Limited Phase II Environmental Site Assessment

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

Nye County
Assessor's Parcel Number 008-311-01

Prepared For:

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Environmental Services

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STANDARD ABBREVIATIONS

ACM	Asbestos-Containing Material
AHERA	Asbestos Hazard Emergency Response Act
APN	Assessor's Parcel Number
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BER	Business Environmental Risk
bgs	Below Ground Surface
CEM	Certified Environmental Manager
CFR	Code of Federal Regulations
COC	Chain of Custody
DI	Deionized
DQI	Data Quality Indicators
DQO	Data Quality Objective
DRO	Diesel Range Organics
EDD	Electronics Data Deliverable
EDR/Lightbox	Environmental Data Resources, LLC of Lightbox Holdings, LP.
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
FAAS	Flame Atomic Absorption Spectrometry
HA	Homogenous Area
HASP	Health and Safety Plan
GRO	Gasoline Range Organics
HUD	United States Department of Housing and Urban Development
IDW	Investigation-Derived Waste
LBP	Lead-Based Paint
LCS	Laboratory Control Samples
LOD	Level of Detection
MDL	Method Detection Limit
MQO	Measurement Quality Objective
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAC	Nevada Administrative Code
ND	Non-detect
NDEP	Nevada Division of Environmental Protection
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NLLAP	National Lead Laboratory Accreditation Program
NRPP	National Radon Proficiency Program
NVLAP	National Voluntary Laboratory Accreditation Program
ORO	Oil Range Organics
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyl
PCS	Performance Characteristic Sheet
PLM	Polarized Light Microscopy
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limit
QC	Quality Control
RC	Reportable Concentration

REC	Recognized Environmental Condition
RL	Reporting Limit
RPD	Relative Percentage Difference
SAP	Sampling and Analysis Plan
SIM	Selected Ion Monitoring
SOP	Standard Operating Procedure
SS	Soil Sample
SVOC	Semivolatile Organic Compound
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
UST	Underground Storage Tank
VEC	Vapor Encroachment Condition
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
WRCC	Western Regional Climate Center
XRF	X-Ray Fluorescence

COMMON UNITS OF MEASURE

ft^2	Square feet
mg/cm^2	Milligrams per square centimeter
mg/in^2	Milligrams per square inch
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
pCi/L	Picocuries per liter
ppb	Parts per billion
µg/kg	Micrograms per kilogram
µg/cm	Micrograms per centimeter
$µg/ft^2$	Micrograms per square foot
$µg/m^3$	Micrograms per cubic meter
°F	Degrees Fahrenheit

EXECUTIVE SUMMARY

BEC Environmental, Inc. (BEC) was authorized by Nevada Brownfields Program (NBP), administered by the Nevada Division of Environmental Protection (NDEP), to perform a Limited Phase II Environmental Site Assessment (ESA) of the Nye County Courthouse, located at 1 Frankie Street, Tonopah, Nevada 89049, on a portion of Nye County Assessor's Parcel Number (APN) 008-311-01. The Nye County Courthouse property comprises a 2.01-acre parcel with one 22,689-square-foot (ft^2) building listed as "Old Courthouse," and one "Outbuilding structure." A 2015 Building Sketch from the Assessor's Office depicted three sheds on the parcel. This Limited Phase II ESA was conducted to investigate suspected contamination of the site based on recognized environmental conditions (RECs) identified by BEC in the Phase I ESA completed on February 10, 2021, (BEC, 2021) under the NBP. The Limited Phase II ESA was conducted in accordance with the following documents:

- American Society for Testing and Materials (ASTM) E1903-19: *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process* (ASTM, 2019)
- *Sampling and Analysis Plan: Phase II Limited Environmental Site Assessment: Nye County Courthouse* (BEC, 2021)

The Phase I ESA identified the following REC warranting further investigation:

- *The regulatory database review identified the subject site as the Nye County Sheriff's Office in the State UST database. According to case file records, the tanks were installed in May 1974, and were determined to be out of use as of January 1975. Due to the unknown quantity of gasoline and diesel fuel remaining after the USTs ceased to be used in 1975, lack of laboratory analytical data related to the UST removals in 1987, and unknown location of the tanks on the subject site, this was considered a REC for the subject site at the time of this report. Additionally, nearby earthquakes occurring throughout 2020 may have exacerbated vapor intrusion through fracture-flow pathways.*

Sample locations were planned based on a scoping meeting held on November 9, 2020, between BEC and NDEP, and via email authorization from NDEP on January 5, 2021.

Vapor intrusion samples were collected from three locations within the Courthouse: one in the below-ground boiler room, and one each in the occupied office spaces on the first floor. Air samples were collected over a 24-hour period and analyzed for volatile organic compounds (VOCs). Sample analytical data indicated VOCs were not present in excess of their individual EPA Vapor Intrusion Screening Levels (VISLs) in any indoor air samples collected from the Nye County Courthouse. Based on the results of laboratory analysis for indoor air sampling, additional vapor intrusion investigation did not appear to be warranted at the time of this report.

The Phase I ESA also identified the following Business Environmental Risks (BERs):

- Based on the age of the building, renovations over time, materials of construction, and a limited amount of information from a 1997 asbestos survey, BEC considered asbestos-containing materials (ACMs) to be a BER.
- Based on the age of the building, BEC considered lead-based paint (LBP) to be a BER.
- Mold and staining potentially associated with mold due to water damage was considered to be a BER at the time of this report.

An Asbestos-Containing Material Identification Survey of the Old Court House in Tonopah was provided by the User after site reconnaissance was completed (Goyette&Jeong, 1997). The asbestos sampling was conducted prior to planned renovation activities. Additional investigation was warranted to determine if the ACM identified in the report was removed during renovation, and if additional suspect-ACM was present in the Old Courthouse.

As such, site visit activities also included a visual survey of potential ACMs throughout the original courthouse building, excluding any new additions made to the building. Homogeneous areas were counted, and types of materials and their locations were compared to materials tested in the Asbestos-Containing Material Identification Survey conducted in 1997. According to the limited scope of work in this survey, materials tested for were limited to "damaged or commonly disturbed materials… intact materials were not sampled" (Goyette&Jeong, 1997). Based on observations, BEC concludes it is likely the majority, if not all, materials tested remain in the old Courthouse building, and the locations of materials specified appeared unrenovated at the time of this report.

1 INTRODUCTION

BEC Environmental, Inc. (BEC) was authorized by Nevada Brownfields Program (NBP), administered by the Nevada Division of Environmental Protection (NDEP), to perform a Limited Phase II Environmental Site Assessment (ESA) of the Nye County Courthouse, located at 1 Frankie Street, Tonopah, Nevada 89049, on Nye County Assessor's Parcel Number (APN) 008-311-01. This Limited Phase II ESA was conducted to investigate suspected contamination of the site based on recognized environmental conditions (RECs) identified by BEC in the Phase I ESA completed on February 10, 2021 (BEC, 2021) under the NBP. The site comprises one 2.01-acre parcel with one 22,689-square-foot (ft^2) building listed as "Old Courthouse," and one "Outbuilding structure." A 2015 Building Sketch from the Assessor's Office depicted three sheds on the parcel. Field observations from the Phase I ESA include a primarily paved parcel with the Courthouse building, one single-story pre-fabricated building, four sheds, and one CONEX storage container. For the purposes of this investigation, only the main Courthouse building was evaluated (hereinafter referenced as "the subject site"). The approximate location of the parcel and subject site is shown in **Appendix A**, **Figure 1 – Vicinity Map** and **Figure 2 – Site Location Map**. Photographs of the sampling locations are included in **Appendix B**, **Sampling Location Photos**.

The site is located in a mixed-use, rural downtown area with primarily residential buildings. According to the Nye County Assessor's Office, the land use is classified as "Offices, Professional and Business Services." The Nye County Commissioners have been the sole owners of the parcel since the donation of the land. The original building was used as a courthouse, jail, and Sherriff's Office for Nye County until approximately 1995, when operations were transferred to other County facilities. At the time of this report, Nye County was renting space in the Courthouse building and the additional building on the parcel to non-profit organizations for daily use.

1.1 Scope of Services

The Phase II Limited Site Investigation was conducted in general accordance with ASTM E1903-19: *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process* and the scope of work authorized by NDEP via email on January 5, 2021. The Sampling and Analysis Plan (SAP) completed on February 11, 2021, is included in **Appendix C**. The ASTM Standard established the industry-accepted approach and process for the execution and development of a Limited Phase II ESA.

The scope and services for this Limited Phase II ESA included:

- Review of background information; specifically, existing technical reports
- Implementing site sampling and field procedures
- Evaluation of field and analytical information
- Interpretation and reporting of results and recommendations

Prior to conducting Phase II ESA activities, BEC prepared a SAP to outline the project objectives, data quality objectives, and appropriate scope of work to satisfy those objectives (BEC, 2021). BEC then conducted indoor air investigations to screen the subject site for the presence and extent of contamination associated with historic use of the property. The results of the Limited Phase II ESA are presented in this report.

1.2 Limitations and Expectations of Assessments

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard of care exercised by environmental consultants performing similar work in the State of Nevada. This study was not intended to be a definitive investigation of the nature and extent of contamination at the subject site. Recommendations provided are not necessarily inclusive of all possible conditions. The assessment did not include a survey for wetlands, endangered species, or naturally occurring radioactive materials. No other warranty, express or implied, is made regarding the professional opinions in this report. This document is intended to be used in its entirety. No portion of this document, by itself, is designed to completely represent any aspect of the project described herein. NDEP or BEC should be contacted if the reader requires any additional information or has questions regarding the content, interpretations presented, or completeness of this document.

The conclusions presented in this report are professional opinions based solely upon reported data described in this report. BEC does not assume any liability for information that has been misrepresented to us by others, or for items not visible, accessible, or present on the subject site during the time of the investigation. The conclusions and recommendations are intended exclusively for the purpose outlined herein and for the site location and project indicated. This Limited Phase II ESA was prepared for use by NDEP. This report shall not be relied upon by or transferred to any additional parties, or used for any other purpose, without the express written authorization of NDEP.

1.3 Limiting Conditions and Methodologies Used

The findings, opinions, and conclusions contained herein are based on analytical results from indoor air samples collected at the subject site. The conditions of the subject site can change with time as a result of natural processes or human activities at or in the vicinity of the subject site. Additionally, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or increased understanding of impacts to human health and the environment. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which NDEP nor BEC has any control. Neither NDEP nor BEC can warrant or guarantee that not finding indicators of any particular hazardous material means this particular hazardous material or any other hazardous materials do not exist on the subject site. Additional research, including invasive testing, can reduce the uncertainty. No techniques now commonly employed can eliminate the uncertainty altogether.

2 PHASE II SITE INVESTIGATION ACTIVITIES

Phase II sample collection was conducted by BEC on January 6 and 7, 2021. Samples were collected from indoor air and subsequently analyzed for volatile organic compounds (VOCs). This section outlines the sampling activities and laboratory analysis results.

2.1 Scope of Assessment

Areas of investigation were based on information gathered during the Phase I ESA and SAP development. The Phase I ESA identified the following REC:

- *The regulatory database review identified the subject site as the Nye County Sheriff's Office in the State UST database. According to case file records, the tanks were installed in May 1974, and were determined to be out of use as of January 1975. Due to the unknown quantity of gasoline and diesel fuel remaining after the USTs ceased to be used in 1975, lack of laboratory analytical data related to the UST removals in 1987, and unknown location of the tanks on the subject site, this was considered a REC for the subject site at the time of this report. Additionally, nearby earthquakes occurring throughout 2020 may have exacerbated vapor intrusion through fracture-flow pathways.*

Laboratory results of the sampling event indicated VOCs were not present in excess of their individual EPA Vapor Intrusion Screening Levels (VISLs) in any indoor air samples collected from the Nye County Courthouse.

Samples were collected from indoor air by Kelly Sheehan (BEC), Environmental Scientist. Sheehan is also an Asbestos Hazard Emergency Response Act (AHERA) Building Inspector and State of Nevada Asbestos Abatement Consultant (License No. I-2166).

In addition to the indoor air quality sampling, Sheehan performed a follow-up investigation of homogeneous areas of potential Asbestos Containing Material (ACM) in the original Courthouse building. The purpose of the investigation conducted on January 6 and 7, 2021, was to observe materials and compare them to those reported in the Asbestos-Containing Material Identification Survey conducted in 1997.

2.2 Pre-field Activities

Prior to site assessment activities, a Site-Specific Health and Safety Plan was reviewed by on-site BEC personnel. A walk-through of the site and structure(s) was conducted to identify potentially contaminated areas. The Site-Specific Health and Safety Plan is included in **Appendix D**.

2.3 Vapor Intrusion Sampling

Indoor air sampling areas were based on information obtained through the Phase I ESA and refined based on information obtained during the Phase II site investigation. Air samples were collected in three locations within the Courthouse: one in the below-ground boiler room, and one each in the occupied office spaces on the first floor. Sample locations are shown on **Appendix A, Figure 3 – Interior Sample Location Map**. The purpose of collecting and analyzing indoor air samples was to evaluate if sufficient petroleum vapors enter the building to present a workplace safety hazard for current and future workers. Additionally, results from indoor air sampling may indicate the building's susceptibility to soil gas entry to determine if further investigation and/or mitigation is necessary for either condition.

