

Work Plan for Step-out Surface Dust Sampling and Analysis

Prepared for:
Exide Technologies, Inc.
Vernon, California

Prepared by:
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Los Angeles and Irvine, California

Submitted to:
Department of Toxic Substances Control
Sacramento, California

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07-32583A

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Acronyms and Abbreviations

DTSC	Department of Toxic Substances Control
ENVIRON	ENVIRON International Corporation
EPA	United States Environmental Protection Agency
Exide	Exide Technologies, Inc.
g	grams
HERO	DTSC's Office of Human Health and Ecological Risk
HHERA	Human Health and Ecological Risk Assessment
µm	micron
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
PAHs	Polyaromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RSLs	Regional Screening Levels
sq. ft.	square feet
TestAmerica	TestAmerica Laboratories, Inc.

1 Introduction

ENVIRON International Corporation (ENVIRON) prepared this work plan to establish the procedures and methodologies that ENVIRON will follow for collecting and analyzing the surface dust samples collected from the vicinity of the Exide Technologies, Inc. (Exide) facility located at 2700 South Indiana Street, Vernon, California (the facility or the Site). The objective of this surface dust sampling and analysis is to delineate the lateral extent of aerially deposited hazardous constituents in off-site surface dust that could be potentially attributed to Exide's air emissions.

2 Sampling Locations and Method

2.1 Sampling Locations

Figure 1 depicts the sampling domain (rail yard located north of the facility is excluded) as well as increasingly expanding concentric circles outward from the facility starting at 500 feet with a 1500-foot interval. At least 15 samples will be collected from the surfaces defined below within each circle. If a particular street has sidewalks on both sides, samples will be collected from both sides of the street.

As requested by the Department of Toxic Substances Control (DTSC), sampling locations include the following types of surfaces:

- Open drainage channel;
- The exposed hardscape of the Los Angeles River channel (Note: ENVIRON may elect to use the results of the sediment samples collected from the LA River as part of Exide's Phase 5 RCRA Facility Investigation. These samples, collected on October 25 and 26, 2011, are included in the current draft Human Health and Ecological Risk Assessment (HHERA) prepared for the Site);
- Sidewalks;
- Roofs and ground levels from neighboring facilities; and
- Storm water curb boxes.

Neighboring facilities, Rehrig Pacific, Baker Commodities, Former Honeywell Property (now owned by Baker), and Command Packaging, have been included. ENVIRON assumes that Exide will request access from these facilities.

ENVIRON will conduct a site reconnaissance prior to collecting samples for the purposes of finalizing the surface dust sampling locations and identifying any exposed soils in the surrounding industrial areas (for example, tree wells, unpaved areas where a sidewalk meets a facility fence line, etc.).

For sidewalk dust sampling, samples will be collected from the inner two concentric circles shown on Figure 1 first. The results will be screened using either the United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) or alternative soil screening values as documented in DTSC's Office of Human Health and Ecological Risk (HERO) Human Health Risk Assessment (HHRA) Note #3, issued May 21, 2013 for the applicable land use designation. The soil screening levels are summarized in Table 1. If the results are higher than the screening criteria, ENVIRON will return and sample from the next two concentric circles and only for those chemicals that exceed the screening criteria.

2.2 Sampling Method

ENVIRON will delineate a suitable, approximate 500 square feet (sq. ft.) dry area at each proposed sample location using a clean tape measure except for the storm water curb boxes where grab samples of sediment/dust will be collected). For example, the 500 sq. ft. sampling area could have an outline of 20 by 25 feet, or 10 by 50 feet, depending on local conditions.

Actual sampling areas will be logged in the Sampling Log (see Appendix A). The sample locations are expected to include horizontal or inclined surfaces in the vicinity of the Site, such as sidewalks, rooftops, and concrete hardscape within the drainage channel.

Once each sampling area has been identified and secured using traffic cones and/or barrier tape (if necessary), the field technician will prepare the sampling equipment for sample collection. ENVIRON will use the following sampling equipment:

- a bag-style vacuum cleaner (e.g. Mighty Mite™ with a screened, 1-foot wide vacuum opening);
- an electrical generator to power the vacuum cleaner;
- dedicated, vacuum filter bags;
- a portable field scale;
- a five gallon bucket;
- a stainless steel funnel; and
- 4-ounce glass jars with Teflon lids provided by the laboratory.

According to manufacturer's specifications, the vacuum filter bags are 99% efficient at screening particles down to a diameter of 1 micron (µm). Based on its communication with the analytical laboratory, ENVIRON will need to collect in excess of 50 grams (g) of particulates to conduct the required analyses, which are to include metals (arsenic, lead, antimony, cadmium, and total chromium), polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs) (including naphthalene), dioxins/furans, and hexavalent chromium (see Section 3).

Prior to vacuuming the sample, ENVIRON's field technician will weigh the empty sample bag using the portable field scale and record the weight in grams on the Sampling Log.

After the 500 sq. ft. area has been vacuumed, the field technician will re-weigh the sample bag to determine the mass of the aspirated material. The technician will ensure that the net weight (total minus bag) will be at least 50g. Additional areas may be vacuumed to obtain sufficient sample mass. The field technician will then record the dimensions of the final sampling area, weights, and any notable observations, on the Sampling Log.

One of the glass sample jars will be placed at the bottom of the 5-gallon bucket. The stainless steel funnel will be placed inside the glass jar. The filter bag will be carefully cut open using scissors and its contents carefully emptied into the funnel, directing the sample into the jar. Each sample jar will be labeled with a unique identifier (i.e., Sample ID). ENVIRON proposes to use a sample identification scheme based on distance from the facility, quadrant, and type of sampling surface of the sample collection. For example, the Sample ID "500NE-Sidewalk-001" describes the first sample collected from the 500-foot ring in the northeast quadrant on a sidewalk. For storm water curb boxes, grab samples may be collected using disposable scoops. Samples will also be placed in the glass jars and identified as described above.

Upon completion of sample collection, ENVIRON will complete the chain-of-custody form (Sample ID, analytical methods, and other instructions). Each sample jar will be placed in a sealable plastic bag then immediately stored in a dry insulated cooler with ice pending delivery, under chain-of-custody protocol, to TestAmerica, Inc. (TestAmerica), a California-certified laboratory, for analyses as described in Section 3 of this work plan.

Between dust samples, the vacuum cleaner head will be wiped using a single-use lint-free swab to remove any remaining dust. A filter bag will be dedicated for decontamination purpose. The field technician will place the decontamination filter bag into the vacuum, and will run the vacuum for three to five minutes to purge the dust from the unit. Other field equipment (e.g., stainless steel funnel, bucket, etc.) will be decontaminated, as needed, using single-use lint-free swabs.

For quality assurance/quality control (QA/QC) purposes, ENVIRON's field technician will collect a double volume sample for every ten (10) samples collected. TestAmerica will be instructed to split the double volume to create a duplicate sample.

If any exposed industrial soils are identified for sampling, ENVIRON will collect the soil samples following the standard operating procedure for layered sampling prepared by Advanced GeoServices (see Appendix B).

3 Analytical Methods

Table 2 below summarizes the analytes requested by DTSC and the EPA analytical methods.

