Calculation Worksheets
Attachment B: 95 Percent UCL Statistical Data Worksheet
Attachment C: Emission Calculation Worksheet
Attachment D: Dispersion Model Output/Graphics Files
Attachment E: List of References

Attachment A

Noncarcinogenic Hazard Calculation Worksheets

Table A1
Quantification of Noncarcinogenic Acute Hazards
1-Hour Exposure Scenario / Maximum Exposed Receptor

Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*									
				REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	SKIN	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
Construction	1.15428E-05	1.00E+00	Arsenic	2.0E-01		5.8E-05	5.8E-05				5.8E-05		
Total						5.8E-05	5.8E-05				5.8E-05		

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
SKIN	Irritation and/or other effects
EYES	Eye irritation and/or other effects

Table A2
Quantification of Noncarcinogenic Acute Hazards
8-Hour Exposure Scenario / Maximum Exposed Receptor

Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*									
				REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	SKIN	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
Construction	6.66631E-06	1.00E+00	Arsenic	1.5E-02	4.4E-04	4.4E-04	4.4E-04				4.4E-04	4.4E-04	
Total					4.4E-04	4.4E-04	4.4E-04				4.4E-04	4.4E-04	

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
SKIN	Irritation and/or other effects
EYES	Eye irritation and/or other effects

Attachment B

95 Percent UCL Statistical Data Worksheet

1	**UCL Statistics for Uncensored Full Data Sets**											
2												
3			User Selected Options									
4			Date/Time of Computation	ProUCL 5.112/13/2019 12:32:57 PM								
5			From File	As 95% Input_Site Wide.xls								
6			Full Precision	OFF								
7			Confidence Coefficient	95%								
8			Number of Bootstrap Operations	2000								
9												
10												
11	**Arsenic**											
12												
13	**General Statistics**											
14					Total Number of Observations	291			Number of Distinct Observations	256		
15									Number of Missing Observations	0		
16					Minimum	0.448			Mean	29.34		
17					Maximum	633			Median	7.84		
18					SD	61.34			Std. Error of Mean	3.596		
19					Coefficient of Variation	2.091			Skewness	5.198		
20												
21	**Normal GOF Test**											
22					Shapiro Wilk Test Statistic	0.466			**Shapiro Wilk GOF Test**			
23					5% Shapiro Wilk P Value	0			Data Not Normal at 5% Significance Level			
24					Lilliefors Test Statistic	0.321			**Lilliefors GOF Test**			
25					5% Lilliefors Critical Value	0.0523			Data Not Normal at 5% Significance Level			
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
30					95% Student's-t UCL	35.27			95% Adjusted-CLT UCL (Chen-1995)	36.42		
31									95% Modified-t UCL (Johnson-1978)	35.45		
32												
33	**Gamma GOF Test**											
34					A-D Test Statistic	32.36			**Anderson-Darling Gamma GOF Test**			
35					5% A-D Critical Value	0.804			Data Not Gamma Distributed at 5% Significance Level			
36					K-S Test Statistic	0.292			**Kolmogorov-Smirnov Gamma GOF Test**			
37					5% K-S Critical Value	0.0555			Data Not Gamma Distributed at 5% Significance Level			
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41					k hat (MLE)	0.681			k star (bias corrected MLE)	0.676		
42					Theta hat (MLE)	43.08			Theta star (bias corrected MLE)	43.38		
43					nu hat (MLE)	396.3			nu star (bias corrected)	393.6		
44					MLE Mean (bias corrected)	29.34			MLE Sd (bias corrected)	35.67		
45									Approximate Chi Square Value (0.05)	348.6		
46					Adjusted Level of Significance	0.0492			Adjusted Chi Square Value	348.4		
47												
48	**Assuming Gamma Distribution**											
49					95% Approximate Gamma UCL (use when n>=50))	33.12			95% Adjusted Gamma UCL (use when n<50)	33.14		
50												
51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.853			**Shapiro Wilk Lognormal GOF Test**			

53	5% Shapiro Wilk P Value					0	Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.23	**Lilliefors Lognormal GOF Test**					
55	5% Lilliefors Critical Value					0.0523	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					-0.803	Mean of logged Data					2.488
60	Maximum of Logged Data					6.45	SD of logged Data					1.142
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					26.87	90% Chebyshev (MVUE) UCL					28.89
64	95% Chebyshev (MVUE) UCL					31.55	97.5% Chebyshev (MVUE) UCL					35.25
65	99% Chebyshev (MVUE) UCL					42.51						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					35.25	95% Jackknife UCL					35.27
72	95% Standard Bootstrap UCL					35.28	95% Bootstrap-t UCL					37.38
73	95% Hall's Bootstrap UCL					37.3	95% Percentile Bootstrap UCL					35.11
74	95% BCA Bootstrap UCL					36.65						
75	90% Chebyshev(Mean, Sd) UCL					40.12	95% Chebyshev(Mean, Sd) UCL					45.01
76	97.5% Chebyshev(Mean, Sd) UCL					51.79	99% Chebyshev(Mean, Sd) UCL					65.11
77												
78	**Suggested UCL to Use**											
79	95% Chebyshev (Mean, Sd) UCL					45.01						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

Attachment C

Emission Calculation Worksheet

EMISSION CALCULATION WORKSHEET

SOURCE ID: All

ACTIVITY TIMELINE

operational time (min/hr)	60
total operational time (min)	43200
operational time (min/day)	480

EQUIPMENT

Backhoe/loader

FUGITIVE EMISSION QUANTIFICATION (PM10)

1. SOIL VOLUME

Amount of soil disturbed (cy)

Total	3347.0

2. SOURCE AREA (m^2) 7004.0

3. SOIL DENSITY

Amount of soil disturbed (tons) = (A x B) / 2000

A = Amount of Soil Removed (cy)	3347.0
B = Soil Density (lbs/cy)	2500.0
Total	4183.8

4. EMISSIONS / PARTICULATES (PM10)

Emissions for material handling.

Emisson Factor (lbs/ton) = k(0.0032) x $(U/5)^{1.3}$ x $(M/2)^{-1.4}$

k = Particle Size Multiplier	0.35
U = Mean Wind Speed (mph)	7.2
M = Material Moisture Content (%)	7.9
Total	0.000262
Tons Transferred	4183.8
Emission Rate (lbs/day)	1.2179E-02
Emission Rate (lbs/hr)	1.5224E-03
Emission Rate (g/sec)	1.9181E-04
Emission Rate (g/m^2-sec)	2.7386E-08

5. EMISSIONS / CONTAMINANT (ARSENIC)

E = (soil concentraton) x (10-6) x (PM10 flux rate)