Three 6-liter summa canisters were deployed in the locations specified above on January 6, 2021, by Sheehan. After a period of approximately 24 hours, the canisters were retrieved and sealed by Sheehan. The canisters were packaged and transported to a certified analytical laboratory for analysis of VOCs using EPA Method TO-15.

2.4 Quality Assurance Review

2.4.1 Sample Receipt

The condition of samples upon receipt are evaluated initially by the laboratory and assessed by the data reviewer. There were no sample receipt issues associated with packaging, shipping time, or temperature control reported. ASSET Laboratories reported all samples were received in acceptable condition.

2.4.2 Field Quality Control

Per recommendations from NDEP, field quality control samples in the form of blanks and duplicates were not required for this investigation.

2.4.3 Laboratory Quality Control

2.4.3.1 Holding Times

Holding time refers to the period of time between sample collection and the preparation and/or analysis of the sample. ASSET Laboratories stated the samples were received within the appropriate holding times

from collection to receipt. Samples were also prepared and analyzed within the specified analysis holding time.

2.4.3.2 Method Blanks

Method blanks are laboratory quality control (QC) samples that are prepared and analyzed with each batch of applicable environmental samples. Method blanks were comprised of contaminant-free deionized water that is carried through all preparation procedures in batches with field samples (including the addition of all reagents and QC monitoring compounds). Method blanks monitored potential contaminants in laboratory processes, reagents, and containers.

ASSET Laboratories concluded all method blanks applied to sample analyses showed no analyte detected for VOCs.

2.4.3.3 Spike Samples

Spike samples are environmental matrices spiked with a subset of target compounds at known concentrations. These quality control samples were analyzed with project samples to measure laboratory accuracy and potential interference from the matrix. Two types of spike samples were analyzed with the project samples to monitor for potential interferences during analysis:

- Matrix spike (MS) and matrix spike duplicate (MSD) samples; these samples consist of aliquots of environmental samples spiked with a known quantity of target compounds. MS/MSD samples monitor potential interference from the site-specific sample matrix and its effect on target compounds.
- Blank spike samples, also known as laboratory control samples (LCS); these samples are an aliquot of reagent soil or water spiked with a known quantity of target compounds. The LCS monitors laboratory accuracy without the bias of a sample matrix. A laboratory control sample duplicate (LCSD) result may also be reported.

MS/MSD and LCS results associated with each analysis are reported below. Data were qualified only if both the MS and MSD (or LCS) recovery were outside the QC limits. If either recovery in the pair was acceptable, the data were not qualified. Unless otherwise noted, all qualifications were sample qualifications.

The laboratory report stated analyte recovery for EPA Method TO-15 was within the acceptance criteria for all analytes, except acetone. The laboratory report stated the National Environmental Laboratory Accreditation Commission (NELAC) standard allows for three analytes in marginal exceedance based on 51-70 analytes. The spike value for acetone in the LCS was 5.000 parts per billion by volume (ppbv) and the recovery was 6.660 ppbv; the percent recovery was 133, exceeding the high limit of 130. Therefore, the following qualifier was assigned: “Spike/Surrogate outside of limits due to matrix interference.” The LCSD was not outside control limits, with a value of 6.410 ppbv for a spike amount of 5.000 ppbv; the percent recovery was 128. The relative percent difference (RPD) for the LCS and LCSD for EPA Method TO-15 was within accepted laboratory limits, even for acetone, which had a 3.83% RPD. The laboratory report stated the LCS validated the analytical batch.

2.4.3.4 Quantitation Less than the Practical Quantitation Limit for Stable Chemistries

The laboratory evaluated the practical quantitation limit (PQL) for each sample result. Each data point was assessed as nonqualified or qualified based upon the acceptance criteria. Data may be qualified as “estimated” (J-qualified.) J-qualified data often result from data falling between laboratory method detection limit (MDL) and PQL or a result exceeding a calibration range. These results would be used as positive detection at the reported concentration, with the understanding that the result is estimated. 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 Measurement Quality Objectives, would be considered as a possible corrective action.

J-qualified analytes for the Courthouse boiler room sample (IA-CH-B) were as follows: acetone, chloromethane, and dichlorodifluoromethane. J-qualified analytes for the Courthouse office #1 sample (IA-CH-O1) were as follows: dichlorodifluoromethane. J-qualified analytes for the Courthouse office #2 sample (IA-CH-O2) were as follows: dichlorodifluoromethane, and m,p-xylene.

2.4.3.5 Other Qualifications

In instances where the target analyte was not detected in the sample, the analyte was reported to the practical quantitation limit and qualified as non-detect.

2.5 Analytical Testing

The air samples were delivered under Chain of Custody (COC) protocol to ASSET Laboratories for analysis and were analyzed for VOCs using EPA method TO-15. COCs and laboratory report documentation for the samples are provided in **Appendix E**.

2.6 Analytical Results

The analytical results from the Phase II sampling event are summarized in the following sections. Based on prior research regarding VOCs expected from petroleum contamination, specific analytes were selected for review from the full list of TO-15 analytes. These SAP-approved analytes are listed in the sample results presented in **Table 2-1**. The full laboratory data package is provided in **Appendix E.**

2.6.1 Vapor Intrusion Samples

In accordance with EPA guidance, analytical results for indoor air samples were compared to EPA VISLs for regulated constituents. The results from the VISL Calculator are included in **Appendix F – EPA Vapor Intrusion Screening Levels.** No sample results were reported at or above the EPA VISLs, as seen in **Table 2-1**. VISL calculator results were reported in units of µg/m^3, therefore the following calculation was used to convert sample results reported in units of ppbv for comparison:

$$\frac{\mu g}{m^3} = \frac{ppbv * 12.187 * M}{273.15 + ℃}$$

Where *M* is the molecular weight of the analyte in units of grams per mole, and the ambient outdoor temperature (46°F = 7.8°C) was used for the basement sample due to being in an uninsulated area of the building, and an approximated ambient indoor temperature (70°F = 21.1°C) for the indoor office samples. The equation was retrieved from the Danish Centre for Environment and Energy (DCE, 2019).

Table 2-1: VOC Concentrations in Indoor Air

Analyte	Sample ID [2]						Commercial VISLs (µg/m³)
	IA-CH-B		IA-CH-O1		IA-CH-O2		
	ppbv [3]	µg/m³	ppbv [3]	µg/m³	ppbv [3]	µg/m³	
Acetone	ND <3.10	ND <7.81	11.2	26.9	4.79	11.52	13,500
Benzene [1]	ND <0.253	ND <0.857	ND <0.293	ND <0.948	ND <0.305	ND <0.987	1.57
Ethylbenzene	ND <0.775	ND <3.569	ND <0.900	ND <3.957	ND <0.935	ND <4.111	4.91
Methyl tert-butyl ether (MTBE)	ND <3.10	ND <11.85	ND <3.60	ND <13.14	ND <3.74	ND <13.65	47.2
Styrene	ND <0.775	ND <3.501	ND <0.900	ND <3.882	ND <0.935	ND 4.033	438
Toluene	ND <0.775	ND <3.098	1.75	6.68	1.8	6.9	2190
Xylenes (total)	ND <0.775	ND <3.569	ND <1.8	ND <7.9	ND <1.87	ND <8.22	43.8

[1] The benzene VISL value fell between the laboratory MDL and PQL. However, results were non-detect to the MDL. Thus, the values expressed in this row are the MDL, the remaining values on the table are expressed to the PQL for comparison purposes.
[2] Sample IDs as follows: IA-CH-B: Courthouse boiler room; IA-CH-O1: Courthouse Office 1 – Southeast side; IA-CH-O2: Courthouse Office 2 – Northwest side.
[3] Analytical results were reported in ppbv and converted to µg/m³. Calculations shown in **Appendix E**.

2.7 Deviation from the Sampling and Analysis Plan

Phase II activities were conducted in general accordance with the scope of work authorized by NDEP via email on January 5, 2021, and the SAP submitted to NDEP on January 13, 2021. Deviations from the SAP are discussed below.

- Homogenous areas of suspect ACM were counted throughout the old Courthouse building, noted, and compared to the material type and descriptions discussed from the Asbestos-Containing Material Identification Survey conducted in 1997. The purpose of this comparison was to determine if ACMs documented in 1997 remained at the subject site or appeared to have been removed.

3 DISCUSSION OF FINDINGS

The following sections summarize the findings of the Phase II sampling activities, and the conclusions made by BEC according to those findings.

3.1 Vapor Intrusion: VOCs

Laboratory results of the sampling event indicated VOCs, represented in **Table 2-1: VOC Concentrations in Indoor Air**, were not present in excess of their individual EPA VISLs in any indoor air samples collected from the Nye County Courthouse. Although acetone was detected in samples IA-CH-B, IA-CH-O1, and IA-CH-O2, the results were three to four levels of magnitude lower than the EPA VISL. Additionally, it is likely these results were affected by matrix interference, as reported by the laboratory for LCS and LCSD samples. Additionally, toluene was detected in both samples collected from the first-floor offices (IA-CH-O1 and IA-CH-O2), but was three levels of magnitude lower than the EPA VISL.

3.2 Homogeneous Areas: ACM

Approximately 46 homogeneous areas were identified during the site survey. This count was strictly restricted to upstairs, downstairs, and boiler room of the original Courthouse building, not new additions. During the site visit, William Allen, Nye County Facilities Director, stated no asbestos removal or renovations had been done as far as he was aware of, and he highly doubted they would have happened. Based on this statement, observations on the site visit, and descriptions of the limited materials tested in the Asbestos-Containing Material Identification Survey conducted in 1997, it is unlikely these materials were removed.

4 REGULATORY REPORTING

None of the matrices sampled and analyzed in this assessment required regulatory reporting.

5 RECOMMENDATIONS

5.1 Vapor Intrusion

Laboratory results of the sampling event indicated VOCs were not present in the sample collected from the boiler room of the Nye County Courthouse. VOCs, although present in the first-floor office spaces of the Nye County Courthouse, were not in excess of their individual EPA VISLs in the indoor air samples collected from either the northeast or southwest areas of the building. Although preferential pathways may be present due to the extensive utility piping observed from the basement extending throughout the rest of the building, it did not appear contamination was significantly impacting indoor air quality related to VOCs at the subject site at the time of this report. Additional vapor investigation or mitigation measures for VOCs are not recommended at the time of this report.

5.2 Asbestos-Containing Materials

Site observations indicated building materials previously tested as positive for asbestos remain in the building, and other suspect-ACM has not been previously tested. Any building materials not tested are assumed to be ACM. BEC recommends testing all potentially impacted building materials for asbestos before any renovation, stabilization, or demolition activities.

6 CLOSING

BEC has conducted this Limited Phase II ESA in general accordance with ASTM E1903-19 *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process* and the EPA approved Sampling and Analysis Plan at the property known as the Nye County Courthouse, located at 1 Frankie Street, Tonopah, Nevada 89049, in Nye County, Nevada (APN 008-311-01), in general conformance with the scope and limitations of ASTM E1903-11 and the following objectives:

- To assess potential contamination associated with two former USTs at the property in addition to nearby earthquakes occurring throughout 2020 exacerbating vapor intrusion through fracture-flow pathways.

- To determine if the type of ACMs documented in 1997 were still present at the subject site, homogenous areas of suspect ACM were counted throughout the old Courthouse building, noted, and compared to the material type and descriptions documented in the Asbestos-Containing Material Identification Survey conducted in 1997.

The BEC Team members responsible for the development of this report are listed below and their qualifications are provided herein (**Appendix G – Certifications**). Should you have any questions or concerns, please contact Rachel Schlick at (702) 304-9830.

_____ _____

Rachel Kistler, Preparer
Environmental Scientist
BEC Environmental, Inc.

Date

_____ _____

Rachel Schlick, Reviewer
Environmental Scientist
BEC Environmental, Inc.

