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SAMPLING AND ANALYSIS PLAN

1301 East Webb Avenue
APN 139-23-812-025
North Las Vegas
Clark County
Nevada
NDEP Contract #DEP14-008
Task M10-15

Prepared for:

State of Nevada
Department of Conservation and Natural Resources
Division of Environmental Protection
Bureau of Corrective Actions
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

On behalf of:

City of North Las Vegas

July 2015

Sampling and Analysis Plan for:

Limited Phase II Environmental Site Assessment for
1301 East Webb Avenue
North Las Vegas, Nevada

May 2015

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

McGinley and Associates, Inc. (MGA) has prepared this Sampling and Analysis Plan (SAP) for assessment activities to be conducted at 1301 East Webb Avenue in North Las Vegas, Nevada. These assessment activities are being funded by a 128(a) Brownfields grant under United States Environmental Protection Agency (USEPA) Cooperative Agreement # RP-00T84901-3 to the Nevada Division of Environmental Protection (NDEP) and its associated State of Nevada Brownfields Program (NBP). This SAP was prepared in accordance with the NDEP Quality Assurance Program Plan (QA Program Plan) prepared for the NBP (NDEP, 2013).

This SAP addresses the field sampling, analytical procedures, quality control/quality assurance, and data review procedures for the collection and analysis of:

- Soil samples to evaluate contamination at a location on the subject property where heavy equipment and potential petroleum products or flammable hazardous substances may have been previously stored; and
- Suspect building material samples to evaluate those materials for asbestos or lead-based paint (LBP).

1.1 Site Name

North Las Vegas Pump House

1.2 Site Location and Description

The subject property consists of a vacated building, shed, and a fenced yard on a parcel of land located in North Las Vegas, Clark County, Nevada. The subject property is addressed at 1301 East Webb Avenue and listed with Clark County, Nevada as Assessor's Parcel Number (APN) 139-23-812-025. Geographically, the subject property is located in the S ½ of the SE ¼ of Section 23, Township 20 South, Range 61 East of the Mount Diablo Base and Meridian (MDB&M). The subject property consists of a single parcel of land approximately 0.1 acre in size. The location of the site is indicated on Figure 1.

Based upon information available for review, the vacated building located on the Subject Property was originally constructed in 1957. The building is approximately 1,050 square feet in size and has an attached storage unit that is approximately 221 square feet in size. The main structure is a single story house and consists of a dining/office area, kitchen, living room, bedroom, bathroom, and closet. The building is currently boarded and locked. Access to the property can be gained from Webb Avenue to the North or Bruce Street to the west. The parcel has a slight grade and generally slopes to the north-northeast. The layout of the subject property is illustrated on Figure 2.

1.3 Responsible Agency

This project is being conducted on behalf of the City of North Las Vegas for the NDEP through the NBP and the investigation will conform to the requirements within the QA Program Plan (NDEP, 2013).

1.4 Project Organization

Title/Responsibility	Name	Phone
City of North Las Vegas		
Site Contact	Enrique (Rick) Damian	(702) 633-2612
NDEP		
Program Coordinator for the NBP – Project coordination, liaison with City of North Las Vegas, review SAP, Quality Assurance (QA)	Dave Friedman	(775) 687-9385
Quality Coordinator for the NBP – Review SAP, QA	Mary Siders	(775) 687-9496
USEPA		
USEPA Nevada Program Officer	Gail Morison	(415) 972-3807
McGinley and Associates, Inc.		
Principal – Senior review	Joe McGinley	(775) 829-2245
Project Manager – Project management, regulatory liaison, coordinate field activities, data review, report preparation.	Brett Bottenberg	(702) 260-4961
Quality Manager / Environmental Scientist – Oversee implementation of SAP, review QA and Quality Control (QC) procedures, conduct sampling activities, report preparation, data validation.	Sarah Hoffman	(702) 260-4961
GIS Services – Mapping support	Tim Dory	(775) 829-2245
Administrative Assistant – Administrative support	Lauren Bruno	(702) 260-4961
Contractors/Vendors		
Asset Laboraties – Analytical laboratory	Marlon Cartin	(702) 307-2659
Macrotec Consulting, LLC – Asbestos and LBP sampling	Jason McAllister	(702) 949-6225
TESC Inc. – Analytical laboratory		(804) 739-1751
Schneider Laboratories Global, Inc– Analytical laboratory		(804) 353-6778

1.5 Statement of the Specific Problem

The City of North Las Vegas has proposed to redevelop the subject property with a non-profit healthcare facility to provide free exams and eyewear for up to 6,000 Clark County School District (CCSD) students living in the area. Redevelopment of the property will have multiple community benefits such as eliminating an eye-sore in the community, enhancing the safety of the neighborhood, and serving a community in need. However, before the property can be developed, recognized environmental conditions (REC) discovered for the property during a March 2015 Phase I Environmental Site Assessment (ESA) will need to be addressed. The following RECs were found:

- According to City of North Las Vegas employees, the southern parcel may have been used to store heavy equipment. In addition, a sign posted on the fence states “no open flame or ignition beyond this point” which indicates that petroleum products or flammable hazardous substances may have been previously stored or used in the yard. Therefore, spills and leaks of those materials may have occurred in that area; and
- The building located on the property was originally constructed in 1957. It is unknown what renovations, if any, have been implemented. Therefore, due to the age of the structure, the

potential exists that building materials used in the construction of the structure contain asbestos and/or LBP.

These RECs will need to be addressed prior to redevelopment of the property and the assessment should include soil sampling and an asbestos and LBP assessment that is required prior to demolition or renovation of the building.

2. BACKGROUND

According to the Clark County, Nevada Assessor's office, the subject property comprises an area of approximately 0.1 acre on a single parcel of land. Available records indicate a one-story building is located on the property. It appears to have been originally constructed in 1957. Additionally, the available records describe the building as approximately 1,050 square feet in size with a storage unit attached that is approximately 221 square feet. The subject property is listed as APN 139-23-812-025 and is currently owned by the City of North Las Vegas. Prior owners were not listed in the Clark County, Nevada Assessor's online database.

The property was originally platted in 1955 and the structure was constructed in 1957. The site was originally constructed as a single-family residential unit. The City of North Las Vegas has owned the property since 1972. It appears to have been deeded to or acquired via tax roll liens. Limited information is available about the structure prior to 1975. It appears it has been used as a fraternity house, a storage unit for City of North Las Vegas roadway division, and a pump house of unknown nature. There is also anecdotal evidence that the property was used by the Boy Scouts of America for a meeting place. Due to the age of the structure, the possibility of asbestos and lead-containing building materials within the structure is high. Although the structure is regularly referred to by the public works and utilities departments as the "pump house", there is no information which indicates the reason why. Further, no evidence of wells was observed during the initial Phase I ESA. The structure remains standing but is in major disrepair and is considered a blighted structure. It has not had any active use for decades and is currently boarded up and vacant.

2.1 Sampling Area Description

The sampling areas and the proposed sampling activities for those areas are as follows:

- **Rear yard:** Three to five soil borings will be advanced using a hand auger in several discontinuous locations selected by the investigator's opinion of the highest levels of contamination. Soil samples will be collected within each boring at one foot below ground surface (bgs), three feet bgs, and five feet bgs.
- **Structure including the storage shed:** Suspect building materials observed during an investigation of the building will be collected for either asbestos or lead analysis.

2.2 Operational History

Based on available historical information, it appears that the property was originally platted in 1955 and the structure was constructed in 1957. The site was originally constructed as a single-family residential unit. Limited information is available about the structure prior to 1975. It appears it has been used as a fraternity house, a storage unit for City of North Las Vegas roadway division, and a pump house of unknown nature. There is also anecdotal evidence that the property was used by the Boy Scouts of America for a meeting place.

2.3 Previous Investigations/Regulatory Involvement

In March of 2015, MGA conducted a Phase I ESA on the subject property for the NBP and funded by a 128(a) Brownfields grant under EPA Cooperative Agreement # RP-00T84901-3 to

the NDEP. The ESA was conducted in compliance with the American Society for Testing and Materials (ASTM) Standard E-1527-13 to identify any RECs at the site. The proposed sampling assessment is based on the findings of this Phase I ESA which are previously presented in Section 1.5 of this SAP.

2.4 Geological Information

The geology underlying the Subject Property has been mapped as Active Alluvium (J.C. Matti, S.B. Castor, J.W. Bell, and S.M. Rowland, 1973). The unit is described as pink to pale-brown fine sand to pebble to cobble gravel occurring as thin veneers in incised stream channels and on between-channel alluvial flats. The surficial soils found at the Subject Property have been primarily mapped as Glencarb silt loam, 0 to 2 percent slopes. The unit is classified as Hydrologic Unit C, which is characterized by moderately high runoff potential when thoroughly wet, as water is transmitted somewhat restricted through the soil.

There are no surface water bodies that exist on the subject property. The nearest major surface water body to the subject property is the Las Vegas Wash, which is located approximately two miles to the east. Runoff from the site during storm events would most likely travel overland towards the east. According to the Federal Emergency Management Agency (FEMA), the site is not located within a 100-year flood zone and is listed as being in Zone X, which is described as an area outside the 0.2% annual chance floodplain.

Based on a review of the Nevada Division of Water Resources (NDWR) Well Log Database, water wells may be located in the vicinity of the Subject Property, but their exact locations are unknown and their existence has not been field-verified. No wells were observed or reported to be located on the Subject Property during site reconnaissance. Groundwater flow direction at the Subject Property is estimated to be generally towards the east and the depth to groundwater at the Subject Property is estimated to be approximately seven to 20 feet below ground surface.

2.5 Environmental and/or Human Impact

Based on the review of readily accessible public information and interviews conducted for the Phase I ESA, it does not appear that adverse human health effects associated with potential contamination at this site have been reported or documented. However, the potential exists for receptors to interact with soils that have been disturbed or building materials found at the subject property contain asbestos and/or lead.

3. PROJECT DATA QUALITY OBJECTIVES

3.1 Project Task and Problem Definition

The purpose of this investigation is to assess the soil for potential impacts from historical site use and analyze the vacated structure's building materials for asbestos and/or lead. Definitive data will be collected to determine the extent of soil contamination, if any. In addition, an asbestos and LBP assessment will be conducted on existing building materials of the subject property's vacated structure to determine the extent of abatement necessary prior to renovation or demolition.

3.2 Data Quality Objectives (DQOs)

The DQO process (EPA 2006) is a systematic planning tool that is used to establish performance or acceptance criteria. These criteria, in turn, serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study. The DQO process consists

of seven iterative steps, as described in the following sections and summarized in Table 1.

3.2.1 Step 1: State the Problem

The signage mounted on the fence on the property suggests the storage of hazardous materials previously occurred on the property. It is unknown the type of materials, quantity, or duration these flammable hazardous materials may have been stored in the yard on the east side of the building. However, because the flammable materials storage was associated with the North Las Vegas road department, it has been determined that these flammable materials were most likely refined petroleum or petroleum-based products. The nature and extent of contamination in the soil due to the accidental or incidental release of these products, if any, is not known. Additional data are needed to define the nature and extent, if any, of contamination within the soil. In addition, prior to demolition or renovation of the building, an asbestos and LBP assessment is required. Analytical data is required to assess for the presence of these materials and determine if abatement and/or additional assessment activities are required prior to renovation or demolition.

3.2.2 Step 2: Identify Decisions

Analytical data for collected soil samples will be evaluated to determine if concentrations of contaminants of concern (COC) exceed Nevada reportable concentrations (RCs). As stated above, it will be assumed that the potential contaminants in the soil are petroleum or petroleum-based, therefore, soil samples will be analyzed for total petroleum hydrocarbons (TPH) using EPA Method 8015B as the first step to determine if concentrations in the soil exceed regulatory levels. The preliminary soil analytical data will be compared to the RC of 100 mg/kg, as published in the NDEP Draft Guidelines for Discovery Events document (NAC 445A.345 to 445A.348). If a soil sample does exceed the regulatory level of 100 mg/kg, then additional laboratory analyses will be ordered on aliquots from the remaining volume of sample from the same location for Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270C using Select Ion Monitoring and for Volatile Organic Compounds (VOCs) by EPA Method 8260B. Results of the investigation will be used to determine if additional assessment and/or regulatory notification with subsequent clean-up are required on the site. Prior to selection of sampling location, the rear yard area will be investigated using visual, olfactory and a photo-ionizing detector (PID) instrument to determine the biased sampling location based on most likely location of contamination. The hand auger borings will be advanced in these locations.

Analytical data for collected building material samples will be evaluated to determine if concentrations of asbestos and/or LBP exceed regulatory action levels. Asbestos data will be compared to levels established in OSHA 29 CFR 1926.1101, NAC 618.850 to 618.986, NESHAP 40 CFR 61.141 and AHERA 40 CFR Part 763. Lead data for paint samples will be compared to levels established in 40 CFR Part 745 and TSCA 402(c). Results of the investigation will be used to determine if additional assessment and/or abatement is required prior to renovation or demolition. Prior to collection of suspect building materials, the following must occur:

- Site reconnaissance shall be conducted to locate suspect building materials.
- Initial suspect asbestos-containing building materials (ACBM) shall be collected for asbestos analysis.
- Initial suspect paint shall be analyzed by x-ray fluorescence (XRF) and/or collected for lead analysis.

3.2.3 Step 3: Identify Inputs

Information required to address project objectives includes historical data, proposed quantitative data to be collected under this study, soil RCs, analytical test results of collected building materials, laboratory reporting limits that are below Nevada RCs and regulations regarding waste disposal.

Analytical testing of soil samples shall be conducted by Asset Laboratories of Las Vegas, Nevada. Macrotec will be conducting the asbestos and lead sampling. Analytical testing of collected building materials shall be conducted by Triangle Environmental Service Center, Inc. (TESC) and Schneider. X-ray fluorescence (XRF) instrumentation will be utilized to collect lead data at the site. If bulk paint samples are collected for lead analysis, the analytical testing shall also be conducted by TESC. The laboratory data quality indicators (DQIs) and method quality objectives (MQOs) for the analytical testing are provided in Appendix A.

3.2.4 Step 4: Define Study Boundaries

The proposed investigation will occur at the vacated structure and a portion of the yard located at 1301 East Webb Avenue in the City of North Las Vegas, Nevada. Access will be provided by the City of North Las Vegas. Soil sampling will be limited to hand-augered borings advanced within a fenced, rear yard located east of the structure. Building material samples will be limited to suspect asbestos containing materials (ACM) and painted surfaces. The duration of activities described in this SAP is approximately one to two days.

3.2.5 Step 5: Develop Decision Rules

Decision rules are specified in Table 1 and describe actions based on qualitative and definitive data. Laboratory analytical data for the soil samples will be compared to State of Nevada RC. Specifically, if sample results are less than 100 mg/kg, no further analyses or action on the soil will be necessary. If individual sample TPH results indicate soil impacts above 100 mg/kg, the associated sample will also be analyzed for PAHs by gas chromatography/mass spectrometry (GC/MS) using SIM and VOCs using GC/MS. If results indicate the impacted soil is greater than three cubic yards, the spill will be reported to the NDEP.

If asbestos quantities reported by the NVLAP approved laboratory are less than 1% by volume, then no further investigation or abatement will be necessary. If asbestos quantities reported by the NVLAP approved laboratory are greater than 1% within the sample collected, the building material sampled will be qualified as an Asbestos Containing Building Material (ACBM) and an abatement plan will be prepared to remove this material prior to renovation or demolition activities. If lead concentrations in collected samples are reported by the analytical laboratory to be less than 0.5% lead by weight, no further investigation or abatement will be necessary. If lead concentrations in collected samples are reported by the analytical laboratory to be greater than 0.5% lead by weight, the building material sampled will be qualified as containing lead in excess of acceptable levels the site owner (North Las Vegas) will be notified and options of abatement and demolition will be provided to them.

3.2.6 Step 6: Specify Tolerable Limits on Decision Errors

This is not a statistically based study; therefore, sampling locations will be selected based on professional judgment and site knowledge. Errors in selecting impacted and contaminated samples may occur, resulting in a false negative hypothesis that there is no contamination above regulatory levels. It is possible that soil contaminated by the prior release of a flammable material shows no sensory sign or elevated reading on the PID instrument and is therefore passed over as a sampling location. This could result in the conclusion that no existing soil contamination remains on site when there could be contamination above regulatory levels. However, because of the history of the site established by the Phase I ESA, such an error is likely to have little or no risk to future users because it is unlikely that a significantly toxic and persistent contaminant has ever been introduced to the site.

It is possible that areas of the existing site structures will not be accessible to fully or adequately assess for the presence of ACMs or LBP. It is also possible that the XRF unit will fail to accurately detect an area with LBP greater the 0.5% lead by weight. If such a situation does arise, it is also unlikely that such areas, if they exist or if the XRF fails, will be of a quantity that increases the risk to future users.

3.2.7 Step 7: Optimize the Sampling Design

The number of samples will be determined in the field using professional judgment such that samples are sufficient to determine the presence of contamination on site, if it exists. The site investigator responsible for soil sampling will thoroughly walk-over the entire area of the fenced, rear yard focusing on areas of visual contamination while assessing the presence of any petroleum related or chemical odors. The PID instrument should also be used in this process to identify the most impacted areas of soil if applicable. If no observable or detectable areas of surface contamination are noted in the investigation area, a minimum of three samples will be selected for borings and sampled. These areas will be discontinuous and selected such that they represent the near extent of soil within the bounds of the investigation. Daily field checks of the PID instrument will be performed prior to each day's use and in accordance with manufacturer instructions. This field check will be noted in the field book.

Visual observation will be used to select "suspect building materials" to sample for analysis of asbestos and lead. The technician will note any potential areas they could not access to assess either visually or with XRF.

Suspect materials for lead will be field-screened using a portable XRF instrument. An estimated 100 XRF readings will be conducted in the field, with 5 of these samples sent to the laboratory as confirmation samples. A field check will be performed in accordance with manufacturer recommendations prior to each day's use and will be noted in the field book.

It is estimated that a maximum of 15 soil samples, 30 asbestos samples, and 5 lead-based paint samples will be collected.

3.3 Data Quality Indicators (DQIs)

DQIs (precision, accuracy, representativeness, completeness, comparability and sensitivity [i.e., PARCCS parameters]) refer to quality control criteria established for various aspects of data gathering, sampling, and/or analyses. The DQIs are as follows:

- **Precision**: The degree of mutual agreement between or among independent measurements of a similar property (usually reported as standard deviation (SD) or relative percent difference) and relates to the analysis of duplicate laboratory or field samples.
- **Accuracy**: The degree of agreement of a measurement with a known or true value and is determined by comparing the reported laboratory value for a sample to a known or true concentration (i.e. matrix spikes, surrogate spikes, laboratory control samples and performance samples).
- **Representativeness**: The expression of the degree to which data accurately and precisely represent a characteristic of an environmental condition or population and relates to the method of collecting samples and determining sampling locations.
- **Completeness**: Expressed as the percent of valid usable data obtained compared to the amount that was expected.
- **Comparability**: The degree of confidence with which one data set can be compared to another.
- **Sensitivity**: Defined by the laboratory detection limits and are generally expressed in terms of method detection limits (MDLs) or reporting limits (RLs).

3.3.1 Precision and Accuracy

Data quality objectives will be met through adherence of required sampling methodology,

required laboratory analytical methods, and data review. Data are accepted and rejected based on the data quality objectives. If the data are near the regulatory limit and could be affected by variability and accuracy measures, such as low recovery for spikes or surrogates, then further evaluation may be conducted.

Accuracy is determined for field measurements by field equipment calibration before and after sample measurement using appropriate standards. For laboratory measures, accuracy is determined through field blanks, lab matrix spikes, certified reference material, and/or laboratory control samples.

Precision measurements are typically determined by the resolution of the instrument and through evaluation of field and laboratory duplicates. Field duplicates account for both precision of sampling techniques and laboratory analysis, as well as environmental variability. Field duplicates will consist of two grab samples collected in rapid succession from the same location. Laboratory duplicates are used to evaluate precision of the laboratory process.

With regard to asbestos, precision and accuracy are material dependent and must be determined by the individual laboratory for the percent range involved (EPA, 2006).

With regard to LBP sampling, accuracy will be determined based on the calibration of the XRF instrument prior to and after collecting the sampling data. If the post-collection calibration is not successful, then the data collected for the project will be thrown out and additional sampling will be required. Precision for LBP sampling will be determined by comparing duplicate sample collection data in the field.

3.3.2 Representativeness

Sampling locations will be selected using professional judgment and will adequately represent site conditions for the area or structure(s) being investigated.

3.3.3 Completeness

The project goal is to obtain a sufficient number of samples in the judgement of the site investigator that they believe they will characterize site conditions if there is the presence of suspected petroleum-based contaminants in the soil within the fenced back yard or ACMs or LPB within the site structures.

3.3.4 Comparability

Similar studies have not been performed at the project site in the past. Field and weather variations at the time of sample collection should not decrease comparability in relation to asbestos and lead testing if additional studies are performed in the future.

3.3.5 Sensitivity

The laboratory reporting limits are adequate for this investigation when comparing those to screening levels utilized for this project. The table below presents the constituents of concern and their associated reporting limits and screening levels.

Constituent of Concern	Method Detection Limit (MDL)/Reported Detection Limit (RDL)	Screening Level
TPH	MDL: 0.0289 mg/kg RDL: 0.10 mg/kg	100 mg/kg
Asbestos	< 1% by area if sufficient material is analyzed	1% by volume
Lead	0.01 mg/cm^2	1 mg/cm^2

3.4 Data Review and Validation

Data verification is the process of evaluating the completeness, correctness, conformance, and compliance of a specific data set against the method, procedural, or contractual requirements. Data verification evaluates whether sampling protocols, Standard Operating Procedures (SOP), and analytical methods were followed during data generation. Verification also involves examining the data for errors or omissions. Field and laboratory staff will verify that the work is producing appropriate outputs.

Data validation is a systematic process for reviewing a body of data against a pre-established set of acceptance criteria defined in this plan. Data validation is an analyte- and sample-specific process that extends the evaluation of data beyond data verification and is performed to determine the analytical quality of a specific data set. Validation involves a detailed examination of the data package to determine whether measurement quality objectives (MQO) for precision, accuracy, and sensitivity have been met. For this environmental assessment, the intent of the data review and validation process is to verify that the specified levels of precision, accuracy, reproducibility, completeness, comparability, and analytical sensitivity of the final results are achieved, with respect to the project MQOs, and that the data fulfill project DQOs.

MGA's QA officer will supervise or perform data quality assessment tasks. MGA will consistently evaluate and document measurement data to monitor consistency with MQOs, to quantitatively assess data quality, and to identify potential limitations to data use. MGA will review field and analytical laboratory data generated for this project, including the following:

- Chain of custody documentation;
- Laboratory batch QC frequency; and
- Results of batch and field QC analyses.

The laboratory will generate and review all laboratory data. Each data point will be assessed as non-qualified or qualified based upon the acceptance criteria. Data may be qualified as "estimated" (J-qualified); these data are used as is. Some data may be qualified as "rejected" (R-qualified) if critical QC parameters are not met; these data are unusable for any purpose. Sample re-analysis for data not meeting MQOs, will be considered as a possible corrective action. Third-party data validation will not be performed.

3.5 Data Management

Sampling will be conducted in accordance with MGA's SOP. A unique identification number will be assigned to each sample. The number will be an alphanumeric sequence that serves as an acronym to identify the sample. The following sections define the format will be used for the sample designation.

3.5.1 Soil Samples

Soil samples collected for this project will be identified based on the following unique identification system:

Sample ID: BRN028-SB-01-3.0

BRN028 - MGA Project Number

SB-01 – Soil Boring Number (i.e., #01)

3.0 – Depth of soil sample (i.e., 3.0 feet bgs)

3.5.2 Asbestos Samples

Asbestos samples collected for this project will be identified based on the following unique identification system:

Sample ID: BRN028-AB-01

BRN028 - MGA Project Number

AB-01 – Asbestos Sample Number (i.e., #01)

3.5.3 Lead Paint Samples

Bulk lead paint samples collected for this project will be identified based on the following unique identification system:

Sample ID: BRN028-LP-01

BRN028 - MGA Project Number

LP-01 – Lead Paint Sample Number (i.e., #01)

3.5.4 Field Logs

Field logs shall be maintained throughout the project. The following information shall be included on the field logs: description of activities conducted, dates and times, field checks and calibrations of tools and instrumentation used, field observations including current weather conditions, deviations from the sampling program, names of on-site personnel, and sampling locations.

Samples shall be preserved or cooled as required for each laboratory analysis. Samples shall be delivered or shipped to the laboratory under chain-of-custody protocol.

3.6 Assessment Oversight

Prior to commencing with field activities, the SAP and Health and Safety Plan (HASP) will be reviewed by the Project Team. A copy of the HASP is located in Appendix B. The MGA QA Officer will oversee QC of all field activities. If modifications to the proposed sampling program are required due to field conditions, the Project Manager shall be notified for direction. Any modifications to the sampling plan will be documented in the field logs and in the project report as "deviations from the sampling plan."

4. SAMPLING RATIONALE

Soil samples will be collected from various depths within each boring based on photoionization detector (PID) readings made during boring advancement. Asbestos and lead paint samples shall be collected from suspect building materials found within the structure.

An adequate number of samples will be collected to initially assess site conditions. Professional judgment shall be used to select sampling locations that are likely to provide data to address project DQOs (Table 1). Decision statements formulated in the project DQOs are largely concerned with delineating the extent and magnitude of contamination. It is estimated that a maximum of fifteen soil samples, thirty asbestos samples, and five lead-based paint samples will be collected for this assessment.

4.1 Soil Sampling

An initial walkthrough will be conducted to identify possible locations of petroleum impacted soil. During this walkthrough, the investigator will carefully observe the condition of the surface soil and identify all areas of discoloration or variation from the majority of the area. The investigator will pay attention to any petroleum or chemical odors they become aware of while performing this visual check. If there are areas that are ambiguous or multiple areas of equal impacts, the PID instrument should be used to try to verify or classify the level of contamination to maintain focus on the locations of highest impact. The investigator may also place a small quantity of suspect soil into a 4-ounce sample jar and take a PID reading over the headspace of the jar while keeping the lid close to the jar opening, allowing only enough space for the entry of the probe of the PID. Borings will be advanced at locations where staining and/or the presence of

petroleum odors are observed or detected. If no areas of potential contamination are detected, a minimum of three samples will be selected for borings and sampled. These areas will be discontinuous and selected such that they represent the near extent of soil within the bounds of the investigation. At each selected location, a hand auger sampling kit will be utilized to advance each boring. Soil samples will be collected from each boring at select depths and sample locations will be screened using the PID during boring advancement. MGAs SOP for PID soil screening and soil sampling can be found in Appendix C. A minimum of three soil samples will be collected from each boring. A copy of MGA sampling label is located in Appendix D.

4.2 Asbestos Sampling

An initial walkthrough will be conducted to identify homogeneous suspect materials containing asbestos and their respective locations. This information will be used to develop a sample collection strategy. Once suspect bulk materials are identified, samples will be collected and provided to a NVLAP accredited laboratory for analysis

The asbestos assessment will be conducted to identify the presence of any materials containing asbestos pursuant to the following requirements:

- EPA's 40 CFR Part 61 – National Emission Standard for Asbestos (NESHAP)
- EPA's 40 CFR Part 763, Subpart E – Asbestos-Containing Materials in Schools (AHERA)

The survey will identify the quantity and locations of asbestos containing materials within the facility structures. This information can then be used to develop a project specification for the removal of ACM prior to building renovation. A maximum of 30 samples are anticipated to be collected for this assessment.

4.3 Lead-based Paint Sampling

In order to identify building materials containing LBP, XRF testing will be conducted to identify the presence and content level of lead. An initial walkthrough will be conducted to identify and list all testing combinations and room equivalents. Testing combinations will then be selected prior to XRF testing. Once selected, the XRF Analyzer will be calibrated with subsequent testing being conducted on the structure. If necessary, bulk paint chip samples will be collected to confirm XRF readings. An estimated 100 XRF readings will be conducted and five bulk confirmation samples are estimated to be collected.

5. REQUEST FOR ANALYSIS

Laboratory analyses for each collected sample are discussed in Section 5.1 below.

5.1 Analyses Narrative

5.1.1 Soil Samples

It is anticipated that three to five borings will be advanced on the subject property. A minimum of three soil samples will be collected from each boring for analytical testing. The soil samples will be collected as described in Sections 4.1 and 4.2 and analyzed for the following:

- TPH full range (includes gas, diesel, and oil): EPA Method 8015B;
- PAH-SIM: EPA Method 8270C SIM (if necessary); and
- VOCs: EPA Method 8260B (if necessary).

5.1.2 Suspect ACM

Samples collected from suspect ACM shall be analyzed using polarized light microscopy (PLM)/Stereomicroscopy for bulk asbestos samples. These methods are described in 40 CFR Part 763, Appendix E to Subpart E (interim and EPA 600/R-93/116, improved).

5.1.3 Paint

Paint samples will be analyzed via XRF during the field assessment. Bulk paint chip samples utilized for confirmation shall be analyzed by atomic absorption spectrometry (AAS) using method SW-846 Method 7420.

5.2 Analytical Laboratory

Analytical testing on soil samples shall be conducted by Asset Laboratories. Analytical testing and sample handling shall be conducted in accordance with their SOPs (Appendix A). Asset Laboratories is certified for VOC, PAH-SIM, and TPH analysis in the State of Nevada.

All asbestos and LBP analysis shall be conducted by TESC and Schneider Laboratories. Analytical testing and sample handling shall be conducted in accordance with their SOPs (Appendix A). TESC and Schneider are accredited by the NVLAP for analysis of asbestos. In addition, TESC and Schneider are certified for metals analysis in the State of Nevada.

6. FIELD METHODS AND PROCEDURES

6.1 Field Equipment

6.1.1 List of Equipment Needed

- Field logbook and field data sheets;
- Personal protective equipment (Level D);
- Tape measure;
- Camera;
- Hand auger sampling kit with sampling sleeves;
- 30-gallon drum;
- PID instrument;
- 4-oz glass sample containers;
- Volatile organic analysis (VOA) vials;
- Cooler and ice;
- Sample labels;
- Pick axe;
- Shovel;
- Stainless steel bowls and scoops;
- Decontamination supplies;
- Knife/box cutter with retractable blade;
- Zip-lock type bags;
- Permanent marker; and
- Surface tape.

6.1.2 Calibration of Field Equipment

All field equipment will be calibrated according to the manufacturer's guidelines and specifications. Calibration records will be logged in field notebooks.

6.2 Field Screening

PID screening of soil collected from boring advancement will be utilized to help determine collection locations for soil samples. MGA SOP utilized for screening is provided in Appendix C.

6.3 Soil Sampling

6.3.1 Surface Samples

Surface samples are not anticipated to be collected for this project. However, if surface soil sampling is performed, sample collection will be conducted in accordance with MGA's SOP as presented in Appendix C.

6.3.2 Sub-surface Samples

Sub-surface soil samples will be collected in accordance with MGA's SOP as presented in Appendix C.

6.4 Asbestos Sampling

An initial walk through of the subject site will be conducted in order to identify homogeneous suspect materials containing asbestos and their respective locations. This information will then be used to develop a sample collection strategy. Samples will be collected and recorded on a chain-of-custody form. This form accompanies the samples to laboratories, which is accredited by the NVLAP for analysis of asbestos. The location of each collected sample will be documented through the use of field notes.

Samples shall be collected from suspect ACM by cutting material using a clean knife. Samples shall be at least two square inches or two tablespoons in size. Care shall be taken to minimize disturbance to the material. The samples shall be placed in a zipper-lock type bag which will be sealed and labeled prior to delivery to the receiving laboratory.

6.5 Lead-Based Paint Sampling

An initial walk through of the subject site will be conducted in order to identify and list all testing combinations and room equivalents. Testing combinations will be selected prior to XRF testing. The XRF Analyzer will then be calibrated and testing of all room equivalents and testing combinations will be conducted. Testing will be conducted in accordance with chapter seven of the Guidelines of the Evaluation and Control of Lead Based Paint Hazards in Housing published by the Department of Housing and Urban Development (HUD). Interior and exterior XRF readings will be taken on determined surfaces on each building component in each room equivalent. The HUD definition of lead based paint is a lead value equal to or greater than 1.0 mg/cm2. All results above this level are considered positive and all results found below this level are considered negative.

Bulk paint chip samples shall be collected from painted surfaces to provide laboratory confirmation of positive XRF results. Professional judgment will be utilized for collection of confirmation samples. However, per Section 10.3, a minimum of one confirmation sample will be collected per building. All confirmation samples shall be collected from painted surfaces using a clean knife. The samples shall be placed in a zip-lock type bag which will be sealed and labeled prior to delivery to the receiving laboratory.

6.6 Decontamination Procedures

All field equipment which comes in contact with potentially contaminated soil will be decontaminated in accordance with MGA's SOP as presented in Appendix C. Decontamination will occur prior to and after each use of a piece of equipment.

7. SAMPLE CONTAINERS, PRESERVATION AND STORAGE

7.1 Soil Sampling

7.1.1 Soil Sample Containers

Soil samples will be collected in dedicated sample containers provided by the analytical laboratory. The soil samples will be delivered to the laboratory within an acceptable period of time. Appendix C provides MGA's SOPs for sampling.

7.1.2 Soil Sample Preservation and Storage

Collected soil samples will be chilled to 4°C within a laboratory supplied cooler upon collection and during transport to the laboratory.

7.2 Asbestos Samples

Asbestos samples shall not be chilled. Care shall be taken to prevent deterioration or damage to samples during transit.

7.3 Lead-based Paint Samples

Paint samples shall not be chilled. Care shall be taken to prevent deterioration or damage to samples during transit.

8. DISPOSAL OF RESIDUAL MATERIALS

No investigation-derived waste is anticipated to be generated during this investigation. Any investigation-derived waste that is generated will be disposed of in accordance with local, state, and federal regulatory requirements.

9. SAMPLE DOCUMENTATION AND SHIPMENT

9.1 Field Notes

9.1.1 Field Logbooks

Field logs will be completed describing all field activities. The following information will be included in the field logs:

- Project name and location;
- Weather Conditions;
- Sampling location and description utilizing a survey- or mapping-grade GPS unit;
- Site plan showing sample locations;
- Sampler's name (s);
- Date and time of sample collection;
- Type of sample (e.g., soil, groundwater, asbestos, or lead-based paint);
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of samples (e.g., noticeable odors, colors, etc.);
- Sample preservation;
- Lot number of the sample containers, sample identification numbers and explanatory codes, and chain-of-custody form numbers; and
- Name of recipient laboratory.

9.1.2 Photographs

Photographs will be taken at select sampling locations. They will serve to verify information entered in the field logbook. For each photograph taken, the following information, at a minimum, will be written in the logbook:

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

9.2 Labeling

All samples collected will be labeled in a clear and precise manner for proper identification in the field and for tracking in the laboratory. A copy of a label is provided in Appendix D. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information:

- Sample location;
- Date and time of collection;
- Analytical parameter(s) requested; and
- Method of preservation.

9.3 Sample Chain-of-Custody Forms and Custody Seals

All samples shall be delivered to the laboratory under chain-of-custody protocol. All chain-of-custody forms and sample labels will be signed and dated. A copy of the chain-of-custody form is provided in Appendix E. Laboratory supplied custody seals shall be used to seal the screw lid of each sample container.

9.4 Packaging and Shipment

Samples shall be placed in a sturdy cooler. Bubble wrap shall be placed in the bottom of the cooler and sample containers shall be placed in containers provided by the laboratory. Ice shall be packed in zipper-locked, double plastic bags. Empty space in the cooler shall be filled with bubble wrap.

10. QUALITY CONTROL

10.1 Field Quality Control Samples

Samples will be collected in accordance with industry standard procedures. One equipment rinsate blank sample will be collected during this investigation. The collection of this sample will determine if field decontamination procedures have been successfully implemented.

10.2 Background Samples

No background samples are anticipated to be collected during this investigation.

10.3 Field Screening and Confirmation Samples

Field screening for soil samples will be performed utilizing a properly calibrated PID instrument. No confirmation soil samples will be collected during this investigation. Confirmation bulk lead samples will be collected to confirm positive results from real-time XRF data.

10.4 Assessment of Field Variability (Field Duplicates or Co-located Samples)

The scope of this project includes the collection of soil samples. As soils and sediments are generally too heterogeneous to assess the precision of sample collection, field-duplicate soil samples will not be collected for this project.

10.5 Laboratory Quality Control Samples

Laboratory QC (e.g., matrix spike/matrix spike duplicate samples) samples will be analyzed to monitor the precision and accuracy of its analytical procedures.

11. FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this SAP. Modifications to the approved SAP will be noted in the field log book and documented in the sampling project report.

12. FIELD HEALTH AND SAFETY PROCEDURES

A site-specific HASP is provided in Appendix B. The HASP shall be reviewed by all on-site personnel prior to commencing with field activities.

13. SCHEDULE FOR SAMPLING ACTIVITIES

MGA will commence with the activities proposed herein upon receiving NDEP approval of this SAP. It is anticipated that field activities will be completed within three weeks of receiving SAP approval. However, the field activities will be reliant upon amenable weather conditions.

14. REFERENCES

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Nevada Division of Environmental Protection, 2013. *Final Nevada Brownfields Program Quality Assurance Program Plan*.

Natural Resources Conservation Service, 2014. Web Soil Survey: Clark County, Nevada, South Part (NV788). Version 10, August 22, 2014. United States Department of Agriculture. (*http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx*)

US EPA. 2006. *Guidance on Systematic Planning using the Data Quality Objectives Process*. February. EPA QA/G-4, EPA/240/B-06/001

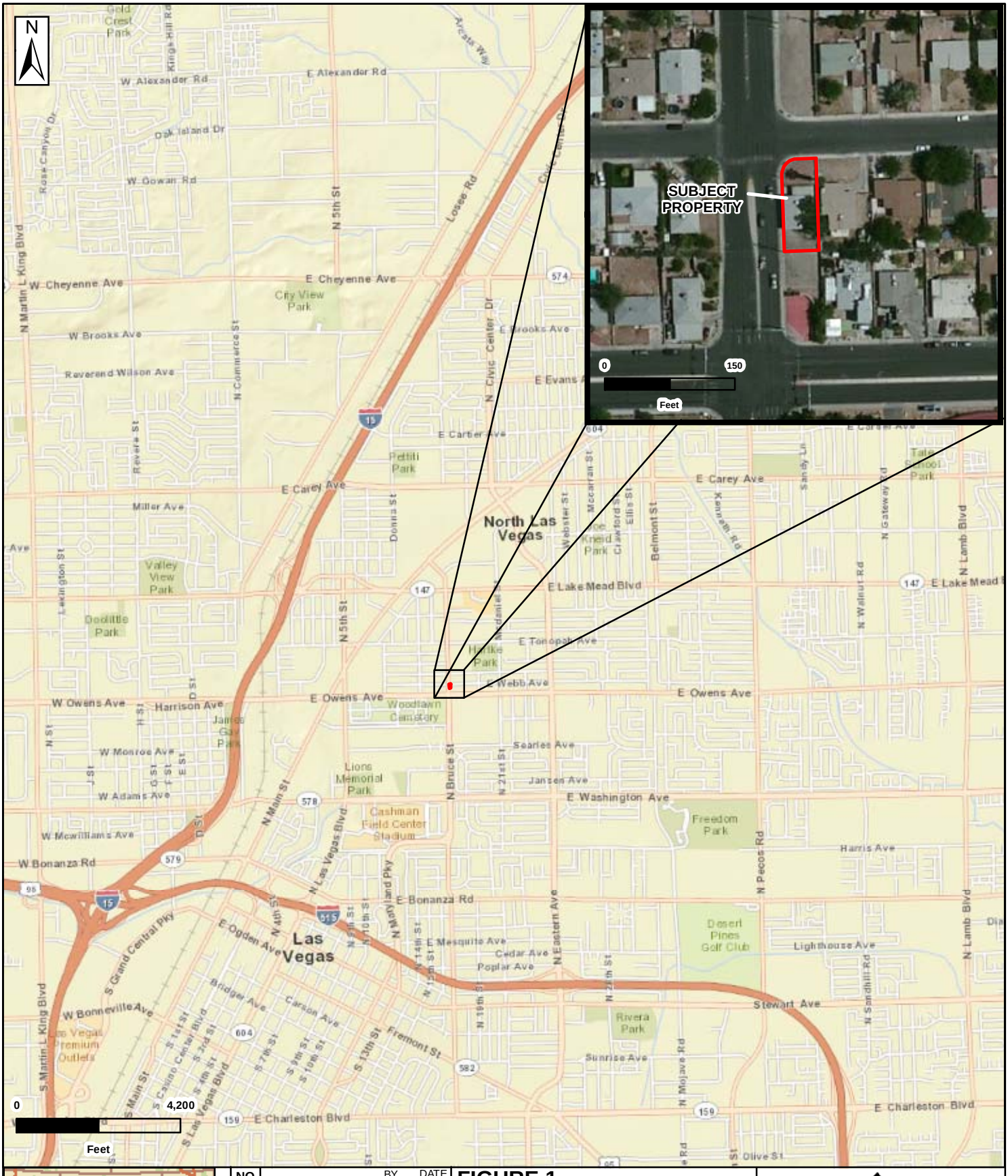
Table 1. DQO Summary Table for Environmental Sampling, APN 139-23-812-025, 1301 East Webb Avenue, North Las Vegas, Nevada						
STEP 1	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**	**STEP 7**
State the Problem	**Identify the Goals or Decisions of the Study (Decision Statements)**	**Identify Information Inputs Needed**	**Define Study Boundaries**	**Develop Analytical Approach (Decision Rules)**	**Specify Acceptance Criteria (Tolerable Limits on Errors)**	**Optimize Plan for Obtaining Data (Sampling Design)**
The City of North Las Vegas would like to redevelop a blighted property; however signs posted on the property suggest some type of hazardous substances may have been stored on site in the past. Additional data are needed to evaluate if petroleum products or flammable hazardous materials are present in site soils and the nature and extent of those materials if present. Testing for asbestos and lead-based paint is needed before demolition or renovation of the building (built in 1957) and the storage unit located on the property.	(1) Do detected concentrations of TPH in soil exceed the RC of 100 mg/kg by USEPA Method 8015B? (2) Does the volume of contaminated soil (with concentrations greater than the RCs) exceed 3 cubic yards? (3) Do asbestos levels within building materials exceed 1% within the sample (i.e., regulatory action levels established under OSHA 29 CFR 1926.1101, NAC 618.850-618.986, NESHAPS 40 CFR 61.141 and/or AHERA 40 CFR Part 763). (4) Do lead concentrations in paint found on building materials exceed regulatory action levels for lead (>0.5% by weight) established under 40CFR Part 745 or TSCA 402(c)?	Historical data Analytical data for soil samples to be collected Data for lead-based paint and asbestos in building RCs for contaminants in soil Analytical data necessary for proper disposal of soil and investigation-derived waste Reporting limits for chemicals of concern (to confirm that analytical reporting limits are less than action levels) Field XRF data for lead and 5 percent confirmation samples sent to the laboratory	<u>Soil Samples:</u> Soil samples will be collected within the fenced rear yard (east side) of the vacant house. It is estimated that 3 to 5 borings will be performed in this sample area using a hand auger. <u>Asbestos and Lead-Based Paint:</u> Building material samples that are found in the vacant house and storage shed and that are suspected of containing asbestos or covered by lead-based paint will be investigated in this study. Duration of sampling activities for soil and building materials are anticipated to take 1 to 2 days of work in the field.	(1a) If detected concentrations of TPH exceed 100 mg/kg, then the sample will be analyzed for selected constituents (PAHs by GC/MS using SIM (Method 8270C) and VOCs by GC/MS (Method 8260B). Constituent concentrations will be compared to Nevada RCs. Additionally, the volume of contaminated soil will be estimated. (1b) If TPH is not detected, or if concentrations of TPH in soil do not exceed 100 mg/kg, then no additional analyses will be performed and volume estimates will not be necessary. (2a) If the volume of contaminated soil (see 1a) exceeds 3 cubic yards, then the discovery will be reported to the NDEP. (2b) If the volume of contaminated soil is less than 3 cubic yards, then this will be noted, but will not be called into the NDEP spill-reporting line. (3a) If asbestos levels within building materials exceed 1% within the sample (i.e., regulatory action levels established under OSHA….etc.), then the building material will be qualified as an ACBM and an abatement plan will be prepared to remove this material prior to renovation activities. (3b) If asbestos is not detected or if levels within building materials do not exceed 1% within the sample, then no abatement plan is needed prior to renovation. (4a) If the concentration of lead in paint on building materials exceeds the regulatory action level for lead (>0.5% lead by weight), then the building material will be qualified as “containing lead in excess of acceptable levels and an asbestos-abatement plan will be prepared to remove this material before renovation. (4b) If the concentration of lead in paint on building materials does not exceed the regulatory action level for lead (i.e., is <0.5% lead by weight), then no lead-abatement plan is needed for renovation.	Not a statistically based sampling plan and professional judgment might miss areas of potential contamination. 1) Areas of prior release show no visible signs of impact or are not detected by the PID. 2) Materials containing ACMs or covered by LBP are not accessible for visual identification or are missed due to mal-function of the XRF. Based on the site’s history and past uses, it is very unlikely that releases of regulated materials exceeded a few gallons; therefore, the risk in not identifying an area of contaminated soil should not pose regulatory or health-based consequences. Regarding the existing building, if demolished, lead-based paint on the structure’s surfaces can be disposed of as C&D debris compliantly. ACM material may be recognized and managed appropriately after starting demolition or may prove non-friable.	Samples will be collected based on professional judgment. A PID will be used in the field to help identify boring locations, screen soils during boring advancement, and to help guide selection of soil intervals for sampling. The instrument lamp is selected to optimize detection of most likely contaminants (i.e., petroleum fuel). A field check will be performed in accordance with manufacturers recommendations prior to each day’s use and will be noted in the field book. Visual observation will be used to select “suspect building materials” to sample for analysis of asbestos and lead. Technician will note any potential areas they could not access to assess either visually or with XRF. Suspect materials for lead will be field-screened using a portable XRF instrument. An estimated 100 XRF readings will be conducted in the field, with 5 of these samples sent to the laboratory as confirmation samples. A field check will be performed in accordance with manufacturer’s recommendations prior to each day’s use and will be noted in the field book. It is estimated that a maximum of 15 soil samples, 30 asbestos samples, and five lead-based paint samples will be collected.

Notes:

Table 2: Method Precision and Accuracy Goals for Select COCs, Reporting Limits and Nevada RC				
Matrix Spike Compound	**Recovery (%)**	**RPD (%)**	**Laboratory Reporting Limit**	**Nevada RCs**
TPH Gas Range (GRO)	67-135	20	1	100
TPH Diesel Range (DRO)	50-150	<20	40	100
Benzene	65-128	20	0.001	0.03
Toluene	70-120	20	0.005	12
Ethylbenzene	74-128	20	0.001	5.7
Total Xylenes	74-127	20	0.003	210
Acenaphthene	22-139	36	0.006	570
Acenaphthylene	33-118	35	0.006	NA
Anthracene	65-119	20	0.006	1,200,000
Benzo(a)anthracene	77-123	20	0.006	0.15
Benzo(a)pyrene	68-118	20	0.006	0.015
Benzo(b)fluoranthene	68-110	20	0.006	0.15
Benzo(g,h,i)perylene	57-118	28	0.006	NA
Benzo(k)fluoranthene	70-124	20	0.006	1.5
Chrysene	79-125	20	0.006	15
Dibenzo(a,h)anthracene	64-121	25	0.006	0.015
Fluoranthene	76-121	20	0.006	2,300
Fluorene	47-126	28	0.006	560
Indeno(1,2,3-c,d)pyrene	62-121	26	0.006	0.15
Naphthalene	11-104	49	0.006	3.9
Phenanthrene	63-118	20	0.006	NA
Pyrene	77-125	20	0.006	1,700

RPD: Relative Percent Difference

NA: Not applicable



NO.	BY	DATE

REVISIONS

A

DESIGNED	SH
DRAWN	TAD
CHECKED	SH
APPROVED	

JOB NO.: BRN-028

FIGURE 1

PROJECT LOCATION MAP
-SHOWING-
APN 139-23-812-025
1301 EAST WEBB AVE.
NORTH LAS VEGAS, NEVADA

McGinley & Associates
Environmental Engineering and Science
RENO | LAS VEGAS | www.mcgis.com

COORDINATE SYSTEM:
NAD 1983 UTM Zone 11N

BRN 028 01
5/5/2015

REVISIONS

NO.	BY	DATE

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JOB NO.: BRN-028

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CHECKED	SH
APPROVED	

FIGURE 2

SITE MAP
-SHOWING-
APN 139-23-812-025
1301 EAST WEBB AVE.
NORTH, LAS VEGAS

McGinley & Associates
Environmental Engineering and Science
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COORDINATE SYSTEM:
NAD 1983 UTM Zone 11N

BRN 028 02
5/5/2015

APPENDIX A

Laboratory Data Quality Objectives and Sample Handling Procedures

QUALITY ASSURANCE MANUAL
Revision 8.0

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for

ASSET LABORATORIES

ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

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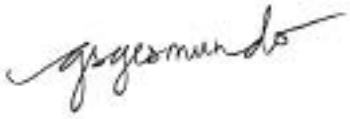
Quality Assurance Manual

APPROVAL SIGNATURES

12/02/14

Puri Romualdo
Laboratory Director

Date



12/02/14

Glen Gesmundo
QA Manager

Date

SECTION 1.0 TABLE OF CONTENTS

LIST OF REFERENCED LABORATORY SOPs

SOP No.	Title	Revision No.
GE-JOBS-01	Job Description	3.0
GE-DCONTROL-02	SOPs, Logbooks Generation, Maintenance and Storage	4.0
GE-PROCUREMENT-01	Procurement of Supplies, Material, and Services	4.0
GE-AUDITS-01	External Audits and Internal Audits	4.0
GE-CLIENTS-01	Client Complaints	4.0
GE-NONCONFORM-01	Non Conformance and Corrective Action	5.0
GE-TRAININGPROGRAM-01	Employee Training Program	4.0
GE-ETHICS-01	Ethics and Data Integrity	4.0
GE-SOP-01	Standard Operating Procedures (SOPs)	4.0
GE-MDLS-01	Method Detection Limits and Instrument Detection Limits	5.0
GE-UNCERTAINTY-01	Procedures for Estimating Uncertainty	4.0
GE-MINTEGRATION-01	Manual Integrations	6.0
GE-BALANCES-01	Calibration of Analytical Balances and Top-loading Balances	4.0
GE-THERMOMETER-01	Thermometers	4.0
GE-ICODE-01	Inorganic Standard Codes	4.0
GE-STDCODE-01	Organic Standard Codes	4.0
GE-SUBSAMP-01	Subsampling	3.0
GE-LOGIN-01	Sample Receipt, Control and Login	6.0
GE-DISPOSAL-01	Sample Disposal	4.0
GE-PT-01	Proficiency Testing Program	5.0
GE-CCHARTS-01	Control Charts and Control Limits	6.0

LIST OF TABLES

LIST OF APPENDICES

SECTION 2.0 INTRODUCTION, SCOPE AND APPLICABILITY

2.1 Introduction

ASSET LABORATORIES is a full service analytical laboratory specializing on providing analytical laboratory support services for compliance with routine and non-routine investigations. Clientele includes consulting and engineering firms, city/local agencies, various state agencies, hazardous waste haulers and others clients requiring analytical services.

It is the purpose of this document to describe ASSET Laboratories' program to assure that analytical data generated by laboratory are of known and documented quality. The policies and procedures in this document have been developed to meet US Department of Defense, Quality Systems Manual for Environmental Laboratories Version 4.2, dated 2010, The NELAC Institute (TNI) Standard, dated 2009 Volume 1 Modules 2 and 4, applicable regulatory agency requirements where the laboratory is accredited with and client specific project requirements. This manual is in compliance with various laboratory accreditations and certifications listed in Appendix L.

2.1.1 Company Vision

ASSET Laboratories' Vision is to grow through client directed partnering and the acquisition or placement of strategically located Laboratories and Service Centers worldwide.

2.1.2 Mission Statement

ASSET Laboratories' Mission is *Customer Satisfaction,* which is achieved by providing the best possible laboratory services in a timely manner with emphasis on Quality, Cost Effective results, Safety and a regard for the environment.

2.1.3 Company Goals

ASSET Laboratories management and its employees are doing every effort to achieve the following company goals:

- Excellence
- Continuous Accessibility for clients
- Mutually beneficial cost effective pricing for Client and ASSET Laboratories
- Unexcelled attention to details
- Highly-trained staff
- Technical sophistication of employees and equipment
- Diverse Technical Services
- Training and education for ambitious, self-motivated and co-operative individuals
- Clean and safe working environment
- Staff and equipment redundancy

2.2 Terms and Definitions

A Quality Assurance Program is a planned system of activities designed to ensure that analytical data generated by the laboratory are of known and documented quality.

Refer to Appendix A for the Glossary/Acronyms

2.3 Scope

The laboratory analyzes environmental and industrial samples which vary from wastewater, drinking water, groundwater, soil, sediments and air matrices. The Quality Assurance Manual describes procedures and methods to conduct analyses of these samples. It also contains guidelines for documenting the analytical processes from the start of a project until the results are delivered to clients. These processes includes reviewing of requests & contracts, servicing clients, sample receiving, tracking of samples received in the laboratory, analyzing samples, reviewing and reporting results.

This document aims to define the minimum level of quality assurance and quality control necessary to meet the requirements of US DoD, NELAC, and applicable regulatory agency where the laboratory is accredited with.

2.4 Management of the QA Manual

This Quality Assurance Manual is reviewed annually to assure that it remains current and in compliance with applicable regulations and client specifications. The Quality Assurance Manager is responsible for the review and the revision if necessary. The QA Manager can make changes in the normal course of business and all changes are integrated into the revised manual. All updates and changes are done following Document Control (see Section 5.0).

SECTION 3.0 ORGANIZATION

Appendix B shows the organizational structure of the analytical services within ASSET Laboratories and a table of Key Personnel along with their assignments, responsibilities, education, and years of applicable experience.

Deputies and/or designees are appointed by the management in the absence of the key personnel in the laboratory.

3.1 Roles and Responsibilities

Quality system is the responsibility of every employee of the laboratory. All employees have access to this manual, are trained to this manual, and conduct their everyday tasks in accordance with the procedures in this manual and laboratory's SOPs.

Specific roles and responsibilities of ASSET Laboratories management and staff related to production of quality data are presented in SOP GE-JOBS-01, Job Description and are summarized as follows:

3.1.1 President

The President has the overall responsibility for the general operations of ASSET Laboratories, including but not limited to Administration, Business Office, Regulatory Affairs, and Technical Operations.

The President is responsible for:

- Supervising and administrating the quality assurance program
- Ensuring that all general and client-specific quality assurance requirements are strictly followed.
- Resolving the approval/rejection of deliverable client sample data package and/or reports.

3.1.2 Laboratory Director

The Laboratory Director is directly involved in the day-to-day operation such as scheduling, staff training, QAPP implementation, and technical peer reviews.

Specific responsibilities include, but are not limited to:

- Researches, analyzes and modifies, as needed, test methods and procedures. Reviews and approves new and revised Standard Operating Procedures (SOPs) and other laboratory documents. Complies with and implement current SOPs, Good Laboratory Practices (GLPs), Chemical Hygiene and Health & Safety requirements.
- Reviewing and approving, together with the QA Manager, project proposals from marketing including project's QAPP, in accordance with the established procedure for the review of new contracts. This is to ensure identification of capabilities and

limitations of the laboratory. Discrepancies are resolved before the contract is signed and project is initiated.

- He/She reviews schedules of laboratory workloads to ensure timely completion of projects.
- Overseeing and supports staff training to assure that documentation is complete and accurate and that new employees are properly trained.
- Monitoring validity of analyses performed and data generated in the laboratory. Reviews analytical results to assure data quality & defensibility. Also reviews critical technical data and investigations.
- Recommending process improvements and corrective actions.
- Enforcing current Company policies and procedures, QA/QC procedures including safety rules and regulations from ELAP, NELAP, Nevada and all pertinent accreditation and regulatory requirements within the laboratory.
- Ensuring that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory. Oversees, participates and approves the interviewing, recommends hiring, of departmental employees.
- Creating, planning and implementing goals, objectives and practices for effective, efficient and cost effective management of allocated resources.
- Maintaining an environment that emphasizes an intelligent and responsible approach to producing high data quality and accuracy based on the SOPs carried out.
- Coordinates audit responses with the QA Manager.
- Performing annual management review together with the QA Manager to evaluate suitability and effectiveness of quality system and make necessary changes or improvements

3.1.3 Quality Assurance Manager (QA Manager)

The QA Manager reports directly to the President and is responsible for all matters on laboratory quality assurance.

Specific roles include but not limited to:

- Serves as the focal point for QA/QC in the laboratory
- Having functions independent from the laboratory operations for which he/she has quality assurance oversight.

- Having documented training and/or experience in QA/QC procedures and be knowledgeable in the quality system.

- Responsible for implementation and monitoring of the laboratory quality assurance program. Training and advising all laboratory staff on QA/QC procedures to their daily tasks. Provides training to employees on ethics and data integrity.

- Ensuring that all data generated is scientifically sound, legally defensible, and of known precision and accuracy.

- Developing and implementing new QA procedures within ASSET Laboratories to improve data quality.

- Conducting internal audits and inspections of all departments on a periodic basis at least annually; reporting the results of the audits to the Laboratory Director, and Department Supervisors/Group Leaders; and implementation of corrective actions to ensure compliance with the QA plan.

- Monitoring and evaluating laboratory certifications; scheduling proficiency testing samples.

- Coordinating the analysis of performance evaluation (PE) samples for all analytical departments on a periodic basis.

- Evaluating the results; reporting the results to the President, Laboratory Director, and appropriate Supervisors; and applying corrective actions as needed.

- Establishing and maintaining statistical and data records that accurately reflect the quality assurance performance of all analytical departments.

- Maintaining and overseeing the master sources of all SOPs, training logs, and completed/full laboratory notebooks.

- Responsible for filing and reviewing training records of employees.

- Serving as the in-house client representative on all projects inquiries involving data quality issues.

- Maintaining and updating the QA Manual on an annual basis (minimum).

3.1.4 Laboratory Supervisor(s)/Group Leader(s)

The Laboratory Supervisors are directly involved in the day-to-day such as scheduling, supervision of laboratory procedures and reporting of results, staff training, etc. of their respective departments. He/She reports to the Laboratory Director. The Laboratory Supervisors/Group Leaders are responsible for:

- Enforcing the QA/QC procedures and requirements within their respective activities and areas of specialization.

- Monitoring validity of the analyses performed and data generated in the laboratory to assure reliable data.

- Supervising the staff training in the procedures described in the standard operating procedures (SOPs) as they apply to the assigned responsibilities of the staff.

- Recommending process improvements and corrective actions

3.1.5 Project Manager (PM)

The Project Manager has the overall responsibility for the technical completeness, subcontracting, invoicing, cost control, and adherence to schedules. He/She has to perform the roles of a Document Control Officer. He/She reports to the Laboratory Director.

Specific responsibilities include but not limited to:

- Implementing the appropriate quality procedures for project activities in support of the QAPP.

- Communicating with the Laboratory Director and/or QA Manager relating to QA/QC activities

- Communicating with client on their queries, clarifications or requests, and coordinating it back to the Laboratory Director and/or designee for approval

- Communicating with client on all inquiries involving project-specific issues.

- Responsible for the filing, offsite archival, retrieval and storage of all documents

3.1.6 Sample Control Officer

The Sample Control Officer has the primary responsibility of managing the day to day activities of the sample control section.

Specific responsibilities include but not limited to:

- Overseeing sample log-in and its proper documentation

- Sample tracking, sample storage, sample disposal/return

- Bottle preparation and packaging

- Subcontracting of analysis

- Coordination and scheduling of sampling programs

- Client contact for verifications, non-conformances and TAT requests
- Assists with contract administration

3.1.7 Staff (Chemists, Analysts, Technicians)

Every ASSET Laboratories personnel are responsible for the quality of work that is consistent with the requirements established by ASSET Laboratories management. The laboratory personnel play an active role in the laboratory quality program and whenever possible, make recommendations regarding the process improvements and corrective actions. Specific job descriptions are available in the Human Resource File. He/She reports to Department Supervisor/Group Leaders.

ASSET Laboratories personnel responsibilities include but not limited to:

- Performs environmental sample analyses in accordance to approved laboratory SOPs, instrument/equipment maintenance and prepares data packages.
- Providing the management and the QA Manager with the immediate notifications of the quality problems by submitting Non-Conformance forms.
- Identifying and carrying out the approved corrective actions within their respective activities and specialization.
- Participating in the training program (including reading SOPs and QA Manual, MDL determinations and Accuracy and Precision data).
- Following QA/QC criteria for all program requirements.
- Correct reporting of sample results and QC samples.

3.1.8 Support Services Group

ASSET Laboratories recognizes the need for developing ways to be able to address critically-important projects' turnaround time. This is most important when spikes of samples are received, especially when the request is in RUSH turnaround time and/or the samples are short hold.

Since the conceptualization of a branch office in the Philippines, the concept of having an overflow support service for the Las Vegas operations has been included in the objective. By utilizing the time difference between the US and the Philippines, analysis can take place constantly without sacrificing quality and having to have our chemists work long hours doing clerical work like data packaging. In providing support services, analyst can focus and give more attention to sample analysis and providing clients with quality data.

Since the Philippine operations will be a branch office of our ASSET Laboratories Las Vegas operations, all protocols, manuals, SOPs and overall quality will be upheld.

Dedicated personnel in Las Vegas will oversee the processes and operations in the Philippine branch to make sure that no deviations will be made from the SOPs. These, plus scheduled external and internal audits, both for laboratory operations and remote operations, will ensure consistency and adherence to protocols. All audits, assessment and various metrics will be reported to the Las Vegas QA Manager for documentation.

The support group primarily works to provide assistance to ASSET Laboratories in providing quality work to clients. The group coordinates directly to the supervisor who requested support.

Specific responsibilities include but not limited to:

3.1.8.1 Sample Control

- Logging in of samples in ELIMS
- Processing and Sending of Sample Receiving Documents to Clients
- Coordination with Chemist on RUSH and Short Hold Samples

3.1.8.2 Project Management

- Login Review
- Putting sales order entry to MAS promptly
- Preparing invoices
- Sending of Invoice to Clients Electronically
- Keeping Track of Client Requests
- Keeping Track of Invoice Amount

3.1.8.3 Quality Assurance

Processing documentation of the following:

- MDL Study Evaluation
- LOD/PQL Verification Evaluation
- DOC Evaluation
- SOP updating
- Control Chart Generation and Monitoring

3.1.8.4 Report Packaging

Support services also package electronically the analytical results to level 2, 3 or 4 as per client requirement. This includes merging of various summaries and raw data (i.e. instrument output, standard logbook, calibration summaries and tune files where applicable).

3.1.8.5 Management Information System

- Server Maintenance and Monitoring
- Database Administration and Maintenance
- Network Administration and Troubleshooting
- Programming and Coding Requests

3.2 Deputies

The following table defines who temporarily assumes the duties and responsibilities of key personnel in their absence:

Table 3-2. Key personnel Deputies

Key Personnel	Deputy
President	Laboratory Director
Laboratory Director	QA Manager
QA Manager	Laboratory Director
Supervisor/Group Leader	Laboratory Director
Project Manager	QA Manager
Sample Control Officer	Project Manager

In the case of absence of both Laboratory Director and QA Manager, the Department Supervisors/Group Leaders and/or designee will perform the duties and responsibilities of the job.

SECTION 4.0 QUALITY SYTEM

4.1 Quality Policy Statement and Objectives

ASSET Laboratories is committed to provide the client with analytical data of known and documented quality to meet its data quality objectives in a reasonable time frame and at a fair cost. The reliability of the data generated by ASSET Laboratories is measured by the close adherence to quality control, qualifications and experience of personnel, and the organization's commitment in maintaining data integrity, validity, and usability.

The following statements describe the quality of the data required to be usable for the client.

4.1.1 Data Quality Objectives (DQOs)

Data quality objectives are used to assess the minimum data quality to ensure that the amount, type, and quality of data obtained during analytical processes are adequate to support and draw valid conclusions with a known level of confidence. DQOs also support specific decisions, and planning relative to remedial and regulatory actions.

The data quality objectives process facilitates the determination of the following:

- Information and data requirements for the specified project.
- Where, when, and how to collect samples to allow the most precise measurements as possible.
- Laboratory Quality Assurance/Quality Control required for defensibility of data.
- Required number of observations.

DQOs are usually expressed in terms of:

4.1.1.1 Precision

The agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses. These samples should contain concentrations of analyte above the MDL, and may involve the use of matrix spikes. The most commonly used estimates of precision are the relative standard deviation (RSD) or the coefficient of variation (CV) (SW 846, Chapter One),

$$RSD = CV = \frac{100S}{X}$$

where:

x = the arithmetic mean of the x_i measurements,
S = Variance

The relative percent difference (RPD) when only two samples are available is calculated as.

$$RPD = 100\left[\frac{(X1 - X2)}{\left\{\frac{X1 + X2}{2}\right\}}\right]$$

4.1.1.2 Accuracy

The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component (SW 846, Chapter One).

4.1.1.3 Representativeness

It is the degree to which data accurately represent a particular characteristic of a population or environmental parameter. It is a qualitative parameter that is most concerned with the proper design of the sampling program.

4.1.1.4 Comparability

It measures the confidence in comparing results in one experiment with the results of the same experiment on different samples. It is also demonstrated through the participation in round-robin performance evaluation studies and the use of standard reference materials that are traceable to the National Institutes of Science and Technology (NIST) and EPA.