95 UCL Soil Concentration (mg/kg)	45.01
Emission Rate (g/sec)	8.6335E-09
Emission Rate (g/m^2-sec)	1.2327E-12

Attachment D

Dispersion Model Output/Graphics Files

```
**BEE-Line Software:  (Version 12.04) data input file
**  Model: AERMOD.EXE     Input File Creation Date: 10/15/2020  Time: 12:05:37 PM
NO ECHO

  *** Message Summary For AERMOD Model Setup ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of            0 Informational Message(s)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W186     259       MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used          0.50
 ME W187     259       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET

 *********************************
 *** SETUP Finishes Successfully ***
 *********************************

 *** AERMOD - VERSION  19191 ***   *** Shenandoah Street ES                                          ***        10/15/20
 *** AERMET - VERSION  16216 ***   *** Arsenic                                                       ***        12:05:39
                                                                                                              PAGE   1
 *** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  DRYDPLT  URBAN  ADJ_U*

                                          ***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **PARTICLE DEPOSITION Data Provided.
 **Model Uses DRY DEPLETION.     DDPLETE  =  T
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for     6 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   9818605.0 ;  Urban Roughness Length =  1.000 m

 **Model Allows User-Specified Options:
         1. Stack-tip Downwash.
         2. Model Assumes Receptors on FLAT Terrain.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Used.

 **Other Options Specified:
         ADJ_U*   - Use ADJ_U* option for SBL in AERMET
         CCVR_Sub - Meteorological data includes CCVR substitutions
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Accepts FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  OTHER

 **Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR

 **This Run Includes:      6 Source(s);       1 Source Group(s); and     161 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:      0 VOLUME source(s)
```

```
                and:      6 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  16216

**Output Options Selected:
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
        Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
        Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =    53.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                           ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      3.5 MB of RAM.

**Input Runstream File:          C:\document\schools\shenandoah es\model\SHENANDOAH_ARSENIC_2.DTA
**Output Print File:             C:\document\schools\shenandoah es\model\SHENANDOAH_ARSENIC_2.LST

**File for Summary of Results:   C:\document\schools\shenandoah es\model\SHENANDOAH_ARSENIC_2.SUM

*** AERMOD - VERSION  19191 ***   *** Shenandoah Street ES                                          ***        10/15/20
*** AERMET - VERSION  16216 ***   *** Arsenic                                                       ***        12:05:39
                                                                                                             PAGE   2
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  DRYDPLT  URBAN  ADJ_U*


                                          *** AREA SOURCE DATA ***

             NUMBER EMISSION RATE  COORD (SW CORNER)  BASE     RELEASE  X-DIM     Y-DIM    ORIENT.    INIT.   URBAN  EMISSION RATE
  SOURCE      PART.  (GRAMS/SEC       X        Y      ELEV.    HEIGHT  OF AREA   OF AREA   OF AREA     SZ     SOURCE  SCALAR VARY
    ID        CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS) (METERS)  (METERS)   (DEG.)  (METERS)              BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

A2              3   0.12327E-11  372166.0 3767219.0    53.0     0.00      3.05      3.05     22.00     1.00     YES   HROFDY
A3              3   0.12327E-11  372182.0 3767216.0    53.0     0.00      3.05      3.05     22.00     1.00     YES   HROFDY
A4              3   0.12327E-11  372175.0 3767201.0    53.0     0.00      3.05      3.05     22.00     1.00     YES   HROFDY
A5              3   0.12327E-11  372161.0 3767206.0    53.0     0.00      3.05      3.05     22.00     1.00     YES   HROFDY
*** AERMOD - VERSION  19191 ***   *** Shenandoah Street ES                                          ***        10/15/20
*** AERMET - VERSION  16216 ***   *** Arsenic                                                       ***        12:05:39
                                                                                                             PAGE   3
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  DRYDPLT  URBAN  ADJ_U*


                                       *** AREAPOLY SOURCE DATA ***

             NUMBER EMISSION RATE   LOCATION OF AREA  BASE     RELEASE  NUMBER      INIT.   URBAN  EMISSION RATE
  SOURCE      PART.  (GRAMS/SEC       X        Y      ELEV.    HEIGHT  OF VERTS.     SZ     SOURCE  SCALAR VARY
    ID        CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS)            (METERS)            BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

A1              3   0.12327E-11  372200.3 3767301.8    53.0     0.00      26         1.00     YES   HROFDY
A6              3   0.12327E-11  372300.9 3767284.1    53.0     0.00       4         1.00     YES   HROFDY

*** AERMOD - VERSION  19191 ***   *** Shenandoah Street ES                                          ***        10/15/20
*** AERMET - VERSION  16216 ***   *** Arsenic                                                       ***        12:05:39
                                                                                                             PAGE   4
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  DRYDPLT  URBAN  ADJ_U*
```

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs

ALL A1 , A2 , A3 , A4 , A5 , A6 ,

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs

9818605. A1 , A2 , A3 , A4 , A5 , A6 ,

*** SOURCE PARTICULATE/GAS DATA ***

*** SOURCE ID = A1 ; SOURCE TYPE = AREAPOLY ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** SOURCE ID = A2 ; SOURCE TYPE = AREA ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** SOURCE ID = A3 ; SOURCE TYPE = AREA ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** SOURCE PARTICULATE/GAS DATA ***

*** SOURCE ID = A4 ; SOURCE TYPE = AREA ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** SOURCE ID = A5 ; SOURCE TYPE = AREA ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** SOURCE ID = A6 ; SOURCE TYPE = AREAPOLY ***

MASS FRACTION =
0.07870, 0.12920, 0.79220,

PARTICLE DIAMETER (MICRONS) =
1.00000, 2.50000, 10.00000,

PARTICLE DENSITY (G/CM**3) =
2.30000, 2.30000, 2.30000,

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR

SOURCE ID = A1 ; SOURCE TYPE = AREAPOLY :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

SOURCE ID = A2 ; SOURCE TYPE = AREA :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

SOURCE ID = A3 ; SOURCE TYPE = AREA :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

SOURCE ID = A4 ; SOURCE TYPE = AREA :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01

13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

SOURCE ID = A5 ; SOURCE TYPE = AREA :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR

SOURCE ID = A6 ; SOURCE TYPE = AREAPOLY :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.00000E+00	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.00000E+00	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)
(METERS)

(372148.4,	3767206.0,	53.0,	53.0,	2.0);	(372279.9,	3767204.8,	53.0,	53.0,	2.0);
(372124.0,	3767215.0,	53.0,	53.0,	2.0);	(372136.0,	3767215.0,	53.0,	53.0,	2.0);
(372148.0,	3767215.0,	53.0,	53.0,	2.0);	(372256.0,	3767215.0,	53.0,	53.0,	2.0);
(372268.0,	3767215.0,	53.0,	53.0,	2.0);	(372280.0,	3767215.0,	53.0,	53.0,	2.0);
(372292.0,	3767215.0,	53.0,	53.0,	2.0);	(372100.0,	3767227.0,	53.0,	53.0,	2.0);
(372112.0,	3767227.0,	53.0,	53.0,	2.0);	(372124.0,	3767227.0,	53.0,	53.0,	2.0);
(372136.0,	3767227.0,	53.0,	53.0,	2.0);	(372148.0,	3767227.0,	53.0,	53.0,	2.0);
(372160.0,	3767227.0,	53.0,	53.0,	2.0);	(372269.4,	3767224.0,	53.0,	53.0,	2.0);
(372303.7,	3767229.6,	53.0,	53.0,	2.0);	(372315.5,	3767226.9,	53.0,	53.0,	2.0);
(372112.0,	3767239.0,	53.0,	53.0,	2.0);	(372124.0,	3767239.0,	53.0,	53.0,	2.0);
(372136.0,	3767239.0,	53.0,	53.0,	2.0);	(372148.0,	3767239.0,	53.0,	53.0,	2.0);
(372160.0,	3767239.0,	53.0,	53.0,	2.0);	(372305.4,	3767238.9,	53.0,	53.0,	2.0);
(372316.0,	3767239.0,	53.0,	53.0,	2.0);	(372112.0,	3767251.0,	53.0,	53.0,	2.0);
(372124.0,	3767251.0,	53.0,	53.0,	2.0);	(372136.0,	3767251.0,	53.0,	53.0,	2.0);
(372147.9,	3767247.7,	53.0,	53.0,	2.0);	(372244.3,	3767255.6,	53.0,	53.0,	2.0);
(372256.0,	3767251.0,	53.0,	53.0,	2.0);	(372294.4,	3767251.2,	53.0,	53.0,	2.0);
(372304.0,	3767251.0,	53.0,	53.0,	2.0);	(372316.0,	3767251.0,	53.0,	53.0,	2.0);
(372115.0,	3767260.0,	53.0,	53.0,	2.0);	(372184.0,	3767263.0,	53.0,	53.0,	2.0);
(372244.0,	3767263.0,	53.0,	53.0,	2.0);	(372256.0,	3767263.0,	53.0,	53.0,	2.0);
(372268.0,	3767263.0,	53.0,	53.0,	2.0);	(372280.2,	3767265.7,	53.0,	53.0,	2.0);
(372292.0,	3767263.0,	53.0,	53.0,	2.0);	(372304.0,	3767263.0,	53.0,	53.0,	2.0);
(372316.0,	3767263.0,	53.0,	53.0,	2.0);	(372328.0,	3767263.0,	53.0,	53.0,	2.0);
(372147.7,	3767276.7,	53.0,	53.0,	2.0);	(372160.0,	3767275.0,	53.0,	53.0,	2.0);
(372172.0,	3767275.0,	53.0,	53.0,	2.0);	(372184.0,	3767275.0,	53.0,	53.0,	2.0);
(372234.0,	3767276.0,	53.0,	53.0,	2.0);	(372244.0,	3767275.0,	53.0,	53.0,	2.0);
(372256.0,	3767275.0,	53.0,	53.0,	2.0);	(372268.0,	3767275.0,	53.0,	53.0,	2.0);
(372280.0,	3767275.0,	53.0,	53.0,	2.0);	(372292.0,	3767275.0,	53.0,	53.0,	2.0);
(372316.0,	3767275.0,	53.0,	53.0,	2.0);	(372328.0,	3767275.0,	53.0,	53.0,	2.0);
(372124.0,	3767287.0,	53.0,	53.0,	2.0);	(372136.0,	3767287.0,	53.0,	53.0,	2.0);
(372148.0,	3767287.0,	53.0,	53.0,	2.0);	(372160.0,	3767287.0,	53.0,	53.0,	2.0);
(372172.0,	3767287.0,	53.0,	53.0,	2.0);	(372184.0,	3767287.0,	53.0,	53.0,	2.0);
(372232.0,	3767287.0,	53.0,	53.0,	2.0);	(372244.0,	3767287.0,	53.0,	53.0,	2.0);
(372256.0,	3767287.0,	53.0,	53.0,	2.0);	(372268.0,	3767287.0,	53.0,	53.0,	2.0);

```
    ( 372280.0, 3767287.0,      53.0,      53.0,       2.0);        ( 372292.0, 3767287.0,      53.0,      53.0,       2.0);
    ( 372304.0, 3767287.0,      53.0,      53.0,       2.0);        ( 372316.0, 3767287.0,      53.0,      53.0,       2.0);
    ( 372328.0, 3767287.0,      53.0,      53.0,       2.0);        ( 372136.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372148.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372160.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372207.8, 3767301.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372232.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372244.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372256.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372268.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372280.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372292.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372304.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372316.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372328.0, 3767299.0,      53.0,      53.0,       2.0);
    ( 372340.0, 3767299.0,      53.0,      53.0,       2.0);        ( 372136.0, 3767311.0,      53.0,      53.0,       2.0);
```