Date

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

_____ _____

Rachel O. Schlick, CEM
Certified Environmental Manager, No. 2447
Expires: October 18, 2021

Date

REFERENCES

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APPENDIX A

Figures

Figure 1 - Vicinity Map

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

0 500 1,000 2,000 3,000 Feet

N

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Figure 2 - Site Location Map

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

0 50 100 200 300
Feet

N

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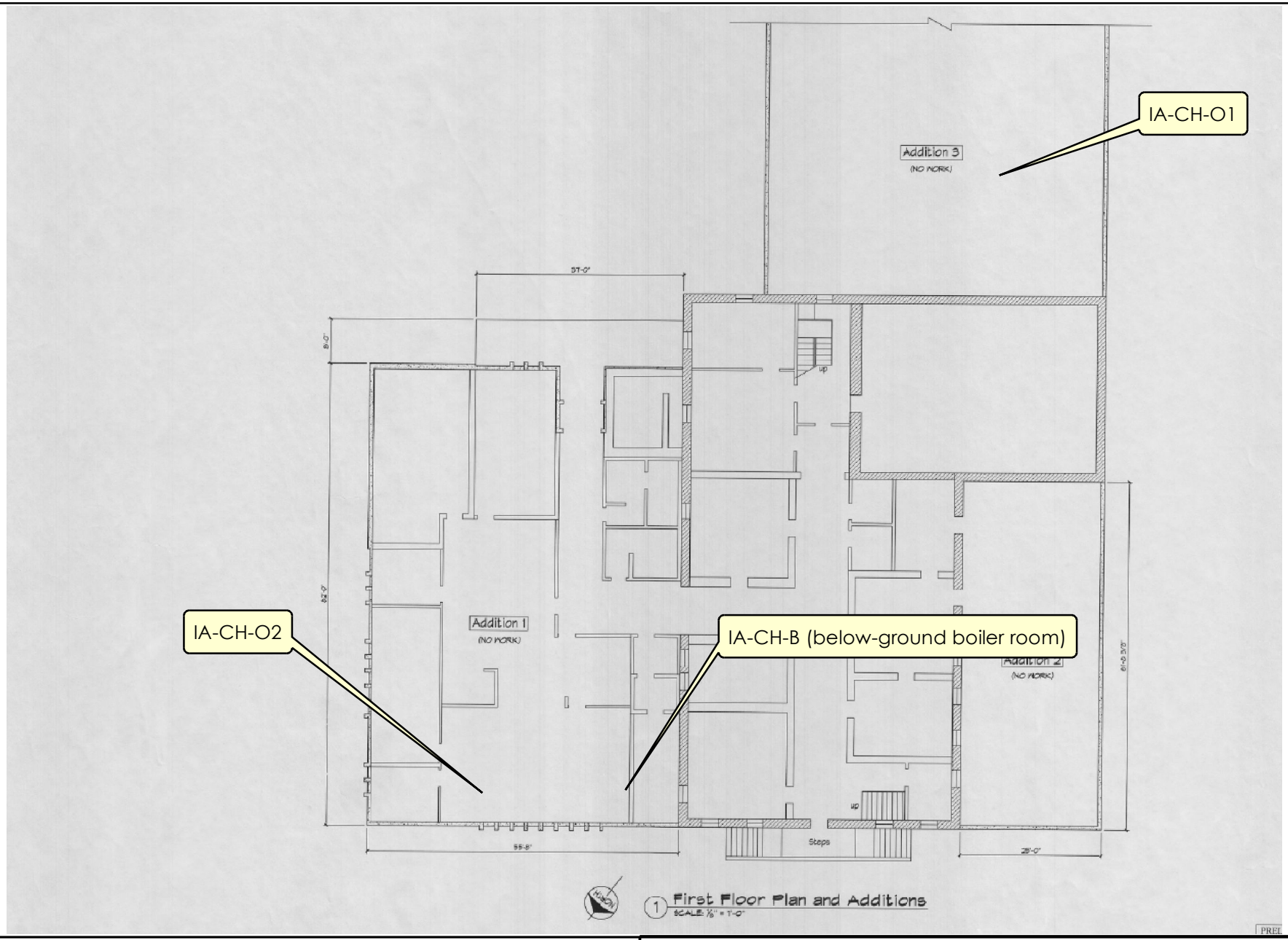

Figure 3 - Proposed Interior Sample Locations

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

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APPENDIX B

Sampling Location Photos

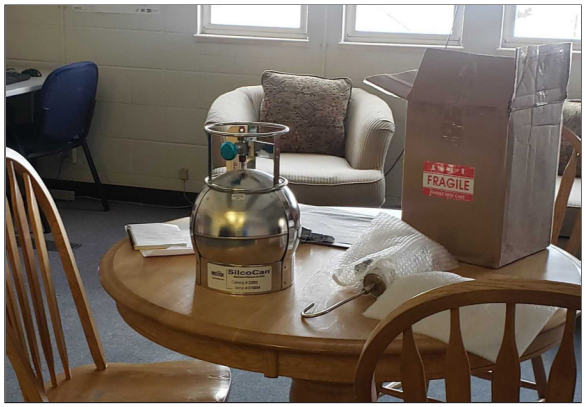
Photo 1

Sample ID: IA-CH-B
Location: Courthouse boiler room

Photo 2

Sample ID: IA-CH-O1
Location: Courthouse Office 1 - Southeast side

Photo 3



Sample ID: IA-CH-O2
Location: Courthouse Office 2 - Northwest side

APPENDIX C

Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN

Phase II Limited Environmental Site Assessment

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

Nye County
Assessor's Parcel Number 008-311-01

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Task: BC14-21
Category: 54
Organizational Code: 5420
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Environmental Services

Approval Page

Sampling and Analysis Plan for:

Nye County Courthouse
Phase II Limited Environmental Site Assessment
1 Frankie Street
Tonopah, Nevada 89049

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STANDARD ABBREVIATIONS

ACM	Asbestos Containing Material
AHERA	Asbestos Hazard Emergency Response Act
APN	Assessor's Parcel Number
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BER	Business Environmental Risk
bgs	Below Ground Surface
CAS	Chemical Abstract Services
CEM	Certified Environmental Manager
CFR	Code of Federal Regulations
DQI	Data Quality Indicators
DQO	Data Quality Objective
DRO	Diesel Range Organics
EDD	Electronics Data Deliverable
ESA	Environmental Site Assessment
FAAS	Flame Atomic Absorption Spectrometry
GPS	Global Positioning System
GRO	Gasoline Range Organics
HA	Homogenous Area
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
LBP	Lead-based Paint
MDL	Method Detection Limit
MQO	Measurements Quality Objective
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NLLAP	National Lead Laboratory Accreditation Program
NVLAP	National Voluntary Laboratory Accreditation Program
ORO	Oil Range Organics
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PAH	Polycyclic Aromatic Hydrocarbon
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PLM	Polarized Light Microscopy
PPE	Personal Protective Equipment
PQL	Practical Quantification Limits
QA	Quality Assurance
QC	Quality Control
RC	Reportable Concentration
REC	Recognized Environmental Condition
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SD	Standard Deviation
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
UST	Underground Storage Tank
VISL	Vapor Intrusion Screening Levels
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WRCC	Western Regional Climate Center
XRF	X-Ray Fluorescence

COMMON UNITS OF MEASURE

ft^2	Square feet
mg/cm^2	Milligrams per square centimeter
mg/in^2	Milligrams per square inch
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
pCi/L	Picocuries per liter
µg/kg	Micrograms per kilogram
µg/cm	Micrograms per centimeter
$µg/ft^2$	Micrograms per square foot
°F	Degrees Fahrenheit
°C	Degrees Celsius
%	Percent

1 INTRODUCTION

BEC Environmental, Inc. (BEC) prepared this Sampling and Analysis Plan (SAP) for Phase II Limited Environmental Site Assessment (ESA) activities at the Nye County Courthouse (subject site), located at 1 Frankie Street, Tonopah, Nevada 89049.

Nye County requested assistance from the Nevada Brownfields Program (NBP), administered by the Nevada Division of Environmental Protection (NDEP), to perform assessment activities to facilitate renovations at the site. Activities conducted by the NBP are funded by the Environmental Protection Agency (EPA) through a Brownfields grant under Section 128(a) of the Comprehensive Environmental Response, Cleanup, and Liability Act (CERCLA). This SAP was prepared in accordance with the *Quality Assurance Program Plan for the Nevada Brownfields Program* dated January 31, 2013 (NDEP, 2013), and the EPA Region 9 *Sampling and Analysis Plan Guidance and Template*, *Version 4, Brownfields Assessment Projects* dated August 2018 (EPA, 2018).

1.1 Site History

BEC was retained by NDEP on behalf of Nye County to perform a Phase I ESA for the subject site to evaluate the potential hazards associated with the building prior to renovations, including potential structural issues that resulted from a 6.5-magnitude earthquake that struck on May 15, 2020. The draft Nye County Courthouse Phase I ESA, submitted to NDEP on September 14, 2020, identified the following Recognized Environmental Conditions (RECs):

- *The regulatory database review identified the subject site as the Nye County Sheriff's Office in the State UST database. Due to the unknown quantity of gasoline and diesel fuel remaining after the USTs ceased to be used in 1975, lack of laboratory analytical data related to the UST removals in 1988, and location on the subject site, this was considered a REC for the subject site at the time of this report.*

In addition to the RECs identified above, the potential for asbestos containing materials (ACMs), lead based paint (LBP), and mold were identified as Business Environmental Risks. Lastly, the Phase I ESA noted waste associated with renovation activities, including fluorescent bulbs, lighting ballasts, and electrical equipment, should be characterized and disposed of in accordance with local, state, and federal regulations as a part of the clean-up and redevelopment process.

1.2 Site Name

The Nye County Courthouse will be hereinafter referenced as the subject site.

1.3 Site Location

The subject site is located at 1 Frankie Street, Tonopah, Nevada 89049, on a 2.01-acre parcel at Nye County Assessor's Parcel Number (APN) 008-311-01. According to the Assessor's improvement listing, there is one 22,689-square-foot (ft^2) building listed as "Old Courthouse," and one "Outbuilding structure." A 2015 Building Sketch from the Assessor's Office depicted three sheds on the parcel. For the purposes of this investigation, only the main Courthouse building will be evaluated. A Vicinity Map (**Attachment 1, Figure 1**) and a Site Location Map (**Attachment 1, Figure 2**), depict the location of the subject site addressed for the purposes of this study.

1.4 Responsible Agency

This investigation will be conducted for NDEP under the NBP on behalf of Nye County. The work will be performed by BEC and their subcontractors. The investigation conforms to the requirements and guidelines of the *Quality Assurance Program Plan for the Nevada Brownfields Program* dated January 31, 2013 (NDEP, 2013), and the *EPA Region 9 Sampling and Analysis Plan Guidance and Template, Version 4, Brownfields Assessment Projects* (EPA, 2018).

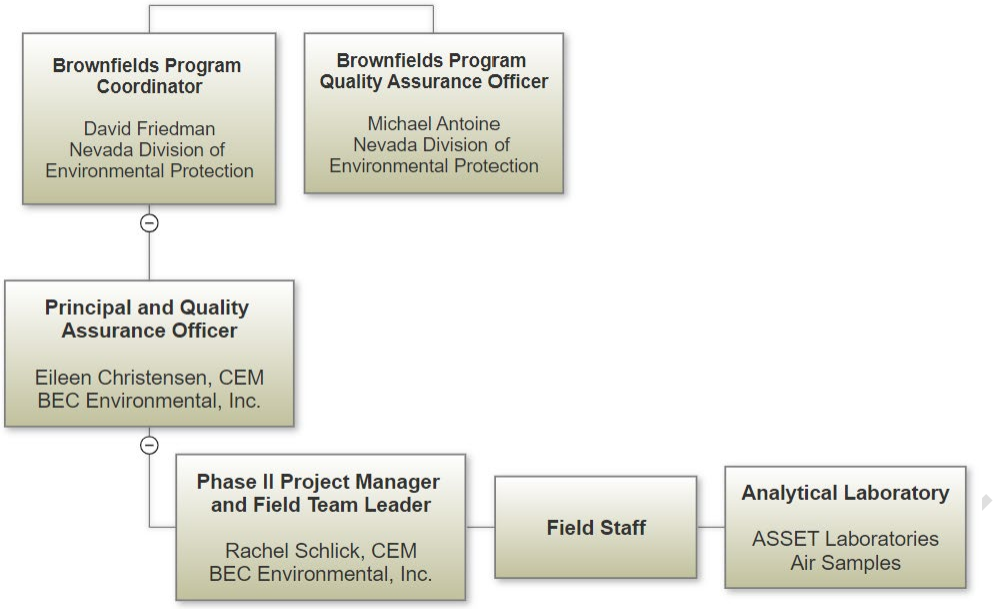
1.5 Project Organization

Project organization is shown in **Table 1-1**.

Table 1-1: Key Project Personnel Contact Information and Responsibilities

Title	Name	Phone Number Email Address	Responsibilities
NDEP			
Brownfields Program Coordinator	David Friedman	(775) 687-9572 DFriedman@ndep.nv.gov	Nevada Brownfields Program coordination
Brownfields Program Quality Assurance (QA) Officer	Michael Antoine	(775) 687-9490 MAntoine@ndep.nv.gov	NDEP QA review of the SAP and QA goals
Nye County			
Grantee Program Administrator	Lorina Dellinger	(775) 482-7319 LDellinger@co.nye.nv.us	Nye County project coordinator for Brownfields projects
Director, Facility Operations	William Allen	(775) 751-4289 WJallen@co.nye.nv.us	Provide site access
BEC Environmental, Inc.			
Project Quality Assurance Officer	Eileen Christensen	(702) 304-9830 Eileen@becnv.com	Oversight, QA/QC review, and data validation
Project Manager and Field Team Leader	Rachel Schlick	(702) 304-9830 RachelS@becnv.com	SAP planning and implementation, Project management, and data review
Project Support and Field Team Member	Kelly Sheehan	(702) 304-9830 KellyS@becnv.com	Performance of field activities and report preparation
Contractors/Vendors			
ASSET Laboratories	Marlon Cartin	(702) 307-2659 Marlon@assetlaboratories.com	Indoor air VOC analysis

Organization Chart



1.6 Document Organization

Following the introduction, this document contains the following sections consistent with EPA guidance:

- Section 2 – Background
- Section 3 – Project and Data Quality Objectives
- Section 4 – Sampling Design and Rationale
- Section 5 – Request for Analysis
- Section 6 – Field Methods and Procedures
- Section 7 – Sample Containers, Preservation, Packaging, and Shipping
- Section 8 – Disposal of Residual Materials
- Section 9 – Sample Documentation
- Section 10 – Quality Control
- Section 11 – Field Variances
- Section 12 – Field Health and Safety Procedures

2 BACKGROUND

This section provides an overview of the location, previous investigations, and the apparent problem(s) associated with the site or sampling area.