Table 2. Summary of Analytes and Analytical Methods

Analytes	Analytical Methods
Arsenic (As), Lead (Pb), Antimony (Sb), Cadmium (Cd), Chromium (Cr)	EPA 6020
PCBs	EPA 8082
PAHs (including naphthalene)	EPA 8310
Dioxins/Furans*	EPA 8290
Hexavalent Chromium	EPA 7196 Industrial Area EPA 7199 Residential Area

*Note: ENVIRON will analyze approximately 25% of the samples for Dioxins/Furans.

TestAmerica will also weigh each sample and include the sample total weight in its report so that ENVIRON can calculate surface concentrations for each sample.

4 Data Analysis and Report

ENVIRON will review the laboratory reports from TestAmerica and prepare a sampling and analysis report for DTSC to review. The sampling and analysis report will describe and document sampling activities (sampling locations, chain of custody procedures, etc.), field observations, analytical results, and any modifications and amendment to the approved work plan, if any. The results will be reported in units of mass of analyte per mass of total dust and mass of analyte per area vacuumed for each sample (for example, mg/kg and mg/square foot, respectively).

5 Quality Assurance and Quality Control

The Quality Assurance Project Plan (QAPP) for this project is included in Appendix C. ENVIRON's general QA/QC procedure is included in Appendix D and will be followed throughout this project. TestAmerica will follow its own QA/QC procedures (See Appendix E).

Table

Table 1 - Residential and Industrial Soil Screening Values
Exide Technologies, Inc.
2700 South Indiana Street, Vernon, California

Chemical[a]	CAS Number	Residential Soil (mg/kg)		Industrial Soil (mg/kg)	
Arsenic	7440-38-2	6.2E-02	DTSC 2013	2.5E-01	DTSC 2013
Lead	7439-92-1	8.0E+01	DTSC 2013	3.2E+02	DTSC 2013
Antimony	7440-36-0	3.1E+01	USEPA RSL 2013	4.1E+02	USEPA RSL 2013
Cadmium	7440-43-9	4.0E+00	DTSC 2013	5.1E+00	DTSC 2013
Chromium	7440-47-3	1.2E+05	USEPA RSL 2013	1.5E+06	USEPA RSL 2013
Total PCBs	1336-36-3	2.2E-01	USEPA RSL 2013	7.4E-01	USEPA RSL 2013
Dioxins/Furans (as 2,3,7,8-TCDD)	1746-01-6	4.5E-06	USEPA RSL 2013	1.8E-05	USEPA RSL 2013
Hexavalent Chromium	18540-29-9	2.9E-01	USEPA RSL 2013	5.6E+00	USEPA RSL 2013
Acenaphthene	83-32-9	3.4E+03	USEPA RSL 2013	3.3E+04	USEPA RSL 2013
Acenaphthylene	208-96-8	--	--	--	--
Anthracene	120-12-7	1.7E+04	USEPA RSL 2013	1.7E+05	USEPA RSL 2013
Benzo(a)anthracene	56-55-3	1.5E-01	USEPA RSL 2013	2.1E+00	USEPA RSL 2013
Benzo(a)pyrene	50-32-8	1.5E-02	USEPA RSL 2013	2.1E-01	USEPA RSL 2013
Benzo(b)fluoranthene	205-99-2	1.5E-01	USEPA RSL 2013	2.1E+00	USEPA RSL 2013
Benzo(ghi)perylene	191-24-2	--	--	--	--
Benzo(k)fluoranthene	207-08-9	3.8E-01	DTSC 2013	1.3E+00	DTSC 2013
Chrysene	218-01-9	3.8E+00	DTSC 2013	1.3E+01	DTSC 2013
Dibenzo(a,h)anthracene	53-70-3	1.5E-02	USEPA RSL 2013	2.1E-01	USEPA RSL 2013
Fluoranthene	206-44-0	2.3E+03	USEPA RSL 2013	2.2E+04	USEPA RSL 2013
Fluorene	86-73-7	2.3E+03	USEPA RSL 2013	2.2E+04	USEPA RSL 2013
Indeno(1,2,3-cd)pyrene	193-39-5	1.5E-01	USEPA RSL 2013	2.1E+00	USEPA RSL 2013
Naphthalene	91-20-3	3.6E+00	USEPA RSL 2013	1.8E+01	USEPA RSL 2013
Phenanthrene	85-01-8	--	--	--	--
Pyrene	129-00-0	1.7E+03	USEPA RSL 2013	1.7E+04	USEPA RSL 2013

Notes:
---- = Not available
mg/kg = milligram per kilogram
DTSC = Department of Toxic Substances Control
PAH = Polycyclic Aromatic Hydrocarbons
RSL = Regional Screening Level
TCDD = Tetrachlorodibenzodioxin
USEPA = United States Environmental Protection Agency

a. The PAH chemicals listed were based on USEPA Method 8310.

Sources:

Department of Toxic Substances Control (DTSC). 2013. Human Health Risk Assessment (HHRA) Note Number 3, Issue: DTSC recommended methodology for use of U.S. EPA Regional Screening Levels (RSLs) in the Human Health Risk Assessment process at hazardous waste sites and permitted facilities. May.

United States Environmental Protection Agency (USEPA). 2013. Regional Screening Levels (RSLs) Summary Table. May. Available at http://www.epa.gov/region9/superfund/prg/index.html.

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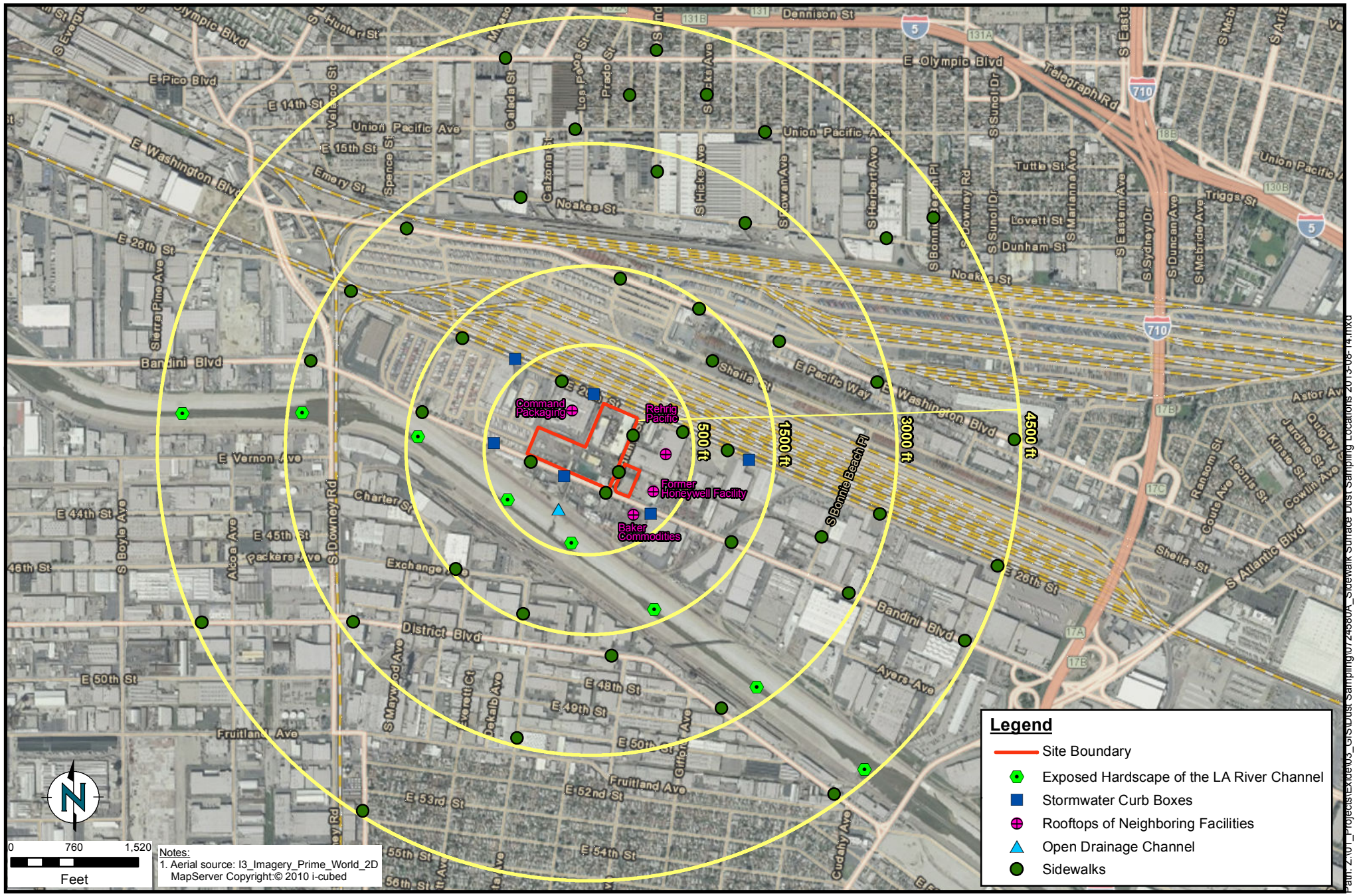
Figure