*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)
(METERS)

```
    ( 372148.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372160.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372208.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372232.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372244.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372256.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372268.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372280.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372292.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372304.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372316.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372328.0, 3767311.0,      53.0,      53.0,       2.0);
    ( 372340.0, 3767311.0,      53.0,      53.0,       2.0);        ( 372137.9, 3767322.3,      53.0,      53.0,       2.0);
    ( 372148.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372160.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372208.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372232.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372244.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372256.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372268.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372280.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372292.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372304.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372316.0, 3767323.0,      53.0,      53.0,       2.0);        ( 372328.0, 3767323.0,      53.0,      53.0,       2.0);
    ( 372148.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372160.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372208.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372232.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372244.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372256.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372268.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372280.0, 3767335.0,      53.0,      53.0,       2.0);
    ( 372292.0, 3767335.0,      53.0,      53.0,       2.0);        ( 372304.0, 3767331.9,      53.0,      53.0,       2.0);
    ( 372148.0, 3767347.0,      53.0,      53.0,       2.0);        ( 372160.0, 3767347.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767347.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767347.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767347.0,      53.0,      53.0,       2.0);        ( 372208.0, 3767347.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767347.0,      53.0,      53.0,       2.0);        ( 372232.0, 3767347.0,      53.0,      53.0,       2.0);
    ( 372244.0, 3767347.0,      53.0,      53.0,       2.0);        ( 372256.0, 3767347.0,      53.0,      53.0,       2.0);
    ( 372268.4, 3767344.4,      53.0,      53.0,       2.0);        ( 372160.0, 3767359.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767359.0,      53.0,      53.0,       2.0);        ( 372184.0, 3767359.0,      53.0,      53.0,       2.0);
    ( 372196.0, 3767359.0,      53.0,      53.0,       2.0);        ( 372208.0, 3767359.0,      53.0,      53.0,       2.0);
    ( 372220.0, 3767359.0,      53.0,      53.0,       2.0);        ( 372232.1, 3767358.4,      53.0,      53.0,       2.0);
    ( 372160.0, 3767371.0,      53.0,      53.0,       2.0);        ( 372172.0, 3767371.0,      53.0,      53.0,       2.0);
    ( 372184.0, 3767371.0,      53.0,      53.0,       2.0);        ( 372196.0, 3767371.0,      53.0,      53.0,       2.0);
    ( 372172.0, 3767379.5,      53.0,      53.0,       2.0);
```