2.1 Site Description

The subject site consists of a 22,689 ft^2 building located on 2.01 acres in a mixed-use, rural downtown area with primarily residential buildings. According to the Nye County Assessor's Office, the land use is classified as "Offices, Professional and Business Services." The current adjoining property uses for both sites are summarized in **Table 2-1**.

Observations from the subject site include a primarily paved parcel with the courthouse building, one single-story pre-fabricated building, four sheds, and one CONEX storage container.

Table 2-1: Subject Sites Adjoining Property Overview

Direction	Description
North:	Residential parcels across a small strip of undeveloped land and alleyways.
East:	Largely undeveloped land owned by the County.
South:	Residential parcels across a small strip of undeveloped land and alleyways.
West:	Residential parcel across an alleyway and Courthouse Road.

2.2 Operational History

Although there are no title records associated with the parcel, information retrieved from the Nye County Assessor's Office on August 21, 2020, as part of the Phase I ESA confirmed the Nye County Commissioners as the current owner of the subject site. The land for the Nye County Courthouse was donated by the Tonopah Mining Company and construction on the courthouse was completed in 1905 (Janus Associates, 1980). The Nye County Commissioners have been the sole owners of the parcel since the donation of the land. According to historical records, a jail was added to the Courthouse in 1907. Additional renovations to the courthouse were completed in 1965. According to the Phase I ESA, one 10,000-gallon gasoline underground storage tank (UST) and one 10,000-gallon diesel UST were installed at the subject site in May 1974, but were then registered as "out of use" as of January 1, 1975, and removed from the site on April 8, 1988. The original building was used as a courthouse, jail, and Sherriff's Office for Nye County until approximately 1995, when operations were transferred to other county facilities. At the time of this report, Nye County was renting space to non-profit organizations for daily use in the courthouse building and the additional building on the parcel.

2.3 Previous Investigations and Regulatory Involvement

The subject site is listed on the NDEP Underground/Aboveground Storage Tank (UST/AST) registration database. According to the Nye County Courthouse Phase I ESA, The Nye County Sheriff's Office (now the Nye County Courthouse), Facility ID: 7-000055, was located on the subject site at 1 Frankee Street (also known as Frankie Street). One 10,000-gallon gasoline UST and one 10,000-gallon diesel UST were installed at the subject site in May 1974. According to a letter from the Echo Bay Management Corporation to NDEP, both tanks had been removed from the subject site as of April 8, 1988. Based on information contained in the EPA Form – Tank Data as of January 9, 1987, the USTs were last used on January 1, 1975, with an unknown quantity of gasoline and diesel remaining. However, no analytical data confirming the concentration of total petroleum hydrocarbons (TPH) in the proximity of tank closure as part of the closure process was included with available case file information.

The only other prior investigation at the Courthouse was a Limited Asbestos Survey in 1997. No other case files with NDEP or other regulatory agencies were identified for the subject sites during the Phase I ESA process.

2.4 Scoping Meeting

A preliminary scoping meeting was scheduled to prepare for further investigation of the subject site, including the revisions of the Phase I ESA, and preparations of this SAP. The meeting was held on November 9, 2020, between David Friedman (NDEP), Eileen Christensen (BEC), and Rachel Kistler (BEC) via videoconference. Discussions included reviewing the NDEP case file for the subject site (Facility ID 7-000055) to clarify understanding of the prior USTs installed on the site. Due to nearby earthquakes occurring throughout 2020, Christensen expressed concern of potential vapor intrusion from possible undocumented petroleum remaining in the soil from the time of UST removal being exacerbated through fracture-flow pathways. Friedman agreed to conducting ambient air sampling in the below-

ground boiler room of the original Courthouse building and in the occupied office spaces on the first floor.

2.5 Geological and Meteorological Information

The subject site is located in Tonopah, Nevada, in the western part of the Great Basin section of the Basin and Range physiographic province. Tonopah is at the southern end of the San Antonio Mountains that separate Big Smoky Valley from Ralston Valley. These elongated valleys and range result from northeast-trending block faulting, a fundamental characteristic of the Basin and Range physiographic province.

Additionally, the subject site is located northeast of Brougher Mountain. The geology typical of Brougher Mountain and other mountains along the west side of the San Antonio Range is a mix of older basalts interfingered with younger felsic volcanic rocks. Near Tonopah, Tertiary volcanic rocks crop out beneath the younger Fraction Tuff. The volcanic rocks at Tonopah are distinctive and include the Mizpah Trachyte, the principal ore-bearing formation in the area. Other formations associated with the area include the Siebert Tuff and Oddie Rhyolite (Ninyo and Moore, 2007).

Ephemeral washes carry sediments to alluvial fan deposits on the mountain flank. These alluvial fan deposits underlie the subject site. As the distance increases from the source rock area, the sediments carried down to the alluvial fans become increasingly finer grained.

The dominant soil composition at land surface in the vicinity of the subject sites was based on information provided by Environmental Data Resources, Inc. (EDR), as supplied from the U.S. Department of Agriculture's Soil Conservation Service. The main soil component at the subject site is named Pintwater, a very cobbly fine sandy loam with very slow infiltration rates. The soil surface texture typical of the subject sites is a 3-inch layer of well drained, very cobbly fine sandy loam with very slow infiltration rates, overlying a three to sixteen-inch layer of extremely cobbly fine sandy loam. These types of soils are clayey, have a high water table, or are shallow to an impervious layer. No natural surface water bodies, including ponds, streams, or other bodies of water, are present on the site.

Northern portions of Nye County experience four seasonal changes with heavy rainstorms prevalent during late spring (May-June) and late summer (August). According to the Tonopah, Nevada (268160) station of the Western Regional Climate Center (WRCC), Tonopah's average maximum and minimum temperatures are 38.4˚F and 22.8˚F in January, and 87.4˚F and 61.3˚F in July. The average annual precipitation in Tonopah is 4.8 inches (WRCC, 2016). The snowmelt and limited precipitation infiltrates the subsurface through the bedrock and eventually becomes the shallow groundwater aquifer.

Tonopah is located primarily within Nevada Hydrographic Region 10 Basin 137A (Big Smoky Valley/Tonopah Flat), on the border of Basin 141 (Ralston Valley) to the east. According to Esmeralda County's Water Resources Plan, "The lower portion of the Big Smoky Valley hydrographic basin discharges mostly to the Clayton Valley basin. The Division of Water Resources has indicated that some groundwater may discharge from Big Smoky Valley to Columbus Salt Marsh. Recharge to lower Big Smoky Valley is mostly from the northern portions of Big Smoky Valley." Similarly, Ralston Valley, primarily in Nye County, discharges water to the west-southwest toward the Alkali Springs Valley in Esmeralda (Farr West Engineering, 2012).

A groundwater monitoring well (NV Well #32280) located approximately 4,427 feet (ft) north-northwest the subject site and approximately 160 ft lower in elevation, was determined to have a 10.5-ft depth to groundwater when drilled in 1988. Regional groundwater flow direction is expected to be south-southwest. However, as a result of a 6.5 magnitude earthquake on May 15, 2020, subsequent aftershocks,

and increased geologic activity in this area, subsurface fracturing may have impacted the direction of local groundwater flow. Well Log #32280 is provided in **Attachment 2 – Groundwater Information**.

2.6 Impact on Human Health and/or the Environment

No reported or documented adverse human health effects associated with the RECs were discovered through the Phase I ESA process. However, vapor intrusion pathways potentially created or exposed due to increased geologic activity in the local area may pose an increased risk for petroleum vapors entering the building and affecting workers.

3 PROJECT AND DATA QUALITY OBJECTIVES

The Data Quality Objective (DQO) process is a systematic planning tool used to establish performance or acceptance criteria to clarify study objectives (EPA, 2006). 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.

3.1 Project Task and Problem Definition

The purpose of this environmental investigation will be to sample for the presence of volatile organic compounds (VOCs) in ambient air at the subject site. No analytical data confirming the concentration of TPH in the proximity of tank closure as part of the closure process was included with available case file information. Therefore, it is unknown if there may have been petroleum-affected soil at the subject site which was later paved over. Due to increased geologic activity at the site, vapor intrusion pathways may have been created or exposed, allowing petroleum vapors to enter the building. The principal study question is, "are potential contaminants present at the sites at levels that exceed appropriate health-risk-based screening levels for current and future occupants of the sites based on the intended use?" To assess the presence of contaminants in indoor air at the Courthouse, ambient air samples will be collected and analyzed for VOCs.

3.2 Data Quality Objectives

3.2.1 Step 1: State the Problem

Problem Description. The primary problem is how to sufficiently characterize the nature and extent of indoor air contamination within the Courthouse building.

Planning Team. The planning team includes the EPA Region 9 Project Manager and QA Manager; the Nye County Facilities Director, who will provide the access to the subject site; and the Qualified Environmental Professional team.

Conceptual Model of the Potential Hazard. The Nye County Courthouse is a 22,689-ft^2 building owned by Nye County, and office space is leased to local non-profit organizations. Future renovation plans are being considered for the Courthouse.

One 10,000-gallon gasoline UST and one 10,000-gallon diesel UST were installed at the subject site in May 1974. Based on information contained in the EPA Form – Tank Data as of January 9, 1987, the USTs were last used on January 1, 1975, with an unknown quantity of gasoline and diesel remaining. The tanks were removed from the subject site as of April 8, 1988. However, no analytical data confirming the concentration of total petroleum hydrocarbons (TPH) in the proximity of tank closure as part of the closure process was included with available case file information. Due to recently increased geologic activity near the site, there are concerns regarding vapor intrusion pathways having been created or exposed, allowing petroleum vapors to enter the building and potentially impact workers.

Available Resources, Constraints, and Deadlines. Based on the availability of a previously completed Limited Asbestos Survey and no planned or ongoing renovations to the subject site, asbestos containing materials and lead based paint business environmental risks were not evaluated as part of this Limited Phase II ESA.

Due to the coordination between multiple parties and timelines of laboratory equipment availability, David Friedman (NDEP) approved air samples to be analyzed via EPA Method TO-15 (standard) instead of TO-15 SIM (select ion monitoring), which has sufficient method detection limits to meet the data quality objectives.

3.2.2 Step 2: Identify the Goals of the Study

Primary Question:

- Is there VOC contamination in the indoor air present at levels that exceed appropriate health-risk-based screening levels for current and future occupants and users?

Alternative Actions:

- Take no action (i.e., do not assess or renovate this site).
- Conduct indoor air sampling and analyze for VOCs. Determine if there is sufficient information to proceed with estimating various remedial options.

Decision Statement:

- Conduct ambient air sampling in indoor air in the Courthouse. If contamination is not found in excess of screening levels protective of human health or the environment, normal operations may continue. Additional environmental characterization may be required prior to performing renovations. If contamination is found in excess of screening levels protective of human health and/or the environment, then options for further site characterization, remediation, or alternative uses of the site will be considered.

3.2.3 Step 3: Identify Information Inputs

Information Needed to Resolve the Decision Statement. Analytical data for collected samples will be evaluated to determine if concentrations exceed applicable regulatory thresholds. Indoor air samples will be collected over a 24-hour period from three locations within the Courthouse: one in the below-ground boiler room, and one each in the occupied office spaces on the first floor. Air samples collected on the first floor will be collected at breathing level. Ambient air will be sampled from the locations listed into 6-liter summa canisters recommended by the laboratory and sent for analysis under chain of custody protocol. Analytical data for collected samples will be evaluated to determine if concentrations exceed applicable regulatory thresholds and pose a risk to human health or the environment.

Indoor air samples will be analyzed for the following constituents of concern:

- VOCs using EPA Method TO-15

The proposed analytical method, method detection limit, and reportable concentrations are presented in **Table 3-1**. Unless otherwise noted, reportable concentrations were based off the EPA Vapor Intrusion Screening Levels (VISLs) (**Attachment 3**). If the onsite VOC concentrations exceed the exposure limits, it indicates the building is susceptible to soil gas intrusion, and subsequently, there is likely soil contamination at the site and an additional sampling investigation may be warranted.

Table 3-1: Air Contaminants of Concern, Laboratory, and Screening Levels Matrix

Group / EPA Method	Analyte	CAS # [1]	Practical Quantitation Limit (µg/m³)	Method Detection Limit (µg/m³)	Commercial VISLs[2] (µg/m³)
VOCs / TO-15	Benzene	71-43-2	1.6	0.67900	1.57
	Ethylbenzene	100-41-4	2.17	0.76900	4.91
	Methyl t-butyl ether (MTBE)	1634-04-4	7.21	0.87200	47.2
	Naphthalene	91-20-3	18.337	0.24900	36.1
	Styrene	100-42-5	2.13	0.85800	438
	Toluene	108-88-3	1.88	0.71600	2190
	Xylenes (mixture)	1330-20-7	4.34	1.65000	43.8

[1] CAS #: Chemical Abstract Services Registry Number
[2] VISLs – Vapor Intrusion Screening Levels – Target Indoor Air Concentration

3.2.4 Step 4: Define Study Boundaries

Sample collection will occur within the boundary of the subject site as defined in Section 2.1 of this Plan and as shown on **Figure 3 – Proposed Interior Sample Locations** (**Attachment 1**). Sampling will be limited to areas suspected to be susceptible to vapor intrusion (below-ground boiler room) and areas of active building occupancy (two office spaces). Analysis will be limited to VOCs. The estimated duration of activities described in this SAP is approximately 24 hours.