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Stepout Surface Dust Sampling Locations

Exide Technologies Facility
2700 South Indiana Street
Vernon, California

Figure 1

DRAFTED BY: SShin

Date: 8/14/2013

PROJECT: 07-24580A

Appendix A

Step-out Surface Dust Sampling Log

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Step-out Surface Dust Sampling Log

Date	Time	Sample ID	Weight (grams)			Sample Area	Description of Sampling Location	Notes
			Empty Bag	Total Weight	Sample Weight	(sq. ft.)		

Appendix B

Standard Operating Procedure for the Collection of Layered Soil Samples

STANDARD OPERATING PROCEDURE FOR THE COLLECTION OF LAYERED SOIL SAMPLES

Purpose: Collection of soil samples in order to determine changes in concentrations with increasing depth below the ground surface.

Equipment Needed:

1. AMS Soil Core Sampler (or equivalent) equipped with a 2-inch diameter by 6-inch core cup.
2. Plastic liners and end caps
3. Disposable gloves
4. Sample jars
5. Cutting tool for plastic liners

Methodology:

1. Soil handling shall be performed with gloved hands. Clean gloves shall be used between sample locations and when processing samples for laboratory analysis.
2. Cut and remove any surface vegetation to expose the underlying soil taking care to keep disturbance of the soil surface to a minimum.
3. Drive the core sample cup into the ground vertically to the full depth of the core cup (6 inches).
4. Remove the core sample from the ground taking care to prevent sample loss.
5. Remove the plastic liner from the core cup and verify that a 6-inch core was recovered.
6. Place caps on each end of the liner and label the core including the location and date and time of sampling and noting which end is the top. Set aside until ready to prepare the layered samples.
7. Decontaminate the core cup and cap as well as any other part of the sampler that came into contact with the soil using the following procedure:
    a. Remove residual soils and surface films with a paper towel and tap water;
    b. Brush with an Alconox and water solution;
    c. Rinse with tap water;
    d. Rinse with deionized water;
    e. Rinse with pesticide grade Hexane;
    f. Dry with paper towels; and
    g. Cover/wrap with plastic or aluminum foil if stored overnight.
    h. Place disposable materials and gloves into a container for disposal.
8. When ready to obtain subsamples from the liner, cut the liner vertically on both sides and remove the upper half of the liner.
9. Measure and mark the depth intervals of 0” to 1”, 1” to 3” and 3” to 6” on the sample core. Cut and remove the upper inch of the core and place it into a sample jar using a disposable knife. Repeat for the remaining depth intervals using a clean knife each time and discard any sample deeper than 6 inches.
10. Label the sample according the established naming protocol and noting the location, date and time of sampling and sample depth interval.
11. Place sample containers into a cooler for delivery to the laboratory.

Appendix C

Quality Assurance Project Plan



Quality Assurance Project Plan for Step-out Surface Dust Sampling and Analysis Work Plan

Exide Technologies, Inc.
2700 South Indiana Street
Vernon, California

Prepared for:
Exide Technologies, Inc.
Vernon, California

Prepared by:
ENVIRON International Corporation
Irvine and Los Angeles, California

Submitted to:
Department of Toxic Substances Control
Sacramento, California

Date:
August 2013

Project Number:
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Contents

List of Exhibits

Acronyms and Abbreviations

COC	chemicals of concern
COC	chain-of-custody
Cr VI:	Hexavalent Chromium
DTSC:	Department of Toxic Substances Control
DQI:	Data Quality Indicator
DQO:	Data Quality Objective
ENVIRON	ENVIRON International Corporation
Exide	Exide Technologies
OSHA:	Occupational Health and Safety Administration
QA/QC:	Quality Assurance/Quality Control
QAPP:	Quality Assurance Project Plan
PIC	Principal-in-Charge
PM	Project Manager
PAHs:	Polyaromatic Hydrocarbons
PCBs:	Polychlorinated Biphenyls
PID:	Photo-ionization Detector
SOP:	Standard Operating Procedures
TestAmerica	TestAmerica Laboratories, Inc.
USEPA:	United States Environmental Protection Agency

1 Project Management/Data Quality Objectives

1.1 Project Organization/Roles and Responsibilities

The purpose of defining the project organization and the roles and responsibilities of the individuals involved in the project is to provide all involved parties with a clear understanding of the role that each party plays, and to provide the lines of authority and reporting for the project. A project organization chart is provided as Exhibit A. The organization chart also provides contact information for the parties listed. The Department of Toxic Substances Control (DTSC) is the lead agency for this project.

Personnel assigned to the project will be required to familiarize themselves with pertinent protocols and procedures presented in this Quality Assurance Project Plan (QAPP). Key project positions from ENVIRON International Corporation (ENVIRON) related to project management, data quality management, and field operations management are as follows:

Principal-in-Charge, **Russell S. Kemp, PE** – The Principal-in-Charge (PIC) is responsible for overall technical and policy decisions, reviewing all ENVIRON written deliverables for Quality Assurance/Quality Control (AQ/QC) purpose, and communications with Exide and DTSC.

Project Manager, **Yi Tian, CIH, CSP, QEP** – The Project Manager (PM) is responsible for implementing project objectives, preparing written documents, and managing ENVIRON staff. The PM will also serve as the QA/QC officer for the project.

Project Geologist, **Alexander E. Marr, PG.** – The Project Geologist is responsible for overseeing the field technicians to carry out the field program.

Data Management, **Fan Xu, PhD, CIH** – The data manager is responsible for management of the database, including updating and maintaining the database as needed, and preparing data tables.

Field Technicians from ENVIRON will be responsible for executing the approved work plan. They will work with the Project Manager/Project Geologist to ensure that work is conducted in compliance with project-specific objectives and applicable QA procedures.