*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
       1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
```

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54,   3.09,   5.14,   8.23, 10.80,

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: C:\document\schools\shenandoah es\metdata\KSMO_v9.SFC   Met Version: 16216
Profile file: C:\document\schools\shenandoah es\metdata\KSMO_v9.PFL
Surface format: FREE
Profile format: FREE
Surface station no.:   93197   Upper air station no.:   3190
Name: SANTA MONICA MUNI AIRPORT, CA   Name: UNKNOWN
Year: 2012   Year: 2012

First 24 hours of scalar data

YR	MO	DY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALB	REF WS	WD	HT	REF TA	HT	IPCOD	PRATE	RH	SFCP	CCVR
12	01	01	01	-6.6	0.113	-9.000	-9.000	-999.	91.	19.8	0.17	2.20	1.00	1.26	131.	10.	283.1	2.	0	0.00	89.	1013.	0
12	01	01	02	-7.6	0.121	-9.000	-9.000	-999.	101.	21.3	0.17	2.20	1.00	1.35	232.	10.	282.0	2.	0	0.30	92.	1013.	10
12	01	01	03	-3.3	0.082	-9.000	-9.000	-999.	57.	15.3	0.17	2.20	1.00	0.86	46.	10.	280.9	2.	0	0.00	95.	1013.	10
12	01	01	04	-5.4	0.102	-9.000	-9.000	-999.	79.	17.9	0.17	2.20	1.00	1.14	82.	10.	281.4	2.	0	0.00	92.	1012.	0
12	01	01	05	-6.6	0.113	-9.000	-9.000	-999.	91.	19.8	0.17	2.20	1.00	1.26	205.	10.	281.4	2.	0	0.00	92.	1013.	0
12	01	01	06	-7.4	0.119	-9.000	-9.000	-999.	99.	20.9	0.17	2.20	1.00	1.33	254.	10.	280.9	2.	0	0.00	100.	1014.	10
12	01	01	07	-4.6	0.094	-9.000	-9.000	-999.	70.	16.6	0.17	2.20	1.00	1.04	39.	10.	279.2	2.	0	0.00	96.	1014.	10
12	01	01	08	-16.0	0.197	-9.000	-9.000	-999.	209.	43.0	0.17	2.20	0.54	2.10	63.	10.	282.0	2.	0	0.30	89.	1015.	0
12	01	01	09	36.8	0.255	0.339	0.005	38.	309.	-40.8	0.17	2.20	0.31	2.27	33.	10.	292.0	2.	0	0.00	39.	1016.	0
12	01	01	10	102.6	0.234	0.691	0.006	117.	271.	-11.3	0.17	2.20	0.23	1.79	204.	10.	289.2	2.	0	0.00	66.	1016.	0
12	01	01	11	154.6	0.178	1.118	0.005	327.	181.	-3.3	0.17	2.20	0.20	1.11	119.	10.	296.4	2.	0	0.00	30.	1016.	0
12	01	01	12	182.0	0.295	1.459	0.005	618.	385.	-12.8	0.17	2.20	0.19	2.30	76.	10.	300.9	2.	0	0.00	999.	1014.	0
12	01	01	13	175.0	0.355	1.686	0.005	991.	507.	-23.0	0.17	2.20	0.19	2.98	179.	10.	293.8	2.	0	0.00	52.	1014.	0
12	01	01	14	148.1	0.374	1.737	0.005	1282.	549.	-31.9	0.17	2.20	0.20	3.25	211.	10.	292.0	2.	0	0.00	58.	1013.	0
12	01	01	15	98.0	0.291	1.572	0.005	1436.	380.	-22.7	0.17	2.20	0.23	2.44	231.	10.	290.9	2.	0	0.00	64.	1013.	0
12	01	01	16	28.2	0.303	1.044	0.005	1460.	400.	-89.0	0.17	2.20	0.32	2.85	217.	10.	289.2	2.	0	0.00	71.	1014.	0
12	01	01	17	-22.4	0.259	-9.000	-9.000	-999.	317.	73.7	0.17	2.20	0.58	2.73	226.	10.	287.0	2.	0	0.00	86.	1014.	0
12	01	01	18	-8.7	0.131	-9.000	-9.000	-999.	124.	23.3	0.17	2.20	1.00	1.45	230.	10.	286.4	2.	0	0.00	89.	1014.	0
12	01	01	19	-13.2	0.163	-9.000	-9.000	-999.	157.	29.4	0.17	2.20	1.00	1.77	225.	10.	285.9	2.	0	0.00	92.	1014.	0
12	01	01	20	-5.7	0.106	-9.000	-9.000	-999.	83.	18.6	0.17	2.20	1.00	1.18	182.	10.	284.9	2.	0	0.00	92.	1015.	0
12	01	01	21	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.17	2.20	1.00	0.00	0.	10.	284.2	2.	0	0.00	96.	1015.	0
12	01	01	22	-7.3	0.119	-9.000	-9.000	-999.	99.	21.1	0.17	2.20	1.00	1.33	202.	10.	285.4	2.	0	0.00	92.	1016.	0
12	01	01	23	-6.0	0.108	-9.000	-9.000	-999.	86.	19.1	0.17	2.20	1.00	1.21	251.	10.	284.9	2.	0	0.00	92.	1016.	0
12	01	01	24	-5.4	0.102	-9.000	-9.000	-999.	78.	18.0	0.17	2.20	1.00	1.14	224.	10.	284.2	2.	0	0.00	100.	1016.	10

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
12	01	01	01	10.1	1	131.	1.26	283.2	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
372148.40	3767206.00	0.00000	(16102316)	372279.90	3767204.80	0.00000	(14120116)
372124.00	3767215.00	0.00000	(15122009)	372136.00	3767215.00	0.00000	(15122216)
372148.00	3767215.00	0.00000	(16102316)	372256.00	3767215.00	0.00001	(16102316)
372268.00	3767215.00	0.00001	(14120116)	372280.00	3767215.00	0.00001	(14120116)
372292.00	3767215.00	0.00001	(14120116)	372100.00	3767227.00	0.00000	(14123016)
372112.00	3767227.00	0.00000	(14123016)	372124.00	3767227.00	0.00000	(15122009)
372136.00	3767227.00	0.00000	(16102316)	372148.00	3767227.00	0.00000	(16102316)
372160.00	3767227.00	0.00000	(16102316)	372269.40	3767224.00	0.00001	(13121716)
372303.70	3767229.60	0.00001	(13121716)	372315.50	3767226.90	0.00001	(13121716)
372112.00	3767239.00	0.00000	(15052509)	372124.00	3767239.00	0.00000	(16102316)
372136.00	3767239.00	0.00000	(12122309)	372148.00	3767239.00	0.00001	(12122309)
372160.00	3767239.00	0.00001	(12122309)	372305.40	3767238.90	0.00001	(13121716)
372316.00	3767239.00	0.00001	(16031116)	372112.00	3767251.00	0.00000	(15052509)
372124.00	3767251.00	0.00001	(12122309)	372136.00	3767251.00	0.00001	(12122309)
372147.90	3767247.70	0.00001	(12122309)	372244.30	3767255.60	0.00001	(12120109)
372256.00	3767251.00	0.00001	(12011516)	372294.40	3767251.20	0.00001	(12011516)
372304.00	3767251.00	0.00001	(12011516)	372316.00	3767251.00	0.00001	(12110816)
372115.00	3767260.00	0.00001	(12120709)	372184.00	3767263.00	0.00001	(12112916)
372244.00	3767263.00	0.00001	(12011516)	372256.00	3767263.00	0.00001	(12011516)
372268.00	3767263.00	0.00001	(12120109)	372280.20	3767265.70	0.00001	(12120109)
372292.00	3767263.00	0.00001	(12011516)	372304.00	3767263.00	0.00001	(12011516)
372316.00	3767263.00	0.00001	(12011516)	372328.00	3767263.00	0.00000	(12110816)
372147.70	3767276.70	0.00001	(12120109)	372160.00	3767275.00	0.00001	(12112916)
372172.00	3767275.00	0.00001	(12112916)	372184.00	3767275.00	0.00001	(12112916)
372234.00	3767276.00	0.00001	(12011516)	372244.00	3767275.00	0.00001	(12011516)
372256.00	3767275.00	0.00001	(12011516)	372268.00	3767275.00	0.00000	(12011516)
372280.00	3767275.00	0.00001	(15122116)	372292.00	3767275.00	0.00001	(15122116)
372316.00	3767275.00	0.00001	(12011516)	372328.00	3767275.00	0.00000	(12011516)
372124.00	3767287.00	0.00001	(12112916)	372136.00	3767287.00	0.00001	(12112916)
372148.00	3767287.00	0.00001	(12112916)	372160.00	3767287.00	0.00001	(12112916)
372172.00	3767287.00	0.00001	(12112916)	372184.00	3767287.00	0.00001	(12112916)
372232.00	3767287.00	0.00001	(12011516)	372244.00	3767287.00	0.00001	(12011516)
372256.00	3767287.00	0.00001	(12011516)	372268.00	3767287.00	0.00000	(12011516)
372280.00	3767287.00	0.00000	(12011516)	372292.00	3767287.00	0.00000	(15122116)
372304.00	3767287.00	0.00001	(15122116)	372316.00	3767287.00	0.00000	(12011516)
372328.00	3767287.00	0.00000	(12011516)	372136.00	3767299.00	0.00000	(12112916)
372148.00	3767299.00	0.00000	(12112916)	372160.00	3767299.00	0.00001	(12112916)
372172.00	3767299.00	0.00001	(12112916)	372184.00	3767299.00	0.00001	(12112916)
372196.00	3767299.00	0.00001	(16121309)	372207.80	3767301.00	0.00001	(12120109)
372220.00	3767299.00	0.00001	(15122116)	372232.00	3767299.00	0.00001	(12011516)

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
372244.00	3767299.00	0.00001	(12011516)	372256.00	3767299.00	0.00001	(12011516)
372268.00	3767299.00	0.00000	(12011516)	372280.00	3767299.00	0.00000	(12011516)
372292.00	3767299.00	0.00000	(15122116)	372304.00	3767299.00	0.00000	(15122116)
372316.00	3767299.00	0.00000	(12011516)	372328.00	3767299.00	0.00000	(12011516)

372340.00	3767299.00	0.00000	(12011516)	372136.00	3767311.00	0.00000	(12112916)
372148.00	3767311.00	0.00000	(12112916)	372160.00	3767311.00	0.00000	(12112916)
372172.00	3767311.00	0.00000	(12112916)	372184.00	3767311.00	0.00000	(16010914)
372196.00	3767311.00	0.00001	(14032409)	372208.00	3767311.00	0.00001	(15122116)
372220.00	3767311.00	0.00001	(15122116)	372232.00	3767311.00	0.00001	(15122116)
372244.00	3767311.00	0.00000	(15122116)	372256.00	3767311.00	0.00000	(12011516)
372268.00	3767311.00	0.00000	(12011516)	372280.00	3767311.00	0.00000	(12011516)
372292.00	3767311.00	0.00000	(12011516)	372304.00	3767311.00	0.00000	(15122116)
372316.00	3767311.00	0.00000	(12011516)	372328.00	3767311.00	0.00000	(12011516)
372340.00	3767311.00	0.00000	(12011516)	372137.90	3767322.30	0.00000	(12112916)
372148.00	3767323.00	0.00000	(12112916)	372160.00	3767323.00	0.00000	(12112916)
372172.00	3767323.00	0.00000	(16010914)	372184.00	3767323.00	0.00000	(16010914)
372196.00	3767323.00	0.00000	(15120616)	372208.00	3767323.00	0.00000	(15122116)
372220.00	3767323.00	0.00001	(15122116)	372232.00	3767323.00	0.00000	(15122116)
372244.00	3767323.00	0.00000	(15122116)	372256.00	3767323.00	0.00000	(15122116)
372268.00	3767323.00	0.00000	(16010916)	372280.00	3767323.00	0.00000	(16010916)
372292.00	3767323.00	0.00000	(16010916)	372304.00	3767323.00	0.00000	(16010916)
372316.00	3767323.00	0.00000	(16010916)	372328.00	3767323.00	0.00000	(12011516)
372148.00	3767335.00	0.00000	(16010914)	372160.00	3767335.00	0.00000	(16010914)
372172.00	3767335.00	0.00000	(16010914)	372184.00	3767335.00	0.00000	(16010914)
372196.00	3767335.00	0.00000	(15120616)	372208.00	3767335.00	0.00000	(15120616)
372220.00	3767335.00	0.00000	(15122116)	372232.00	3767335.00	0.00000	(15122116)
372244.00	3767335.00	0.00000	(15122116)	372256.00	3767335.00	0.00000	(15122116)
372268.00	3767335.00	0.00000	(15122116)	372280.00	3767335.00	0.00000	(16010916)
372292.00	3767335.00	0.00000	(16010916)	372304.00	3767331.90	0.00000	(16010916)
372148.00	3767347.00	0.00000	(16010914)	372160.00	3767347.00	0.00000	(16010914)
372172.00	3767347.00	0.00000	(16010914)	372184.00	3767347.00	0.00000	(15120616)
372196.00	3767347.00	0.00000	(15120616)	372208.00	3767347.00	0.00000	(15120616)
372220.00	3767347.00	0.00000	(15122116)	372232.00	3767347.00	0.00000	(15122116)
372244.00	3767347.00	0.00000	(15122116)	372256.00	3767347.00	0.00000	(15122116)
372268.40	3767344.40	0.00000	(15122116)	372160.00	3767359.00	0.00000	(16010914)