3.2.5 Step 5: Develop the Analytic Approach

Decision rules from sampling activities will be based on the analytical results obtained, in comparison to regulatory thresholds specified in **Table 3-1**. These comparisons will be used to evaluate if additional assessment and/or remediation action is required (i.e., if the reported concentrations exceed regulatory thresholds). Data may also be used to assist in determining an appropriate approach to remediation methodology and/or institutional controls.

If VOCs in indoor air are detected above the EPA VISLs for constituent concentrations as outlined in **Table 3-1**, recommendations for further investigation will be evaluated. If contaminants of concern are not detected above screening levels, then no further action will be required.

3.2.6 Step 6: Specify Performance or Acceptance Criteria

Vapor intrusion sampling will not be a statistically based study; therefore, sampling locations will be selected based on professional judgment and site knowledge.

3.2.7 Step 7: Optimize Sample Design

The goals of the sampling event are to establish whether indoor air at the site is contaminated with hazardous materials. Samples will be collected at various locations throughout the site that have been identified as potential sources of contamination. Summa canisters over a 24-hour period are proposed to evaluate the potential presence of VOCs in indoor air.

3.3 Measurement Quality Objectives

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

- **Precision:** the degree of mutual agreement between or among independent measurements of a similar property (reported as standard deviation [SD] or relative percent difference [RPD]) 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 sample locations.
- **Completeness:** expressed as the percent of valid usable data obtained compared to the amount that was expected.
- **Comparability:** expresses the confidence with which one data set can be compared with another.
- **Sensitivity:** the adequacy of laboratory reporting limits for this investigation when compared to screening levels utilized for this project.

3.3.1 Precision and Accuracy

DQOs will be met through adhering to required sampling methodology, required laboratory analytical methods, and data review. Data are accepted and rejected based on the DQOs. 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 will be made. Audits will be initiated when DQOs are not being met.

3.3.1.1 Vapor Intrusion

One indoor air sample will be collected in the below-ground boiler room, and one air sample will be collected from each of the occupied office spaces within the breathing zone. Per NDEP's recommendations, no trip blanks or field blanks will be utilized for this investigation. Field procedures and documentation, sample custody control, and laboratory requirements for sample preservation and holding time will be reviewed to verify appropriate sample preservation and holding times are achieved. A review of the laboratory's internal QC results will include an evaluation of laboratory duplicates, matrix spike, duplicate percent recoveries, method blanks, and laboratory control standards. A review of the laboratory's internal QC results will include an evaluation of laboratory duplicates, matrix spike, duplicate percent recoveries, method blanks, and laboratory control standards.

3.3.2 Representativeness

The project goal is to obtain an adequate number of samples to characterize site conditions.

3.3.3 Completeness

A total of three air samples will be collected at the subject site: one from the below-ground boiler room, and one each from the occupied office spaces within the breathing zone.

During field activities, there is potential for sample contamination associated with human error, instrument failure, environmental conditions, and other circumstances which may interfere with laboratory analysis and associated validity of analytical results. Additionally, sample containers may be broken, lost, or otherwise invalidated. However, BEC expects the number of valid results from the analysis to be equal to or greater than 90%. This percentage will allow for the appropriate level of decision making in determining if the collected data is sufficient to characterize the site or if additional data are required.

3.3.4 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Field and weather variations at the time of sample collection should not decrease comparability to any studies performed in the future.

3.3.5 Sensitivity

The laboratory reporting limits are adequate for this investigation when compared to screening levels utilized for this project. Constituents of potential concern, analytical methods, method detection limits, and permissible exposure limits are presented in **Table 3-1**.

3.4 Data Review and Validation

The limited scope of this investigation warrants the use of a Tier 1A data validation effort. 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 (SOPs), 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 evaluate the analytical quality of a specific data set. This involves a detailed examination of the data package to determine whether measurement quality objectives (MQOs) for precision, accuracy, and sensitivity have been met. For this assessment, the intent of the data review and validation process is to verify 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 the data fulfills project DQOs.

A verification-level validation will be performed on all field documentation and analytical data reports. The data validation process will be used to verify the data quality. The following QC elements will be reviewed, as appropriate, for sampling activities associated with VOCs:

- Analytical holding times
- Preparation blank contamination
- Check standard precision
- Analytical accuracy (blank, matrix spike, and control sample recoveries)
- Analytical precision (comparison of replicate sample results)

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

- Chain of Custody documentation
- Laboratory batch QC frequency
- Results of batch and field QC analysis

The laboratory will generate and review all laboratory data. Each data point will be assessed as nonqualified or qualified based upon the acceptance criteria. Data may be qualified as "estimated" (J-qualified); these data are considered estimates. J-qualified data often result from data falling between

laboratory MDL and practical quantification limits (PQL) or a result exceeding a calibration range. These results will be used as positive detection at the reported concentration, with the understanding that the result is estimated. 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

Data management systems and procedures will be used to establish and maintain efficient organization and reporting of the environmental information collected. Procedures and standards for conducting specific data management tasks (i.e., acquisition, handling, storage, and distribution of the data) will be documented in a project log. Essential elements of data management and reporting activities associated with this assessment are discussed in the following section.

3.5.1 Field Data

The main documentation of field activities will consist of daily field records (a combination of field logbooks, field forms, global positioning system [GPS] records, and Chain of Custody forms), including sample location and selection justification. Upon completion of sampling activities, hardcopy notes and forms will be scanned to develop an electronic record for use in preparing the Limited Phase II ESA. Information on sampling locations, dates, depths, equipment, sample identifiers, and other relevant conditions will be entered into the project log. BEC's QA Officer will ensure 100% of hand-entered data is verified based on hard-copy records. Electronic QA checks to identify anomalous values will also be conducted following data entry.

3.5.2 Laboratory Data

The analytical laboratories will each submit data in electronic format. The project manager or designated data manager will provide the desired format for Electronic Data Deliverables (EDDs) to the laboratories, and the project data manager and laboratory coordinator will discuss these specifications with laboratory QA managers prior to data delivery and tailor them as necessary to specific laboratory capabilities. QA checks of format and consistency will be applied to EDDs received from the laboratory.

3.5.3 Reporting

Qualitative (e.g., field logs, observations) and quantitative (e.g., sample results, measurements) will be evaluated, analyzed, and reported in the final Site Characterization Report. BEC's QA Officer will perform a technical review of the qualitative and quantitative data presented in the report, to ensure the technical information is accurately reported and discussed within each report. BEC will perform a secondary professional review to ensure grammar, formatting, and narrative components of the report are correct prior to final report submittal.

3.6 Assessment Oversight

The SAP and Site-Specific Health and Safety Plan (HASP) will be reviewed by the Project Team prior to commencing with field work. The BEC Project Manager will oversee QC of field activities. If modifications to the proposed sampling program are necessitated by field conditions, the Project Manager will be notified and consulted for direction. Modifications to the SAP will be documented in the field logs and in the Site Characterization Report as "deviations from the SAP".

4 SAMPLING DESIGN AND RATIONALE

The following sections describe the method used in determining the sampling design, including location of samples and constituents of concern.

4.1 Vapor Intrusion Sampling

Vapor intrusion is defined as the migration of chemical vapors from contaminated soil and groundwater into existing or planned buildings. Vapor intrusion exposes building occupants to potentially toxic levels of vapors when VOCs present in contaminated soil or groundwater emit vapors that migrate into overlying buildings. VOCs in contaminated soil and groundwater emit vapors that rise through the pore space of the unsaturated zone above the water table. These vapors can move laterally as well as vertically from the source of contamination. Generally, soil or groundwater contamination within 100 feet (laterally or vertically) of any current or future on-site or off-site buildings contains the potential for releasing hazardous vapors to the indoor air. Any passageway, such as a sand or gravel layer, buried utility line, or animal burrow, may facilitate the flow of soil vapor. Properties with a higher potential for soil vapor intrusion include industrial and commercial areas, such as former manufacturing and chemical processing plants, warehouses, train yards, dry cleaners, and gas stations.

Based on the age of the building, the presence of subsurface utility corridors, and unknown soil contamination from two USTs previously located on the subject site, soil vapor intrusion is possible at the subject site. Due to the amount of unknown information at the time of this report, the vapor intrusion pathway is incomplete and therefore, extensive soil and groundwater sampling is not required at this time. Utility corridors, sumps, and foundational cracks within the boiler room of the subject site present the most likely routes of vapor intrusion. Air samples will be collected with Summa canisters in the boiler room near utility corridors, sumps, and obvious cracks in the foundation and boiler room walls, and in the two occupied office spaces on the first floor of the building. Exact locations for air samples will be based on professional judgment of environmental personnel in the field.

The purpose of collecting air samples and analyzing for VOCs is to evaluate if potential vapors from potential contaminant sources would present a workplace safety hazard for current and future workers in the building. If the levels exceed EPA VISLs, this could be indicative of soil and/or groundwater contamination at the site and may warrant further investigation.

4.2 Cultural Resource Discoveries

Ground disturbing activities may reveal previously unidentified cultural resources. Cultural resources are artifacts, relics, or other physical traces, regardless of condition, that may be associated with prehistoric or indigenous occupation and use of the site and may possess archeological significance or be of importance to existing tribes. A copy of the Plan and Procedures for the Unanticipated Discovery of Cultural Resources and Human Skeletal Remains is provided in **Attachment 4**.

5 REQUEST FOR ANALYSIS

Sample media, analytical methods, and laboratory information is discussed in Section 5.1 and Section 5.2.

5.1 Analyses Narratives

A total of three interior air samples will be collected from the subject site over a period of 24 hours. The samples will be submitted to ASSET Laboratories for VOCs analysis by EPA Method TO-15, per the laboratory's SOP, included in **Attachment 5 – Standard Operating Procedures**. **Table 5-1** presents a summary of indoor air laboratory analysis, sample container and type, and holding time.

Table 5-1: Vapor Intrusion Analytical Services Matrix

Sample Matrix	**Gas**	
Analytical Method:	**EPA TO-15**	
Analytical Holding Time:	**30 days**	
Sample Preservation:	**None**	
Sample Volume / Container:	**6-liter Summa canister**	
Sample Number	**Sample Location**	**Special Designation**
IA-CH-B	Courthouse boiler room	N/A
IA-CH-O1	Courthouse Office 1 – Southeast side	N/A
IA-CH-O2	Courthouse Office 2 – Northwest side	N/A
Total number Air Samples, excluding QC	3	
Total number Air Samples, including QC[1]	3	

[1] No trip or field QC samples will be utilized for this investigation.

5.2 Analytical Laboratory

BEC proposes to use ASSET Laboratories to perform the laboratory analysis for VOCs in air samples. Analytical testing and sample handling, including container types and preservation methods, will be conducted in accordance with ASSET Laboratories Quality Assurance Manual (**Attachment 6 – Laboratory Quality Assurance Manuals**). ASSET Laboratories is accredited through the National Environmental Laboratory Accreditation Program (NELAP) (through the Oregon Environmental Laboratory Accreditation Program [ORELAP]) to perform analysis of EPA Method TO-15.

Additional information regarding analytical method, sample containers, sample quantity, sample preservation, and sample holding times are presented in **Table 5-1.**

6 FIELD METHODS AND PROCEDURES

The following sections describe the procedures and equipment to be used to collect samples at the subject site.

6.1 Field Equipment

6.1.1 List of Equipment Needed

This section outlines the necessary field equipment for sample collection.

Table 6-1: Field and Sampling Equipment

Description of Equipment	Material (if applicable)	Dedicated (Yes/No)
Summa Canisters	Stainless Steel	Yes
Adjustable wrench	Metal	No
Field logbook, field data sheets, Chains of Custody forms	Paper	No
Camera	Metal/Electronic	No
Regular and indelible ink pens	Plastic	No

6.1.2 Calibration of Field Equipment

Air canisters for VOC sampling will have flow valves calibrated by the lab prior to use. Per the laboratory's instructions, these devices do not require a field calibration check.

6.2 Field Screening

No field screening will be conducted in conjunction with laboratory sampling for this project.

6.3 Vapor Intrusion Sampling

An initial walk through of the subject site will be conducted in order to identify adequate sampling locations for indoor air samples. Sample locations will be marked on a map of the project area and described on an air sample log (**Attachment 7 – Field Forms**). A total of three air samples will be collected over a period of 24 hours for this sampling plan: one in the below-ground boiler room, and one air sample will be collected from each of the occupied office spaces within the breathing zone. No trip blanks or field blanks will be utilized for this investigation (**Table 5-1**). Samples will be collected in 6-liter passivated sampling canisters. Each sample will be documented on a Chain of Custody form (**Attachment 8**), which will accompany the samples to the NELAP-accredited laboratory.

6.4 Decontamination Procedures

Air sampling canisters are dedicated equipment and will be cleaned and prepared for sample collection by the laboratory. Other non-dedicated equipment used during sampling will not interfere with sample collection. **Table 6-1** outlines the equipment planned for use during sampling activities.

7 SAMPLE CONTAINERS, PRESERVATION, PACKAGING, AND SHIPPING

The quantity and type of sample containers, required sample volumes, and preservatives are listed in Section 5 of this plan. Sample containers will be provided by the selected analytical laboratory. Each container will be pre-cleaned by the laboratory prior to sample collection.