1.2 Problem Definition/Background

1.2.1 Purpose

This QAPP has been prepared by ENVIRON on behalf of Exide Technologies (Exide) to (1) describe the QA/QC procedures that the project team will follow during implementation of the Surface Dust Sampling Work Plan (Work Plan) at the Exide site, located at 2700 South Indiana Street, Vernon, California (the Site), and (2) assure reporting of data that are representative of field conditions.

Guidelines followed in the preparation of this QAPP are described in United States Environmental Protection Agency (USEPA) Guidance for Quality Assurance Project Plans, EPA QA/G-5 (USEPA, 2002). Other documents used in preparation of the QAPP include Guidance for the Data Quality Objectives Process, EPA QA/G-4 (USEPA, 2000).

1.2.2 Problem Statement

The Exide facility located at 2700 South Indiana Avenue, Vernon, California is a secondary lead recycling facility for the recovery of lead from automotive batteries and other lead-bearing materials received from off-site and on-site. The Site occupies approximately 18 acres in two separate lots (see Figure 1), and has been used for a variety of metal fabrication and metal recovery operations since 1922. The primary Site use since the late 1970s has been lead-battery recycling. Exide receives spent (used) lead-acid batteries and other lead bearing materials and recycles them to recover lead and polypropylene. The sulfuric acid in the batteries is recycled and used in the on-site wastewater treatment system. The polypropylene is sent to an off-site facility for recycling. Exide recovers an average of 100,000 to 120,000 tons of lead per year. Exide also recycles lead bearing plant scrap and secondary materials, primarily from lead-acid battery manufacturers.

The objective of the Work Plan is to provide a detailed method to assess and characterize chemicals of concern (COC) in dust particles generated by activities at the Site and to assess the extent of aerial deposition of these COC.

Metals contamination has been detected in portions of the Site and in surrounding areas. The primary COC as described by the DTSC consist of metals (e.g. arsenic, lead, antimony, cadmium, and chromium); Polychlorinated biphenyls (PCBs); Polycyclic Aromatic Hydrocarbons (PAHs); dioxins/furans; and hexavalent chromium (Cr VI).

1.3 Data Quality Objectives

Quality assurance objectives for data generated during implementation of the Work Plan are intended to provide guidance for the laboratory analysis of samples to ensure that the data are representative of Site conditions. Specific data quality objectives (DQO) were developed through the DQO process (USEPA, August 2000) to ensure that data collected are of the appropriate type and quality to achieve and support the objectives of the Work Plan.

Performance and acceptance criteria are often expressed in terms of data quality indicators. The principal data quality indicators (DQI) are precision, accuracy, representativeness, comparability, and completeness, defined in the USEPA Guidance document (USEPA, 2002) as:

- **Precision** of the data is the measure of agreement among repeated measurements of the same sample under identical or substantially similar conditions. It is calculated as either the range or as the standard deviation. Precision may also be expressed as a percentage of the mean of measurements, such as relative range or relative standard deviation. The level of effort of precision will be a minimum of 1 in 20 samples analyzed.
- **Accuracy** of the data is the measure of the overall agreement of a measured value to the true value. It includes a combination of systematic error (bias) and random error (precision) components of sampling and analytical operations. To estimate the accuracy of the data, a selected sample is spiked with a known amount of a standard and is analyzed; the results of which are used to calculate percent recovery. These Matrix Spike/Matrix Spike Duplicate samples are usually part of the laboratory's internal QA/QC.

- **Representativeness** is a qualitative term used to express the degree to which data accurately and precisely represent a characteristic of a population. Sample collection and handling methods, sample preparation, analytical procedures, holding times, and QA protocols developed for this project, and discussed in the subsequent sections of this document, have been established to ensure that the collected data are representative.
- **Comparability** is a qualitative term used to express the confidence with which one data set can be compared to another data set. Data comparability will be sustained in this project through the use of defined procedures and consistent sampling methods (sample collection and handling, sample preparation, and analytical procedures). Actual detection limits will depend on the sample matrix and will be reported by the laboratory as defined for specific samples.
- **Completeness** is defined as a measure of the amount of valid data to be obtained from the analytical measurement system and the complete implementation of defined field procedures.

1.4 Specific Training Requirements/Certification

Project staff working at the Site must meet the applicable Occupational Health and Safety Administration (OSHA) health and safety training requirements for field personnel. Staff records documenting compliance with OSHA requirements are kept on file at ENVIRON.

1.5 Documents and Records

Data measured using field instruments will be recorded on the appropriate field forms. Units of measure for field analyses are identified on the individual field forms. The Project Geologist, or other appropriate person designated by the Project Manager, will review the field data to evaluate the completeness of the field records. Field records will be retained in the project file until completion of the project, after which field records will be retained so as to comply with ENVIRON's document retention policy.

Analytical data will contain the necessary sample results and quality control data to assure compliance with the DQOs defined for the project. All laboratory reports, including chain-of-custody forms, will be retained in the project file.

Work in progress reports and final reports will be kept in the project file. Such documents may contain laboratory reports, chain-of-custody forms, etc.). The selection of documents retained in the project file, and the length of time that the documents will remain the project file, will be made in accordance with ENVIRON's document retention policy.

2 Data Generation and Acquisition

Sampling process design; sampling methods; sample handling and custody; analytical methods; quality control; instrument/equipment testing, inspection, maintenance, and calibration; inspection/acceptance of supplies; non-direct measurements, and data management are discussed in this section of the document.

2.1 Sampling Process Design

Samples collected as part of the Work Plan will include primarily surface dust samples and quality control samples, such as duplicate samples of dust.

Dust samples will be analyzed for the following analytes:

- Metals (arsenic, lead, antimony, cadmium, chromium), by EPA Method 6020
- PCBs, by EPA Method 8082;
- PAHs, by EPA Method 8310;
- Dioxins/Furans, by EPA Method 8290;
- Hexavalent Chromium, by EPA Method 7196 (for industrial area) and Method 7199 (for residential area).

Samples will be sent under standard chain-of-custody protocols to TestAmerica Laboratories, Inc. (TestAmerica) of Irvine, California. TestAmerica is certified by the California Department of Health Services pursuant to the provisions of the California Environmental Laboratory Improvement Act of 1988.

2.2 Sampling Methods

Detailed dust sample collection protocols are included in the Work Plan.

2.3 Sample Handling and Custody Requirements

Field documents will include daily field log forms, sample custody seals, and chain-of-custody (COC) records. The designated field staff is personally responsible for the care and custody of the samples collected from the time they are collected until they are transferred or dispatched to the laboratory. In this process, a COC record accompanies the samples. When transferring samples, the individuals relinquishing and receiving the sample(s) sign, date, and note the time on the record. This record documents custody transfer from the sampler, often through a laboratory courier, to the sample-receiving department at the laboratory. Samples will ultimately be disposed of by the analytical laboratory.

2.4 Analytical Methods

Analytical methods are listed in the Work Plan. TestAmerica's standard operating procedures (SOPs) for the listed methods shall conform to the USEPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", also known as "SW-846", which is available online at: http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm.

2.5 Quality Control Requirements

2.5.1 Field QC Procedures

QC samples collected in the field may consist of field duplicates, and equipment blanks.