372172.00	3767359.00	0.00000	(16051010)	372184.00	3767359.00	0.00000	(15120616)
372196.00	3767359.00	0.00000	(15120616)	372208.00	3767359.00	0.00000	(15120616)
372220.00	3767359.00	0.00000	(15122116)	372232.10	3767358.40	0.00000	(15122116)
372160.00	3767371.00	0.00000	(16051010)	372172.00	3767371.00	0.00000	(15120616)
372184.00	3767371.00	0.00000	(15120616)	372196.00	3767371.00	0.00000	(15120616)

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
372172.00	3767379.50	0.00000	(15120616)				

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)

372148.40	3767206.00	0.00000	(14123016)	372279.90	3767204.80	0.00000	(16112416)
372124.00	3767215.00	0.00000	(14123016)	372136.00	3767215.00	0.00000	(14123016)
372148.00	3767215.00	0.00000	(14123016)	372256.00	3767215.00	0.00000	(14121616)
372268.00	3767215.00	0.00000	(13012516)	372280.00	3767215.00	0.00000	(13012516)
372292.00	3767215.00	0.00000	(15122516)	372100.00	3767227.00	0.00000	(14123016)
372112.00	3767227.00	0.00000	(14123016)	372124.00	3767227.00	0.00000	(14123016)
372136.00	3767227.00	0.00000	(14123016)	372148.00	3767227.00	0.00000	(14123016)
372160.00	3767227.00	0.00000	(14123016)	372269.40	3767224.00	0.00000	(15011016)
372303.70	3767229.60	0.00000	(16122416)	372315.50	3767226.90	0.00000	(16122416)
372112.00	3767239.00	0.00000	(14123016)	372124.00	3767239.00	0.00000	(14123016)
372136.00	3767239.00	0.00000	(14123016)	372148.00	3767239.00	0.00000	(14123016)
372160.00	3767239.00	0.00000	(14123016)	372305.40	3767238.90	0.00000	(16122416)
372316.00	3767239.00	0.00000	(16122416)	372112.00	3767251.00	0.00000	(14123016)
372124.00	3767251.00	0.00000	(14123016)	372136.00	3767251.00	0.00000	(14123016)
372147.90	3767247.70	0.00000	(14123016)	372244.30	3767255.60	0.00001	(12121716)
372256.00	3767251.00	0.00001	(12121716)	372294.40	3767251.20	0.00001	(12121716)
372304.00	3767251.00	0.00000	(12110816)	372316.00	3767251.00	0.00000	(12110816)
372115.00	3767260.00	0.00000	(14120316)	372184.00	3767263.00	0.00001	(12112916)
372244.00	3767263.00	0.00000	(12121716)	372256.00	3767263.00	0.00000	(12120216)
372268.00	3767263.00	0.00000	(12120216)	372280.20	3767265.70	0.00000	(12120116)
372292.00	3767263.00	0.00001	(12110816)	372304.00	3767263.00	0.00000	(12110816)
372316.00	3767263.00	0.00000	(12110816)	372328.00	3767263.00	0.00000	(12110816)
372147.70	3767276.70	0.00000	(13020516)	372160.00	3767275.00	0.00000	(12112916)
372172.00	3767275.00	0.00000	(12112916)	372184.00	3767275.00	0.00001	(12112916)
372234.00	3767276.00	0.00001	(12121716)	372244.00	3767275.00	0.00000	(12110816)
372256.00	3767275.00	0.00000	(12110816)	372268.00	3767275.00	0.00000	(12120216)
372280.00	3767275.00	0.00000	(12120216)	372292.00	3767275.00	0.00000	(12120216)
372316.00	3767275.00	0.00000	(12110816)	372328.00	3767275.00	0.00000	(12110816)
372124.00	3767287.00	0.00000	(12112916)	372136.00	3767287.00	0.00000	(16112016)
372148.00	3767287.00	0.00000	(12120116)	372160.00	3767287.00	0.00000	(12112916)
372172.00	3767287.00	0.00000	(12112916)	372184.00	3767287.00	0.00001	(12112916)
372232.00	3767287.00	0.00001	(12120216)	372244.00	3767287.00	0.00000	(12110816)
372256.00	3767287.00	0.00000	(12110816)	372268.00	3767287.00	0.00000	(12110816)
372280.00	3767287.00	0.00000	(12120216)	372292.00	3767287.00	0.00000	(12120216)
372304.00	3767287.00	0.00000	(12120216)	372316.00	3767287.00	0.00000	(12110816)
372328.00	3767287.00	0.00000	(12110816)	372136.00	3767299.00	0.00000	(12112916)
372148.00	3767299.00	0.00000	(12112916)	372160.00	3767299.00	0.00000	(12112916)
372172.00	3767299.00	0.00000	(12112916)	372184.00	3767299.00	0.00000	(12112916)
372196.00	3767299.00	0.00000	(14030216)	372207.80	3767301.00	0.00001	(12120116)
372220.00	3767299.00	0.00001	(12120116)	372232.00	3767299.00	0.00000	(12120116)

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
372244.00	3767299.00	0.00000	(12110816)	372256.00	3767299.00	0.00000	(12110816)
372268.00	3767299.00	0.00000	(12110816)	372280.00	3767299.00	0.00000	(12110816)
372292.00	3767299.00	0.00000	(12120216)	372304.00	3767299.00	0.00000	(12120216)
372316.00	3767299.00	0.00000	(12110816)	372328.00	3767299.00	0.00000	(12110816)
372340.00	3767299.00	0.00000	(12110816)	372136.00	3767311.00	0.00000	(12112916)
372148.00	3767311.00	0.00000	(12112916)	372160.00	3767311.00	0.00000	(12112916)
372172.00	3767311.00	0.00000	(12112916)	372184.00	3767311.00	0.00000	(16040916)
372196.00	3767311.00	0.00000	(14113016)	372208.00	3767311.00	0.00000	(12120116)
372220.00	3767311.00	0.00000	(12120116)	372232.00	3767311.00	0.00000	(12120116)
372244.00	3767311.00	0.00000	(12120116)	372256.00	3767311.00	0.00000	(12110816)
372268.00	3767311.00	0.00000	(12110816)	372280.00	3767311.00	0.00000	(12110816)
372292.00	3767311.00	0.00000	(12110816)	372304.00	3767311.00	0.00000	(12110816)

372316.00	3767311.00	0.00000	(12110816)	372328.00	3767311.00	0.00000	(12110816)
372340.00	3767311.00	0.00000	(12110816)	372137.90	3767322.30	0.00000	(12112916)
372148.00	3767323.00	0.00000	(12112916)	372160.00	3767323.00	0.00000	(16040916)
372172.00	3767323.00	0.00000	(16040916)	372184.00	3767323.00	0.00000	(14113016)
372196.00	3767323.00	0.00000	(14113016)	372208.00	3767323.00	0.00000	(14113016)
372220.00	3767323.00	0.00000	(12120116)	372232.00	3767323.00	0.00000	(12120116)
372244.00	3767323.00	0.00000	(12120116)	372256.00	3767323.00	0.00000	(12120116)
372268.00	3767323.00	0.00000	(12120116)	372280.00	3767323.00	0.00000	(12110816)
372292.00	3767323.00	0.00000	(12110816)	372304.00	3767323.00	0.00000	(12110816)
372316.00	3767323.00	0.00000	(12110816)	372328.00	3767323.00	0.00000	(12110816)
372148.00	3767335.00	0.00000	(16040916)	372160.00	3767335.00	0.00000	(16040916)
372172.00	3767335.00	0.00000	(16040916)	372184.00	3767335.00	0.00000	(14113016)
372196.00	3767335.00	0.00000	(14113016)	372208.00	3767335.00	0.00000	(14113016)
372220.00	3767335.00	0.00000	(12120116)	372232.00	3767335.00	0.00000	(12120116)
372244.00	3767335.00	0.00000	(12120116)	372256.00	3767335.00	0.00000	(12120116)
372268.00	3767335.00	0.00000	(12120116)	372280.00	3767335.00	0.00000	(12120116)
372292.00	3767335.00	0.00000	(12110816)	372304.00	3767331.90	0.00000	(12110816)
372148.00	3767347.00	0.00000	(16040916)	372160.00	3767347.00	0.00000	(16040916)
372172.00	3767347.00	0.00000	(14113016)	372184.00	3767347.00	0.00000	(14113016)
372196.00	3767347.00	0.00000	(14113016)	372208.00	3767347.00	0.00000	(14113016)
372220.00	3767347.00	0.00000	(12120116)	372232.00	3767347.00	0.00000	(12120116)
372244.00	3767347.00	0.00000	(12120116)	372256.00	3767347.00	0.00000	(12120116)
372268.40	3767344.40	0.00000	(12120116)	372160.00	3767359.00	0.00000	(14113016)
372172.00	3767359.00	0.00000	(14113016)	372184.00	3767359.00	0.00000	(14113016)
372196.00	3767359.00	0.00000	(14113016)	372208.00	3767359.00	0.00000	(14113016)
372220.00	3767359.00	0.00000	(12120116)	372232.10	3767358.40	0.00000	(12120116)
372160.00	3767371.00	0.00000	(14113016)	372172.00	3767371.00	0.00000	(14113016)
372184.00	3767371.00	0.00000	(14113016)	372196.00	3767371.00	0.00000	(14113016)

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): A1 , A2 , A3 , A4 , A5 ,
A6 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
372172.00	3767379.50	0.00000	(14113016)				

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

NETWORK GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	0.00001	ON 13121716: AT (372305.40, 3767238.90, 53.00, 53.00, 2.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER   IN MICROGRAMS/M**3   **

NETWORK GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	0.00001	ON 12112916: AT (372184.00, 3767263.00, 53.00, 53.00, 2.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
                     GP = GRIDPOLR
                     DC = DISCCART
                     DP = DISCPOLR

*** AERMOD - VERSION 19191 ***   *** Shenandoah Street ES   ***   10/15/20
*** AERMET - VERSION 16216 ***   *** Arsenic   ***   12:05:39

*** MODELOPTs: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)
A Total of   2 Warning Message(s)
A Total of   799 Informational Message(s)

A Total of   43848 Hours Were Processed

A Total of   455 Calm Hours Identified

A Total of   344 Missing Hours Identified (0.78 Percent)

   ******** FATAL ERROR MESSAGES ********
              *** NONE ***

   ********   WARNING MESSAGES   ********
ME W186   259   MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used   0.50
ME W187   259   MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET

   ****
   *** AERMOD Finishes Successfully ***
   ****

* AERMOD (19191): Shenandoah Street ES 10/15/20
* AERMET (16216): Arsenic 08:46:14
* MODELING OPTIONS USED: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*
* PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL
* FOR A TOTAL OF 161 RECEPTORS.
* FORMAT: (2(1X,F13.5),1X,E13.6,3(1X,F8.2),3X,A5,2X,A8,2X,A5,5X,A8,2X,I8)

X	Y	AVERAGE CONC	ZELEV	ZHILL	ZFLAG	AVE	GRP	RANK	NET ID	DATE(CONC)
372148.40000	3767206.00000	0.267365E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372279.90000	3767204.80000	0.469713E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14120116
372124.00000	3767215.00000	0.209706E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122009
372136.00000	3767215.00000	0.241458E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122216
372148.00000	3767215.00000	0.298767E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372256.00000	3767215.00000	0.780460E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372268.00000	3767215.00000	0.776474E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14120116