4.1.2 Preventive Maintenance and Quality Assessment

ASSET Laboratories' QA/QC protocol ensures that analytical measurement systems are maintained within acceptable limits and reproducibility. Specific sections of this QA/QC plan address various QA/QC procedures that are followed to generate valid and defensible data. Some elements of the QA/QC procedure include:

4.1.2.1 Preventive Maintenance

All analytical instruments and equipment are checked and calibrated by the analyst each time the instrument or equipment is used. In addition, the instrument or equipment is rechecked and recalibrated depending on the usage either on a time basis or sample basis according to the Standard Operating Procedures (SOPs). Besides daily checks, a schedule of preventive maintenance is kept to reduce the likelihood of total failures. Instrument calibration and precision statistical data are kept for record and reference.

4.1.2.2 Quality Assessment Procedures

ASSET Laboratories employs quality assessment procedures to detect problems through data assessment and establish corrective action procedures that keep the analytical process reliable. Data validation is accomplished at all levels. Data reporting procedures start at the laboratory bench level. Supervisors/Group Leaders, QA Manager, and Laboratory Director and/or his designated signatory personnel perform the review of the final data package report.

4.1.3 Data Integrity, Confidentiality and Quality of Data

Performance levels, Data Integrity and Confidentiality are of utmost importance for the maintenance of ASSET Laboratories' required quality of data and all personnel are required to attend training and sign an "Ethics and Data Integrity Agreement". Data integrity procedures provide assurance of laboratory's dedication in providing data of known and documented quality to ASSET Laboratories' clients. Client confidentiality policy assures that the reports and associated documentation will only be released to the original client.

ASSET Laboratories has "zero tolerance" for falsification of data – any deliberate or negligent manipulation of data resulting in false reporting of results, time worked, documentation, will cause immediate termination.

4.2 Quality System Documentation

ASSET Laboratories' Quality System is communicated through the ff documents:

- Quality Assurance Manual (QAM)
- Work Instructions – procedural steps, tasks or forms associated with operation of management system (e.g. . checklists, forms, logbooks)
- Laboratory SOPs – General and Technical

4.2.1 Order of Precedence

In the event of conflict or discrepancy between policies or procedures, the order of precedence is as follows:

1. Quality Assurance Manual
2. Laboratory SOPs
3. Other Work Instructions (memos, flow charts)

Note: Client's Quality Assurance Project Plan (QAPP) will take precedence over the above items for the client's specific project only.

SECTION 5.0 DOCUMENT CONTROL

5.1 General

A document control program is established to ensure that all documents issued or generated at ASSET Laboratories are accountable, traceable and up-to-date and out-of-date or obsolete documents are archived or destroyed. All documents distributed within the laboratory are controlled documents. Uncontrolled documents are those documents given to clients, auditors, etc. Controlled documents are also uploaded on the laboratory intranet. Printed copies from the intranet are considered uncontrolled. Documents issued in the laboratory include logbooks, notebooks, SOPs, and control limits.

The QA Manager is responsible for control and distribution of SOPs and other quality related documents in the laboratory. The QA Manager maintains a database for documents issued in the laboratory.

The QA Manager also maintains access to reference methods (Standard Method, EPA) and regulatory documents (TNI 2009, DoD QSM) for employee reference.

The laboratory also maintains records of audit reports and responses, Proficiency Testing Studies, certifications, non-conformance and corrective action reports, MDL studies, LOD/PQL verification results, and training files. The laboratory also maintains raw analytical documents such as instrument printouts, standard preparation & sample preparation logbooks, electronic data and final reports.

5.2 Document Approval and Issue

Documents generated and issued by the laboratory are uniquely identified with laboratory's name, document title and number, revision number, effective date, page numbering, total number of pages and the issuing authority. The QA Manager is responsible for the maintenance of the document control program of the laboratory.

Controlled documents are authorized by the QA Manager. The development of a new document starts with the chemist when he/she submits an electronic draft to the laboratory director for review. The Laboratory director will review and make necessary corrections to the document

before submission to the QA Manager for final approval. The QA Manager will verify the document and retains the document as the final version. This final version is then given unique identification, distributed to applicable department of the laboratory and uploaded in the intranet.

All current SOPs for internal laboratory use are controlled and uploaded to the laboratory's intranet. The QA Manager maintains a list of the final versions of controlled documents.

The Quality Assurance Manual and SOPs will be reviewed annually for accuracy and content. The Laboratory Director and QA Manager signs and approves SOPs and the QAM.

All current SOPs and the QAM are uploaded on the laboratory intranet (ASSET Laboratories Help Desk) by the QA Manager and are considered controlled copies. No paper copies are issued in the laboratory. Any printed copies on work desks are considered uncontrolled. Access to the intranet is based on user name and password. Each employee is issued a user name and password for access. The QA Manager maintains a database for documents uploaded in the intranet.

Uncontrolled copies must not be used with in the laboratory.

5.3 Document Changes

For the changes to the QAM, SOPs, and Logbooks refer to SOP GE-DCONTROL-02, SOPs, Logbooks Generation, Maintenance and Storage. Changes to any documents shall be reviewed and approved by the same key personnel who performed the original review.

For minor changes in the SOP, the chemist can make minor changes without having to revise the entire SOP. Minor changes include changing initial temperature, changing the head pressure, changing a standard in the calibration curve, etc. The changes can be made by crossing out the old entry, adding the new entry, date and then initial. All changes must be conveyed to the QA Manager as soon as possible. For major changes such as changing the make of autosampler, changing extraction procedure or applying changes in the reference method, the chemist will make the changes and submits to the laboratory director for review and approval. The chemist will wait for the approval of the laboratory director before any procedure is changed. Once the laboratory director approves the changes, all changes must be conveyed to the QA Manager as soon as possible.

Every year after the approval date, SOPs are reviewed for accuracy and content by the QA Manager. Minor and major changes are integrated in the final revision. A newly revised document will be re-issued as soon as practicable. Upon released of the revised SOPs in the laboratory, they are also uploaded in the intranet.

For changes in logbooks and notebooks, all mistakes are corrected at the time the error is discovered. Cross out with a single line so as to remain legible. **Do not** erase, write over, or use correction material. Each cross out is initialed and dated. If the reason for the change is not obvious, then the reason must be stated. If there is insufficient space for all or part of the correction information, enter a footnote call out near the incorrect data and enter the required information as a comment elsewhere on the data sheet, notebook page, etc.

5.4 Obsolete Documents

All invalid or obsolete documents are removed from where they were issued, or otherwise prevented from unintended use.

SECTION 6.0 REVIEW OF REQUESTS, TENDERS AND CONTRACTS

When large or new projects are scheduled to arrive at the laboratory, the Project Manager or client service person should request all pertinent sample information from the client. This includes methods to be used, number of sample(s), matrix types, QC requirements like MDL, PQL and control limits, turn-around-time, data package requirements and expected sample delivery schedule. The Project Manager or client service person should always request the project's Quality Assurance Project Plan (QAPP).

A meeting of all key personnel is called to distribute the sample information for the project. The current accreditation status of the laboratory must be reviewed against requested analyses. Allocation of personnel, laboratory resources and materials are distributed for the type of work and the expected turn-around-time. The laboratory must inform the client thru the Project Managers the results of this review in case there is any potential conflict, deficiency, lack of appropriate accreditation status, or inability on the laboratory's part to complete or meet client's requirements. Any work that needs to be subcontracted will also be communicated to the clients. The client will also be informed of any deviation from the contract. For major changes, a documented approval (i.e. correspondence log, email, phone logs) from client will be kept for reference.

Any differences between the request or tender and the contract shall be resolved before any work commences. Each contract shall be acceptable both to the laboratory and the client. If a contract needs to be amended after work has commenced, the same contract review shall be repeated and any amendments shall be communicated to all affected personnel.

Records of reviews as well as pertinent communication/discussion with clients shall be maintained by means of e-mails or phone logs.

The President maintains copies of all signed contracts. Copies are distributed to Project Manager and QA Manager. All pertinent information in the contract is disseminated in the laboratory through project QAPP SOP and/or scheduled project meetings.

SECTION 7.0 SUBCONTRACTING OF ENVIRONMENTAL TESTS

Samples can be subcontracted to another laboratory if ASSET Laboratories is not approved to perform a particular test or if the lab is not able to complete analysis of required tests because of unforeseen reasons (e.g., workload, need for further expertise or temporary incapacity). Previously arranged projects/contracts where clients were notified of intention to subcontract analysis in form of bids or client communication through e-mail is sufficient form of notification. In other case, the client will be advised in writing by the Project Managers of its intention to sub-contract any portion of the testing to another party. If the laboratory subcontracts any part of the testing covered under NELAP, this work will be placed with a laboratory accredited under NELAP for the tests to be performed or with a laboratory that meets applicable statutory and

regulatory requirements for performing the tests. The laboratory performing the subcontracted work shall be indicated in the final report and non-NELAP accredited work shall be clearly identified. Subcontracted laboratories must be accredited by US DoD and meet the requirements of the US DoD QSM if client or project requires US DoD certification.

All data from subcontract laboratories must meet all project requirements. Samples must be re-analyzed if specified project requirements are not met. The final report is reviewed for typographical and technical errors. The laboratory is responsible to the client for the subcontractor's work, except in the case where the client specifies which subcontractor is to be used.

The QA Manager maintains a list of subcontractors that the laboratory uses for environmental tests and their certifications/accreditations.

SECTION 8.0 PURCHASING SERVICES AND SUPPLIES

ASSET Laboratories has procedure for purchasing supplies, reception and storage of reagents and laboratory consumable materials relevant to environmental testing. This is to guarantee that the quality of supplies used for various laboratory analyses are complying with standard specifications or requirements. Refer to SOP GE-Procurement-01, Procurement of Supplies, Material, and Services for more details.

The procurement of supplies is important to guarantee proper delivery of requested supplies. When supplies require special paperwork or extra equipment, they must be stated on the Purchase Order to provide the vendor with the laboratory's requirements. Proper ordering of supplies ensures the laboratory high quality chemicals and standards, calibration certificates for calibration items, and safety materials sheets for chemicals.

8.1 Glassware

All glassware used for volumetric measurements and dispensing must be Class A (Pyrex or equivalent) or checked for accuracy on a quarterly basis according to laboratory procedures.

8.2 Materials, Reagents, Standards & Supplies

Materials, reagents, standards, solvent, and gases are carefully selected to meet specifications defined in the analyses methods. Each new supply of these items is verified for their performance capabilities, freedom from impurities that interfere with the analysis, and background levels measured to check the degree of contamination.

Reagents and standards have specific grade of reagent in the laboratory SOPs. It is the responsibility of the chemist to check the suitable grade of reagent in the laboratory SOPs before use. Reagents and standards are checked and concentrations verified before use whenever possible. The reagents and standards are checked for signs of deterioration (e.g., formation of precipitates and discoloration) and verified through analysis as blank (i.e. instrument blank) to check for interferences and as spike standards to check for concentrations and specifications.

Chemicals must not be used past the manufacturer's expiration date and must not be used past the expiration time noted in the laboratory SOPs after preparation. The expiration date is generally determined from the manufacturer's expiration date. If not stated, the laboratory will assume 3 years from date opened for solids and 2 years from date opened for liquids.

Recertification of prepared stock standards is done by confirming the concentration using a second source. Confirmed concentration should be ±10% of second source for Metals and ±20% for others.

Blank or clean water for volatile and semi-volatile organics is obtained from in-house commercial water purifier. Deionize or nanopure water for inorganic analyses are obtained from a commercial water demineralizer. The laboratory conducts daily checks of the reagent water by monitoring conductivity. The conductivity must be equal to or less than 1 μmho/cm.

Services such as electricity, air, gas, and vacuum are checked for proper specifications for efficient and reliable performance of the instruments.

Compressed gases in use should be monitored daily. The pressure in the gas cylinders must not be below 500 psi or the cylinders must be replaced.

Purchased pre-cleaned sample containers must be accompanied with certificate of analysis.

8.2.1 Purchasing

The chemist or analyst in charge will be the requisitioner. He/She will identify items for purchase and creates a purchase order on MAS 200. Items must be specified by description, concentration, packaging, catalog number, manufacturer and quantity needed. The purchase order will be submitted to the Laboratory Director for approval. Once approved, items can now be ordered.

8.2.2 Receiving

Materials are dated upon receipt to establish their order of use, "as first in, first out basis," and to minimize the possibility of exceeding their shelf life. Pertinent information such as name of supplier, lot or serial number, expiration date, concentration, date opened, date received, and date expired are logged/recorded into the chemical inventory logbook. Chemicals are labeled with sticker containing information such as chemical inventory code, receipt date, open date, and expiration date.

Purchased supplies and reagents and consumable materials that may affect the quality of environmental tests should not be used until they have been inspected or otherwise verified as complying with standard specifications or requirements defined in the methods for environmental tests concerned. For the following type of supplies, the accompanying paperwork is required for the items ordered. The requisitioner is required to check for the said items when supplies were received. If missing, this must be immediately communicated to the vendor.

Table 8-2 . Materials Document Requirements

Type of supply	Requirements
Standards	Certificate of Analysis
Chemicals	MSDS
Acids	Trace Grade Quality
Solvents	Pesticide Grade
Equipment	Specific items needed for the purchase of the equipment
Thermometers (Calibration Type Only)	Certificate of Calibration
Weights (Class A Only)	Certificate of Calibration
Class A glassware including glass micro liter syringes	Certificate of Calibration

8.2.3 Storage

Acids and bases are segregated in terms of storage. Various types of solvents are stored in flammable storage cabinets. Dry chemicals used for inorganic and organic analyses are stored in the chemical storage cabinet. Incompatible chemicals should not be stored together for safety reasons. Primary standards and working standards prepared for organic analysis are stored in the standard refrigerator/freezer.

All chemicals must be stored properly following directions of storage procedures in containers to prevent degradation and contamination. Light sensitive reagents must be stored in amber bottles.

8.3 Equipment/Instrument/Software

Information on the actual performance of the equipment is obtained before request to purchase equipment is made. The availability of the supplier's service to install and test it against specifications as part of purchase price is also considered. The chemist or analyst will make a request for new equipment to the Laboratory Director. The Laboratory Director and/or designee will make the list of the necessary specifications needed for the new equipment to be purchased.

Upon receipt of new equipment, unique identification name or number is given and also added on the equipment list. When first installed, an internal calibration of the instrument is performed using the manufacturer's manual. Analytical reference standards are analyzed for qualitative and quantitative checks on the instrument performance during the sample run. Routine preventive maintenance of the instruments/or equipment is done on a regular scheduled basis.

8.4 Services

ASSET Laboratories is using outside services for maintenance of the equipment for instrumentation work such as ICP and ICP-MS. ASSET Laboratories has a contract for instrument maintenance services from instrument’s manufacturer. All other instruments are currently maintained/serviced by in-house technician.

SECTION 9.0 SERVICE TO CLIENT

9.1 Client Confidentiality and Support

The laboratory shall afford clients or their representatives' cooperation to clarify the client's request and to monitor laboratory's performance in relation to the work performed, provided that the laboratory ensures confidentiality to other clients.

The laboratory has procedures established for the review of requests and contracts (Section 7.0). The laboratory performs the thorough review of the technical and QC requirements in every requests and contracts to ensure the success of every project.

The clients or their representatives can be granted by the laboratory special services like reasonable access to the relevant areas of the laboratory for witnessing tests performed for the client, audit laboratory and assist client-specified third party data validators.

9.2 Client Communication and Feedback

The laboratory maintains and documents timely communication with the client for the purposes of seeking feedback, both positive and negative, and clarifying customer requests. Feedbacks are used and analyzed to improve the laboratory quality system, testing activities, and service to client.

Negative customer feedback is documented as customer complaint as discussed in Section 10.0

The Project Manager or client service person is the main communication link to the clients. He/She will inform the clients if there are any non-conformances in sample receipt and sample analysis. Also, he/she will notify the clients of any delay in project completion.

The QA Manager and/or Laboratory Director are available to discuss any technical questions or concerns of the clients.

SECTION 10.0 CLIENT COMPLAINTS

10.1 General

Client complaints can range from issues with reported results, technical problems or other incident stemming from all facets of the laboratory business, which may affect quality of the product and/ or service. The person who receives the complaint or discovers the incident is responsible for initiating the process. Investigation of root cause and identifying the corrective action for the issue are all documented on the client complaint form.

The SOP GE-CLIENTS-01, Client Complaints discusses the details for initiating, documenting, reviewing and reporting complaints/incidents.

When a client has a question on the report, have the department supervisor re-check all calculations and identifications. When a client has a technical question, the Laboratory Director

must spearhead the investigation. Any other problems affecting quality of product and services to the client not addressed above must be directed to Laboratory Director. Any issues involving legal or business decisions must be directed to the Laboratory Director and Senior Management.

Appendix C shows an example of a Client Complaint/Incident Form

10.2 Monitoring of Client Complaints

The person who ultimately receives the complaint or discovers the incident is responsible for initiating the client complaint form. The client complaint form is available at QA department. The QA Manager will be responsible for filling up the general information and description of complaint of the form. The form is then forwarded to the concerned department supervisor/group leader for investigation of the nature of complaints. The department supervisor/group leader recommends corrective action and forwards the form to the Laboratory Director for approval. The QA Manager will review the actions taken if acceptable or not acceptable. QA will be responsible to determine if the laboratory is in error or not in error on the complaint reported.

If the corrective action was insufficient upon review by the QA Manager, the form and other documentation will be returned to the department supervisor/group leader and Laboratory Director until the corrective action is satisfactory.

All client complaint forms are assigned with a sequential control number by the QA Manager. A copy of the complaint form and other documentation related to the issue will be given to Project Manager for filing if the complaint is related to a particular project folder, with subsequent notification to salesperson. Otherwise, the original copy is filed at QA office. In the future, it is ASSET Laboratories' plan to create a database for tracking client complaints.

10.3 Reporting

The laboratory shall inform the initiator of the complaint of the results of the investigation and the corrective action taken, if there is any.

The Project Manager is responsible for reporting the result of investigation for issues requiring client notification. At the end of each year, the QA Manager is responsible for summarizing the client complaints and includes it as part of QA report to management.

SECTION 11.0 CONTROL OF NON CONFORMING WORK

11.1 General

When nonconforming work or departures from the laboratory's policies and procedures in the quality system or technical operations have been identified, corrective action is taken immediately. The laboratory evaluates the significance of the non-conforming work and initiates corrective action based on the result of evaluation. If the non-conforming work is isolated case, the laboratory can opt to add a qualifier to the final results and/or document the non-conformance in the case narrative. If the non-conforming work is systematic or involved improper practices, the corrective action should include in depth investigation and a possible

suspension of analytical method. Non-conformances should be documented following the laboratory's corrective action system (Section 13.0).

An example of a Corrective Action Form is shown in Appendix D.

11.2 Responsibilities and Authorities

Any non-conformance can be immediately brought to the attention of the department supervisor/group leader, the Laboratory Director and/or QA Manager. These personnel must assess whether a problem or departure has any effect on laboratory's QA/QC policy. The analyst, department supervisor/group leader, QA Manager, Sample Control personnel or Project Manager(s) personnel, can initiate the Non-Conformance/Corrective action form. The previously mentioned groups can also recommend possible corrective actions to problems. For exceptionally permitting departures from documented policies and procedures or standard specifications, all must be clearly stated in the case narrative of the report.

Any issues involving violations to the laboratory's Ethics and Data Integrity procedures must be reported immediately to the Laboratory Director, QA Manager and/or President.

The Laboratory Director, QA Manager and President have the authority to halt work, withhold reports and suspend analysis as well as authorize the resumption of work.

11.3 Analysis Suspension/Stop Work

When a result in a performance audit is unacceptable or when a system audit reveals an unacceptable performance, the laboratory identifies the problems and implement corrective actions immediately. Also, the authorized personnel may suspend the analytical work until corrective action has been implemented and performance has been proven to be acceptable.

In cases when suspension/restriction of analysis is necessary, the laboratory will hold all reports to client pending review. No faxing, mailing or distributing through electronic means may occur. Client will NOT generally be notified and analysis may still proceed in some instances depending on the nonconformance.

Within 24 hrs, the QA Manager will determine if the compliance is met and reports can be released, or together with the Laboratory Director, Department Supervisor/Group Leader and President (if needed) will determine the plan of action to bring work into compliance, and release work. Clients will then be notified if the suspension of work will affect the laboratory's capability to accept work.

SECTION 12.0 CORRECTIVE ACTION

12.1 General

The need for corrective action comes from several sources: equipment malfunction; failure of internal QA/QC checks; failure of performance of system audits; non-compliance with QA requirements, calculation and reporting errors, deviations from established laboratory procedures, failure of Proficiency Testing Studies, client complaints and staff observation. The Non-Conformance event is documented on a Non-Conformance/Corrective Action form. The

details of how the Non-Conformance/Corrective Action form is completed and routed are in the SOP GE-NONCONFORM-01, Non Conformance and Corrective Action.

12.2 Cause of Analysis

Once the non-conformance has been identified, a non-conformance form must be filled out by any employee or the first person to observe the non-conformance and submitted to the department supervisor/group leader, QA Manager, Sample Control Officer or Project Manager and Laboratory Director.

The non-conformance forms contain incident description, samples affected, possible cause, corrective action, and proof of conformance.

The procedure for corrective action shall start with an investigation to determine the root cause(s) of the problem.

12.2.1 Root Cause Analysis

A system of problem solving methods aimed at identifying the underlying or basic factors of problems or incidents (A2LA Complaints, Feedback, Root Cause Analysis, and Corrective Action June 2011)

In order to identify the root cause of a problem, several tools and techniques can be used such as flow charts, records, interviews, five whys and fish bone diagram. The flow chart presents linkages and connections from beginning to end of task for easier understanding of work flow. Interviewing staffs helps explain the problem, documents and actions for better understanding of the situation. Asking the five whys is helpful in tracing the chain of events because the problem on hand might have come from overlooked detail before, perceived to be a small problem at that time.

12.2.2 Selection and Implementation of Corrective Actions

Where corrective action is needed, the laboratory shall identify potential corrective actions. It shall select and implement the action(s) most likely to eliminate the problem and to prevent recurrence.

Corrective actions shall be to a degree appropriate to the magnitude and the risk of the problem.

The laboratory shall document and implement any required changes resulting from the corrective action investigations.

12.3 Monitoring of Corrective Actions

After department supervisor/group leader had signed the Non-Conformance it is submitted to QA Manager for review and filed at QA department. The Laboratory Director and QA Manager will monitor the results to ensure that the corrective action(s) taken is/are effective.

At the end of each year, the QA Manager is responsible for summarizing the non-conformance

reports and includes it as part of QA report to management.

12.4 Additional Audits

Where the identification of nonconformance or departures casts doubts on the laboratory's compliance with its own policies and procedures or on its compliance with state and federal requirements, the laboratory shall ensure that the appropriate areas of activity are audited in accordance with Section 16.2.

12.5 Technical Corrective Action

If quality control measurements are found to be unacceptable, the analyst must follow corrective actions on Appendix E. Some unacceptable results may require re-analysis or re-preparation. If the re-analysis is within acceptable criteria, then the analyst does not submit a Non-Conformance form. If the re-analysis is not within acceptance criteria, then a Non-Conformance/Corrective action form must be submitted to document the possible matrix effects. And if the failed QC does not affect the use of results, data will be reported with an appropriate data qualifier and/or documented properly in the report's case narrative.

SECTION 13.0 PREVENTIVE ACTION / IMPROVEMENT

Preventive action is a pro active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints. It can be initiated through feedbacks from clients, employees and business affiliates.

Opportunities for preventive actions may be discovered during data analysis and data review processing, evaluation of internal or external audits, results and evaluation of Proficiency Testing Studies, client complaints, staff observation and management review.

The QA Department has the overall responsibility to ensure that preventive action processes is implemented and documented. Documents are presented in the QA annual report and discussed in the Management Review.

SECTION 14.0 CONTROL OF RECORDS

The laboratory maintains a records management system that complies with regulatory and client requirements. The lab shall retain all original observations, calculations and derived data, calibration records and a copy of the test report for a minimum of **five years**.

14.1 General

The laboratory has established procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality technical and administrative records. Records can be as hard copy or electronic copy or at times, records are in both formats. Table 15-1 presents the different types and examples of records and their corresponding retention times. The QA Manager maintains the quality records and technical records.

All record entries must be legible. Printed is preferable, but written is acceptable for all characters, including notes. All record entries must be made using indelible ink pens, preferably blue or black. All records are stored and retained in secure and easily retrievable facility that prevents damage or deterioration and loss.

The laboratory has procedures to protect and back up records stored electronically and to prevent unauthorized access to or amendments of these records. Electronic copies of ASSET Laboratories QAM and SOPs are located on a secured laboratory server accessible only to the QA Manager. The computer is virus checked at all times to deter virus data corruption. The network is backed-up on a weekly basis followed by an incremental, daily back up.

Table 14-1 Record Types & Retention Times

	Record Types	**Retention Time**
Quality Records	QAM SOPs Regulatory Certifications Internal & external audits/responses Corrective/Prevention Action reports Client Complaint forms Management Reviews Method & software validation data PT results MDLs/LOQ/PQLS/DOCs Training Records	5 yrs from archival
Technical Records	Raw Data (instrument/noted observations) Logbooks Analytical records Lab reports	5 yrs from archival
Project Records	Project QAPP Contracts COC & SRCs Correspondence (email & telephone logs) Lab Reports Project Folders*	5 yrs from archival
Administrative	Company Policy Employee Handbook Personnel files Safety Manual	5 yrs from archival

*project folder is generated by Project Managers that contains all pertinent paperwork of a project (COC, SRC, correspondence, sample results, calibration, calibration verifications, QA/QC data, data verification checklists, preliminary and/or final reports)

The laboratory record system allows historical reconstruction of all laboratory activities that produced the analytical data. This includes readily understood documentation of sample from receipt to report generation. The SOP GE-DCONTROL-01, Document Control (Project Folders) provides the detailed pathway of how project documents are routed and archived in the laboratory.

- The records include identity of personnel involved in sampling, sample receipt, preparation and analysis. The laboratory's copy of COCs is kept together with sample receipt documentations and correspondence in project folders. In all analytical work in the laboratory, the originator(s) of all record entries are identified by initial(s) or signature(s). In most cases, there are specific places on logbooks and data sheet for initials to identify the originator of entries or groups of entries. In logbooks, all analysts making entries are required to print their names with corresponding initials and signatures in the second page.

- All information relating to the laboratory facilities equipment, analytical test methods, and related laboratory activities, such as sample receipt, sample preparation, or data verification are documented.

- The record keeping system facilitates retrieval of all working files and archived records for inspection and verification purposes. Instrument data are stored sequentially by date of analyses for each instrument. Run logs are maintained and stored for each instrument and a copy is included in the data package. This is essential for the reconstructing of an analytical sequence. If no instrument was used for an analysis, documentations are recorded in bound logbooks. Standards and reagents preparations are recorded in bound logbooks and entered into the chemical inventory in LIMS.

- All changes to records must follow procedure in Section 6.3. All changes to electronic copies, in LIMS and instrument data are reflected in audit trails. The reason for the signature or initials shall be clearly indicated in the records such as "sampled by", "prepared by", or "reviewed by".

14.2 Technical Records

The laboratory retains records of original observations, derived data and sufficient information to establish audit trail, calibration records, staff records and a copy of each test report issued for a minimum of five years. The records for each environmental test shall contain sufficient information to facilitate identification of factors affecting the uncertainty and to enable the environmental test to be repeated under conditions as close as possible to the original. The records shall include the identity of the personnel responsible for sampling, performance of each environmental test and checking of results.

The essential information to be associated with analysis, such as strip charts, tabular printouts, computer data files, analytical notebooks, and run log, include:

- Laboratory sample ID code
- Date of analysis and time of analysis is required if the holding time is 72 hours or less or when time critical steps are included in the analysis. For DoD projects, date and time of preparation and analysis shall be included in the laboratory report. If the time of sample collection is not provided, the laboratory must assume the most conservative time of day. For the purpose of batch processing, the start and stop dates and times shall be recorded.
- Instrumentation identification and instrument operating conditions/parameters
- Analysis type
- All manual integrations including manual integrations

- Analyst's or operator's initials/signature
- Sample preparation including clean up, separation protocols, volumes, weights, instrument printouts, meter readings, calculations, reagents
- Sample analysis
- Standard and reagent origin, receipt, preparation and use
- Calibration criteria, frequency and acceptance criteria
- Data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions
- Quality control protocols and assessment
- Electronic data security, software documentation and verification, software & hardware audits, backups and records of any changes to automated data entries
- Method performance criteria including expected quality control requirements.

Observations, data and calculations shall be recorded at the time they are made and shall be identifiable to the specific task.

All changes to records must follow procedure in Section 6.3. All changes to electronic copies, in LIMS and instrument data are reflected in audit trails

14.3 Laboratory Support Activities

In addition to documenting all the above mentioned essential information, the following shall be retained:

- All original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analyst's work sheets and data output records (chromatograms, strip charts, and other instrument response readout records)
- A written description or reference to the specific test method used which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value
- Copies of final reports
- Archived SOPs
- Correspondence relating to laboratory activities for a specific project
- All corrective action reports, audits and audits responses
- Proficiency test results and raw data
- Results of data review, verification and crosschecking procedures

14.4 Sample Handling Records

A record of all procedures to which a sample is subjected while in the possession of the laboratory shall be maintained. These shall include but are not limited to all records pertaining to:

- Sample preservation, receipt, acceptance or rejection and log-in
- Sample storage and tracking including shipping receipts, sample transmittal forms (chain of custody form)
- Documented procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples.

14.5 Administrative Records

The laboratory maintains personnel qualifications, experience and training records, and a log of names, initials and signatures for all individuals who are responsible for signing or initiating any laboratory record.

14.6 Records Management and Storage

14.6.1 Quality and Technical Records

All laboratory records are kept and retained for a maximum of 5 years unless otherwise specified by client or regulatory bodies.

Analyst's notebooks, instrument maintenance logbooks, standard preparation and extraction logbooks, instrument run logbooks, laboratory equipment and maintenance logbooks are submitted to the QA Manager once they are already full and are archived by the QA Manager for 5 years. An Access database has been developed to record the name of the logbook, notebook code identification, department, and type of logbook, log number, date of issue, archival date and number of box where the logbook was kept. This will allow easy retrieval of logbooks when needed.

All records in the project folders are retained for 5 years from the generation of the last entry in records. For clients that require archival of records longer than 5 years, a formal request latter must be submitted prior to the start of retrieval.

The original hard copy of the client complaint and non-conformance forms will be filed and retained at the QA Office for a minimum of five years.

14.6.2 Electronic Records

Records that are stored or generated by computers or personal computers shall have hard protected backups.

All data from the instrument computers are copied into their specific folder in the archive server. Accesses to these instrument archives are limited only to the primary user and department supervisor. The archive server is scheduled to run a daily backup to a backup server. The backup server is then replicated to another backup storage separate from the backup server.

Electronic copies of the SOPs are located on a secured laboratory server accessible only to the QA Manager. The computer is virus checked at all times to deter virus data corruption. The network is backed-up on a daily basis.

Electronic reports generated for the client are saved directly to a specified directory on the network for a period of three months. After three months, reports are transferred to an archive folder. This folder is only accessible to QA Manager and data manager. The network and archived folders are backed up on a daily basis.

14.6.3 Archive Access

Access to archived information shall be documented with an access log. These records shall be protected against fire, theft, loss, environmental deterioration, vermin and, in the case of electronic records, electronic or magnetic sources.

If the electronic project folder needs to be retrieved from the archived folder storage location, the project folder must be retrieved by the QA Manager. Access to archived folder is limited to QA Manager and data manager. An access log must be filled to document reason and personnel asking access to the project folder. Original electronic file folder is copied from archived folder to Reports folder and folder name changed to workorder plus revision number. This Reports folder is only accessible to QA Manager and project management team. All changes to the file must be performed on a revised copy by renaming original file with original name and revision number. Original file and revision must be included in the new revised folder. If files will be added, the QA Manager or project manager will add the file to the revised folder. Once revisions are completed, the QA Manager will archive the revised folder. For workorders done in the last three months, folders are still at Reports folder on the network. However for old folders, a request for retrieval must be filed.

14.6.4 Transfer of Ownership

In the event that the laboratory transfers ownership, all records and data will be kept for a minimum of five years. All applicable client notifications will be sent for their information. In the unlikely event that the laboratory goes out of business, laboratory data will be turned over to applicable client for their record retention.

14.7 Records Disposal

Records are removed from archive and destroyed after 5 years or as per client/regulatory requirement. For project specific records, the clients are notified prior to destruction. Electronic copies of records must also be destroyed.

SECTION 15.0 AUDITS

ASSET Laboratories participates in external audits from engineering companies, other laboratories, and government agencies. External audits assure that the laboratory is operating under proper specifications as well as meeting their requirements. Another source of audits for the laboratory is the internal audit conducted by the QA Manager. Audits are conducted and documented as described in SOP GE-AUDITS-01, External Audits and Internal Audits.

15.1 External Audits

15.1.1 Agency Audits

ASSET Laboratories retains the laboratory certification from National Environmental Laboratory Accreditation Program (NELAP) through the Oregon Environmental

Laboratory Accreditation Program (ORELAP), California Environmental Laboratory Accreditation Program (CA-ELAP) and Nevada Division of Environmental Protection (NDEP). (See Appendix G for ASSET Laboratories Certification). ORELAP, CA-ELAP and NDEP perform inspections of the laboratory every 2 years. Any recorded deficiencies are corrected and a response letter is submitted to accrediting agency.

15.1.2 Client Audits

Clients can audit or inspect the laboratory for conformance to EPA methods and/or specific project requirements. After the audit, a formal letter describing any findings is submitted to the laboratory. All findings will require corrective actions and evidence or proof of conformance for the response letter.

15.2 Internal Audits

Internal audits are performed at least annually but may be performed more frequently if the QA Manager determines a need for more frequent audits. An internal audit encompasses Sample Control, Organics, and Inorganics. Items checked for include, but are not limited to the following:

- Runlog are checked for completeness, verification of calculations, and for standard traceability.
- Balances, oven temperatures, refrigerator temperatures are being recorded.
- Standard logbooks are checked for completeness and for traceability.

The internal audits are documented on checklists during the actual audit. A report is generated based on the findings, and is then distributed to the President, Laboratory Director, and the Department Supervisors/Group Leaders.

All deficiencies found during an internal audit are written into a report. The report is then given to the President, Laboratory Director, and the department supervisor/ group leader. All corrections must be completed within 10 working days. A follow-up inspection is performed on the outstanding deficiencies. Deficiencies that are not completed are documented in the report to the Laboratory Director and/or President.

If findings during the internal audit cast a doubt on the effectiveness of the operations or on the correctness or validity of the data, immediate investigation and performance of corrective action is implemented by the QA Manager, Department Supervisor/Group Leader, Laboratory Director and/or the President (if necessary). Clients will be notified in writing within 24 hrs, if investigation shows that the laboratory results may have been affected.

SECTION 16.0 MANAGEMENT REVIEWS

16.1 Annual QA Report

Data from formal performance audits of the laboratory's activities are reviewed directly by the QA Manager, Laboratory Director, and the department supervisors.

All quality assurance or quality control issues are discussed among the QA Manager, Laboratory Director, and department supervisors. The report can be used as a focal point for discussion involving corrective action. Any corrective action taken is decided with the concurrence of the unit department supervisors, the QA Manager, and/or Project Manager, and the Laboratory Director.

The QA Manager provides a management report at least annually to the President. The report describes any significant quality assurance problem and/or solution, results of performance and system audits, assessment of accuracy and precision data, and health and safety issues. An overall QA report will be compiled that will outline problems (short-term and long-term), solutions, areas to improve, and long-term goals for the upcoming year. The supervisors and Laboratory Director can also make comments and/or suggestions to the report.

16.2 Annual Management Review

Management review of the quality system and laboratory operations is being done at a minimum on an annual basis. The Laboratory Director and QA Manager report the review and findings to management in a form or e-mail or formal report. The review takes into account reports from the analysts, the outcome of recent internal audits, assessments by external bodies, the results of inter-laboratory comparisons or proficiency test, any changes in the volume and type of work undertaken, feedback from clients, corrective actions and other relevant factors.

Findings from the management reviews and the action that arise from them should be recorded. The management shall ensure that those actions are carried out within an appropriate and agreed timescale.

SECTION 17.0 TECHNICAL REQUIREMENTS

17.1 PERSONNEL

17.1.1 Education and Experience Requirements for Technical Personnel

SOP GE-JOBS-01, Job Description details the minimum educational attainment and experience requirement for each position in the laboratory. A master's degree in chemistry or related field may substitute one year laboratory experience and two years' experience for doctorate degree. Laboratory experience may also substitute the minimum education credential requirement. For example, 8 years analytical laboratory experience may substitute BS degree requirement.

17.1.2 Training

It is ASSET Laboratories' intention to provide all new, experienced or inexperienced, employees with structured and documented training. The training provided by ASSET Laboratories will enable new members to integrate quickly and more predictably. Depending on experience and education a new member may start at a support level such as sample preparation or a sophisticated level such as instrumental analyses (GC, GC/MS, ICP, and AA). This apprenticeship program is an excellent vehicle for chemists inexperienced in environmental analyses and new graduates to assimilate considerable skills and experience in a short period of time.

ASSET Laboratories' training program is designed to ensure that all personnel are qualified and properly trained to perform all required tasks. The training program also provides that all pertinent health and safety issues, ethics and data integrity policy are covered before the commencement of work. Periodic evaluation of each staff member's skills by performance evaluation samples is also part of the training procedure. SOP GE-Training Program-01, Employee Training Program presents the details of the training program.

Initial training includes reading and understanding the quality manual, method, Standard Operating Procedure (SOP) comprehension, standards preparation, method set-up, accurate reporting, correct and accurate QA/QC and routine instrument maintenance. Trainees are given supervised training by the department supervisor or by designated chemist(s) who already completed the initial proficiency. Once the initial training is complete, the chemist's initial proficiency demonstration can be determined from accuracy and precision data, testing of the SOPs, and demonstration through performance evaluation (PE) samples. All results are documented into the personnel training folder by the QA Manager to reflect current training qualifications.

As part of the chemist's training, each chemist and technician must read the QA Manual whenever there is a revision to the manual. Each chemist must answer some questions and sign the questionnaire as documentation to reading the QA Manual. The questionnaire also allows the chemist to ask questions and give updates for the next revision.

If laboratory will use temporary or contractual employees, the employee will undergo the same training as the regular employee. The procedure for initial demonstration of capability, ethics and data integrity training, proficiency testing and other method related trainings would also be applied to temporary or contractual employees.

The oversight of the training program is performed by the QA Manager, the department supervisors/group leaders, and the Laboratory Director.

17.1.2.1 Initial Demonstration of Capability

Demonstration of capability (DOC) must be made prior to institution of new methods, when there is change in personnel and there is major change in instrumentation.

As part of the training procedure, the analysts must provide a documented demonstration of capability for the test methods being performed. This is achieved by providing "Accuracy and Precision" data. The accuracy and precision data is calculated from 4 Laboratory Control Samples (LCS) that are spiked with a secondary source standard. The results are evaluated for accuracy (average recovery) and precision (standard deviation of the recovery). The results are evaluated against method or in-house limits. If there are no method criteria, the average recovery of 80 – 120% (Inorganics) and 70-130% (Organics) and 20% for the standard deviation will be used as acceptance criteria. If the data does not meet the criteria, then a corrective action is initiated. Once the problem is corrected, a new precision and accuracy data set is collected and evaluated.

A certification statement signed by the Laboratory Director and QA Manager is issued to analysts who have completed their demonstration of capability. The certification and raw data generated are filed electronically in employees' training folder.

17.1.2.2 Ethics and Data Integrity Training and Policy

Data integrity training is an integral part in new employee orientation and is conducted at least annually thereafter. Topics covered shall be documented in writing and provided to all trainees. Key topics covered during training must include organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting, how and when to report data integrity issues, and record keeping. Training shall include discussion regarding all data integrity procedures, data integrity training documentation, in-depth data monitoring and data integrity procedure documentation. Employees are required to understand that any infractions of the laboratory data integrity procedures will result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment or civil/criminal prosecution.

The initial data integrity training and the annual refresher training shall have a signature attendance sheet or other form of documentation that demonstrates all staff has participated and understands their obligations related to data integrity.

The data integrity procedures also include written ethics agreements, examples of improper practices, and examples of improper chromatographic manipulations, requirements for external ethics program training, and any external resources available to employees. All documentation of training and agreement are filed on employees' training folder.

According to ASSET Laboratories' Employee Handbook, under section "Personal Conduct", disciplinary action, which may include discharge, will be taken for offenses such as: falsifying data and/or company records, violation of safety rules, breach of security and/or confidentiality, commitment of financial or legal resources without authorization of company officer." When a new employee begins work at ASSET Laboratories, they are required to read the Employee Handbook and an "Ethics and Data Integrity Agreement". Each document requires the employee to sign an acknowledgement memo stating that they have read and understood each item that was submitted to them.

The SOP GE-ETHICS-01, Ethics and Data Integrity describe the following activities unacceptable under any circumstances:

- Knowingly record inaccurate data.
- Fabricate data without performing the work needed to generate the information or also called "dry labbing". This also includes creating any type of fictitious data or documentation.
- Time travel or adjusting clocks on software systems to make it appear that data was analyzed within holding times.

- Manipulations of data for the purpose of passing system performance checks or quality control criteria (e.g., surrogate standards, internal standards, calibration standards, method blanks, laboratory control standards, matrix spike samples, instrument tuning, pesticide degradation check,

- Manipulations of samples, software, or analytical conditions (e.g. unjustified dilution of samples, manipulating GC/MS tuning data to produce an ion abundance result that appears to meet specific QC criteria, changing instrument conditions for sample analysis from the conditions used for standard analysis, forcing calibration or QC data to meet criteria, removing computer operational codes such as the “m” flag, inappropriately subtracting background, or improperly manipulating he chromatographic baseline, turning off, or otherwise disabling, electronic instrument audit/tracking functions)

- Misrepresenting or misreporting QC samples (e.g., representing spiked samples as being digested or extracted when this was not performed, substituting previously generated runs for a non-compliant calibration or QC run to make it appear that an acceptable run was performed, failing to prepare or analyze method blanks and the laboratory control sample (LCS) in the same manner that samples were prepared or analyzed, tampering with QC samples and results, including special treatments for QC samples, performing multiple calibrations or QC runs until one meets criteria, rather than taking needed corrective action, and not documenting or retaining data for the other unacceptable data, deleting or failing to record non-compliant QC data to conceal the fact that calibration on other QC analyses were non-compliant

- Improper calibrations (e.g. discarding mid-level points in the initial calibration to meet calibration criteria, discarding points from a Limit of Detection (LOD) study to force the calculated LOD to be lower than the actual value, using an initial calibration that does not correspond to the actual run sequence to make continuing calibration data look acceptable when in fact it was no)

- Improper manual integrations, including peak shaving, peak enhancing, or baseline manipulation to meet QC criteria or to avoid corrective action

- Concealing a known analytical or sample problem

- Concealing a known improper or unethical behavior or action

- Failing to report the occurrence of a prohibited practice or known improper or unethical act to the appropriate laboratory or contract representative, or to an appropriate government official

- Any employee aware of misrepresentation of facts regarding analytical results is required to notify his/her immediate supervisor or, if this is not feasible, another representative of the management of the company immediately.

- Any employee who has a concern regarding misrepresentation of facts should speak with his/her immediate supervisor.

- If at this stage, they both feel that the issue has been adequately addressed the matter is closed. If the matter remains unresolved, the employee is to bring it to the attention of the next level of management. This process is to continue until either that matter has been resolved to the satisfaction of the employee, or until the laboratory director has become involved.

- If the laboratory director cannot address the issue to the satisfaction of the employee, a three-way discussion between the employee, the laboratory director and QA Manager is to be held to resolve the matter.

- Employees are encouraged to follow the above steps. However, if an employee feels that it would be in his/her best interest to contact any member of the management directly, the employee can take advantage of laboratory's open door policy.

- An employee who complies with the provisions of this policy will be protected from any retaliatory action. However, if the employee has engaged in wrongdoing, disclosure of this will not relieve him/her from accepting responsibilities for his/her acts.

- If an employee reports a potential wrongdoing pursuant to this policy, the most senior manager involved in the resolution of the matter must document, in writing, the episode to the President.

17.1.2.3 Initial Performance Evaluation Samples

After completing the training period, a performance evaluation sample will be given to the analyst to evaluate his/her performance of method. The performance evaluation sample(s) can either be single or double blind samples for the analyst to analyze. The analyst will report all target compounds identified. If there are "unacceptable" results, the analyst must investigate the cause of the problem, correct the issue and perform another performance evaluation sample.

Record of Performance Evaluation samples is kept by the QA Manager and included in the analyst-training file. Non-conformance and corrective action forms (if there are any) are also filed by the QA Manager.

Internal performance evaluation samples are performed as needed.

17.1.2.4 Continuing Demonstration of Capability and Proficiency.

Continuing (supplemental) training includes development of SOPs, learning the importance of documentation, the understanding of meeting QA/QC criteria and quality. Supplemental training can be obtained from reading different procedures, instrument manuals and related literature. Knowledge regarding methods and instrumentation can also be obtained from external training by agencies and manufacturers. Copies of completion certifications are kept in the chemist's training file.

Continuing proficiency of analysts is demonstrated by analysis of another precision and accuracy data as described in initial demonstration of capability or analysis of proficiency testing sample on annual basis. All records supporting analyst's continuing proficiency must be filed on employees' training folder. A certification statement signed by the Laboratory Director and QA Manager to demonstrate continued proficiency are also issued to analyst and filed on their training folder.

ASSET Laboratories employees will receive ethics and data integrity training on a minimum frequency of once per year. Copy of training materials will be provided to the employees for reference. Attendance sheet will be required to acknowledge receipt of training.

SECTION 18.0 ACCOMODATION AND ENVIRONMENTAL CONDITIONS

18.1 Laboratory Layout

The laboratory is strategically situated in a commercial business complex and occupies five suites combined together. ASSET Laboratories official address is 3151 W. Post Road, Las Vegas, Nevada, 89118. See Appendix F for Laboratory Layout.

ASSET Laboratories also now has service center in California. The office is located at 11060 Artesia Blvd., Suite C, Cerritos, California, 90703.

18.2 Building Security

The laboratory suites are kept secure during and after office hours with building keys, alarm and door codes.

All visitors, guests, and other non-laboratory personnel are required to sign the guest registry. All visitors are escorted within the facility.

18.3 Work Areas

The laboratory is separated into specific areas for sample receiving, sample preparation, organic analysis, inorganic analysis, and administrative functions. They are only accessible to authorized personnel.

Measures have been taken to prevent cross-contamination. There's an effective separation between neighboring areas in which there are incompatible activities like volatile organic area from semi volatile preparation and sample receiving area. Samples suspected of containing high analyte concentrations are stored separately from other samples.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality.

SECTION 19.0 ENVIRONMENTAL METHODS AND METHOD VALIDATION

19.1 General

ASSET Laboratories uses appropriate methods and procedures to meet regulatory and client requirements and within the scope and laboratory's capabilities. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of environmental test data.

The laboratory has instructions on the use and operation of all relevant equipment, and on the handling and preparation of samples where the absence of such instructions could jeopardize the results of environmental tests. All instructions, standards, manuals and reference data relevant to the work of the laboratory are available in the laboratory to all analysts. Deviation, if there is any, from the environmental test methods has been documented, technically justified, authorized, and accepted by the client.

19.1.1 Standard Operating Procedures (SOPs)

Analytical procedures used for various laboratory analyses are in accordance with the EPA approved methods. Any variances in the methods have been documented for equivalency based on accuracy and precision data. All variances in the analytical methods are noted in all corresponding SOPs. Controlled SOPs are available to the all analysts. New methods and/or SOPs are distributed throughout the laboratory by issuing controlled copies. Old methods/SOPs are collected before the new documents are given to the analysts. They are also available in the laboratory intranet.

- All SOPs contains a revision number, effective date and approval signatures.
- Procedures in developing and writing a SOP are described in SOP GE-SOP-01, Standard Operating Procedures (SOPs)
- SOPs are reviewed for accuracy and adequacy annually and revised when necessary.
- Administrative SOPs are reviewed and revised every two years or when necessary.

19.1.2 Laboratory Method Manuals

ASSET Laboratories maintains in-house method manuals for each accredited analyte or test method.

These method manuals refer to test methods or SOPs that have been written by the laboratory. Each test method includes the following (where applicable):

1) identification of the test method;
2) applicable matrix or matrices;
3) detection limit;
4) scope and application, including components to be analyzed;
5) summary of the test method;
6) definitions;

7) interferences;
8) safety;
9) equipment and supplies;
10) reagents and standards;
11) sample collection, preservation, shipment and storage;
12) quality control;
13) calibration and standardization;
14) procedure;
15) data analysis and calculations;
16) method performance;
17) pollution prevention;
18) data assessment and acceptance criteria for quality control measures;
19) corrective actions for out of control data;
20) contingencies for handling out-of-control or unacceptable data;
21) waste management;
22) revisions
23) references; and
24) any tables, diagrams, flowcharts and validation data.
25) equipment/instrument maintenance;
26) computer hardware/software
27) troubleshooting

19.2 Selection of Methods

The laboratory analyzes those target analytes identified by the client on a project-specific basis. The Project Manager is responsible in making sure that proper methods are applied to samples that arrived in the laboratory. ASSET Laboratories employs analytical procedures according to the laboratory certification granted by regulatory agencies.

19.2.1 Sources of Methods

Some common sources of methods include Standard Methods for the Analysis of Water and Wastewater, SW-846 Test Methods for Evaluating Solid Waste and Methods for Chemical Analysis of Water and Wastes. The laboratory uses the latest methods as approved by the California Environmental Laboratory Accreditation Program (ELAP), Nevada Division of Environmental Protection and Oregon National Environmental Laboratory Accreditation Program (NELAP).

The laboratory shall inform the client when the method proposed by the client is considered to be inappropriate or out of date. The communication will be documented especially when the client decided to proceed contrary to the laboratory's recommendation.

19.2.2 Demonstration of Capabilities

Prior to acceptance and institution of new methods, satisfactory demonstration of capability is required. The demonstration of capability is done on a clean quality system matrix free of target analytes or interferences. Thereafter, continuing demonstration of

method performance is required any time there is a significant change in instrumentation, personnel and methodology. The following steps shall be performed:

a. A quality control sample shall be prepared using stock standards that are prepared independently from those used in instrument calibration. The Laboratory Control Sample (LCS) is used as a quality control sample.

b. Four LCSs shall be prepared and analyzed according to the test method either concurrently or over a period of days.

c. Using all of the results, calculate the Average Recovery in the appropriate reporting units and the standard deviations.

d. Compare the Average Recovery and Standard Deviations to the corresponding criteria for accuracy and precision in the test method if there is any or to the laboratory in-house limit. The default limit is 70-130% for Average Recovery and 20% for Standard Deviations.

When one or more of the tested parameters did not meet the acceptance criteria, the analyst must perform the following:

a. Locate and correct the source of the problem and repeat by analyzing 4 LCSs again for all parameters of interest.

b. Repeat the analysis for all the parameters that failed to meet criteria by analyzing 4 LCSs. Repeated failure confirms a general problem with the measurement system and if this occurs, locate and correct the source of the problem and repeat the analysis of 4 LCSs for all compounds of interest.

A certification statement signed by the Laboratory Director and QA Manager is issued to analysts who have completed their demonstration of capability.

19.3 Laboratory Developed Methods and Non-Standard Methods

The laboratory can develop new method but must be fully define in an SOP, approved and validated by the Laboratory Director and QA Manager. When it's necessary to use methods not covered by standard methods, these shall subject to agreement with the client and shall include a clear specification of the client's requirements and the purpose of the environmental tests.

19.4 Validation of Methods

A method is validated and ready for use if the calibration procedure has been completed, MDL study has been performed, procedure for demonstration of capability was conducted and proficiency testing was performed if applicable.

It is important to differentiate DL, LOD and LOQ in order to get a better understanding of these limits and relate it to its equivalent laboratory terminologies. The following provides the definition of these limits at how it is used in the laboratory:

Detection Limit (DL) – The lowest concentration or amount of the target analyte that can be

identified, measured, and reported with confidence that the analyte concentration is not a false positive value (NELAC). Method Detection Limit (MDL) is one way to establish a detection limit.

Limit of Detection (LOD) – An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific and maybe laboratory dependent (NELAC). LOD is not equivalent to MDL.

Limit of Quantitation (LOQ) – The minimum levels, concentrations, or quantities of a target variable (e.g. target analyte) that can be reported with a specified degree of confidence (NELAC). For US Department of Defense (US DoD) projects, it is defined as the lowest concentration that produces a quantitative result within specified limits of precision and bias. LOQ shall be set at or above the concentration of the lowest initial calibration standard. At the laboratory, this is also equivalent to practical quantitation limit (PQL).

SOP GE-MDLS-01, Method Detection Limits and Instrument Detection Limits describe the overall procedure on how they are generated and used within the laboratory.

19.4.1 Method Detection Limit (MDL) Study

ASSET Laboratories methods for which the MDL are developed have been based on the EPA methods 40 CFR 136 - Definition and Procedure for the Determination of the Method Detection Limit.

The calculation for MDL is defined as follows for all measurements:

$$MDL = t_{(n-1,\ 1-\alpha\ =0.\ 99)} x\ S$$

Where:

MDL = the method detection limit

S = the standard deviation of the replicate analyses

$t_{(n - 1, 1 - \alpha = 0.99)}$ = the Students' t-value appropriate to a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom.

Method Detection Limits (MDL) studies are conducted by the laboratory on initial setup of the method or if there is a major modification of the method. MDLs are performed on a more frequent basis if conditions are changed from the previous MDL study. Examples of such conditions are a new instrument, new or refurbished detector or detector components, or different purge and trap device. The MDL is defined as the minimum concentration of a substance that can be measured and reported with a 99% confidence level that the analyte concentration is greater than zero. This procedure consists of analyzing seven (7) aliquots of a standard at 3 to 5 times the estimated MDL, which is taken through the entire sample processing steps of the analytical method. MDLs are matrix dependent. The MDL is defined as the student t-factor times the standard deviation from the seven replicates.

Once all replicates have been analyzed, the MDL is then calculated and must meet 40 CFR Part 136 Appendix B criteria. The validity of MDLs must be immediately verified by preparing a sample 2 to 3 times MDL concentration for single analyte test or 1 to 4 times for multiple analytes and analyzed per normal procedure.

The department supervisor/group leader, the Laboratory Director, and the QA Manager reviews and approves the MDL study as being valid. The QA Manager then collects and maintains all MDL studies.

Each MDL is compared to the current reporting limits. The analyte reporting limit must be greater than or equal to the established MDL value. The spiking concentration must not exceed 10 times the MDL value. If the MDL fails to meet these criteria, a new sample will be extracted/analyzed and added to the MDL study. In calculating MDL, a new t – factor must be used corresponding to the number of samples analyzed.

MDL is not required for any component for which spiking solutions or quality control samples are not available such as temperature, pH or when test results are not reported outside the calibration range.

19.4.2 Limit of Detection (LOD) Determination and Verification

MDL data shall be used to determine LOD for each analyte and matrix as well as for all preparatory and cleanup methods. After each detection limit determination, LOD must be immediately established by spiking quality system matrix at approximately 2-3X MDL for single analyte standard and 1-4X MDL for a multi-analyte standard. This spike concentration establishes LOD. It is specific to each combination of analyte, matrix, method (including sample preparation), and instrument configuration. The analytes must be qualitatively identified. The LOD must be verified quarterly. The following requirements apply to the initial detection limit/LOD determinations and to the quarterly LOD verifications:

- The apparent signal to noise ratio at the LOD must be at least three and the results must meet all method requirements for analyte identification (e.g., ion abundance, second-column confirmation, or pattern recognition.) For data systems that do not provide a measure of noise, the signal produced by the verification sample must produce a result that is at least three standard deviations greater than the mean method blank concentrations.

- If a laboratory uses multiple instruments for a given method the LOD must be verified on each.

- If the LOD verification fails, then the laboratory must repeat the detection limit determination and LOD verification at a higher concentration or perform and pass two consecutive LOD verifications at a higher concentration and set the LOD at the higher concentration.

- The laboratory shall maintain documentation for all detection limit determinations and LOD verifications.

LOD must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis. LOD should be less than PQL. LOD is not required for a test method which spiking solutions or quality control samples are not available such as

temperature, or, when test results are not reported outside of the calibration range. When an LOD study is not performed, the laboratory may not report a value below the PQL.

19.4.3 Practical Quantitation Limit (PQL) Establishment and Verification

PQL is the lowest concentration that can be measured with the consideration for practical limitations such as sample size, matrix interferences and dilutions. PQL must be set within the calibration range (this includes the low calibration point) prior to sample analysis.

The validity of PQL shall be confirmed by successful analysis of a QC sample containing the analytes of concern at 1-2X the claimed PQL. A successful analysis is one where the recovery of each analyte is within the established test method acceptance criteria or client data quality objectives accuracy. PQL verification is conducted quarterly per test method per matrix. Normally, MDL study is performed at PQL concentration or less. The data obtained from MDL study can be used to determine precision and bias at PQL.

PQL verification is not required for any component or property for which spiking solutions or quality control samples are not commercially available like pH, temperature, etc.

19.5 Estimation of Uncertainty

Uncertainty is defined by ISO as the parameter, associated with the result of measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

The ultimate use of uncertainty estimates is to be able to state the goodness of a test result and to allow client or end user to properly interpret data in the report.

Measurement uncertainty in the laboratory can be attributed to different sources like the reference standards and reference materials, methods and equipment and other environmental conditions including the analyst. Qualitative tests or categorical tests do not require measurement of uncertainty. Methods that specify reporting requirements are also not subject to measurement of uncertainty. For all test methods that do not specify reporting requirements and method uncertainty, control charting of Laboratory Control Samples (LCS) results will be the simplest, most direct way of estimating measurement uncertainty. Using control chart, it can be immediately seen that the action limits provide an estimate of measurement uncertainty at approximately the 99.7% level of confidence (3 sigma) and that warning limits will provide estimates of uncertainty at approximately the 95% level of confidence (2 sigma) (G-104-A2LA Guide for Estimation of Measurement Uncertainty in Testing, July 2002).

SOP GE-UNCERTAINTY-01, Procedures for Estimating Uncertainty provides a guideline for estimating uncertainty of measurements in the laboratory.

19.6 Control of Data

The laboratory has procedures to ensure that reported data are free from transcription and calculation errors.

19.6.1 Electronic Data

ASSET Laboratories utilizes LIMS, a customized database that meets the laboratory needs. LIMS integrity is assured by internal user controls. Personnel are issued with unique user name by the IT department upon completion of training and approval from the Laboratory Director. Each personnel are required to create a unique password.

Instrument data output are directly uploaded to the LIMS to prevent error.

Spreadsheets that are used for calculation are verified through hand calculations prior to use and are lock protected.

19.6.2 Logbook Entries

All logbooks/notebooks are controlled by the QA Manager. The cover of each logbooks/notebooks is identified with subject identification (instrument, method, procedure, etc). All analysts making entries in the book are required to print their names with corresponding initials and signatures in the second page of each logbook. All documentation entered must be clear, legible and detailed. Each entry must be dated by month, day and year in which the data were recorded and signed by the person performing the work or entering the data. Corrections should follow procedures outlined in 6.3

All blanks with no data must contain a diagonal line or "Z" out and initialed and dated.

The use of abbreviations is kept to a minimum. Only nationally accepted abbreviations (e.g., mg/kg, mL, µg/kg) and chemical formula abbreviations (e.g., NaOH, HCl) may be used without further clarification. Other abbreviations can be used providing the abbreviation can be traced to the corresponding abbreviation explanation.

19.6.3 Data Review/Validation

The data review and validation starts with the analyst who makes sure that all integrations and peak identifications are correct. The analyst must also verify that all LIMSDATA (raw data) is being imported into ELIMS properly. Calculation of results and % recovery must be verified against expected results. The second step of the data validation pathway is the department supervisors. The Inorganic and Organic supervisors must check and verify all data leaving their department. The third step of data validation is by the Project Managers. They have to make sure that all project requirements have been met. The final step is the Laboratory Director, designated signatory person, or the QA Manager who will oversee that all data reports are correct before going to the client.

Data Review and Validation procedures are outlined in Section 25.3

19.6.4 Significant Figures

For analyses with instrument output records that are compatible with the LIMS system are calculated with all the digits produced by the instrument. Results are reported at 2 significant figures.

For those analyses without instrument printout or instrument output that are not compatible with the LIMS system, raw values are manually entered by analysts including dilution factors using at least 2 significant figures. The LIMS will calculate and results are reported at 2 significant figures.

19.7 Manual Integration

Manual integration should only be performed on sample data when substantial matrix interferences result in quantification errors when automated procedures are used. In the event that manual integration is necessary on any analytical standard, strict documentation requirements are to be followed (the chromatograms obtained before and after the manual integration must be retained to permit reconstruction of results).

Manual integrations are necessary when the software identifies the wrong peak, does not integrate the peak or the integration takes positive or negative area from the peak. The chemist must then re-integrate the peak. After the quantitation report is printed, the analyst must put the reason for doing manual integrations and initial and date.

If manual integration is performed, it must follow a pattern and be consistent so that (a) automatic and manual integrations are consistent, (b) continuing calibration verification standards are integrated the same as initial calibration standards, and (c) target analytes surrogates, and matrix spiked analytes in samples are similarly processed.

The ~~ATL~~ SOP GE-MINTEGRATION-01, Manual Integrations describes standard practices for performing and documenting integration of chromatographic peaks and provides guidelines to analyst in making ethical judgment regarding manual peak integration.

SECTION 20.0 EQUIPMENT and CALIBRATION REQUIREMENTS

Appendix G lists the various instrumentation and equipment currently available in the laboratory.

Equipment shall be operated by authorized personnel only. Up-to-date instructions on the use and maintenance of equipment (including any relevant manuals provided by the manufacturer of the equipment) shall be readily available for the use by the appropriate laboratory personnel.

20.1 Preventive Maintenance Activities and Schedules

Instruments are maintained according to the SOPs using the manufacturer documentation. Repairs are conducted as needed, either by manufacturer representatives or by in-house personnel. Routine maintenance (lamp replacement, etc.) is conducted as needed to maintain instrument integrity.

Critical equipment and instrumentation are maintained on a scheduled basis to minimize analytical downtime. Hard bound maintenance logbooks are kept for each equipment. The analysts also records routine and unscheduled maintenance. Each entry must contain at the minimum: date, event/problem, corrective action, proof of conformance, and initials.

Equipment that has been subjected to overloading or mishandling, gives suspect results, or has been shown to be defective or outside specified limits should be taken out of service. It must be clearly labeled or marked “Out of Service”, until it has been repaired and known by calibration or

test to perform correctly. All corrective action done on the instrument must be recorded on the maintenance logbook as proof of conformance.

20.2 Support Equipment

This section applies to all devices that may not be the actual test instrument, but are necessary to support laboratory operations. These include but are not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices, thermal/pressure sample preparation devices and volumetric dispensing devices if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume.

20.2.1 Weights and Balances

Each analytical and top-loading balance in the laboratory is calibrated daily using two traceable weights that bracket the expected weights to be measured. These calibration weights used for daily check are calibrated against Class “1” weights on annual basis. This calibration is recorded in the calibration notebook of each balance. The reading must be within the specified acceptance limits: Top-loading balance: ±2% or ±0.02g, whichever is greater; Analytical balance: ±0.1% or ±0.05 mg, whichever is greater. If the reading falls outside the acceptance limit, a non-conformance form must be submitted and the problem addressed.

The Class “1” weights are sent for outside calibration every five years.

SOP GE-BALANCES-01, Calibration of Analytical Balances and Top-loading Balances, describes the procedures on how to calibrate an analytical or top-loading balance.

20.2.2 Thermometers

Thermometers throughout the laboratory are calibrated before first use and annually against a NIST traceable thermometer. IR guns are calibrated before first use and quarterly. The NIST traceable thermometer is sent for outside calibration on annual basis. Each thermometer in the laboratory is labeled with an identifier code and the positive or negative correction factor. The positive or negative correction factor must be applied to all temperature readings from that particular thermometer. The reading must be within the specified limits for the type of thermometer. If the temperature reading falls outside the acceptance limit, a non-conformance form must be submitted and the problem addressed.

SOP GE-THERMOMETER-01, Thermometers describes the calibration of all thermometers according to purpose.

20.2.3 Pipettes, Burettes and Syringes

Pipettes are calibrated by measuring the weight of a volume of water. Calibration checks of the pipettes are performed daily. The reading must be within the specified acceptance limits (See Pipette SOP for details of acceptance limits). If the reading falls outside the acceptance limit, a non-conformance form must be submitted and the problem addressed.

Eppendorf pipettes are calibrated at a minimum of 1 week. See SOP GE-EPPENDORF-01, Calibration of Eppendorf Pipettes for details of calibration and acceptance limits.

Mechanical volumetric dispensing devices (except Class A and glass microliter syringes) are calibrated by lot before first use and quarterly.

Glass microliter syringes are considered as Class A glassware but must come with a certificate attesting to established accuracy or the accuracy must be initially demonstrated and documented by the laboratory.

20.2.4 Ovens, Refrigerators/Freezers, Incubators, Water Baths

The temperature of refrigerators and freezers must be monitored each working day. Refrigerators and freezers used for sample storage must be monitored daily (7 days per week).

Ovens and water baths are checked in the expected use range prior to each use. Temperature ranges/settings are specified in specific SOPs. For drying ovens, temperatures must be within ±5% of set temperature.