The field duplicate is an independent sample collected as close as possible to the same time that the primary sample is collected and from the same source, and is used to document sample precision. Field duplicates will be generated in the field by collecting a double volume sample, i.e., greater than 100g. The presumably homogenized sample volume of dust will be manually split in the field into two sample jars. Field duplicates will be labeled and packaged in the same manner as primary samples so that the laboratory cannot distinguish between the primary sample and the duplicate sample. Field duplicates will be collected by alternately filling the primary sample and the duplicate sample containers, at a location of known or suspected contamination. Field duplicates will be collected at a frequency of one per 10 samples collected, or a minimum of one per sampling event, whichever is greater, and will be analyzed for the same suite of parameters as the primary sample.

2.5.2 Laboratory QC Procedures

TestAmerica's QA/QC procedure, as well as the method detection limits and reporting limits for the analytical methods used in this project, are included in Appendix E. Laboratory QC samples and procedures will include the following:

- Method blanks will be prepared and analyzed at least once with each analytical batch, with a minimum of one for every 20 samples
- Laboratory control samples will be prepared and analyzed at least once with each analytical batch, with a minimum of one for every 20 samples.
- Blanks, QC samples, and project samples will be spiked with surrogate compounds if specified in applicable analytical method. Surrogate recoveries are expected to be within the range set by the laboratory in accordance with procedures specified in the method.

2.5.3 Corrective Actions

Corrective actions may be initiated if precision or accuracy goals are not achieved. The initial step in corrective action will be to instruct the laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous results. At the same time, sample collection and handling procedures will be reviewed to assess whether they could have contributed to the anomalous results. Based on this evaluation, the Project Manager or Project Geologist, together with the Project QA Officer, will assess whether re- analysis or resampling is required or whether any protocol should be modified for future sampling events. Any changes in laboratory methods, or quality assurance parameters or limits, require written approval by ENVIRON prior to implementation by the laboratory.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

2.6.1 Field Instrumentation

Field equipment used to collect dust samples, e.g. vacuum cleaner, will be maintained according to the manufacturer's specifications, and will be inspected prior to use.

2.6.2 Laboratory Equipment

Instrument maintenance logbooks are maintained in the laboratory. In general, the logbooks contain a schedule of maintenance, as well as a complete history of past maintenance, both routine and non-routine, for that particular instrument.

Preventive maintenance is performed according to the procedures specified in the manufacturer's instrument manuals, including lubrication, source cleaning, and detector cleaning, and the frequency of such maintenance. Chromatographic carrier gas purification traps, injector liners, and injector septa are cleaned or replaced on a regular basis. Precision and accuracy data are examined for trends and excursion beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to degrade as evidenced by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the pre-determined QC criteria.

2.7 Instrument Calibration and Frequency

Field equipment for dust sampling activities does not require calibration. Laboratory calibration procedures are described in the method-specific SOPs at http://www.testamericainc.com/.

2.8 Data Management

Sampling data will be provided to ENVIRON by the laboratory in both hard copy and electronic formats. Data generated during performance of the Work Plan will undergo two levels of review and validation, one at the laboratory, and one after the data have been received by ENVIRON (as described in Section 4). Data tables will be prepared from the database. Original hard copy laboratory reports will be retained in the project file.

3 Assessment and Oversight

Assessments and evaluations are designed to determine whether the QAPP is being implemented as approved, to increase confidence in the information obtained, and ultimately, to determine whether the information may be used for its intended purpose(s).

3.1 Assessment and Response Actions

During the performance of the Work Plan, the Project Manager, the Project Geologist, the Project QA Officer, or other person designated by the Project Manager, will perform periodic assessments of compliance with the QAPP. When problems or issues are identified, the Task Leader(s) will be notified of the issue and instructed as to how to proceed going forward. If a subsequent assessment reveals that the problem has not been corrected, a field audit will be conducted. In addition, periodic unannounced QC audits may be conducted of field operations. Such QC audits may include evaluation of the following actions: field procedures, sampling activities, field notes, chain-of- custody procedures, field measurements, field equipment calibration procedures, and sample packaging and shipment.

The laboratory will be responsible for its own compliance with the QAPP. ENVIRON will review selected elements of the laboratory's performance as it relates to the QAPP. If non-compliance issues are identified, the laboratory will be notified as to what issue(s) has been identified and will be required to prepare a written response to ENVIRON regarding what corrective action will be taken to address the issue. If non-compliance problems persist, audits and/or performance evaluation sampling may be implemented.

3.2 Reports to Management

The Project Manager/Project Geologist and the Task Leader(s) will communicate on a timely basis to discuss progress on the project, and resolve any issues or problems to be corrected. In addition, the Task Leader(s) will notify the Project Manager/Project Geologist immediately of any changes to the scope of work or the analytical program that could potentially impact the usability of the data collected.

4 References

USEPA, 1999. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA540/R-94/013. Office of Emergency and Remedial Response. Washington, DC.

USEPA, 2000. Guidance for the Data Quality Objectives Process. EPA/600/R-96/055 (EPA QA/G-4). Office of Environmental Information, U.S. Environmental Protection Agency. Washington, DC.

USEPA, 2002a. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA540/R-94/012. Office of Emergency and Remedial Response. Washington, DC.

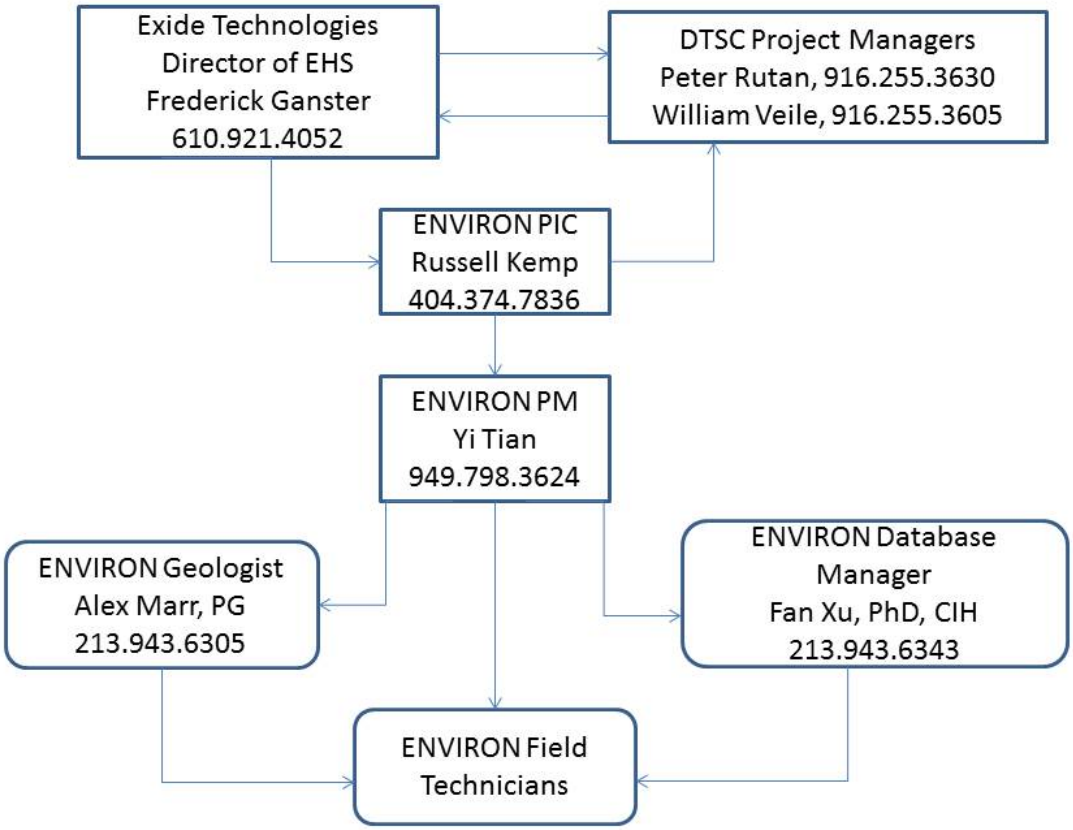
USEPA, 2002b. EPA Guidance for Quality Assurance Project Plans. EPA/240/R-02/009 (EPA QA/G-5). Office of Environmental Information, U.S. Environmental Protection Agency. Washington, DC.