372280.00000	3767215.00000	0.684191E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14120116
372292.00000	3767215.00000	0.758683E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14120116
372100.00000	3767227.00000	0.197988E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14123016
372112.00000	3767227.00000	0.223767E-05	53.00	53.00	2.00	1-HR	ALL	1ST		14123016
372124.00000	3767227.00000	0.257534E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122009
372136.00000	3767227.00000	0.303359E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372148.00000	3767227.00000	0.373253E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372160.00000	3767227.00000	0.479346E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372269.40000	3767224.00000	0.109449E-04	53.00	53.00	2.00	1-HR	ALL	1ST		13121716
372303.70000	3767229.60000	0.111194E-04	53.00	53.00	2.00	1-HR	ALL	1ST		13121716
372315.50000	3767226.90000	0.523904E-05	53.00	53.00	2.00	1-HR	ALL	1ST		13121716
372112.00000	3767239.00000	0.275417E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15052509
372124.00000	3767239.00000	0.340688E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16102316
372136.00000	3767239.00000	0.427120E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372148.00000	3767239.00000	0.552523E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372160.00000	3767239.00000	0.727781E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372305.40000	3767238.90000	0.115428E-04	53.00	53.00	2.00	1-HR	ALL	1ST		13121716
372316.00000	3767239.00000	0.606710E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16031116
372112.00000	3767251.00000	0.387519E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15052509
372124.00000	3767251.00000	0.537415E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372136.00000	3767251.00000	0.757583E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372147.90000	3767247.70000	0.830197E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12122309
372244.30000	3767255.60000	0.979203E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12120109
372256.00000	3767251.00000	0.957759E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372294.40000	3767251.20000	0.104120E-04	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372304.00000	3767251.00000	0.940264E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372316.00000	3767251.00000	0.631468E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12110816
372115.00000	3767260.00000	0.612379E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12120709
372184.00000	3767263.00000	0.107723E-04	53.00	53.00	2.00	1-HR	ALL	1ST		12112916
372244.00000	3767263.00000	0.859673E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372256.00000	3767263.00000	0.682790E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372268.00000	3767263.00000	0.671632E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12120109
372280.20000	3767265.70000	0.915233E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12120109
372292.00000	3767263.00000	0.986019E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372304.00000	3767263.00000	0.752399E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372316.00000	3767263.00000	0.560165E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372328.00000	3767263.00000	0.408026E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12110816
372147.70000	3767276.70000	0.807919E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12120109
372160.00000	3767275.00000	0.722968E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12112916
372172.00000	3767275.00000	0.788273E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12112916
372184.00000	3767275.00000	0.103604E-04	53.00	53.00	2.00	1-HR	ALL	1ST		12112916
372234.00000	3767276.00000	0.111702E-04	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372244.00000	3767275.00000	0.956793E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372256.00000	3767275.00000	0.630400E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516

372268.00000	3767275.00000	0.485899E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372280.00000	3767275.00000	0.583170E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372292.00000	3767275.00000	0.596307E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372316.00000	3767275.00000	0.508713E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372328.00000	3767275.00000	0.391703E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372124.00000	3767287.00000	0.675300E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372136.00000	3767287.00000	0.563162E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372148.00000	3767287.00000	0.543154E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372160.00000	3767287.00000	0.610816E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372172.00000	3767287.00000	0.793856E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372184.00000	3767287.00000	0.107928E-04	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372232.00000	3767287.00000	0.106093E-04	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372244.00000	3767287.00000	0.823578E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372256.00000	3767287.00000	0.598309E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372268.00000	3767287.00000	0.457065E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372280.00000	3767287.00000	0.377663E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372292.00000	3767287.00000	0.418656E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372304.00000	3767287.00000	0.535657E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372316.00000	3767287.00000	0.475986E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372328.00000	3767287.00000	0.369986E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372136.00000	3767299.00000	0.432214E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372148.00000	3767299.00000	0.473954E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372160.00000	3767299.00000	0.558938E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372172.00000	3767299.00000	0.688180E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372184.00000	3767299.00000	0.829348E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372196.00000	3767299.00000	0.926420E-05	53.00	53.00	2.00	1-HR	ALL	1ST	16121309
372207.80000	3767301.00000	0.103118E-04	53.00	53.00	2.00	1-HR	ALL	1ST	12120109
372220.00000	3767299.00000	0.959009E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372232.00000	3767299.00000	0.788075E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372244.00000	3767299.00000	0.633657E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372256.00000	3767299.00000	0.513150E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372268.00000	3767299.00000	0.416707E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372280.00000	3767299.00000	0.346471E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372292.00000	3767299.00000	0.308122E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372304.00000	3767299.00000	0.344637E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372316.00000	3767299.00000	0.311476E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372328.00000	3767299.00000	0.299173E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372340.00000	3767299.00000	0.267591E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372136.00000	3767311.00000	0.367833E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372148.00000	3767311.00000	0.399602E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372160.00000	3767311.00000	0.436717E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372172.00000	3767311.00000	0.459384E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372184.00000	3767311.00000	0.484895E-05	53.00	53.00	2.00	1-HR	ALL	1ST	16010914
372196.00000	3767311.00000	0.517304E-05	53.00	53.00	2.00	1-HR	ALL	1ST	14032409
372208.00000	3767311.00000	0.649119E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372220.00000	3767311.00000	0.722505E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372232.00000	3767311.00000	0.619345E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372244.00000	3767311.00000	0.451203E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372256.00000	3767311.00000	0.392639E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372268.00000	3767311.00000	0.350167E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372280.00000	3767311.00000	0.307761E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372292.00000	3767311.00000	0.272191E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372304.00000	3767311.00000	0.255908E-05	53.00	53.00	2.00	1-HR	ALL	1ST	15122116
372316.00000	3767311.00000	0.237423E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372328.00000	3767311.00000	0.235736E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372340.00000	3767311.00000	0.226056E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12011516
372137.90000	3767322.30000	0.299662E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372148.00000	3767323.00000	0.295888E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916
372160.00000	3767323.00000	0.284255E-05	53.00	53.00	2.00	1-HR	ALL	1ST	12112916