7.1 Vapor Intrusion Samples

All sampling procedures performed under this SAP will not require the use of chemical or temperature preservation. Air samples will be collected in Summa canisters and labelled appropriately.

7.2 Packaging and Shipping

All sample containers will be placed in a strong-outside shipping container. Care will be taken to prevent deterioration or damage to samples during transit. Samples will be transported directly to the laboratory once sampling has been completed, under proper Chain of Custody protocol, by the sample collector.

8 DISPOSAL OF RESIDUAL MATERIALS

Not applicable to this project as no PPE or disposable equipment will be utilized for this sampling event.

9 SAMPLE DOCUMENTATION

9.1 Field Notes

This section discusses record keeping in the field, which may include a combination of logbooks, preprinted forms, photographs, or other documentation. Information to be maintained is provided below.

9.1.1 Field Logbooks

Field logbooks and sample logs will be completed describing all field activities. At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description
- Sampler's name(s)
- Date and time of sample collection
- Type of sample (air)
- Type of sampling equipment used
- Field instrument readings from summa canister flow controllers
- Analyte (VOCs)
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Name(s) of recipient laboratory(ies)

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

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

9.1.2 Photographs

Photographs will be taken at the sampling locations and at other areas of interest on site or sampling area. They will serve to verify information entered in the field logbook.

9.2 Sample Labeling

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. A copy of the sample label is included in **Attachment 9**. The samples will have pre-assigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: sample ID, sample location, date of collection, and analytical parameters(s). Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

<u>Air Samples: Indoor Air – Building – Location</u>
Examples:
IA-CH-B (Courthouse, boiler room)
IA-CH-O# (Courthouse, office #)

9.3 Sample Chain-of-Custody Forms and Custody Seals

All sample shipments for analyses will be accompanied by a chain-of-custody record. A copy of the form is found in **Attachment 8**. Form(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day).

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

Custody seals will not be utilized for this investigation.

10 QUALITY CONTROL

This section describes the steps taken to ensure QC throughout the sampling process.

10.1 Field Quality Control Samples

Per recommendations from NDEP, field quality control samples will not be required for this investigation.

10.1.1 Assessment of Field Contamination (Blanks)

Per recommendation from NDEP, neither equipment blanks, field blanks, nor trip blanks will be required for this investigation. Air samples will not require a temperature blank.

10.1.2 Assessment of Field Variability (Field Duplicate or Collocated Samples)

Per recommendation from NDEP, field duplicate samples will not be required for this investigation.

10.2 Background Samples

Background samples will not be collected for this investigation. There is no expectation that native or ambient levels of the target analytes will be present.

10.3 Field Screening, Including Confirmation Samples, and Split Samples

Not required for this investigation.

10.4 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 parameters. Specific laboratory QC procedures are provided in **Attachment 5**.

11 FIELD VARIANCES

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

12 FIELD HEALTH AND SAFETY PROCEDURES

A site-specific HASP is provided in **Attachment 10**. The HASP will be reviewed and signed by on-site personnel prior to commencing work.

13 REFERENCES

EPA. (2006). *Guidance on Systematic Planning Using the Data Quality Objectives Process.* Office of Environmental Information. Washington, DC: United States Environmental Protection Agency. doi:EPA/240/B-06/001

EPA. (2018, August). *Quality Assurance Planning Region 9.* Retrieved May 24, 2019, from EPA: https://www.epa.gov/quality/quality-assurance-planning-region-9#sap

Farr West Engineering. (2012). *Esmeralda County Water Resources Plan.* Esmeralda County, Nevada.

NDEP. (2013, January). *Brownfields Nevada's Land Recycling Program Quality Assurance Program Plan.* Retrieved February 2020, from NDEP: https://ndep.nv.gov/uploads/documents/nv_brownfileds_qa_plan-2013.pdf

Ninyo and Moore. (2007). *Phase I Environmental Site Assessment Report, Parcel Nos 08-161-04 and 08-061-05, Tonpah, Nevada.* Las Vegas: Ninyo and Moore.

WRCC. (2016, June 9). *Western Regional Climate Center*. Retrieved September 2, 2020, from https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv8160

ATTACHMENT 1

Figures

Figure 1 - Vicinity Map

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

0 500 1,000 2,000 3,000 Feet

N

bec environmental, inc.
Environmental Services

Figure 2 - Site Location Map

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

0 50 100 200 300
Feet

N

bec environmental, inc.
Environmental Services

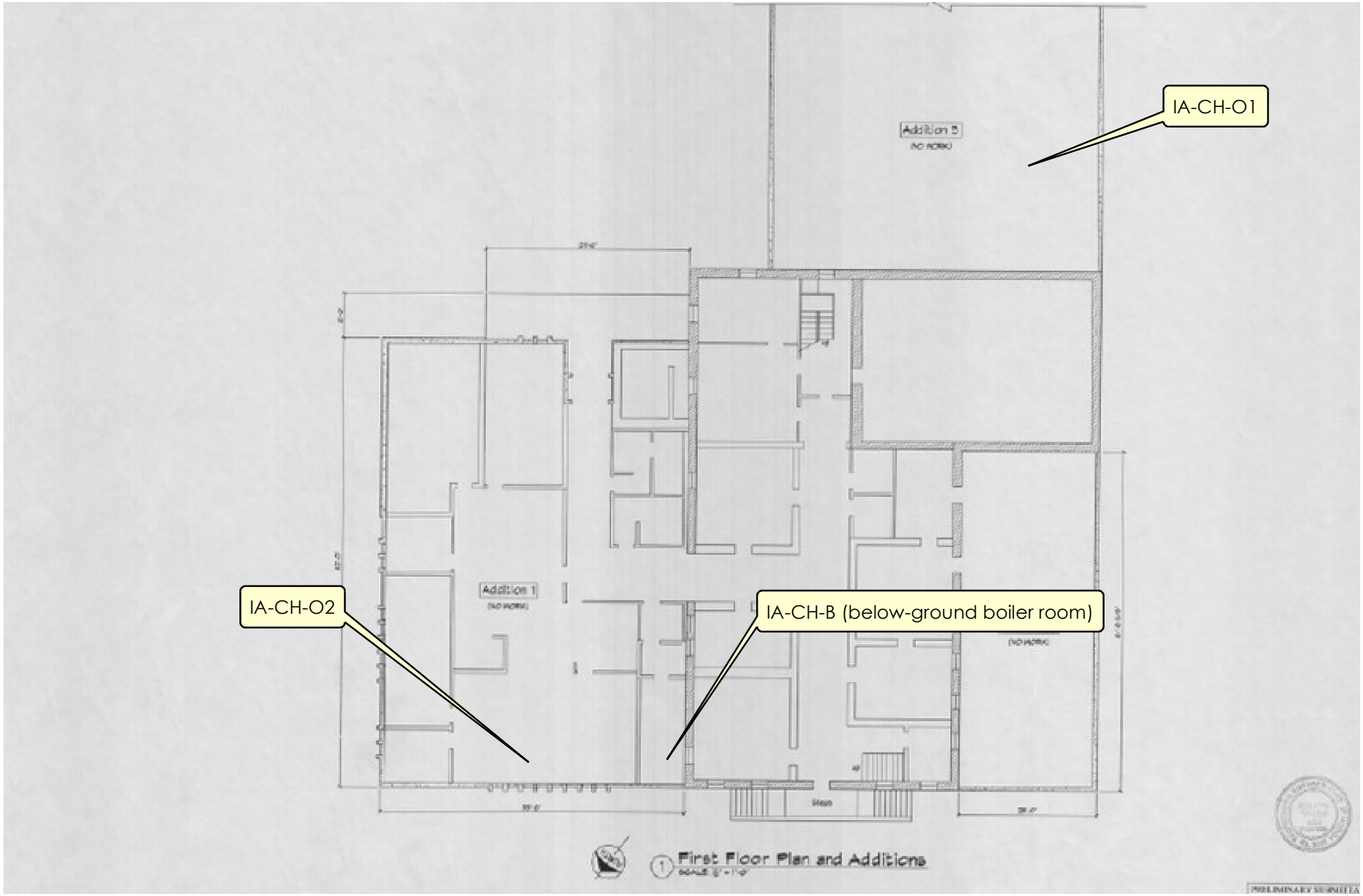


Figure 3 - Proposed Interior Sample Locations

Nye County Courthouse
1 Frankie Street
Tonopah, Nevada 89049

bec environmental, inc.
Environmental Services

N

ATTACHMENT 2

Groundwater Information

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No. 32280
Permit No.
Basin 137A

In Book 1

NOTICE OF INTENT NO. 5256

PRINT OR TYPE ONLY

1. OWNER Unocal Corp. ADDRESS AT WELL LOCATION M-4
MAILING ADDRESS San Diego CA

2. LOCATION SW ¼ NW ¼ Sec. 35 T. 3 (N) S R. 42 E. Nye County
PERMIT NO. (Issued by Water Resources) Parcel No. Subdivision Name

3. TYPE OF WORK: New Well ☒ Recondition ☐ Deepen ☐ Other ☐

4. PROPOSED USE: Domestic ☐ Irrigation ☐ ~~Test~~ Monitor ☒ Municipal ☐ Industrial ☐ Stock ☐

5. TYPE WELL: Cable ☐ Rotary ☒ Other ☐

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Silty Sand		0'	4'	4'
Rhyodacite		4'	11'	7'
Clayey Sand		11'	14'	3'
Rhyodacite		14'	20'	6'

RECEIVED
JUN 19 1989
Div. of Water Resources
Branch Office - Las Vegas, NV

Date started 9-14, 19 88
Date completed 9-14, 19 88

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours

8. WELL CONSTRUCTION
Diameter 8 inches Total depth 20 feet
..... inches
..... inches
Casing record Surface to 19'
Weight per foot ..... Thickness .....

Diameter	From	To
4 inches	surface feet	19 feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet

Surface seal: Yes ☒ No ☐ Type cement-sand grout
Depth of seal 4 feet
Gravel packed: Yes ☒ No ☐
Gravel packed from 4 feet to 20 feet

Perforations:
Type perforation factory slotted screen
Size perforation 0.04 inch
From 9 feet to 19 feet
From ..... feet to ..... feet
From ..... feet to ..... feet
From ..... feet to ..... feet
From ..... feet to ..... feet

9. WATER LEVEL
Static water level 11 feet below land surface
Flow ..... G.P.M. ..... P.S.I.
Water temperature ..... °F Quality .....

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name Don Wilson / Converse Consultants (Contractor)
Address 4670 S. Polaris Ave. Las Vegas, NV 89103 (Contractor)
Nevada contractor's license number issued by the State Contractor's Board .....
Nevada contractor's driller's number issued by the Division of Water Resources .....
Nevada driller's license number issued by the Division of Water Resources, the on-site driller M1589
Signed ..... (By driller performing actual drilling on site or contractor)
Date .....

(Rev. 11-85) USE ADDITIONAL SHEETS IF NECESSARY (O)-627

Log # 32280 EV-015

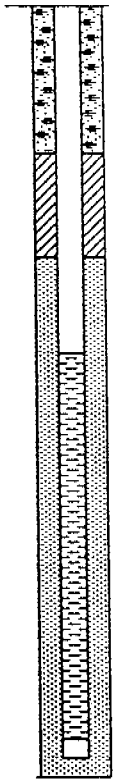
SW NW 35 3N 42E

Top of Casing 45.25 ft

Equipment Mayhew 1000 AR

Elevation ft (TBM) Date 9/14/88

Blows/ft	HC Odor	PID	Depth ft	Sample
	No		0	
	No		5	
	No	1	10	
	No		15	
	No		20	



(See Plate 9 for Wellhead construction detail)
8" dia. Borehole
Cement-Sand Grout

4" dia. Blank PVC Casing

Bentonite Seal

Filter Pack
(medium aquarium sand)

4" dia. 0.04 Slotted
PVC Casing

Well Cap

BROWN SILTY SAND (SM)
dense, slightly moist, fine- to coarse-grained sand, (fill).

GRAY RHYO-DACITE
moderately weathered with clay.

with calcite

GRAY CLAY (CL)
stiff, wet, slightly plastic.

GRAY RHYO-DACITE
moderately weathered, dry.

very hard

Boring terminated at 20.0 feet.
Ground water encountered at 10.5 feet.
Boring converted to ground-water monitoring well on 9/14/88.