Exhibit A

Project Organizational Chart

Exhibit A

Project Organizational Chart



Appendix D

ENVIRON's QA/QC Program

ENVIRON's QA/QC Program

Objectives

- Enhance the quality and reliability of data collection and analysis.
- Promote uniformity in the presentation of data.
- Ensure proper document review.

General

- The goal for SWBU should be to consistently deliver state-of-the-practice work products of the highest possible quality.
- All work products should focus on our clients' specific needs as identified in the approved scope of work.
- Quality of the work products should not be compromised because of either schedule or budget constraints.
- While we should do our best to satisfy the needs of our clients and their counsel, this should never lead to compromising the quality or integrity of our work.
- ENVIRON policies related to various aspects of a project should always be followed. Exceptions should be approved by the SWBU Managing Principal.

Proposals

- Prior to agreeing to undertaking an assignment and submitting a proposal, all potential conflicts of interest should be cleared. Clearing conflicts is the responsibility of the Principal-in-Charge (PIC).
- In preparing proposals and making client presentations, the various sub-directories under the marketing directory of ENVIRON's exchange should be consulted as appropriate.
- Proposals should provide time and budget for performing internal QA/QC and implementing the required revisions.
- Proposals should have as attachments the latest versions of ENVIRON's (1) General Business Terms and Conditions for client's approval; and (2) Document Retention Policy for client's information (The latest versions of these documents are on the S-drive). Exceptions should be approved by the SWBU Managing Principal.

Contracts

- For all new assignments, the project contract should be reviewed by the PIC. If the terms of the contract are different from ENVIRON's standard Business Terms and Conditions, or if the contract is one that has been produced by client, the project contract should be additionally approved by the SWBU Managing Principal. Work should not commence on a project without having a finalized contract unless approved by the SWBU Managing Principal.

- The PIC and the Project Manager (PM) should make sure that contract and job set-up are consistent with the project proposal.

Project Staffing

- Every project should have a PIC and a PM with the right skills for the anticipated project tasks. For small and/or litigation projects, the PIC may also be the PM.
- Staff selected for various project tasks should have the right skills for performing the assigned tasks.
- Requests for project staffing should be submitted to the SWBU staff coordinator in a timely manner so that qualified staff can be assigned to the project.

Project Kick-Off Meeting

- Whenever possible, the PIC and/or the PM should hold a project kick-off meeting with the project staff to discuss project requirements and staff assignments.
- During project kick-off meeting, or soon thereafter but prior to the initiation of project activities, the roles and responsibilities of the project staff should be clearly communicated to them with associated schedules and budgets.

Project and Document Review

- All reports and documents that contain interpretations, opinions, conclusions, and/or recommendations, should be peer reviewed by the PIC or an individual designated by the PIC. Additionally, reports and documents that pertain to assignments outside of the PIC's Practice Area should also be peer reviewed by an individual selected by the respective Practice Area Leader (PAL). For example, a due diligence report that is being peer reviewed by an RI/FS and Remediation Practice Area PIC should also be peer reviewed by an individual designated by the Due Diligence PAL.
- Review of reports, proposals, and work plans must be accompanied with a blue sign-off sheet ("blue sheet"). The attached electronic version of the "blue sheet" should be used when these documents are transmitted on-line for internal peer review.
- E-mails of any materiality must be peer reviewed.
- Requests for review of various documents should allow enough time, and provide budget, for the review to take place and corrections be made.
- Standardized reports and correspondence formats should be used where available (e.g., Phase I reports and reliance letters; various sub-directories under the marketing directory of ENVIRON's exchange).
- Comments made by project peer reviewers should be fully incorporated by the staff. Obviously, if staff has suggestions or does not agree with the reviewer, the matter should be discussed with the reviewer, the PM, and/or the PIC.
- Project memos, letters, reports, and other documents should follow ENVIRON's guidelines for font, line spacing, indentation, etc. (information is available on the marketing directory of ENVIRON's exchange).

- For projects where skill sets different than those of the PIC and PM are required, other Principals and/or Managers should be involved with the project and peer review activities.
- Project QA/QC activities should be performed at intermediate project milestones and include review of chain-of-custody forms, field notes, boring and well construction logs, preliminary drawings, calculations, report outlines, draft documents, etc.
- The PM should ensure that the project files are maintained appropriately.
- Electronic files should be saved to the p-drive in the office where the PM resides. To minimize the risk of producing multiple versions of documents and creating quality problems, project files should not be saved to personal directories or c- drives.
- When numbers and quantities are given in a document, special attention should be paid to significant figures. It is rare that what we do is accurate to more than 3 significant figures, and generally no more than 2.

Field Work and Logs

- SWBU field preparation checklist, which is attached, should be followed and completed, as appropriate. Any exceptions should be approved by the PM.
- Soil boring and monitoring well construction logs should be reviewed and checked off by a geologist or civil engineer experienced in the preparation and review of such logs.
- Utility and engineering drawings of the site should be requested from the client and, if available, reviewed prior to performing intrusive field activities.
- The client should be requested to approve our intrusive sampling locations.

External Meetings and Telephone Calls

- Important points discussed during meetings with the client, its counsel, or agencies should preferably be memorialized in letters, e-mails, or faxes.
- Telephone logs should be kept for important points discussed with the client, its counsel, or the agencies, unless otherwise directed by the client or its counsel (e.g., in litigation cases).
- During meetings or telephone calls, conclusions, cost estimates, schedule commitments, etc., which have not been previously cleared with the PIC, should not be presented to the client, its counsel, or the agencies.
- To the extent possible, cost and schedule estimates should not be given to clients during meetings and/or over the telephone. These estimates have potential liability for ENVIRON and need to be done thoughtfully and after (a) checking with prospective subcontractors for cost estimates and availability; (b) checking internally for staff availability; and (c) obtaining the PIC's approval.

Graphics and Secretarial Products

- Project staff should check all graphics and secretarial products, including bound and pdf documents.

Signing of Deliverables

- Signing and adding professional stamps to a document should only be done by the staff that has authored or thoroughly reviewed the document.
- Staff's electronic signatures should be added to a document only after getting their specific approval for that document.
- The PIC and PM should develop procedures for sign-off of project documents for instances when they are traveling, on vacation, or otherwise not available.

Electronic Transmittal of Documents

- Generally, electronically transmitted documents should be in "protected" Adobe pdf format. Transmittal of documents in Microsoft WORD, EXCEL, and other editable formats should only be done if requested by the agencies (e.g., for preparing fact sheets), or when preparing joint documents together with a client and its counsel or other consultants.