20.3 Instrument Calibration

Calibration refers to the relationship of concentrations of known analyte standards versus the instrument response to the analyte. It is a reproducible reference point to which all sample measurements can be correlated.

ASSET Laboratories has established procedures for the calibration of each laboratory instrument and equipment. Procedures for calibration are discussed in detail in method SOPs. The instruments are calibrated following the requirements of the specific methods of analysis. If there is no method specific calibration procedure, manufacturer's recommended procedure is used. All calibrations and acceptance criteria are checked for conformance to the specific method requirements. The data resulting from the instrument calibration and the associated QC procedures used determine the frequency of the calibration process.

Sufficient raw data records must be retained to permit reconstruction of the initial instrument calibration, e.g. calibration date, test method, instrument, analysis date, each analyte name, analyst's initials or signature; concentration and response, calibration curve or response factor, or unique equation or coefficient used to reduce instrument responses to concentration.

Sample results must be quantitated from the initial instrument calibration and may not be quantitated from any continuing instrument calibration verification, unless otherwise required by regulation, method or program.

Criteria for the acceptance of an initial instrument calibration must be established, e.g., correlation coefficient or relative percent difference. The criteria must be appropriate to the calibration technique employed.

If the initial instrument calibration results are outside established acceptance criteria, corrective actions must be performed and all associated samples reanalyzed. If reanalysis of the samples

is not possible, data associated with an unacceptable initial instrument calibration shall be reported with appropriate data qualifiers.

20.3.1 Calibration Standards

Calibration standards are prepared following procedures in the laboratory SOPs. If a reference or mandated method does not specify the number of calibration standards, the minimum number is five for organic analytes and three for inorganic analytes (one which must be at Limit of Quantitation), not including blanks or a zero standard except for ICP or ICP/MS.

The lowest calibration standard shall be at or below the Practical Quantitation Limit (PQL) but above the Limit of Detection.

Measured concentrations outside the working range shall be reported using defined qualifiers or flags or explained in the case narrative with the exception of ICP methods and methods that doesn't specify use of two or more standards.

All reported target analytes and surrogates (if applicable) shall be included in the initial calibration.

20.3.2 Initial Calibration Verification (ICV)

The initial calibration must be verified by analyzing a second source standard. ICV standard can be a standard from a different manufacturer or different lot number used for initial calibration. The concentration of the second source shall be near the midpoint of the calibration range. Acceptance criteria are based on the reference methods or from project specific requirements. Initial calibration verification shall be successfully completed prior to analyzing any sample.

If ICV fails, check standard and standard preparation and analyze new set. If ICV passed the criteria, the initial calibration is verified and ready for sample analysis. ICV still fails, check instrument and prepare new calibration.

20.3.3 Continuing Calibration Verification (CCV)

Instrument calibration verification applies to both external and internal standard calibration as well as to linear and non-linear calibration. CCV standard should be the same as the source for the initial calibration standards. The concentration of the CCV standard shall be between the low calibration standard and the midpoint of the calibration range.

Instrument calibration verification must be performed at the beginning and end of each analytical batch except if an internal standard is used like GC/MS on which only one verification needs to be performed at the beginning of 12-hr analytical shift. The 12-hr analytical shift begins with the injection of the calibration verification (or the MS tuning standard in MS methods) and ends after the completion of the analysis of the last sample or standard that can be injected within 12 hours of the beginning of the shift. Some methods have more frequent CCV requirements (see specific SOPs). Inorganic methods require the CCV to be analyzed after every 10 samples and at the end of the

sequence.

CCV standard must be within established limit. If CCV fails and immediate reanalysis still fails, corrective actions must be performed. Once corrective actions have been completed and documented, the laboratory has to demonstrate acceptable performance with two consecutive CCVs or a new calibration must be performed.

The laboratory shall reanalyze CCVs and all samples analyzed since the last successful calibration verification. If reanalysis is not possible, data reported with appropriate qualifiers and explained in the report's case narrative. Data associated with unacceptable calibration verification may be fully useable under the following special conditions:

- When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

- When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

Data reported by the conditions above will be flagged with appropriate qualifier.

DoD requires that if the laboratory routinely analyzes two CCVs, then both CCV's must be evaluated. If either CCV fails, perform corrective action and reanalyze all samples since last acceptable calibration verification.

SECTION 21.0 MEASUREMENT TRACEABILITY

21.1 Reference Materials

Reference materials can be used in the laboratory to verify results against a certified value. These reference materials are purchased from NIST certified vendors or the PT provider. ASSET Laboratories utilizes certified reference materials to validate methods, verify instrument performance, preparation procedures, standard preparation and calibrations.

21.2 Documentation and Labeling of Standards, Reagents, and Reference Materials

As chemicals and solvents are received in the laboratory, each individual type of chemical must be documented according to the date received, opened, and expired (ROE). The laboratory records the inventory code, chemical name, formula, location of storage, vendor, lot number, grade/purity, date received, date of expiration, status, CAS number, Catalog number and comments into the LIMS. (This information is temporarily being recorded in the manual system.) Certificate of Analysis are retained as well.

Standard solutions are properly labeled as to name of solution, concentration, solvent, date of preparation, date of expiration and initial of who prepared. Standard preparation is documented in the standard preparation logbook. The standards are stored in places where these are protected from degradation and contamination.

Refer to Organic & Inorganic Standard Code SOPs for procedures in creating standard codes.

SECTION 22.0 SAMPLING

22.1 Sample Collection

Sampling is done by outside contractors mostly by clients, i.e., environmental engineering consultants, and government contractors.

22.2 Holding Time and Preservation

The laboratory conforms to all regulations for holding times and preservations. See Appendix H for tables of holding times and preservations (Referenced from EPA SW-846, Standard Methods, 40 CFR Part 136). Sample holding time, preparation, and analyses follow the specified method requested for analysis.

The laboratory can also provide containers with chemical preservation for clients requesting containers ahead of time.

22.3 Sample Containers Preparation

To ensure sample integrity, steps are taken to minimize contamination from the containers by lot analyses verification of cleanliness. If the analyte(s) to be determined is organic in nature, the preferred container is made of glass. If the analyte(s) is inorganic, then the container is plastic. Sample containers supplied to the clients are either commercially obtained as pre-cleaned containers or verified clean by laboratory analyses. Purchased pre-cleaned containers must be accompanied with certificate of analysis.

ASSET Laboratories prepares all sample containers, including trip or transport blanks, according to the requirements stated in 40CFR, Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants and SW 846.

22.4 Subsampling

Taking out a portion of material from a laboratory sample bottle for weighing and analysis is a sample mass reduction step and should be performed with correct subsampling practices in order to get a representative sample of the parent sample it is derived. The SOP GE-SUBSAMP-01, Subsampling describes the laboratory protocol when a single container sample is requested for multiple analyses, taking samples if dissolved analysis is requested, taking aliquot samples from brass tubes/sleeves and glass jars, and subsampling heterogeneous sample.

22.5 Handling of Samples

22.5.1 Chain of Custody (COC)

Chain-of-custody procedures are used and implemented in the laboratory. The purpose of COC is to establish a detailed documentation of all transactions in which the samples are transferred from the custody of one individual to another. These procedures are used from the point at which the samples are collected to the opening of the samples in the laboratory, and the subsequent disposition of unused samples. A COC form documents sampling efforts and sample transfer from the field to a testing facility or between testing facilities. An example of an ASSET Laboratories chain-of-custody form is shown in Appendix I. A sample is considered in the possession of the laboratory upon receipt of ASSET Laboratories courier.

If samples need to be subcontract, a new ASSET Laboratories COC form, that cross references the original COC, is generated to accompany samples delivered outside the laboratory.

22.5.2 Sample Receiving Procedure

Samples received at ASSET Laboratories are considered as physical evidence and are handled according to the procedural safeguards established by EPA.

The SOP GE-LOGIN-01, Sample Receipt, Control and Login describes in detail how samples are received, the step-by-step sample log-in process, how samples are tracked from receipt to completion, and the overall responsibilities of the Sample Control Officer.

22.5.2.1 Sample Acceptance Policy

ASSET Laboratories has established a sample acceptance policy procedure to better serve its clients. Analytical results from samples that do not satisfy the laboratory sample acceptance policy will be noted on the case narrative.

- Proper, full and complete documentation of the chain-of-custody form that includes sample identification and location, date and time of collection (time is required especially for samples with holding time of less than 48 hrs), collector's name, sample matrix, preservation and test required on samples. See Appendix I for an example of COC.

- Sample labels that are intact and Sample IDs legibly written to identify sample. Use of indelible or water resistant ink is advised.

- Samples have unique identification or sample IDs.

- Samples have proper container and preservative as required by the method. See Appendix H for container type and preservative for each test.

- Samples received in the laboratory within method holding time. For a list of holding time for each test, see Appendix H. When samples are received for field tests with short holding time like pH and residual chlorine, the laboratory will analyze the samples as soon as possible or within 24 hrs. Data from samples that are analyzed out of holding time are flagged with H qualifier.

- Adequate sample volume provided for test requested. For a list of required sample volume, see Appendix H.

- Sample received at required temperature of ≤ 6°C or there is evidence of chilling like received on cooler with ice for samples collected and received on the same day.

- Sample does not show sign of damage or contamination like loosely cap lid.

- Water samples for volatiles analysis should have minimum headspace. The size of any bubble if there is any should not exceed 5 - 6 mm.

Document all discrepancy in the sample receipt checklist. Client must be informed by e-mail or telephone for any sample that does not meet the above requirements. The communication can be either by e-mail or telephone and must be documented on the client correspondence log. Any instruction from client should be noted in the correspondence log. If the laboratory does not receive response from client and there is holding time issue, the laboratory will proceed with analysis.

22.5.2.2 Sample Verification

A sample custodian receives a sample shipment or delivery. An alternate person is designated to receive samples if the Sample Control Officer is not available. The following procedures are taken during the process.

- Coolers should be opened under a fume hood, wearing the appropriate personal protection equipment.

- The cooler temperature is taken through the use of one or more temperature blank(s) for each transport container. If temperature blank is not available, the laboratory uses an IR gun to monitor the surface temperature of sample containers. The cooler temperature is recorded on the project folder. The acceptance criterion for the cooler temperature is ≤ 6 degrees Celsius.

- Presence or absence of custody seals or tape on the shipping containers and the condition of the seals (i.e. intact, broken, etc.) are noted on the chain of custody.

- If the COC is not available with the samples, a Sample Control Personnel or Client Service person must call the client to request the COC.

- The COC accompanying the samples is signed and dated. A copy of the COC is kept in the project folder.

- The Sample Control Personnel must check agreement between client's sample labels, labels and COC. If there are any discrepancies, then client must be notified immediately of any problems.

22.5.2.3 Sample Login

Login begins with assigning an ASSET Laboratories workorder number from ELIMS (Environmental Laboratory Information Management System). This is a seven digit sequential number that identifies the samples by batch.

- Within each workorder, the samples are assigned an individual number starting at 001A. A sample is defined as having a unique client ID. A workorder with 10 samples will be labeled as N002500-001A / 010A.

- Those samples that have the same client ID but have different bottle/preservation must have individual fraction assigned to each bottle. A sample with 3 fractions will be labeled as N002500-001A / 001C.

- For VOA vials, the ELIMS will assign multiple containers with 1 of 2, 2 of 2, etc. VOAs with headspace will be assigned the higher number. Analyst will analyze first the 1 vial.

Turnaround time for samples received after 3:00 pm starts at 8:00 am the following day. Samples are login for the test requested using in-house specific testcodes.

Other login information including information for specific sample handling, QA/QC, detection limits are documented in the “Comments” section of the sample login of ELIMS.

A sample-receiving checklist is filled out on the ELIMS. The checklist documents the carrier name, cooler temperature, shipment/sample condition questions and Sample Control personnel initials. A printout of the checklist is placed into the project folder.

An electronic project folder is created for each WorkOrder. A WorkOrder COC generated by ELIMS is printed to pdf and placed inside the electronic project folder. All sample receiving documentation that includes COC, sample receipt checklist and client communication is placed to its corresponding electronic project folder for review.

22.5.2.4 Sample Labeling

After the samples have been logged into the ELIMS, a sample label is printed containing the client ID, laboratory number, date received and the barcode. When affixing label to the container, sample control personnel must compare client sample ID written on the laboratory’s label versus client’s sample label. If the labels do not match, sample login and chain of custody must be reviewed for errors and corrected as needed.

22.5.2.5 Sample Preservation Check

The preservation of all aqueous samples for Metals, Sulfide, and Cyanide must be verified in Sample Control. A small aliquot is transferred to a plastic container and the pH tested using a pH strip. The result is recorded in the pH/preservative logbook and the corresponding test.

For samples received that are not preserved, sample control will preserve the

sample to meet the test requirement.

- Sulfide - add zinc acetate and NaOH to adjust the pH to >9.

- Cyanide - oxidizing agents such as chlorine decompose most of the cyanides. Test a drop of the sample with potassium iodide-starch test paper; a blue color indicates the need for treatment. Add Ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add 0.06 grams of ascorbic acid for each liter of sample. Adjust pH to >12 with 10N NaOH.

- Metals (Total Recoverable) - adjust the pH with HNO_3 to pH <2. Following acidification, the sample should be mixed, held for 24 hours, and then verified to be pH <2 just prior to withdrawing an aliquot for processing or "direct analysis". If for some reason such as high alkalinity the sample pH is verified to be > 2, more acid must be added and the sample held for 24 hours until verified to be pH < 2.

- Oil and Grease (EPA 1664) – Samples received for Oil and Grease or TRPH that are not marked preserved are treated by adding hydrochloric acid (HCl). Sample pH is checked following EPA 1664 SOP for pH verification.

22.6 Sample Storage

22.6.1 Samples

Sample control department is responsible for the proper sample storage.

- Samples received by the laboratory are placed into refrigeration units, which are restricted to authorized laboratory personnel. Samples for volatile analysis are kept in a separate refrigerator. The temperature of the refrigerators is monitored for the acceptable temperature range.

- Acceptable refrigerator temperature range is ≤ 6^{o} C.

- Temperature of the sample storage refrigerators is monitored daily for acceptable working temperature range using an NIST traceable thermometer. See Section 5.4.2 for thermometer and refrigerator/freezer calibrations.

- Corrective actions are taken if the refrigerators malfunction or the temperature is out of acceptable range. A Non-Conformance Form is submitted to the QA Manager following the corrective action.

- If a client submits samples to the laboratory, which could or/will, go to litigation, the laboratory can make provisions to store the samples into a separate walk-in refrigerator. The refrigerator can be locked and secured until a written notice is received from the client. The client must approve transferring or disposal of samples. A written authorization must be faxed to the laboratory confirming status of samples. All documentation must be placed into the project folder.

22.6.2 Extracts, Digestates and Leachates

The department that performs the extraction and digestion is responsible for the storage of extracts, leachates and digestates. Once the sample has been processed, the extract, digestate or leachate must be stored according to method specified conditions. The digestates for metals are stored at room temperature until sample analysis. Organic extracts can be stored up to 40 days at ≤ 6° C. The extracts must be stored in a separate refrigerator from that housing the analytical standards. The leachates (from tests such as TCLP) can be stored prior to the preparation stage or the analytical stage. Each has a holding time and/or preservation requirements. See method SOPs for details.

22.6.3 Refrigerator Blank

Samples or extracts designated for volatile organics analysis must be segregated from other samples and extracts. Samples suspected of containing high concentrations of volatile organics shall be further isolated from other volatile organic samples.

Storage or refrigerator blanks are used to determine if cross contamination occurred. A refrigerator blank also known as holding blank is made by placing a preserved filled VOA with water or a VOA with blank soil inside the refrigerator for seven days to monitor storage contaminants. After seven days, the VOA is log to be analyzed for EPA 8260. The results are checked by the QA Manager and filed by the Sample Control Officer.

22.7 Sample Traceability in the Laboratory

Traceability of the samples that are transferred to or from the laboratory is tracked by the use of the ASSET Laboratories laboratory number (batch) and client sample identification. These are monitored from the point of acquisition by the laboratory through the sample preparation, analysis, data reduction, data validation, final report generation, and sample disposal.

Sample traceability throughout the laboratory is achieved by using the ELIMS Sample Tracker.

- When the samples are given to the chemist, ELIMS records the date, time, samples, the name of the chemist the samples were transferred to and the Sample Control personnel initials.

- When the samples are returned to Sample Control, the date, time, samples and the location of the walk-in refrigerator are recorded.

- When samples are transferred to Sample Disposal, ELIMS records the date, time, samples, transfer location and the Sample Control personnel initials.

- Samples that are consumed, broken, disposed or returned to the client are recorded by ELIMS with the date and time of transaction.

In the Sample Preparation Areas, sample traceability is documented on the organic extraction and metal digestion logbooks. After the samples have been prepared, the extractor or digestor gives the extracts and an extraction printout from ELIMS to the analyst.

Sample traceability continues through the analysis, data reduction, data validation, final report generation, and sample disposal by the use of the laboratory number. All result templates, folders, invoices, and final reports document the laboratory number for all samples.

22.8 Sample Disposal

Unused and remaining portions of the samples received in the laboratory are kept for at least 45 days upon receipt (or as stated by the project requirements). A sample disposal fee is charged if client prefers the laboratory to dispose them. Laboratory sample disposal is in accordance with the local, state, and federal regulations.

Laboratory waste is segregated according to hazard class. Non-hazardous waste is disposed of in one of two ways: non-hazardous aqueous waste is neutralized and disposed with excess water. Non-hazardous soil samples are disposed of in the regular trash.

Hazardous wastes are segregated by organic and inorganic type material. This material is packaged in steel drums. Oil samples are also segregated into steel drums for recycling. Waste solvents and solvent-based extracts are stored in steel drums for recycling. A licensed disposal company performs all handling of hazardous waste.

SOP GE-DISPOSAL-01, Sample Disposal provides a detailed pathway how to handle and dispose environmental sample disposals.

SECTION 23.0 QUALITY ASSURANCE for ENVIRONMENTAL TESTING

23.1 Proficiency Testing Program

ASSET Laboratories participates in performance evaluation sample analyses as required by NELAP (ORELAP), ELAP (California) and NDEP (Nevada). The laboratory joins the proficiency testing (PT) program provided by a third party on a semi-annual basis. Proficiency testing is performed for wastewater, drinking water and hazardous waste program. Results from these are reported to the regulatory agencies for compliance with certification requirements. Analyst's training records are also updated with the result of the proficiency testing and data are used for continuing demonstration of capability.

If there is "unacceptable" result on proficiency testing, the analyst must investigate the root cause of the problem, correct the issue and perform a corrective action PT. A corrective action letter is submitted to the State Agency for all analytes that did not pass acceptance criteria. Another proficiency sample may be submitted for evaluation.

The QA Manager is responsible for assigning, ordering and reporting PT samples from an accredited PT provider. The QA Manager is responsible for record keeping of PT results and entering result of the study into an Access database.

~~ATL~~ SOP GE-PT-01, Proficiency Testing Program indicates procedure to treat PT samples as regular samples, i.e., managed, analyzed and reported in the same manner as real environmental samples utilizing same staff, methods as used for routine analysis of that analyte, procedures, equipment, facilities, and frequency of analysis.

23.2 Quality Control Parameters

Data generated at ASSET Laboratories are assessed for data quality in terms of accuracy, bias and precision. QC results are reported together with the final sample results. When the project or client requests QC data, a blank, duplicate, spike, and a standard reference material are analyzed for each set of samples for precision and accuracy data. The exact quality and quantity of the QC samples are determined by the project or client.

Method QA/QCs are those measures taken to evaluate the method protocols and provide assurance that the values being obtained are correct. These are run at a frequency of one (1) per batch (batch QC sample frequencies and batch size are defined by the method series requirement and/or project requirements). A batch is defined as a group of samples, which are analyzed together with the same method sequence and with the manipulations common to each sample within the same time period or in continuous sequential time periods. Samples in each batch must be of similar composition.

Samples are analyzed in the laboratory per batch. A typical batch usually consist 20 samples, Method Blank (MB), Laboratory Control Sample (LCS), Matrix Spike (MS) and Matrix Spike Duplicate (MSD) or as required by method or client requirements. A duplicate sample can also be analyzed per client request or method requirement. A batch cannot have more than 20 samples.

23.2.1 Negative Control

23.2.1.1 Method Blank

Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. It is used to assess contamination resulting from the analytical process.

A minimum of one method blank must be included with each set of 20 or fewer samples.

Target analytes present in the method blank should be below the reporting limit or less than 1/10 of sample concentration or 1/10 the regulatory limit (whichever is greater). For DoD projects, the method blank should be below ½ the reporting limit or less than 1/10 of sample concentration or 1/10 the regulatory limit (whichever is greater)

If the method blank is contaminated, then the laboratory shall reprocess affected samples in a subsequent preparation batch, except when sample results are below the PQL. If insufficient sample volume remains for reprocessing, the results shall be reported with appropriate data qualifiers.

The following are also Negative Controls:

- Calibration Blank – reagent water containing no analytes of interest, prepared and analyzed together with the calibration standards. Used to determine the zero point of the calibration curve for all initial and continuing calibrations

- Instrument Blank – a clean sample or reagent water prepared and processed during the analytical sequence used to determine instrument contamination.

- Trip Blank – is submitted by the client with each shipment of water and soil samples for volatile analyses or as specified in the project QAPP. Used to assess contamination during handling and shipment.

- Equipment Blank – created in the field, usually prepared by blank water rinsed sampling equipment to assess effectiveness of decontamination

- Refrigerator Blank – also referred as holding blank, used to monitor contamination in sample storage of VOC samples.

For Trip, Equipment and Storage Blanks, if contaminant analyte is at or above the reporting limit and is greater than 1/10 of the amount measured in any sample, the results are considered suspect and are reported as estimated. For DoD projects, no analyte should be greater than ½ the reporting limit.

23.2.2 Positive Controls

23.2.2.1 Laboratory Control Sample (LCS)

LCS is an aliquot of laboratory reagent blanks to which known quantities of the method analytes are added in the laboratory. All analyte concentrations shall be within the calibration range of the methods or at project-specific concentration of concern. If this is not specified, it shall be at or below the midpoint of the calibration curve. The components to be spiked shall be as specified by the mandated test method or other regulatory requirement or as requested by the client. In the absence of specified spiking components the laboratory shall spike per the following:

- For those components that interfere with an accurate assessment such as spiking simultaneously with technical chlordane, toxaphene and PMBs, the spike should be chosen that represents the chemistries and elution patterns of the components to be reported.
- For methods that have extremely long lists of analytes, a representative number may be chosen: 1-10 target analytes, spike all components; 11-20, spike at least 10 or 80%, whichever is greater; >20 target analytes, spike at least 16 components. However, all target analytes should be included in the spike mixture over a 2-year period.

The LCS is analyzed exactly like a sample, and is used to evaluate ongoing laboratory performance and analyte recovery in a clean matrix.

A minimum of one LCS must be included with each set of 20 or fewer samples. Exceptions would be for those analytes for which no spiking.

LCS is recovery is calculated as:

$$\%\ Recovery = \frac{Concentration\ Found}{True\ Concentration} x\ 100$$

For example, if the LCS True Concentration is 50 ug/L and the Concentration Found during the analysis is 46 ug/L, then (46/50)*100 = 92% recovery.

LCS recovery should be within control limit. Control limit maybe based on laboratory generated in-house limit, method default limit or client specific limit.

If the LCS recovery is outside control limit, samples analyzed along with the LCS shall be reprocessed and re-analyzed or the data reported with appropriate data qualifying codes. If LCS recovery is biased high and samples were none detect (ND), it is not necessary to reanalyze LCS and samples.

23.2.3 Sample Specific Controls

23.2.3.1 24.2.3.1 Matrix Spike (MS)

MS is aliquot of environmental sample to which a known quantity of the method analyte is added in the laboratory. The spiking occurs prior to sample preparation and analysis. The MS is analyzed exactly like a sample, and is used to determine whether the sample matrix contributes bias to the analytical results. A minimum of one MS must be included with each set of 20 or fewer samples.

The background concentration of the analyte in the sample matrix must be determined in a separate aliquot and the measured value in the Matrix Spike corrected for background concentration.

Matrix spike recovery is calculated as follows:

$$\%\ Recovery = \frac{Spike\ Sample\ Result - Original\ Sample\ Result}{Spike\ Concentration} x\ 100$$

For example, if the Spike Concentration is 50 ug/L, the Spiked Sample Result is 54 ug/L, and the original Sample Result is 6 ug/L, then (54-6)/50*100 = 96%.

Matrix spike recovery should be within control limit. Control limit maybe based on laboratory generated in-house limit, method default limit or client specific limit.

For matrix spike results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

23.2.3.2 Matrix Spike Duplicate (MSD)

MSD is a duplicate of the Matrix Spike used to determine the precision and bias of a method in a given sample matrix. A minimum of one MSD must be included with each set of 20 or fewer samples.

MSD recovery is calculated the same as the matrix spike. Relative Percent Difference (RPD) of MS and MSD concentration is calculated as follows:

$$Duplicate\ \%RPD = \frac{MS_{result} - MSD_{result}}{\left(\frac{MS_{result} + MSD_{result}}{2}\right)} x\ 100$$

For example, if the original result is 250 mg/L and the duplicate result is 200 mg/L, then [(250-200)/(250+200)/2] *100 = 22

MSD recovery and %RPD should be within control limit. Control limit maybe based on laboratory generated in-house limit, method default limit or client specific limit.

For matrix spike duplicate results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

23.2.3.3 Sample Duplicates

Sample duplicates are replicate aliquots of same sample taken through the entire analytical procedure to determine the precision of analytical results in a given matrix. Duplicate analysis is performed at a minimum of one with each set of 20 or fewer samples or as specified by the mandated test method.

%RPD of sample duplicates is calculated and should be within control limit. Control limit maybe based on laboratory generated in-house limit, method default limit or client specific limit.

For sample duplicate results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

23.2.3.4 Surrogates

Most organic analyses make use of surrogates. Surrogate is an organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples (SW-846, Chapter One). Surrogates are added to samples and QCs prior to sample preparation/extraction and recovery are compared against method default limit or based on in-house laboratory limit.

Surrogate recovery is calculated using the formula below:

$$\%Recovery = \frac{Concentration\ \ Found}{True\ \ Concentration} x\ 100$$

For example, if the Surrogate True Concentration is 0.5 ug /L and the Concentration Found during the analysis is 0.4 ug/L, then (0.4/0.5)*100 = 80% recovery.

If the surrogate recovery is outside control limit, samples must be reprocessed and re-analyzed or the data reported with appropriate data qualifying codes. If surrogate recovery is biased high and analyte(s) is none detect (ND), it is not necessary to reanalyze samples.

23.3 Quality Control (QC) Limit

The analysis of QC samples for organics, metals, and general chemistry demonstrate that adequate recoveries have been obtained in spiked (fortified) samples, check for matrix interference in samples, confirm that reagents used for analyses have no impurities that interfere with the analysis of the analyte, identify if cross-contamination between samples has occurred during workup, check laboratory performance against reference materials, and verify the precision and accuracy of methods. The results from the QC samples such as matrix spike (MS), matrix spike duplicate (MSD), laboratory control sample (LCS), and surrogates (if applicable) are compiled and graphed on control charts. The primary functions of the control charts are to define control limits for the individual methods and as a performance monitoring tool.

The laboratory follows at least the minimum quality control requirements specified by each method (if and only if all parameters are the same). In general, these method specific quality control requirements will be used as a guideline to determine approximate limits until in-house limits can be generated. The laboratory will follow whichever limits are the most stringent.

If the method does not specify limits or guidelines for quality control requirements, the laboratory will default to recovery limits such as 80 – 120% and RPD of 20% (for inorganic methods such as wet chemistry and metals) or recovery limits of 70 – 130% and RPD of 30% (for methods such as purgeable and extractable organics) until in-house limits can be generated.

If the method only has guidelines for the quality control requirement, then the laboratory will use them strictly as guidelines and set default limits as stated above until in-house limits can be generated. For tests where in-house control limits are used, these are updated on annual basis.

The acceptability of LCS/MS/MSD results within any preparatory batch shall be based on project-specified limits if available. In the absence of project specified limits, the laboratory will use its in-house limits for batch acceptance. The laboratory in-house limits are calculated from the laboratory's historical LCS/MS/MSD data in accordance with its SOP. SOP GE-CCHARTS-01. Control Charts and Control Limits describes the process for establishing and maintaining LCS limits and the use of control charts. In summary, in-house limits are generated using a minimum of 20 points generated under the same analytical process. No point is excluded from the calculation unless there is a documented and scientifically valid reason. Average (Ave) and standard deviation (SD) were calculated and in-house limits are generated using Ave $\pm$ 3SD.

See Appendix J for current in-house control limits.

23.4 Marginal Exceedance

If a large number of analytes are in the LCS, it becomes statistically likely that a few will be outside control limits. This may not indicate that the system is out of control; therefore corrective action may not be necessary. Upper and lower marginal exceedance (ME) limits can be established to determine when corrective action is necessary. A ME limit is four (4) standard deviations around the mean.

The number of allowable marginal exceedances is based on the number of analytes in the LCS. This ME approach is relevant only for methods with long lists of analytes and do not apply to methods with fewer than 11 target analytes. The number of allowable ME is as

follows:

- >90 analytes in LCS, 5 analytes allowed in ME of the LCS control limit
- 71-90 analytes in LCS, 4 analytes allowed in ME of the LCS control limit
- 51-70 analytes in LCS, 3 analytes allowed in ME of the LCS control limit
- 31-50 analytes in LCS, 2 analytes allowed in ME of the LCS control limit
- 11-30 analytes in LCS, 1 analytes allowed in ME of the LCS control limit

If one analyte exceeds the ME limits, the LCS fails and corrective action is necessary. Marginal exceedances must be random. If the same analyte exceeds the LCS control limit repeatedly, it is an indication of a systemic problem. The source of the error must be located and corrective action taken.

SECTION 24.0 REPORTING OF RESULTS

24.1 General

The results of each test and analyses carried out by the laboratory are reported accurately, clearly, unambiguously and objectively, and in accordance with State and Federal requirements as well as client specific requirements

Upon completion of all required analyses, the results are submitted for final report generation. At all stages of Data Handling (Data Collection, Validation, and Reporting), the laboratory staff and management review all data before the final deliverable package is released. The following steps detail the internal laboratory procedure that ensures the final report is complete and concise format. All final reports must be signed by the Laboratory Director or designee before they are released to the client.

24.2 Data Collection and Review

Computers are used to collect and quantify data from the GCMS, GC, AA, ICP and ICP-MS and other instruments. Instrument output can be imported into the ELIMS for calculations and reporting. General chemistry results are manually typed into the ELIMS for reporting.

Data are spot-checked for accuracy. Concentration of the analytes found in the analysis for organics, metals, and general chemistry will be expressed according to required units depending on the sample matrix, i.e., µg/L or µg/kg.

Data collection and review include the following:

- Review of sample documents for completeness by the analyst(s) at each step of the analysis scheme.

- Daily review of quality control indicators such as blanks, surrogate recoveries, duplicate analyses, matrix spikes analyses, etc. The quality control indicators must be evaluated using specific criteria described in Section 24.2. If any indicator is outside the acceptance criteria, then the analyst must follow the SOP for Non-Conformance, Corrective Actions.

- All analyses must have data qualifiers for such items as:

    - All results must be flagged if the method blank contains hits above the reporting limit.
    - All results must be flagged for samples analyzed past holding time.

- All manual integrations must be dated and initialed by the analyst and must follow the manual integration policy.

- The analyst prints a “preliminary” report from the ELIMS program. The analyst reviews all raw data and the “preliminary” report prior to submittal for:

    - Correct sample identification on raw data
    - Correct analytical method
    - Correct analyte list to report
    - Matrix type and Units
    - Dilution Factors
    - Calculations
    - MDL, PQL
    - Correct and complete QA/QC
    - Complete technical check

- The analyst submits a “First Level Data Review” sheet for each batch number.

- All data must be reported in a consistent unit to allow comparability of data among organization. The standard units used to report data are listed below.

- Units of mass/volume, volume/volume, mass/mass are reported as parts per unit. The common units are:

    - Parts per Million or ppm: mg/L or uL/mL or mg/kg
    - Parts per Billion or ppb: ug/L or nL/mL or μg/kg

    Physical parameters are reported using common units as:

    - pH (pH units)
    - Hardness (mg $CaCO_3$/L)
    - Alkalinity (mg $CaCO_3$/L)
    - Temperature (°C or °F)
    - Dissolved Oxygen (mg/L)
    - Flow Rate (mL/min)

- Data is usually reported on an “as received” basis. Solid samples results are reported in wet basis but if requested can be reported in dry basis. Other reporting units are allowed, based upon client request. Refer to appropriate project descriptions for special reporting of units.

24.3 Data Validation

Once the preliminary report has been generated, the department supervisor/group leader reviews the report for technical errors against the raw data submitted by the analyst(s).

Results must be checked for correlation between test results from different tests. Some tests are grouped together by type (i.e. demand, general minerals, etc.). The results from each grouping should correlate through ratios, percentages, etc. If the ratios do not meet the criteria, then check for reporting and calculation errors. If all reporting and calculations are correct, then re-analyze one or more of the tests (as necessary) and re-evaluate.

The following steps are taken during the data validation process:

- All final data are visually checked for consistency and reasonableness. Series of grossly high or grossly low results are also checked. Unusually high or unexpectedly low results are verified using a different method, where possible.

- All reported data must be within the working linear range of the instrument.

- LCS and spike recovery must be within the specified control limits, or within the laboratory generated limits, when applicable. Any out-of-control data are properly qualified with an appropriate explanation (e.g., matrix interference).

- All analytical problems encountered during sample analysis must be properly addressed to provide explanations for data reviewers.

- Checks on calculations are as follows

    - Calculations from new analyst(s) are reviewed at 100%
    - A calculation from a trained analyst(s) is subject to a minimum of a 50% review.

- Department Supervisor/Group Leader must review the raw data and report for:

    - All assigned samples are properly analyzed
    - Correct matrix and units
    - Correct and complete QA/QC
    - Correct calculations (including sample preparation factor and sample dilutions)
    - Special instruction met

- The department supervisor/group leader approves the “Second Level Review Section” on the bottom of the “First Level Review” sheet. If there are any problems or questions, the department supervisor/group leader sends the entire data package back to the analyst for review.

24.4 Final Report

24.4.1 Final Reports

After the department supervisor/group leader reviews and approves the preliminary report, the data package is submitted to the Project Manager(s). The Project Manager(s) reviews the entire package and then fill-out a "Project Manager" checklist which documents typographical errors, holding time issues, project specific requirements, etc. The Project Manager prints the final report, which includes sample results and applicable QA/QC. Preliminary results can be faxed to the client with a disclaimer that the results are preliminary. In order to avoid miss-communication of results, no verbal results are given to the client.

Validated results can be faxed, e-mailed or uploaded to ftp at the client's request. For an example of fax cover page, see Appendix K. If there are amendments to the results, a new hardcopy report must be generated. A new electronic copy will be submitted to the client.

24.4.2 Test Report

Each test report shall include at least the following information, unless the laboratory has valid reasons for not doing so:

- a report title (e.g. Analytical Results)
- cover page which includes name, address and telephone number of the laboratory
- unique identification of the report (such as the Work Order number), and on each page an identification in order that the page is recognized as a part of the test report, and clear identification of the test report.

Note: Page numbers are represented as page # of ## or total number of pages is listed in the table of contents.

- The name and address of the client and project name/number
- Identification of the method used
- A description of, the condition of, and unambiguous identification of the sample(s), including client identification code
- The date of receipt of the sample(s), date and time of sample collection, date(s) of performance of environmental test, time of sample preparation and/or analysis
- Date reported
- Practical Quantitation Limit
- Method Detection Limit (if requested)
- Definition of data qualifiers and reporting acronyms
- Sample results with appropriate unit of measurements
- QC results including Method blank, LCS, MS/MSD recoveries and limits
- COC and other sample receiving items (such as client correspondence, shipping documents)
- A statement to the effect that the results relate only to the samples

- The name, title and signature of person(s) authorizing the test report
- Where applicable, a narrative of the report that explains the issue(s) and corrective actions taken.
- Appropriate laboratory certification number for the state of origin of the sample, if applicable

24.4.3 Electronic Data and Deliverables (EDD)

Some clients may request an electronic Data Deliverable (EDD). The laboratory has a default format that can be provided to clients. EDD format may be customized to fit the client's needs. If a different format is required, a copy of the EDD specification must be submitted prior to the report's due date to the ELIMS Implementation Team. Also, please note that the price for EDDs is dependent on the format.

24.4.4 Supplemental Information for Test Reports

In addition to Section 25.4.1.1 requirements, test reports include unacceptable quality controls, inclusion or exclusions to the test method and information on specific test conditions that may have affected the quality of the results. This is typically in the form of a footnote or a qualifier and/or a narrative explaining the discrepancy.

24.4.5 Final Review

All hardcopy final reports are then sent to the Laboratory Director or the designated signatory person for final review. Copies of the final report are kept in the project/batch folder, and are then archived.

If the final report is found to be incomplete or additional errors are found, it is then documented and returned to the department supervisors for correction.

QA Manager reviews at least 5% of the data generated or as per client/project specification. If the final report is found to be incomplete or errors found, it is then returned to the department supervisors for correction. An amended report is generated and sent to the Laboratory Director or designee for final review.

24.5 Amendments

Procedures for amendments and/or additions to documentation are:

- Typographical errors (client initiated) are documented by email from the client or by documenting the conversation on the telephone log.
- Re-analysis of a test parameter may be necessary if the data is questionable to the analyst/supervisor.
- When completed, the supervisor reviews and validates all data for precision, accuracy, completeness, and comparability.
- If any result is changed, the report is amended and is faxed and mailed to the client.
- All data is archived into the project folder.

SECTION 25.0 REFERENCES

25.1 Federal Register, 40CFR Part 136, March 12, 2007, "Guidelines Establishing Test Procedures for Analysis of Pollutants the Clean Water Act.

25.2 Taylor, John K., Quality Assurance of Chemical Measurements, Lewis Publishing, 1987.

25.3 USEPA, Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA-600/4-79-019, Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1979.

25.4 USEPA, Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1979.

25.5 USEPA, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Office of Soil Waste and Emergency Response, Washington, D.C., 1987.

25.6 USEPA, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Office of Soil Waste and Emergency Response, Washington, D.C., 1992.

25.7 USEPA, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. SW-846, Office of Soil Waste and Emergency Response, Washington, D.C., 1996.

25.8 USEPA, Testing Methods: Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA-600/4-82-057, Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1982.

25.9 The NELAC Institute Standard 2009 Modules 2 & 4

25.10 US Department of Defense, Quality Systems Manual for Environmental Laboratories Version 4.2, 2010

25.11 Greenberg, Arnold E., Clesceri, Lenore S., Eaton, Andrew D., Standard Method for the Examination of Water and Wastewater, 18th ed., American Public Health Association, 1992.

25.12 Standard Methods Online Edition.

SECTION 26.0 DOCUMENT REVISION HISTORY

Revision No.	Date	Description
7.0	February 2014	• Updated to ASSET Laboratories • Added Support Services Group in Section 3.0 Organization • Added recertification of stock standards in Section 8.2 • Revised Section 12.0, Corrective Action to the current LIMS procedure • Revised Section 14.0, data backup system and archiving of electronic documents • Added MDL verification in Section 19.4.1 • Changed QA review to 5% or as per client requirement in Section 24.4 • Updated Appendices
8.0	December 2014	• Changed signatories and key personnel • Updated Company Logo • Updated laboratory certifications

APPENDIX A

GLOSSARY / ACRONYMS

Glossary and Acronyms

ACCEPTANCE CRITERIA Specified limits placed on characteristics of an item, process, or service defined in a requirement document

ACCURACY is the nearness of a result or the mean of a set of results to the true or accepted value.

B is a laboratory flag when target analyte is detected in method blank at or above the method reporting limit or PQL.

BATCH is a group of samples which behave similarly with respect to the sampling or the testing procedures being employed and which are processed as a unit using the same lot of solvents/reagents/spikes. A batch is group of 20 samples or fewer processed together in one analytical run.

CALIBRATION refers to a plot of concentrations of known analyte standards versus the instrument response to the analyte. It is a reproducible reference point to which all sample measurements can be correlated. The appropriate linear or nonlinear coefficient for standard concentration to instrument response should $\geq$ 0.995.

CALIBRATION STANDARDS are series of known standard solutions used by the analyst for calibration of the instrument. These are prepared by diluting a stock standard solution to produce working standards, which cover the working range of the instrument. One calibration standard should be at or below the reporting limit for the method.

CAL DOHS is an acronym for **California Department of Health Services**. CAL DOHS is the lead agency for the ELAP program and for setting environmental standards in the state.

CARBON RANGE refers to the amount of petroleum hydrocarbons in a specific section of a chromatogram based on the retention time of pure alkanes such as hexane, heptane, octane etc., i.e. c6-c7, c7-c8, c8-c9 etc. Pure straight chain hydrocarbons (alkanes) have retention times that increase regularly with the number of carbon atoms. These retention times are used to divide a chromatogram into carbon ranges: C8-C10 indicates that we are talking about the part of the chromatogram between the retention time of Octane (eight carbon atoms) and Decane (ten carbon atoms).
The TPH of a Carbon Range is defined as the area of a range of the sample compared to the area of the same range of the reference standard. The carbon ranges of some typical products:

C5-C12	Gasoline
C8-C17	Jet A
C8-C17	JP5
C8-C18	Kerosene
C10-C28	Diesel
C18-C36	Motor Oil
C20-C38	Hydraulic Oil
C10-C40	Fuel Oil#6 (Bunker Oil)

CCV is an acronym for **Continuing Calibration Verification**. CCV is a standard that periodically confirms that instrument response has not changed significantly from the initial calibration. This is prepared from the same stock solution that was used to prepare the calibration standards. Its concentration should be at or near the mid-range levels of the calibration curve. It is analyzed at the beginning and end of a sample run, or periodically during a run for example every after every 10^{th} sample depending on the method requirements. Each method has its own set of acceptance criteria.

CHAIN OF CUSTODY FORM Record that documents the possession of the samples from time of collection to receipt in the laboratory.

CHLORINATED HYDROCARBONS refer to the list of Volatile Organic Compounds contained in EPA 8010 and EPA 601. This list can also be referred to as Chlorinated Solvents or Purgeable Halocarbons.

CHLORINATED SOLVENTS refer to the list of Volatile Organic Compounds contained in EPA 8010 and EPA 601. This list can also be referred to as Chlorinated Hydrocarbons or Purgeable Halocarbons.

CONTAMINATION is a component of a sample or an extract that is not representative of the environment source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

CONTINUING CALIBRATION is the analysis of analytical standard at concentration within the calibration range to verify initial calibration of the system at a specified time frame.

CORRECTIVE ACTIONS are steps that are taken to remove the causes of an existing nonconformity or to make quality improvements. Corrective actions address actual problems. In general, the corrective action process can be thought of as a problem solving process.

DETECTION LIMIT (DL) is the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value (NELAC). Method Detection Limit (MDL) is one way to establish a detection limit.

DEMONSTRATION OF CAPABILITY (DOC). A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI)

DUP or DUPLICATE is a client assigned or randomly selected routine sample that is analyzed twice. Sample duplicate is processed independently through entire sample preparation and analytical process. A minimum of one duplicate must be included for each matrix type with each set of 20 or fewer samples.

E is a laboratory flag when analyte exceeded the calibration range.

ELAP is an acronym for **Environmental Laboratory Accreditation Program**. ELAP is responsible for the certification of environmental laboratories in the state of California.

EPA 8260 is the methodology for the identification of a specified list of Volatile Organic Compounds utilizing GC/MS (Gas Chromatography/Mass Spectrometry).

EPA 8270 is the methodology for the identification of a specified list of Semi-Volatile Organic Compounds utilizing GC/MS (Gas Chromatography/Mass Spectrometry).

GAS CHROMATOGRAPH is the instrument used to separate analytes on a stationary phase within a chromatographic column.

GC/MS is an acronym for **Gas Chromatography/Mass Spectrometry**. It refers to methodology for the identification of compounds which utilizes Gas Chromatography to separate compounds and a Mass Spectrometer as detector.

H is a laboratory flag when analyte was analyzed beyond holding time.

Holding Time. The maximum time that samples may be held prior to analyses and still be considered valid or not compromised.

IC is an acronym for **Ion Chromatography**, a method which can be used for the detection of Phosphate (PO_4), Sulfate (SO_4), Chloride (Cl), Fluoride (F), Bromide (Br), Nitrite (NO_2), and Nitrate (NO_3).

ICB is an acronym for Initial Calibration Blank. ICB is a volume of reagent water or solvent treated in the same manner as the calibration standards. It is used to verify blank standard, and to check carry-overs and contamination.

ICP is an acronym for **Inductively Coupled Plasma.** Inductively Coupled Plasma Spectrometer is one technique for analyzing metal samples. An induction coil is wrapped around a quartz tube in which a stream of charge argon particles and sample solute is flowing. The sample must be in solution and is normally introduced through a nebulizer. The interaction between the induced magnetic field from the coil and the argon plasma create an extremely high temperature. The primary goal of ICP is to get elements to emit characteristic wavelength specific light which can then be meausured.

ICP/MS is an acronym for **Inductively Coupled Plasma/Mass Spectrometry**. It refers to methodology for the detection of metals which utilizes an ICP as ion source and a mass spectrometer as detector. It may also be referred to as EPA Method 6020.

ICV is an acronym for **Initial Calibration Verification** Standard. It is a standard used to confirm the accuracy of the instrument calibration. This is prepared from a different stock solution (i.e. different vendor or lot number) than was used to prepare the calibration standards. It is run after the initial calibration and each method has its own set of acceptance criteria.

IDL is an acronym for **Instrument Detection Limit.** IDL is the concentration equivalent to a signal, due to the analyte of interest, which is the smallest signal that can be distinguished from background noise by a particular instrument. The IDL should always be below the method detection limit, and is not used for compliance data reporting, but may be used for statistical data analysis and comparing the attributes of different instruments. IDL is determined on a clean matrix and analyzed without going through the preparatory step.

INITIAL CALIBRATION is the analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the detector to the target compounds.

INTERNAL STANDARD CALIBRATION is a calibration that involves the comparison of instrument responses from the target compounds in the sample to the responses of specific standards added to the sample or sample extract prior to injection. The ratio of the peak area (or height) of the target compound in the sample or sample extract to the peak area (or height) of the internal standard in the sample or sample extract is compared to a similar ratio derived for each calibration standard. The ratio is termed the response factor (RF), and may also be known as a relative response factor in other methods.

IS is an acronym for **INTERNAL STANDARD.** The internal standard is a compound that matches as closely, but not completely, the chemical species of interest in the samples.

LOD is an acronyl for **Limit of Detection**. It is an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific and maybe laboratory dependent (NELAC). LOD is not equivalent to MDL.

LOQ is an acronym for **Limit of Quantitation**. It is the minimum levels, concentrations, or quantities of a target variable (e.g. target analyte) that can be reported with a specified degree of confidence (NELAC). This is also equivalent to practical quantitation limit (PQL).

LCS is an acronym for **Laboratory Control Sample.** It is an aliquot of laboratory reagent blanks to which known quantities of the method analytes are added in the laboratory. The LCS is analyzed exactly like a sample, and is used to evaluate ongoing laboratory performance and analyte recovery in a clean matrix. A minimum of one LCS must be included with each set of 20 or fewer samples.

MDL is an acronym for **Method Detection Limit.** Minimum concentrations of a substance that can be measured and reported with 99% confidence that the value is above zero. The sample is carried through the entire method under ideal conditions. This is performed on an annual basis by the laboratory.

$$MDL = t_{(n-1,\ 1-\alpha\infty=0.99)} \times S$$

Where: S = standard deviation of the replicate analyses

$t_{(n-1,\ 1-\alpha\infty=0.99)}$ = the Student's t-value appropriate to a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom.

METHOD BLANK or MB is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. It is used to assess contamination resulting from the analytical process. A minimum of one method blank must be included with each set of 20 or fewer samples.

mg/kg is an acronym for **milligrams per kilogram**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 500 mg/kg diesel. It is normally used in conjunction with solid or soil samples.

mg/L is an acronym for **milligrams per liter**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 mg/L lead. It is normally used in conjunction with extracted samples involved in STLC or TCLP analysis which show the quantities of the constituent which are leachable.

MS is an acronym for **Matrix Spike**. It is an aliquot of environmental sample to which a known quantity of the method analyte is added in the laboratory. The spiking occurs prior to sample preparation and analysis. Spiking volume should be limited to 5% or less of sample volume. The MS is analyzed exactly like a sample, and is used to determine whether the sample matrix contributes bias to the analytical results. A minimum of one MS must be included with each set of 20 or fewer samples. The background concentration of the analyte in the sample matrix must be determined in a separate aliquot and the measured value in the Matrix Spike corrected for background concentration.

MSD is an acronym for Matrix Spike Duplicate. MSD A duplicate of the Matrix Spike used to determine the precision and bias of a method in a given sample matrix.

ND is an acronym for none detected. nd is reported when an analyte was not found at detection limit.

NIST is an acronym for National Institute of Standards and Technology. A federal agency under the United States Commerce's Technology Administration that is designed as the United States national metrology institute (NMI).

NELAC is an acronym for national environmental laboratory accreditation conference. nelac is a standards adoption body that solicits, adopts and publishes a consensus performance standard on which nelap is based.

NELAP is an acronym for national environmental laboratory accreditation program. NELAP is the program that implements the nelac standards. state and federal agencies serve as accrediting authorities with coordination facilitated by EPA to assure uniformity.

NON-CONFORMANCE is a departure of a quality characteristic from its intended level of state that occurs with severity sufficient to cause an associated product or service not to meet specified criterion.

PERCENT RECOVERY or %R is the numerical ratio of the amount of analyte measured by the laboratory method divided by the known amount of analyte added to the matrix to be analyzed.

PERCENT DIFFERENCE OR %D is the comparison of two values. the percent difference indicates both the direction and magnitude of the comparison, i.e, the percent difference may be either negative, positive, or zero.

ppb is an acronym for **parts per billion**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 ppb diesel. It is normally used in conjunction with aqueous samples.

ppm is an acronym for **parts per million**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 500 ppm diesel. It is normally used in conjunction with solid or soil samples.

ppt is an acronym for **parts per trillion**. It is a unit of measure used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 ppt gasoline. It is normally used in conjunction with air samples.

PQL is an acronym for **Practical Quantitation Limits.** PQL is the lowest concentration that can be measured with the consideration for practical limitations such as sample size, matrix

interferences and dilutions. PQL is normally 3-10 times the MDL.

PRECISION is a measure of the reproducibility of a set of replicate results among themselves or the agreement among repeat observations made under the same conditions.

Preservation Any conditions under which is a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis (TNI)

Proficiency Testing. A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI)

Proficiency Test Sample (PT) A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria.

RPD is an acronym for **Relative Percent Difference.** It is the ratio of the difference of two readings over its average. This is a means of determining the precision between two numbers.

$$RPD = 100\left[\frac{(X1 - X2)}{\left\{\frac{X1 + X2}{2}\right\}}\right]$$

Where:

X_1 = the larget of the two observed values
X_2 = the smaller of the two observed values

QA is an acronym for **Quality Assurance**. QA is a planned system of activities (program) whose purpose is to provide assurance of the reliability and defensibility of the data.

QC is an acronym for **Quality Control**. QC is a routine application of procedure for controlling the monitoring process. QC is the responsibility of all those performing the hands-on operations in the laboratory.

Reference Material. Material or substance one or more properties of which are sufficiently homogenous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI)

Reference Standard. Standard used for the calibration of working measurement standards in a given organization or a given location. (TNI)

RESOLUTION is the separation between peaks on a chromatogram.

S is a laboratory flag when surrogates or spikes are outside control limits due to matrix interference.

SERIAL DILUTION is the dilution of a sample by a known factor. When corrected by the dilution factor, the diluted sample must agree with the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferents.

SEMIVOLATILE COMPOUNDS are compounds amenable to analysis by extraction with an organic solvent. Used synonymously with base neutral acid or extractable compounds.

SIM is an acronym for **Selected Ion Monitoring**. SIM sets the mass selective detector to repeatedly scan a few selected ions rather than a full spectrum. In the acquisition method (GC/MS SIM or Gas Chromatography/Mass Spectrometry using Selected Ion Monitoring), the selected ions can be changed to reflect the desired compound to be detected. The detector scans for a primary, secondary and tertiary ion set unique to the compound of interest in a particular retention time window. It is an invaluable tool for positive identification of a compound resulting in considerable reduction in false positives and exceptionally low detection limits.

SOLUBLE is a term used for the characterization of metals as hazardous waste. It is often used interchangeably with "WET" or "STLC" when referring to the amount of a metal that is leachable, i.e. soluble lead. The extraction process takes 48 hours.

STANDARD ADDITION or Method of Standard Addition (MSA) is the addition of three increments of a standard solution (spikes) to sample aliquots of the same size. Measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-squares analysis. The analyte concentration is determine by the absolute value of the x-intercept. Ideally, the spike volume is low relative to the sample volume. Standard addition may counteract matrix effects; it will not counteract spectral effects.

STANDARD DEVIATION is the square root of the variance of a set of values.

$$S = \frac{(Y_i - Y)^2}{n - 1}$$

where S = Standard Deviation
Y_i = measured value of replicate
Y = mean of replicate measurements
n = number of replicates

SURROGATE is an organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples.

SVOCs is an acronym for **Semi-Volatile Organic Compound**. It is also commonly referred to as BNAs (Base Neutral Acid) or EPA 8270.

TCLP is an acronym for **Toxicity Characteristic Leachate Procedure** and is used to characterize the mobility of both organic and inorganic analytes present in liquid and solid wastes. It is an extraction method prescribed by CFR (Code of Federal Regulations.) The extraction process takes 18 hours.

TPH is an acronym for **Total Petroleum Hydrocarbons**. It is a measure of the total amount of fuel present in the sample, i.e., TPH-gasoline or TPH-diesel. TPH results can be quantified or calculated as:

- Totals as specific fuels types, i.e. TPH as diesel, crude or gasoline
- Totals in specific carbon ranges, i.e. 500 ppm C10-C25

Traceability. The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to

national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI)

µg/L is an acronym for **micrograms per liter**. It is a unit measure for concentration used in analytical results which expresses the concentration of the constituent of concern, i.e. 5 µg/L diesel. It is normally used in conjunction with aqueous samples.

US DoD is an acronym for **United States Department of Defense.**

VOLATILE COMPOUNDS are compounds amendable to analysis by the purge and trap techniques. used synonymously with purgeable compounds.

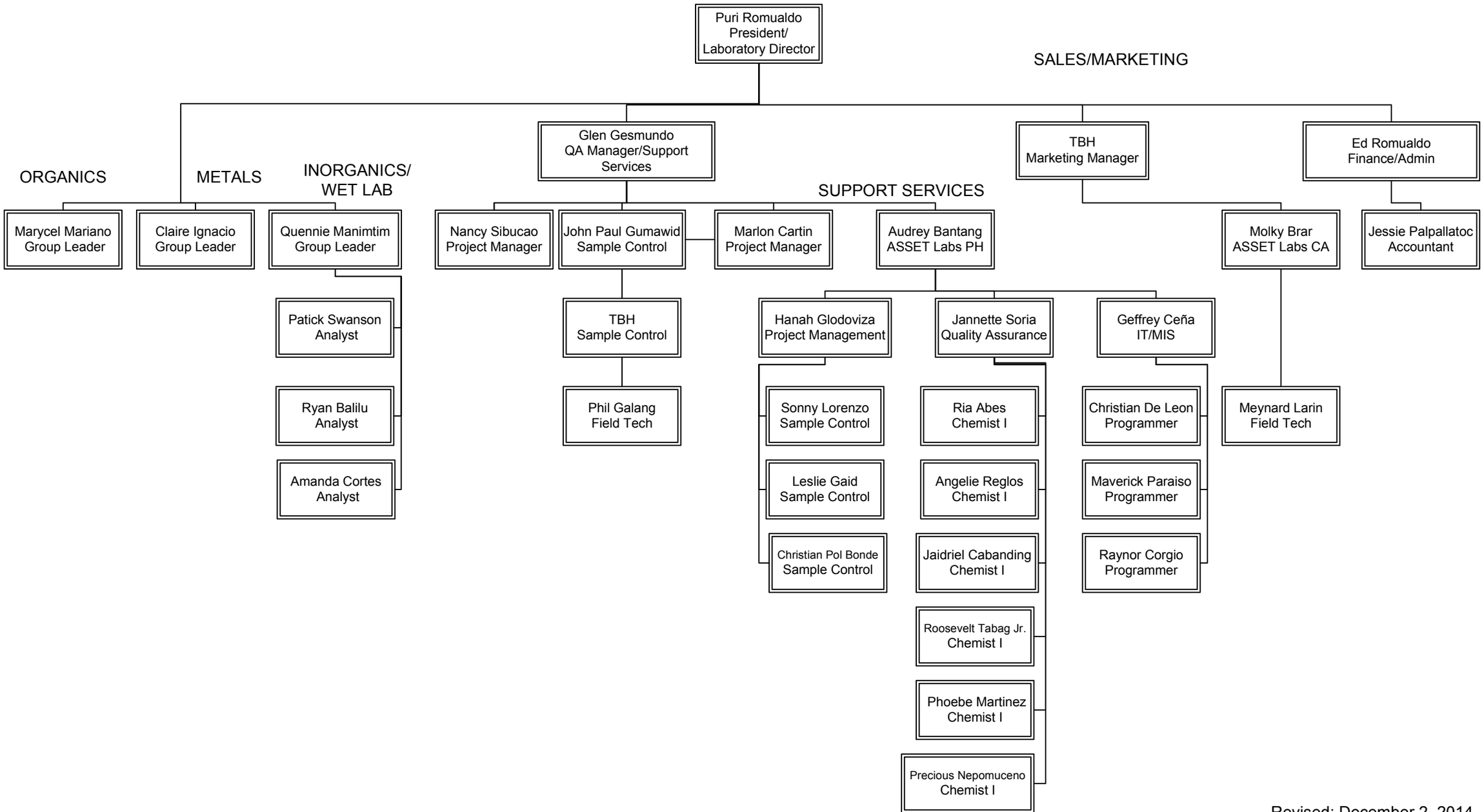
VOAs is an acronym for **Volatile Organic Analysis or Analytes**. VOA is often used when speaking about the analysis of volatile organics. The acronym is rarely used and has been replaced by VOC's. VOA vials refer to the 40 ml containers used for aqueous sampling of volatile compounds.

VOCs is an acronym for **Volatile Organic Compounds**. The term VOCs commonly refers to the list of compounds contained in EPA Method 8240 or the longer list of EPA Method 8260.

APPENDIX B

ORGANIZATIONAL CHART AND LIST OF KEY PERSONNEL

ASSET Laboratories Organizational Chart



Revised: December 2, 2014

ASSET Laboratories Key Personnel

Name, Experience, Education	Title	Responsibilities
Puri Romualdo **39 Years**; 7 year as President; 8 years as Vice-President of ATL ; 10 years as Vice-President of CRL; 4 years as Vice-President of ET&T; 10 years as Chemist. *B.S., Chemical Engineering*	*President/ Laboratory Director*	• Supervising and administrating the quality assurance program. • Ensuring that all general and client-specific quality assurance requirements are strictly followed. • Resolving the approval/rejection of deliverable client sample data package and/or reports. • Ensuring that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory. • Enforcing the QA/QC procedures and requirements within their respective activities and areas of specialization. • Recommending process improvements and corrective actions • Supervising the staff training in the procedures described in the standard operating procedures (SOPs) as they apply to the assigned responsibilities of the staff. • Maintaining an environment that emphasizes an intelligent and responsible approach to producing high data quality and accuracy based on the SOPs carried out.
Glen Gesmundo **13 Years;** 10 years as QA Officer 3 years Organic Chemist M.S., Agricultural Chemistry minor in Environmental Science *BS Chemical Engineering*	*QA Officer*	• Responsible for implementation and monitoring of the laboratory quality assurance program • Ensuring that all data generated is scientifically sound, legally defensible, and of known precision and accuracy. • Monitoring the QA plan on a periodic basis to ensure compliance with the QA objectives of the laboratory. • Developing and implementing new QA procedures within ASSET Laboratories to improve data quality. • Conducting audits and inspections of all division sections on a periodic basis. • Coordinating the analysis of performance evaluation (PE) samples for all analytical divisions on a periodic basis. • Evaluating the results; reporting the results to the General Manager and appropriate Group Leaders; and applying corrective action as needed. • Establishing and maintaining statistical and data records that accurately reflect the quality assurance performance of all analytical divisions. • Maintaining and overseeing the master sources of all SOPs, training logs and completed/full laboratory notebooks. • Serving as the in-house client representative on all projects inquires involving data quality issues. • Overseeing ASSET Laboratories data validation process and Electronic Data Deliverables

Name	Title	Responsibilities
Quennie Manimtim **7 Years;** Inorganic and Organic Chemist *M.S., Agricultural Chemistry minor in Environmental Science* *BS Chemical Engineering*	*Senior Chemist*	• Performs routine tasks and non-routine tasks. • Performs non-routine instrument repairs. • Develops and evaluates new methodologies. • Provides the management and the QAO with immediate notifications of the quality problems by submitting Non-Conformance forms. • Identifies and carries out the approved corrective actions within their respective activities and specialization. • Participates in the training program (including reading SOPs and QA Manual, MDL determinations and Accuracy and Precision data). • Follows QA/QC criteria for all program requirements. • Correct reporting of sample results and QC samples. • Supervising the staff training in the procedures described in the standard operating procedures (SOPs) as they apply to the assigned responsibilities of the staff. • Reports to laboratory director.
Marlon Cartin **7 Years;** Sample Control Officer/Project Coordinator *B.S. Chemistry*	*Project Coordinator*	• Responsible for overseeing sample log-in, proper documentation, sample tracking, sample storage, sample disposal/return, and coordination and scheduling of sampling programs. • Reports to the QA Manager

APPENDIX C

CLIENT COMPLAINT FORM

CLIENT COMPLAINT/INCIDENT REPORT FORM

Control No.: _____

Section I. General Information

Submitted by:_____ Date Initiated: _____ Complaint/Incident Date: _____

Complaint/Incident address to: Organics Inorganics Sales Client Services QA Others _____

Client Name:_____ Samples Affected:_____

Section 2. Description of Complaint/Incident

Section 3. Investigation of Root Cause

Date	Action(s)	Responsible Person

Section 4. Corrective Action

Date	Action(s)	Responsible Person

Section 5. Analyst, Supervisor, Laboratory Director Approval

Employee: _____ Date: _____
Supervisor: _____ Date: _____
Laboratory Director: _____ Date: _____

Section 6. QA Evaluation of complaint/incident

Corrective Action: Acceptable Not Acceptable
Is claim valid: Yes No Not Applicable
QA Manager: _____ Date: _____

Section 7. QA Follow-up/Corrective Action Verification

Follow-up necessary: Yes No
Schedule date of follow-up: _____ Date Followed up: _____ Signature:_____
Corrective Action: Effective Not Effective
QA Comments/Actions:_____

APPENDIX D

CORRECTIVE ACTION FORM

Advanced Technology Laboratories, Inc.

Corrective Action Report (CAR)

Date Initiated: 04-Sep-13 **Corrective Action Report ID:** 21
Initiated By: Marycel Mariano **Department:** GC-SEMI-2

Corrective Action Description

CAR Summary: Surrogates recovery are outside acceptable limits, low bias.

Description of Nonconformance: N010909-025A, -031A & -032A failed surrogates (Tetrachloro-m-xylene & Decachlorobiphenyl) criteria, high bias, possibly due to the presence of unknown peaks on the samples which co-eluted with the surrogates.

Description of Corrective Action: Results are acceptable since samples are ND.

Performed By: Marycel Mariano **Completion Date:** 04-Sep-13

Client Notification

Client Notification Required: Yes **Notified By:** Nancy Sibucao
Comment: case narrative

Quality Assurance Review

Corrective Action: Effective
Further Action required by QA: none

Approval and Closure

CAR Closed By: _____ Close Date: 11-Sep-13
Glen Gesmundo
QA Reviewed By: _____ QA Date: 05-Sep-13
Nancy Sibucao

Last Updated BY: GlenG Updated: 22-Sep-2013 9:40 PM Reported: 24-Sep-2013 10:10 A

APPENDIX E

TABLES OF INSTRUMENT CALIBRATION, LABORATORY QC PROCEDURES AND CORRECTIVE ACTIONS

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions for GCMS Methods

GCMS Methods (Methods 8260 and 8270)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Demonstrate acceptable analytical capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, test method, or sample matrix.	Method-specific criteria.	Recalculate results; locate and fix problem, then rerun demonstration for those analytes that did not meet criteria.	NA.	This is a demonstration of analytical ability to generate acceptable precision and bias. No analysis shall be allowed by analyst until successful demonstration of capability is complete.
Tuning	Prior to ICAL and at the beginning of each 12-hour period.	Refer to method for specific ion criteria.	Retune instrument and verify. Rerun affected samples.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be accepted without a valid tune.
Breakdown check (DDT Method 8270 only)	Correct problem then repeat breakdown check.	Degradation ≤ 20% for DDT. Benzidine and pentachlorophenol shall be present at their normal responses, and shall not exceed a tailing factor of 2.	At the beginning of each 12-hour period, prior to analysis of samples.	Flagging criteria are not appropriate.	No samples shall be run until degradation ≤ 20%.
Second source calibration verification (ICV)	Once after each ICAL.	1. Average RF for SPCCs: VOCs ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane; ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs ≥ 0.050. 2. %Difference/Drift for all target compounds and surrogates: VOCs and SVOCs ≤ 30%D.	Correct problem and verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until calibration has been verified.
Retention time window position establishment for each analyte and surrogate	Once per ICAL.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.	NA.	