DLN M-1589

Basin-10-137a

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring M- 3 (sheet 1 of 1)

Unocal Bulk Plant
Tonopah, Nevada NYE County

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
M.O'M.	00382,142.14		10/88		

ATTACHMENT 3

EPA Vapor Intrusion Screening Level Calculator

Default VISL Results
Commercial Equation Inputs

Output generated 07JAN2021:13:59:24

Variable	Value
Exposure Scenario	Commercial
Temperature for Groundwater Vapor Concentration C	25
THQ (target hazard quotient) unitless	0.1
TR (target risk) unitless	1E-06
AT_w (averaging time - composite worker)	365
EF_w (exposure frequency - composite worker) day/yr	250
ED_w (exposure duration - composite worker) yr	25
ET_w (exposure time - composite worker) hr	8
LT (lifetime) yr	70
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp} > C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc} > C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)
Benzene	71-43-2	Yes	Yes	Yes	Yes	1.57E+00	CA	5.24E+01	6.93E+00	No (5)
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	4.91E+00	CA	1.64E+02	1.52E+01	Yes (700)
Methyl tert-Butyl Ether (MTBE)	1634-04-4	Yes	Yes	Yes	Yes	4.72E+01	CA	1.57E+03	1.97E+03	--
Naphthalene	91-20-3	Yes	Yes	Yes	Yes	3.61E-01	CA	1.20E+01	2.01E+01	--
Styrene	100-42-5	Yes	Yes	Yes	Yes	4.38E+02	NC	1.46E+04	3.90E+03	No (100)
Toluene	108-88-3	Yes	Yes	Yes	Yes	2.19E+03	NC	7.30E+04	8.07E+03	No (1000)
Xylenes	1330-20-7	Yes	Yes	Yes	Yes	4.38E+01	NC	1.46E+03	1.62E+02	Yes (10000)

Chemical	Pure Phase Vapor Concentration C_{vp} \ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc} \ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (µg/m³)
Benzene	3.98E+08	4.06E+08	25	1.20	CRC89	7.80E-06	I	3.00E-02	I	No	1.57E+00	1.31E+01
Ethylbenzene	5.48E+07	5.44E+07	25	0.80	CRC89	2.50E-06	C	1.00E+00	I	No	4.91E+00	4.38E+02
Methyl tert-Butyl Ether (MTBE)	1.19E+09	1.22E+09	25	2.00	YAWS	2.60E-07	C	3.00E+00	I	No	4.72E+01	1.31E+03
Naphthalene	5.86E+05	5.58E+05	25	0.90	CRC89	3.40E-05	C	3.00E-03	I	No	3.61E-01	1.31E+00
Styrene	3.58E+07	3.49E+07	25	0.90	CRC89	-		1.00E+00	I	No	-	4.38E+02
Toluene	1.41E+08	1.43E+08	25	1.10	CRC89	-		5.00E+00	I	No	-	2.19E+03
Xylenes	4.56E+07	2.87E+07	25	-		-		1.00E-01	I	No	-	4.38E+01

Chemical Properties
Output generated 07JAN2021:13:59:24

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)
Benzene	71-43-2	Yes	Yes	78.115	PHYSPROP	9.48E+01	PHYSPROP	1.79E+03	PHYSPROP	5	5.55E-03
Ethylbenzene	100-41-4	Yes	Yes	106.17	PHYSPROP	9.60E+00	PHYSPROP	1.69E+02	PHYSPROP	700	7.88E-03
Methyl tert-Butyl Ether (MTBE)	1634-04-4	Yes	Yes	88.151	PHYSPROP	2.50E+02	PHYSPROP	5.10E+04	PHYSPROP	-	5.87E-04
Naphthalene	91-20-3	Yes	Yes	128.18	PHYSPROP	8.50E-02	PHYSPROP	3.10E+01	PHYSPROP	-	4.40E-04
Styrene	100-42-5	Yes	Yes	104.15	PHYSPROP	6.40E+00	PHYSPROP	3.10E+02	PHYSPROP	100	2.75E-03
Toluene	108-88-3	Yes	Yes	92.142	PHYSPROP	2.84E+01	PHYSPROP	5.26E+02	PHYSPROP	1000	6.64E-03
Xylenes	1330-20-7	Yes	Yes	106.17	PHYSPROP	7.99E+00	PHYSPROP	1.06E+02	PHYSPROP	10000	6.63E-03

Chemical	Henry's Law Constant (unitless)	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Benzene	2.27E-01	PHYSPROP	2.27E-01	353.15	PHYSPROP	5.62E+02	CRC89	7.34E+03	CRC89	1.2	CRC89
Ethylbenzene	3.22E-01	PHYSPROP	3.22E-01	409.25	PHYSPROP	6.17E+02	CRC89	8.50E+03	CRC89	0.8	CRC89
Methyl tert-Butyl Ether (MTBE)	2.40E-02	PHYSPROP	2.40E-02	328.15	PHYSPROP	4.97E+02	CRC89	6.68E+03	CRC89	2	YAWS
Naphthalene	1.80E-02	PHYSPROP	1.80E-02	491.05	PHYSPROP	7.48E+02	CRC89	1.04E+04	Weast	0.9	CRC89
Styrene	1.12E-01	PHYSPROP	1.12E-01	418.15	PHYSPROP	6.35E+02	CRC89	8.74E+03	Weast	0.9	CRC89
Toluene	2.71E-01	PHYSPROP	2.71E-01	383.75	PHYSPROP	5.92E+02	CRC89	7.93E+03	Weast	1.1	CRC89
Xylenes	2.71E-01	PHYSPROP	2.71E-01	411.65	PHYSPROP	6.20E+02	YAWS	8.52E+03	Weast	-	

ATTACHMENT 4

Unanticipated Discovery Plan

bec environmental, inc.
Environmental Services

BEC ENVIRONMENTAL, INC. PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

Introduction

This plan stipulates the procedures to be used for unanticipated cultural discoveries during field work conducted by BEC Environmental, Inc. (BEC) personnel. It specifies different procedures for the treatment of possible human remains and the treatment of other classes of archaeological discoveries. It also stipulates the different procedures to be used for the treatment of archaeological discoveries within the project areas.

1. Recognizing Cultural Resources

Items to be treated as discoveries will include:

- Human remains
- Prehistoric cultural features, including stained basins, stone circles, dense heat- altered rock concentrations, and bone beds or other bone concentrations
    - Lenses, layers, and patches of prehistoric culturally stained sediment
    - Historic cultural features such as foundations, cellars, or privy holes
    - Culturally modified bone and/or stone artifact concentrations
    - Temporally diagnostic artifacts or obsidian artifact concentrations

Items that will not be treated as discoveries include:

- Isolated artifacts or low density artifact scatters, not including temporally diagnostic artifacts or obsidian artifact concentrations
- Patches of discolored sediment and/or charcoal that are not definitively cultural in origin
- Non-human bone that is not clearly culturally modified or culturally introduced into the deposit

Archaeological resources and human remains are protected under a number of state and national statutes including, but not limited to, the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), the Archaeological Resource Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), and American Indian Religious Freedom Act (AIRFA). All care must be taken by BEC, its subcontractors, and other personnel on site to adhere to the mandates of legislation regarding the protection of cultural resources within the each of the project areas of potential effect (APE). The State Historic Preservation Office (SHPO) will be consulted concerning any discoveries deemed as eligible for inclusion in the National Register of Historic Places (NRHP).

Some historic properties are determined to be significant and worthy of protection considerations, as established by the NHPA and its implementing regulations. The steps to identifying, evaluating the significance of, and assessing the effects on historic properties are clearly identified in 36 CFR 800. .

2. On-Site Responsibilities

- STOP WORK. If any BEC Staff, Occasional Field Staff or site visitor believes that he or she has located or uncovered any cultural resource at any point in the project, all work within 50 feet of the discovery must stop. The BEC Field Safety Supervisor (FSS) will ensure the following actions are taken:

1. Stop work immediately if they observe any indication of the presence of cultural materials (artifacts or other man-made features), animal bone, or possibly human bone.
2. If there is an archaeological monitor for the project, notify that person. If there is a monitoring plan in place, follow its provisions. C. Comply with unanticipated discovery procedures.
3. Treat human remains with dignity and respect.

In the event of an unanticipated discovery, the excavation activity that resulted in the exposure of the discovery will be immediately halted, followed as soon as possible by the cessation of all other ground-disturbing activity within 50ft (15m) of the discovery. After all activity within 50ft (15m) area of the discovery has been halted, the following steps will be taken to ensure that no further disturbance occurs to the discovery:

1. Secure an area at least 50ft (15m) in each direction from the discovery, as necessary, with clearly visible barricading of an appropriate type to prohibit entry to the vicinity.
2. Prevent vehicle traffic through the area immediately surrounding the discovery.

In all cases, EPA (or the Client's project officer) will be notified by the BEC representative immediately by phone or in person, followed by written notification of any discoveries of archaeological materials. The Nevada State Historic Preservation Office (SHPO) would also be notified by EPA or BEC regarding any unanticipated discovery. Discovery situations will be handled in an expedited and respectful manner, so as to not interfere with the work/project schedule any more than is necessary. In all discovery situations, work will be redirected away from the discovery, or halted by BEC's designated official at the discovery location for a period of time adequate to assess the nature of the discovery and to determine the necessary course of action as determined by the EPA and the SHPO.

Work will not resume in the area of discovery until such time as authorized by EPA.

Human Remains

Human remains and associated artifacts may be discovered during excavation activities. If human remains are discovered under any circumstances, they will be secured and protected until such time as appropriate disposition has been determined in accordance with applicable local, state, and Federal statutes. Pursuant to federal laws, upon the discovery of any human remains, regardless of land ownership the appropriate **County Sheriff and coroner** shall be immediately notified in case such remains might represent a crime scene. The Sheriff and appropriate specialists will determine if the remains are modern or archaeological. Work activities in the immediate vicinity of the discovery 100ft (30.5 m) will cease immediately, but may continue elsewhere in the APE. Immediately upon discovery, the area will secured with appropriate security and avoidance measures. Protective measures, such as covering the area with a tarp, will occur in adverse weather conditions. In all instances the goal shall be to prevent deterioration of or further damage to the remains and the area associated with those remains. It may be necessary to provide 24-hour, on-site security for NAGPRA-associated discoveries or for other discoveries as determined by EPA.

Procedure When Human Remains and/or Potentially Human Skeletal Materials are Observed

Human remains are physical remains of a human body or bodies including, but not limited to, bones, teeth, hair, ashes, and preserved soft tissues (mummified or otherwise preserved) of an individual. Remains may be articulated or disarticulated bones or teeth.

Any suspected human skeletal remains encountered during the project will be treated in accordance with applicable local, state, and Federal statutes, including the Native American Graves Protection and Repatriation Act:

- Workers will treat all human remains with dignity and respect.
- Immediately stop work in the vicinity of an unanticipated discovery involving potentially human remains.
- Immediately notify the FSS about the find.
- If the FSS believes that potentially human skeletal remains have been found, he/she will stop all ground-disturbing activities within the area of the potential discovery.
    - Protect and secure the evidence of the discovery.
    - Delineate the area with flagging or safety fencing.

Testing to Determine Site NRHP Eligibility and/or Project Effect

Should further testing under this section be required, the Client will make arrangements, or direct BEC to arrange for a qualified archeologist to conduct these tests.

Subsurface testing may be required to obtain data necessary to evaluate the NRHP eligibility of discovery sites or to assess the project's effect on historic properties. It will be conducted before excavation and reclamation have been resumed. Such testing may result in recommendations for data recovery excavations to mitigate adverse effects to NRHP eligible sites if excavation were to resume prior to such actions. In some cases, it is likely that this testing stage may lead to recommendations that the discoveries are not eligible or do not contribute to a historic property's eligibility.

Testing of the potentially eligible discoveries during the excavation phase of the project will be limited to assessing the potential for impacting intact portions of significant discoveries that may be disturbed by continuing excavation, potentially resulting in further adverse effects to the discovery. It will involve the excavation of systematic arrays of auger probes on a 1 x 1-m or 2 x 2-m grid (depending on the nature and size of discovery). Formal test units may also be excavated to better assess the nature of positive auger probes.

Any test excavations will adhere to standard field and laboratory procedures. All excavated deposits will be screened using 1/8-inch mesh hardware cloth except in cases of clay soils, where 1/4-inch mesh hardware cloth may be used. Test units will be excavated in arbitrary 10-cm levels. Features will be excavated as discrete elements, and will be documented with plan maps, profiles, and photographs, as appropriate. Feature fill samples will be taken for the purpose of radiometric and plant macrofossil analysis.

Disposition of Collected Material

Curation of all records and other items resulting from identification and data recovery efforts shall be completed by the archeologist in accordance with 36 CFR Part 79, and the provisions of the Native American Graves Protection and Repatriation Act (PL 101-601). Documentation of the curation of collected materials shall be provided to EPA and SHPO within 30 calendar-days of completion of the project. All non-funerary artifacts collected will be curated at the Nevada State Museum in Carson City, Nevada.

Key Contacts

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ATTACHMENT 5

Standard Operating Procedures

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

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STANDARD OPERATING PROCEDURE

Description: Determination of Volatile Organic Compounds (VOCs) in Air by GCMS

Method: EPA Method TO-15

Approval Signatures:

Marycel Mariano, QA Officer	07/05/18 *Date*
Quennie Manimtim, Laboratory Director	7/5/18 *Date*

SOP No:	***AIR-TO15-01***	***Revision No.:***	***3.0***
Effective Date:	***07/05/2018***	***Supersedes:***	***2.0 (06/15/2017)***
Prepared by:	***Marycel Mariano***		

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1 IDENTIFICATION OF TEST METHOD

Test method is Compendium Method TO-15.
Test Name is Determination of Volatile Organic Compounds (VOCs) in Air by Gas Chromatography/ Mass Spectrometry (GC/MS)

2 APPLICABLE MATRIX OR MATRICES

This method applies to air samples collected in canisters or Tedlar bags.

3 PRACTICAL QUANTITATION LIMIT

This table contains the target analytes and corresponding Molecular Weight, CAS No and reporting limit.