Projects Managed by other ENVIRON Offices

- When a SWBU Associate is assigned to a project managed by ENVIRON offices outside of the SWBU without the involvement of a SWBU Principal or Manager, the Associate should inform his/her PAL about the assignment and a copy of the final report should be sent to the PAL at the same time as it is being sent to the ENVIRON office that is managing the project.

Project Budget and Schedule

- Project schedules should be tracked regularly and any possibility of missing deadlines should be discussed with the client well in advance of the deadlines. Any schedule extensions approved by the client should be memorialized with the client via letters, faxes, or e-mails.
- Budgets should be tracked regularly using such resources as the ENVIRON Exchange. Any potential budget over-runs should be brought to the attention of the client preferably prior to having expended more than approximately 80 to 90 percent of the approved budget, and definitely prior to incurring any budget over- runs. Any budget increases approved by the client should be memorialized via letters, faxes, or e-mails.

Invoicing and Accounts Receivable

- Project charges appearing in the pre-bills should be carefully reviewed, and invoice descriptions should be accurate and consistent with the invoiced charges.

Purging of Project Files

- ENVIRON's policies for document handling, purging of project files, and closing projects should be followed (see ENVIRON's Document Retention Policy under the S-drive).

Recommendations for Future QA/QC Tasks

- Revise the attached Field Preparation Checklist and expand it by including other aspects of the SWBU field procedures, e.g., mold investigations.

- Develop on-the-job training modules as part of the SWBU QA program.
- Create and regularly update a directory that would contain the latest version of this
- QA/QC Program Elements, and all related ENVIRON and SWBU policies.

Attachments:
Document Quality Control Sign-Off Sheet; Field Preparation Checklist

ENVIRON International Corporation

Document Quality Control Sign-Off Sheet

Project Number: _____

Project Name: _____

Project Type: ☐ Letter ☐ Report ☐ Proposal ☐ RFP ☐ Figures ☐ SOQ

☐ Other (Define) _____

Document Title: _____

Document Path: Los Angeles Projects Drive \ \ _____

_____

Document Author(s): _____

Principal-in-Charge: _____

Project Manager: _____

Project Secretary: _____

	DOCUMENT TRACKING					
	Draft		Final		Electronic Signature	Professional Stamp
	Initials	Date	Initials	Date	Approval	
Spell Check:						
Author Review:						
Calculation(s) Check:						
Technical Review:						
Manager Review:						
Additional Senior Level Review:						
Editorial Review:						
Final Spell Check:						
Principal Review:						
Distribution Verified:						

ENVIRON FIELD PREPARATION CHECKLIST

Project Name: Date:

Project No.: Prepared by: Project Manager: Revised:

- Review proposal/workplan with Project Manager
- Review Site Safety Plan with Health & Safety Officer, if applicable
- Coordinate with contractors and subcontractors
  - Utility locators
  - Drillers
  - Traffic control
  - Concrete cutters
  - Bin/waste haulers
  - Surveyors
  - CPT
  - Soil gas
  - Other
  - Laboratory

- Execute Subcontract Agreements
- Organize and prepare field equipment
- Complete field equipment billing form
- Get proper field forms
- Organize laboratory kits, bottles, etc.
- Obtain list of important contact numbers
- Notify regulatory agencies (e.g., DTSC)

Appendix E

Analytical Laboratory QA/QC Procedures - TestAmerica

Analytical Laboratory QA/QC Procedures - TestAmerica

TestAmerica is committed to providing quality analytical services to all of our clients. To maintain a high level of quality, an extensive Quality Assurance Program has been developed. The Quality Assurance Program provides a means by which the integrity of data can be verified and through which TestAmerica can express its goals, policies, and commitment to generating data of superior quality. Since critical decisions are based on the data produced, it is essential that clear and thorough verification procedures exist and that the laboratory organization and management policies support the goals of the Program.

TestAmerica Quality Assurance Program defines the overall policies, organization objectives and functional responsibilities for achieving data quality goals. The Program was developed to ensure compliance with the 2003 National Environmental Laboratory Accreditation Conference (NELAC) standards and ISO/IEC Guide 17025 (1999). In addition, the policies and procedures outlined in the Program Manual are compliant with the various accreditation and certification programs. Each TestAmerica laboratory maintains a local perspective in its scope of services and client relations and maintains a national perspective in terms of quality.

It is TestAmerica's policy to continually improve systems and provide support to quality improvement efforts. The company recognizes that the implementation of a quality assurance program requires management's commitment and support as well as the involvement of the entire staff. Every staff member plays an integral part in quality assurance and is held responsible and accountable for the quality of their work.

Ethics & Data Integrity

In all aspects of the laboratory and business operations, management is dedicated to maintaining the highest ethical standards. An Ethics Policy and a Code of Ethical Conduct has been incorporated as part our Quality Assurance Program. Training on ethical and legal responsibilities is provided and each employee signs off on the policy annually as a condition of employment.

The seven elements of TestAmerica's ethics and data integrity program include:

1. An Ethics Policy and Code of Ethical Conduct
2. An Ethics and Compliance Officer (ECO)
3. A training program
4. Self-governance through disciplinary action for violations
5. A confidential mechanism for anonymously reporting alleged misconduct and a means for conducting internal investigations of all alleged misconduct
6. Procedures and guidance for recalling data if necessary
7. An effective external and internal monitoring system

As an American Council of Independent Laboratories (ACIL) member, all TestAmerica laboratories adhere to the following ACIL Code of Ethics:

1. Produce results, which are accurate and include QA/QC information that meets client, pre-defined Data Quality Objectives (DQOs).
2. Present services in a confidential, honest and forthright manner.
3. Provide employees with guidelines and an understanding of the ethical and quality standards of our industry.
4. Operate our facilities in a manner that protects the environment and the health and safety of employees and the public.
5. Obey all pertinent federal, state and local laws and regulations and encourage other members of our industry to do the same.
6. Educate clients as the extent and kinds of services available.
7. Assert competency only for work for which adequate personnel and equipment are available and for which adequate preparation has been made.
8. Promote the status of environmental laboratories, their employees, and the value of services rendered by them.

Blind Sampling Programs

Each spring and fall quarter, TestAmerica receives check samples from a NIST approved vendor for the Water Supply (WS), Water Pollution (WP) Studies, and Soil studies. In addition, TestAmerica analyzes samples annually for the Daily Monitoring Requirement Quality Assurance (DMR-QA) program. Additional blind check samples are received throughout the year. These evaluations contain a variety of organic and inorganic analytes whose values are unknown to the laboratory. The analytes must be correctly identified and accurately quantitated to maintain our certifications and accreditations. The results of these analyses are kept on file with the Quality Assurance Director/Manager and are available upon request.

Audits

The Quality Assurance Director is responsible for an annual audit of the laboratory's quality system. All areas of the laboratory are reviewed to ensure that all policies and procedures outlined in the Quality Assurance Program Manual are being implemented. An integral part of this audit is through the evaluation of an internal double blind PT study. Areas of the laboratory that are assessed include, but are not limited to laboratory procedures, purchasing, data processing/handling, project management, complaint resolution, and sample control.

In addition, the Quality Assurance Manager performs weekly data audits on randomly selected projects, documents the findings and initiates corrective actions if necessary. This review includes laboratory files, maintenance logs, notebooks and raw data for documentation of all quality control measurements. The notebooks are audited for sample results, calculations, calibration data, and QA/QC recoveries. Copies of corrective action reports, methodology, reagent preparation information, standard operating procedures (SOPs) and method exceptions are also reviewed. Data reporting procedures are also audited to ensure that results are easily traceable.