372172.00000	3767323.00000	0.310690E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372184.00000	3767323.00000	0.323104E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372196.00000	3767323.00000	0.348480E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372208.00000	3767323.00000	0.384222E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372220.00000	3767323.00000	0.500167E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372232.00000	3767323.00000	0.487361E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372244.00000	3767323.00000	0.399297E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372256.00000	3767323.00000	0.304899E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372268.00000	3767323.00000	0.270278E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372280.00000	3767323.00000	0.258372E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372292.00000	3767323.00000	0.240035E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372304.00000	3767323.00000	0.221693E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372316.00000	3767323.00000	0.205639E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372328.00000	3767323.00000	0.196845E-05	53.00	53.00	2.00	1-HR	ALL	1ST		12011516
372148.00000	3767335.00000	0.205264E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372160.00000	3767335.00000	0.227038E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372172.00000	3767335.00000	0.234035E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372184.00000	3767335.00000	0.213963E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372196.00000	3767335.00000	0.260489E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372208.00000	3767335.00000	0.271011E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372220.00000	3767335.00000	0.351921E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372232.00000	3767335.00000	0.379631E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372244.00000	3767335.00000	0.344350E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372256.00000	3767335.00000	0.283690E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372268.00000	3767335.00000	0.230107E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372280.00000	3767335.00000	0.199963E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372292.00000	3767335.00000	0.200004E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372304.00000	3767331.90000	0.201489E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010916
372148.00000	3767347.00000	0.176657E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372160.00000	3767347.00000	0.181125E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372172.00000	3767347.00000	0.170277E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372184.00000	3767347.00000	0.177658E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372196.00000	3767347.00000	0.207709E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372208.00000	3767347.00000	0.211432E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372220.00000	3767347.00000	0.258906E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372232.00000	3767347.00000	0.296601E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372244.00000	3767347.00000	0.291539E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372256.00000	3767347.00000	0.257992E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372268.40000	3767344.40000	0.220112E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372160.00000	3767359.00000	0.140093E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16010914
372172.00000	3767359.00000	0.130766E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16051010
372184.00000	3767359.00000	0.152041E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372196.00000	3767359.00000	0.171292E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372208.00000	3767359.00000	0.171847E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372220.00000	3767359.00000	0.199018E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372232.10000	3767358.40000	0.237937E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15122116
372160.00000	3767371.00000	0.107501E-05	53.00	53.00	2.00	1-HR	ALL	1ST		16051010
372172.00000	3767371.00000	0.112086E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372184.00000	3767371.00000	0.131826E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372196.00000	3767371.00000	0.144289E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616
372172.00000	3767379.50000	0.104115E-05	53.00	53.00	2.00	1-HR	ALL	1ST		15120616

* MODELING OPTIONS USED: NonDFAULT CONC FLAT FLGPOL DRYDPLT URBAN ADJ_U*
* PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: ALL
* FOR A TOTAL OF 161 RECEPTORS.
* FORMAT: (2(1X,F13.5),1X,E13.6,3(1X,F8.2),3X,A5,2X,A8,2X,A5,5X,A8,2X,I8)
* X Y AVERAGE CONC ZELEV ZHILL ZFLAG AVE GRP RANK NET ID DATE(CONC)

372148.40000	3767206.00000	0.168385E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372279.90000	3767204.80000	0.188059E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16112416
372124.00000	3767215.00000	0.151207E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372136.00000	3767215.00000	0.171188E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372148.00000	3767215.00000	0.195173E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372256.00000	3767215.00000	0.358627E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14121616
372268.00000	3767215.00000	0.288043E-05	53.00	53.00	2.00	8-HR	ALL	1ST		13012516
372280.00000	3767215.00000	0.294075E-05	53.00	53.00	2.00	8-HR	ALL	1ST		13012516
372292.00000	3767215.00000	0.284514E-05	53.00	53.00	2.00	8-HR	ALL	1ST		15122516
372100.00000	3767227.00000	0.134633E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372112.00000	3767227.00000	0.158778E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372124.00000	3767227.00000	0.184122E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372136.00000	3767227.00000	0.214050E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372148.00000	3767227.00000	0.250566E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372160.00000	3767227.00000	0.294279E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372269.40000	3767224.00000	0.417146E-05	53.00	53.00	2.00	8-HR	ALL	1ST		15011016
372303.70000	3767229.60000	0.386716E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16122416
372315.50000	3767226.90000	0.228899E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16122416
372112.00000	3767239.00000	0.195794E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372124.00000	3767239.00000	0.235097E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372136.00000	3767239.00000	0.283969E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372148.00000	3767239.00000	0.348292E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372160.00000	3767239.00000	0.431370E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372305.40000	3767238.90000	0.445524E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16122416
372316.00000	3767239.00000	0.296219E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16122416
372112.00000	3767251.00000	0.264634E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372124.00000	3767251.00000	0.332000E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372136.00000	3767251.00000	0.404115E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372147.90000	3767247.70000	0.446167E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14123016
372244.30000	3767255.60000	0.550085E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12121716
372256.00000	3767251.00000	0.518661E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12121716
372294.40000	3767251.20000	0.541378E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12121716
372304.00000	3767251.00000	0.460107E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372316.00000	3767251.00000	0.267221E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372115.00000	3767260.00000	0.399486E-05	53.00	53.00	2.00	8-HR	ALL	1ST		14120316
372184.00000	3767263.00000	0.666631E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12112916
372244.00000	3767263.00000	0.457816E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12121716
372256.00000	3767263.00000	0.363825E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120216
372268.00000	3767263.00000	0.374388E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120216
372280.20000	3767265.70000	0.492090E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120116
372292.00000	3767263.00000	0.507640E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372304.00000	3767263.00000	0.363653E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372316.00000	3767263.00000	0.250285E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372328.00000	3767263.00000	0.164817E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372147.70000	3767276.70000	0.376463E-05	53.00	53.00	2.00	8-HR	ALL	1ST		13020516
372160.00000	3767275.00000	0.365882E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12112916
372172.00000	3767275.00000	0.431853E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12112916
372184.00000	3767275.00000	0.623452E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12112916
372234.00000	3767276.00000	0.602529E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12121716
372244.00000	3767275.00000	0.463789E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372256.00000	3767275.00000	0.306348E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372268.00000	3767275.00000	0.262585E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120216
372280.00000	3767275.00000	0.292669E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120216
372292.00000	3767275.00000	0.300378E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12120216