GCMS Methods (Methods 8260 and 8270) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Evaluation of relative retention times (RRT)	With each sample.	RRT of each target analyte within ± 0.06 RRT units.	Correct problem, then rerun ICAL.	Flagging criteria are not appropriate.	Laboratories may update the retention times based on the CCV to account for minor performance fluctuations or after routine system maintenance (such as column clipping). With each sample, the RRT shall be compared with the most recently updated RRT. If the RRT has changed by more than ±0.06 RRT units since the last update, this indicates a significant change in system performance and the laboratory must take appropriate corrective actions as required by the method and rerun the ICAL to reestablish the retention times.
Continuing calibration verification (CCV)	Daily before sample analysis and every 12 hours of analysis time.	1. Average RF for SPCCs: VOCs ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane; ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs ≥ 0.050. 2. %Difference/Drift for all target compounds and surrogates: VOCs and SVOCs ≤ 20%D (Note: D = difference when using RFs or drift when using least squares regression or non-linear calibration).	Correct problem, then rerun calibration verification. If that fails, then repeat ICAL.	CCV failure must be explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid CCV. Flagging is only appropriate in cases where the samples cannot be reanalyzed.

GCMS Methods (Methods 8260 and 8270) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Internal standards verification	Every field sample, standard, and QC sample.	Retention time ± 30 seconds from retention time of the CCV; EICP area within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	If corrective action fails in field samples, explain in case narrative.	Sample results are not acceptable without a valid IS verification.
Method blank	One per preparatory batch.	No analytes detected > RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Correct problem. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.	Problem must be corrected. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
LCS/LCSD containing all analytes to be reported, including surrogates	One per preparatory batch.	Use method default or in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Matrix spike (MS)	One per preparatory batch per matrix .	Use method default or in-house control limits.	Evaluate results to determine the source of difference and to determine if there is a matrix effect or analytical error.	Data must be qualified and explained in the case narrative.	For matrix evaluation only. If MS results are outside the LCS limits, the data shall be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.

GCMS Methods (Methods 8260 and 8270) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Matrix spike duplicate (MSD) or sample duplicate	One per preparatory batch per matrix.	Use method default or in-house control limits. MSD or sample duplicate: RPD ≤ 30% (between MS and MSD or sample and sample duplicate).	Evaluate results to determine the source of difference and to determine if there is a matrix effect or analytical error.	Data must be qualified and explained in the case narrative.	The data shall be evaluated to determine the source of difference.
Surrogate spike	All field and QC samples.	Use method default or in-house control limits.	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	Apply Q-flag to all associated analytes if acceptance criteria are not met.	Alternative surrogates are recommended when there is obvious chromatographic interference.
Results reported between MDL and PQL.	NA.	NA.	NA.	Apply J-flag to all results between MDL and PQL.	
MDL study	One per instrument per year.	For all analytes MDL should be <PQL and MDL X10 should be greater than amount spike.	Check instrument. Re-do MDL.		

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions for GC Methods

GC Methods (Methods 8015, 8081, and 8082)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Demonstrate acceptable analytical capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, test method, or sample matrix.	Method-specified criteria.	Recalculate results; locate and fix problem, then rerun demonstration for those analytes that did not meet criteria	Not Applicable (NA).	This is a demonstration of analytical ability to generate acceptable precision and bias. No analysis shall be allowed by analyst until successful demonstration of capability is complete.
(RT) window width calculated for each analyte and surrogate	At method set-up and after major maintenance (e.g., column change).	RT width is ± 3 times standard deviation for each analyte RT from a 72-hour study.	NA.	NA.	
Breakdown check (Endrin / DDT Method 8081 only)	At the beginning of each 12-hour period, prior to analysis of samples.	Degradation ≤ 15% for both DDT and Endrin.	Correct problem then repeat breakdown check.	Flagging criteria are not appropriate.	No samples shall be run until degradation ≤ 15% for both DDT and Endrin.
Minimum five-point initial calibration (ICAL) for all analytes	ICAL prior to sample analysis.	One of the options below: Option 1: RSD for each analyte ≤ 20%; Option 2: linear least squares regression: r ≥ 0.995; Option 3: non-linear regression: coefficient of determination (COD) r2 ≥ 0.99 (6 points shall be used for second order, 7 points shall be used for third order).	Correct problem then repeat ICAL.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until ICAL has passed. Calibration may not be forced through the origin. Quantitation for multicomponent analytes such as chlordane, toxaphene, and Aroclors must be performed using a 5-point calibration. Results may not be quantitated using a single point.

GC Methods (Methods 8015, 8081, and 8082) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Retention time window position establishment for each analyte and surrogate	Once per ICAL and at the beginning of the analytical shift.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.	NA.	
Second source calibration verification (ICV)	Immediately following ICAL.	All analytes within established retention time windows. GC methods: All analytes within ± 15% of expected value from the ICAL;	Correct problem, rerun ICV. If that fails, repeat ICAL.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until calibration has been verified.
Continuing calibration verification (CCV)	Prior to sample analysis, after every 12 hrs, and at the end of the analysis sequence.	All analytes within established retention time windows. GC methods: All analytes within ± 15% of expected value from the ICAL;	Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid CCV. Flagging is only appropriate in cases where the samples cannot be reanalyzed. Retention time windows are updated per the method.
Method blank	One per preparatory batch.	No analytes detected > RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results.	Correct problem.If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.	Problem must be corrected. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
MDL study	One per instrument per year.	For all analytes MDL should be <PQL and MDL X10 should be greater than amount spike.	Check instrument. Re-do MDL.		

GC Methods (Methods 8015, 8081, and 8082) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Laboratory control sample (LCS)/ Laboratory control sample duplicate (LCSD) containing all analytes to be reported, including surrogates	One per preparatory batch.	Use method default or in-house control limits. In-house control limits may not be greater than ± 3 times the standard deviation of the mean LCS recovery..	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Matrix spike (MS)	One per preparatory batch per matrix .	Use method default or in-house control limits.	Evaluate results to determine the source of difference and to determine if there is a matrix effect or analytical error.	Data must be qualified and explained in the case narrative.	For matrix evaluation only. If MS results are outside the LCS limits, the data shall be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.
Matrix spike duplicate (MSD) or sample duplicate	One per preparatory batch per matrix.	Use method default or in-house control limits. MSD or sample duplicate: RPD ≤ 30% (between MS and MSD or sample and sample duplicate).	Evaluate results to determine the source of difference and to determine if there is a matrix effect or analytical error.	Data must be qualified and explained in the case narrative.	The data shall be evaluated to determine the source of difference.
Surrogate spike	All field and QC samples.	Use method default or in-house control limits.	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	Data must be qualified and explained in the case narrative.	Alternative surrogates are recommended when there is obvious chromatographic interference.

GC Methods (Methods 8015, 8081, and 8082) (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Confirmation of positive results (second column or second detector)	All positive results must be confirmed (with the exception of Method 8015).	Calibration and QC criteria same as for initial or primary column analysis. Results between primary and second column RPD ≤ 40%.	NA.	Discuss in the case narrative if RPD > 40%.	Report the result from the primary column if RPD ≤ 40%. Otherwise, report higher result. .
Results reported between MDL and PQL.	NA.	NA.	NA.	Apply J-flag to all results between MDL and PQL.	

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions for Metals ICP

Method EPA 6010B (Metals by ICP)			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration	Initial calibration prior to sample analysis	r>0.995	Evaluate system. Repeat calibration.
Initial calibration verification (second source) ICV	With each initial calibration	Within 10 % of expected value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	After initial calibration, every 10 samples, and at the end of analytical sequence.	All analytes < PQL.	Investigate source of contamination. Clean instrument if necessary and rerun blank
Interference Check Standards A / AB (ICSA / ICSAB)	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent.	For ICSA, Al, Ca, Fe, Mg, Cr, Mo, Ti within 20% of expected value; Others, below PQL. For ICSAB, all analytes within 20% of expected value	a.Investigate source of interference. Correct instrument if necessary and rerun ICSAB. b. Adjust interelement correction factors. Recalibrate the instrument.
Continuing calibration verification (CCV)	After every ten samples and at the end of the analytical sequence.	Recoveries within ± 10% of expected value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification. If analyte concentration is high bias and the sample is ND, no need to re-analyze samples.
Method Blank	One per batch of 20 samples	All analytes < PQL.	Investigate source of contamination. Clean instrument if necessary and rerun blank.
Laboratory Control Sample and Laboratory Control Sample Duplicate (LCSD)	Minimum of one LCS per batch of 20 samples.	85-115% for water 80-120% for soil	a.Check calculations. Check standards preparation. Check for instrument malfunction. Rerun the LCS. b. If out the second time, reprepare the entire batch. c. If LCS is high bias and sample is ND, no need to re-prepare/reanalyze the batch.
Matrix spike/matrix spike duplicate (MS/MSD)	One MS/MSD per batch of 20 samples. Same spiking analytes as LCS.	In-house established limits.	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.

Method EPA 6010B (Metals by ICP) (continued)			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Internal Standard	Added to every sample including standards and blanks prior to analysis.	65-125%	a.Check for instrument malfunction. Check for sample interference. Rerun the sample. b. Recalibrate the instrument.
MDL study	One per instrument per year.	For all analytes MDL should be <PQL and MDL X 10 should be greater than amount spike..	Check instrument. Re-do MDL.
Dilution Test	One per preparatory batch.	Five-fold dilution must agree within ± 10% of the original measurement.	Perform post-digestion spike (PDS) addition.
Post-digestion spike (PDS) addition	When dilution test fails.	Recovery within 75-125%.	Run all associated samples in the preparatory batch by method of standard additions (MSA).

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions for Metals ICPMS

Method EPA 6020 (Metals by ICPMS).			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration	Initial calibration prior to sample analysis	r>0.995	Evaluate system. Repeat calibration.
Initial calibration verification (second source) ICV	With each initial calibration	Within 10% of expected value.	Correct problem, then repeat initial calibration
Initial Calibration Blank (ICB)/ Continuing Calibration Blank (CCB)	After initial calibration, every 10 samples, and at the end of analytical sequence.	All analytes < PQL.	Investigate source of contamination. Clean instrument if necessary and rerun blank
Interference Check Standard A / AB (ICSA/ICSAB)	At the beginning of an analytical run or once every 12 hour, whichever is more frequent.	For ICSA, Al, Ca, Fe, Mg, Na, K, Mo, Ti within 20% of expected value; Others, below PQL. For ICSAB, all analytes within 20% of expected value	a.Investigate source of interference. Rerun ICSA / ICSAB. b. Recalibrate the instrument.
Continuing calibration verification (CCV)	After every ten samples and at the end of the analytical sequence.	Recoveries within ± 15% of expected value.	a. Evaluate system. Rerun standard. b. Reprep standard and recalibrate. Rerun affected samples.
Method Blank	One per batch of 20 samples	All analytes < PQL.	Investigate source of contamination. Clean instrument if necessary and rerun blank.
Laboratory Control Sample (LCS)	Minimum of one LCS per batch of 20 samples.	85-115% for water/soil	a.Check calculations. Check standards preparation. Check for instrument malfunction. Rerun the LCS. b. If out the second time, reprepare the entire batch.
Matrix spike/matrix spike duplicate (MS/MSD)	One MS/MSD per batch of 20 samples. Same spiking analytes as LCS.	75-125% for water/soil	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.
Internal Standard	Added to every sample including standards and blanks prior to analysis.	30-120% of ICB's IS intensity	a.Check for instrument malfunction. Check for sample interference. Rerun the sample. b. Recalibrate the instrument.
MDL study	One per instrument per matrix per year.	For all analytes MDL should be <PQL.	Check instrument. Re-do MDL.

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions For Metals

EPA 7470A /7471A/245.1					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
Minimum 5 standards and a calibration blank	Daily ICAL prior to sample analysis.	If more than one calibration standard is used, r ≥ 0.995.	Correct problem, then repeat ICAL.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until ICAL has passed
Second source calibration verification (ICV)	Once after each ICAL, prior to beginning a sample run.	Value of second source for all analyte(s) within ± 10% of true value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until calibration has been verified.
Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	± 10% of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid CCV. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Method blank	One per preparatory batch.	No analytes detected > PQL and greater than 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater).	Correct problem. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.	Problem must be corrected. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Calibration blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected > PQL.	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.	Apply B-flag to all results for specific analyte(s) in all samples associated with the blank.	

EPA 7470A /7471A/245.1 (continued)					
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**	**Flagging Criteria**	**Comments**
LCS containing all analytes to be reported	One per preparatory batch.	85-115%	Investigate and correct problem. If poor recovery is indicative of laboratory problems, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Problem must be corrected. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Matrix spike (MS)	One per 10 samples.	70-130%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteriabatch is validated by the LCS.	Apply S-flag if acceptance criteria are not met.	For matrix evaluation only. If MS results are outside the LCS limits, the data shall be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.
Matrix spike duplicate (MSD) or sample duplicate	One per preparatory batch per matrix	MSD Recovery: 70-130% MSD or sample duplicate: RPD ≤ 20% (between MS and MSD or sample and sample duplicate).	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.	Apply S-flag if acceptance criteria are not met.	The data shall be evaluated to determine the source of difference.
Results reported between DL and LOQ	NA.	NA.	NA.	Apply J-flag to all results between MDL and PQL.	

Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions For WetChemistry

EPA 300.0 (Inorganic Anions by IC)			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration (minimum of 3 standards and a calibration blank)	Initial calibration prior to sample analysis	r > 0.995	Evaluate system. Repeat calibration.
Initial calibration verification (second source) ICV	With each initial calibration	Within 10% of expected value.	Correct problem, then repeat initial calibration
Initial Calibration Blank (ICB)	After initial calibration, every 10 samples, and at the end of analytical sequence.	All analytes < RL.	Investigate source of contamination. Clean instrument if necessary and rerun blank
Continuing calibration verification (CCV)	After every ten samples and at the end of the analytical sequence.	Recoveries within ± 10% of expected value.	a. Evaluate system. Rerun standard. b. Reprep standard and recalibrate. Rerun affected samples.
Method Blank	One per batch of 20 samples	All analytes < RL.	Investigate source of contamination. Clean instrument if necessary and rerun blank.
Laboratory Control Sample (LCS)	Minimum of one LCS per batch of 20 samples.	80-120%	a.Check calculations. Check standards preparation. Check for instrument malfunction. Rerun the LCS. b. If out the second time, reprepare the entire batch.
Matrix spike/matrix spike duplicate (MS/MSD)	One MS/MSD per batch of 20 samples. Same spiking analytes as LCS.	80-120%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.
MDL study	Twice a year per instrument .	For all analytes MDL should be < PQL.	Check instrument. Re-do MDL.

Spectrophotometer Tests			
Calibration QC Check	**Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration	Initial calibration prior to sample analysis	r > 0.995	Evaluate system. Repeat calibration.
Initial calibration verification (second source) ICV	With each initial calibration	Within 10% of expected value.	Correct problem, then repeat initial calibration
Continuing Calibration	Every 20 samples	± 10%	a. Evaluate system. Rerun standard. b. Reprep standard and recalibrate. Rerun affected samples.
Method Blank	Every 20 samples	< PQL	Investigate source of contamination. Clean instrument if necessary and rerun blank.
Laboratory Control Sample (LCS)	Every 20 samples	80 – 120%	a.Check calculations. Check standards preparation. Check for instrument malfunction. Rerun the LCS. b. If out the second time, reprepare the entire batch.
Matrix spike/matrix spike duplicate (MS/MSD)	Every 20 samples	80-120%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.
MDL study	One for each test per year.	For all analytes MDL should be < PQL.	Check instrument. Re-do MDL.

Titration Tests			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Titrant standardization	Every 20 samples	Within 5% of expected concentration	Check calculations and standard preparation. Reanalyze.
Method Blank	Every 20 samples	< PQL	Investigate source of contamination. Reanalyze.
Laboratory Control Sample (LCS)	Every 20 samples	80 – 120%	a.Check calculations. Check standards preparation. Rerun the LCS. b. All samples (including QC samples) must be reanalyze if LCS fails.
Matrix spike/matrix spike duplicate (MS/MSD)	Every 20 samples	80-120%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.
pH			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Three Buffers	Beginning of use / new chemist	Within 0.1 unit of true value	Recalibrate instrument.
Buffer Check	Every 10 samples and at the end of the sample batch.	Within 0.1 unit of true value	Recalibrate instrument.
Duplicate	Every 10 samples	% RPD must be < current control limits	Reanalyze original sample and sample duplicate.
Gravimetric Tests			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Balance Check	Beginning of use.	Within current control limits.	Recalibrate instrument.
Method Blank	Every 20 samples	< PQL	Investigate source of contamination. Reanalyze.
Laboratory Control Sample (LCS)	Every 20 samples	80 – 120%	a.Check calculations. Check standards preparation. Rerun the LCS. b. All samples (including QC samples) must be reanalyze if LCS fails.
Matrix spike/matrix spike duplicate (MS/MSD)	Every 20 samples	80-120%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS.
Sample Duplicate	Every 20 samples	RPD: 20%	Reanalyze original sample and sample duplicate.

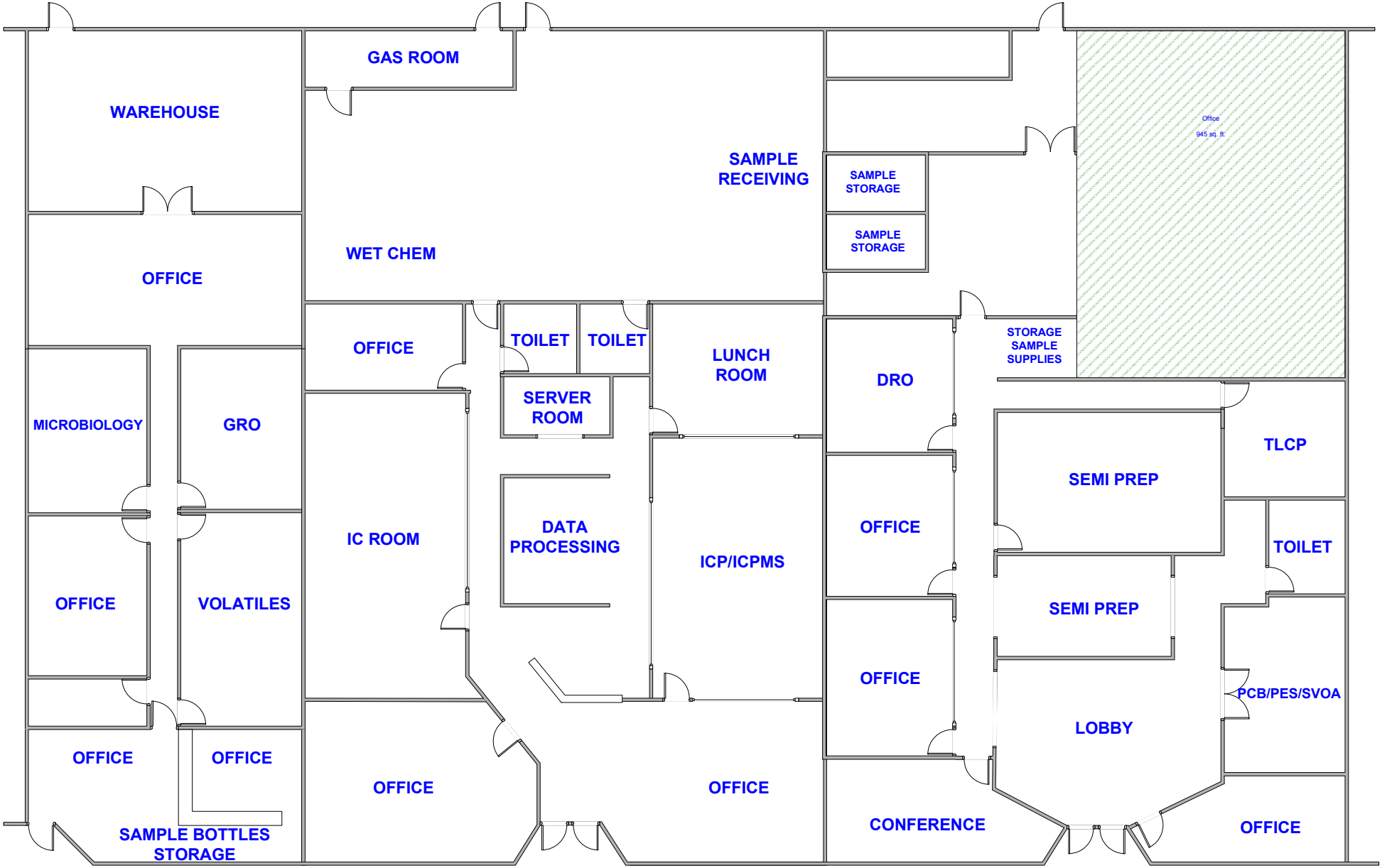
Distillation Tests +Spectrophotometer Tests			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration	Initial calibration prior to sample analysis	r > 0.995	Evaluate system. Repeat calibration.
Continuing Calibration	Every 20 samples	± 10%	a. Evaluate system. Rerun standard. b. Reprep standard and recalibrate. Rerun affected samples.
Method Blank	Every 20 samples	< PQL	Investigate source of contamination. Reanalyze.
Laboratory Control Sample (LCS)	Every 20 samples	80 – 120%	a.Check calculations. Check standards preparation. Rerun the LCS. b. All samples (including QC samples) must be reanalyze if LCS fails.
Matrix Spike / Matrix Spike Duplicate (MS/MSD)	Every 20 samples	80 – 120%	Check for standards preparation. Check for interferences. Review against LCS recoveries to look for trends. If poor recovery is indicative of laboratory problems, re-prepare and re-analyze batch. Otherwise, if LCS passed QC criteria batch is validated by the LCS
MDL study	One for each test per year.	For all analytes MDL should be < PQL.	Check instrument. Re-do MDL.

APPENDIX F

LABORATORY LAYOUT

ASSET Laboratories Las Vegas

FLOOR PLAN



Revised: February 7, 2014

APPENDIX G

LIST OF INSTRUMENTATION AND EQUIPMENT

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

EQUIPMENT LIST

(Updated 02/03/14)

Volatile Organics- EPA Method 8015B GRO and 8260B			
Qty	**Equipment**	**Make**	**Model**
4	Gas Chromatograph	Agilent	5890/6890 N
2	GC Mass Spectrometer	Agilent	5973 and 5975 MSD
4	Purge & Trap Concentrator	Tekmar	LSC 3100, Atom X
4	Auto Sampler	Archon	5100, Atom X
4	Data System	Agilent	Enviroquant
1	Analytical Balance	Mettler	
4	Computers	Dell	Dimension 3100
2	Printers	HP	
Semi-volatile Organics- EPA Method 8015B DRO			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	5890 Series II w/2 FID
3	Liquid Auto Sampler	Agilent	7673
2	Data System	Agilent	Enviroquant
2	Computer	Dell	Dimension 3100
1	Printer	HP	Laser Jet
1	Refrigerator	GE	
3	Hood	Genie Scientific/Custom	
Semi-volatile Organics- EPA Method 8081/8082			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	5890 w/ dual ECD and 6890 w/ dual ECD
2	Liquid Auto Sampler	Agilent	7673
2	Data System	Agilent	Enviroquant
2	Computer	Dell	Dimension 3100
1	Printer	HP	Laser Jet
Semi-volatile Organics- EPA Method 8270C			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	(2) 6890
2	GC Mass Spectrometer	Agilent	(2)5973 MSD
2	Liquid Auto Sampler	Agilent	7673
2	Data System	Agilent	Enviroquant
2	Computer	Dell	Dimension 3100
1	Printer	HP	Laser Jet

Metals- EPA Method 6000/200.7/200.8 Series			
Qty	**Equipment**	**Make**	**Model**
2	Inductively Coupled Plasma	Perkin Elmer	Optima 4200DV and 7300DV
2	Inductively Coupled Plasma_Mass Spectrophotometer	Perkin Elmer/Agilent	ELAN DRC Plus/7700X
4	Auto Sampler	Perkin Elmer/CETAC	AS93 plus/ASX 500
4	Chiller	Polyscience	
4	Computer	Dell/HP	Optiplex/Desktop
3	Printer	HP	HP Laser Jet 250/4350
Metals- EPA Method 7470/7471A/245.1			
Qty	**Equipment**	**Make**	**Model**
1	Mercury Cold Vapor Analyzer	CETAC Mercury Analyzer	M 6000
1	Hood	Prescott	Custom
1	Data System	CETAC	
1	Computer	Dell	GX100
1	Printer	HP	HP Laser Jet 250
Classical Wet Chemistry			
Qty	**Equipment**	**Make**	**Model**
1	Analytical Balance	Sartorius	SP 180
1	Convection Oven	Scientific Products	DK-3
1	pH Meter	VWR	Symphony
1	Turbidimeter	Le Motte	2008
1	Computer	Dell	Optiplex GX1
1	Printer	Agilent	
2	Hood	Genie Scientific	
1	Conductivity meter	VWR	
1	UV/VIS Spectrophotometer	Thermo	Helios Gamma
1	Distillation Apparatus for Ammonia and TKN	Buchi	Buchi 322 Distillation Unit and Buchi 342 Control Unit
1	Easy Chem	Systea Scientific	Easy Chem Plus
1	Digestion Block for TKN	Buchi	Buchi 342
1	Digestion Vessel/Reaction Vessel for Ammonia and TKN	Buchi	
Inorganics- EPA Method 300/218.6/7199/TOC			
Qty	**Equipment**	**Make**	**Model**
5	Ion Chromatograph	Dionex	ICS-5000, ICS-2000, ICS 1500, DX 500
2	Ion Chromatograph	Dionex	DX-100
5	Data System	Dionex	Integrated w/instrument

1	TOC Analyzer	GE	Sievers 900
5	Auto Sampler	Dionex	AS40, AS DV
6	Computer	Dell	Optiplex GX1,GX270, Dimension 2400
1	Analytical Balance	Sartorius	BA100S
2	Printer	Agilent	Laser Jet 2300, 4L
Sample Preparation Chemistry			
Qty	**Equipment**	**Make**	**Model**
2	Hot Block Digester	Env.Express	-----
1	Computer	Dell	Optiplex GX100,
5	Fume Hood	Genie Scientific/Custom	Custom
3	Sonicator	Tekmar	Various
1	Hot Plate	Corning/Linberg/Thermolyne	
1	Top Loading Balance	Mettler	DB202
2	TCLP Rotator	Environmental Express	-----
3	Top Loading Balance	Mettler	Various
2	TurboVap Concentrator	Zymark/Caliper	TurboVap II
1	Refrigerator		
Microbiology			
Qty	**Equipment**	**Make**	**Model**
1	Quanti-Tray Sealer	IDEXX	2X
1	Incubator	Binder	BD 115
1	Water Bath	LAB-LINE	Shak-R-Bath
2	Thermometer	Miller and Weber	ASTM 64C
1	UV Lamp	IDEXX	6 watt, 365 nm
1	Autoclave	Pelton Crane	-
Sample Control			
Qty	**Equipment**	**Make**	**Model**
1	Top Loading Balance	Sartorius	B3103
50	Sample Coolers	Miscellaneous	Various sizes
10	Refrigerator	VWR	4°C coolers
2	Computer	Dell	Dimension 3100
2	Printer/Copier/Fax	Brother/Konica Minolta	7820 N
1	Barcode Printer	Zebra	WASP 606
2	Barcode Scanner	Metrologic	MS 6720
1	Fume Hood	Custom	Custom

Document Control/Client Services			
Qty	**Equipment**	**Make**	**Model**
3	Computer	Dell	Optiflex
2	Copier/Scanner /Printer	Konica Minolta	601,550C
Laboratory Information Management System (LIMS)/Data Storage System			
1	SQL-SVR	Dell	Power Edge (LIMS Data)
3	Servers	Dell	Power Edge (Storage/E-mail)
4	Computer	Dell	Dimension/Optiplex,Vostro
Health and Safety			
Qty	**Equipment**	**Make**	**Model**
3	First Aid Kits	Lab Safety Products	Various
4	Fire Extinguishers	Underwriter Laboratories	First Alert
2	Portable Eye Wash/Plumbed	Various	
1	Spill Containment Set-up	Labconco	-----
1	Spill Kit	Labconco	-----
Field/Courier Services			
3	Field Truck	Ford/Chevy	Escape /F150/Silverado
1	pH meter	VWR	2000/3000 series

APPENDIX H

TABLES OF HOLDING TIMES AND PRESERVATION

Tables of Holding Time and Preservation

Volatile Organics in Water					
Parameter	***Method***	***Holding Time***	***Min. Vol. (mL)***	***Container Type***	***Preservation***
GRO	8015B	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L if residual chlorine present, 4 ℃
TPH(g)/BTEX/MTBE	8015B (GRO), 8021B (BTEX/MTBE)	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L if residual chlorine present, 4 ℃
Purgeable Halocarbons/ Aromatics	8260B (8021B list)	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L if residual chlorine present, 4 ℃
VOCs (Volatile Organic Compounds)	8260B/624	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L if residual chlorine present, 4 ℃

Note: * 7 days without HCl

Volatile Organics in Soil					
Parameter	***Method***	***Holding Time***	***Min. Wt. (g)***	***Container Type***	***Preservation***
GRO	8015B	14 days	5	4 oz glass jar w/Teflon lid	4℃
GRO(EnCore)	5035/8015B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	4℃
GRO (NaHSO4 preserved)	5035/8015B	14 days	(3) 5g/sample	2 pre-weighed NaHSO4 preserved VOA + 1 pre-weighed MeOH preserved VOA	4℃, NaHSO4, MeOH
Purgeable Halocarbons/Aromatics	8260(8021B list)	14 days	5	4 oz glass jar w/Teflon lid	4℃
GRO/BTEX/MTBE	8015B/8021B	14 days	5	4 oz glass jar w/Teflon lid	4℃
TPH(g) (EnCORE)	5035/8015B (M)	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	4℃
TPH(g) (NaHSO4 & MeOH preserved)	5035/8015B (M)	14 days	(3) 5g/sample	2 pre-weighed NaHSO4 preserved VOA + 1 pre-weighed MeOH preserved VOA	4℃, NaHSO4, MeOH
VOCs	8260B	14 days	5	4 oz glass jar w/Teflon lid	4℃
VOCs (EnCORE)	5035/8260B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	4℃
VOCs (NaHSO4 & MeOH preserved)	5035/8260B	14 days	(3) 5g/sample	2 pre-weighed NaHSO4 preserved VOA + 1 pre-weighed MeOH preserved VOA	4℃, NaHSO4, MeOH

Semivolatile Organics in Water					
Parameter	***Method***	***Holding Time***	***Min. Vol. (mL)***	***Container Type***	***Preservation***
DRO	8015B	7*	1000	1 L amber glass	4 ℃**
Pesticides, Organochlorine	8081A/608	7*	1000	1 L amber glass	4 ℃**
1.1 PCBs	8082/608	7*	1000	1 L amber glass	4 ℃**
SVOCs (BNAs)	625/8270C	7*	1000	1 L amber glass	4 ℃**
1,4-Dioxane	8270C Isotope Dilution	7*	1000	1 L amber glass	4 ℃**
TPH (d)	8015B (M)	7*	1000	1 L amber glass	4 ℃**
TPH-CC (C8-C40)	8015B (M)	7*	1000	1 L amber glass	4 ℃**

Note: * 7 days for extraction, 40 days after extraction for analysis. ** If sampling from location where residual chlorine is present, samples have to be treated with sodium thiosulfate ($Na_2S_2O_3$)

Semivolatile Organics in Soil					
Parameter	***Method***	***Holding Time***	***Min. Vol. (g)***	***Container Type***	***Preservation***
DRO	EPA 8015B	14*	30	4 oz glass jar w/Teflon lid	4℃
PCBs	EPA 8082	14*	30	4 oz glass jar w/Teflon lid	4℃
Pesticides, Organochlorine	EPA 8081A	14*	30	4 oz glass jar w/Teflon lid	4℃
SVOCs (BNAs)	EPA 8270C	14*	30	4 oz glass jar w/Teflon lid	4℃
TPH(d)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	4℃
TPH-CC (C8-C40)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	4℃

Note: * 14 days for extraction, 40 days for analysis

General Chemistry Water					
Parameter	***Method***	***Holding Time***	***Minimum Volume (mL)***	***Sample Volume & Container Type***	***Preservation***
Acidity	SM 2310B	14 days	100	125 mL, 4oz plastic or glass	Cool, 4 ℃
Alkalinity	SM 2320B	14 days	100	125 mL, 4oz plastic or glass	Cool, 4 ℃
Ammonia	SM 4500-NH3C	28 days	100	500 mL, plastic or glass	Cool, 4 ℃, H2SO4 to pH < 2
Biochemical Oxygen Demand	SM5210B	48 hours	300	1 L, plastic or glass	Cool, 4 ℃
Bromide	300.0	28 days	50	125 mL, 4oz plastic	Cool, 4 ℃
cBOD	SM5210B	48 hours	300	1 L, 32oz plastic	Cool, 4 ℃
Chemical Oxygen Demand	410.4	28 days	50	125 mL, 4oz plastic	Cool, 4 ℃, H2SO4 to pH < 2
Chloride	SM 4500-Cl- C, 300.0	28 days	50	125 mL, 4oz plastic	Cool, 4 ℃
Chlorine, Free	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, 4 ℃
Chlorine, Total Residual	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, 4 ℃
Color	SM2120B	48 hours	100	250 mL, 8oz plastic or glass	Cool, 4 ℃
Cyanide, Amenable	SM 4500-CN G	14 days	250	250 mL, 8oz plastic	Cool, 4 ℃; if oxidizing agents present add 0.6 g of ascorbic acid per L; adjust pH > 12 with 10N NaOH.
Cyanide, Total	SM 4500-CN G 9014	14 days	250	250 mL, 8oz plastic	Cool, 4 ℃; if oxidizing agents present add 0.6 g of ascorbic acid per L; adjust pH > 12 with 10N NaOH.
Flashpoint	1010	14 days	100	250 mL, 8oz plastic	None
Fluoride	SM 4500-F C, 300.0	28 days	50	250 mL, 8oz plastic	None
Hardness	SM2340 C SM2340B	6 months	100	125 mL, 4oz plastic or glass	HNO_3 , pH < 2
Nitrate	300.0, SM 4500 NO3 E	48 Hours	50	125 mL, 4oz plastic or glass	Cool, 4 ℃
Nitrate-Nitrite	SM 4500-NO3 E	28 days	50	125 mL, 4oz plastic or glass	Cool, 4 ℃, H2SO4 to pH < 2
Nitrite	300.0; SM 4500-NO2 B	48 hours	50	125 mL, 4oz plastic or glass	Cool, 4 ℃
Oil and Grease - HEM	1664	28 days	1000	32oz, glass	Cool, 4 ℃, H2SO4 to pH < 2

General Chemistry Water (continued)					
Parameter	***Method***	***Holding Time***	***Minimum Volume (mL)***	***Sample Volume & Container Type***	***Preservation***
Oxygen, Dissolved	360.1, SM4500-O G	15 mins	50	250 mL, glass or BOD bottle	None
Perchlorate	314.0	28	50	125 ml HDPE	4℃
pH	SM 4500-H+ B	15 mins	50	125 mL, 4oz plastic or glass	None required
Phenolics	420.1	28 days	100	500 mL amber	Cool, 4 ℃, H2SO4 to pH < 2
Phosphate,Ortho	300.0; 365.3; SM 4500-P E	48 hours	50	125 mL, 4oz plastic	Cool, 4 ℃
Phosphorus, Total	365.3; SM4500-PE	28 days	100	125 mL, 4oz plastic	Cool, 4 ℃, H2SO4 to pH < 2
Solids, Total (TS)	SM 2540 B	7 days	200	250 mL, 8oz plastic	Cool, 4 ℃
Solids, Total Dissolved (TDS)	SM 2540 C	7 days	200	250 mL, 8oz plastic	Cool, 4 ℃
Solids, Total Suspended (TSS)	SM 2540 D	7 days	200	250 mL, 8oz plastic	Cool, 4 ℃
Solids, Settleable (SS)	SM 2540 F	48 hours	1000	1 L , 32oz plastic	Cool, 4 ℃
Solids, Volatile (VS)	160.4	7 days	200	250 mL, 8oz plastic	Cool, 4 ℃
Specific Conductance	120.1	24 hours	50	125 mL, 4oz plastic or glass	Cool, 4 ℃
Sulfate	300.0	28 days	50	125 mL, 4oz plastic or glass	Cool, 4 ℃
Sulfide, Dissolved	SM 4500-S-2 D	7 days	100	125 mL, Plastic	NaOH + AlCl3, flocculate + settle. Transfer liquid, preserve w/ zinc acetate, pH > 9. Cool, 4 ℃
Sulfide, Total	SM 4500-S-2 D	7 days	100	500 mL, Plastic or Glass	Cool, 4 ℃, add zinc acetate, pH > 9
Surfactants (MBAS)	SM 5540 C	48 hours	200	250 mL, 8oz plastic	Cool, 4 ℃
Total Organic Carbon (TOC)	SM 5310B	28 days	40	40 mL VOA	Cool, 4 ℃, H2SO4 to pH < 2
Total Organic Halides (TOX)	9020	28 days	200	500 mL, amber glass	Cool, 4 ℃, H2SO4 to pH < 2
TRPH	1664	28 days	1000	1 L, glass	Cool, 4 ℃, H2SO4 to pH < 2
Turbidity	180.1	48 Hours	50	125 mL, plastic or glass	Cool, 4 ℃

General Chemistry Soil					
Parameter	***Method***	***Holding Time***	***Minimum Weight (g)***	***Sample Volume & Container Type***	***Preservation***
Alkalinity	310.1(M)	14 days	20	4 oz glass jar w/Teflon lid	4℃
Bromide	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	4℃
Chemical Oxygen Demand (COD)	410.4(M)	28 days	10	4 oz glass jar w/Teflon lid	4℃
Chloride	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	4℃
Chromium IV (Hexavalent Chromium)	7196A	21 days	10	4 oz glass jar w/Teflon lid	4℃
Cyanide, Amenable	9010B/9014	14 days	20	4 oz glass jar w/Teflon lid	4℃
Cyanide, Reactive	SW 846 Ch.7	14 days	10	4 oz glass jar w/Teflon lid	4℃
Cyanide, Total	9010B/9014	14 days	10	4 oz glass jar w/Teflon lid	4℃
Ignitability (Flashpoint)	1010	14 days	20	4 oz glass jar w/Teflon lid	4℃
Moisture Content	ASTM D2216	ASAP	10	4 oz glass jar w/Teflon lid	4℃
Nitrogen, Nitrate	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	4℃
Nitrogen, Nitrite	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	4℃
Oil and Grease (HEM)	1664(M)	28 days	30	4 oz glass jar w/Teflon lid	4℃
Perchlorate	314.0 (M)	28	50	125 ml HDPE	4℃
pH	9045C / 9040B	ASAP	10	4 oz glass jar w/Teflon lid	4℃
Phenolics, Total	420.1 (M)	28 days	20	4 oz glass jar w/Teflon lid	4℃
Phosphate, Ortho	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	4℃
Phosphate, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	4℃
Phosphorus, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	4℃
Sulfate	300.0(M)	28 days	20	4 oz glass jar w/Teflon lid	4℃
Sulfide, Reactive	SW 846 Ch.7	7 days	20	4 oz glass jar w/Teflon lid	4℃
Sulfide, Total	9030B/EPA 376.2(M)	7 days	20	4 oz glass jar w/Teflon lid	4℃
Total Organic Carbon (TOC)	9060	28 days	2	4 oz glass jar w/Teflon lid	4℃
TRPH	1664SGT/ HEM (M)	28 days	30	4 oz glass jar w/Teflon lid	4℃

Note: (M) indicates modification of the method

Metals in Water					
Parameter	**Method**	**Holding Time**	**Minimum Volume (mL)**	**Sample Volume & Container Type**	**Preservation**
Mercury	7470A/245.1	28 days	50	Minimum 250mL or 16oz plastic	HNO3, pH < 2
ICP Metals, except Chromium VI & Mercury	6010B,200.7	6 months	50	250 mL, 16oz plastic	HNO3, pH < 2
ICPMS Metals	6020/200.8	6 months	50	250 mL, 16oz plastic	HNO3, pH < 2
Sodium	7770/SM 3111B	6 months	50	250 mL, 16oz plastic	HNO3, pH < 2
Potassium	7610/ SM 3111B	6 months	50	250 mL, 16oz plastic	HNO3, pH < 2
Hexavalent Chromium	7196A , 218.6/ 7199	24 hours	50	250 mL, 8oz plastic	Cool, 4 ℃
Hexavalent Chromium	218.6	28 days	50	250 mL, 8oz plastic	Cool to 4°C, field filtered and adjusted to pH 9.3-9.7 with ammonium buffer solution

Note: Dissolved Metals must be filtered prior to preservation.

Metals in Soil					
Parameter	**Method**	**Holding Time**	**Minimum Weight (g)**	**Sample Volume & Container Type**	**Preservation**
Mercury	EPA 7471A	28 days	5	4 oz glass jar w/Teflon lid	4℃
ICP Metals	EPA 6010B	6 months	5	4 oz glass jar w/Teflon lid	4℃
ICP/MS Metals	EPA 6020	6 months	5	4 oz glass jar w/Teflon lid	4℃
Sodium	EPA 7770	6 months	5	4 oz glass jar w/Teflon lid	4℃
Potassium	EPA 7610	6 months	5	4 oz glass jar w/Teflon lid	4℃
Mercury	EPA 7471A	28 days	5	4 oz glass jar w/Teflon lid	4℃

TCLP						
Parameter	**From: Field Collection To: TCLP Extraction**	**From: TCLP Extraction To: Preparative Extraction**	**From: Preparative Extraction To: Determinative Analysis**	**Sample Volume & Container Type**	**Total Elapsed Time**	**Preservation**
Volatiles	14 days	NA	14 days	40mL VOA	28 days	None
Semivolatiles	14 days	7 days	40 days	32oz amber	61 days	None
Mercury	28 days	NA	28 days	16oz plastic	56 days	HNO3, pH < 2
Metals, except Mercury	180 days	NA	180 days	16oz plastic	360 days	HNO3, pH < 2

Microbiology						
Parameter	**Matrix**	**Method**	**Holding Time**	**Minimum Volume (mL)**	**Sample Volume & Container Type**	**Preservation**
Coliform: Total, Fecal, *E.coli*	Drinking Water	9223B	30 hrs	100	120 mL pre-sterilized plastic bottle	Cool, <10°C; 10% $Na_2S_2O_3$
	Water/Wastewater		8 hrs			

APPENDIX I

CHAIN OF CUSTODY

CHAIN OF CUSTODY RECORD

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES
3151-3153 W. Post Rd.
Las Vegas, NV 89118
Tel: (702) 307-2659 ● Fax: (702) 307-2691

FOR LABORATORY USE ONLY

P.O. #: _____

Logged By: _____ Date: _____

Method of Transport
Client ☐
ATL ☐
CA OverN ☐
FedEx ☐
Other: _____

Sample Condition Upon Receipt
1. CHILLED Y ☐ N ☐ 4. SEALED Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐ 5. # OF SPLS MATCH COC Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐ 6. PRESERVED Y ☐ N ☐

Client: Address: Tel:
Attention: City: State: Zip Code: Fax:

Project Name: Project #: Sampler: *I attest to the validity and authenticity of this sample. I am aware that tampering with or intentionally mislabeling the sample location, date or time of collection is considered fraud and may be grounds for legal action.* (Printed Name) (Signature)

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
Print Name Date
Signature

Send Report To:
Attn:
Co:
Addr:
City: State: Zip:

Bill To:
Attn:
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample :$2.00 / sample /mo (after 45 days)
- Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

PRESERVATION

Q A / Q C
RTNE ☐
CT ☐
SWRCB ☐ Logcode_____
OTHER _____

ITEM	LAB USE ONLY: Lab No.	Sample Description: Sample ID / Location	Date	Time	8260B (Volatiles)	8015M - GRO	8015B - DRO/ORO	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
															H	

■ TAT starts 8AM the following day if samples received after 3 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☐ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4ºC
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

APPENDIX J
CONTROL LIMITS

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

HEXAVALENT CHROMIUM BY IC

Matrix: WATER

EPA 218.6

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	90	110	20	90	110

EPA 218.6 LOW LEVEL

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	90	110	20	90	110

EPA 218.7

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	90	110	20	90	110

EPA 218.7 LOW LEVEL

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	90	110	20		

EPA 7199

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	85	115	20	85	115

Matrix: SOIL

EPA 7199

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Cr6+	75	125	20	80	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

6010B/200.7 _ ICP Metals

Matrix: **WATER**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Antimony	75	125		20		85	115
Arsenic	75	125		20		85	115
Barium	75	125		20		85	115
Beryllium	75	125		20		85	115
Cadmium	75	125		20		85	115
Chromium	75	125		20		85	115
Cobalt	75	125		20		85	115
Copper	75	125		20		85	115
Lead	75	125		20		85	115
Molybdenum	75	125		20		85	115
Nickel	75	125		20		85	115
Selenium	75	125		20		85	115
Silver	75	125		20		85	115
Thallium	75	125		20		85	115
Vanadium	75	125		20		85	115
Zinc	75	125		20		85	115

Matrix: **SOIL**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Antimony	75	125		20		80	120
Arsenic	75	125		20		80	120
Barium	75	125		20		80	120
Beryllium	75	125		20		80	120
Cadmium	75	125		20		80	120
Chromium	75	125		20		80	120
Cobalt	75	125		20		80	120
Copper	75	125		20		80	120
Lead	75	125		20		80	120
Molybdenum	75	125		20		80	120
Nickel	75	125		20		80	120
Selenium	75	125		20		80	120
Silver	75	125		20		80	120
Thallium	75	125		20		80	120
Vanadium	75	125		20		80	120
Zinc	75	125		20		80	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

6010B/200.7 _ ICP Metals

Matrix: **WATER**

	MS			RPD		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Aluminum	75	125		20		85	115
Calcium	75	125		20		85	115
Iron	75	125		20		85	115
Magnesium	75	125		20		85	115
Manganese	75	125		20		85	115
Boron	75	125		20		85	115
Silicon	75	125		20		85	115
Silicon (SiO2)	75	125		20		85	115
Potassium	75	125		20		85	115
Sodium	75	125		20		85	115
Titanium	75	125		20		85	115
Strontium	75	125		20		85	115

Matrix: **SOIL**

	MS			RPD		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Aluminum	75	125		20		80	120
Calcium	75	125		20		80	120
Iron	75	125		20		80	120
Magnesium	75	125		20		80	120
Manganese	75	125		20		80	120
Boron	75	125		20		80	120
Silicon	75	125		20		80	120
Potassium	75	125		20		80	120
Sodium	75	125		20		80	120

Effective Date: February 2014

6020/200.8 _ ICPMS Metals

Matrix: **WATER**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Antimony	75	125		20		85	115
Arsenic	75	125		20		85	115
Barium	75	125		20		85	115
Beryllium	75	125		20		85	115
Cadmium	75	125		20		85	115
Chromium	75	125		20		85	115
Cobalt	75	125		20		85	115
Copper	75	125		20		85	115
Lead	75	125		20		85	115
Molybdenum	75	125		20		85	115
Nickel	75	125		20		85	115
Selenium	75	125		20		85	115
Silver	75	125		20		85	115
Thallium	75	125		20		85	115
Vanadium	75	125		20		85	115
Zinc	75	125		20		85	115

Matrix: **SOIL**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Antimony	75	125		20		85	115
Arsenic	75	125		20		85	115
Barium	75	125		20		85	115
Beryllium	75	125		20		85	115
Cadmium	75	125		20		85	115
Chromium	75	125		20		85	115
Cobalt	75	125		20		85	115
Copper	75	125		20		85	115
Lead	75	125		20		85	115
Molybdenum	75	125		20		85	115
Nickel	75	125		20		85	115
Selenium	75	125		20		85	115
Silver	75	125		20		85	115
Thallium	75	125		20		85	115
Vanadium	75	125		20		85	115
Zinc	75	125		20		85	115

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

Matrix: **FILTER**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Arsenic				20		85	115
Lead				20		85	115

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

6020/200.8 _ ICPMS Metals

Matrix: **WATER**

	MS			RPD		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Aluminum	75	125		20		85	115
Calcium	75	125		20		85	115
Iron	75	125		20		85	115
Magnesium	75	125		20		85	115
Manganese	75	125		20		85	115
Boron	75	125		20		85	115
Silicon	75	125		20		85	115
Potassium	75	125		20		85	115
Sodium	75	125		20		85	115

Matrix: **SOIL**

	MS			RPD		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Aluminum	75	125		20		85	115
Calcium	75	125		20		85	115
Iron	75	125		20		85	115
Magnesium	75	125		20		85	115
Manganese	75	125		20		85	115
Boron	75	125		20		85	115
Silicon	75	125		20		85	115
Potassium	75	125		20		85	115
Sodium	75	125		20		85	115

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

MERCURY BY COLD VAPOR TECHNIQUE

Matrix: WATER

EPA 245.1

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Mercury	75	125	20	85	115

EPA 245.1 LL

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Mercury	75	125	20	85	115

EPA 7470

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Mercury	75	125	20	85	115

Matrix: SOIL

EPA 7471A

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Mercury	75	125	20	80	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

ANIONS BY IC

Matrix: WATER

EPA 300.0

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Bromide	80	120	20	90	110
Chloride	80	120	20	90	110
Fluoride	80	120	20	90	110
Nitrogen, Nitrate (As N) (RTNE)	80	120	20	90	110
Nitrogen, Nitrite	80	120	20	90	110
Phosphorous, Diss oPO4 (RTNE)	80	120	20	90	110
Sulfate	80	120	20	90	110

Matrix: WATER LOW LEVEL

EPA 300.0

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Nitrate as N_PGE	80	120	20	90	110
Nitrogen, Nitrite	80	120	20	90	110

Matrix: SOIL

EPA 300.0

	MS		RPD	LCS	
Analyte	Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Bromide	80	120	20	90	110
Chloride	80	120	20	90	110
Fluoride	80	120	20	90	110
Nitrogen, Nitrate (As N)	80	120	20	90	110
Nitrogen, Nitrite	80	120	20	90	110
Phosphate	80	120	20	90	110
Sulfate	80	120	20	90	110

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

WET CHEMISTRY

Matrix: **WATER**

	METHOD	MS		RPD	LCS	
Analyte		Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Hexavalent Chromium	EPA 7196A	85	115	20	85	115
Total Phosphorus	EPA 365.3	80	120	20	80	120
Ammonia	SM4500NH3C	80	120	20	80	120
TKN	SM4500NH3C	70	130	20	80	120
Alkalinity	SM2320B	80	120	20	80	120
pH	SM4500-H+B			10		
TDS	SM2540C			5	80	120
Oil and Grease	EPA 1664	76	104	18	76	104
TRPH	EPA 1664	76	104	18	76	104

Matrix: **SOIL**

	METHOD	MS		RPD	LCS	
Analyte		Lower Limit	Upper Limit	Limit	Lower Limit	Upper Limit
Hexavalent Chromium	EPA 7196A	70	130	30	80	120
Total Phosphorus	EPA 365.3	70	130	30	80	120
Ammonia	SM4500NH3C	70	130	30	80	120
TKN	SM4500NH3C	70	130	30	80	120
pH	EPA 9045C			20		
Oil and Grease	EPA 1664	70	130	30	80	120
TRPH	EPA 1664	70	130	30	80	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

EPA 8081

Matrix: **WATER**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
4,4´-DDD	61	125	20
4,4´-DDE	54	124	20
4,4´-DDT	62	133	20
Aldrin	44	120	20
alpha-BHC	51	122	20
alpha-Chlordane	49	122	20
beta-BHC	55	120	20
delta-BHC	26	122	20
Dieldrin	50	132	20
Endosulfan I	50	124	20
Endosulfan II	52	134	20
Endosulfan sulfate	52	126	20
Endrin	34	183	20
Endrin aldehyde	49	120	20
Endrin ketone	40	148	20
gamma-BHC	51	122	20
gamma-Chlordane	52	124	20
Heptachlor	23	138	20
Heptachlor epoxide	52	123	20
Methoxychlor	49	147	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	33	123
Tetrachloro-m-xylene	21	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

EPA 8081

Matrix: **SOIL**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
4,4´-DDD	57	139	30
4,4´-DDE	54	130	30
4,4´-DDT	64	134	30
Aldrin	40	120	30
alpha-BHC	40	120	30
alpha-Chlordane	52	120	30
beta-BHC	48	120	30
delta-BHC	23	120	30
Dieldrin	53	130	30
Endosulfan I	48	121	30
Endosulfan II	59	127	30
Endosulfan sulfate	54	127	30
Endrin	53	171	30
Endrin aldehyde	42	120	30
Endrin ketone	33	144	30
gamma-BHC	42	120	30
gamma-Chlordane	52	125	30
Heptachlor	25	139	30
Heptachlor epoxide	50	121	30
Methoxychlor	55	152	30

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	22	141
Tetrachloro-m-xylene	19	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

EPA 8082

Matrix: **WATER**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	51	127	20
Aroclor 1260	55	122	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	22	147
Tetrachloro-m-xylene	20	129

Matrix: **SOIL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	58	124	
Aroclor 1260	62	130	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	21	169	20
Aroclor 1260	15	154	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	41	150
Tetrachloro-m-xylene	27	120

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

Matrix: **OIL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	79	136	
Aroclor 1260	75	136	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	42	151	30
Aroclor 1260	41	145	30

	Surrogate	
Surrogate	Lower Limit	Upper Limit
Decachlorobiphenyl	53	150
Tetrachloro-m-xylene	45	129

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8015B _ DIESEL

Matrix: **WATER HIGH LEVEL**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	43	120	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	49	137

Matrix: **WATER LOW LEVEL**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	39	120	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	50	130

Matrix: **SOIL HIGH LEVEL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	67	120	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	47	187	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	49	173

Matrix: **SOIL LOW LEVEL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	53	120	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	24	120	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	50	122

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8015B _ GAS

Matrix: **WATER**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	71	128	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	61	128	

	Surrogate	
Analyte	Lower Limit	Upper Limit
Chlorobenzene-d5	67	132

Matrix: **SOIL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	76	130	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	53	136	30

	Surrogate	
Analyte	Lower Limit	Upper Limit
Chlorobenzene-d5	57	134

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8270SIM

Matrix: **WATER**

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	**RPD**
1-Methylnaphthalene	18	126	20
2-Methylnaphthalene	33	125	20
Acenaphthene	37	121	20
Acenaphthylene	30	130	20
Anthracene	34	128	20
Benzo(a)anthracene	41	136	20
Benzo(a)pyrene	36	129	20
Benzo(b)fluoranthene	38	135	20
Benzo(g,h,i)perylene	45	130	20
Benzo(k)fluoranthene	43	126	20
Chrysene	40	132	20
Dibenz(a,h)anthracene	46	130	20
Fluoranthene	47	131	20
Fluorene	37	126	20
Indeno(1,2,3-cd)pyrene	50	125	20
Naphthalene	30	120	20
Phenanthrene	39	120	20
Pyrene	46	126	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	23	120
2-Fluorobiphenyl	16	120
4-Terphenyl-d14	33	126
Nitrobenzene-d5	14	137

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8270SIM

Matrix: SOIL

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	**RPD**
1-Methylnaphthalene	35	120	20
2-Methylnaphthalene	36	120	20
Acenaphthene	43	120	20
Acenaphthylene	37	122	20
Anthracene	42	129	20
Benzo(a)anthracene	51	135	20
Benzo(a)pyrene	48	134	20
Benzo(b)fluoranthene	50	137	20
Benzo(g,h,i)perylene	50	138	20
Benzo(k)fluoranthene	54	135	20
Chrysene	50	137	20
Dibenz(a,h)anthracene	53	135	20
Fluoranthene	58	130	20
Fluorene	44	120	20
Indeno(1,2,3-cd)pyrene	55	131	20
Naphthalene	31	120	20
Phenanthrene	48	120	20
Pyrene	55	127	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	20	120
2-Fluorobiphenyl	27	120
4-Terphenyl-d14	26	132
Nitrobenzene-d5	25	139

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8260B _ VOC

Matrix: **WATER**

LCS/LCSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	80	126	20
1,1,1-Trichloroethane	77	120	20
1,1,2,2-Tetrachloroethane	77	120	20
1,1,2-Trichloroethane	77	122	20
1,1-Dichloroethane	74	123	20
1,1-Dichloroethene	71	128	20
1,1-Dichloropropene	80	120	20
1,2,3-Trichlorobenzene	80	126	20
1,2,3-Trichloropropane	77	120	20
1,2,4-Trichlorobenzene	80	128	20
1,2,4-Trimethylbenzene	80	120	20
1,2-Dibromo-3-chloropropane	62	133	20
1,2-Dibromoethane	80	123	20
1,2-Dichlorobenzene	80	120	20
1,2-Dichloroethane	80	120	20
1,2-Dichloropropane	80	120	20
1,3,5-Trimethylbenzene	80	120	20
1,3-Dichlorobenzene	80	120	20
1,3-Dichloropropane	80	120	20
1,4-Dichlorobenzene	80	120	20
2,2-Dichloropropane	66	145	20
2-Butanone	39	153	20
2-Chloroethyl vinyl ether			20
2-Chlorotoluene	80	120	20
2-Hexanone	46	158	20
4-Chlorotoluene	80	120	20
4-Isopropyltoluene	80	120	20
4-Methyl-2-pentanone	58	140	20
Acetone	13	185	20
Acrolein	39	139	20
Acrylonitrile	55	135	20
Benzene	80	120	20
Bromobenzene	80	120	20
Bromochloromethane	79	120	20
Bromodichloromethane	80	120	20
Bromoform	69	144	20
Bromomethane	30	156	20
Carbon disulfide	68	131	20
Carbon tetrachloride	72	137	20
Chlorobenzene	80	120	20
Chloroethane	61	137	20
Chloroform	77	120	20
Chloromethane	41	150	20
cis-1,2-Dichloroethene	77	120	20
cis-1,3-Dichloropropene	80	120	20
Cyclohexanone	76	129	20
Dibromochloromethane	80	129	20
Dibromomethane	80	120	20

LCS/LCSD

Analyte	Lower	Upper	RPD
Dichlorodifluoromethane	72	125	20
Di-isopropyl ether	56	137	20
Ethyl Acetate	58	132	20
Ethyl Ether	67	135	20
Ethyl tert-butyl ether	65	132	20
Ethylbenzene	80	120	20
Freon-113	71	132	20
Hexachlorobutadiene	78	127	20
Iodomethane	12	161	20
Isopropylbenzene	80	120	20
m,p-Xylene	80	120	20
Methylene chloride	67	125	20
MTBE	67	122	20
Naphthalene	74	129	20
n-Butylbenzene	80	120	20
n-Propylbenzene	80	120	20
o-Xylene	80	120	20
sec-Butylbenzene	80	120	20
Styrene	80	120	20
Tert-amyl methyl ether	79	120	20
Tert-Butanol	48	141	20
tert-Butylbenzene	80	120	20
Tetrachloroethene	80	120	20
Toluene	80	120	20
trans-1,2-Dichloroethene	75	122	20
trans-1,3-Dichloropropene	80	125	20
Trichloroethene	80	120	20
Trichlorofluoromethane	75	132	20
Vinyl acetate	59	142	20
Vinyl chloride	66	131	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichloroethane-d4	76	124
Dibromofluoromethane	80	124
Toluene-d8	80	120
4-Bromofluorobenzene	80	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8260B _ VOC

Matrix: **WATER**

Analyte	MS/MSD Lower	MS/MSD Upper	**RPD**
1,1,1,2-Tetrachloroethane	80	122	20
1,1,1-Trichloroethane	76	120	20
1,1,2,2-Tetrachloroethane	74	124	20
1,1,2-Trichloroethane	75	127	20
1,1-Dichloroethane	76	124	20
1,1-Dichloroethene	66	134	20
1,1-Dichloropropene	79	115	20
1,2,3-Trichlorobenzene	73	132	20
1,2,3-Trichloropropane	74	121	20
1,2,4-Trichlorobenzene	74	132	20
1,2,4-Trimethylbenzene	54	137	20
1,2-Dibromo-3-chloropropane	56	133	20
1,2-Dibromoethane	78	126	20
1,2-Dichlorobenzene	80	120	20
1,2-Dichloroethane	80	120	20
1,2-Dichloropropane	71	128	20
1,3,5-Trimethylbenzene	71	126	20
1,3-Dichlorobenzene	80	120	20
1,3-Dichloropropane	80	120	20
1,4-Dichlorobenzene	79	120	20
2,2-Dichloropropane	63	150	20
2-Butanone	40	141	20
2-Chloroethyl vinyl ether			20
2-Chlorotoluene	77	120	20
2-Hexanone	45	155	20
4-Chlorotoluene	78	119	20
4-Isopropyltoluene	74	124	20
4-Methyl-2-pentanone	53	153	20
Acetone	16	156	20
Acrolein	39	144	20
Acrylonitrile	50	147	20
Benzene	80	120	20
Bromobenzene	80	120	20
Bromochloromethane	78	120	20
Bromodichloromethane	74	128	20
Bromoform	65	137	20
Bromomethane	20	155	20
Carbon disulfide	64	137	20
Carbon tetrachloride	74	125	20
Chlorobenzene	80	120	20
Chloroethane	43	151	20
Chloroform	76	118	20
Chloromethane	37	164	20
cis-1,2-Dichloroethene	78	121	20
cis-1,3-Dichloropropene	80	120	20
Cyclohexanone	72	135	20
Dibromochloromethane	80	123	20
Dibromomethane	80	120	20

Analyte	MS/MSD Lower	MS/MSD Upper	**RPD**
Dichlorodifluoromethane	67	129	20
Di-isopropyl ether	54	147	20
Ethyl Acetate	56	137	20
Ethyl Ether	63	145	20
Ethyl tert-butyl ether	61	146	20
Ethylbenzene	80	120	20
Freon-113	66	138	20
Hexachlorobutadiene	64	129	20
Iodomethane	7	157	20
Isopropylbenzene	78	121	20
m,p-Xylene	80	120	20
Methylene chloride	63	130	20
MTBE	58	139	20
Naphthalene	49	146	20
n-Butylbenzene	73	126	20
n-Propylbenzene	76	123	20
o-Xylene	80	120	20
sec-Butylbenzene	74	124	20
Styrene	32	149	20
Tert-amyl methyl ether	76	125	20
Tert-Butanol	43	164	20
tert-Butylbenzene	77	122	20
Tetrachloroethene	62	128	20
Toluene	80	120	20
trans-1,2-Dichloroethene	70	128	20
trans-1,3-Dichloropropene	80	126	20
Trichloroethene	80	120	20
Trichlorofluoromethane	63	138	20
Vinyl acetate	50	149	20
Vinyl chloride	63	138	20

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8260B _ VOC

Matrix: **SOIL**

LCS/LCSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	79	128	20
1,1,1-Trichloroethane	80	122	20
1,1,2,2-Tetrachloroethane	80	120	20
1,1,2-Trichloroethane	80	120	20
1,1-Dichloroethane	80	120	20
1,1-Dichloroethene	74	126	20
1,1-Dichloropropene	80	120	20
1,2,3-Trichlorobenzene	70	124	20
1,2,3-Trichloropropane	78	120	20
1,2,4-Trichlorobenzene	73	123	20
1,2,4-Trimethylbenzene	80	120	20
1,2-Dibromo-3-chloropropane	71	127	20
1,2-Dibromoethane	80	120	20
1,2-Dichlorobenzene	80	120	20
1,2-Dichloroethane	78	122	20
1,2-Dichloropropane	80	120	20
1,3,5-Trimethylbenzene	80	120	20
1,3-Dichlorobenzene	80	120	20
1,3-Dichloropropane	80	120	20
1,4-Dichlorobenzene	80	120	20
2,2-Dichloropropane	79	128	20
2-Butanone	41	191	20
2-Chloroethyl vinyl ether	70	130	20
2-Chlorotoluene	80	120	20
2-Hexanone	54	165	20
4-Chlorotoluene	80	120	20
4-Isopropyltoluene	79	122	20
4-Methyl-2-pentanone	80	126	20
Acetone	33	189	20
Acrolein	30	148	20
Acrylonitrile	69	140	20
Benzene	80	120	20
Bromobenzene	80	120	20
Bromochloromethane	80	120	20
Bromodichloromethane	80	125	20
Bromoform	69	145	20
Bromomethane	57	140	20
Carbon disulfide	72	138	20
Carbon tetrachloride	80	125	20
Chlorobenzene	80	120	20
Chloroethane	64	139	20
Chloroform	80	120	20
Chloromethane	73	120	20
cis-1,2-Dichloroethene	80	120	20
cis-1,3-Dichloropropene	80	121	20
Cyclohexanone	80	122	20
Dibromochloromethane	79	133	20
Dibromomethane	80	120	20

LCS/LCSD

Analyte	Lower	Upper	RPD
Dichlorodifluoromethane	66	125	20
Di-isopropyl ether	76	123	20
Ethyl Acetate	75	130	20
Ethyl Ether	75	134	20
Ethyl Tert-butyl ether	79	122	20
Ethylbenzene	80	120	20
Freon-113	75	130	20
Hexachlorobutadiene	69	120	20
Iodomethane	58	134	20
Isopropylbenzene	78	120	20
m,p-Xylene	80	120	20
Methylene chloride	73	120	20
MTBE	77	120	20
Naphthalene	68	126	20
n-Butylbenzene	79	125	20
n-Propylbenzene	80	120	20
o-Xylene	80	120	20
sec-Butylbenzene	79	120	20
Styrene	80	120	20
Tert-amyl methyl ether	79	120	20
Tert-Butanol	66	132	20
tert-Butylbenzene	78	120	20
Tetrachloroethene	80	120	20
Toluene	80	120	20
trans-1,2-Dichloroethene	80	120	20
trans-1,3-Dichloropropene	80	129	20
Trichloroethene	80	120	20
Trichlorofluoromethane	71	132	20
Vinyl acetate	77	136	20
Vinyl chloride	75	123	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichloroethane-d4	67	136
Dibromofluoromethane	70	131
Toluene-d8	75	120
4-Bromofluorobenzene	59	124