TestAmerica Reporting Limits and Method Detection Limits for Metals

Metals (ICP/MS) 6020

Analyte Description	CAS Number	RL - Limit	RL - Units	MDL - Limit	MDL - Units
Antimony	7440-36-0	1	mg/Kg	0.15	mg/Kg
Arsenic	7440-38-2	0.5	mg/Kg	0.45	mg/Kg
Barium	7440-39-3	0.5	mg/Kg	0.15	mg/Kg
Beryllium	7440-41-7	0.3	mg/Kg	0.05	mg/Kg
Cadmium	7440-43-9	0.5	mg/Kg	0.05	mg/Kg
Chromium	7440-47-3	1	mg/Kg	0.4	mg/Kg
Cobalt	7440-48-4	0.5	mg/Kg	0.05	mg/Kg
Copper	7440-50-8	1	mg/Kg	0.25	mg/Kg
Lead	7439-92-1	0.5	mg/Kg	0.1	mg/Kg
Molybdenum	7439-98-7	1	mg/Kg	0.1	mg/Kg
Nickel	7440-02-0	1	mg/Kg	0.25	mg/Kg
Selenium	7782-49-2	1	mg/Kg	0.25	mg/Kg
Silver	7440-22-4	0.5	mg/Kg	0.05	mg/Kg
Thallium	7440-28-0	0.5	mg/Kg	0.1	mg/Kg
Vanadium	7440-62-2	1	mg/Kg	0.4	mg/Kg
Zinc	7440-66-6	10	mg/Kg	2	mg/Kg

TestAmerica Reporting Limits and Method Detection Limits for PCBs

Soilids	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	8082				
	Analyte Description	CAS Number	RL - Limit	RL - Units	MDL - Limit	MDL - Units
	Aroclor 1016	12674-11-2	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1221	11104-28-2	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1232	11141-16-5	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1242	53469-21-9	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1248	12672-29-6	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1254	11097-69-1	0.05	mg/Kg	0.0121	mg/Kg
	Aroclor 1260	11096-82-5	0.05	mg/Kg	0.0121	mg/Kg
	DCB Decachlorobiphenyl (Surr)	2051-24-3		mg/Kg		mg/Kg

TestAmerica Reporting Limit and Method Detection Limit for Hexavalent Chromium

Chromium, Hexavalent (IC) 7199_ORGFM (Residential Area)

Analyte Description	CAS Number	RL - Limit	RL - Units	MDL - Limit	MDL - Units
Cr (VI)	18540-29-9	0.8	mg/Kg	0.15	mg/Kg

Industrial Area:

Soilids	Chromium, Hexavalent	7196A				
	Analyte Description	CAS Number	RL - Limit	RL - Units	MDL - Limit	MDL - Units
	Cr (VI)	18540-29-9	1	mg/Kg	0.4	mg/Kg

ENVIRON

TestAmerica Reporting Limits and Method Detection Limits for PAHs

Soilids	PAHs (HPLC)	8310				
	Analyte Description	CAS Number	RL - Limit	RL - Units	MDL - Limit	MDL - Units
	Acenaphthene	83-32-9	0.2	mg/Kg	0.056	mg/Kg
	Acenaphthylene	208-96-8	0.3	mg/Kg	0.094	mg/Kg
	Anthracene	120-12-7	0.02	mg/Kg	0.005	mg/Kg
	Benzo[a]anthracene	56-55-3	0.01	mg/Kg	0.008	mg/Kg
	Benzo[a]pyrene	50-32-8	0.01	mg/Kg	0.004	mg/Kg
	Benzo[b]fluoranthene	205-99-2	0.02	mg/Kg	0.013	mg/Kg
	Benzo[g,h,i]perylene	191-24-2	0.03	mg/Kg	0.008	mg/Kg
	Benzo[k]fluoranthene	207-08-9	0.01	mg/Kg	0.005	mg/Kg
	Chrysene	218-01-9	0.02	mg/Kg	0.004	mg/Kg
	Dibenz(a,h)anthracene	53-70-3	0.01	mg/Kg	0.004	mg/Kg
	Fluoranthene	206-44-0	0.03	mg/Kg	0.008	mg/Kg
	Fluorene	86-73-7	0.03	mg/Kg	0.008	mg/Kg
	Indeno[1,2,3-cd]pyrene	193-39-5	0.01	mg/Kg	0.006	mg/Kg
	Naphthalene	91-20-3	0.2	mg/Kg	0.086	mg/Kg
	Phenanthrene	85-01-8	0.03	mg/Kg	0.005	mg/Kg
	Pyrene	129-00-0	0.02	mg/Kg	0.006	mg/Kg
	2-Chloroanthracene	17135-78-3		mg/Kg		mg/Kg

TestAmerica Reporting Limits and Method Detection Limits for Dioxins and Furans

Dioxins and Furans (HRGC/HRMS) 8290

Analyte Description	CAS Number	RL - Limit	RL - Units	EQL - Limit	EQL - Units
2,3,7,8-TCDD	1746-01-6	0.000001	mg/Kg	Sample specific limit	mg/Kg
2,3,7,8-TCDF	51207-31-9	0.000001	mg/Kg	Sample specific limit	mg/Kg
1,2,3,7,8-PeCDD	40321-76-4	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,7,8-PeCDF	57117-41-6	0.000005	mg/Kg	Sample specific limit	mg/Kg
2,3,4,7,8-PeCDF	57117-31-4	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,4,7,8-HxCDD	39227-28-6	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,6,7,8-HxCDD	57653-85-7	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,7,8,9-HxCDD	19408-74-3	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,4,7,8-HxCDF	70648-26-9	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,6,7,8-HxCDF	57117-44-9	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,7,8,9-HxCDF	72918-21-9	0.000005	mg/Kg	Sample specific limit	mg/Kg
2,3,4,6,7,8-HxCDF	60851-34-5	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,4,6,7,8-HpCDD	35822-46-9	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,4,6,7,8-HpCDF	67562-39-4	0.000005	mg/Kg	Sample specific limit	mg/Kg
1,2,3,4,7,8,9-HpCDF	55673-89-7	0.000005	mg/Kg	Sample specific limit	mg/Kg
OCDD	3268-87-9	0.00001	mg/Kg	Sample specific limit	mg/Kg
OCDF	39001-02-0	0.00001	mg/Kg	Sample specific limit	mg/Kg
13C-2,3,7,8-TCDD	76523-40-5	Surrogate/IS			
13C-2,3,7,8-TCDF	89059-46-1	Surrogate/IS			
13C-1,2,3,7,8-PeCDD	109719-79-1	Surrogate/IS			
13C-1,2,3,7,8-PeCDF	109719-77-9	Surrogate/IS			
13C-1,2,3,6,7,8-HxCDD	109719-81-5	Surrogate/IS			
13C-1,2,3,4,7,8-HxCDF	114423-98-2	Surrogate/IS			
13C-1,2,3,4,6,7,8-HpCDD	109719-83-7	Surrogate/IS			
13C-1,2,3,4,6,7,8-HpCDF	109719-84-8	Surrogate/IS			
13C-OCDD	114423-97-1	Surrogate/IS			

Dioxin/Furans use EQL instead of MDL values. The EQLs are sample specific and vary from sample to sample.