372316.00000	3767275.00000	0.229792E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372328.00000	3767275.00000	0.166428E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12110816
372124.00000	3767287.00000	0.287647E-05	53.00	53.00	2.00	8-HR	ALL	1ST		12112916
372136.00000	3767287.00000	0.259030E-05	53.00	53.00	2.00	8-HR	ALL	1ST		16112016

372148.00000	3767287.00000	0.243379E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372160.00000	3767287.00000	0.280308E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372172.00000	3767287.00000	0.378547E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372184.00000	3767287.00000	0.571684E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372232.00000	3767287.00000	0.556229E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372244.00000	3767287.00000	0.402506E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372256.00000	3767287.00000	0.284875E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372268.00000	3767287.00000	0.221068E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372280.00000	3767287.00000	0.202980E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372292.00000	3767287.00000	0.207032E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372304.00000	3767287.00000	0.256485E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372316.00000	3767287.00000	0.226462E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372328.00000	3767287.00000	0.161957E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372136.00000	3767299.00000	0.171195E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372148.00000	3767299.00000	0.188198E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372160.00000	3767299.00000	0.223156E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372172.00000	3767299.00000	0.281276E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372184.00000	3767299.00000	0.359942E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372196.00000	3767299.00000	0.439892E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14030216
372207.80000	3767301.00000	0.503360E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372220.00000	3767299.00000	0.543800E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.00000	3767299.00000	0.421602E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372244.00000	3767299.00000	0.316136E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372256.00000	3767299.00000	0.245075E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372268.00000	3767299.00000	0.197087E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372280.00000	3767299.00000	0.169034E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372292.00000	3767299.00000	0.157246E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372304.00000	3767299.00000	0.159113E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120216
372316.00000	3767299.00000	0.158054E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372328.00000	3767299.00000	0.138690E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372340.00000	3767299.00000	0.114799E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372136.00000	3767311.00000	0.132267E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372148.00000	3767311.00000	0.144298E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372160.00000	3767311.00000	0.159746E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372172.00000	3767311.00000	0.173184E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372184.00000	3767311.00000	0.190259E-05	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372196.00000	3767311.00000	0.230545E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372208.00000	3767311.00000	0.260525E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372220.00000	3767311.00000	0.311887E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.00000	3767311.00000	0.291888E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372244.00000	3767311.00000	0.240471E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372256.00000	3767311.00000	0.193817E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372268.00000	3767311.00000	0.166475E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372280.00000	3767311.00000	0.146012E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372292.00000	3767311.00000	0.132613E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372304.00000	3767311.00000	0.125772E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372316.00000	3767311.00000	0.121306E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372328.00000	3767311.00000	0.113245E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372340.00000	3767311.00000	0.100937E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372137.90000	3767322.30000	0.102750E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372148.00000	3767323.00000	0.103191E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12112916
372160.00000	3767323.00000	0.102899E-05	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372172.00000	3767323.00000	0.113387E-05	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372184.00000	3767323.00000	0.123325E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372196.00000	3767323.00000	0.154605E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372208.00000	3767323.00000	0.146210E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372220.00000	3767323.00000	0.179877E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.00000	3767323.00000	0.195005E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372244.00000	3767323.00000	0.184244E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116

372256.00000	3767323.00000	0.160827E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372268.00000	3767323.00000	0.136136E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372280.00000	3767323.00000	0.121744E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372292.00000	3767323.00000	0.112797E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372304.00000	3767323.00000	0.106422E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372316.00000	3767323.00000	0.101045E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372328.00000	3767323.00000	0.952165E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372148.00000	3767335.00000	0.751178E-06	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372160.00000	3767335.00000	0.796102E-06	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372172.00000	3767335.00000	0.814338E-06	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372184.00000	3767335.00000	0.984329E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372196.00000	3767335.00000	0.111078E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372208.00000	3767335.00000	0.103195E-05	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372220.00000	3767335.00000	0.115306E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.00000	3767335.00000	0.133076E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372244.00000	3767335.00000	0.137981E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372256.00000	3767335.00000	0.131509E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372268.00000	3767335.00000	0.118579E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372280.00000	3767335.00000	0.104450E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372292.00000	3767335.00000	0.935228E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372304.00000	3767331.90000	0.938661E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12110816
372148.00000	3767347.00000	0.605446E-06	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372160.00000	3767347.00000	0.611440E-06	53.00	53.00	2.00	8-HR	ALL	1ST	16040916
372172.00000	3767347.00000	0.681091E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372184.00000	3767347.00000	0.794882E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372196.00000	3767347.00000	0.843662E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372208.00000	3767347.00000	0.778532E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372220.00000	3767347.00000	0.803521E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.00000	3767347.00000	0.945601E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372244.00000	3767347.00000	0.103776E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372256.00000	3767347.00000	0.105593E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372268.40000	3767344.40000	0.104472E-05	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372160.00000	3767359.00000	0.509417E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372172.00000	3767359.00000	0.585333E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372184.00000	3767359.00000	0.651417E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372196.00000	3767359.00000	0.667740E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372208.00000	3767359.00000	0.616333E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372220.00000	3767359.00000	0.590332E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372232.10000	3767358.40000	0.708566E-06	53.00	53.00	2.00	8-HR	ALL	1ST	12120116
372160.00000	3767371.00000	0.451178E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372172.00000	3767371.00000	0.505456E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372184.00000	3767371.00000	0.544233E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372196.00000	3767371.00000	0.547364E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016
372172.00000	3767379.50000	0.458392E-06	53.00	53.00	2.00	8-HR	ALL	1ST	14113016

Attachment E

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