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8260B _ VOC

Matrix: **SOIL**

MS/MSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	71	130	20
1,1,1-Trichloroethane	72	126	20
1,1,2,2-Tetrachloroethane	56	135	20
1,1,2-Trichloroethane	73	138	20
1,1-Dichloroethane	75	127	20
1,1-Dichloroethene	72	123	20
1,1-Dichloropropene	71	120	20
1,2,3-Trichlorobenzene	42	134	20
1,2,3-Trichloropropane	64	127	20
1,2,4-Trichlorobenzene	46	133	20
1,2,4-Trimethylbenzene	66	122	20
1,2-Dibromo-3-chloropropane	53	141	20
1,2-Dibromoethane	72	135	20
1,2-Dichlorobenzene	69	120	20
1,2-Dichloroethane	70	134	20
1,2-Dichloropropane	74	126	20
1,3,5-Trimethylbenzene	65	120	20
1,3-Dichlorobenzene	70	120	20
1,3-Dichloropropane	74	125	20
1,4-Dichlorobenzene	70	120	20
2,2-Dichloropropane	72	132	20
2-Butanone	52	261	20
2-Chloroethyl vinyl ether	70	130	20
2-Chlorotoluene	67	120	20
2-Hexanone	56	216	20
4-Chlorotoluene	68	120	20
4-Isopropyltoluene	58	125	20
4-Methyl-2-pentanone	63	155	20
Acetone	27	239	20
Acrolein	24	150	20
Acrylonitrile	45	165	20
Benzene	75	122	20
Bromobenzene	71	120	20
Bromochloromethane	76	134	20
Bromodichloromethane	73	132	20
Bromoform	59	152	20
Bromomethane	57	144	20
Carbon disulfide	69	132	20
Carbon tetrachloride	70	125	20
Chlorobenzene	74	120	20
Chloroethane	40	164	20
Chloroform	74	129	20
Chloromethane	46	151	20
cis-1,2-Dichloroethene	75	129	20
cis-1,3-Dichloropropene	73	132	20
Cyclohexanone	74	130	20
Dibromochloromethane	70	139	20
Dibromomethane	74	133	20

Analyte	Lower	Upper	RPD
Dichlorodifluoromethane	43	150	20
Di-isopropyl ether	72	137	20
Ethyl Acetate	12	180	20
Ethyl Ether	73	147	20
Ethyl Tert-butyl ether	73	140	20
Ethylbenzene	71	120	20
Freon-113	68	129	20
Hexachlorobutadiene	33	125	20
Iodomethane	51	145	20
Isopropylbenzene	66	120	20
m,p-Xylene	70	120	20
Methylene chloride	63	137	20
MTBE	69	138	20
Naphthalene	46	135	20
n-Butylbenzene	56	125	20
n-Propylbenzene	66	120	20
o-Xylene	69	121	20
sec-Butylbenzene	61	120	20
Styrene	69	127	20
Tert-amyl methyl ether	71	133	20
Tert-Butanol	41	168	20
tert-Butylbenzene	63	120	20
Tetrachloroethene	68	120	20
Toluene	73	121	20
trans-1,2-Dichloroethene	75	126	20
trans-1,3-Dichloropropene	72	141	20
Trichloroethene	69	130	20
Trichlorofluoromethane	67	130	20
Vinyl acetate	24	166	20
Vinyl chloride	65	132	20

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8270C _ SVOC

Matrix: **WATER**

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	30	120	20
1,2-Dichlorobenzene	24	120	20
1,2-Diphenylhydrazine	47	120	20
1,3-Dichlorobenzene	22	120	20
1,4-Dichlorobenzene	23	120	20
2,4,5-Trichlorophenol	41	120	20
2,4,6-Trichlorophenol	40	120	20
2,4-Dichlorophenol	37	120	20
2,4-Dimethylphenol	31	120	20
2,4-Dinitrophenol	27	143	20
2,4-Dinitrotoluene	50	120	20
2,6-Dinitrotoluene	51	120	20
2-Chloronaphthalene	37	120	20
2-Chlorophenol	33	120	20
2-Methylnaphthalene	35	120	20
2-Methylphenol	33	120	20
2-Nitroaniline	42	125	20
2-Nitrophenol	31	120	20
3,3´-Dichlorobenzidine	39	120	20
3/4-Methylphenol	33	120	20
3-Nitroaniline	49	120	20
4,6-Dinitro-2-methylphenol	51	129	20
4-Bromophenyl-phenylether	51	120	20
4-Chloro-3-methylphenol	42	120	20
4-Chloroaniline	29	120	20
4-Chlorophenyl-phenylether	46	120	20
4-Methylphenol	33	120	20
4-Nitroaniline	47	120	20
4-Nitrophenol	24	120	20
Acenaphthene	44	120	20
Acenaphthylene	44	120	20
Aniline	31	120	20
Anthracene	51	120	20
Benzidine (M)	7	122	20
Benzo(a)anthracene	57	120	20
Benzo(a)pyrene	51	120	20
Benzo(b)fluoranthene	51	120	20
Benzo(g,h,i)perylene	47	123	20
Benzo(k)fluoranthene	52	120	20
Benzoic acid	17	120	20
Benzyl alcohol	27	120	20
Bis(2-chloroethoxy)methane	40	120	20
Bis(2-chloroethyl)ether	39	120	20
Bis(2-chloroisopropyl)ether	33	120	20
Bis(2-ethylhexyl)phthalate	52	130	20
Butylbenzylphthalate	51	130	20
Carbazole	52	120	20
Chrysene	29	157	20

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	RPD
Dibenz(a,h)anthracene	41	147	20
Dibenzofuran	45	120	20
Diethylphthalate	51	120	20
Dimethylphthalate	48	120	20
Di-n-butylphthalate	51	125	20
Di-n-octylphthalate	51	136	20
Fluoranthene	51	120	20
Fluorene	47	120	20
Hexachlorobenzene	51	120	20
Hexachlorobutadiene	23	120	20
Hexachlorocyclopentadiene	13	120	20
Hexachloroethane	19	120	20
Indeno(1,2,3-cd)pyrene	45	128	20
Isophorone	39	120	20
Naphthalene	33	120	20
Nitrobenzene	36	120	20
N-Nitrosodimethylamine	15	120	20
N-Nitrosodi-n-propylamine	41	120	20
N-Nitrosodiphenylamine	53	120	20
Pentachlorophenol	40	120	20
Phenanthrene	49	120	20
Phenol	15	120	20
Pyrene	50	120	20
Pyridine	2	120	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	19	120
2,4,6-Tribromophenol	25	120
2-Chlorophenol-d4	28	120
2-Fluorobiphenyl	29	120
2-Fluorophenol	16	120
4-Terphenyl-d14	58	121
Nitrobenzene-d5	24	120
Phenol-d5	23	120

Effective Date: February 2014

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

8270C _ SVOC

Matrix: **SOIL**

LCS/MS/MSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	35	120	30
1,2-Dichlorobenzene	32	120	30
1,2-Diphenylhydrazine	51	120	30
1,3-Dichlorobenzene	29	120	30
1,4-Dichlorobenzene	31	120	30
2,4,5-Trichlorophenol	53	120	30
2,4,6-Trichlorophenol	51	120	30
2,4-Dichlorophenol	45	120	30
2,4-Dimethylphenol	44	120	30
2,4-Dinitrophenol	30	127	30
2,4-Dinitrotoluene	53	120	30
2,6-Dinitrotoluene	58	120	30
2-Chloronaphthalene	46	120	30
2-Chlorophenol	41	120	30
2-Methylnaphthalene	45	120	30
2-Methylphenol	44	120	30
2-Nitroaniline	43	132	30
2-Nitrophenol	40	120	30
3,3´-Dichlorobenzidine	37	120	30
3/4-Methylphenol	47	120	30
3-Nitroaniline	54	120	30
4,6-Dinitro-2-methylphenol	45	126	30
4-Bromophenyl-phenylether	58	120	30
4-Chloro-3-methylphenol	53	120	30
4-Chloroaniline	39	120	30
4-Chlorophenyl-phenylether	56	120	30
4-Methylphenol	47	120	30
4-Nitroaniline	49	120	30
4-Nitrophenol	40	127	30
Acenaphthene	51	120	30
Acenaphthylene	55	120	30
Aniline	40	120	30
Anthracene	57	120	30
Benzidine (M)	0	120	30
Benzo(a)anthracene	64	120	30
Benzo(a)pyrene	59	120	30
Benzo(b)fluoranthene	62	120	30
Benzo(g,h,i)perylene	51	126	30
Benzo(k)fluoranthene	59	120	30
Benzoic acid	23	120	30
Benzyl alcohol	46	120	30
Bis(2-chloroethoxy)methane	50	120	30
Bis(2-chloroethyl)ether	38	120	30
Bis(2-chloroisopropyl)ether	25	127	30
Bis(2-ethylhexyl)phthalate	63	129	30
Butylbenzylphthalate	64	128	30
Carbazole	58	120	30
Chrysene	33	150	30

LCS/MS/MSD

Analyte	Lower	Upper	RPD
Dibenz(a,h)anthracene	46	149	30
Dibenzofuran	55	120	30
Diethylphthalate	61	120	30
Dimethylphthalate	59	120	30
Di-n-butylphthalate	62	121	30
Di-n-octylphthalate	62	143	30
Fluoranthene	57	120	30
Fluorene	56	120	30
Hexachlorobenzene	60	120	30
Hexachlorobutadiene	34	120	30
Hexachlorocyclopentadiene	20	120	30
Hexachloroethane	33	120	30
Indeno(1,2,3-cd)pyrene	51	129	30
Isophorone	47	120	30
Naphthalene	40	120	30
Nitrobenzene	43	120	30
N-Nitrosodimethylamine	22	126	30
N-Nitrosodi-n-propylamine	51	120	30
N-Nitrosodiphenylamine	63	120	30
Pentachlorophenol	46	120	30
Phenanthrene	56	120	30
Phenol	44	120	30
Pyrene	57	120	30
Pyridine	27	120	30

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	20	120
2,4,6-Tribromophenol	31	125
2-Chlorophenol-d4	29	120
2-Fluorobiphenyl	35	120
2-Fluorophenol	27	120
4-Terphenyl-d14	26	142
Nitrobenzene-d5	25	120
Phenol-d5	20	120

Effective Date: February 2014

APPENDIX K
FAX COVER PAGE

ASSET LABORATORIES

ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

3151 W. Post Rd.
Las Vegas, NV 89118
(702) 307-2659 Phone
(702) 307-2691 Fax

Fax Transmittal Sheet

To:

From:

RE:

Message:

APPENDIX L

LABORATORY CERTIFICATIONS

CALIFORNIA ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

(ELAP)

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

ASSET Laboratories

11060 Artesia Blvd. Suite C

Cerritos, CA 90703

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site inspection, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **2921**

Expiration Date: **8/31/2016**

Effective Date: **8/20/2014**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

California State
Environmental Laboratory Accreditation Program

EDMUND G. BROWN JR.
Governor

August 19, 2014

Amolk "Molky" Brar
ASSET Laboratories
11060 Artesia Blvd. Suite C
Cerritos, CA 90703

Dear Amolk "Molky" Brar: Certificate No. 2921

This is to advise you that the laboratory named above has been certified as an environmental testing laboratory pursuant to the provisions of the Health and Safety Code (HSC), Division 101, Part 1, Chapter 4, Section 100825, *et seq.*

The Fields of Testing for which this laboratory has been certified are indicated on the enclosed "Fields of Testing." The certificate shall remain in effect until **August 31, 2016** unless it is revoked. This certificate is subject to an annual fee as prescribed by HSC 100860.1(a).

The application for renewal of this certificate must be received before the expiration date of this certificate to remain in force according to the HSC 100845(a).

Any changes in laboratory location or structural alterations, which may affect adversely the quality of analysis in the Fields of Testing for which this laboratory has been granted a certificate, require prior notification. Notification is also required for changes in ownership or laboratory director within 30 days after the change (HSC, Section 100845(b) and (d)).

Your continued cooperation with the above requirements is essential for maintaining the high quality of the data produced by environmental laboratories certified by the State of California.

If you have any questions, please contact Rosalinda Lomboy at (818) 551-2014.

Sincerely,

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

Enclosure

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

ASSET Laboratories

11060 Artesia Blvd. Suite C
Cerritos, CA 90703
Phone: 562-219-7435

Certificate No.: 2921
Renew Date: 8/31/2016

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.020	001	Conductivity	EPA 120.1
108.110	001	Turbidity	EPA 180.1
108.390	001	Turbidity	SM2130B-2001
108.430	001	Conductivity	SM2510B-1997
108.440	001	Residue, Total	SM2540B-1997
108.441	001	Residue, Filterable TDS	SM2540C-1997
108.442	001	Residue, Non-filterable TSS	SM2540D-1997
108.443	001	Residue, Settleable	SM2540F-1997
108.490	001	Hydrogen Ion (pH)	SM4500-H+ B-2000
108.597	001	Organic Carbon-Total (TOC)	SM5310C-2000

Field of Testing: 116 - Volatile Organic Chemistry of Hazardous Waste

116.080	000	Volatile Organic Compounds	EPA 8260B
116.080	120	Oxygenates	EPA 8260B
116.100	001	Total Petroleum Hydrocarbons - Gasoline	LUFT GC/MS
116.100	010	BTEX and MTBE	LUFT GC/MS

As of 8/19/2014 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

CDPH
California Department of
PublicHealth

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL LABORATORY ACCREDITATION

Is hereby granted to

Advanced Technology Laboratories, Inc.

3151-3153 West Post Road

Las Vegas, NV 89118

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **2676**

Expiration Date: **06/30/2015**

Effective Date: **07/01/2013**

Richmond, California
subject to forfeiture or revocation

Fred Shaske for
David Mazzera, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

State of California—Health and Human Services Agency
California Department of Public Health

RON CHAPMAN, MD, MPH
Director & State Health Officer

EDMUND G. BROWN JR.
Governor

April 22, 2014

Jose Tenorio Jr.
Advanced Technology Laboratories, Inc. dba ASSET Laboratories
3151 West Post Road
Las Vegas, NV 89118

Dear Jose Tenorio Jr.: Certificate No. 2676

This is to advise you that the laboratory named above has been certified as an environmental testing laboratory pursuant to the provisions of the Health and Safety Code (HSC), Division 101, Part 1, Chapter 4, Section 100825, *et seq.*

The Fields of Testing for which this laboratory has been certified are indicated on the enclosed "Fields of Testing." The certificate shall remain in effect until **June 30, 2015** unless it is revoked. This certificate is subject to an annual fee as prescribed by HSC 100860.1(a).

The application for renewal of this certificate must be received before the expiration date of this certificate to remain in force according to the HSC 100845(a).

Any changes in laboratory location or structural alterations, which may affect adversely the quality of analysis in the Fields of Testing for which this laboratory has been granted a certificate, require prior notification. Notification is also required for changes in ownership or laboratory director within 30 days after the change (HSC, Section 100845(b) and (d)).

Your continued cooperation with the above requirements is essential for maintaining the high quality of the data produced by environmental laboratories certified by the State of California.

If you have any questions, please contact Rosalinda Lomboy at (818) 551-2014.

Sincerely,

for

David Mazzera, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

Enclosure

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

Advanced Technology Laboratories, Inc. dba ASSET Laboratories
3151 West Post Road
Las Vegas, NV 89118
Phone: (702) 307-2659

Certificate No.: 2676
Renew Date: 6/30/2015

Field of Testing: 101 - Microbiology of Drinking Water

101.060	002	Total Coliform	SM9223B
101.060	003	E. coli	SM9223B
101.160	001	Total Coliform (Enumeration)	SM9223B
101.200	001	E. coli (Enumeration)	SM9223B
101.300	001	E. coli	SM9223B

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.030	001	Bromide	EPA 300.0
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate	EPA 300.0
102.030	007	Nitrite	EPA 300.0
102.030	008	Phosphate, Ortho	EPA 300.0
102.030	010	Sulfate	EPA 300.0
102.045	001	Perchlorate	EPA 314.0
102.120	001	Hardness	SM2340B
102.140	001	Total Dissolved Solids	SM2540C
102.150	001	Chloride	SM4110B
102.150	002	Fluoride	SM4110B
102.150	003	Nitrate	SM4110B
102.150	004	Nitrite	SM4110B
102.150	005	Phosphate, Ortho	SM4110B
102.150	006	Sulfate	SM4110B
102.263	002	TOC/DOC	SM5310C
102.520	001	Calcium	EPA 200.7
102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	004	Silica	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calculation)	EPA 200.7

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.060	009	Iron	SM3120B
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8

As of 4/22/2014 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	011	Mercury	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.160	001	Mercury	EPA 245.1
103.310	001	Chromium (VI)	EPA 218.6

Field of Testing: 106 - Radiochemistry of Drinking Water

+	001	Uranium	EPA 200.8
106.092	001	Uranium	EPA 200.8

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.020	001	Conductivity	EPA 120.1
108.090	001	Residue, Volatile	EPA 160.4
108.110	001	Turbidity	EPA 180.1
108.112	003	Hardness (calculation)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	006	Silica, Dissolved	EPA 200.7
108.112	007	Sodium	EPA 200.7
108.112	008	Phosphorus, Total	EPA 200.7
108.113	001	Boron	EPA 200.8
108.113	002	Calcium	EPA 200.8
108.113	003	Magnesium	EPA 200.8
108.113	004	Potassium	EPA 200.8
108.113	006	Sodium	EPA 200.8
108.120	001	Bromide	EPA 300.0
108.120	002	Chloride	EPA 300.0
108.120	003	Fluoride	EPA 300.0
108.120	007	Phosphate, Ortho	EPA 300.0
108.120	008	Sulfate	EPA 300.0
108.120	012	Nitrate (as N)	EPA 300.0

108.120	013	Nitrate-Nitrite (as N)	EPA 300.0
108.120	014	Nitrite as N	EPA 300.0
108.120	015	Phosphate, Ortho (as P)	EPA 300.0
108.232	004	Nitrite as N	EPA 353.2
108.264	001	Phosphate, Ortho	EPA 365.3
108.265	001	Phosphorus, Total	EPA 365.3
108.381	002	Oil & Grease Total	EPA 1664 Rev. B
108.390	001	Turbidity	SM2130B-2001
108.410	001	Alkalinity	SM2320B-1997
108.420	001	Hardness (calculation)	SM2340B-1997
108.430	001	Conductivity	SM2510B-1997
108.439	001	Residue, Volatile	SM2540E-1997
108.440	001	Residue, Total	SM2540B-1997
108.441	001	Residue, Filterable TDS	SM2540C-1997
108.442	001	Residue, Non-filterable TSS	SM2540D-1997
108.443	001	Residue, Settleable	SM2540F-1997
108.447	001	Boron	SM3120B-1999
108.447	002	Calcium	SM3120B-1999
108.447	003	Hardness (calculation)	SM3120B-1999
108.447	004	Magnesium	SM3120B-1999
108.447	005	Potassium	SM3120B-1999
108.447	006	Silica	SM3120B-1999
108.447	007	Sodium	SM3120B-1999
108.447	008	Phosphorus, Total	SM3120B-1999
108.448	001	Bromide	SM4110B
108.448	002	Chloride	SM4110B
108.448	003	Fluoride	SM4110B
108.448	004	Nitrate	SM4110B
108.448	005	Nitrite	SM4110B
108.448	006	Nitrate-nitrite	SM4110B
108.448	007	Phosphate, Ortho	SM4110B
108.448	008	Sulfate	SM4110B
108.490	001	pH	SM4500-H+ B
108.502	002	Ammonia (as N)	SM4500-NH3 E-1997
108.529	001	Nitrate-Nitrite (as N)	SM4500-NO3- F-2000
108.529	002	Nitrite as N	SM4500-NO3- F-2000
108.540	001	Phosphate, Ortho	SM4500-P E-1999
108.541	001	Phosphorus, Total	SM4500-P E-1999
108.584	001	Sulfide (as S)	SM4500-S= D-2000
108.597	001	Organic Carbon-Total (TOC)	SM5310C-2000
108.603	001	Oil & Grease Total	SM5520B-2001

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

As of 4/22/2014 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	006	Boron	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8

109.020	021	Iron	EPA 200.8
109.020	022	Tin	EPA 200.8
109.020	023	Titanium	EPA 200.8
109.104	001	Chromium (VI)	EPA 218.6
109.190	001	Mercury	EPA 245.1
109.400	001	Mercury	SM3112B
109.430	001	Aluminum	SM3120B
109.430	002	Antimony	SM3120B
109.430	003	Arsenic	SM3120B
109.430	004	Barium	SM3120B
109.430	005	Beryllium	SM3120B
109.430	007	Cadmium	SM3120B
109.430	009	Chromium	SM3120B
109.430	010	Cobalt	SM3120B
109.430	011	Copper	SM3120B
109.430	012	Iron	SM3120B
109.430	013	Lead	SM3120B
109.430	015	Manganese	SM3120B
109.430	016	Molybdenum	SM3120B
109.430	017	Nickel	SM3120B
109.430	019	Selenium	SM3120B
109.430	021	Silver	SM3120B
109.430	023	Thallium	SM3120B
109.430	024	Vanadium	SM3120B
109.430	025	Zinc	SM3120B
109.445	002	Chromium (VI)	SM3500-Cr B-2009
109.446	001	Chromium (VI)	SM3500-Cr C-2009

Field of Testing: 110 - Volatile Organic Chemistry of Wastewater

110.040	000	Purgeable Organic Compounds	EPA 624

Field of Testing: 111 - Semi-volatile Organic Chemistry of Wastewater

111.100	000	Base/Neutral & Acid Organics	EPA 625

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B
114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B

114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020
114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020
114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.103	001	Chromium (VI)	EPA 7196A
114.106	001	Chromium (VI)	EPA 7199
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.240	001	Corrosivity - pH Determination	EPA 9040B
114.241	001	Corrosivity - pH Determination	EPA 9045C
Field of Testing: 115 - Extraction Test of Hazardous Waste			
115.020	001	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II
115.040	001	Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312
Field of Testing: 116 - Volatile Organic Chemistry of Hazardous Waste			
116.030	001	Gasoline-range Organics	EPA 8015B
116.080	000	Volatile Organic Compounds	EPA 8260B
116.080	120	Oxygenates	EPA 8260B
116.110	001	Total Petroleum Hydrocarbons - Gasoline	LUFT
Field of Testing: 117 - Semi-volatile Organic Chemistry of Hazardous Waste			
117.010	001	Diesel-range Total Petroleum Hydrocarbons	EPA 8015B
117.016	001	Diesel-range Total Petroleum Hydrocarbons	LUFT

117.110	000	Extractable Organics	EPA 8270C
117.210	000	Organochlorine Pesticides	EPA 8081A
117.220	000	PCBs	EPA 8082

Field of Testing: 120 - Physical Properties of Hazardous Waste

120.020	001	Ignitability	EPA 1020A
120.070	001	Corrosivity - pH Determination	EPA 9040B
120.080	001	Corrosivity - pH Determination	EPA 9045C

OREGON ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (ORELAP)

(NELAP)

OREGON

Environmental Laboratory Accreditation Program

NELAP Recognized

ASSET Laboratories

4046

3151 W. Post Road

Las Vegas,NV 89118

IS GRANTED APPROVAL BY ORELAP UNDER THE 2009 TNI STANDARDS, TO PERFORM ANALYSES ON ENVIRONMENTAL SAMPLES IN MATRICES AS LISTED BELOW :

Air	*Drinking Water*	*Non Potable Water*	*Solids and Chem. Waste*	*Tissue*
Chemistry	Chemistry	Chemistry	Chemistry	

AND AS RECORDED IN THE LIST OF APPROVED ANALYTES, METHODS, ANALYTICAL TECHNIQUES, AND FIELDS OF TESTING ISSUED CONCURRENTLY WITH THIS CERTIFICATE AND REVISED AS NECESSARY.

ACCREDITED STATUS DEPENDS ON SUCCESSFUL ONGOING PARTICIPATION IN THE PROGRAM AND CONTINUED COMPLIANCE WITH THE STANDARDS.

CUSTOMERS ARE URGED TO VERIFY THE LABORATORY'S CURRENT ACCREDITATION STATUS IN OREGON.

Gary K. Ward, MS
Oregon State Public Health Laboratory
ORELAP Administrator
3150 NW. 229th Ave, Suite 100
Hillsboro, OR 97124

ISSUE DATE: 01/30/2015

EXPIRATION DATE: 01/29/2016

Certificate No: 4046 - 002

Oregon

Environmental Laboratory Accreditation Program

Department of Agriculture, Laboratory Division
Department of Environmental Quality, Laboratory Division
Oregon Health Authority, Public Health Division

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ORELAP Fields of Accreditation

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MATRIX : Air

Reference	Code	Description
EPA TO-15	**10248803**	**VOCs collected in Canisters by GC/MS**

Analyte Code	*Analyte*
5105	1,1,1,2-Tetrachloroethane
5160	1,1,1-Trichloroethane
5110	1,1,2,2-Tetrachloroethane
5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
5165	1,1,2-Trichloroethane
4630	1,1-Dichloroethane
4640	1,1-Dichloroethylene
5155	1,2,4-Trichlorobenzene
5210	1,2,4-Trimethylbenzene
4570	1,2-Dibromo-3-chloropropane (DBCP)
4585	1,2-Dibromoethane (EDB, Ethylene dibromide)
4695	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)
4610	1,2-Dichlorobenzene
4635	1,2-Dichloroethane (Ethylene dichloride)
4655	1,2-Dichloropropane
5215	1,3,5-Trimethylbenzene
9318	1,3-Butadiene
4615	1,3-Dichlorobenzene
4620	1,4-Dichlorobenzene
4735	1,4-Dioxane (1,4- Diethyleneoxide)
4410	2-Butanone (Methyl ethyl ketone, MEK)
4860	2-Hexanone (MBK)
4542	4-Ethyltoluene
4995	4-Methyl-2-pentanone (MIBK)
4315	Acetone
4325	Acrolein (Propenal)
4375	Benzene
5635	Benzyl chloride
4395	Bromodichloromethane
4400	Bromoform
4450	Carbon disulfide
4455	Carbon tetrachloride
4475	Chlorobenzene
4575	Chlorodibromomethane
4485	Chloroethane (Ethyl chloride)
4505	Chloroform
4705	cis & trans-1,2-Dichloroethene
4680	cis-1,3-Dichloropropene
4555	Cyclohexane

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Analyte Code	*Analyte*
4595	Dibromomethane (Methylene bromide)
4625	Dichlorodifluoromethane (Freon-12)
4750	Ethanol
4755	Ethyl acetate
4765	Ethylbenzene
4835	Hexachlorobutadiene
4895	Isopropyl alcohol (2-Propanol, Isopropanol)
5240	m+p-xylene
4950	Methyl bromide (Bromomethane)
4960	Methyl chloride (Chloromethane)
4990	Methyl methacrylate
5000	Methyl tert-butyl ether (MTBE)
4975	Methylene chloride (Dichloromethane)
5245	m-Xylene
5005	Naphthalene
4825	n-Heptane
4855	n-Hexane
5250	o-Xylene
5255	p-Xylene
5100	Styrene
5115	Tetrachloroethylene (Perchloroethylene)
5120	Tetrahydrofuran (THF)
5140	Toluene
4700	trans-1,2-Dichloroethylene
4685	trans-1,3-Dichloropropylene
5170	Trichloroethene (Trichloroethylene)
5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)
5225	Vinyl acetate
5235	Vinyl chloride
5260	Xylene (total)

EPA TO-15 GC/MS SIM **10248858** **VOCs collected in Canisters by GC/MS SIM**

Analyte Code	*Analyte*
5185	1,1,1-Trichloro-2,2,2-trifluoroethane
5110	1,1,2,2-Tetrachloroethane
5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
5165	1,1,2-Trichloroethane
4630	1,1-Dichloroethane
4640	1,1-Dichloroethylene
4585	1,2-Dibromoethane (EDB, Ethylene dibromide)
4635	1,2-Dichloroethane (Ethylene dichloride)
4655	1,2-Dichloropropane
4375	Benzene
4395	Bromodichloromethane
4455	Carbon tetrachloride
4485	Chloroethane (Ethyl chloride)
4505	Chloroform
4705	cis & trans-1,2-Dichloroethene
4645	cis-1,2-Dichloroethylene
4680	cis-1,3-Dichloropropene
4625	Dichlorodifluoromethane (Freon-12)
4765	Ethylbenzene
5240	m+p-xylene
4950	Methyl bromide (Bromomethane)
4960	Methyl chloride (Chloromethane)
4975	Methylene chloride (Dichloromethane)
5250	o-Xylene
5100	Styrene
5115	Tetrachloroethylene (Perchloroethylene)
5140	Toluene

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Analyte Code	*Analyte*
4700	trans-1,2-Dichloroethylene
4685	trans-1,3-Dichloropropylene
5170	Trichloroethene (Trichloroethylene)
5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)

EPA TO-3 **10249000** **Cryogenic Trapping**

Analyte Code	*Analyte*
4375	Benzene
4765	Ethylbenzene
9408	Gasoline range organics (GRO)
5000	Methyl tert-butyl ether (MTBE)
5140	Toluene
5260	Xylene (total)

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MATRIX : Drinking Water

Reference	Code	Description
EPA 200.7 4.4	**10013806**	**ICP - metals**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1760	Hardness (calc.)
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1990	Silica as SiO2
1150	Silver
1155	Sodium
1165	Thallium
1185	Vanadium
1190	Zinc

EPA 200.8 5.4	**10014605**	**Metals by ICP-MS**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1760	Hardness (calc.)
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1095	Mercury
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1150	Silver
1155	Sodium
1165	Thallium
1185	Vanadium

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Analyte Code	*Analyte*
1190	Zinc

EPA 218.6 3.3 **10028009** **Dissolved Hexavalent Chromium by Ion Chromatography**

Analyte Code	*Analyte*
1045	Chromium VI

EPA 245.1 3 **10036609** **Mercury by Cold Vapor Atomic Absorption**

Analyte Code	*Analyte*
1095	Mercury

EPA 314.0 **10277006** **Perchlorate in Drinking Water by Ion Chromatography**

Analyte Code	*Analyte*
1895	Perchlorate

ORELAP Fields of Accreditation

ORELAP ID: 4046
EPA CODE: NV00922
Certificate: 4046 - 002

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MATRIX : Non-Potable Water

Reference	Code	Description
EPA 200.7 4.4	**10013806**	**ICP - metals**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1760	Hardness (calc.)
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1990	Silica as SiO2
1150	Silver
1155	Sodium
1160	Strontium
1165	Thallium
1175	Tin
1180	Titanium
1185	Vanadium
1190	Zinc

EPA 200.8 5.4	**10014605**	**Metals by ICP-MS**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1760	Hardness (calc.)
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1150	Silver
1155	Sodium

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Analyte Code	*Analyte*
1160	Strontium
1165	Thallium
1175	Tin
1180	Titanium
1185	Vanadium
1190	Zinc

EPA 218.6 3.3 **10028009** **Dissolved Hexavalent Chromium by Ion Chromatography**

Analyte Code	*Analyte*
1045	Chromium VI

EPA 245.1 3 **10036609** **Mercury by Cold Vapor Atomic Absorption**

Analyte Code	*Analyte*
1095	Mercury

EPA 3010A **10133605** **Acid Digestion of Aqueous samples and Extracts for Total Metals**

Analyte Code	*Analyte*
8031	Extraction/Preparation

EPA 314.0 **10277006** **Perchlorate in Drinking Water by Ion Chromatography**

Analyte Code	*Analyte*
1895	Perchlorate

EPA 3510C **10138202** **Separatory Funnel Liquid-liquid extraction**

Analyte Code	*Analyte*
8031	Extraction/Preparation

EPA 5030B **10153409** **Purge and trap for aqueous samples**

Analyte Code	*Analyte*
8031	Extraction/Preparation

EPA 6010B **10155609** **ICP - AES**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1990	Silica as SiO2

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Analyte Code	*Analyte*
1150	Silver
1155	Sodium
1160	Strontium
1165	Thallium
1175	Tin
1180	Titanium
1185	Vanadium
1190	Zinc

EPA 6020 **10156000** **Inductively Coupled Plasma-Mass Spectrometry**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1150	Silver
1155	Sodium
1160	Strontium
1165	Thallium
1175	Tin
1180	Titanium
1185	Vanadium
1190	Zinc

EPA 7470A **10165807** **Mercury in Liquid Waste by Cold Vapor Atomic Absorption**

Analyte Code	*Analyte*
1095	Mercury

EPA 8015B **10173601** **Non-halogenated organics using GC/FID**

Analyte Code	*Analyte*
9369	Diesel range organics (DRO)
9408	Gasoline range organics (GRO)
9499	Motor Oil

EPA 8081A **10178606** **Organochlorine Pesticides by GC/ECD**

Analyte Code	*Analyte*
7355	4,4'-DDD
7360	4,4'-DDE
7365	4,4'-DDT
7025	Aldrin
7110	alpha-BHC (alpha-Hexachlorocyclohexane)

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Analyte Code	*Analyte*
7240	alpha-Chlordane
7115	beta-BHC (beta-Hexachlorocyclohexane)
7250	Chlordane (tech.)
7105	delta-BHC
7470	Dieldrin
7510	Endosulfan I
7515	Endosulfan II
7520	Endosulfan sulfate
7540	Endrin
7530	Endrin aldehyde
7535	Endrin ketone
7120	gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)
7245	gamma-Chlordane
7685	Heptachlor
7690	Heptachlor epoxide
7810	Methoxychlor
8250	Toxaphene (Chlorinated camphene)

EPA 8082 **10179007** **Polychlorinated Biphenyls (PCBs) by GC/ECD**

Analyte Code	*Analyte*
8880	Aroclor-1016 (PCB-1016)
8885	Aroclor-1221 (PCB-1221)
8890	Aroclor-1232 (PCB-1232)
8895	Aroclor-1242 (PCB-1242)
8900	Aroclor-1248 (PCB-1248)
8905	Aroclor-1254 (PCB-1254)
8910	Aroclor-1260 (PCB-1260)

EPA 8260B **10184802** **Volatile Organic Compounds by purge and trap GC/MS**

Analyte Code	*Analyte*
5105	1,1,1,2-Tetrachloroethane
5160	1,1,1-Trichloroethane
5110	1,1,2,2-Tetrachloroethane
5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
5165	1,1,2-Trichloroethane
4630	1,1-Dichloroethane
4640	1,1-Dichloroethylene
4670	1,1-Dichloropropene
5150	1,2,3-Trichlorobenzene
5180	1,2,3-Trichloropropane
5155	1,2,4-Trichlorobenzene
5210	1,2,4-Trimethylbenzene
4570	1,2-Dibromo-3-chloropropane (DBCP)
4585	1,2-Dibromoethane (EDB, Ethylene dibromide)
4610	1,2-Dichlorobenzene
4635	1,2-Dichloroethane (Ethylene dichloride)
4655	1,2-Dichloropropane
5215	1,3,5-Trimethylbenzene
4615	1,3-Dichlorobenzene
4660	1,3-Dichloropropane
4620	1,4-Dichlorobenzene
4665	2,2-Dichloropropane
4410	2-Butanone (Methyl ethyl ketone, MEK)
4500	2-Chloroethyl vinyl ether
4535	2-Chlorotoluene
4860	2-Hexanone (MBK)
4540	4-Chlorotoluene
4910	4-Isopropyltoluene (p-Cymene)
4995	4-Methyl-2-pentanone (MIBK)

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Analyte Code	*Analyte*
4315	Acetone
4325	Acrolein (Propenal)
4340	Acrylonitrile
4375	Benzene
4385	Bromobenzene
4390	Bromochloromethane
4395	Bromodichloromethane
4400	Bromoform
4450	Carbon disulfide
4455	Carbon tetrachloride
4475	Chlorobenzene
4575	Chlorodibromomethane
4485	Chloroethane (Ethyl chloride)
4505	Chloroform
4705	cis & trans-1,2-Dichloroethene
4645	cis-1,2-Dichloroethylene
4680	cis-1,3-Dichloropropene
4595	Dibromomethane (Methylene bromide)
4625	Dichlorodifluoromethane (Freon-12)
4725	Diethyl ether
9375	Di-isopropylether (DIPE)
4755	Ethyl acetate
4765	Ethylbenzene
4770	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)
4835	Hexachlorobutadiene
4900	Isopropylbenzene
5240	m+p-xylene
4950	Methyl bromide (Bromomethane)
4960	Methyl chloride (Chloromethane)
5000	Methyl tert-butyl ether (MTBE)
4975	Methylene chloride (Dichloromethane)
5005	Naphthalene
4435	n-Butylbenzene
5090	n-Propylbenzene
5250	o-Xylene
4440	sec-Butylbenzene
5100	Styrene
4370	T-amylmethylether (TAME)
4420	tert-Butyl alcohol
4445	tert-Butylbenzene
5115	Tetrachloroethylene (Perchloroethylene)
5140	Toluene
4700	trans-1,2-Dichloroethylene
4685	trans-1,3-Dichloropropylene
5170	Trichloroethene (Trichloroethylene)
5225	Vinyl acetate
5235	Vinyl chloride
5260	Xylene (total)

EPA 8270C **10185805** **Semivolatile Organic compounds by GC/MS**

Analyte Code	*Analyte*
5155	1,2,4-Trichlorobenzene
4610	1,2-Dichlorobenzene
6221	1,2-Diphenylhydrazine
4615	1,3-Dichlorobenzene
4620	1,4-Dichlorobenzene
4735	1,4-Dioxane (1,4- Diethyleneoxide)
6835	2,4,5-Trichlorophenol
6840	2,4,6-Trichlorophenol
6000	2,4-Dichlorophenol

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Analyte Code	*Analyte*
6130	2,4-Dimethylphenol
6175	2,4-Dinitrophenol
6185	2,4-Dinitrotoluene (2,4-DNT)
6190	2,6-Dinitrotoluene (2,6-DNT)
5795	2-Chloronaphthalene
5800	2-Chlorophenol
6385	2-Methylnaphthalene
6400	2-Methylphenol (o-Cresol)
6460	2-Nitroaniline
6490	2-Nitrophenol
6412	3 & 4 Methylphenol
5945	3,3'-Dichlorobenzidine
6465	3-Nitroaniline
5660	4-Bromophenyl phenyl ether (BDE-3)
5700	4-Chloro-3-methylphenol
5745	4-Chloroaniline
5825	4-Chlorophenyl phenylether
6410	4-Methylphenol (p-Cresol)
6470	4-Nitroaniline
6500	4-Nitrophenol
5500	Acenaphthene
5505	Acenaphthylene
5545	Aniline
5555	Anthracene
5595	Benzidine
5575	Benzo(a)anthracene
5580	Benzo(a)pyrene
5590	Benzo(g,h,i)perylene
5600	Benzo(k)fluoranthene
5585	Benzo[b]fluoranthene
5610	Benzoic acid
5630	Benzyl alcohol
5760	bis(2-Chloroethoxy)methane
5765	bis(2-Chloroethyl) ether
5780	bis(2-Chloroisopropyl) ether
5670	Butyl benzyl phthalate
5680	Carbazole
5855	Chrysene
5895	Dibenz(a,h) anthracene
5905	Dibenzofuran
6070	Diethyl phthalate
6135	Dimethyl phthalate
5925	Di-n-butyl phthalate
6200	Di-n-octyl phthalate
6265	Fluoranthene
6270	Fluorene
6275	Hexachlorobenzene
4835	Hexachlorobutadiene
6285	Hexachlorocyclopentadiene
4840	Hexachloroethane
6315	Indeno(1,2,3-cd) pyrene
6320	Isophorone
5005	Naphthalene
5015	Nitrobenzene
6530	n-Nitrosodimethylamine
6545	n-Nitrosodi-n-propylamine
6535	n-Nitrosodiphenylamine
6605	Pentachlorophenol
6615	Phenanthrene
6625	Phenol
6665	Pyrene

ORELAP Fields of Accreditation

ORELAP ID: 4046
EPA CODE: NV00922
Certificate: 4046 - 002

ASSET Laboratories

3151 W. Post Road
Las Vegas NV 89118

Issue Date: 01/30/2015 ***Expiration Date:*** 01/29/2016

As of 01/30/2015 ***this list supercedes all previous lists for this certificate number. Customers. Please verify the current accreditation standing with ORELAP.***

Analyte Code	*Analyte*
5095	Pyridine

ORELAP Fields of Accreditation

ORELAP ID: 4046
EPA CODE: NV00922
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MATRIX : Solids

Reference	Code	Description
EPA 3050B	**10135601**	**Acid Digestion of Sediments, Sludges, and soils**

Analyte Code	*Analyte*
8031	Extraction/Preparation

Reference	Code	Description
EPA 3060A	**10136604**	**Alkaline Digestion for Hexavalent Chromium**

Analyte Code	*Analyte*
8031	Extraction/Preparation

Reference	Code	Description
EPA 3550B	**10141807**	**Ultrasonic Extraction**

Analyte Code	*Analyte*
8031	Extraction/Preparation

Reference	Code	Description
EPA 3580A	**10143007**	**Waste Dilution**

Analyte Code	*Analyte*
8031	Extraction/Preparation

Reference	Code	Description
EPA 5035A	**10284807**	**Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples**

Analyte Code	*Analyte*
8031	Extraction/Preparation

Reference	Code	Description
EPA 6010B	**10155609**	**ICP - AES**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1150	Silver
1155	Sodium
1165	Thallium
1175	Tin
1180	Titanium
1185	Vanadium
1190	Zinc

ORELAP Fields of Accreditation

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ASSET Laboratories

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EPA 6020 **10156000** **Inductively Coupled Plasma-Mass Spectrometry**

Analyte Code	*Analyte*
1000	Aluminum
1005	Antimony
1010	Arsenic
1015	Barium
1020	Beryllium
1025	Boron
1030	Cadmium
1035	Calcium
1040	Chromium
1050	Cobalt
1055	Copper
1070	Iron
1075	Lead
1085	Magnesium
1090	Manganese
1100	Molybdenum
1105	Nickel
1125	Potassium
1140	Selenium
1150	Silver
1155	Sodium
1160	Strontium
1165	Thallium
1185	Vanadium
1190	Zinc

EPA 7199 **10163005** **Determination of Hexavalent Chromium in Drinking Water, Groundwater and Industrial Wastewater Effluents by Ion Chromatography**

Analyte Code	*Analyte*
1045	Chromium VI

EPA 7471A **10166208** **Mercury in Solid Waste by Cold Vapor Atomic Absorption**

Analyte Code	*Analyte*
1095	Mercury

EPA 8015B **10173601** **Non-halogenated organics using GC/FID**

Analyte Code	*Analyte*
9369	Diesel range organics (DRO)
9408	Gasoline range organics (GRO)
9499	Motor Oil

EPA 8081A **10178606** **Organochlorine Pesticides by GC/ECD**

Analyte Code	*Analyte*
7355	4,4'-DDD
7360	4,4'-DDE
7365	4,4'-DDT
7025	Aldrin
7110	alpha-BHC (alpha-Hexachlorocyclohexane)
7240	alpha-Chlordane
7115	beta-BHC (beta-Hexachlorocyclohexane)
7250	Chlordane (tech.)
7105	delta-BHC
7470	Dieldrin
7510	Endosulfan I
7515	Endosulfan II

ORELAP Fields of Accreditation

ORELAP ID: 4046
EPA CODE: NV00922
Certificate: 4046 - 002

ASSET Laboratories

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Analyte Code	*Analyte*
7520	Endosulfan sulfate
7540	Endrin
7530	Endrin aldehyde
7535	Endrin ketone
7120	gamma-BHC (Lindane, gamma-HexachlorocyclohexanE)
7245	gamma-Chlordane
7685	Heptachlor
7690	Heptachlor epoxide
7810	Methoxychlor
8250	Toxaphene (Chlorinated camphene)

EPA 8082 **10179007** **Polychlorinated Biphenyls (PCBs) by GC/ECD**

Analyte Code	*Analyte*
8880	Aroclor-1016 (PCB-1016)
8885	Aroclor-1221 (PCB-1221)
8890	Aroclor-1232 (PCB-1232)
8895	Aroclor-1242 (PCB-1242)
8900	Aroclor-1248 (PCB-1248)
8905	Aroclor-1254 (PCB-1254)
8910	Aroclor-1260 (PCB-1260)

EPA 8260B **10184802** **Volatile Organic Compounds by purge and trap GC/MS**

Analyte Code	*Analyte*
5105	1,1,1,2-Tetrachloroethane
5160	1,1,1-Trichloroethane
5110	1,1,2,2-Tetrachloroethane
5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
5165	1,1,2-Trichloroethane
4630	1,1-Dichloroethane
4640	1,1-Dichloroethylene
4670	1,1-Dichloropropene
5150	1,2,3-Trichlorobenzene
5180	1,2,3-Trichloropropane
5155	1,2,4-Trichlorobenzene
5210	1,2,4-Trimethylbenzene
4570	1,2-Dibromo-3-chloropropane (DBCP)
4585	1,2-Dibromoethane (EDB, Ethylene dibromide)
4610	1,2-Dichlorobenzene
4635	1,2-Dichloroethane (Ethylene dichloride)
4655	1,2-Dichloropropane
5215	1,3,5-Trimethylbenzene
4615	1,3-Dichlorobenzene
4660	1,3-Dichloropropane
4620	1,4-Dichlorobenzene
4665	2,2-Dichloropropane
4410	2-Butanone (Methyl ethyl ketone, MEK)
4500	2-Chloroethyl vinyl ether
4535	2-Chlorotoluene
4860	2-Hexanone (MBK)
4540	4-Chlorotoluene
4910	4-Isopropyltoluene (p-Cymene)
4995	4-Methyl-2-pentanone (MIBK)
4315	Acetone
4325	Acrolein (Propenal)
4340	Acrylonitrile
4375	Benzene
4385	Bromobenzene
4390	Bromochloromethane
4395	Bromodichloromethane

ORELAP Fields of Accreditation

ORELAP ID: 4046
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ASSET Laboratories

3151 W. Post Road
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Analyte Code	*Analyte*
4400	Bromoform
4450	Carbon disulfide
4455	Carbon tetrachloride
4475	Chlorobenzene
4575	Chlorodibromomethane
4485	Chloroethane (Ethyl chloride)
4505	Chloroform
4705	cis & trans-1,2-Dichloroethene
4645	cis-1,2-Dichloroethylene
4680	cis-1,3-Dichloropropene
4595	Dibromomethane (Methylene bromide)
4625	Dichlorodifluoromethane (Freon-12)
4725	Diethyl ether
9375	Di-isopropylether (DIPE)
4755	Ethyl acetate
4765	Ethylbenzene
4770	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)
4835	Hexachlorobutadiene
4900	Isopropylbenzene
5240	m+p-xylene
4950	Methyl bromide (Bromomethane)
4960	Methyl chloride (Chloromethane)
5000	Methyl tert-butyl ether (MTBE)
4975	Methylene chloride (Dichloromethane)
5005	Naphthalene
4435	n-Butylbenzene
5090	n-Propylbenzene
5250	o-Xylene
4440	sec-Butylbenzene
5100	Styrene
4370	T-amylmethylether (TAME)
4420	tert-Butyl alcohol
4445	tert-Butylbenzene
5115	Tetrachloroethylene (Perchloroethylene)
5140	Toluene
4700	trans-1,2-Dichloroethylene
4685	trans-1,3-Dichloropropylene
5170	Trichloroethene (Trichloroethylene)
5225	Vinyl acetate
5235	Vinyl chloride
5260	Xylene (total)

EPA 8270C **10185805** **Semivolatile Organic compounds by GC/MS**

Analyte Code	*Analyte*
5155	1,2,4-Trichlorobenzene
4610	1,2-Dichlorobenzene
6221	1,2-Diphenylhydrazine
4615	1,3-Dichlorobenzene
4620	1,4-Dichlorobenzene
4735	1,4-Dioxane (1,4- Diethyleneoxide)
6835	2,4,5-Trichlorophenol
6840	2,4,6-Trichlorophenol
6000	2,4-Dichlorophenol
6130	2,4-Dimethylphenol
6175	2,4-Dinitrophenol
6185	2,4-Dinitrotoluene (2,4-DNT)
6190	2,6-Dinitrotoluene (2,6-DNT)
5795	2-Chloronaphthalene
5800	2-Chlorophenol
6385	2-Methylnaphthalene

ORELAP Fields of Accreditation

ORELAP ID: 4046
EPA CODE: NV00922
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ASSET Laboratories

3151 W. Post Road
Las Vegas NV 89118

Issue Date: 01/30/2015 ***Expiration Date:*** 01/29/2016

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Analyte Code	*Analyte*
6400	2-Methylphenol (o-Cresol)
6460	2-Nitroaniline
6490	2-Nitrophenol
6412	3 & 4 Methylphenol
5945	3,3'-Dichlorobenzidine
6465	3-Nitroaniline
5660	4-Bromophenyl phenyl ether (BDE-3)
5700	4-Chloro-3-methylphenol
5745	4-Chloroaniline
5825	4-Chlorophenyl phenylether
6410	4-Methylphenol (p-Cresol)
6470	4-Nitroaniline
6500	4-Nitrophenol
5500	Acenaphthene
5505	Acenaphthylene
5545	Aniline
5555	Anthracene
5595	Benzidine
5575	Benzo(a)anthracene
5580	Benzo(a)pyrene
5590	Benzo(g,h,i)perylene
5600	Benzo(k)fluoranthene
5585	Benzo[b]fluoranthene
5610	Benzoic acid
5630	Benzyl alcohol
5760	bis(2-Chloroethoxy)methane
5765	bis(2-Chloroethyl) ether
5780	bis(2-Chloroisopropyl) ether
5670	Butyl benzyl phthalate
5680	Carbazole
5855	Chrysene
5895	Dibenz(a,h) anthracene
5905	Dibenzofuran
6070	Diethyl phthalate
6135	Dimethyl phthalate
5925	Di-n-butyl phthalate
6200	Di-n-octyl phthalate
6265	Fluoranthene
6270	Fluorene
6275	Hexachlorobenzene
4835	Hexachlorobutadiene
6285	Hexachlorocyclopentadiene
4840	Hexachloroethane
6315	Indeno(1,2,3-cd) pyrene
6320	Isophorone
5005	Naphthalene
5015	Nitrobenzene
6530	n-Nitrosodimethylamine
6545	n-Nitrosodi-n-propylamine
6535	n-Nitrosodiphenylamine
6605	Pentachlorophenol
6615	Phenanthrene
6625	Phenol
6665	Pyrene
5095	Pyridine

STATE OF NEVADA

(NDEP)

STATE OF NEVADA
Brian Sandoval, Governor
Department of Conservation & Natural Resources
Leo M. Drozdoff, P.E., Director
DIVISION OF ENVIRONMENTAL PROTECTION
Colleen Cripps, Ph.D., Administrator
ndep NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

July 31, 2014

ASSET Laboratories
3151 West Post Road
Las Vegas, NV 89118

RE: Nevada Environmental Laboratory Certification 1 Year Extension.

Dear Sir or Madam:

Your laboratory's 2013-2014 Nevada scope has been extended until July 31, 2015 or until you receive the updated 2014-2015 scope.

This will serve as official notice to you and your clients.

Be advised this letter is only valid as long as your laboratory maintains compliance with State of Nevada regulation NAC 445A.0552 to .067, NAC 445A.542 to .54296 and/or NAC 459.96902 to .9699.

Failure to do so will result in invalidation of any data submitted to the Nevada Department of Environmental Protection.

If you or your clients have any questions, please contact Donald LaFara at 775-687-9491.

Sincerely,

Don LaFara

Donald LaFara, Laboratory Certification Officer
Program Manager, Laboratory Certification Program
State of Nevada Division of Environmental Protection

State of Nevada

Department of Conservation and Natural Resources
Division of Environmental Protection

Certifies that

Asset Laboratories

3151-3153 W. Post Rd Las Vegas, NV 89118-

Having met the requirements of the
Nevada Administrative Code: NAC 445A

is hereby approved to perform the analyses as indicated on the most recently issued parameter list which must accompany this certificate to be valid. It is the certified laboratory's responsibility to provide their client the most current certified parameter list. Contact LCP to verify certification status.

Expiration Date: 7/31/2014

Certificate Number: NV009222014-2

Donald LaFara, Program Manager
Laboratory Certification Program

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number: NV009222014-2** **Expiration Date: 7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline Chemistry				
EPA 120.1	Conductivity	8/1/2013	7/31/2014	Certified
EPA 1664B	n-Hexane Extractable Material (O&G)	8/1/2013	7/31/2014	Certified
EPA 1664B (SGT-HEM)	Hexane Extractable Material - Silica Gel Treated (HEM-SGT)	8/1/2013	7/31/2014	Certified
EPA 180.1	Turbidity	8/1/2013	7/31/2014	Certified
EPA 200.7	Aluminum	8/1/2013	7/31/2014	Certified
EPA 200.7	Antimony	8/1/2013	7/31/2014	Certified
EPA 200.7	Arsenic	8/1/2013	7/31/2014	Certified
EPA 200.7	Barium	8/1/2013	7/31/2014	Certified
EPA 200.7	Beryllium	8/1/2013	7/31/2014	Certified
EPA 200.7	Boron	8/1/2013	7/31/2014	Certified
EPA 200.7	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.7	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.7	Calcium hardness as CaCO3	8/1/2013	7/31/2014	Certified
EPA 200.7	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.7	Cobalt	8/1/2013	7/31/2014	Certified
EPA 200.7	Copper	8/1/2013	7/31/2014	Certified
EPA 200.7	Hardness by calculation	8/1/2013	7/31/2014	Certified
EPA 200.7	Iron	8/1/2013	7/31/2014	Certified
EPA 200.7	Lead	8/1/2013	7/31/2014	Certified
EPA 200.7	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.7	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.7	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.7	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.7	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.7	Selenium	8/1/2013	7/31/2014	Certified
EPA 200.7	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 200.7	Silver	8/1/2013	7/31/2014	Certified
EPA 200.7	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.7	Strontium	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 200.7	Thallium	8/1/2013	7/31/2014	Certified
EPA 200.7	Tin	8/1/2013	7/31/2014	Certified
EPA 200.7	Titanium	8/1/2013	7/31/2014	Certified
EPA 200.7	Total hardness as CaCO3	8/1/2013	7/31/2014	Certified
EPA 200.7	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.7	Zinc	8/1/2013	7/31/2014	Certified
EPA 200.8	Aluminum	8/1/2013	7/31/2014	Certified
EPA 200.8	Antimony	8/1/2013	7/31/2014	Certified
EPA 200.8	Arsenic	8/1/2013	7/31/2014	Certified
EPA 200.8	Barium	8/1/2013	7/31/2014	Certified
EPA 200.8	Beryllium	8/1/2013	7/31/2014	Certified
EPA 200.8	Boron	8/1/2013	7/31/2014	Certified
EPA 200.8	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.8	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.8	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.8	Cobalt	8/1/2013	7/31/2014	Certified
EPA 200.8	Copper	8/1/2013	7/31/2014	Certified
EPA 200.8	Iron	8/1/2013	7/31/2014	Certified
EPA 200.8	Lead	8/1/2013	7/31/2014	Certified
EPA 200.8	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.8	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.8	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.8	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.8	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.8	Selenium	8/1/2013	7/31/2014	Certified
EPA 200.8	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 200.8	Silver	8/1/2013	7/31/2014	Certified
EPA 200.8	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.8	Strontium	8/1/2013	7/31/2014	Certified
EPA 200.8	Thallium	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 200.8	Tin	8/1/2013	7/31/2014	Certified
EPA 200.8	Titanium	8/1/2013	7/31/2014	Certified
EPA 200.8	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.8	Zinc	8/1/2013	7/31/2014	Certified
EPA 218.6	Chromium VI	8/1/2013	7/31/2014	Certified
EPA 245.1	Mercury	8/1/2013	7/31/2014	Certified
EPA 300.0	Bromide	8/1/2013	7/31/2014	Certified
EPA 300.0	Chloride	8/1/2013	7/31/2014	Certified
EPA 300.0	Fluoride	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrate as N	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrite as N	8/1/2013	7/31/2014	Certified
EPA 300.0	Orthophosphate as P	8/1/2013	7/31/2014	Certified
EPA 300.0	Sulfate	8/1/2013	7/31/2014	Certified
EPA 314.0	Perchlorate	8/1/2013	7/31/2014	Certified
EPA 365.3	Orthophosphate as P	8/1/2013	7/31/2014	Certified
EPA 365.3	Phosphorus, total	8/1/2013	7/31/2014	Certified
EPA 608	4,4'-DDD	8/1/2013	7/31/2014	Certified
EPA 608	4,4'-DDE	8/1/2013	7/31/2014	Certified
EPA 608	4,4'-DDT	8/1/2013	7/31/2014	Certified
EPA 608	Aldrin	8/1/2013	7/31/2014	Certified
EPA 608	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 608	alpha-Chlordane	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1016 (PCB-1016)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1221 (PCB-1221)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1232 (PCB-1232)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1242 (PCB-1242)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1248 (PCB-1248)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1254 (PCB-1254)	8/1/2013	7/31/2014	Certified
EPA 608	Aroclor-1260 (PCB-1260)	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 608	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 608	Chlordane (tech.)	8/1/2013	7/31/2014	Certified
EPA 608	Chlordane, total	8/1/2013	7/31/2014	Certified
EPA 608	delta-BHC	8/1/2013	7/31/2014	Certified
EPA 608	Dieldrin	8/1/2013	7/31/2014	Certified
EPA 608	Endosulfan I	8/1/2013	7/31/2014	Certified
EPA 608	Endosulfan II	8/1/2013	7/31/2014	Certified
EPA 608	Endosulfan sulfate	8/1/2013	7/31/2014	Certified
EPA 608	Endrin	8/1/2013	7/31/2014	Certified
EPA 608	Endrin aldehyde	8/1/2013	7/31/2014	Certified
EPA 608	Endrin ketone	8/1/2013	7/31/2014	Certified
EPA 608	gamma-BHC (Lindane)	8/1/2013	7/31/2014	Certified
EPA 608	gamma-Chlordane	8/1/2013	7/31/2014	Certified
EPA 608	Heptachlor	8/1/2013	7/31/2014	Certified
EPA 608	Heptachlor epoxide	8/1/2013	7/31/2014	Certified
EPA 608	Toxaphene (Chlorinated camphene)	8/1/2013	7/31/2014	Certified
EPA 624	1,1,1,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,1,1-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,1,2,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,1,2-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,1-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,1-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 624	1,2,3-Trichloropropane	8/1/2013	7/31/2014	Certified
EPA 624	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 624	1,2,4-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 624	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2013	7/31/2014	Certified
EPA 624	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2013	7/31/2014	Certified
EPA 624	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 624	1,2-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 624	1,2-Dichloropropane	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 624	1,3,5-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 624	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 624	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 624	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2013	7/31/2014	Certified
EPA 624	2-Chloroethyl vinyl ether	8/1/2013	7/31/2014	Certified
EPA 624	2-Hexanone	8/1/2013	7/31/2014	Certified
EPA 624	4-Methyl-2-pentanone (MIBK)	8/1/2013	7/31/2014	Certified
EPA 624	Acetone	8/1/2013	7/31/2014	Certified
EPA 624	Acrolein (Propenal)	8/1/2013	7/31/2014	Certified
EPA 624	Acrylonitrile	8/1/2013	7/31/2014	Certified
EPA 624	Benzene	8/1/2013	7/31/2014	Certified
EPA 624	Bromodichloromethane	8/1/2013	7/31/2014	Certified
EPA 624	Bromoform	8/1/2013	7/31/2014	Certified
EPA 624	Carbon disulfide	8/1/2013	7/31/2014	Certified
EPA 624	Carbon tetrachloride	8/1/2013	7/31/2014	Certified
EPA 624	Chlorobenzene	8/1/2013	7/31/2014	Certified
EPA 624	Chlorodibromomethane (Dibromochloromethane)	8/1/2013	7/31/2014	Certified
EPA 624	Chloroethane (Ethyl chloride)	8/1/2013	7/31/2014	Certified
EPA 624	Chloroform	8/1/2013	7/31/2014	Certified
EPA 624	cis & trans-1,2-Dichloroethene	8/1/2013	7/31/2014	Certified
EPA 624	cis-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 624	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 624	Dibromomethane (Methylene bromide)	8/1/2013	7/31/2014	Certified
EPA 624	Dichlorodifluoromethane (Freon-12)	8/1/2013	7/31/2014	Certified
EPA 624	Di-isopropylether (DIPE)	8/1/2013	7/31/2014	Certified
EPA 624	Ethylberzene	8/1/2013	7/31/2014	Certified
EPA 624	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2013	7/31/2014	Certified
EPA 624	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 624	m+p-xylene	8/1/2013	7/31/2014	Certified
EPA 624	Methyl bromide (Bromomethane)	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 624	Methyl chloride (Chloromethane)	8/1/2013	7/31/2014	Certified
EPA 624	Methyl tert-butyl ether (MTBE)	8/1/2013	7/31/2014	Certified
EPA 624	Methylene chloride (Dichloromethane)	8/1/2013	7/31/2014	Certified
EPA 624	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 624	n-Propylbenzene	8/1/2013	7/31/2014	Certified
EPA 624	o-Xylene	8/1/2013	7/31/2014	Certified
EPA 624	Styrene	8/1/2013	7/31/2014	Certified
EPA 624	T-amylmethylether (TAME)	8/1/2013	7/31/2014	Certified
EPA 624	tert-Butyl alcohol (TBA)	8/1/2013	7/31/2014	Certified
EPA 624	Tetrachloroethylene (Perchloroethylene)	8/1/2013	7/31/2014	Certified
EPA 624	Toluene	8/1/2013	7/31/2014	Certified
EPA 624	trans-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 624	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 624	Trichloroethene (Trichloroethylene)	8/1/2013	7/31/2014	Certified
EPA 624	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2013	7/31/2014	Certified
EPA 624	Vinyl acetate	8/1/2013	7/31/2014	Certified
EPA 624	Vinyl chloride	8/1/2013	7/31/2014	Certified
EPA 624	Xylene (total)	8/1/2013	7/31/2014	Certified
EPA 625	1,2,4,5-Tetrachlorobenzene	2/27/2014	7/31/2014	Certified
EPA 625	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 625	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 625	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 625	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 625	2,3,4,6-Tetrachlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4,5-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4,6-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4-Dichlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4-Dimethylphenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4-Dinitrophenol	8/1/2013	7/31/2014	Certified
EPA 625	2,4-Dinitrotoluene (2,4-DNT)	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 625	2,6-Dinitrotoluene (2,6-DNT)	8/1/2013	7/31/2014	Certified
EPA 625	2-Chloronaphthalene	8/1/2013	7/31/2014	Certified
EPA 625	2-Chlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2013	7/31/2014	Certified
EPA 625	2-Methylnaphthalene	8/1/2013	7/31/2014	Certified
EPA 625	2-Methylphenol (o-Cresol)	8/1/2013	7/31/2014	Certified
EPA 625	2-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 625	2-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 625	3,3'-Dichlorobenzidine	8/1/2013	7/31/2014	Certified
EPA 625	3-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 625	4-Bromophenyl phenyl ether	8/1/2013	7/31/2014	Certified
EPA 625	4-Chloro-3-methylphenol	8/1/2013	7/31/2014	Certified
EPA 625	4-Chloroaniline	8/1/2013	7/31/2014	Certified
EPA 625	4-Chlorophenyl phenylether	8/1/2013	7/31/2014	Certified
EPA 625	4-Methylphenol (p-Cresol)	8/1/2013	7/31/2014	Certified
EPA 625	4-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 625	4-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 625	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 625	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 625	Aniline	8/1/2013	7/31/2014	Certified
EPA 625	Anthracene	8/1/2013	7/31/2014	Certified
EPA 625	Benzidine	8/1/2013	7/31/2014	Certified
EPA 625	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 625	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 625	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 625	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 625	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 625	Benzoic acid	8/1/2013	7/31/2014	Certified
EPA 625	Benzyl alcohol	8/1/2013	7/31/2014	Certified
EPA 625	bis(2-Chloroethoxy)methane	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 625	bis(2-Chloroethyl) ether	8/1/2013	7/31/2014	Certified
EPA 625	bis(2-Chloroisopropyl) ether	8/1/2013	7/31/2014	Certified
EPA 625	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 625	Butyl benzyl phthalate	8/1/2013	7/31/2014	Certified
EPA 625	Carbazole	8/1/2013	7/31/2014	Certified
EPA 625	Chrysene	8/1/2013	7/31/2014	Certified
EPA 625	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 625	Dibenzofuran	8/1/2013	7/31/2014	Certified
EPA 625	Diethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 625	Dimethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 625	Di-n-butyl phthalate	8/1/2013	7/31/2014	Certified
EPA 625	Di-n-octyl phthalate	8/1/2013	7/31/2014	Certified
EPA 625	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 625	Fluorene	8/1/2013	7/31/2014	Certified
EPA 625	Hexachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 625	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 625	Hexachlorocyclopentadiene	8/1/2013	7/31/2014	Certified
EPA 625	Hexachloroethane	8/1/2013	7/31/2014	Certified
EPA 625	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 625	Isophorone	8/1/2013	7/31/2014	Certified
EPA 625	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 625	Nitrobenzene	8/1/2013	7/31/2014	Certified
EPA 625	n-Nitrosodiethylamine	8/1/2013	7/31/2014	Certified
EPA 625	n-Nitrosodimethylamine	8/1/2013	7/31/2014	Certified
EPA 625	n-Nitrosodi-n-propylamine	8/1/2013	7/31/2014	Certified
EPA 625	n-Nitrosodiphenylamine	8/1/2013	7/31/2014	Certified
EPA 625	Pentachlorophenol	8/1/2013	7/31/2014	Certified
EPA 625	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 625	Phenol	8/1/2013	7/31/2014	Certified
EPA 625	Pyrene	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 625	Pyridine	8/1/2013	7/31/2014	Certified
Organic Nitrogen by Calculation	Organic nitrogen	8/1/2013	7/31/2014	Certified
Organic Nitrogen by Calculation (EPA methods)	Organic nitrogen	8/1/2013	7/31/2014	Certified
Organic Nitrogen by Calculation (SM Methods)	Organic nitrogen	8/1/2013	7/31/2014	Certified
SM 2130 B	Turbidity	8/1/2013	7/31/2014	Certified
SM 2320 B	Alkalinity as CaCO3	8/1/2013	7/31/2014	Certified
SM 2340 B	Calcium hardness as CaCO3	8/1/2013	7/31/2014	Certified
SM 2340 B	Hardness by calculation	8/1/2013	7/31/2014	Certified
SM 2510 B	Conductivity	8/1/2013	7/31/2014	Certified
SM 2540 B	Residue-total	8/1/2013	7/31/2014	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2013	7/31/2014	Certified
SM 2540 D	Residue-nonfilterable (TSS)	8/1/2013	7/31/2014	Certified
SM 2540 F	Residue-settleable	8/1/2013	7/31/2014	Certified
SM 3500-Cr C	Chromium VI	8/1/2013	7/31/2014	Certified
SM 4110 B	Bromide	8/1/2013	7/31/2014	Certified
SM 4110 B	Chloride	8/1/2013	7/31/2014	Certified
SM 4110 B	Fluoride	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrate as N	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrite as N	8/1/2013	7/31/2014	Certified
SM 4110 B	Sulfate	8/1/2013	7/31/2014	Certified
SM 4500-H+ B	pH	8/1/2013	7/31/2014	Certified
SM 4500-NH3 C	Ammonia as N	8/1/2013	7/31/2014	Certified
SM 4500-NH3 C	Kjeldahl nitrogen - total	8/1/2013	7/31/2014	Certified
SM 4500-Norg C	Kjeldahl nitrogen - total	8/1/2013	7/31/2014	Certified
SM 4500-P E	Orthophosphate as P	8/1/2013	7/31/2014	Certified
SM 4500-$S2^{-}$ D	Sulfide	8/1/2013	7/31/2014	Certified
SM 5310 C	Dissolved organic carbon (DOC)	8/1/2013	7/31/2014	Certified
SM 5310 C	Total organic carbon	8/1/2013	7/31/2014	Certified

Disclaimer: A laboratory that is certified or approved has established that they have the ability to implement a quality control program in accordance with the appropriate Federal or State regulations or statutes. It is the certified laboratory's responsibility to provide their client the most current certified parameter list. Contact LCP to verify certification status.

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number: NV009222014-2** **Expiration Date: 7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***Mining (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline Chemistry				
EPA 120.1	Conductivity	8/1/2013	7/31/2014	Certified
EPA 200.7	Aluminum	8/1/2013	7/31/2014	Certified
EPA 200.7	Antimony	8/1/2013	7/31/2014	Certified
EPA 200.7	Arsenic	8/1/2013	7/31/2014	Certified
EPA 200.7	Barium	8/1/2013	7/31/2014	Certified
EPA 200.7	Beryllium	8/1/2013	7/31/2014	Certified
EPA 200.7	Boron	8/1/2013	7/31/2014	Certified
EPA 200.7	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.7	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.7	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.7	Cobalt	8/1/2013	7/31/2014	Certified
EPA 200.7	Copper	8/1/2013	7/31/2014	Certified
EPA 200.7	Iron	8/1/2013	7/31/2014	Certified
EPA 200.7	Lead	8/1/2013	7/31/2014	Certified
EPA 200.7	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.7	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.7	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.7	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.7	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.7	Selenium	8/1/2013	7/31/2014	Certified
EPA 200.7	Silver	8/1/2013	7/31/2014	Certified
EPA 200.7	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.7	Strontium	8/1/2013	7/31/2014	Certified
EPA 200.7	Thallium	8/1/2013	7/31/2014	Certified
EPA 200.7	Tin	8/1/2013	7/31/2014	Certified
EPA 200.7	Titanium	8/1/2013	7/31/2014	Certified
EPA 200.7	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.7	Zinc	8/1/2013	7/31/2014	Certified
EPA 200.8	Aluminum	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***Mining (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 200.8	Antimony	8/1/2013	7/31/2014	Certified
EPA 200.8	Arsenic	8/1/2013	7/31/2014	Certified
EPA 200.8	Barium	8/1/2013	7/31/2014	Certified
EPA 200.8	Beryllium	8/1/2013	7/31/2014	Certified
EPA 200.8	Boron	8/1/2013	7/31/2014	Certified
EPA 200.8	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.8	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.8	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.8	Cobalt	8/1/2013	7/31/2014	Certified
EPA 200.8	Copper	8/1/2013	7/31/2014	Certified
EPA 200.8	Iron	8/1/2013	7/31/2014	Certified
EPA 200.8	Lead	8/1/2013	7/31/2014	Certified
EPA 200.8	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.8	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.8	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.8	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.8	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.8	Selenium	8/1/2013	7/31/2014	Certified
EPA 200.8	Silver	8/1/2013	7/31/2014	Certified
EPA 200.8	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.8	Strontium	8/1/2013	7/31/2014	Certified
EPA 200.8	Thallium	8/1/2013	7/31/2014	Certified
EPA 200.8	Tin	8/1/2013	7/31/2014	Certified
EPA 200.8	Titanium	8/1/2013	7/31/2014	Certified
EPA 200.8	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.8	Zinc	8/1/2013	7/31/2014	Certified
EPA 300.0	Chloride	8/1/2013	7/31/2014	Certified
EPA 300.0	Fluoride	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrate as N	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrate-nitrite	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***Mining (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 300.0	Nitrite as N	8/1/2013	7/31/2014	Certified
EPA 300.0	Sulfate	8/1/2013	7/31/2014	Certified
SM 2320 B	Alkalinity as CaCO3	8/1/2013	7/31/2014	Certified
SM 2510 B	Conductivity	8/1/2013	7/31/2014	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2013	7/31/2014	Certified
SM 4110B	Chloride	8/1/2013	7/31/2014	Certified
SM 4110B	Fluoride	8/1/2013	7/31/2014	Certified
SM 4110B	Nitrate as N	8/1/2013	7/31/2014	Certified
SM 4110B	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
SM 4110B	Nitrite as N	8/1/2013	7/31/2014	Certified
SM 4110B	Sulfate	8/1/2013	7/31/2014	Certified
SM 4500-NH3 C	Ammonia as N	8/1/2013	7/31/2014	Certified
SM 4500-NH3 C	Kjeldahl nitrogen - total	8/1/2013	7/31/2014	Certified
SM 4500-Norg C	Kjeldahl nitrogen - total	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline Chemistry				
EPA 1020	Ignitability	8/1/2013	7/31/2014	Certified
EPA 1311-Metals	TCLP extracted Metals	8/1/2013	7/31/2014	Certified
EPA 1311-SOCs	TCLP extracted SOCs	8/1/2013	7/31/2014	Certified
EPA 1311-VOCs	TCLP extracted VOCs	8/1/2013	7/31/2014	Certified
EPA 1312-Metals	SPLP extracted Metals	8/1/2013	7/31/2014	Certified
EPA 1312-SOCs	SPLP extracted SOCs	8/1/2013	7/31/2014	Certified
EPA 1312-VOCs	SPLP extracted VOCs	8/1/2013	7/31/2014	Certified
EPA 314.0	Perchlorate	8/1/2013	7/31/2014	Certified
EPA 6010	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6010	Antimony	8/1/2013	7/31/2014	Certified
EPA 6010	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6010	Barium	8/1/2013	7/31/2014	Certified
EPA 6010	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6010	Boron	8/1/2013	7/31/2014	Certified
EPA 6010	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6010	Calcium	8/1/2013	7/31/2014	Certified
EPA 6010	Chromium	8/1/2013	7/31/2014	Certified
EPA 6010	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6010	Copper	8/1/2013	7/31/2014	Certified
EPA 6010	Iron	8/1/2013	7/31/2014	Certified
EPA 6010	Lead	8/1/2013	7/31/2014	Certified
EPA 6010	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6010	Manganese	8/1/2013	7/31/2014	Certified
EPA 6010	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6010	Nickel	8/1/2013	7/31/2014	Certified
EPA 6010	Potassium	8/1/2013	7/31/2014	Certified
EPA 6010	Selenium	8/1/2013	7/31/2014	Certified
EPA 6010	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 6010	Silver	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6010	Sodium	8/1/2013	7/31/2014	Certified
EPA 6010	Strontium	8/1/2013	7/31/2014	Certified
EPA 6010	Thallium	8/1/2013	7/31/2014	Certified
EPA 6010	Tin	8/1/2013	7/31/2014	Certified
EPA 6010	Titanium	8/1/2013	7/31/2014	Certified
EPA 6010	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6010	Zinc	8/1/2013	7/31/2014	Certified
EPA 6010B	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6010B	Antimony	8/1/2013	7/31/2014	Certified
EPA 6010B	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6010B	Barium	8/1/2013	7/31/2014	Certified
EPA 6010B	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6010B	Boron	8/1/2013	7/31/2014	Certified
EPA 6010B	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6010B	Calcium	8/1/2013	7/31/2014	Certified
EPA 6010B	Chromium	8/1/2013	7/31/2014	Certified
EPA 6010B	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6010B	Copper	8/1/2013	7/31/2014	Certified
EPA 6010B	Iron	8/1/2013	7/31/2014	Certified
EPA 6010B	Lead	8/1/2013	7/31/2014	Certified
EPA 6010B	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6010B	Manganese	8/1/2013	7/31/2014	Certified
EPA 6010B	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6010B	Nickel	8/1/2013	7/31/2014	Certified
EPA 6010B	Potassium	8/1/2013	7/31/2014	Certified
EPA 6010B	Selenium	8/1/2013	7/31/2014	Certified
EPA 6010B	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 6010B	Silver	8/1/2013	7/31/2014	Certified
EPA 6010B	Sodium	8/1/2013	7/31/2014	Certified
EPA 6010B	Strontium	8/1/2013	7/31/2014	Certified

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State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6010B	Thallium	8/1/2013	7/31/2014	Certified
EPA 6010B	Tin	8/1/2013	7/31/2014	Certified
EPA 6010B	Titanium	8/1/2013	7/31/2014	Certified
EPA 6010B	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6010B	Zinc	8/1/2013	7/31/2014	Certified
EPA 6020	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6020	Antimony	8/1/2013	7/31/2014	Certified
EPA 6020	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6020	Barium	8/1/2013	7/31/2014	Certified
EPA 6020	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6020	Boron	8/1/2013	7/31/2014	Certified
EPA 6020	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6020	Calcium	8/1/2013	7/31/2014	Certified
EPA 6020	Chromium	8/1/2013	7/31/2014	Certified
EPA 6020	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6020	Copper	8/1/2013	7/31/2014	Certified
EPA 6020	Iron	8/1/2013	7/31/2014	Certified
EPA 6020	Lead	8/1/2013	7/31/2014	Certified
EPA 6020	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6020	Manganese	8/1/2013	7/31/2014	Certified
EPA 6020	Mercury	8/1/2013	7/31/2014	Certified
EPA 6020	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6020	Nickel	8/1/2013	7/31/2014	Certified
EPA 6020	Potassium	8/1/2013	7/31/2014	Certified
EPA 6020	Selenium	8/1/2013	7/31/2014	Certified
EPA 6020	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 6020	Silver	8/1/2013	7/31/2014	Certified
EPA 6020	Sodium	8/1/2013	7/31/2014	Certified
EPA 6020	Strontium	8/1/2013	7/31/2014	Certified
EPA 6020	Thallium	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6020	Tin	8/1/2013	7/31/2014	Certified
EPA 6020	Titanium	8/1/2013	7/31/2014	Certified
EPA 6020	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6020	Zinc	8/1/2013	7/31/2014	Certified
EPA 6020A	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6020A	Antimony	8/1/2013	7/31/2014	Certified
EPA 6020A	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6020A	Barium	8/1/2013	7/31/2014	Certified
EPA 6020A	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6020A	Boron	8/1/2013	7/31/2014	Certified
EPA 6020A	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6020A	Calcium	8/1/2013	7/31/2014	Certified
EPA 6020A	Chromium	8/1/2013	7/31/2014	Certified
EPA 6020A	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6020A	Copper	8/1/2013	7/31/2014	Certified
EPA 6020A	Iron	8/1/2013	7/31/2014	Certified
EPA 6020A	Lead	8/1/2013	7/31/2014	Certified
EPA 6020A	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6020A	Manganese	8/1/2013	7/31/2014	Certified
EPA 6020A	Mercury	8/1/2013	7/31/2014	Certified
EPA 6020A	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6020A	Nickel	8/1/2013	7/31/2014	Certified
EPA 6020A	Potassium	8/1/2013	7/31/2014	Certified
EPA 6020A	Selenium	8/1/2013	7/31/2014	Certified
EPA 6020A	Silver	8/1/2013	7/31/2014	Certified
EPA 6020A	Sodium	8/1/2013	7/31/2014	Certified
EPA 6020A	Strontium	8/1/2013	7/31/2014	Certified
EPA 6020A	Thallium	8/1/2013	7/31/2014	Certified
EPA 6020A	Tin	8/1/2013	7/31/2014	Certified
EPA 6020A	Titanium	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6020A	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6020A	Zinc	8/1/2013	7/31/2014	Certified
EPA 7196	Chromium VI	8/1/2013	7/31/2014	Certified
EPA 7199	Chromium VI	8/1/2013	7/31/2014	Certified
EPA 7470	Mercury	8/1/2013	7/31/2014	Certified
EPA 8015	Diesel range organics (DRO)	8/1/2013	7/31/2014	Certified
EPA 8015B	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8015B	Residual Range Organics (RRO) - Oil Range Organics	8/1/2013	7/31/2014	Certified
EPA 8015C	Diesel range organics (DRO)	2/27/2014	7/31/2014	Certified
EPA 8015C	Diesel range organics (DRO)	2/27/2014	7/31/2014	Certified
EPA 8015C	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8015C	Residual Range Organics (RRO) - Oil Range Organics	8/1/2013	7/31/2014	Certified
EPA 8015M	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDD	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDE	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDT	8/1/2013	7/31/2014	Certified
EPA 8081A	Aldrin	8/1/2013	7/31/2014	Certified
EPA 8081A	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 8081A	alpha-Chlordane	8/1/2013	7/31/2014	Certified
EPA 8081A	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 8081A	Chlordane (tech.)	8/1/2013	7/31/2014	Certified
EPA 8081A	Chlordane, total	8/1/2013	7/31/2014	Certified
EPA 8081A	delta-BHC	8/1/2013	7/31/2014	Certified
EPA 8081A	Dieldrin	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan I	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan II	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan sulfate	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin aldehyde	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin ketone	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8081A	gamma-BHC (Lindane)	8/1/2013	7/31/2014	Certified
EPA 8081A	gamma-Chlordane	8/1/2013	7/31/2014	Certified
EPA 8081A	Heptachlor	8/1/2013	7/31/2014	Certified
EPA 8081A	Heptachlor epoxide	8/1/2013	7/31/2014	Certified
EPA 8081A	Methoxychlor	8/1/2013	7/31/2014	Certified
EPA 8081A	Toxaphene (Chlorinated camphene)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1016 (PCB-1016)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1016 in Oil (PCB-1016 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1221 (PCB-1221)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1232 (PCB-1232)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1242 (PCB-1242)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1242 in Oil (PCB-1242 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1248 (PCB-1248)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1254 (PCB-1254)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1254 in Oil (PCB-1254 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1260 (PCB-1260)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1260 in Oil (PCB-1260 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1262 (PCB-1262)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1268 (PCB-1268)	8/1/2013	7/31/2014	Certified
EPA 8082	PCBs in Oil	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1016 (PCB-1016)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1221 (PCB-1221)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1232 (PCB-1232)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1242 (PCB-1242)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1248 (PCB-1248)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1254 (PCB-1254)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1260 (PCB-1260)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1262 (PCB-1262)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1268 (PCB-1268)	8/1/2013	7/31/2014	Certified
EPA 8082A	PCBs in Oil	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	1,1,1,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,1-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	1,1-Dichloropropene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,3-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,3-Trichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,4-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,3,5-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,3-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,4-Dioxane (1,4- Diethyleneoxide)	8/1/2013	7/31/2014	Certified
EPA 8260	2,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2013	7/31/2014	Certified
EPA 8260	2-Chloroethyl vinyl ether	8/1/2013	7/31/2014	Certified
EPA 8260	2-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260	2-Hexanone	8/1/2013	7/31/2014	Certified
EPA 8260	4-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260	4-Isopropyltoluene (p-Cymene)	8/1/2013	7/31/2014	Certified
EPA 8260	4-Methyl-2-pentanone (MIBK)	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Acetone	8/1/2013	7/31/2014	Certified
EPA 8260	Acetonitrile	8/1/2013	7/31/2014	Certified
EPA 8260	Acrolein (Propenal)	8/1/2013	7/31/2014	Certified
EPA 8260	Acrylonitrile	8/1/2013	7/31/2014	Certified
EPA 8260	Allyl chloride (3-Chloropropene)	8/1/2013	7/31/2014	Certified
EPA 8260	Benzene	8/1/2013	7/31/2014	Certified
EPA 8260	Bromobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Bromochloromethane	8/1/2013	7/31/2014	Certified
EPA 8260	Bromodichloromethane	8/1/2013	7/31/2014	Certified
EPA 8260	Bromoform	8/1/2013	7/31/2014	Certified
EPA 8260	Carbon disulfide	8/1/2013	7/31/2014	Certified
EPA 8260	Carbon tetrachloride	8/1/2013	7/31/2014	Certified
EPA 8260	Chlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Chlorodibromomethane (Dibromochloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Chloroethane (Ethyl chloride)	8/1/2013	7/31/2014	Certified
EPA 8260	Chloroform	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified
EPA 8260	Cyclohexanone	8/1/2013	7/31/2014	Certified
EPA 8260	Dibromomethane (Methylene bromide)	8/1/2013	7/31/2014	Certified
EPA 8260	Dichlorodifluoromethane (Freon-12)	8/1/2013	7/31/2014	Certified
EPA 8260	Diethyl ether	8/1/2013	7/31/2014	Certified
EPA 8260	Di-isopropylether (DIPE)	8/1/2013	7/31/2014	Certified
EPA 8260	Ethyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260	Ethyl methacrylate	8/1/2013	7/31/2014	Certified
EPA 8260	Ethylberzene	8/1/2013	7/31/2014	Certified
EPA 8260	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2013	7/31/2014	Certified
EPA 8260	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8260	Iodomethane (Methyl iodide)	8/1/2013	7/31/2014	Certified

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EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Isobutyl alcohol (2-Methyl-1-propanol, Isobutanol)	8/1/2013	7/31/2014	Certified
EPA 8260	Isopropylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	m+p-xylene	8/1/2013	7/31/2014	Certified
EPA 8260	Methacrylonitrile	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl bromide (Bromomethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl chloride (Chloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl methacrylate	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl tert-butyl ether (MTBE)	8/1/2013	7/31/2014	Certified
EPA 8260	Methylene chloride (Dichloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8260	n-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	n-Propylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	o-Xylene	8/1/2013	7/31/2014	Certified
EPA 8260	Propionitrile (Ethyl cyanide)	8/1/2013	7/31/2014	Certified
EPA 8260	sec-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Styrene	8/1/2013	7/31/2014	Certified
EPA 8260	T-amylmethylether (TAME)	8/1/2013	7/31/2014	Certified
EPA 8260	tert-Butyl alcohol (TBA)	8/1/2013	7/31/2014	Certified
EPA 8260	tert-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Tetrachloroethylene (Perchloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260	Toluene	8/1/2013	7/31/2014	Certified
EPA 8260	trans-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260	trans-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified
EPA 8260	Trichloroethene (Trichloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2013	7/31/2014	Certified
EPA 8260	Vinyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260	Vinyl chloride	8/1/2013	7/31/2014	Certified
EPA 8260	Xylene (total)	8/1/2013	7/31/2014	Certified
EPA 8260B	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260C	1,1,1,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,1-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloropropene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,3-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,3-Trichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,4-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3,5-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,4-Dioxane (1,4- Diethyleneoxide)	8/1/2013	7/31/2014	Certified
EPA 8260C	2,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Chloroethyl vinyl ether	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Hexanone	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Isopropyltoluene (p-Cymene)	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Methyl-2-pentanone (MIBK)	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260C	Acetone	8/1/2013	7/31/2014	Certified
EPA 8260C	Acetonitrile	8/1/2013	7/31/2014	Certified
EPA 8260C	Acrolein (Propenal)	8/1/2013	7/31/2014	Certified
EPA 8260C	Acrylonitrile	8/1/2013	7/31/2014	Certified
EPA 8260C	Allyl chloride (3-Chloropropene)	8/1/2013	7/31/2014	Certified
EPA 8260C	Benzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromochloromethane	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromodichloromethane	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromoform	8/1/2013	7/31/2014	Certified
EPA 8260C	Carbon disulfide	8/1/2013	7/31/2014	Certified
EPA 8260C	Carbon tetrachloride	8/1/2013	7/31/2014	Certified
EPA 8260C	Chlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Chlorodibromomethane (Dibromochloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	Chloroethane (Ethyl chloride)	8/1/2013	7/31/2014	Certified
EPA 8260C	Chloroform	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified
EPA 8260C	Dibromomethane (Methylene bromide)	8/1/2013	7/31/2014	Certified
EPA 8260C	Dichlorodifluoromethane (Freon-12)	8/1/2013	7/31/2014	Certified
EPA 8260C	Diethyl ether	8/1/2013	7/31/2014	Certified
EPA 8260C	Di-isopropylether (DIPE)	8/1/2013	7/31/2014	Certified
EPA 8260C	Ethyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260C	Ethyl methacrylate	8/1/2013	7/31/2014	Certified
EPA 8260C	Ethylberzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8260C	Iodomethane (Methyl iodide)	8/1/2013	7/31/2014	Certified
EPA 8260C	Isobutyl alcohol (2-Methyl-1-propanol, Isobutanol)	8/1/2013	7/31/2014	Certified
EPA 8260C	Isopropylbenzene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260C	m+p-xylene	8/1/2013	7/31/2014	Certified
EPA 8260C	Methacrylonitrile	8/1/2013	7/31/2014	Certified
EPA 8260C	Methyl bromide (Bromomethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	Methyl chloride (Chloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	Methyl methacrylate	8/1/2013	7/31/2014	Certified
EPA 8260C	Methyl tert-butyl ether (MTBE)	8/1/2013	7/31/2014	Certified
EPA 8260C	Methylene chloride (Dichloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8260C	n-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	n-Propylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	o-Xylene	8/1/2013	7/31/2014	Certified
EPA 8260C	Propionitrile (Ethyl cyanide)	8/1/2013	7/31/2014	Certified
EPA 8260C	sec-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Styrene	8/1/2013	7/31/2014	Certified
EPA 8260C	T-amylmethylether (TAME)	8/1/2013	7/31/2014	Certified
EPA 8260C	tert-Butyl alcohol (TBA)	8/1/2013	7/31/2014	Certified
EPA 8260C	tert-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Tetrachloroethylene (Perchloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	Toluene	8/1/2013	7/31/2014	Certified
EPA 8260C	trans-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	trans-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified
EPA 8260C	Trichloroethene (Trichloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2013	7/31/2014	Certified
EPA 8260C	Vinyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260C	Vinyl chloride	8/1/2013	7/31/2014	Certified
EPA 8260C	Xylene (total)	8/1/2013	7/31/2014	Certified
EPA 8270	1,1'-Biphenyl (BZ-0)	8/1/2013	7/31/2014	Certified
EPA 8270	1,2,4,5-Tetrachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,2-Diphenylhydrazine	8/1/2013	7/31/2014	Certified
EPA 8270	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,4-Dioxane (1,4- Diethyleneoxide)	8/1/2013	7/31/2014	Certified
EPA 8270	2,3,4,6-Tetrachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4,5-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4,6-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dimethylphenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dinitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dinitrotoluene (2,4-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270	2,6-Dinitrotoluene (2,6-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Chloronaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	2-Chlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methylnaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methylphenol (o-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	2-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	3,3'-Dichlorobenzidine	8/1/2013	7/31/2014	Certified
EPA 8270	3-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Bromophenyl phenyl ether	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chloro-3-methylphenol	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chloroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chlorophenyl phenylether	8/1/2013	7/31/2014	Certified
EPA 8270	4-Methylphenol (p-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270	4-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	Acenaphthene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270	Acetophenone	8/1/2013	7/31/2014	Certified
EPA 8270	Aniline	8/1/2013	7/31/2014	Certified
EPA 8270	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Atrazine	8/1/2013	7/31/2014	Certified
EPA 8270	Benzaldehyde	8/1/2013	7/31/2014	Certified
EPA 8270	Benzidine	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzoic acid	8/1/2013	7/31/2014	Certified
EPA 8270	Benzyl alcohol	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroethoxy)methane	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroethyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroisopropyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270	Butyl benzyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Caprolactam	8/1/2013	7/31/2014	Certified
EPA 8270	Carbazole	8/1/2013	7/31/2014	Certified
EPA 8270	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Dibenzofuran	8/1/2013	7/31/2014	Certified
EPA 8270	Diethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Dimethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Di-n-butyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Di-n-octyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Fluorene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	Hexachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachlorocyclopentadiene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachloroethane	8/1/2013	7/31/2014	Certified
EPA 8270	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Isophorone	8/1/2013	7/31/2014	Certified
EPA 8270	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	Nitrobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodiethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodimethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodi-n-propylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodiphenylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosomethylethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	Pentachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270	Phenol	8/1/2013	7/31/2014	Certified
EPA 8270	Pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Pyridine	8/1/2013	7/31/2014	Certified
EPA 8270C	1,1'-Biphenyl (BZ-0)	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2,4,5-Tetrachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2-Diphenylhydrazine	8/1/2013	7/31/2014	Certified
EPA 8270C	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,4-Dioxane (1,4- Diethyleneoxide)	8/1/2013	7/31/2014	Certified
EPA 8270C	2,3,4,6-Tetrachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4,5-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4,6-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dichlorophenol	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	2,4-Dimethylphenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dinitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dinitrotoluene (2,4-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270C	2,6-Dinitrotoluene (2,6-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Chloronaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Chlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methylnaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methylphenol (o-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	3,3'-Dichlorobenzidine	8/1/2013	7/31/2014	Certified
EPA 8270C	3-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Bromophenyl phenyl ether	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chloro-3-methylphenol	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chloroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chlorophenyl phenylether	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Methylphenol (p-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270C	Acetophenone	8/1/2013	7/31/2014	Certified
EPA 8270C	Aniline	8/1/2013	7/31/2014	Certified
EPA 8270C	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Atrazine	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzaldehyde	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzidine	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzoic acid	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzyl alcohol	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroethoxy)methane	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroethyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroisopropyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270C	Butyl benzyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Caprolactam	8/1/2013	7/31/2014	Certified
EPA 8270C	Carbazole	8/1/2013	7/31/2014	Certified
EPA 8270C	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270C	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Dibenzofuran	8/1/2013	7/31/2014	Certified
EPA 8270C	Diethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Dimethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Di-n-butyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Di-n-octyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Fluorene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorocyclopentadiene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachloroethane	8/1/2013	7/31/2014	Certified
EPA 8270C	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Isophorone	8/1/2013	7/31/2014	Certified
EPA 8270C	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	Nitrobenzene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	n-Nitrosodiethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodimethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodi-n-propylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodiphenylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosomethylethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	Pentachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Phenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Pyridine	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Fluorene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Pyrene	8/1/2013	7/31/2014	Certified
EPA 9050A	Conductivity	8/1/2013	7/31/2014	Certified
EPA 9056	Bromide	8/1/2013	7/31/2014	Certified
EPA 9056	Chloride	8/1/2013	7/31/2014	Certified
EPA 9056	Fluoride	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: *NV00922* **Attachment to Certificate Number: NV009222014-2** **Expiration Date: 7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: *RCRA (Non Potable Water)*

Method	Analyte	Start Date	Date Expires	Status
EPA 9056	Nitrate as N	8/1/2013	7/31/2014	Certified
EPA 9056	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
EPA 9056	Nitrite as N	8/1/2013	7/31/2014	Certified
EPA 9056	Orthophosphate as P	8/1/2013	7/31/2014	Certified
EPA 9056	Sulfate	8/1/2013	7/31/2014	Certified
EPA 9060A	Total organic carbon	2/27/2014	7/31/2014	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2013	7/31/2014	Certified
SM 2540 G	Residue-total	8/1/2013	7/31/2014	Certified
SM 4500-$S2^-$ D	Sulfide	8/1/2013	7/31/2014	Certified
SM 4500-$S2^-$ D [20th]	Sulfide	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
Discipline Chemistry				
EPA 1020	Ignitability	8/1/2013	7/31/2014	Certified
EPA 1020A	Ignitability	8/1/2013	7/31/2014	Certified
EPA 1311-Metals	TCLP extracted Metals	8/1/2013	7/31/2014	Certified
EPA 1311-Pest	TCLP extracted Pesticides	8/1/2013	7/31/2014	Certified
EPA 1311-SOCs	TCLP extracted SOCs	8/1/2013	7/31/2014	Certified
EPA 1311-VOCs	TCLP extracted VOCs	8/1/2013	7/31/2014	Certified
EPA 1312-Metals	SPLP extracted Metals	8/1/2013	7/31/2014	Certified
EPA 1312-SOCs	SPLP extracted SOCs	8/1/2013	7/31/2014	Certified
EPA 1312-VOCs	SPLP extracted VOCs	8/1/2013	7/31/2014	Certified
EPA 314.0M	Perchlorate	8/1/2013	7/31/2014	Certified
EPA 6010	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6010	Antimony	8/1/2013	7/31/2014	Certified
EPA 6010	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6010	Barium	8/1/2013	7/31/2014	Certified
EPA 6010	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6010	Boron	8/1/2013	7/31/2014	Certified
EPA 6010	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6010	Calcium	8/1/2013	7/31/2014	Certified
EPA 6010	Chromium	8/1/2013	7/31/2014	Certified
EPA 6010	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6010	Copper	8/1/2013	7/31/2014	Certified
EPA 6010	Iron	8/1/2013	7/31/2014	Certified
EPA 6010	Lead	8/1/2013	7/31/2014	Certified
EPA 6010	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6010	Manganese	8/1/2013	7/31/2014	Certified
EPA 6010	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6010	Nickel	8/1/2013	7/31/2014	Certified
EPA 6010	Potassium	8/1/2013	7/31/2014	Certified
EPA 6010	Selenium	8/1/2013	7/31/2014	Certified

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EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6010	Silver	8/1/2013	7/31/2014	Certified
EPA 6010	Sodium	8/1/2013	7/31/2014	Certified
EPA 6010	Strontium	8/1/2013	7/31/2014	Certified
EPA 6010	Thallium	8/1/2013	7/31/2014	Certified
EPA 6010	Tin	8/1/2013	7/31/2014	Certified
EPA 6010	Titanium	8/1/2013	7/31/2014	Certified
EPA 6010	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6010	Zinc	8/1/2013	7/31/2014	Certified
EPA 6010B	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6010B	Antimony	8/1/2013	7/31/2014	Certified
EPA 6010B	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6010B	Barium	8/1/2013	7/31/2014	Certified
EPA 6010B	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6010B	Boron	8/1/2013	7/31/2014	Certified
EPA 6010B	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6010B	Calcium	8/1/2013	7/31/2014	Certified
EPA 6010B	Chromium	8/1/2013	7/31/2014	Certified
EPA 6010B	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6010B	Copper	8/1/2013	7/31/2014	Certified
EPA 6010B	Iron	8/1/2013	7/31/2014	Certified
EPA 6010B	Lead	8/1/2013	7/31/2014	Certified
EPA 6010B	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6010B	Manganese	8/1/2013	7/31/2014	Certified
EPA 6010B	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6010B	Nickel	8/1/2013	7/31/2014	Certified
EPA 6010B	Potassium	8/1/2013	7/31/2014	Certified
EPA 6010B	Selenium	8/1/2013	7/31/2014	Certified
EPA 6010B	Silver	8/1/2013	7/31/2014	Certified
EPA 6010B	Sodium	8/1/2013	7/31/2014	Certified
EPA 6010B	Strontium	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6010B	Thallium	8/1/2013	7/31/2014	Certified
EPA 6010B	Tin	8/1/2013	7/31/2014	Certified
EPA 6010B	Titanium	8/1/2013	7/31/2014	Certified
EPA 6010B	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6010B	Zinc	8/1/2013	7/31/2014	Certified
EPA 6020	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6020	Antimony	8/1/2013	7/31/2014	Certified
EPA 6020	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6020	Barium	8/1/2013	7/31/2014	Certified
EPA 6020	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6020	Boron	8/1/2013	7/31/2014	Certified
EPA 6020	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6020	Calcium	8/1/2013	7/31/2014	Certified
EPA 6020	Chromium	8/1/2013	7/31/2014	Certified
EPA 6020	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6020	Copper	8/1/2013	7/31/2014	Certified
EPA 6020	Iron	8/1/2013	7/31/2014	Certified
EPA 6020	Lead	8/1/2013	7/31/2014	Certified
EPA 6020	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6020	Manganese	8/1/2013	7/31/2014	Certified
EPA 6020	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6020	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 6020	Nickel	8/1/2013	7/31/2014	Certified
EPA 6020	Potassium	8/1/2013	7/31/2014	Certified
EPA 6020	Selenium	8/1/2013	7/31/2014	Certified
EPA 6020	Silver	8/1/2013	7/31/2014	Certified
EPA 6020	Sodium	8/1/2013	7/31/2014	Certified
EPA 6020	Strontium	8/1/2013	7/31/2014	Certified
EPA 6020	Thallium	8/1/2013	7/31/2014	Certified
EPA 6020	Tin	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6020	Titanium	8/1/2013	7/31/2014	Certified
EPA 6020	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6020	Zinc	8/1/2013	7/31/2014	Certified
EPA 6020A	Aluminum	8/1/2013	7/31/2014	Certified
EPA 6020A	Antimony	8/1/2013	7/31/2014	Certified
EPA 6020A	Arsenic	8/1/2013	7/31/2014	Certified
EPA 6020A	Barium	8/1/2013	7/31/2014	Certified
EPA 6020A	Beryllium	8/1/2013	7/31/2014	Certified
EPA 6020A	Boron	8/1/2013	7/31/2014	Certified
EPA 6020A	Cadmium	8/1/2013	7/31/2014	Certified
EPA 6020A	Calcium	8/1/2013	7/31/2014	Certified
EPA 6020A	Chromium	8/1/2013	7/31/2014	Certified
EPA 6020A	Cobalt	8/1/2013	7/31/2014	Certified
EPA 6020A	Copper	8/1/2013	7/31/2014	Certified
EPA 6020A	Iron	8/1/2013	7/31/2014	Certified
EPA 6020A	Lead	8/1/2013	7/31/2014	Certified
EPA 6020A	Magnesium	8/1/2013	7/31/2014	Certified
EPA 6020A	Manganese	8/1/2013	7/31/2014	Certified
EPA 6020A	Nickel	8/1/2013	7/31/2014	Certified
EPA 6020A	Potassium	8/1/2013	7/31/2014	Certified
EPA 6020A	Selenium	8/1/2013	7/31/2014	Certified
EPA 6020A	Silver	8/1/2013	7/31/2014	Certified
EPA 6020A	Sodium	8/1/2013	7/31/2014	Certified
EPA 6020A	Strontium	8/1/2013	7/31/2014	Certified
EPA 6020A	Thallium	8/1/2013	7/31/2014	Certified
EPA 6020A	Tin	8/1/2013	7/31/2014	Certified
EPA 6020A	Titanium	8/1/2013	7/31/2014	Certified
EPA 6020A	Vanadium	8/1/2013	7/31/2014	Certified
EPA 6020A	Zinc	8/1/2013	7/31/2014	Certified
EPA 7196	Chromium VI	8/1/2013	7/31/2014	Certified

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EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 7199	Chromium VI	8/1/2013	7/31/2014	Certified
EPA 7471	Mercury	8/1/2013	7/31/2014	Certified
EPA 8015	Diesel range organics (DRO)	8/1/2013	7/31/2014	Certified
EPA 8015B	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8015B	Residual Range Organics (RRO) - Oil Range Organics	8/1/2013	7/31/2014	Certified
EPA 8015C	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8015C	Residual Range Organics (RRO) - Oil Range Organics	8/1/2013	7/31/2014	Certified
EPA 8015M	Gasoline range organics (GRO)	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDD	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDE	8/1/2013	7/31/2014	Certified
EPA 8081A	4,4'-DDT	8/1/2013	7/31/2014	Certified
EPA 8081A	Aldrin	8/1/2013	7/31/2014	Certified
EPA 8081A	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 8081A	alpha-Chlordane	8/1/2013	7/31/2014	Certified
EPA 8081A	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2013	7/31/2014	Certified
EPA 8081A	Chlordane (tech.)	8/1/2013	7/31/2014	Certified
EPA 8081A	Chlordane, total	8/1/2013	7/31/2014	Certified
EPA 8081A	delta-BHC	8/1/2013	7/31/2014	Certified
EPA 8081A	Dieldrin	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan I	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan II	8/1/2013	7/31/2014	Certified
EPA 8081A	Endosulfan sulfate	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin aldehyde	8/1/2013	7/31/2014	Certified
EPA 8081A	Endrin ketone	8/1/2013	7/31/2014	Certified
EPA 8081A	gamma-BHC (Lindane)	8/1/2013	7/31/2014	Certified
EPA 8081A	gamma-Chlordane	8/1/2013	7/31/2014	Certified
EPA 8081A	Heptachlor	8/1/2013	7/31/2014	Certified
EPA 8081A	Heptachlor epoxide	8/1/2013	7/31/2014	Certified
EPA 8081A	Methoxychlor	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8081A	Toxaphene (Chlorinated camphene)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1016 (PCB-1016)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1016 in Oil (PCB-1016 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1221 (PCB-1221)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1232 (PCB-1232)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1242 (PCB-1242)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1242 in Oil (PCB-1242 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1248 (PCB-1248)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1254 (PCB-1254)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1254 in Oil (PCB-1254 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1260 (PCB-1260)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1260 in Oil (PCB-1260 in Oil)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1262 (PCB-1262)	8/1/2013	7/31/2014	Certified
EPA 8082	Aroclor-1268 (PCB-1268)	8/1/2013	7/31/2014	Certified
EPA 8082	PCBs in Oil	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1016 (PCB-1016)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1221 (PCB-1221)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1232 (PCB-1232)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1242 (PCB-1242)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1248 (PCB-1248)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1254 (PCB-1254)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1260 (PCB-1260)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1262 (PCB-1262)	8/1/2013	7/31/2014	Certified
EPA 8082A	Aroclor-1268 (PCB-1268)	8/1/2013	7/31/2014	Certified
EPA 8082A	PCBs in Oil	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,1,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,1-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2013	7/31/2014	Certified
EPA 8260	1,1,2-Trichloroethane	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	1,1-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,1-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	1,1-Dichloropropene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,3-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,3-Trichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2,4-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260	1,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,3,5-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	1,3-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	2,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2013	7/31/2014	Certified
EPA 8260	2-Chloroethyl vinyl ether	8/1/2013	7/31/2014	Certified
EPA 8260	2-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260	2-Hexanone	8/1/2013	7/31/2014	Certified
EPA 8260	4-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260	4-Isopropyltoluene (p-Cymene)	8/1/2013	7/31/2014	Certified
EPA 8260	4-Methyl-2-pentanone (MIBK)	8/1/2013	7/31/2014	Certified
EPA 8260	Acetone	8/1/2013	7/31/2014	Certified
EPA 8260	Acrolein (Propenal)	8/1/2013	7/31/2014	Certified
EPA 8260	Benzene	8/1/2013	7/31/2014	Certified
EPA 8260	Bromobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Bromochloromethane	8/1/2013	7/31/2014	Certified
EPA 8260	Bromodichloromethane	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Bromoform	8/1/2013	7/31/2014	Certified
EPA 8260	Carbon disulfide	8/1/2013	7/31/2014	Certified
EPA 8260	Carbon tetrachloride	8/1/2013	7/31/2014	Certified
EPA 8260	Chlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Chlorodibromomethane (Dibromochloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Chloroethane (Ethyl chloride)	8/1/2013	7/31/2014	Certified
EPA 8260	Chloroform	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260	cis-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified
EPA 8260	Cyclohexanone	8/1/2013	7/31/2014	Certified
EPA 8260	Dibromomethane (Methylene bromide)	8/1/2013	7/31/2014	Certified
EPA 8260	Dichlorodifluoromethane (Freon-12)	8/1/2013	7/31/2014	Certified
EPA 8260	Diethyl ether	8/1/2013	7/31/2014	Certified
EPA 8260	Di-isopropylether (DIPE)	8/1/2013	7/31/2014	Certified
EPA 8260	Ethyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260	Ethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2013	7/31/2014	Certified
EPA 8260	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8260	Iodomethane (Methyl iodide)	8/1/2013	7/31/2014	Certified
EPA 8260	Isopropylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	m+p-xylene	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl bromide (Bromomethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl chloride (Chloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Methyl tert-butyl ether (MTBE)	8/1/2013	7/31/2014	Certified
EPA 8260	Methylene chloride (Dichloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8260	n-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	n-Propylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	o-Xylene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	sec-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Styrene	8/1/2013	7/31/2014	Certified
EPA 8260	T-amylmethylether (TAME)	8/1/2013	7/31/2014	Certified
EPA 8260	tert-Butyl alcohol (TBA)	8/1/2013	7/31/2014	Certified
EPA 8260	tert-Butylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260	Tetrachloroethylene (Perchloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260	Toluene	8/1/2013	7/31/2014	Certified
EPA 8260	trans-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260	Trichloroethene (Trichloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2013	7/31/2014	Certified
EPA 8260	Vinyl acetate	8/1/2013	7/31/2014	Certified
EPA 8260	Vinyl chloride	8/1/2013	7/31/2014	Certified
EPA 8260	Xylene (total)	8/1/2013	7/31/2014	Certified
EPA 8260B	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,1,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,1-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2,2-Tetrachloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1,2-Trichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,1-Dichloropropene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,3-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,3-Trichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2,4-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260C	1,2-Dichloroethane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3,5-Trimethylbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	1,3-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	2,2-Dichloropropane	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Chloroethyl vinyl ether	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260C	2-Hexanone	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Chlorotoluene	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Isopropyltoluene (p-Cymene)	8/1/2013	7/31/2014	Certified
EPA 8260C	4-Methyl-2-pentanone (MIBK)	8/1/2013	7/31/2014	Certified
EPA 8260C	Acetone	8/1/2013	7/31/2014	Certified
EPA 8260C	Acrolein (Propenal)	8/1/2013	7/31/2014	Certified
EPA 8260C	Benzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromochloromethane	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromodichloromethane	8/1/2013	7/31/2014	Certified
EPA 8260C	Bromoform	8/1/2013	7/31/2014	Certified
EPA 8260C	Carbon disulfide	8/1/2013	7/31/2014	Certified
EPA 8260C	Carbon tetrachloride	8/1/2013	7/31/2014	Certified
EPA 8260C	Chlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	Chlorodibromomethane (Dibromochloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	Chloroethane (Ethyl chloride)	8/1/2013	7/31/2014	Certified
EPA 8260C	Chloroform	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,2-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	cis-1,4-Dichloro-2-butene	8/1/2013	7/31/2014	Certified

Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV0(***

Asset Laboratories

3151-3153 W. Post F

ıment to Certificate Number: **NV009222014-2** **Expiration Date:** **7/31/2014**

Matrix: ***RCRA (Solid***

Method	e	Start Date	Date Expires	Status
EPA 8260C	methane (Methylene bromide)	8/1/2013	7/31/2014	Certified
EPA 8260C	difluoromethane (Freon-12)	8/1/2013	7/31/2014	Certified
EPA 8260C	ther	8/1/2013	7/31/2014	Certified
EPA 8260C	opylether (DIPE)	8/1/2013	7/31/2014	Certified
EPA 8260C	etate	8/1/2013	7/31/2014	Certified
EPA 8260C	nzene	8/1/2013	7/31/2014	Certified
EPA 8260C	robutadiene	8/1/2013	7/31/2014	Certified
EPA 8260C	hane (Methyl iodide)	8/1/2013	7/31/2014	Certified
EPA 8260C	lbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	ene	8/1/2013	7/31/2014	Certified
EPA 8260C	romide (Bromomethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	hloride (Chloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	rt-butyl ether (MTBE)	8/1/2013	7/31/2014	Certified
EPA 8260C	e chloride (Dichloromethane)	8/1/2013	7/31/2014	Certified
EPA 8260C	lene	8/1/2013	7/31/2014	Certified
EPA 8260C	enzene	8/1/2013	7/31/2014	Certified
EPA 8260C	benzene	8/1/2013	7/31/2014	Certified
EPA 8260C		8/1/2013	7/31/2014	Certified
EPA 8260C	lbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C		8/1/2013	7/31/2014	Certified
EPA 8260C	ethylether (TAME)	8/1/2013	7/31/2014	Certified
EPA 8260C	l alcohol (TBA)	8/1/2013	7/31/2014	Certified
EPA 8260C	lbenzene	8/1/2013	7/31/2014	Certified
EPA 8260C	roethylene (Perchloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260C		8/1/2013	7/31/2014	Certified
EPA 8260C	-Dichloroethylene	8/1/2013	7/31/2014	Certified
EPA 8260C	-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	ethene (Trichloroethylene)	8/1/2013	7/31/2014	Certified
EPA 8260C	fluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2013	7/31/2014	Certified
EPA 8260C	etate	8/1/2013	7/31/2014	Certified

Disclaimer: A laboratory th **ablished that they have the ability to implement a quality control program in accordance with the appropriate Federal or State regulations or statut** **sponsibility to provide their client the most current certified parameter list. Contact LCP to verify certification status.**

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260C	Vinyl chloride	8/1/2013	7/31/2014	Certified
EPA 8260C	Xylene (total)	8/1/2013	7/31/2014	Certified
EPA 8270	1,1'-Biphenyl (BZ-0)	8/1/2013	7/31/2014	Certified
EPA 8270	1,2,4,5-Tetrachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,2-Diphenylhydrazine	8/1/2013	7/31/2014	Certified
EPA 8270	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	2,3,4,6-Tetrachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4,5-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4,6-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dimethylphenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dinitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2,4-Dinitrotoluene (2,4-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270	2,6-Dinitrotoluene (2,6-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Chloronaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	2-Chlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methylnaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	2-Methylphenol (o-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270	2-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	2-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	3,3'-Dichlorobenzidine	8/1/2013	7/31/2014	Certified
EPA 8270	3-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Bromophenyl phenyl ether	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chloro-3-methylphenol	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chloroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Chlorophenyl phenylether	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	4-Methylphenol (p-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270	4-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270	4-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 8270	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270	Acetophenone	8/1/2013	7/31/2014	Certified
EPA 8270	Aniline	8/1/2013	7/31/2014	Certified
EPA 8270	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Atrazine	8/1/2013	7/31/2014	Certified
EPA 8270	Benzaldehyde	8/1/2013	7/31/2014	Certified
EPA 8270	Benzidine	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Benzoic acid	8/1/2013	7/31/2014	Certified
EPA 8270	Benzyl alcohol	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroethoxy)methane	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroethyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Chloroisopropyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270	Butyl benzyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Caprolactam	8/1/2013	7/31/2014	Certified
EPA 8270	Carbazole	8/1/2013	7/31/2014	Certified
EPA 8270	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270	Dibenzofuran	8/1/2013	7/31/2014	Certified
EPA 8270	Diethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Dimethyl phthalate	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	Di-n-butyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Di-n-octyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270	Fluorene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachlorocyclopentadiene	8/1/2013	7/31/2014	Certified
EPA 8270	Hexachloroethane	8/1/2013	7/31/2014	Certified
EPA 8270	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Isophorone	8/1/2013	7/31/2014	Certified
EPA 8270	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270	Nitrobenzene	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodiethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodimethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodi-n-propylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosodiphenylamine	8/1/2013	7/31/2014	Certified
EPA 8270	n-Nitrosomethylethylamine	8/1/2013	7/31/2014	Certified
EPA 8270	Pentachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270	Phenol	8/1/2013	7/31/2014	Certified
EPA 8270	Pyrene	8/1/2013	7/31/2014	Certified
EPA 8270	Pyridine	8/1/2013	7/31/2014	Certified
EPA 8270C	1,1'-Biphenyl (BZ-0)	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2,4,5-Tetrachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2,4-Trichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,2-Diphenylhydrazine	8/1/2013	7/31/2014	Certified
EPA 8270C	1,3-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	1,4-Dichlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	2,3,4,6-Tetrachlorophenol	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	2,4,5-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4,6-Trichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dichlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dimethylphenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dinitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2,4-Dinitrotoluene (2,4-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270C	2,6-Dinitrotoluene (2,6-DNT)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Chloronaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Chlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methylnaphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Methylphenol (o-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	2-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	3,3'-Dichlorobenzidine	8/1/2013	7/31/2014	Certified
EPA 8270C	3-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Bromophenyl phenyl ether	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chloro-3-methylphenol	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chloroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Chlorophenyl phenylether	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Methylphenol (p-Cresol)	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Nitroaniline	8/1/2013	7/31/2014	Certified
EPA 8270C	4-Nitrophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270C	Acetophenone	8/1/2013	7/31/2014	Certified
EPA 8270C	Aniline	8/1/2013	7/31/2014	Certified
EPA 8270C	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Atrazine	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzaldehyde	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	Benzidine	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzoic acid	8/1/2013	7/31/2014	Certified
EPA 8270C	Benzyl alcohol	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroethoxy)methane	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroethyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Chloroisopropyl) ether	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270C	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2013	7/31/2014	Certified
EPA 8270C	Butyl benzyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Caprolactam	8/1/2013	7/31/2014	Certified
EPA 8270C	Carbazole	8/1/2013	7/31/2014	Certified
EPA 8270C	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270C	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C	Dibenzofuran	8/1/2013	7/31/2014	Certified
EPA 8270C	Diethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Dimethyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Di-n-butyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Di-n-octyl phthalate	8/1/2013	7/31/2014	Certified
EPA 8270C	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C	Fluorene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorobutadiene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachlorocyclopentadiene	8/1/2013	7/31/2014	Certified
EPA 8270C	Hexachloroethane	8/1/2013	7/31/2014	Certified
EPA 8270C	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270C	Isophorone	8/1/2013	7/31/2014	Certified
EPA 8270C	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C	Nitrobenzene	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodiethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodimethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodi-n-propylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosodiphenylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	n-Nitrosomethylethylamine	8/1/2013	7/31/2014	Certified
EPA 8270C	Pentachlorophenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Phenol	8/1/2013	7/31/2014	Certified
EPA 8270C	Pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C	Pyridine	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Acenaphthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Acenaphthylene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(a)anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(a)pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(b)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(g,h,i)perylene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Benzo(k)fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Chrysene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Dibenz(a,h) anthracene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Fluoranthene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Fluorene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Indeno(1,2,3-cd) pyrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Naphthalene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Phenanthrene	8/1/2013	7/31/2014	Certified
EPA 8270C SIM	Pyrene	8/1/2013	7/31/2014	Certified
EPA 9045	Corrosivity (pH)	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 9045B	Corrosivity (pH)	8/1/2013	7/31/2014	Certified
EPA 9045C	Corrosivity (pH)	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number: NV009222014-2** **Expiration Date: 7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline Chemistry				
EPA 150.1	pH	8/1/2013	7/31/2014	Certified
EPA 180.1	Turbidity	8/1/2013	7/31/2014	Certified
EPA 200.7	Aluminum	8/1/2013	7/31/2014	Certified
EPA 200.7	Barium	8/1/2013	7/31/2014	Certified
EPA 200.7	Beryllium	8/1/2013	7/31/2014	Certified
EPA 200.7	Boron	8/1/2013	7/31/2014	Certified
EPA 200.7	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.7	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.7	Calcium hardness as CaCO3	8/1/2013	7/31/2014	Certified
EPA 200.7	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.7	Copper	8/1/2013	7/31/2014	Certified
EPA 200.7	Hardness by calculation	8/1/2013	7/31/2014	Certified
EPA 200.7	Iron	8/1/2013	7/31/2014	Certified
EPA 200.7	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.7	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.7	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.7	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.7	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.7	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 200.7	Silver	8/1/2013	7/31/2014	Certified
EPA 200.7	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.7	Total hardness as CaCO3	8/1/2013	7/31/2014	Certified
EPA 200.7	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.7	Zinc	8/1/2013	7/31/2014	Certified
EPA 200.8	Aluminum	8/1/2013	7/31/2014	Certified
EPA 200.8	Antimony	8/1/2013	7/31/2014	Certified
EPA 200.8	Arsenic	8/1/2013	7/31/2014	Certified
EPA 200.8	Barium	8/1/2013	7/31/2014	Certified
EPA 200.8	Beryllium	8/1/2013	7/31/2014	Certified

Disclaimer: A laboratory that is certified or approved has established that they have the ability to implement a quality control program in accordance with the appropriate Federal or State regulations or statutes. It is the certified laboratory's responsibility to provide their client the most current certified parameter list. Contact LCP to verify certification status.

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 200.8	Boron	8/1/2013	7/31/2014	Certified
EPA 200.8	Cadmium	8/1/2013	7/31/2014	Certified
EPA 200.8	Calcium	8/1/2013	7/31/2014	Certified
EPA 200.8	Calcium hardness as CaCO3	8/1/2013	7/31/2014	Certified
EPA 200.8	Chromium	8/1/2013	7/31/2014	Certified
EPA 200.8	Copper	8/1/2013	7/31/2014	Certified
EPA 200.8	Iron	8/1/2013	7/31/2014	Certified
EPA 200.8	Lead	8/1/2013	7/31/2014	Certified
EPA 200.8	Magnesium	8/1/2013	7/31/2014	Certified
EPA 200.8	Manganese	8/1/2013	7/31/2014	Certified
EPA 200.8	Molybdenum	8/1/2013	7/31/2014	Certified
EPA 200.8	Nickel	8/1/2013	7/31/2014	Certified
EPA 200.8	Potassium	8/1/2013	7/31/2014	Certified
EPA 200.8	Selenium	8/1/2013	7/31/2014	Certified
EPA 200.8	Silica as SiO2	8/1/2013	7/31/2014	Certified
EPA 200.8	Silver	8/1/2013	7/31/2014	Certified
EPA 200.8	Sodium	8/1/2013	7/31/2014	Certified
EPA 200.8	Thallium	8/1/2013	7/31/2014	Certified
EPA 200.8	Vanadium	8/1/2013	7/31/2014	Certified
EPA 200.8	Zinc	8/1/2013	7/31/2014	Certified
EPA 218.6	Chromium VI	8/1/2013	7/31/2014	Certified
EPA 245.1	Mercury	8/1/2013	7/31/2014	Certified
EPA 300.0	Bromide	8/1/2013	7/31/2014	Certified
EPA 300.0	Chloride	8/1/2013	7/31/2014	Certified
EPA 300.0	Fluoride	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
EPA 300.0	Nitrite as N	8/1/2013	7/31/2014	Certified
EPA 300.0	Orthophosphate as P	8/1/2013	7/31/2014	Certified
EPA 300.0	Sulfate	8/1/2013	7/31/2014	Certified
EPA 314.0	Perchlorate	8/1/2013	7/31/2014	Certified

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: ***NV00922*** **Attachment to Certificate Number:** **NV009222014-2** **Expiration Date:** **7/31/2014**

Asset Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
SM 2320 B	Alkalinity as CaCO3	8/1/2013	7/31/2014	Certified
SM 2340 B	Hardness by calculation	8/1/2013	7/31/2014	Certified
SM 2510 B	Conductivity	8/1/2013	7/31/2014	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2013	7/31/2014	Certified
SM 2540 D	Residue-nonfilterable (TSS)	8/1/2013	7/31/2014	Certified
SM 3500-Cr C	Chromium VI	8/1/2013	7/31/2014	Certified
SM 4110 B	Bromide	8/1/2013	7/31/2014	Certified
SM 4110 B	Chloride	8/1/2013	7/31/2014	Certified
SM 4110 B	Fluoride	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrate as N	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrate-nitrite	8/1/2013	7/31/2014	Certified
SM 4110 B	Nitrite as N	8/1/2013	7/31/2014	Certified
SM 4110 B	Sulfate	8/1/2013	7/31/2014	Certified
SM 4500-H+ B	pH	8/1/2013	7/31/2014	Certified
SM 4500-P E	Orthophosphate as P	8/1/2013	7/31/2014	Certified
SM 5310 C	Dissolved organic carbon (DOC)	8/1/2013	7/31/2014	Certified
SM 5310 C	Total organic carbon	8/1/2013	7/31/2014	Certified

T E S C

Triangle Environmental Service Center, Inc.

QUALITY ASSURANCE MANUAL

for

POLARIZED LIGHT MICROSCOPY (PLM)

Prepared by

Triangle Environmental Service Center, Inc.

January 2007

T E S C

Triangle Environmental Service Center, Inc.

This Quality Assurance manual reviewed by the Laboratory Director annually. and updated as needed. This manual shall be made accessible to all laboratory personnel.

Date of Revision:	Reason for Revision:	Revised By:

TABLE OF CONTENTS

T E S C

Triangle Environmental Service Center, Inc.

1. Scope and Objective

1.1 Scope

This Quality Assurance and Quality Control (QA/QC) manual is prepared by Triangle Environmental Service Center (TESC), Inc. for its PLM laboratory use. It covers the responsibilities and requirements of a PLM analyst, training procedures for new employees, standard procedures of sample analysis, and QA/QC procedures. The manual is prepared in accordance with the NIST Handbook 150, NVLAP Procedures, ISO/IEC 17025 and General Requirements. It can be used as a handbook for training new employees and as a guidebook for the PLM analyst for daily analytical operations.

1.2 Company Mission

The Mission of Triangle Environmental Service Center (TESC), Inc., is:

- to provide employment opportunities to willing individuals, without regard to gender, race, color, creed or handicap;
- to create and maintain an atmosphere of creativity, individuality and productivity
- to provide unparalleled quality, service and attention to our customers;
- to consistently strive toward our goal of error free work;
- to make a contribution toward improvement of the environment and life on our planet.

1.3 Laboratory Objective

The goal of the TESC laboratory is to provide accurate and legally defensible analytical results to the customers.

1.4 Laboratory Policies

To ensure the laboratory objective, TESC's laboratory personnel are guaranteed freedom from commercial, financial and any other pressures that might adversely affect the quality of their work.

TESC is obligated and will do whatever we can to ensure the protection of our customer's confidential information and proprietary rights.

Currently, TESC does not use the NVLAP Logo on our letterhead, brochures, or test reports. TESC uses the term *NVLAP* for advertising specifically for bulk asbestos analysis. When the term *NVLAP* is used to reference the laboratory's accreditation status, it shall be accompanied by the laboratory's NVLAP code.

When the term *NVLAP* is used in a contract or proposal, it shall be accompanied by a description of the laboratory's scope of accreditation and current accreditation status. Every test report that bears the term *NVLAP* includes a statement that the report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government.

2. Organization and Staff

2.1 Organization

TESC PLM laboratory is a division of TESC, and is under direct supervision and management of the Laboratory Director. The Laboratory Director reports directly to the top management in the company (President and CEO).

2.2 General Employment Requirements

All candidates for employment as a microscopist performing polarized light microscopy must have minimum of a high school diploma. TESC prefers a Bachelor of Science in Geology or in related physical science. In addition, it is desirable that all microscopists have successfully completed courses in Petrology, Mineralogy and Crystallography and/or Optical Mineralogy through college education or other equivalent training.

2.3 Microscopist

2.3.1 Responsibilities

- Maintain in prime operating condition the polarized light microscope and stereoscopic microscope. Institute correction of any problems that occur.
- Measure hood airflow, check RI liquids, perform calibrations each morning and record measurements in log for this purpose.
- Prepare and analyze samples of bulk material for the presence of asbestos using polarized light microscopy assisted by stereoscopic microscopy.
- Follow the TESC procedure manual for the analysis as stated above, and to report the results of this analysis on the appropriate forms and in the appropriate manner.
- Participate in all proficiency testing programs for this type of analysis in which TESC is active.
- Reanalyze at least 10% of all samples analyzed for quality control purposes.
- Speak with customers as needed and explain to them the reported findings.

- Know, understand and follow all other points of this manual.
- Perform other tasks and/or activities as needed by TESC.

2.3.2 Requirements

- Completion of TESC or other certified training course in asbestiform fiber identification by polarized light microscopy.
- Ability to solve problems with minimal supervision.
- Ability to competently speak with customers.
- Knowledge and understanding of the principles and practices of the polarized light microscope, including equipment maintenance.

2.4 Senior Geologist / Microscopist

2.4.1 Responsibilities

- All responsibilities listed above for microscopist.
- Monitor quantities of lab supplies and inform the Laboratory Director of any needs.
- Ensure all lab equipment is maintained in prime operating conditions. Inform the Laboratory Director of any malfunctions.
- Recommend to the Laboratory Director new systems and/or policies that are needed in the laboratory in order for the laboratory to function more efficiently or accurately.
- Report to the Laboratory Director any problems that arise, the knowledge of which is necessary for TESC to maintain credibility with customers or regulatory agencies.

2.4.2 Requirements

- Completion of the McCrone PLM training course or equivalent.
- A minimum of three months as an analyst.
- Highly competent in the analysis of asbestos minerals by Polarized Light Microscopy (PLM).
- Ability to communicate with and motivate co-workers and customers.
- Understanding of current laboratory procedures and laboratory regulations.
- Understanding of current industry wide regulations is preferred.

2.5 Laboratory Director/Quality Assurance Coordinator

2.5.1 Responsibilities

- Maintain functionally, accuracy and efficiency of all TESC laboratories.
- Supervise laboratory staff. Approve time sheets for laboratory personnel.
- Maintain and update the Quality Assurance and Standard Operating Procedures manuals, and all equipment manuals.
- Recommend to Management new systems and/or policies that are needed in the laboratory in order for the laboratories to function more efficiently or accurately.
- Maintain accountability for all sample results that are reported by the laboratories.
- Report to Management any problems that arise, since this is necessary for Management to maintain credibility with customers or regulatory agencies.
- Act as Quality Assurance Coordinator and Supervise and maintain TESC's Quality Assurance and Quality Control (QA/QC) Program.
- Other jobs and/or activities as requested by the TESC Management.

2.5.2 Requirements

- A minimum of three years experience in an environmental or related laboratory.
- Excellent written and oral communication skills.
- Excellent organizational and management skills.
- Thorough understanding of current asbestos laboratory and asbestos analysis regulations and procedures.
- Knowledge of current general asbestos industry regulations.

3. Training

3.1 General Description

Training generally lasts for a period of three months or more depending on the background and ability of the trainee. The new analyst is expected to logically progress through the given information as described below. Analysts who cannot transcend the described progression are immediately released from employment. Because the material replayed in training directly relates to the new analyst's ability to group basic concepts and independently expand their breadth of knowledge, an inability to perform is not tolerated. Trainees are not permitted to perform any analyses for external customers for the first six weeks of employment

at the very minimum. The exact pace of the training is dictated by the ability of the trainee. Although a new employee may have training and experience from a previous company, they are still required to learn TESC's procedures and practices.

3.2 Week One

On the first day of employment the new analyst is given an orientation tour of the laboratory, an explanation of the equipment used and safety procedures, and an introduction to asbestos rules and regulations. The rest of the week is spent reading the company employee manual; the Environmental Laboratory and Quality Assurance Manual; the TESC Standard Operating Procedure Manual; The McCrone Asbestos Mineral Identification Manual; the ASTM PLM Method including EPA's current test method; and other related scientific articles including chapters from college level optical mineralogy texts. This time is interspersed with short lectures on the reading material in order to reinforce the information and concepts.

3.3 Week Two

The trainee is given detailed instruction on the parts and operation of the polarized light microscope and readings from the McCrone Polarized Light Microscopy Manual. TESC's reference slide collection that includes asbestos mineral SRM samples, reference samples of minerals from commercial slide collections and other sources, and NVLAP proficiency sample slides is used to teach or review microscope operation and mineral optical properties. The last three days of the week are spent going through permanent slide mounts of the six asbestos minerals as well as mounting the asbestos minerals in the appropriate RI liquids for identification. The trainee and senior microscopist or laboratory director review the slides on a regular basis. The subject of quantification is not addressed at this time.

3.4 Week Three

This week the trainee is introduced to common building materials and their components including asbestiform fibers. The major material groups are reviewed and processed in batches of similar application such as flooring materials. Instruction is given on sample preparation per type of product in addition to component identification and on completing bench sheets. The trainee is carefully instructed on how to think about sample preparations. Due to the large variety of material types submitted for analyses, emphasis is placed on evaluating preparation techniques versus a step-by-step version of sample

preparation. The trainee is continually provoked and encouraged to think. Sets of basic samples of each material type are prepared and analyzed in succession by the trainee and the results reviewed by the senior microscopist or laboratory director.

3.5 Week Four

The trainee is given sets of samples on a daily basis to prepare and identify component types. The sets of samples are prepared and analyzed independently by the trainee. When the trainee has completed a set, the senior microscopist or laboratory director is consulted and the samples are reviewed for the quality and appropriateness of the preparation technique. The samples are also reviewed individually as to the content. The trainee must explain the optical criteria for all identifications.

An examination, including a written and hands-on analysis, is given after the trainee has finished the theoretical and analytical procedure training.

3.6 Weeks Five Through Eight

Quantification is introduced into the analytical process. The concept of Calibrated Visual Estimation is explained along with the use of percentage estimation charts. If the trainee has completed courses in optical mineralogy and petrology, then they should be familiar with this technique. The trainee is now required to quantify the asbestiform and non-asbestiform fibers in the building material training sets. After successful completion of this exercise, the element of time constraint is introduced. The trainee is given sets of samples that are due at a specified time and allowed to work independently. The senior microscopist or laboratory director review the trainee's results per sample set for proper quality, analytical accuracy and completion time. Trainees who become incompetent due to reasonable stress and pressure are considered for release from employment.

3.7 Weeks Nine Through Twelve

The trainee continues to work primarily on large and small sets of archival samples and results are compared to those originally reported. The trainee is encouraged to work independently, however is constantly monitored by the senior microscopist or laboratory director from a distance. They are watchful for signs of developing bad habits, negligence, or incompetence during the analytical process. Knowledge of current regulations, telephone skills, and acceptable result reporting styles are reviewed. Eventually the trainee is given small, simple sets of "real" samples to analyze and report under constant supervision. All of these samples are checked and confirmed by the supervisor (100% QC). When the

trainee is deemed "ready", a test comprised of 10 NVLAP proficiency samples is administered to insure that the trainee can competently perform the required analytical work. The test samples include all six asbestos varieties and mimic fibers. All physical and optical properties of the asbestos minerals must be accurately recorded and the laboratory bench sheets must be properly completed for each sample. Upon successful completion of this test (score of 90% or above), the trainee is considered competent to perform PLM analysis, but their work is periodically monitored to insure that proper procedures are followed.

3.8 Closing Statement on Training

The Laboratory environment is kept open to all skill levels. At no time is an employee encouraged to exhibit an arrogant attitude, including the senior microscopist or laboratory director. An atmosphere of constant learning is maintained and trainees are encouraged to contribute comments and ideas. Each individual learns and advances at different levels and the above schedule is meant as a basic guide.

4. Sample Receipt

4.1 Sampling Materials and Procedures

Trained and certified field technicians, in accordance with EPA and State regulations, collect all in house samples. The technicians should record relevant information on field data sheets and chain of custody sheets while sampling. This information includes, but is not limited to, identification of the technician, environmental and building conditions (if relevant), diagrams and descriptions of sample location, and photos of the sample in its container at the sample site. All sampling records are stored in the client job file.

Customers (i.e. homeowners) are advised to visit our website, www.tesclab.com, for detailed sampling instructions. A sample submittal form is included on the website to insure that the client supplies us with all the required information for sample analysis and report generation.

Typical sampling materials include, but are not limited to, sprayed acoustic ceiling material; insulation from an attic or heating system; floor tile or linoleum and its associated mastic; tape joint compound, wall texture, gaskets, and roofing materials.

4.2 Sample Acceptance

Samples are received via mail, courier, and drop off or collected by our field technicians. The following criteria are applied for the acceptance versus rejection

of samples.

- Samples are received in sealed plastic containers free of external visible debris.
- The container seal is intact with no punctures or tears in the container.
- There is one sample per container.
- There is a sufficient amount of material to be analyzed (two tablespoons of texture or insulation material; two square inches of all layers of sheet-like materials and other surfacing materials).
- The customer uniquely identifies samples by numbers and/or location.
- Source and contact for the results are clearly indicated.
- Method of payment has been arranged.

5. Sample Login

The following information is recorded in the login book for each set of samples:

- Date of login
- Turn around time requested
- TESC's individual sample ID code
- The customer's name, job site, and/or job #, and/or PO #, and/or address
- Type of analysis requested
- Initials of the sample recipient

In addition, a chain of custody is completed for each sample set if one is not provided with the samples, and each set is assigned a unique sample identifier and numbering system. The recipient also signs, dates, and fills in the time the sample(s) was (were) received on this form. (See example of TESC's chain of custody in appendix V).

6. Sample Preparation and Analysis

See Apparatus and Reagent, and Analytical Procedures for Polarized Light Microscopy in Appendix I, Sections one, two, and three.

7. Analytical Reports

7.1 Reporting of Results

In order to report the analytical results to the client promptly, TESC releases the results to the person designated by the client via telephone, email or fax. The customer lists the designated person on the sample chain of custody form. If the results are to be released to a third party, TESC requires the customer to give written authorization. This is to protect the customer's confidentiality. A record is kept to document the telephone and fax transmission of the results.

The final analytical reports are prepared in Microsoft ACCESS, (see the following section on Computer Facility) and the reporting formats are flexible to meet the needs of individual clients.

All data, observations and calculations are recorded at the time that they are made and are identifiable to the specific task. The results of the analytical data sheets are then released to the typist who inputs the data into the database computer. The Laboratory Director reviews the reports by carefully checking all the calculations and sample descriptions in the report against the analytical data sheet and the client sample submittal form. Revisions are made as necessary when the Laboratory Director finds errors. In situations were the Laboratory Director is not available to review the final reports, the Laboratory Director shall name the person authorized to perform the review.

7.2 Subcontractor Results

In cases where a test report contains results performed by subcontractors, these results are clearly identified. The name of the subcontracting laboratory and their NVLAP lab code are identified in the space usually reserved for the analysts' name at the beginning of the report. Subcontractor results are limited to those performed under the scope of the subcontractors' accreditation. The subcontractor initially reports the results directly to TESC by fax transmittal, and then the original report is sent to TESC by mail. These reports are filed with the customers other documents, and are kept indefinitely. Only NVLAP accredited laboratories are used as subcontracting laboratories.

7.3 Approved Signatory

TESC's approved signatory is the Laboratory Director. The next approved signatory is the Senior Geologist.

7.4 Final Report Submission

A file copy is made of all analytical reports. The original final report is mailed to the customer, with a copy of the chain of custody, within a few days by regular mail.

7.5 Contents of Final Reports

The following information is included in all final test reports:

- Name and address of the customer
- Date sample(s) were collected, received, analyzed, and reported

- Sample batch identification designated by laboratory and customer sample number
- Color and homogeneity
- Presence or absence of asbestos
- Type or types of asbestos present
- Estimated area percentage of each type of asbestos present
- Estimated area percentage of non-asbestos fibrous materials present
- Analyst's name
- Individual sample identification designated by lab and by customer
- Statement of test method used (*e.g.*, EPA -600/M4-82-020...)
- Statement of expected accuracy of results
- Statement of reproducibility
- Signature of the laboratory director

Please see sample report in Appendix V

7.6 Report Retention

Copies of all reports are filed alphabetically by customer name and kept in file cabinets. All reports are kept confidential. At the year's end, the files are placed in storage boxes and kept in a safe and secure archival space. Copies of the analyst worksheets and all paperwork submitted by the customer are retained with a copy of the final report.

All reports are kept indefinitely.

Computer records are backed-up on diskettes and kept indefinitely.

8. Client Complaints and Questions

Questions about the implications of test results are directed to the General Manager. The Laboratory Director and/or the analyst involved handles specific questions about the actual analysis.

Samples in question are re-analyzed at the request of the customer. These data are recorded and used in the intra-laboratory QC program (See Intra-laboratory Quality Control)

9. Sample Archive

9.1 Sample Retention

All analyzed samples are safely and securely retained for a minimum of one month. Sample retention is in accordance to all Federal, State, and local regulations. The sample storage facility is designed so that damage and cross-contamination will not occur (see the following section).

9.2 Sample Archive

Samples are archived as follows:

- Original Sample Sets - Archived daily in bins marked by month
- Reanalyzed (QC) samples - Archived with original sample sets

10. Waste Disposal

- All Sample Sets - Assumed positive asbestos samples are disposed of following current Federal, State, and local ACM regulations.
- Negative Samples (when separated) - All asbestos-negative samples are thrown away as ordinary trash.

11. Computer Facility

11.1 The Facility and its Maintenance

TESC uses computer to generate analytical reports. The database program being used is Microsoft ACCESS. The use of the computer database program for generating reports is in compliance with all existing procedures.

11.2 The Database Program

ACCESS is an inter-relational database program that is commercially published by Microsoft Inc. It is one of the most popular computer database programs in the market today. TESC's in-house computer scientist customized the database specifically for the reporting of asbestos analysis. Its reliability and flexibility has been well documented by the industries. It has been proven by TESC that the program is adequate for the task.

11.3 Data Integrity

To protect the integrity of the data, the Laboratory Director proofreads all the reports generated by the database. If a calculation process is involved, the analyst calculates the analytical data first. The computer program will then independently

calculate them again based on the inputted original data. The Laboratory Director can review the differences in calculations if there are any.

11.4 Data Security

To ensure the security, integrity, and the customer's confidentiality, the database is password protected and is limited to authorized personnel.

12. Quality Assurance (QA)

12.1 Overview of the Quality Assurance Program

The quality assurance program is designed to bring all unacceptable variances in the analytical results to the attention of the Quality Assurance Coordinator. In the case of variance, corrective procedures are implemented. A one on one discussion with the microscopist having difficulty is used to determine the cause that led to the discrepancy. The specific problem is corrected when all parties understand the nature of the misconception and have come to an agreement on how to avoid future problems.

12.2 Document Control

The Quality Assurance Coordinator is responsible for the maintenance and control of all laboratory documents including Standard Operating Procedures and final laboratory reports. All documents used by personnel in the laboratory shall be reviewed and approved by the Quality Assurance Coordinator prior to their being issued. All laboratory documents shall be uniquely identified with the date of issue or the date of revision, page numbering, total number of pages and authorized signature(s).

A master list of current authorized revisions of laboratory documents is available on the TESC server, filed under laboratory documents. This list details the title of the document and the current revision date. The current authorized revisions of the appropriate laboratory documents are located in the PLM laboratory.

Only the laboratory director, Quality Assurance Coordinator or supervisory laboratory personnel are authorized to make changes to documents maintained on the TESC server.

These documents are password protected. Any changes made must first be reviewed and approved by the Quality Assurance Coordinator. Once changes are made, the date of the document must be updated to reflect the date of the change. The master list of authorized revisions of laboratory documents must also be updated to reflect the date of the most recent revision. The updated document must then be printed and replace any older versions.

Documents amended by hand are not permitted. All laboratory documents are maintained on the TESC server and any revisions and subsequent printings will follow the procedures described above.

12.3 Review of Requests, Tenders and Contracts

The Laboratory Director shall review in conjunction with the Field Director all requests, tenders and contracts whose intent is to lead to a contract for laboratory testing services. This review will take into account financial, scheduling, and legal aspects of such requests, tenders, and contracts. All such requests, tenders, and contacts must have their requirements adequately defined, documented, and understood by all involved parties.

It is the responsibility of the Laboratory Director to determine whether the laboratory has the capability and the resources to meet the requirements of such requests, tenders, and contracts. This determination is made with the aid of capacity numbers, laboratory resources, and analyst experience. The laboratory may provide results of proficiency testing to the customer as one proof of capability. The Laboratory Director, with the aid of the Supervisory Geologist, must also determine that the appropriate test method is selected and that the laboratory is able to perform the clients' required methods. This review must also cover any work that is subcontracted by the laboratory.

The review of requests, tenders, and contracts, and any significant changes there in, shall be recorded with the date and the initials of the persons responsible for performing the contracted work. These records are kept in the customers' job files. Pertinent discussions with the customer relating to the requirements or results of the work performed under the contract shall also be recorded and kept in the job file.

A contract can be either a written or verbal agreement between the customer and TESC. The contract must be acceptable to both the customer and the laboratory. Any differences shall be resolved before any work commences. The customer shall be notified as soon as possible as to any deviation from the contract. If a contract needs to be amended after work has commenced, the same review process shall be repeated. Any and all amendments shall be communicated to all affected personnel.

12.4 Subcontracting a Test

At times it is necessary due to unforeseen reasons (e.g., workload or temporary incapacity) for TESC to subcontract work. This work shall be placed with a competent, NVLAP certified subcontractor. The laboratory shall advise the customer in writing or by phone of this arrangement, and gain approval of the

customer prior to subcontracting the work. The laboratory is responsible to the customer for the subcontractor's work. The laboratory maintains a list of all subcontractors it uses for tests, and a record of their accreditation certifications.

12.5 Quality Assurance Report

The Quality Assurance Coordinator shall provide a report to laboratory management on a quarterly basis, which shall document all quality assurance problems observed, corrective actions taken, and documentation made. The Quality Assurance Coordinator will also document the results of the quality assurance audits, which are performed at least annually. Please see an example of a checklist for annual Quality Assurance audits in Appendix I.

12.6 Periodic Program Review

All laboratory documents will be reviewed, and revised if necessary, at least annually. Only the Laboratory Director, Quality Assurance Coordinator or senior supervisory lab personnel may approve the appropriate revisions. All revisions must be documented on the signature page with the date of revision, the reason for the revision and the authorized approval signature. Obsolete or invalid revisions of documents must be removed immediately from all points of issue, and marked as obsolete.

12.7 Documentation and Record Keeping

The laboratory shall maintain all records indefinitely. These shall include, but is not limited to, all final reports submitted to customers, Standard Operating Procedures, new procedures and their development, and all laboratory and Quality Assurance records.

If the laboratory discontinues business, all customers will be notified 60 days in advance of the closure.

12.8 Equipment and Supply Calibration

12.8.1 Hoods

The airflow velocity of each hood is checked on a daily basis and recorded in the logbook assigned to that workstation. Any hood that exhibits a dramatic drop in velocity is removed from service until the cause of the malfunction is repaired. All hoods must run at a minimum of 70 ft/sec. Hood face velocities will be measured semi-annually and these records kept indefinitely.

12.8.2 Microscopes

The individual PLM microscopes are calibrated daily. Each day of use the analyst must record that the polarizer and analyzer are properly aligned and that the stage and objectives are centered, along with the date and initials of the analyst. All data is recorded in the logbook assigned to that station.

12.8.3 Refractive Index Oils

The laboratory's refractive index (RI) oils are inventoried every six months. The inventory information is recorded on the RI Oil Inventory worksheet (in Quality Assurance Record Book) and includes the bottle number, refractive index, series/type, volume, condition, supplier, and lot number.

The refractive indices of the refractive index oils are checked by using ABBE Refractometer or with the RI calibration beads purchased from the manufacturer (Cargille). The reagent bottles (1.550, 1.605, 1.680) of the liquid are calibrated under the following guidelines:

- Upon opening, and
- Twice per year thereafter (January and July) until the liquid is exhausted or until the oil no longer matches the labeled RI.
- The ¼ oz reference liquids are not regularly calibrated due to infrequent use.
- Information on calibration is recorded on a worksheet that includes bottle number, refractive index at opening, date received, date opened, refractive index at testing, temperature at testing, and refractive index at 25^{o}C.

12.8.4 Equipment

Equipment manuals are located in each laboratory as applicable. Each equipment manual contains the following information.

- Manufacturer's Operation Manual Per Model/Type Equipment
- Inventory Sheet per Piece of Equipment Which Lists the following:

  - The name of the item of equipment
  - The manufacturer's name and type, identification and serial number.
  - Dates received and placed into service.

- ♦ Laboratory inventory number.

- Repair and Calibration record per piece of serviced equipment which lists the following:

  - ♦ Details of maintenance, description of defective operation.
  - ♦ Date removed from service.
  - ♦ Date returned to service.
  - ♦ Name of servicing company.
  - ♦ Record of all annual calibrations made by a professional service company.

12.8.5 Contamination Control

All submitted samples are expected to be in airtight plastic containers. When a sample is received that is not contained, it is immediately placed into a resealable plastic bag. All mail that is suspected of containing samples for analysis is cautiously opened in a HEPA-filtered hood. The analyst use the appropriate caution at all times when dealing with suspected asbestos containing material. A high efficiency particulate air (HEPA) vacuum is available at the facility and the hoods are equipped with HEPA filters to safely handle ACM's.

No loose debris is allowed to remain in the preparation hood. The workspace is promptly wiped clean of all visual debris, and wiped occasionally during use regardless of the absence of visual debris. Tools are cleaned thoroughly between sample preparations. The working stage area of the stereoscope is wiped between sample preparations. Cover slips, slides, and refractive index oil containers remain closed as much as possible and are not placed in the heavy flow area of the hood. All samples and resulting debris are kept within the hood during sample preparation and the cleaning of tools. A container for waste generated during analysis and cleaning is kept inside the hood.

Each workstation is checked for contamination of the hood interior, tools and refractive index liquid daily. A sample of fiberglass is analyzed as a blank for every workstation, per analyst per day of use. The analysis is recorded in the workstation logbook.

All cases of contamination are reported to the Laboratory Director, and are traced to their sources.

13. Intra-Laboratory Quality Control (QC)

13.1 QC Sample Determination

Each analyst always sets aside at least 10% of analyzed for QC re-analysis.

13.2 Reanalysis Procedure

Each QC sample is prepared and analyzed according to the PLM procedures described herein. The QC analytical data are recorded on the QC analysis forms, and are filed in the QC analysis binders kept in the PLM lab. The data is then entered into the PLM QC database. Discrepancies are reported as described below.

13.3 Acceptable Limits of Variation

All percentages are reported as single whole number percentage values such as 25%, or as <1% or >99 if the estimation is less than one percent (below the quantification limit) or greater than 99 percent. Acceptable variation is defined as variation within one reporting category. For example, the primary result of 20-30 (25%) and the secondary result of 30-40 (35%) are within acceptable variation, whereas the results of 20-30 (25%) and 40-50 (45%) are not acceptable.

13.4 Resolution of Discrepancies, Nonconformance/Corrective Action Reports

- The Laboratory Director is notified immediately of any discrepancies or nonconformities (problem with the management system or technical operation of the laboratory).
- The original analyst reviews the sample material and makes a final decision concerning the results with the supervision of the Quality Assurance Coordinator or the Senior Supervisory Microscopist.
- Discrepancies or nonconformities are recorded on a Nonconformities/Corrective Action Report form, and the information is incorporated into the quarterly report. A copy of the report is also put into the appropriate employee's performance file. See an example of a Nonconformities/Corrective Action Report in Appendix I.
- The Quality Assurance Coordinator makes an evaluation of the significance and acceptability of the nonconformities.
- Any necessary corrective actions are immediately taken.
- No results will be reported to customers until the problem is resolved.
- Any significant changes to the original results are immediately reported to the customer.

- The Laboratory Director is responsible for authorizing the resumption of work once the appropriate corrective actions are taken.
- All correspondence with the customer is maintained through the Laboratory Director and a professional resolution is attempted.
- If evaluation by the Laboratory Director of the nonconformities indicates that the problem could recur, or that there is doubt about the compliance of the laboratory with its own policies, corrective action will be taken.

13.5 Corrective Actions

Problems in the laboratory are identified through Nonconformities/Corrective Action Reports, audits, management reviews, and feedback from customers or staff observations. Once a discrepancy or nonconformity is identified it then must be determined if it is necessary to implement corrective action. Corrective action cannot be implemented until there is an investigation into the cause of the problem. Cause analysis should include customer requests, the samples themselves, methods and/or procedures, staff ability and training, or equipment and its calibration.

Once it has been determined that corrective action is needed, the Laboratory Director or Quality Assurance Coordinator must determine potential corrective actions. The action(s) most likely to eliminate the problem are then selected and implemented. The corrective action shall be to a degree appropriate to the magnitude and risk of the problem. Any changes resulting from the corrective action investigation shall be documented and implemented. The results from these changes must be monitored to ensure that the corrective actions taken have been effective.

13.6 Preventive Actions

Preventative actions are utilized as a way for the laboratory to identify opportunities for improvement. This proactive process includes regular reviews of the operational procedures, daily analysis of data, periodic trend and risk analysis of data and review of all the proficiency-testing results.

This ongoing process shall identify needed improvements and potential sources of nonconformities. Preventative action plans will be developed, implemented and monitored if action is required. This way the likelihood of the occurrence of nonconformities will be reduced, and the opportunity for improvement is ongoing. The introduction of preventative actions can occur through the initiation of Nonconformities/Corrective Action Reports. Controls must also be put in place to ensure that the preventative action is effective.

14. Proficiency Tests and Round Robin Program

14.1 NIST/NVLAP Standard Reference Materials

The reference samples are used during the original training period as well as periodically to verify that an analyst can correctly identify the optical characteristics of the asbestos minerals. Permanently prepared slides as well as the bulk SRM's are accessible for immediate referral.

14.2 NIST/NVLAP Proficiency Samples

The laboratory receives proficiency test samples from NIST twice per year, and all PLM analysts participate in tests on an individual basis as required by the National Voluntary Laboratory Accreditation Program for Bulk Asbestos Analysis. Upon completion of a test, the analysts turn in their results to the PLM Supervisor or the Laboratory Director. The results are compared and discrepancies are resolved by re-examining the sample(s) in question and arriving at a single test result for each sample. These single test results are then submitted to NVLAP as the final results for the laboratory. The proficiency test samples are archived and used during the initial training of an analyst and as a daily check of an analyst's accuracy in determining asbestos and non-asbestos characteristics and percentage values. The reference samples include all six asbestos varieties and mimic fibers. The identity and percentage of the asbestos minerals must be accurately recorded on the PLM Daily Reference Sample Sheet kept in the station logbook.

14.3 Round Robin Program

Round Robin samples are exchanged twice per year with two or more other laboratories as an interlaboratory test for PLM proficiency.

15. Staff Performance and Internal Audit

15.1 Review of Analyst

The Laboratory Director reviews each analyst's performance file annually to increase proficiency. Analytical accuracy of each analyst is summarized each month in the PLM QC database.

15.2 Periodic Internal Audit or Quality Assurance Program

The Laboratory Director or Quality Assurance Coordinator shall conduct an internal audit of the laboratory annually to verify that its operations comply with the requirements of the entire Quality Assurance Program. These audits shall

address all elements of the management system including testing and/or calibration activities.
When potential problems arise, or findings cast doubt on the operations or correctness of the test results, the laboratory must make timely corrective actions. Customers must be notified if it is found that laboratory results may have been affected. The audit findings and any corrective actions that arise must be recorded. If corrective actions are implemented, a follow-up audit shall be conducted to verify and record the implementation and effectiveness of the corrective action.

16. Management Reviews

The laboratory's executive management (either president or vice president) shall conduct a review of the laboratory's management system and testing activities annually. This review is to ensure the continuing suitability and effectiveness of the management system and the results produced by the laboratory. The review also allows for the introduction of necessary changes or improvements by the executive management.
This review shall take account of:

- The suitability of policies and procedures.
- Reports from managerial and supervisory personnel.
- The results of recent audits.
- Corrective and preventive actions.
- Assessments by external agencies.
- The results of interlaboratory proficiency tests.
- Changes in the volume and type of the work.
- Customer feedback.
- Complaints.
- Other factors such as quality control activities, resources and staff training.

The findings and actions that arise from these reviews shall be documented. The results from these reviews will be used to establish goals, objectives and action plans for the laboratory's coming year. The management shall make sure that any actions that arise from these reviews are conducted within a reasonable and agreed timescale.

17. APPENDIX I

Standard Operating Procedures: Polarized Light Microscopy

T E S C

Triangle Environmental Service Center, Inc.

18. APPENDIX II

Standard Operating Procedure Manual for
Point Counting Quantitation with Gravimetric Reduction by
Polarized Light Microscopy (PLM)

T E S C

Triangle Environmental Service Center, Inc.

19. APPENDIX III

Standard Operating Procedure Manual for
Standard Point Counting
by Polarized Light Microscopy (PLM)

T E S C

Triangle Environmental Service Center, Inc.

20. APPENDIX IV

Standard Operating Procedure for
Calibration of Refractive Index Oil

21. APPENDIX V

Standard Operating Procedure for the Preparation of Refractive Index Oil

T E S C

Triangle Environmental Service Center, Inc.

22. APPENDIX VI

Standard Operating Procedure for the
Preparation of CARB 435

23. APPENDIX VII

Miscellaneous Forms

24. APPENDIX VIII

Microscope Parts

APPENDIX B

Site Health and Safety Plan

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| Site Remediation

| Soil & Groundwater Investigations

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| Storm Water & Spill Plans

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| Litigation Support & Expert Witness

HEALTH AND SAFETY PLAN

1301 East Webb Avenue
APN 139-23-812-025
North Las Vegas
Clark County
Nevada
NDEP Contract #DEP14-008
Task M10-15

Prepared for:

State of Nevada
Department of Conservation and Natural Resources
Division of Environmental Protection
Bureau of Corrective Actions
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

On behalf of:

City of North Las Vegas

May 2015

Table of Contents

FIGURES

APPENCDICES

1. INTRODUCTION

McGinley & Associates Inc. (MGA) is pleased to submit this Health and Safety Plan (HASP) detailing personal safety precautions being performed on behalf of the Nevada Division of Environmental Protection (NDEP). This HASP addresses activities associated with the collection of soil and building material samples. The sampling activities will be conducted on a 0.1 acre parcel of land located in North Las Vegas, Nevada. The parcel is comprised of a vacated building, a shed, and a fully fenced former storage yard.

Planned site activities will include:

- Site reconnaissance;
- GPR survey;
- Direct push advancement of borings;
- Collection of soil samples for laboratory analysis; and
- Collection of suspect building material for laboratory analysis.

1.1 Scope and Applicability of the Site Health and Safety Plan

The purpose of this HASP is to define the requirements and designate protocols to be followed for the site survey and sampling activities. Applicability extends to all MGA employees, contractors and subcontractors. Each person will also be expected to provide his or her own protective equipment.

All on-site personnel shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This HASP summarizes hazards and defines protective measures planned for the site. This plan must be reviewed and signed by all site personnel prior to commencing with field activities. An agreement of compliance is provided in Appendix A.

During development of this plan, consideration was given to current safety standards as defined by EPA/OSHA/NIOSH, health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following reference sources have been consulted:

- OSHA 29 CFR parts 1910.120, 1910.134, 1926.350 and 1926.650;
- U.S. EPA, OERR ERT Standard Operating Safety Guides
- NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines
- (ACGIH) Threshold Limit Values

1.2 On-Site Personnel

All personnel entering the designated work areas at the Site are responsible for the following:

- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees, and being alert to potentially harmful situations;
- Obeying all applicable laws and regulations relating to health and safety;
- Ensuring that activities do not impact the neighboring community;
- Performing only those tasks that they have been trained to complete and can do safely;
- Notifying their supervisor of any special medical conditions (i.e., allergies, contact lenses, diabetes) that may affect their ability to perform certain tasks;

- Notifying their supervisor of any prescription and/or non-prescription medication that they may be taking that might cause drowsiness, anxiety, or other unfavorable side-affects;
- Learning and complying with Site security requirements;
- Complying with the Site's prohibition on drug and alcohol use, smoking, horseplay, and restricted eating/drinking areas;
- Practicing good housekeeping by keeping the work areas neat, clean and orderly;
- Immediately reporting all injuries, incidents and near-misses to the HSO;
- Properly using PPE specified by this HASP;
- Properly maintaining their designated PPE per manufacturers' recommendations; and
- Complying with the HASP and all health and safety recommendations and precautions.

In the event that a person does not adhere to the provisions of the HASP, he/she will be requested to leave the work area. All non-conformance incidents will be recorded in the site log.

2. KEY PERSONNEL

The Site Health and Safety Officer (HSO) is fully responsible for ensuring the provisions of this HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, it is vital that personnel assigned as HSO be experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120. The following personnel are critical to the planned activities at the Site. The organizational structure will be reviewed and updated periodically by the site supervisor.

Title/Responsibility	Name	Phone
City of North Las Vegas		
Site Contact	Enrique (Rick) Damian	(702) 633-2612
McGinley and Associates, Inc.		
Project Manager – Project management, regulatory liaison, coordinate field activities, site safety, data review, report preparation.	Brett Bottenberg	(702) 232-5247
Environmental Scientist – Collect soil samples.	Sarah Hoffman	(702) 260-4961
Contractors/Vendors		
Macrotec – Asbestos and lead assessment	Jason McAllister Dustin McAllister	(702) 949-6225

2.1 Site Specific Health and Safety Personnel

The HSO is also responsible for conducting site inspections on a regular basis in order to ensure the effectiveness of this plan. The HSO at the site is Sarah Hoffman, Senior Environmental Geologist for MGA.

2.2 Organizational Responsibility

City of North Las Vegas:	Party initiating investigation of soil impacts from previous dumping and staging activities.
MGA:	Primary agent for the City of North Las Vegas providing field services and project oversight of surveys and sampling.
Subcontractors:	Various companies and organizations providing services or skilled trades.

3. TASK/OPERATION SAFETY AND HEALTH RISK ANALYSIS

3.1 Historical Overview of Site

Based on available historical information, it appears that the property was originally platted in 1955 and the structure was constructed in 1957. The site was originally constructed as a single-family residential unit. Limited information is available about the structure prior to 1975. It appears it has been used as a fraternity house, a storage unit for City of North Las Vegas roadway divisions, and a pump house of unknown nature. There is also anecdotal evidence that the property was used by the Boy Scouts of America for a meeting place.

3.2 Chemical Hazards

The following sections provide descriptions of the principal health hazards of the potential contaminants affecting this investigation and include:

- Total Petroleum Hydrocarbons (TPH);
- Asbestos; and/or
- Lead

3.2.1 Petroleum Hydrocarbons

Petroleum hydrocarbons such as gasoline and diesel fuel are comprised of a wide range of substances, some of which may pose substantive human health hazards. Constituents including benzene, toluene, ethyl benzenes, and xylenes (BTEX) are generally a greater concern due to their potential exposure pathway through the lungs. In moderate exposures, BTEX compounds all produce similar acute effects including headaches, narcosis, and anesthesia. Among these compounds, benzene is the primary substance of concern due to its status as a known carcinogen and its association with leukemia and aplastic anemia in chronic exposure situations.

As field activities normally involve subsurface disturbance for generally short periods of time, these pathways should be considered. Planning, development, and implementation of specific sampling protocol should be conducted to mitigate these potential concerns.

3.2.2 Asbestos

Asbestos fibers are usually mixed with various binder materials or resinous matrices. Collecting bulk samples of building materials may release extremely low concentrations of asbestos fibers. Asbestos occurs as bundles of fibers that, when disturbed, are easily separated into smaller and smaller sizes. Micron-size fibers tend to remain airborne and, because of their small size, can be inhaled down to the alveolar surface (smallest ends of air passageways) of the lungs.

Exposure to elevated levels of airborne asbestos fibers is known to cause a number of asbestos-related diseases, including asbestosis (fibrosis of the lung), mesothelioma (cancer of the lining of the lung), and other cancers of the lung, esophagus, stomach, and colon. Although the risk of

developing asbestos-related diseases is greatest for individuals who are regularly exposed to relatively high airborne asbestos fiber concentrations (e.g., industrial asbestos workers), it is apparent that some degree of elevated risk exists for individuals chronically exposed to low airborne asbestos fiber concentrations, which may be present in a building that contains friable ACM. The actual degree of risk associated with prolonged exposure to asbestos levels in this range is still unknown at this time; however, it is prudent to take steps to limit asbestos exposure to the lowest extent possible.

OSHA has established standards for limiting the exposure of personnel working with asbestos. As described in the OSHA Standard (29 CFR 1910.1001), the current permissible exposure limit (PEL) for asbestos, as an 8-hour time weighted average (TWA), is 0.1 fiber per cubic centimeter of air (f/cc). The OSHA 8-hour TWA action limit is 0.05 f/cc. There is no OSHA standard regarding asbestos exposure for the general public.

3.2.3 Inorganic Lead

Inorganic lead exposure can occur via inhalation or ingestion of lead-containing dusts. Skin and eye contact are not considered routes of entry of lead dust into the body. The principal target organs of lead toxicity include the nervous system, kidneys, blood, gastrointestinal, and reproductive systems. Generalized symptoms of lead exposure include decreased physical fitness, fatigue, sleep disturbances, headaches, bone and muscle pain, constipation, abdominal pain, and decreased appetite. More severe exposure can result in anemia, severe gastrointestinal disturbance, a "lead-line" on the gums, neurological symptoms, convulsions, and death.

Neurological effects are among the most severe of inorganic lead's toxic effects and vary depending on the age of individual exposed. Effects observed in adults occur primarily in the peripheral nervous system, resulting in nerve destruction and degeneration. Wrist-drop and foot-drop are two characteristic manifestations of this toxicity.

The EPA also currently lists inorganic lead as a Group B2 probable human carcinogen via the oral route. This conclusion is based on feeding studies conducted in laboratory animals. The current PEL-TWA for inorganic lead is 0.05 mg/m3. Occupational exposure to lead is also specifically regulated under WAC 296-62-07521, with an action level established at 0.03 mg/m3 that triggers monitoring and other requirements. It is not anticipated that any sampling activities involving potential exposure to lead will trigger monitoring requirements for lead, because of the extremely low concentrations released to the air during paint sampling activities.

3.3 Biological Hazards

The parcel may contain spiders, snakes, and other types of natural hazards. Boots and protective clothing should be inspected for spiders prior to putting them on. Snakes should be avoided to prevent snakebites. If a spider or snake bit occurs, the HSO shall be notified immediately and the victim should be transported to North Vista Hospital in North Las Vegas, Nevada.

3.4 General Hazards

General hazards that may be encountered during sampling activities and preventative measures are described in the following sections and include:

- Slips, trips, and falls
- Elevated noise levels
- Hazards associated with lifting and carrying
- Hazards associated with sharp tools
- Extreme weather conditions

3.4.1 Slips, Trips, and Falls

Protection from slips and trips can be curbed by utilizing common sense and being aware of your surroundings. Falls are a leading cause of occupational fatalities. These fatalities are considered preventable with the use of fall protection systems. The following is a list of common fall hazards:

- Elevated work at > 6 feet above lower level with unprotected sides or edges
- Wall openings > 4 feet above lower level
- Floor/Roof openings (hatches)
- Floor/Roof holes (deterioration), i.e. failing roof
- Ramps, walkways, bridges
- Excavations

Protection from fall hazards can be achieved in one of three ways: 1) fixed position systems, 2) personal fall protection, and 3) safety monitoring systems. A combination of these three protection systems is often used to ensure the safety of site workers. Fixed position systems consist of guardrails, safety nets, and floor covers. Personal fall protection will consist of a full-body harness with a 6-foot shock-absorbing lanyard. Good housekeeping, proper PPE, and daily safety meetings can minimize injuries from falls.

3.4.2 Elevated Noise Levels

During on-site activities requiring the use of power equipment, hearing protection may be required to be worn for certain tasks or in designated areas where noise levels reach > 85 dBA. Training on proper use of hearing protection will be conducted prior to initiation of specified onsite work.

3.4.3 Hazards Associated with Lifting and Carrying

The human body is subject to severe damage in the form of back injury and/or hernia if caution is not observed in the handling process. General rules for minimizing injuries from manual lifting are:

- Get good footing.
- Place feet shoulder width apart.
- BEND AT KNEES to grasp object.
- Keep back straight.
- Get a good grip on object.
- Lift gradually by straightening the legs.
- GET HELP if object is too heavy for you to lift (usually 50-60 lbs lifting limit).

3.4.4 Hazards Associated with Sharp Tools

Sampling activities may require the use of sharp tools when cutting or chipping samples from building materials. Cuts and punctures may occur if care is not heeded. Use extreme care when using sharp instruments. Retract blades into containers, or hold blades and sharp tools away from the body when walking

3.4.5 Extreme Weather Conditions

Extreme weather may occur at any time. Since the site activities are anticipated to be performed in the late winter or spring, it is anticipated that temperatures at the site during the proposed activities may exist at levels below freezing.

3.5 Task Hazard Analysis

3.5.1 Ground Penetrating Radar Survey

The ground penetrating radar (GPR) survey will consist of equipment rolling across the ground surface. Hazards from this task may include slips, trips, falls, and extreme weather conditions. In addition, biological hazards at the site may pose as a hazard to GPR technicians.

3.5.2 Boring Advancement

Boring advancement activities may disturb the soil in such a way that causes dust to become airborne. If this occurs, the risk of respiratory exposure goes up. In addition, dermal contact may occur if care is not taken to avoid contact with skin. Care should be taken to avoid the previously stated actions.

3.5.3 Collection of Soil Samples

Dermal contact may occur during collection of soil samples if care is not taken to avoid contact with skin. Care should be taken to avoid the previously stated actions.

3.5.4 Collection of Asbestos Samples

Inhalation of asbestos in dust may occur if care is not heeded during collection of bulk suspect asbestos samples. Use wet methods to collect samples. Spray areas damaged by sampling with adhesive or encapsulant to hold down fibers.

3.5.5 Collection of Lead Based Paint Samples

Inhalation of lead in dust may occur if care is not heeded during collection of bulk suspect lead based paint samples. Use wet methods or adhesive tape as necessary to avoid generating any dusts. Repair areas damaged during sampling immediately.

4. PERSONNEL TRAINING REQUIREMENTS

Consistent with OSHA's 29 CFR 1910.120, regulation covering Hazardous Waste Operations and Emergency Response and OSHA's 29 CFR 1926 Construction Industry Standards, workers are required to be trained in accordance with those standards. At a minimum, all personnel are required to be trained to recognize the hazards on-site and the provisions of this HASP.

4.1 Pre-assignment and Annual Refresher Training

Prior to arrival on site, each employer will be responsible for certifying that his/her employees meet the requirements of training, consistent with OSHA 29 CFR 1910.120 paragraph (e)(3) or (e)(9). The employer should be able to provide a document certifying that each general site worker has received 40 hours of instruction off the site, and 24 hours of training for any workers who are on site only occasionally for a specific task. If an individual employee has work experience and/or training that is equivalent to that provided in the initial training, an employer may waive the 40-hour training so long as that equivalent experience is documented or certified. All personnel must also receive 8 hours of refresher training annually.

4.2 Training and Briefing Topics

The following items may be discussed by a qualified individual at the site pre-entry briefing(s) and at periodic tailgate safety meetings.

Physical Hazards	Chemical Hazards
Emergency Response Plan	Air Monitoring
Training Requirements	Animal Bites and Stings
Respiratory Protection	Medical Surveillance
Site Control	Personal Protective Equipment
Heavy Machinery	

5. PERSONAL PROTECTIVE EQUIPMENT TO BE USED

This section describes the general requirements of the EPA designated Levels of Protection (A-D), and the specific levels of protection required for each task at the site.

5.1 Levels of Protection

Personnel wear protective equipment when response activities involve known or suspected atmospheric contamination vapors, gases, or particulate that may be generated by site activities, or when direct contact with skin-affecting substances may occur. The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B is the primary level of choice when encountering unknown environments.

Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.

Level D: Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective ensemble (i.e., material, format) will depend upon contaminants and degrees of contact. The Level of Protection selected is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, liquids, or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, contaminant matrix, and adequate warning properties.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified. For all unknown situations on this site, Level D is the highest level anticipated.

5.2 Recommended Levels of Protection – Task Specific

The following specific personal protective ensembles are recommended for the site:

***GPR Survey / Site Reconnaissance* - (Level D)**

- Outer Gloves - Nitrile
- Hardhat
- Safety Glasses
- Steel-toed Boots

***Boring Advancement* - (Level D)**

- Outer Gloves - Nitrile
- Hardhat
- Safety Glasses
- Steel-toed Boots

***Soil Sampling* - (Level D)**

- Outer Gloves - Nitrile
- Hardhat
- Safety Glasses
- Steel-toed Boots

***Asbestos and Lead-based Paint Sampling* - (Level D)**

- Outer Gloves - Nitrile
- Hardhat
- Safety Glasses
- Steel-toed Boots

Note: It is not anticipated that respiratory protection will be necessary during routine sampling activities, unless damaged materials known to contain asbestos or lead are present. A half- or full-mask respirator with HEPA cartridges will be worn by personnel whenever undue risk of exposure to lead or asbestos exists. Such situations could arise if sampling in areas with a large amount of suspect asbestos or lead dust or debris. Respirators, if used, shall be NIOSH/MSHA-approved. Cartridges shall be changed whenever breathing resistance increases noticeably. Cartridge changes shall be made only in areas outside the area in which respiratory protection is being used. All respiratory protection will follow OSHA Safety and Health Standards 29 CFR 1910.134.

5.3 Reassessment of Protection Program

The level of Protection provided by PPE selection shall be upgraded or downgraded based upon a change in site conditions or findings of investigations. When a significant change occurs, the hazards should be reassessed and the HASP updated. Some indicators of the need for reassessment are:

- Commencement of a new work phase, such as the start of unexpected sampling or work that begins on a different portion of the site;
- Change in job tasks during a work phase;
- Contaminants other than those previously identified are encountered;
- Change in ambient levels of contaminants;
- Change in work scope which affects the degree of contact with contaminants.

5.4 SOP for Personal Protective Equipment

Proper inspection of PPE features several sequences of inspection depending upon specific articles of PPE and its frequency of use. The different levels of inspection are as follows:

- Inspection and operational testing of equipment received from the factory or distributor;
- Inspection of equipment as it is issued to workers;
- Inspection after use or training and prior to maintenance;
- Periodic inspection of stored equipment; and
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The primary inspection of PPE in use for activities at the site will occur prior to immediate use and will be conducted by the user. This ensures that the specific device or article has been checked-out by the user and that the user is familiar with its use.

6. MEDICAL SURVEILLANCE REQUIREMENTS

Medical monitoring programs are designed to track the physical condition of employees on a regular basis as well as survey pre-employment or baseline conditions prior to potential exposures. The medical surveillance program is a part of each employers Health and Safety program. Exposure to toxic materials is not anticipated at the Site.

6.1 Exposure/Injury/Medical Support

As a follow-up to an injury or possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Depending upon the type of exposure, it is critical to perform follow-up testing within 24-28 hours. It will be up to the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects.

7. EXPOSURE MONITORING/AIR MONITORING

Exposure monitoring will not take place at the Site.

8. SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

8.1 Site Communications Plan

Successful communications between field teams and contact with personnel in the support zone is essential. The following communications systems will be available during activities at the site.

- Hand Signals
- Verbal
- Honk Vehicle Horn - Evacuate immediately

Signal	Definition
Hands on top of head	Need assistance
Thumbs up	OK/I am all right/I understand
Thumbs down	No/negative
Arms waving upright	Send backup support
Grip partners wrist	Exit area immediately

8.2 Safe Work Practices

The following is a list of standing orders for the duration of the project.

- No smoking, eating, or drinking in areas where there is a potential of cross contamination or risk of fire or explosion.
- No horse play.
- Implement the communications system.
- Line of sight must be in position.
- Wear the appropriate level of protection as defined in the Safety Plan.
- No unauthorized entry into hazardous work areas by unauthorized personnel l

9. DECONTAMINATION PLAN

Consistent with the levels of protection required, the decontamination process provides a step by step representation of the personnel decontamination steps for level D and C. These procedures should be modified to suit site conditions and protective ensembles in use. Decontamination involves the orderly controlled removal of contaminants. All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination.

9.1 Personnel Decontamination

All workers exposed to COCs will be required to enact an orderly removal of contaminated PPE. This can be accomplished through repeated change of disposable garments and or PPE wash at the end of the shift. Workers shall be instructed to the importance of decontamination to prevent cross contamination.

9.2 Sampling Equipment Decontamination

Sampling equipment and heavy equipment may be decontaminated in accordance with procedures as defined in the work plan or as follows:

- Sampling equipment will be rinsed using water and a 5% tri-sodium phosphate solution (or an acceptable substitute).
- Sampling equipment will be decontaminated between sample collections to prevent cross contamination.

Disposable sampling equipment shall be utilized wherever practical to minimize employee exposure and possible cross contamination between sampling events.

10. EMERGENCY RESPONSE/CONTINGENCY PLAN

This section describes contingencies and emergency planning procedures to be implemented at the Site. This plan is compatible with local, state, and federal disaster and emergency management plans as appropriate.

10.1 Pre-Emergency Planning

A field pre-construction / field activities meeting will be conducted at the project site prior to implementation of field services. The meeting will include personnel from MGA and selected contractors, if applicable. Each of the activities and procedures presented will be reviewed during this meeting.

In addition, tailgate site safety discussions will be held daily. All employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. The plan will be reviewed and revised if necessary, on a regular basis by the HSO. This will ensure that the plan is adequate and consistent with prevailing site conditions.

10.2 Emergency Recognition/Prevention

Section 3 provides a listing of chemical hazards onsite. Additional hazards as a direct result of site activities are listed in Section 3.2 as are prevention and control techniques/mechanisms. Personnel will be familiar with techniques of hazard recognition from pre-assignment training and site specific briefings. The HSO is responsible for ensuring that prevention devices or equipment is available to personnel.

10.3 Evacuation Routes/Procedures

Since all individuals sampling will be within shouting distance, no special alarm system is anticipated as necessary. Contact appropriate emergency authorities. No other situation calling for site evacuation is reasonably anticipated.

10.4 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a medical emergency, personnel will take direction from the HSO and notify the appropriate emergency organization. In the event of a fire or spill, the site supervisor will notify the appropriate local, state, and federal agencies.

Organization	**Telephone**
Ambulance:	911
Police:	911
Fire:	911
North Vista Hospital	(702) 649-7711
NDEP	(775) 687-4670
Regional EPA:	(415) 744-1500

EPA Emergency Response Team:	(908) 321-6660
National Response Center:	(800) 424-8802
Center for Disease Control:	(404) 488-4100
Chemtrec:	(800) 424-9555

10.5 Nearest Medical Assistance

The nearest medical facility is the North Vista Hospital. The facility is located at 1409 East Lake Mead Boulevard, North Las Vegas, Nevada. A map of the route to this facility which can provide emergency care for individuals who may experience an injury or exposure on site is included in Appendix C of this HASP. The route to the facility should be verified by the HSO prior to sampling activities, and should be familiar to all site personnel.

10.6 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the work area must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket). First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the project manager.

10.7 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the project manager or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on site. If it is safe to do so, site personnel may:

- Use fire-fighting equipment available on site to control or extinguish the fire; and
- Remove or isolate flammable or other hazardous materials which may sustain a fire.

10.8 Emergency Equipment/Facilities

All emergency equipment will be located in the command post and/or support zone and shall include:

- First aid kit;
- Fire extinguisher; and
- Mobile telephone.

11. HAZARD COMMUNICATION

In order to comply with 29 CFR 1910.1200, Hazard Communication, the following written Hazard Communication Program has been established. All employees will be briefed on this program and have a written copy for review.

11.1 Container Labeling

All containers received on site will be inspected to ensure the following:

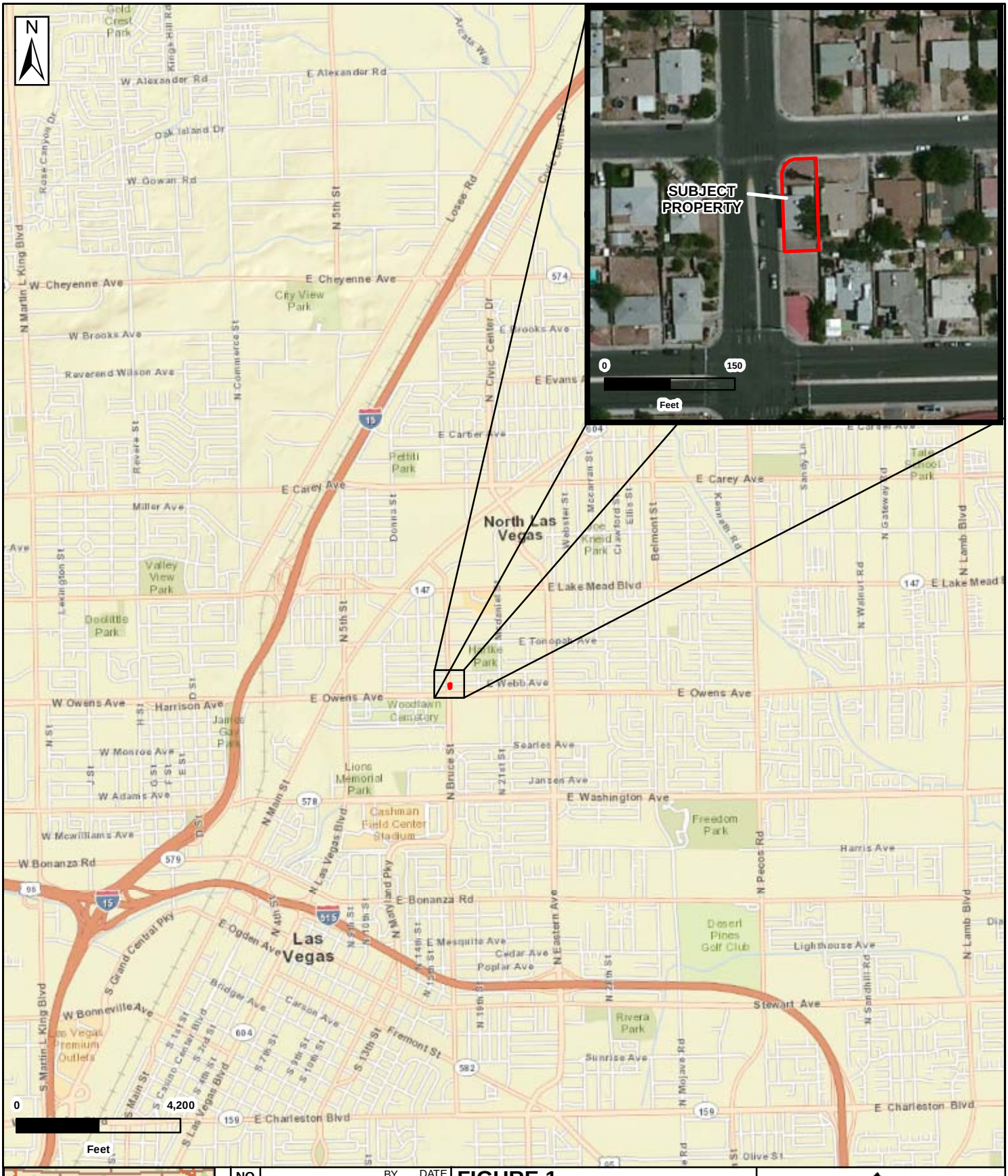
- All containers will be clearly labeled as to the contents;
- The appropriate hazard warnings will be noted; and
- The name and address of the manufacturer will be listed.

All secondary containers will be labeled with either an extra copy of the original manufacturer's label or with generic labels which have a block for identify and blocks for the hazard warning.

11.2 Employee Training and Information

Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:

- An overview of the requirements contained in the Hazard Communication Standard, 29 CFR 1910.1200;
- Chemicals present in their workplace operations;
- Location and availability of a written hazard program;
- Physical and health effects of the hazardous chemicals;
- Methods and observation techniques used to determine the presence or release of hazardous chemicals;
- How to lessen or prevent exposure to these hazardous chemicals through usage of control/work practices and personal protective equipment;
- Emergency procedures to follow if they are exposed to these chemicals;
- How to read labels and review MSDSs to obtain appropriate hazard information;



NO.	BY	DATE

REVISIONS

A

DESIGNED	SH
DRAWN	TAD
CHECKED	SH
APPROVED	

JOB NO.: BRN-028

FIGURE 1

PROJECT LOCATION MAP
-SHOWING-
APN 139-23-812-025
1301 EAST WEBB AVE.
NORTH LAS VEGAS, NEVADA

McGinley & Associates
Environmental Engineering and Science
RENO | LAS VEGAS | www.mcgis.com

COORDINATE SYSTEM:
NAD 1983 UTM Zone 11N

BRN 028 01
5/5/2015

APPENDIX A

Statement of Compliance

HASP

Statement of Compliance

I have read and understand the HASP for the site investigation at 1301 East Webb Avenue, North Las Vegas, Clark County, Nevada.

I agree to comply with the contents of the HASP and understand that not doing so may be reason for discharge from the site.

Signature: _____ Date: _____

Signature: _____ Date: _____

Signature: _____ Date: _____

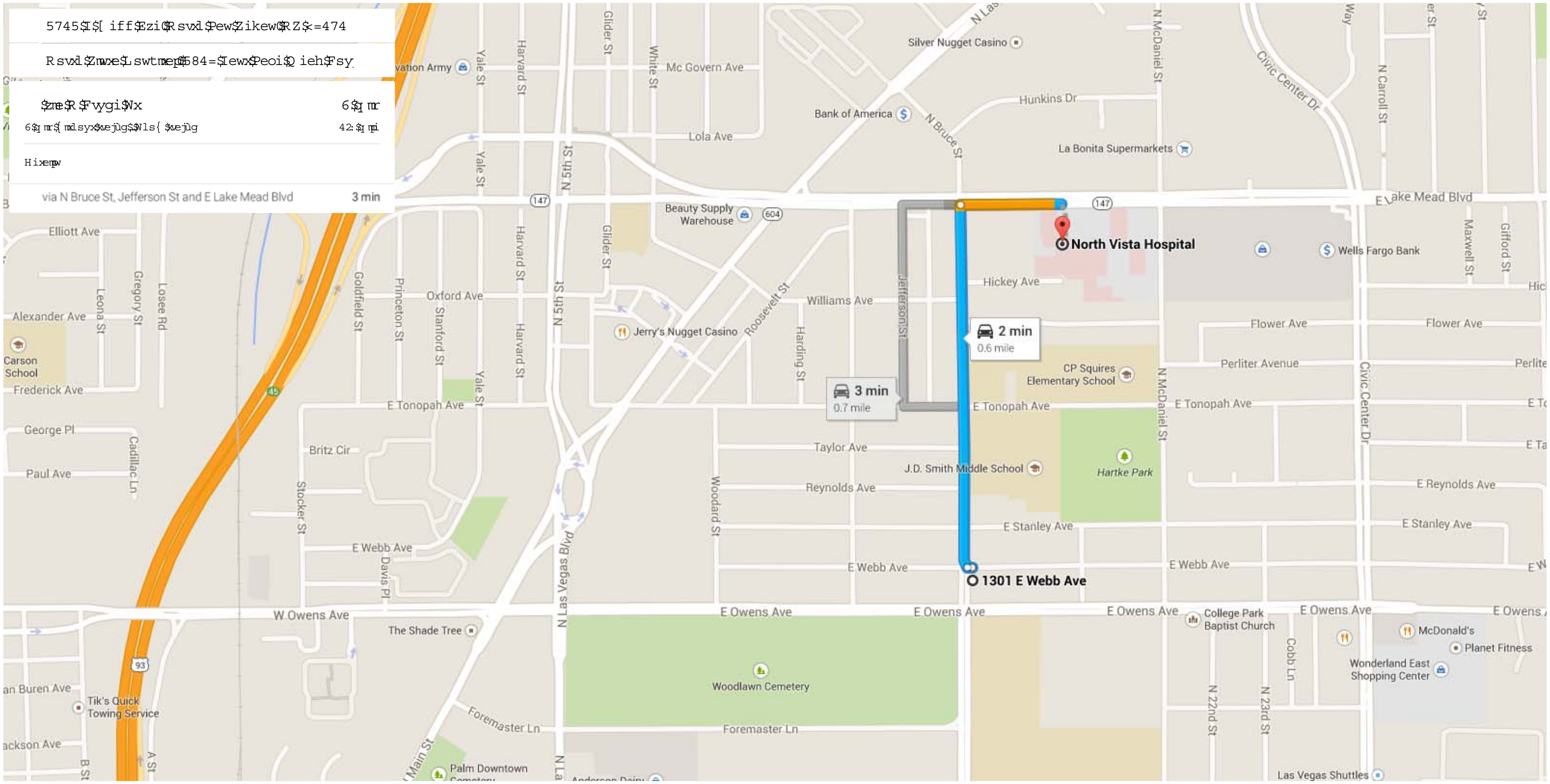
Signature: _____ Date: _____

Signature: _____ Date: _____

Signature: _____ Date: _____

APPENDIX B

Route to Nearest Medial Assistance


via N Bruce St, Jefferson St and E Lake Mead Blvd
3 min
North Vista Hospital
1301 E Webb Ave
2 min
0.6 mile
3 min
0.7 mile
E Lake Mead Blvd
Silver Nugget Casino
Bank of America
Hunkins Dr
La Bonita Supermarkets
Beauty Supply Warehouse
Wells Fargo Bank
Hickey Ave
Williams Ave
Jerry's Nugget Casino
Flower Ave
Perliter Avenue
CP Squires Elementary School
E Tonopah Ave
Taylor Ave
J.D. Smith Middle School
Hartke Park
Reynolds Ave
E Stanley Ave
E Webb Ave
E Owens Ave
W Owens Ave
College Park Baptist Church
McDonald's
Planet Fitness
Wonderland East Shopping Center
Woodlawn Cemetery
Foremaster Ln
The Shade Tree
Tik's Quick Towing Service
Las Vegas Shuttles
Palm Downtown
Carson School
Mc Govern Ave
Lola Ave
Oxford Ave
Britz Cir
Elliott Ave
Alexander Ave
Frederick Ave
George Pl
Paul Ave
N Las Vegas Blvd
N 5th St
Civic Center Dr
N McDaniel St
Jefferson St
Roosevelt St
Harding St
Woodard St
N Bruce St
N Carroll St
Maxwell St
Gifford St
N 22nd St
N 23rd St
Cobb Ln

APPENDIX C

MGA SOPs

GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

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

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

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

(1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.

(2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

Grab Samples

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Composite Samples

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have

been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

- Objective and purpose of the investigation.
- Basis upon which data will be evaluated.
- Information known about the site including location, type and size of the facility, and length of operations/abandonment.
- Type and volume of contaminated material, contaminants of concern (including concentration), and basis of the information/data.
- Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
- Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
- QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate

documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

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

PHOTOIONIZATION DETECTOR (PID) HNU

SOP#: 2114
DATE: 10/06/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedure for using a photoionization detector (PID). The PID is a portable, nonspecific, vapor/gas detector employing the principle of photoionization to detect a variety of chemical compounds, both organic and inorganic, in air. This procedure is applicable to the HNU PI-101, HNU ISPI-101, and HW-101 used for air monitoring.

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

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

The PID is a useful general survey instrument at hazardous waste sites. A PID is capable of detecting and measuring real-time concentrations of many organic and inorganic vapors in air. A PID is similar to a flame ionization detector (FID) in application; however, the PID has somewhat broader capabilities in that it can detect certain inorganic vapors. Conversely, the PID is unable to respond to certain low molecular weight hydrocarbons, such as methane and ethane, that are readily detected by FID instruments.

The PID employs the principle of photoionization. The analyzer will respond to most vapors that have an ionization potential less than or equal to that supplied by the ionization source, which is an ultraviolet (UV) lamp. Photoionization occurs when an atom or molecule absorbs a photon of sufficient energy to release an electron and form a positive ion. This will occur when the ionization potential of the molecule in electron volts (eV) is less than the energy of the photon. The sensor is housed in a probe and consists of a sealed ultraviolet light source that emits photons with an energy level high enough to ionize many trace organics, but not enough to ionize the major components of air (e.g., nitrogen, oxygen, carbon dioxide). The ionization chamber exposed to the light source contains a pair of electrodes, one a bias electrode, and the second the collector electrode. When a positive potential is applied to the bias electrode, an electro-magnetic field is created in the chamber. Ions formed by the adsorption of photons are driven to the collector electrode. The current produced is then measured and the corresponding concentration displayed on a meter, directly, in units above background. Several probes are available for the PID, each having a different eV lamp and a different ionization potential. The selection of the appropriate probe is essential in obtaining useful field results. Though it can be calibrated to a particular compound, the instrument cannot distinguish between detectable compounds in a mixture of gases and, therefore, indicates an integrated response to the mixture.

Three probes, each containing a different UV light source, are available for use with the HNU. Energies are 9.5, 10.2, and 11.7 eV. All three detect many aromatic and large molecular hydrocarbons. The 10.2 eV and 11.7 eV probes, in addition, detect some smaller organic molecules and some halogenated hydrocarbons. The 10.2 eV probe is the most useful for environmental response work, as it is more durable than the 11.7 eV probe and detects more compounds than the 9.5 eV probe.

Gases with ionization potentials near to or less than that of the lamp will be ionized. These gases will thus be detected and measured by the analyzer. Gases with ionization potentials higher than that of the lamp will not be detected. Ionization potentials for various atoms, molecules, and compounds are given in

Table 1 (Appendix A). The ionization potential of the major components of air, oxygen, nitrogen, and carbon dioxide, range from about 12.0 eV to about 15.6 eV and are not ionized by any of the three lamps.

Table 2 (Appendix A) illustrates ionization sensitivities for a large number of individual species when exposed to photons from a 10.2 eV lamp. Applications of each probe are included in Table 3 (Appendix A).

While the primary use of the HNU is as a quantitative instrument, it can also be used to detect certain contaminants, or at least to narrow the range of possibilities. Noting instrument response to a contaminant source with different probes can eliminate some contaminants from consideration. For instance, a compound's ionization potential may be such that the 9.5 eV probe produces no response, but the 10.2 eV and 11.7 eV probes do elicit a response.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

4.1 PID Instrument Limitations

1. The PID is a nonspecific total vapor detector. It cannot be used to identify unknown substances; it can only roughly quantify them.

2. The PID must be calibrated to a specific compound.

3. The PID does not respond to certain low molecular weight hydrocarbons, such as methane and ethane. In addition, the HNU does not detect a compound if the probe has a lower energy than the compound's ionization potential.

4. Certain toxic gases and vapors, such as carbon tetrachloride and hydrogen cyanide, have high ionization potentials and cannot be detected with a PID.

5. Certain models of PID instruments are not intrinsically safe. The HNU PI-101 and HW-101 are not designed for use in potentially flammable or combustible atmospheres. Therefore, these models should be used in conjunction with a Combustible Gas Indicator. The ISPI-101 is intrinsically safe, however.

6. Electrical power lines or power transformers may cause interference with the instrument and thus cause measurement errors. Static voltage sources such as power lines, radio transmissions, or transformers may also interfere with measurements.

7. High winds and high humidity will affect measurement readings. The HNU may become unusable under foggy or humid conditions. An indication of this is the needle dropping below zero, or a slow constant climb on the read-out dial.

8. The lamp window must be periodically cleaned to ensure ionization of the new compounds by the probe (i.e., new air contaminants).

9. The HNU measures concentrations from about 1-2000 ppm, although the response is not linear over this entire range. For example, if calibrated to benzene, the response is linear from about 0-600 units above background. This means the HNU reads a true concentration of benzene only between 0 and 600. Greater concentrations are detected at a lower level than the true value.

10. This instrument is not to be exposed to precipitation (rain). The units are not designed for this service.

11. Do not use this instrument for head space analysis where liquids can inadvertently be drawn into the probe.

4.2 Regulatory Limitations

Transport of calibration gas cylinders by passenger and cargo aircraft must comply with International Air Transport Association (IATA) Dangerous Goods

Regulations or the U.S. Code of Federal Regulations, 49 CFR Parts 100-177. A typical calibration gas included with a PID is isobutylene. It is classified as a non-flammable gas, UN #1556 and the proper shipping name is Compressed Gas. It must be shipped by cargo aircraft only.

5.0 EQUIPMENT/APPARATUS

The following equipment is required for PID operation:

- PID (HNU)
- Operating manual
- Probes: 9.5 eV, 10.2 eV, or 11.7 eV
- Battery charger for PID
- Spare batteries
- Jeweler's screwdriver for adjustments
- Tygon tubing
- NBS traceable calibration gas
- "T" valve for calibration
- Field Data Sheets/Site Logbook
- Intake assembly extension
- Strap for carrying PID
- Teflon tubing for downhole measurements
- Plastic bags for protecting the PID from moisture and dirt

Note: Battery charge status - This instrument may be kept on continuous charge without battery damage.

6.0 REAGENTS

- Isobutylene standards for calibration
- Benzene reference standard
- Methanol for cleaning ionization chamber (GC grade)
- Mild soap solution for cleaning unit surfaces
- Specific gas standards when calibrating to a specific compound
- Light source cleaning compound Cat. No. PA101534-A1 (For use only with 9.5 and 10.2 lamps)

The HNU is calibrated in accordance with the operations manual using isobutylene as the calibration standard. The operations manual may also be referred to for alternate calibration to a specific compound.

7.0 PROCEDURES

7.1 Preparation

Check out and ensure the proper operation of the PID, as appropriate, using the equipment checklist provided in Sections 5.0 and 6.0 and the steps listed below.

7.2 Start-Up Procedures

1. Allow the temperature of the unit to equilibrate to its surrounding. This should take about five minutes.

2. Attach the probe to the read-out unit. Match the alignment key, then twist the connector clockwise until a distinct locking is felt. Make sure the microswitch (red button) is depressed by the locking ring.

3. Turn the FUNCTION switch to the battery check position. Check to ensure that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc, or if the red LED comes on, the battery must be charged prior to using.

4. To zero the instrument, turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15-20 seconds to ensure that the zero adjustment is stable; if not, then readjust.

5. Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used (i.e., 9.8 for the 10.2 eV probe, 5.0 for the 11.7 eV probe, 1 for the 9.5 eV probe. Note: The setting may vary based on the intensity of the light source).

6. Set the FUNCTION switch to the desired range (i.e., 0-20, 0-200, 0-2000).

7. Listen for the fan operation to verify fan function.

8. Look for ultraviolet light source in the probe to verify function. Do not look at light source from closer than six inches with unprotected eyes, observe only briefly.

9. Check instrument with an organic point source, such as a magic marker, prior to survey to verify instrument function.

10. Routinely during the day, verify the useful battery life by turning the function switch to BATT and schedule the instrument's use accordingly.

7.3 Field Operation

7.3.1 Field Calibration

1. Follow the start-up procedure in Section 7.2.

2. Set the FUNCTION switch to the range setting which includes the concentration of the calibration gas.

3. Attach a regulator to a disposable cylinder of calibration gas. Connect the regulator to the probe of the HNU with a piece of clean tygon tubing. Open the valve on the regulator.

4. After 15 seconds, the meter reading should equal the response value as indicated on the calibration gas cylinder used. If the reading is within ±15% of the response value, then the instrument can be field calibrated to the response value using the external SPAN ADJUSTMENT control. The SPAN ADJUSTMENT control should be adjusted to a lower setting until the correct reading has been obtained. The lower the number on the SPAN ADJUSTMENT conrol, the greater the instrument sensitivity. If the SPAN ADJUSTMENT control has to be adjusted below a setting of 4.00, the unit should be red-tagged and returned for repairs.

5. If the meter reading is greater than ±15% of the response value of the calibration gas used, then the instrument should be red-tagged and returned for re-calibration.

6. Record the following information in the site logbook: the instrument ID number (U.S. EPA decal or serial number if the instrument is a rental), the initial and final span settings, the date and time, concentration and type of calibration gas used, and the name of the person who field calibrated the instrument.

7. If the PID does not start up, check out, or calibrate properly, the instrument should not be used. Under no circumstances is work requiring air monitoring with a PID to be done without a proper functioning instrument.

8. In some field applications, with the exception of the probe's inlet and exhaust, the PID should be wrapped in clear plastic to prevent it from becoming contaminated and to prevent water from getting inside in the event of precipitation.

7.3.2 Operation

1. All readings are to be recorded in the site logbook. Readings should be recorded, following background readings, as "units above background," not ppm.

2. As with any field instrument, accurate results depend on the operator being completely familiar with the operator's manual. The instructions in the operating manual should be followed explicitly in order to obtain accurate results.

3. Position the probe assembly close to the area to be monitored because the low sampling rate allows for only very localized readings. Under no circumstances should the probe tip assembly be immersed in fluid.

4. While taking care to prevent the PID from being exposed to excessive moisture, dirt, or contamination, monitor the work activity as specified in the site Health and Safety Plan. The PID survey should be conducted at a slow to moderate rate of speed and the intake assembly (the probe) slowly swept from side to side. There is a three to five second delay in read-out depending upon the instruments sensitivity to the contaminant.

5. During drilling activities, PID monitoring is performed at regular intervals downhole, at the headspace, and in the breathing zone. In addition, where elevated organic vapor levels are encountered, monitoring may be performed in the breathing zone during actual drilling. When the activity being monitored is other than drilling, readings should emphasize breathing zone conditions.

6. When the activity is completed or at the end of the day, carefully clean the outside of the PID with a damp disposable towel to remove any visible dirt.

7.4 Post Operation

1. Turn FUNCTION Switch to OFF.

2. Return the PID to a secure area and check the calibration (Section 7.3.1.) before charging. Connect the instrument to charger and plug in the charger. The probe must be connected to the readout unit to charge the HNU.

3. Complete logbook entries, verifying the accuracy of entries and signing/initialing all pages. Following completion of a series of "0" readings, verify the instrument is working as in Section 7.3.1.

4. Check the equipment, repair or replace damaged equipment, and charge the batteries.

7.5 Equipment Calibration

1. Follow the start-up procedure in Section 7.2.

2. Set the FUNCTION switch to the range setting which includes the concentration of the calibration gas.

3. Attach a regulator to a cylinder of calibration gas. Connect the regulator to the probe of the NHU with a piece of clean tygon tubing. Open the valve on the regulator.

4. After 15 seconds, the meter reading should equal the response value as indicated on the calibration gas cylinder used. If the reading is greater than ±15% of the actual concentration, an internal calibration is necessary. Unlock the SPAN POTENTIOMETER dial before adjusting it. Adjust the SPAN POTENTIOMETER to the span setting recommended for the probe being used (i.e., 9.8 for the 10.2 eV probe, 5.0 for the 11.7 eV probe, 1 for the 9.5 eV probe). To calibrate the instrument, unscrew the bottom support screw and lift the instrument out of the case. Locate and adjust the trimpot "R-32" (near the top of the printed circuit board) by inserting a small screwdriver and gently turning. When the instrument gives the correct reading for the calibration gas being used, reassemble it.

5. Record the following information in the calibration logbook: the instrument identification number (U.S. EPA barcode number or serial number if the instrument is a rental), the initial and final span settings, the date and time, concentration and type of calibration gas used, and the name of the person who calibrated the instrument. Affix a sticker to the instrument indicating the person who performed the calibration, the date of calibration, and the due date of the next calibration.

6. Turn the FUNCTION switch to OFF and connect the instrument to the charger. The probe must be connected to the readout unit to ensure that the unit accepts a charge.

8.0 CALCULATIONS

The HNU is a direct reading instrument. Readings are interpreted as units above background rather than ppm.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in

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

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, or corporate health and safety practices.

The HNU is certified by OSHA standards for use in Class 1, Division 2, Groups A, B, C, and D locations.

12.0 REFERENCES

HNU Systems, Inc. 1975. "Instruction Manual for Model PI-101 Photoionization Analyzer."

U.S. Code of Federal Regulations, 49 CFR Parts 100 to 177, Transportation, revised November 1, 1985.

U.S. Environmental Protection Agency. 1984. "Characterization of Hazardous Waste Sites - A Methods Manual: Volume II, Available Sampling Methods, Second Edition", EPA-600/4-84-076, Environmental Monitoring Systems Laboratory, Office of Research and Development, Las Vegas, Nevada.

International Air Transport Association Dangerous Goods Regulations

APPENDIX A

Tables

TABLE 1. Ionization Potentials

SOME ATOMS AND SIMPLE MOLECULES

Molecule	IP(Ev)	Molecule	IP (eV)
H	13.595	I_2	9.28
C	11.264	HF	15.77
N	14.54	HCl	12.74
O	13.614	HBr	11.62
Si	8.149	HI	10.38
S	10.357	SO_2	12.34
F	17.42	CO_2	13.79
Cl	13.01	COS	11.18
Br	11.84	CS_2	10.08
I	10.48	N_2O	12.90
H_2	15.426	NO_2	9.78
N_2	15.580	O_3	12.80
O_2	12.075	H_2O	12.59
CO	14.01	H_2S	10.46
CN	15.13	H_2Se	9.88
NO	9.25	H_2Te	9.14
CH	11.1	HCN	13.91
OH	13.18	C_2N_2	13.8
F_2	15.7	NH_3	10.15
Cl_2	11.48	CH_3	9.840
Br_2	10.55	CH_4	12.98

PARAFFINS AND CYCLOPARAFFINS

Molecule	IP (eV)
Methane	12.98
Ethane	11.65
Propane	11.07
n-Butane	10.63
I-Butane	10.57
n-Pentane	10.35
ii-Pentane	10.32
2,2-Dimethylpropane	10.35
n-Hexane	10.18
2-Methylpentane	10.12
3-Methylpentane	10.08
2,2-Dimethylbutane	10.06
2,3-Dimethylbutane	10.02
n-Heptane	10.08
2,2,4-Trimethylpentane	9.86
Cyclopropane	10.06
Cyclopentane	10.53
Cyclohexane	9.88
Methylcyclohexane	9.85

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALKYL HALIDES

Molecule	IP (eV)	Molecule	IP (eV)
HCl	12.74	1-bromo-2-methylpropane	10.09
Cl_2	11.48	2-bromo-2-methylpropane	9.89
CH_4	12.98	1-bromopentane	10.10
Methyl chloride	11.28	HI	10.38
Dichloromethane	11.35	I_2	9.28
Trichloromethane	11.42	Methyl iodide	9.54
Tetrachloromethane	11.47	Diiodomethane	9.34
Ethyl chloride	10.98	Ethyl iodide	9.33
1,2-Dichloroethane	11.12	1-iodopropane	9.26
1,3-Dichloropropane	10.85	2-iodopropane	9.17
1-chlorobutane	10.67	1-iodobutane	9.21
2-chlorobutane	10.65	2-iodobutane	9.09
1-chloro-2-methylpropane	10.66	1-iodo-2-methylpropane	9.18
2-chloro-2-methylpropane	10.61	2-iodo-2-methylpropane	9.02
HBr	11.62	1-iodopentane	9.19
Br_2	10.55	F_2	15.7
Methyl bromide	10.53	HF	15.77
Dibromomethane	10.49	$CFCl_3$ (Freon 11)	11.77
Tribomomethane	10.51	CF_2Cl_2 (Freon 12)	12.31
CH_2BrCl	10.77	CF_3Cl (Freon 13)	12.91
$CHBr_2Cl$	10.59	$CHClF_2$ (Freon 22)	12.45
Ethyl bromide	10.29	CF_2Br_2	11.67
1,1-dibromoethane	10.19	CH_3CF_2Cl (Genetron 101)	11.98
1-bromo-2-chloroethane	10.63	$CFCl_2CF_2Cl$	11.99
1-bromopropane	10.18	CF_3CCl_3 (Freon 113)	11.78
2-bromopropane	10.075	$CFHBrCH_2Br$	10.75
1,3-dibromopropane	10.07	CF_2BrCH_2Br	10.83
1-bromobutane	10.13	CF_3CH_2l	10.00
2-bromobutane	9.98	n-C_3F_7l	10.36
1-chloropropane	10.82	n-$C_3F_7CH_2Cl$	11.84
2-chloropropane	10.78	n-$C_3F_7CH_2l$	9.96
1,2-dichloropropane	10.87	CF_2Br_2	11.07

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALIPHATIC ALCOHOL, ETHER, THIOL, AND SULFIDES

Molecule	IP (eV)
Water	12.59
Methyl alcohol	10.85
Ethyl alcohol	10.48
n-propyl alcohol	10.20
i-propyl alcohol	10.16
n-butyl alcohol	10.04
Dimethyl ether	10.00
Diemthyl ether	9.53
n-propyl ether	9.27
i-propyl ether	9.20
Hydrogen Sulfide	10.46
Methanethiol	9.440
Ethanethiol	9.285
1-propanethiol	9.195
1-butanethiol	9.14
Dimethyl sulfide	8.685
Ethyl methyl sulfide	8.55
Diethyl sulfide	8.430
di-n-propyl sulfide	8.30

ALIPHATIC ALDEHYDES AND KETONES

Molecule	IP (eV)
Carbon Dioxide	13.79
Formaldehyde	10.87
Acetaldehyde	10.21
Propionaldehyde	9.98
n-butyraldehyde	9.86
Isobutyraldehyde	9.74
n-valeraldehyde	9.82
Isovaleraldehyde	9.71
Acrolein	10.10
Crotonaldehyde	9.73
Benzaldehyde	9.53
Acetone	9.69
Methyl ethyl ketone	9.53
Methyl n-propyl ketone	9.39
Methyl i-propyl ketone	9.32
Diethyl ketone	9.32
Methyl n-butyl ketone	9.34
Methyl i-butyl ketone	9.30
3,3-dimethyl butanone	9.17
2-heptanone	9.33
Cyclopentanone	9.26
Cyclohexanone	9.14
2,3-butanedione	9.23
2,4-pentanedione	8.87

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALIPHATIC ACIDS AND ESTERS

Molecule	IP (eV)
Carbon Dioxide	13.79
Formic acid	11.05
Acetic acid	10.37
Propionic acid	10.24
n-butyric acid	10.16
Isobutyric acid	10.02
n-valeric acid	10.12
Methyl formate	10.815
Ethyl formate	10.61
n-propyl formate	10.54
n-butyl formate	10.50
Isobutyl formate	10.46
Methyl acetate	10.27
Ethyl acetate	10.11
n-propyl acetate	10.04
Isopropyl acetate	9.99
n-butyl acetate	10.01
Isobutyl acetate	9.97
Sec-butyl acetate	9.91
Methyl propionate	10.15
Ethyl propionate	10.00
Methyl n-butyrate	10.07
Methyl isobutyrate	9.98

ALIPHATIC AMINES AND AMIDES

Molecule	IP (eV)
Ammonia	10.15
Methyl amine	8.97
Ethyl amine	8.86
n-propyl amine	8.78
i-propyl amine	8.72
n-butyl amine	8.71
i-butyl amine	8.70
s-butyl amine	8.70
t-butyl amine	8.64
Dimethyl amine	8.24
Diethyl amine	8.01
Di-n-propyl amine	7.84
Di-i-propyl amine	7.73
Di-n-butyl amine	7.69
Trimethyl amine	7.82
Triethyl amine	7.50
Tri-n-propyl amine	7.23
Formamide	10.25
Acetamide	9.77
N-methyl acetamide	8.90
N,N-dimethyl formamide	9.12
N,N-dimethyl acetamide	8.81
N,N-diethyl formamide	8.89
N,N-diethyl acetamide	8.60

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

OTHER ALIPHATIC MOLECULES WITH N ATOM

Molecule	IP (eV)
Nitromethane	11.08
Nitroethane	10.88
1-nitropropane	10.81
2-nitropropane	10.71
HCN	13.91
Acetontrile	12.22
Propiontrile	11.84
n-butyronitrile	11.67
Acrylonitrile	10.91
3-butene-nitrile	10.39
Ethyl nitrate	11.22
Methyl thiocyanate	10.065
Ethyl thiocyanate	9.89
Methyl isothiocyanate	9.25
Ethyl isothiocyanate	9.14

OLEFINS, CYCLO-OLEFINS, ACETYLENES

Molecule	IP (eV)
Ethylene	10.515
Propylene	9.73
1-butene	9.58
2-methylpropene	9.23
Trans-2-butene	9.13
Cis-2-butene	9.13
1-pentene	9.50
2-methyl-1-butene	9.12
3-methyl-1-butene	9.51
3-methyl-2-butene	8.67
1-hexene	9.46
1,3-butadiene	9.07
Isoprene	8.845
Cyclopentene	9.01
Cyclohexene	8.945
4-methylcyclohexene	8.91
4-cinylcylohexene	8.93
Cyclo-octatetraene	7.99
Acetylene	11.41
Propyne	10.36
1-butyne	10.18

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

SOME DERIVATIVES OF OLEFINS		HETEROCYCLIC MOLECULES	
Molecule	IP (eV)	Molecule	IP (eV)
Vinyl chloride	9.995	Furan	8.89
Cis-dichloroethylene	9.65	2-methyl furan	8.39
Trans-dichloroethylene	9.66	2-furaldehyde	9.21
Trichloroethylene	9.45	Tetrahydrofuran	9.54
Tetrachloroethylene	9.32	Dihydropyran	8.34
Vinyl bromide	9.80	Tetrahydropyran	9.26
1,2-dibromoethylene	9.45	Thiophene	8.860
tribromoethylene	9.27	2-chlorothiophene	8.68
3-chloropropene	10.04	2-bromothiophene	8.63
2,3-dichloropropene	9.82	Pyrrole	8.20
1-bromopropene	9.30	Pyridine	9.32
3-bromopropene	9.7	2-picoline	9.02
$CF_3CCl=CClCF_3$	10.36	3-picoline	9.04
$n\text{-}C_5F_{11}CF=CF_2$	10.48	4-picoline	9.04
Acrolein	10.10	2,3-lutidine	8.85
Crotonaldehyde	9.73	2,4-lutidine	8.85
Mesityl oxide	9.08	2,6-lutidine	8.85
Vinyl methyl ether	8.93	Tribromoethylene	9.27
Allyl alcohol	9.67		
Vinyl acetate	9.19		

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

AROMATIC COMPOUNDS

Molecule	IP (eV)	Molecule	IP (eV)
Benzene	9.245	Phenyl isothiocyanate	8.520
Toluene	8.82	Benzonitrile	9.705
Ethyl benzene	3.76	Nitrobenzene	9.92
n-propyl benzene	8.72	Aniline	7.70
i-propyl benzene	8.69	Fluoro-benzene	9.195
n-butyl benzene	8.69	Chloro-benzene	9.07
s-butyl benzene	8.68	Bromo-benzene	8.98
t-butyl benzene	8.68	Iodo-benzene	8.73
o-xylene	8.56	o-dichlorobenzene	9.07
m-xylene	8.56	m-dichlorobenzene	9.12
p-xylene	8.445	p-dichlorobenzene	8.94
Mesitylene	8.40	1-chloro-2-fluorobenzene	9.155
Durene	8.025	1-chloro-3-fluorobenzene	9.21
Styrene	8.47	1-bromo-4-fluorobenzene	8.99
o-methyl styrene	8.35	o-fluorotoluene	8.915
Ethynylbenzene	8.815	m-fluorotoluene	8.915
Napthalene	8.12	p-fluorotoluene	8.785
1-methylnapthalene	7.69	o-chlorotoluene	8.83
2-methylnapthalene	7.955	m-chlorotoluene	8.83
Biphenyl	8.27	p-chlorotoluene	8.70
Phenol	8.50	o-bromotoluene	8.79
Anisole	8.22	m-bromotoluene	8.81
Phenetole	8.13	p-bromotoluene	8.67
Benzaldehyde	9.53	o-iodotoluene	8.62
Acetophenone	9.27	m-iodotoluene	8.61
Benzenethiol	8.33	p-iodotoluene	8.50
Phenyl isocyanate	8.77	Benzotrifluoride	9.68
		o-fluorophenol	8.66

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

MISCELLANEOUS MOLECULES

Molecule	IP (eV)
Ethylene oxide	10.565
Propylene oxide	10.22
p-dioxane	9.13
Dimethoxymethane	10.00
Diethyoxymethane	9.70
1,1-dimethoxyethane	9.65
Propiolactone	9.70
Methyl disulfide	8.46
Ethyl disulfide	8.27
Diethyl sulfite	9.68
Thiolacetic acid	10.00
Acetyl chloride	11.02
Acetyl bromide	10.55
cyclo-$C_6H_{11}CF_3$	10.46
(n-C_3F_7)(CH_3)C=O	10.58
Trichlorovinylsilane	10.79
$(C_2F_5)_3N$	11.7
Isoprene	9.08
Phosgene	11.77

APPENDIX A (Cont'd)

Tables

TABLE 2. Relative Photoionization Sensitivities for Gases

Chemical	Relative Sensitivity	Examples
Aromatic	10	Benzene, Toluene, Styrene
Aliphatic Acid	10	Diethylamine
Chlorinated Unsaturated	5-9	Vinyl Chloride, Vinylidene Chloride, Trichloroethylene
Carbonyl	7-9	MEK, MiBK, Acetone, Cyclohexanone
Unsaturated	3-5	Acrolein, Propylene, Cyclohexanone, Allyl Alcohol
Sulfide	3-5	Hydrogen Sulfide, Methyl Mercaptan
Paraffin (C5-C7)	1-3	Pentane, Hexane, Heptane
Ammonia	0.3	
Paraffin (C1-C4)	0	Methane, Ethane

NOTE: Relative sensitivity = meter reading when measuring 10 ppm of the listed gas with instrument with 10.2 eV probe calibrated for 10 ppm of benzene, span pot setting = 9.8 for direct reading of benzene.

APPENDIX A (Cont'd)

Tables

TABLE 3. Typical Applications of Interchangeable Probes

	Ionization Potentials	Relative Sensitivity	
p-Xylene	8.44	0.10	0.104
p-Chlorotoluene	8.70	0.09	0.112
Toluene	8.82	0.09	0.112
o-Chlorotoluene	8.83	0.075	0.112
Ethyl Acetate	9.19	0.075	0.112
Benzene	9.24	0.10	0.10
Methyl Mercaptan	9.24	0.10	0.072
Pyridine	9.32	0.075	0.122
Allyl Alcohol	9.67	0.10	0.111
Crotonaldehyde	9.88	0.075	0.104
Amyl Alcohol	9.80	0.09	0.116
Cyclohexane	9.88	0.075	0.104
Vinyl Chloride	9.95	0.085	0.112
Butanol	10.94	0.09	0.176
Ammonia	10.15	0.06	0.160
Acetic Acid	10.37	0.04	0.560
Ethylene	10.52	0.0	0.320
Ethylene Oxide	10.56	0.0	0.298

$$\text{Relative sensitivity} = \frac{\text{Response with 9.5 or 11.7 eV probe}}{\text{Response with 10.2 eV probe}}$$

SAMPLING EQUIPMENT DECONTAMINATION

SOP#: 2006
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination and to provide general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

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

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

1. Physical removal
2. Non-phosphate detergent wash
3. Tap water rinse
4. Distilled/deionized water rinse
5. 10% nitric acid rinse
6. Distilled/deionized water rinse
7. Solvent rinse (pesticide grade)
8. Air dry
9. Distilled/deionized water rinse

If a particular contaminant fraction is not present at the site, the nine (9) step decontamination procedure specified above may be modified for site specificity. For example, the nitric acid rinse may be eliminated if metals are not of concern at a site. Similarly, the solvent rinse may be eliminated if organics are not of

concern at a site. Modifications to the standard procedure should be documented in the site specific work plan or subsequent report.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.

More specifically, sample collection and analysis of decontamination waste may be required before beginning proper disposal of decontamination liquids and solids generated at a site. This should be determined prior to initiation of site activities.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

- The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free (specifically for the contaminants of concern).

- The use of an untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal or industrial water treatment system.

- If acids or solvents are utilized in decontamination they raise health and safety, and waste disposal concerns.

- Damage can be incurred by acid and solvent washing of complex and sophisticated sampling equipment.

5.0 EQUIPMENT/APPARATUS

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations include the ease of decontaminating or disposing of the equipment. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handled bottle brushes can be used to remove contaminants. Large galvanized wash tubs, stock tanks, or buckets can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags can help segregate contaminated equipment. Contaminated liquid can be stored temporarily in metal or plastic cans or drums.

The following standard materials and equipment are recommended for decontamination activities:

5.1 Decontamination Solutions

- Non-phosphate detergent
- Selected solvents (acetone, hexane, nitric acid, etc.)
- Tap water
- Distilled or deionized water

5.2 Decontamination Tools/Supplies

- Long and short handled brushes
- Bottle brushes
- Drop cloth/plastic sheeting
- Paper towels
- Plastic or galvanized tubs or buckets
- Pressurized sprayers (H_2O)
- Solvent sprayers
- Aluminum foil

5.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, emergency eye wash)

5.4 Waste Disposal

- Trash bags
- Trash containers
- 55-gallon drums
- Metal/plastic buckets/containers for storage and disposal of decontamination solutions

6.0 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 (Appendix A) lists solvent rinses which may be required for elimination of particular chemicals. In

general, the following solvents are typically utilized for decontamination purposes:

- 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a contaminant of concern.
- Acetone (pesticide grade)[(1)]
- Hexane (pesticide grade)[(1)]
- Methanol[(1)]

[(1)] - Only if sample is to be analyzed for organics.

7.0 PROCEDURES

As part of the health and safety plan, a decontamination plan should be developed and reviewed. The decontamination line should be set up before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- The number, location, and layout of decontamination stations.
- Decontamination equipment needed.
- Appropriate decontamination methods.
- Methods for disposal of contaminated clothing, equipment, and solutions.
- Procedures can be established to minimize the potential for contamination. This may include: (1) work practices that minimize contact with potential contaminants; (2) using remote sampling techniques; (3) covering monitoring and sampling equipment with plastic, aluminum foil, or other protective material; (4) watering down dusty areas; (5) avoiding laying down equipment in areas of obvious contamination; and (6) use of disposable sampling equipment.

7.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

7.1.1 Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive methods are available:

Mechanical

Mechanical methods of decontamination include using metal or nylon brushes. The amount and type of contaminants removed will vary with the hardness of bristles, length of time brushed, degree of brush contact, degree of contamination, nature of the surface being cleaned, and degree of contaminant adherence to the surface.

Air Blasting

Air blasting equipment uses compressed air to force abrasive material through a nozzle at high velocities. The distance between nozzle and surface cleaned, air pressure, time of application, and angle at which the abrasive strikes the surface will dictate cleaning efficiency. Disadvantages of this method are the inability to control the amount of material removed and the large amount of waste generated.

Wet Blasting

Wet blast cleaning involves use of a suspended fine abrasive. The abrasive/water mixture is delivered by compressed air to the contaminated area. By using a very fine abrasive, the amount of materials removed can be carefully controlled.

7.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods.

Low-Pressure Water

This method consists of a container which is filled with water. The user pumps air out of the container to create a vacuum. A slender nozzle and hose allow the user to spray in hard-to-reach places.

High-Pressure Water

This method consists of a high-pressure pump, an operator controlled directional nozzle, and a high-pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) and flow rates usually range from 20 to 140 liters per minute.

Ultra-High-Pressure Water

This system produces a water jet that is pressured from 1,000 to 4,000 atmospheres. This ultra-high-pressure spray can remove tightly-adhered surface films. The water velocity ranges from 500 meters/second (m/s) (1,000 atm) to 900 m/s (4,000 atm). Additives can be used to enhance the cleaning action.

Rinsing

Contaminants are removed by rinsing through dilution, physical attraction, and solubilization.

Damp Cloth Removal

In some instances, due to sensitive, non-waterproof equipment or due to the unlikelihood of equipment being contaminated, it is not necessary to conduct an extensive decontamination procedure. For example, air sampling pumps hooked on a fence, placed on a drum, or wrapped in plastic bags are not likely to become heavily contaminated. A damp cloth should be used to wipe off contaminants which may have adhered to equipment through airborne contaminants or from surfaces upon which the equipment was set.

Disinfection/Sterilization

Disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization methods are impractical for large equipment. This method of decontamination is typically performed off-site.

7.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each decontamination station by a minimum of three (3) feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line.

A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC) which is in the CRZ. Figure 1 (Appendix B) shows a typical contaminant reduction zone layout. The CRC controls access into and out of the exclusion zone and confines decontamination activities to a limited area. The CRC boundaries should be conspicuously marked. The far end is the hotline, the boundary between the exclusion zone and the contamination reduction zone. The size of the decontamination corridor depends on the number of stations in the decontamination process, overall dimensions of the work zones, and amount of space available at the site. Whenever possible, it should be a straight line.

Anyone in the CRC should be wearing the level of protection designated for the decontamination crew. Another corridor may be required for the entry and exit of heavy equipment. Sampling and monitoring equipment and sampling supplies are all maintained outside of the CRC. Personnel don their equipment away from the CRC and enter the exclusion zone through a separate access control point at the hotline. One person (or more) dedicated to decontaminating equipment is recommended.

7.2.1 Decontamination Setup

Starting with the most contaminated station, the decontamination setup should be as follows:

Station 1: Segregate Equipment Drop

Place plastic sheeting on the ground (Figure 2, Appendix B). Size will depend on amount of

equipment to be decontaminated. Provide containers lined with plastic if equipment is to be segregated. Segregation may be required if sensitive equipment or mildly contaminated equipment is used at the same time as equipment which is likely to be heavily contaminated.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

As indicated in 7.1.2, a high-pressure wash may be required for compounds which are difficult to remove by washing with brushes. The elevated temperature of the water from the high-pressure washers is excellent at removing greasy/oily compounds. High pressure washers require water and electricity.

A decontamination pad may be required for the high-pressure wash area. An example of a wash pad may consist of an approximately 1 1/2 foot-deep basin lined with plastic sheeting and sloped to a sump at one corner. A layer of sand can be placed over the plastic and the basin is filled with gravel or shell. The sump is also lined with visqueen and a barrel is placed in the hole to prevent collapse. A sump pump is used to remove the water from the sump for transfer into a drum.

Typically heavy machinery is decontaminated at the end of the day unless site sampling requires that the machinery be decontaminated frequently. A separate decontamination pad may be required for heavy equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Prior to setting up Station 3, place plastic sheeting on the ground to cover areas under Station 3 through Station 10.
Fill a wash basin, a large bucket, or child's swimming pool with non-phosphate detergent and tap water. Several bottle and bristle brushes to physically remove contamination should be dedicated to this station . Approximately 10 - 50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 4: Water Basin

Fill a wash basin, a large bucket, or child's swimming pool with tap water. Several bottle and bristle brushes should be dedicated to this station. Approximately 10-50 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 5: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to contain the water during the rinsing process. Approximately 10-20 gallons of water may be required initially depending upon the amount of equipment to decontaminate and the amount of gross contamination.

Station 6: Nitric Acid Sprayers

Fill a spray bottle with 10% nitric acid. An acid rinse may not be required if inorganics are not a contaminant of concern. The amount of acid will depend on the amount of equipment to be decontaminated. Provide a 5-gallon bucket or basin to collect acid during the rinsing process.

Station 7: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 8: Organic Solvent Sprayers

Fill a spray bottle with an organic solvent. After each solvent rinse, the equipment should be rinsed with distilled/deionized water and air dried. Amount of solvent will depend on the amount of equipment to decontaminate. Provide a 5-gallon bucket or basin to collect the solvent during the rinsing process.

Solvent rinses may not be required unless organics are a contaminant of concern, and may be eliminated from the station sequence.

Station 9: Low-Pressure Sprayers

Fill a low-pressure sprayer with distilled/deionized water. Provide a 5-gallon bucket or basin to collect water during the rinsate process.

Station 10: Clean Equipment Drop

Lay a clean piece of plastic sheeting over the bottom

plastic layer. This will allow easy removal of the plastic in the event that it becomes dirty. Provide aluminum foil, plastic, or other protective material to wrap clean equipment.

7.2.2 Decontamination Procedures

Station 1: Segregate Equipment Drop

Deposit equipment used on-site (i.e., tools, sampling devices and containers, monitoring instruments radios, clipboards, etc.) on the plastic drop cloth/sheet or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross contamination. Loose leaf sampling data sheets or maps can be placed in plastic zip lock bags if contamination is evident.

Station 2: Physical Removal With A High-Pressure Washer (Optional)

Use high pressure wash on grossly contaminated equipment. Do not use high- pressure wash on sensitive or non-waterproof equipment.

Station 3: Physical Removal With Brushes And A Wash Basin

Scrub equipment with soap and water using bottle and bristle brushes. Only sensitive equipment (i.e., radios, air monitoring and sampling equipment) which is waterproof should be washed. Equipment which is not waterproof should have plastic bags removed and wiped down with a damp cloth. Acids and organic rinses may also ruin sensitive equipment. Consult the manufacturers for recommended decontamination solutions.

Station 4: Equipment Rinse

Wash soap off of equipment with water by immersing the equipment in the water while brushing. Repeat as many times as necessary.

Station 5: Low-Pressure Rinse

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 6: Nitric Acid Sprayers (required only if metals are a contaminant of concern)

Using a spray bottle rinse sampling equipment with nitric acid. Begin spraying (inside and outside) at one end of the equipment allowing the acid to drip to the other end into a 5-gallon bucket. A rinsate blank may be required at this station. Refer to Section 9.

Station 7: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure sprayer.

Station 8: Organic Solvent Sprayers

Rinse sampling equipment with a solvent. Begin spraying (inside and outside) at one end of the equipment allowing the solvent to drip to the other end into a 5-gallon bucket. Allow the solvent to evaporate from the equipment before going to the next station. A QC rinsate sample may be required at this station.

Station 9: Low-Pressure Sprayers

Rinse sampling equipment with distilled/deionized water with a low-pressure washer.

Station 10 : Clean Equipment Drop

Lay clean equipment on plastic sheeting. Once air dried, wrap sampling equipment with aluminum foil, plastic, or other protective material.

7.2.3 Post Decontamination Procedures

1. Collect high-pressure pad and heavy equipment decontamination area liquid and waste and store in appropriate drum or container. A sump pump can aid in the collection process. Refer to the Department of Transportation (DOT) requirements for appropriate containers based on the contaminant of concern.

2. Collect high-pressure pad and heavy equipment decontamination area solid waste and store in appropriate drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

3. Empty soap and water liquid wastes from basins and buckets and store in appropriate

drum or container. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

4. Empty acid rinse waste and place in appropriate container or neutralize with a base and place in appropriate drum. pH paper or an equivalent pH test is required for neutralization. Consult DOT requirements for appropriate drum for acid rinse waste.

5. Empty solvent rinse sprayer and solvent waste into an appropriate container. Consult DOT requirements for appropriate drum for solvent rinse waste.

6. Using low-pressure sprayers, rinse basins, and brushes. Place liquid generated from this process into the wash water rinse container.

7. Empty low-pressure sprayer water onto the ground.

8. Place all solid waste materials generated from the decontamination area (i.e., gloves and plastic sheeting, etc.) in an approved DOT drum. Refer to the DOT requirements for appropriate containers based on the contaminant of concern.

9. Write appropriate labels for waste and make arrangements for disposal. Consult DOT regulations for the appropriate label for each drum generated from the decontamination process.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITYASSURANCE/ QUALITY CONTROL

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks are samples obtained by running analyte free water over decontaminated sampling equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples are treated identical to samples collected that day. A rinsate blank is used to assess cross contamination brought about by improper decontamination procedures. Where dedicated sampling equipment is not utilized, collect one rinsate blank per day per type of sampling device samples to meet QA2 and QA3 objectives.

If sampling equipment requires the use of plastic tubing it should be disposed of as contaminated and replaced with clean tubing before additional sampling occurs.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

11.0 HEALTH AND SAFETY

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

Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

The decontamination solutions must be determined to be acceptable before use. Decontamination materials may degrade protective clothing or equipment; some solvents can permeate protective clothing. If decontamination materials do pose a health hazard, measures should be taken to protect personnel or substitutions should be made to eliminate the hazard. The choice of respiratory protection based on contaminants of concern from the site may not be appropriate for solvents used in the decontamination process.

Safety considerations should be addressed when using abrasive and non-abrasive decontamination

equipment. Maximum air pressure produced by abrasive equipment could cause physical injury. Displaced material requires control mechanisms.

Material generated from decontamination activities requires proper handling, storage, and disposal. Personal Protective Equipment may be required for these activities.

Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard (i.e., acetone, alcohol, and trisodiumphosphate).

In some jurisdictions, phosphate containing detergents (i.e., TSP) are banned.

12.0 REFERENCES

Field Sampling Procedures Manual, New Jersey Department of Environmental Protection, February, 1988.

A Compendium of Superfund Field Operations Methods, EPA 540/p-87/001.

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1, 1986.

Guidelines for the Selection of Chemical Protective Clothing, Volume 1, Third Edition, American Conference of Governmental Industrial Hygienists, Inc., February, 1987.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, October, 1985.

APPENDIX A

Table

Table 1. Soluble Contaminants and Recommended Solvent Rinse

TABLE 1 Soluble Contaminants and Recommended Solvent Rinse		
SOLVENT[1]	EXAMPLES OF SOLVENTS	SOLUBLE CONTAMINANTS
Water	Deionized water Tap water	Low-chain hydrocarbons Inorganic compounds Salts Some organic acids and other polar compounds
Dilute Acids	Nitric acid Acetic acid Boric acid	Basic (caustic) compounds (e.g., amines and hydrazines)
Dilute Bases	Sodium bicarbonate (e.g., soap detergent)	Acidic compounds Phenol Thiols Some nitro and sulfonic compounds
Organic Solvents [2]	Alcohols Ethers Ketones Aromatics Straight chain alkalines (e.g., hexane) Common petroleum products (e.g., fuel, oil, kerosene)	Nonpolar compounds (e.g., some organic compounds)
Organic Solvent[2]	Hexane	PCBs

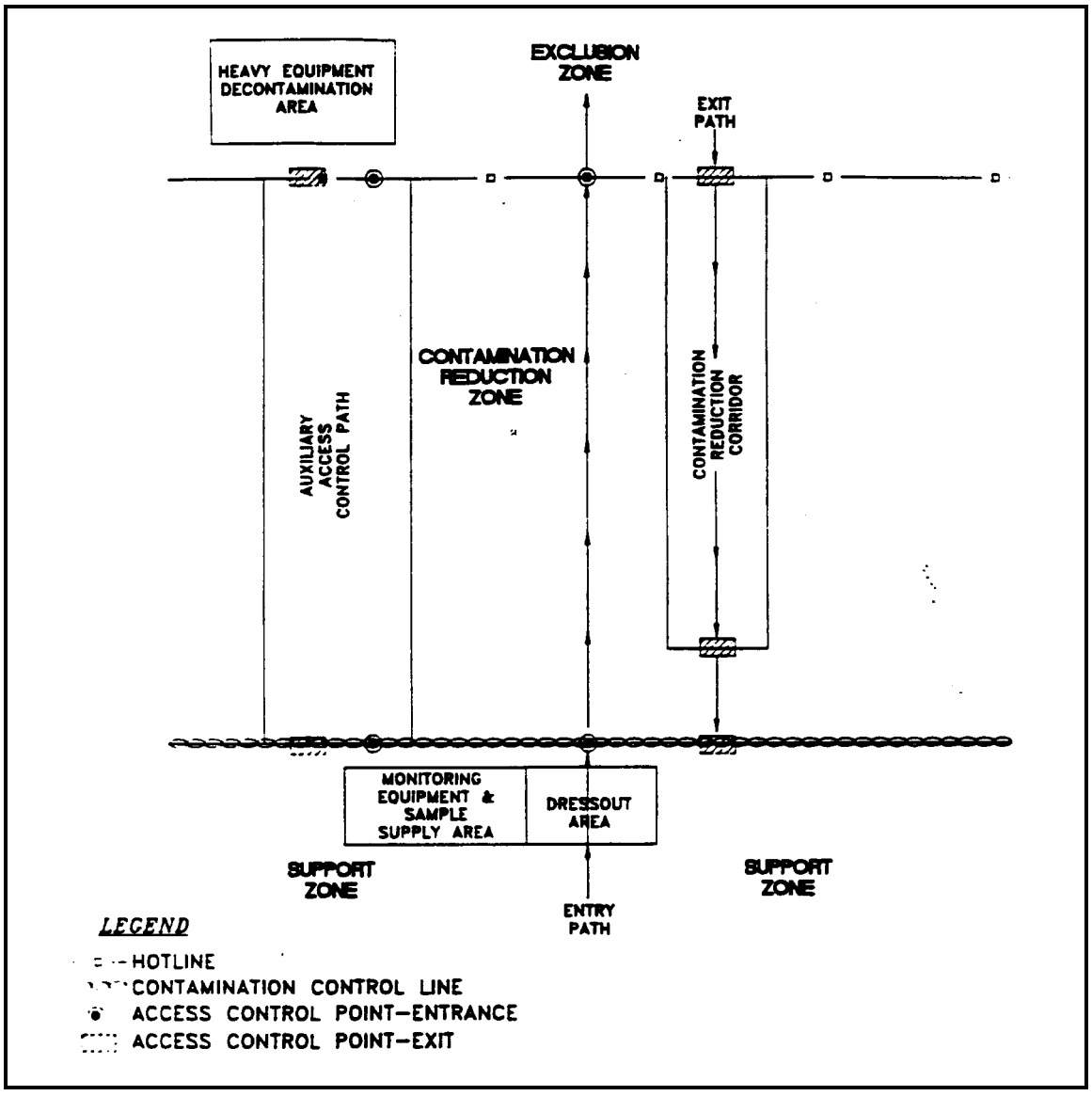
[1] - Material safety data sheets are required for all decontamination solvents or solutions as required by the Hazard Communication Standard

[2] - WARNING: Some organic solvents can permeate and/or degrade the protective clothing

APPENDIX B

Figures

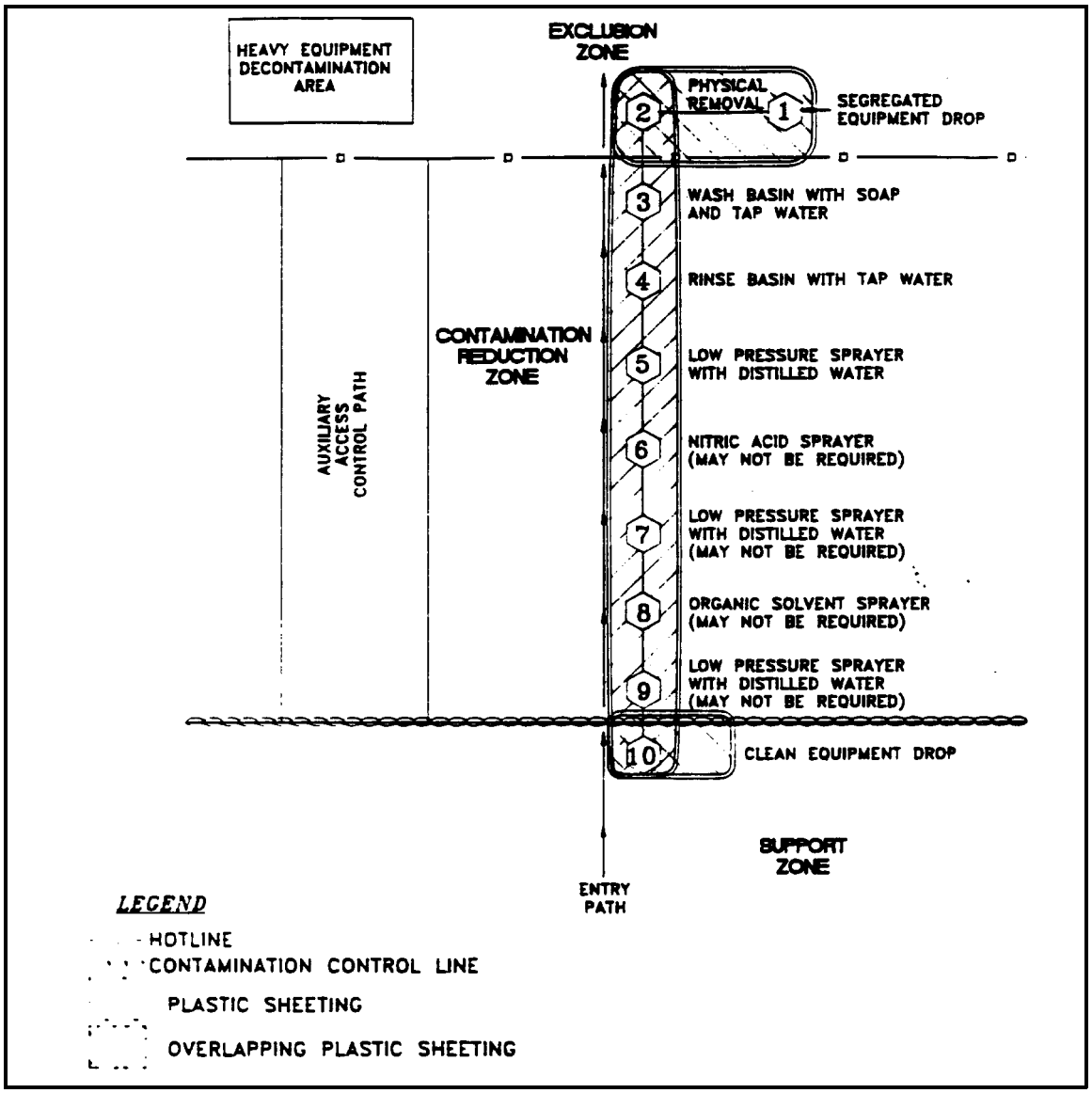
Figure 1. Contamination Reduction Zone Layout



APPENDIX B (Cont'd.)

Figures

Figure 2. Decontamination Layout



U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

SOIL SAMPLING

CONTENTS

SUPERCEDES: SOP #2012; Revision 0.0; 11/16/94; U.S. EPA Contract 68-C4-0022.

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe). Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in ERT/REAC SOP #2003 Rev. 0.0 08/11/94, *Sample Storage, Preservation and Handling*.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT/REAC SOP #2006 Rev. 0.0 08/11/94, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

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

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.

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

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample.

This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.

5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

    When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0^{o} to 45^{o} angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should

be performed in accordance with ASTM D1586-98, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.

2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.

3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration

activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan..

12.0 REFERENCES

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Technique and Strategies. EPA-600/4-83-020.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

U.S. Environmental Protection Agency. 1984 Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA-600/4-84-076.

de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. 1980. Samplers and Sampling Procedures for Hazardous Waste Streams. EPA-600/2-80-018.

ASTM D 1586-98, ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A
Figures
SOP #2012
February 2000

FIGURE 1. Sampling Augers

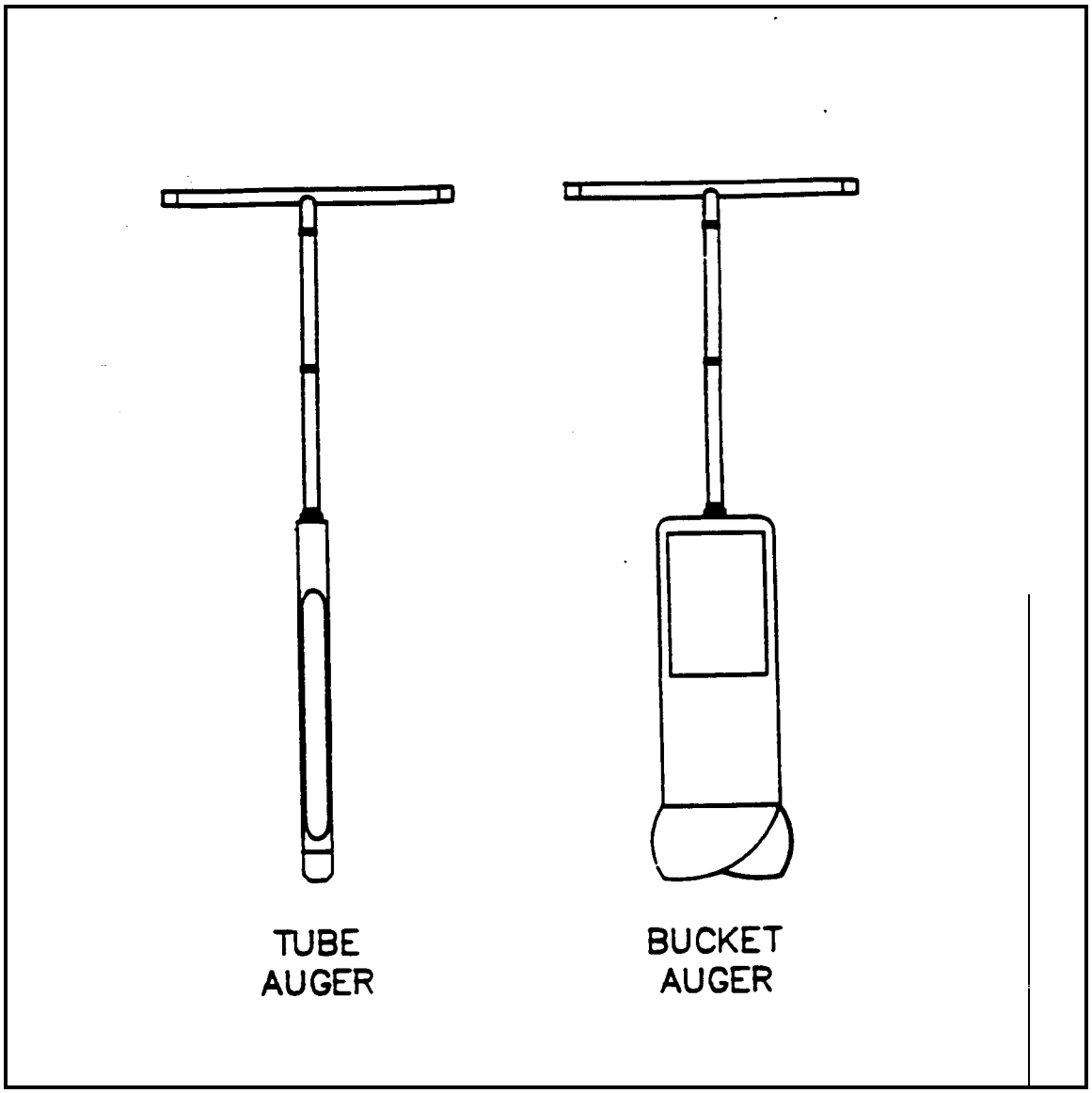
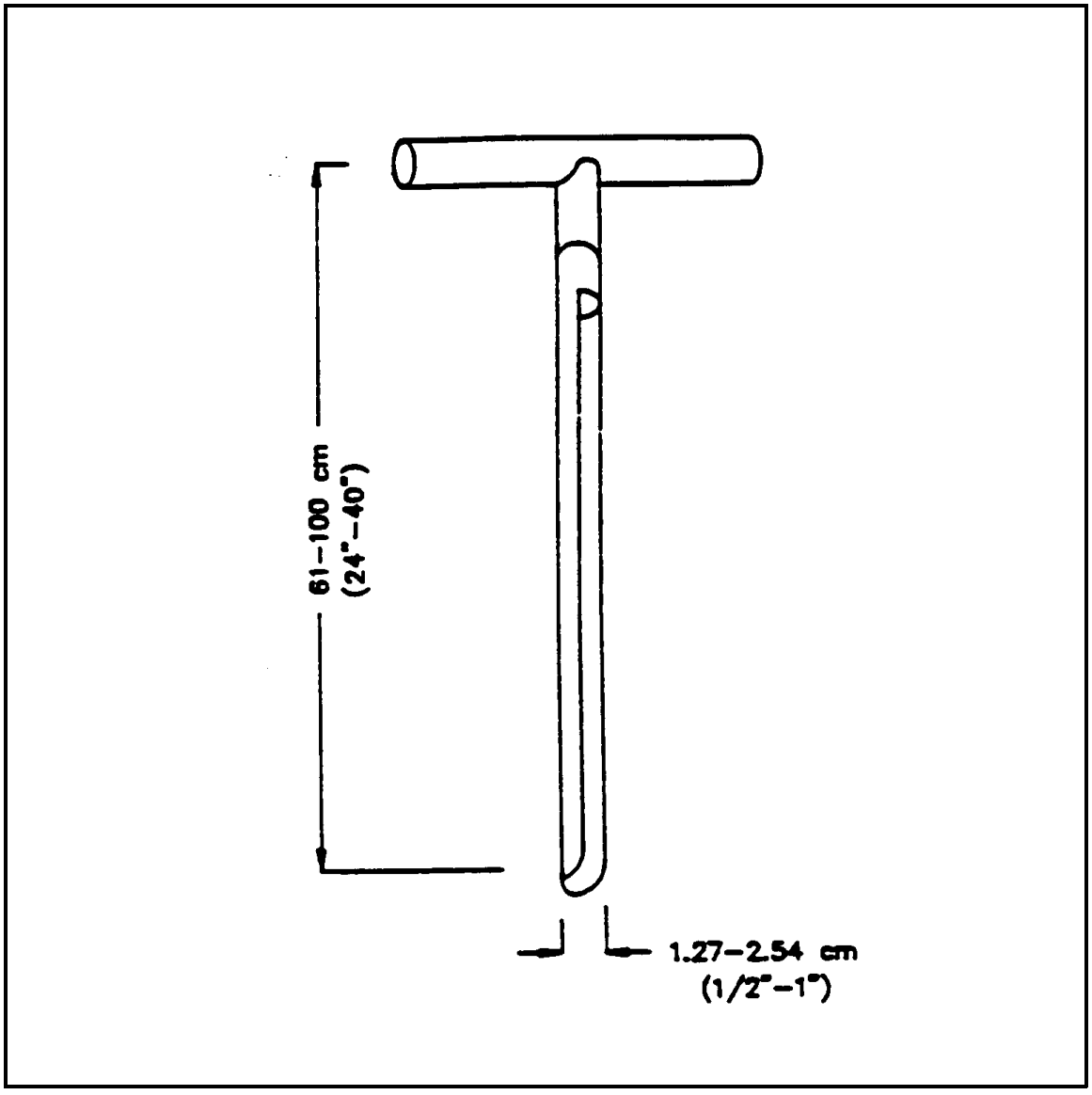


FIGURE 2. Sampling Trier



Environmental Lead Sampling Procedures

Materials Analytical Services, Inc
3945 Lakefield Court,
Suwanee, GA 30024
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FAX 770-866-3259
www.mastest.com

Procedure for Wipe, Soil, and Paint Samples for Lead

A. Wipe Sampling of Settled Dust

1.0 Equipment

1.1 Latex or plastic gloves
1.2 Sample collection container, 50 mL screw-capped tube
1.3 Ghost wipe or other ASTM E 1792-compliant wipe material
1.4 Sampling template with 1 square foot opening
1.5 Masking tape
1.6 Indelible marker
1.7 Chain of custody forms (COCs)

2.0 Procedure For Unconfined Areas

2.1 Place the template on the surface carefully to avoid disturbing the settled dust. Tape the edges of the template to hold it in place. Alternatively, a 1 square foot area may be defined using masking tape only.
2.2 Put on a pair of latex or plastic gloves.
2.3 Open and unfold the Ghost wipe. Drape the Ghost wipe over the fingers of your gloved hand and wipe the area using a side-to-side wiping motion and starting at the corner furthest from you.
2.4 Turn the wipe 180 degrees and make a second side-to side pass in the reverse direction. The 180-degree turn is made so the wiping is always in the same direction to maximize dust pickup.
2.5 Fold the wipe once and repeat the wiping using a top-to-bottom wiping motion. At the end of this sweep, use a slight rolling motion to pick up any ridge of dust that may have formed ahead of the wipe.
2.6 Fold the wipe again and use a clean side to perform a wipe around the perimeter of the template and clean the corners of any remaining dust.
2.7 Fold the wipe again and place in a screw-capped 50 mL tube. Cap the tube tightly.
2.8 Label the tube with the sample number and record the sampling information on the chain of custody.

3.0 Procedure for Confined Areas

3.1 Wipe the area as outlined above, using side-to-side, then top-to-bottom, then the perimeter of the area.
3.2 Place the sample in a screw-capped 50 mL tube. Label the tube with the sample number.
3.3 Measure the area sampled and record this information as well as all other Sample information on the chain of custody. Make sure to include the units of measure.

4.0 Shipping

4.1 Return ship by overnight delivery. No refrigeration or preservation is required.

B. Sampling of Soils

1.0 Equipment

1.1 Sample collection container, 50 mL screw-capped tube, clean glass 4 oz jar, or resealable plastic bag.
1.2 Spoon, for scoop sampling
1.3 Metal or plastic measuring tape or ruler
1.4 Core sampling device with sample removal plunger having 0.5 inch stop and plunger without stop
1.5 Water, drinking quality, used for cleaning coring equipment
1.6 Disposable towelette, used for cleaning coring equipment
1.7 Latex or plastic gloves
1.8 Indelible marker

2.0 Scoop Sampling Procedure for Friable Soils Using 50 mL tubes.

2.1 Put on a pair of clean gloves.
2.2 Using a 50 mL tube, scoop the soil to a depth of ½ inch for a length of 6-12 inches.
2.3 Wipe away any soil clinging to the tube and cap it.
2.4 Label the tube with a sample number and record all sampling information on the chain of custody.

3.0 Scoop Sampling Procedure for Friable Soils Using A Spoon.

3.1 Put on a pair of clean gloves.
3.2 Using a measuring tape and a spoon, dig a small test hole near the sampling area to a depth of ½ inch. Clean the spoon using a wet wipe to remove all traces of soil.
3.3 Scoop the soil down to the depth indicated by the test hole and place the sample in the sampling container. Continue until a hole approximately 2 inches diameter by ½ inch has been created.
3.4 Take 2 more samples within a 1-foot diameter circle around the first sample location using the same procedure. Add these to the same sample container.
3.5 Seal the container in such a manner as to minimize the air contained in the container.
3.6 Label the sample container with a sample number and record the sampling information on the chain of custody.
3.7 Clean the spoon using wipes and water to remove all traces of soil.

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4.0 Sampling procedure for Nonfriable Soils Using a Core Sampler

4.1 Put on a pair of clean gloves.
4.2 Grip the coring tool firmly and push it into the soil to a depth of at least two inches using a twisting motion. For very hard soils, a hammer or similar device may be used.
4.3 If penetration is less than ½ inch, document the actual depth achieved as part of the sampling information.
4.4 Carefully remove the coring tool from the ground while retaining the soil core in the tool.
4.5 Insert a clean plunger equipped with stop into the top end of the coring probe. Push out all but ½ inch of soil. Use a gloved finger to wipe off the excess soil protruding form the end of the probe. Do not drop the excess soil on the sampling area.
4.6 Using the plunger without stop, push out the remaining ½ inch of soil into the sampling container.
4.7 Collect two more cores within a 1-foot diameter circle around the first sample location using the same procedure. Add these to the same sample container.
4.8 Label the sample container with a sample number and record the sampling information on the chain of custody.
4.9 Clean the coring tools using water and wet wipes to remove all soil traces.

5.0 Shipping

5.1 Return ship by overnight delivery. No refrigeration or preservation is required.

B. Sampling of Paint Chips

1.0 Equipment

1.1 Sample collection container, resealable plastic bag
1.2 Razor scraper
1.3 Latex or plastic gloves
1.4 Disposable towelette, used for cleaning scraper
1.5 Collection device (clean creased piece of paper or cleanable tray)
1.6 Indelible marker
1.7 Measuring tape or ruler

2.0 Sampling Procedure

2.1 During this procedure, make every attempt to remove paint chips without removing the underlying substrate. Including substrate will dilute the reported lead content of the paint. A sample from 2 - 4 square inches is sufficient .
2.2 Put on a pair of clean gloves.
2.3 Use of a heat gun is recommended to remove paint without underlying substrate. Hold the heat gun at least six inches from the surface. Discontinue heating when softening or blistering is observed. Do not scorch the surface.
2.4 Use the razor scraper to remove the softened paint from the substrate and place the

sample in a resealable plastic bag.

2.5 If a result in milligrams per square centimeter (mg/cm^2) is desired, you must measure the area sampled and include this area on the chain of custody.

2.6 Label the bag with a sample number and record the sampling information on the chain of custody.

3.0 Shipping

3.1 Return ship by overnight delivery. No refrigeration or preservation is required.

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SOP: BULK ASBESTOS SAMPLING

The following procedures are to be used to collect a bulk samples from building. These procedures may be modified in the field, based on field and site conditions after appropriate annotations have been made in the bound field log book. These procedures are intended for sampling of bulk building materials for asbestos analyses.

The following is a list of equipment for bulk building material sampling:

- Zip lock bags or other air tight containers;
- Spray bottles with water with soap added ("amended" water);
- Plastic drop cloths;
- Coring tool or knife;
- Duct tape or Encapsulant;
- Pre-moistened disposable cloths;
- HEPA vacuum (if needed);
- Camera;
- Indelible ink pen;
- Asbestos disposal bag;
- Sample location and identification labels;
- Locations (map and/or list);
- Appropriate health and safety equipment; and
- Field logbook; and

Bulk samples for asbestos testing must be representative samples of the material to be tested; the sample should contain all layers of the questioned material. Samples from multiple locations should be bagged separately to avoid cross-contamination.

Bulk samples for asbestos must be submitted in a sealed container. Zipped plastic bags are recommended containers.

Although no special sample preservation is necessary, the sample should be handled without exposure to extreme conditions or rough handling so that the received sample is intact and all layers of material in the sample may be examined by analysts handling the material.

Samples must be clearly identified and submitted with corresponding chain of custody.

The field sampling procedure is as follows:

Prior to collecting the sample, ensure the required personal protective equipment (respirator, gloves, etc.) and an approved encapsulant is available for use.

1. Wherever practical, the sample should be collected during quiet hours or when the area surrounding the sampling location is unoccupied.
2. If the material being sampled is friable in nature (i.e. fireproofing, mechanical insulation, etc.), first spray the material in the immediate area surrounding the point of collection with a light misting of water.
3. Where possible, sample collection should be performed adjacent to a point of existing damage. Avoid any unnecessary contact or disturbance.
4. Depending on the condition of the material being sampled, significant amounts of airborne fibers can be discharged during sample collection. The use of a respirator is mandatory in such instances.
5. To avoid possible sample cross-contamination, ensure the knife (or any other instruments) used to collect the sample is properly cleaned using a damp rag following the collection of each individual sample.
6. Should additional fragments or pieces of the material being sampled break off during sample collection, the associated debris must be cleaned up using a HEPA equipped vacuum or damp rag. Unless otherwise indicated through subsequent analysis, dispose of all debris collected as asbestos-containing waste.
7. Place each sample collected in an independently labeled plastic bag (c/w zip-lock closure. Ensure container being used is clean and dry. The exterior of the container must also be wiped clean using a damp cloth to ensure the removal of any visible debris following sample collection.
8. Samples shall be identified with the following information:

    - Date Sampled;
    - Sample ID;
    - Sample Description (i.e. cold water piping, boiler exhaust or sprayed fire proofing, etc.);
    - Sample Location (i.e. building, room number, etc.); and
    - Name and phone number of the individual who collected the sample.

9. Materials of differing composition or appearance should be sampled separately. Mechanical insulation must be sampled separately on a system-by-system basis as well as differentiating between the material present on the straight runs of the piping from material present on any fittings (i.e. tees, valves, elbows, etc.).
10. Ensure full-depth samples are collected for as many products as possible. Products such as finishing plasters or mechanical insulation often involve multiple layers of application or coatings.
11. Following sample collection, temporarily repair jacketing or seal exposed edges of underlying insulation using duct tape or approved asbestos encapsulant (i.e. Serpiflex Shield or approved equivalent).

12. Record sample location on a drawing and through a system of on-site labeling where appropriate. Ensure the data outlined in section 7 above is recorded in the field logbook and maintained on file prior to submitting the sample to the lab.

APPENDIX D

Sample Labels

McGinley & Associates	McGinley & Associates, Inc. 6280 S. Valley View Blvd., Suite 604 Las Vegas, Nevada 89118 702.260.4961

Analysis:	Lead:		Asbestos Bulk:		Mold:	

Sampled By:	
Sample ID:	
Time/Date:	
Location:	
Description:	

APPENDIX E

Chain-of-Custody Forms

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

Contact us:
Nevada: 3151 W. Post Road, Las Vegas, NV 89118
P: 702.307.2659 F: 702.3072691
California: 11060 Artesia Blvd., Ste C, Cerritos, CA 90703
P: 562.219.7435 F: 562.219.7436
www.assetlaboratories.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client:	**Report to:**	**Bill to:**	**EDD Requirement**	**QA/QC**	**Sampe Receipt Condition**
Address:	**Company:**	**Address:**	Excel EDD ☐	RTNE ☐	Y N
			Geotracker ☐	RWQCB ☐	1. Chilled ☐ ☐
Address:	**Email:**		Labspec ☐	CalTrans ☐	2. Headspace ☐ ☐
			Others ☐	Level III ☐	3. Container Intact ☐ ☐
Phone: **Fax:**	**Address:**	**Email to:** **PO#**	Specify:	LEVEL IV ☐	4. Seal Present ☐ ☐
				Regulatory ☐	5. IR number
Submitted By:		**Phone:** **Fax:**	Global ID:	Specify State:	6. Method of Cooling
Title:	**Phone:** **Fax:**				Sample Temp:

Signature: **Date:**	**Sampled By:**	Ground ☐	Sediment ☐		
	I attest to the validity and authenticity of this sample. I am aware that tampering with or intentionally mislabeling the sample location, date or time of collection is considered fraud and may be grounds for legal action.	Potable ☐	Soil ☐		
I hereby authorize ASSET Labs to perform the tests indicated below:		NPDES ☐	Other Solid ☐		
Project Name:	*Signature:* *Date*	Surface ☐			
Project Number:					

Matrix | **Analyses Requested**

Courier:

Tracking No.

Item No.	Laboratory Work Order No.	Sample ID/Location	Date	Time	Water	Solid	Others	Turn Around Time	No. of container	Container Type	PRESERVATION	Remarks
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

Relinquished by (Signature and Printed Name):	Date / Time	Received by (Signature and Printed Name):	Date / Time
Relinquished by (Signature and Printed Name):	Date / Time	Received by (Signature and Printed Name):	Date / Time
Relinquished by (Signature and Printed Name):	Date / Time	Received by (Signature and Printed Name):	Date / Time

Turn Around Time (TAT)

- ☐ A < 24 Hrs or Same Day TAT
- ☐ B = Next Workday
- ☐ C = 2 Workdays
- ☐ D = 3 Workdays
- ☐ E = Routine 5-7 Workdays

TAT Starts at 8 AM the followiing day if samples received after 3:00 PM.

Special Instruction:

Terms

1. All samples will be disposed in 45 days upon receipt and records will be destroyed in 5 years upon submission of final report.
2. Regular TAT is 5-7 business days, surcharges will apply for rush analysis
   Less than 24 Hrs = 200% Next Day = 100% 2 Workdays = 50% 3 Workdays = 35% 4 Workdays = 20%
3. Custom EDD formats will be an additional 3% of the total project price.
4. Add 10% surcharge for Level III Data Packages, 15% for Level IV Data Packages. Surcharge applied on total project price.
5. Trip Blanks and Equipment Blanks are billable sample.
6. ASSET Laboratories is not responsible for samples collected using incorrect methodology.
7. Terms are net 30 Days.
8. All reports are submitted in electronic format. Please inform ASSET Laboratrories if hard copy of report is needed.
9. For subcontract analysis. TAT and Surcharges will vary.

Preservatives:			
H = HCl	N = HNO_3	S = H_2SO_4	C = 4°C
Z = $Zn(AC)_2$	O = NaOH	T = $Na_2S_2O_3$	
Others/Specify:			

Container Type:		
T = Tube	V = VOA	P = Pint
J = Jar	B = Tedlar	G = Glass
M = Metal	P = Plastic	C = Can

White = Laboratory Copy

Yellow = Customer's Copy

9724 Mild Weather Ct.
Las Vegas, NV 89148

Macrotec
Consulting

Phone: (702) 338-8213
Fax: (702) 629-5677

Bulk Sampling Chain of Custody Form

Client Name _____ Project Number _____

Project Name _____ Collection Date _____

Project Location _____ PO Number _____

Technician _____ Turn Around Time _____

Laboratory _____ Method of Analysis _____

Stop at 1st Positive? Y / N Composite Sheet Rock? Y / N Matrix _____

Sample # H#	Sample # Count	Sample Description (Material Type : Description : Color)	Sample Location (General : Room : Specific)

Relinquished By: _____Date: _____ Received By: _____Date: _____

Relinquished By: _____Date: _____ Received By: _____Date: _____

Relinquished By: _____Date: _____ Received By: _____Date: _____