Compound	MW	CAS Number	Report Limit
1,1,1-Trichloroethane	133.4	71556	0.5
1,1,2,2-Tetrachloroethane	168	79345	0.5
1,1,2-Trichloroethane	133.4	79005	0.5
1,1-Dichloroethane	99	75343	0.5
1,1-Dichloroethene	97	75354	0.5
1,2,4-Trichlorobenzene	181.5	120821	0.5
1,2,4-Trimethylbenzene	120	95636	0.5
1,2-Dibromoethane	188	106934	0.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	171	76142	0.5
1,2-Dichlorobenzene	147	95501	0.5
1,2-Dichloroethane	99	107062	0.5
1,2-Dichloropropane	113	78875	0.5
1,3,5-Trimethylbenzene	120	108678	0.5
1,3-Butadiene	54	106990	0.5
1,3-Dichlorobenzene	147	541731	0.5
1,4-Dichlorobenzene	147	106467	0.5
1,4-Dioxane	88	123911	0.5
2-Butanone	72	78933	0.5
2-Hexanone	100	591786	0.5
4-ethyltoluene	120	622968	0.5
4-Methyl-2-pentanone	100	108101	0.5
Acetone*	58	67641	1.0
Acrolein	56	107028	1
Benzene	78	71432	0.5
Benzyl chloride	126.6	100447	0.5
Bromodichloromethane	164	75274	0.5

Bromoform	253	75252	0.5
Bromomethane	95	74839	0.5
Carbon disulfide*	76	75150	0.5
Carbon tetrachloride	154	56235	0.5
Chlorobenzene	112.6	108907	0.5
Chloroethane	64.5	75003	0.5
Chloroform	119	67663	0.5
Chloromethane	85	74873	0.5
cis-1,2-Dichloroethene	97	156694	0.5
cis-1,3-Dichloropropene	111	10061015	0.5
Cyclohexane	84	110827	0.5
Dibromochloromethane	208	124481	0.5
Dichlorodifluoromethane	121	75718	0.5
Ethanol	46	64175	1
Ethyl Acetate	88	141786	0.5
Ethylbenzene	106	100411	0.5
Freon-113	187	76131	0.5
Hexachlorobutadiene	261	87683	0.5
Isopropyl Alcohol	60	67630	0.5
m,p-Xylene	106	1330207	1
Methyl methacrylate	100	80626	1
Methylene Chloride*	85	75092	1.0
MTBE	88	1634044	0.5
n-Heptane	100	142825	0.5
n-Hexane	86	110543	0.5
Naphthalene	128	91203	0.5
o-Xylene	106	95476	0.5
Propylene	42	115071	0.5
Styrene	104	100425	0.5
Tetrachloroethene	166	127184	0.5
Tetrahydrofuran	72	109999	0.5
Toluene	92	108883	0.5
trans-1,2-Dichloroethene	97	156605	0.5
trans-1,3-Dichloropropene	111	10061026	0.5
Trichloroethene	131	79016	0.5
Trichlorofluoromethane	137	75694	0.5
Vinyl acetate	86	108054	0.5
Vinyl Chloride	62.5	75104	0.5

*The PQL for acetone, carbon disulfide and methylene chloride will be increased if the system is found to have a carryover problem for these compounds.

4 SCOPE AND APPLICATION

This method is applicable to volatile organic compounds that have been tested and determined to be stable when stored in pressurized and sub-atmospheric pressure canisters and Tedlar bags. The method documents sampling and analytical procedures for the measurement of subsets of the 97 volatile organic compounds (VOCs) that are included in the 189 hazardous air pollutants (HAPs) listed in Title III of the Clean Air Act Amendments of 1990. VOCs are defined as organic compounds having vapor pressure greater than 10^{-1} Torr at 25ºC and 760 mm Hg. Table 1 list the VOCs along with their CAS number and reporting limit. Other volatile organic compounds may also be measured this method; however, performance of the method for the specific compound(s) must be demonstrated. This may include a calibration range study, a method detection limit (MDL) study, analysis of four Laboratory Control Sample (LCS) or other demonstration of capability and a blank study.

This method applies to ambient concentration of VOCs above 0.5 ppbv and typically requires VOC enrichment by concentrating up to one liter of a sample volume.

5 SUMMARY

5.1 Ambient air or gas samples are collected into SUMMA electro polished stainless steel canister or some other EPA approved canister or sampling bags. Both sub-atmospheric pressure and pressurized sampling modes use an initially evacuated canister to collect the sample. Pressurized sampling requires the use of a sampling pump to provide positive pressure to the sample canister.

5.2 Following sample collection, the canister valve is closed, either a Canister Sampling Field Data Sheet or a sample chain of custody is completed and the canister or sample bag is transported to the laboratory for analysis.

5.3 Upon receipt in the laboratory, sample information and canister ID is checked with the chain-of-custody and laboratory ID is assigned to each sample.

5.4 The pressure in the canister is measured before analysis and recorded on the canister tag and laboratory analytical instrument logbook. Samples received at sub-ambient pressures are pressurized to 2-15 psig using zero grade air. The final canister pressure is also recorded on the canister tag and laboratory analytical instrument logbook.

5.5 The analytical strategy for Method TO-15 involves cryogenic isolation of the analytes from the sample followed by high resolution capillary column GC/MS. In cases where very humid and high carbon dioxide samples are analyzed, the moisture and carbon dioxide is removed by a micro purge & trap system. A Nifon dryer is not used in the laboratory system, so most polar compounds can be analyzed more efficiently. Internal and surrogate standards are added to the sample at the same time as the analytes are cryogenically isolated from the sample. The mass spectrometer is operated in either the full scan or selected ion monitoring (SIM) modes. Mass spectral data are obtained and recorded on

magnetic media during the entire course of the GC/MS analysis. Lower detection limits can be attained for samples analyzed in the SIM mode; however, the number of analytes which can be determined is generally limited, and unique information contained in the full scan mass spectrum is not obtained. In the full scan mode the mass spectrometer operates as a universal detector and the resulting mass spectra permit unambiguous identification of target analytes as well as non-target analytes whose mass spectra can be interpreted by an experienced chemist who has been operating a mass spectrometer.

6 DEFINITIONS

6.1 Practical Quantitation Limit (PQL)

PQL is the lowest concentration that can be measured with the consideration for practical limitations such as sample size, matrix interferences and dilutions. It is normally the lowest concentration in the calibration curve.

6.2 Method Detection Limit (MDL)

The method detection limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results.

6.3 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.

6.4 Calibration Standards

A 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.

6.5 Initial Calibration Verification Standard (ICV)

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.

6.6 Continuing Calibration Verification Standard (CCV)

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.

6.7 Stock Standard Solution

A concentrated standard solution containing one or more method analytes prepared in the laboratory or purchased from a reputable commercial source.

6.8 Reagent Water

Organic-free water, i.e., an interferant is not observed at the method detection limit of the compounds of interest.

6.9 Method Blank

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.

6.10 Laboratory Control Sample (LCS)

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.

6.11 Matrix Spike (MS)

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.

6.12 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.

6.13 Duplicate

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.

6.14 Volatile Compounds (VOCs)

Organic chemical compounds that have high enough vapor pressure under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones, and hydrocarbons are VOCs.

6.15 Resolution

The separation between peaks on a chromatogram.

6.16 Surrogates

Pure compounds that are chemically similar to the analyte group but not expected occur in environmental samples. They are added to every blank, sample, matrix spike, matrix spike duplicate, LCS and standard in known amount before sample analysis. They are measured the same way as the target analytes, and are used to evaluate analytical efficiency.

6.17 Internal Standards

Compounds added to every blank, sample, matrix spike, matrix spike duplicate, LCS and standard. The compounds are added at a known concentration prior to analysis. Internal standards are used as the basis for quantitation of the target compounds.

6.18 Absolute Pressure

Pressure measured with reference to absolute zero pressure (as opposed to atmospheric pressure), usually expressed as kPa, mm Hg or psi.

6.19 Cryogen

A refrigerant used to obtain very low temperatures in the cryogenic trap of the analytical system. A typical cryogen is liquid nitrogen (bp -195.8C).

6.20 Gauge Pressure

Pressure measured above ambient atmospheric pressure (as opposed to absolute pressure). Zero gauge pressure is equal to ambient atmospheric (barometric) pressure.

6.21 Pressurized Sampling

Collection of an air sample in a canister with a (final) canister pressure above atmospheric pressure, using a sample pump.

6.22 Subatmospheric Sampling

Collection of an air sample in an evacuated canister at a (final) canister pressure below atmospheric pressure, without the assistance of a sampling pump. The canister is filled as the internal canister pressure increases to ambient pressure. An auxiliary vacuum pump may be used as part of the sampling system to flush the inlet tubing prior to or during sample collection.

7 INTERFERENCES

7.1 Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, other equipment in the sampling train (pumps, tubing, filters, and flow controllers) may introduce contamination and should therefore be thoroughly cleaned and tested prior to use to ensure that the sampling train will not contaminate the samples.

7.2 Interference can occur in sample analysis if excessive moisture and carbon dioxide exists. In case of excessive moisture or large amounts of carbon dioxide, reducing the sample injection volume will get better results but the report limit will be higher.

7.3 Contamination by carryover can occur whenever high-contamination and low-concentration samples are sequentially analyzed. Whenever an unusually concentrated sample is encountered, it should be followed by the analysis of solvent to check for cross-contamination.

8 SAFETY

8.1 Do not pressurize canisters beyond 30 psig.

8.2 Protective clothing and protective eye wear must be worn at all times during the course of this analysis.

8.3 All safety procedures specified in OSHA safety guidelines shall be followed.

8.4 Care must be taken when using the heater jackets. Prolonged exposure of the skin to a heater jacket that is on may cause skin burns. Once turned on, each heater jacket should be quickly touched to confirm that the heater jacket is working. At the end of cleaning,e ach heater jacket should be turned off and/or plugged.

9 EQUIPMENT AND SUPPLIES

9.1 Sub-Atmospheric Pressure Sampling

9.1.1 Either stainless steel or heavy walled Teflon tubing can be used for the sample inlet line.

9.1.2 Sample canister - SUMMA passivated stainless steel canisters, silica coated canisters and electrical polished canisters are available from a number of commercial suppliers.

9.1.3 Vacuum/pressure gauge - capable of measuring vacuum (0 to -30 in.Hg) and pressure (0 to 30 psig) in the sampling system. Vacuum or pressure in the sample canister is measured immediately prior to analysis.

9.1.4 Flow controllers – the laboratory recommends the use of compensating critical orifice flow controllers for sub-ambient pressure sample collection. The critical orifice have a tamper resistant cap to prevent inadvertent adjustment of flow rate, and circumvent the need for a sampling pump when obtaining time-integrated samples.

9.1.5 Particulate matter filter - 2 um sintered stainless steel in-line filter, if it is necessary.

9.1.6 Sampling bags - Dupont PVF film Tedlar bag or equivalent in 1.0 liter or other volume sizes. Sampling bags are NOT pressurized. Dilutions should be made into other bags.

9.2 Pressurized Sampling

9.2.1 Sample pump – The metal bellows pumps can be utilized consisting of a pump, a mechanical flow regulator, and a mechanical flow restricting device (back pressure flow regulator). If sampling bag is used for sampling, a personal pump can be used.

9.2.2 Sample transfer lines - all transfer lines with which the sample comes in contact should be chromatographic grade stainless steel or heavy walled Teflon tubing. All components of the sampling train should be tested for cleanliness prior to use.

9.3 GC/MS Analytical System

9.3.1 Agilent 7890A Gas chromatography (GC) with Agilent 5975A Quadrupole mass spectrometer (MS) system. Agilent Chemstation software is used for generating the necessary different level reports. The mass spectrometer is operated in the electron impact (EI) mode with electron energy of 70 eV. Ions in the mass range m/z 35-280 are collected in dual mode (Scan and SIM) and measured repeatedly during the course of the GC run. The mass spectrometer is scanned at such a rate that at least 6 data points are acquired across each chromatographic peak.

9.3.2 Gas chromatographs - The gas chromatograph used is Agilent Model 7890A capable of sub-ambient temperature programming and which contain other generally standard features such as pressure control flow regulators, multi-level temperature programming, and heated capillary interfaces.

9.3.3 Cryogenic pre-concentrator – the laboratory uses Nutech 8900DS pre-concentrator.

9.3.4 Electronic Mass Flow Controllers - The Nutech automatic unit is equipped with an electronic mass flow controller to maintain a constant flow (for carrier gas and sample gas) over a range of 0-150 cc/min.

9.3.5 Vacuum pumps – The generic purpose vacuum pump.

9.3.6 Chromatographic column - Rtx-1, 60m x 0.32mm ID, fused silica capillary column with 1.5u film (Restek #10172).

9.3.7 Gases - Standard two-stage compressed gas cylinder regulators with pressure gauges for helium, standard gas cylinders (bottles) and nitrogen gas.

9.3.8 Gas Tight Syringes - Gas tight syringes in various sizes from 10 uL to 1000 mL.

9.4 Canister Cleaning System

9.4.1 The laboratory uses Nutech 2101DS canister automatic clean system. The system is capable to clean 4 canisters at one clean batch and capable of evacuating sample canisters to an absolute pressure of -28.5" Hg. Refer to the SOP for Canister Cleaning System for a complete detailed overview.

10 REAGENTS AND STANDARDS

10.1 Gas cylinders- Ultra high purity helium and zero air. Nitrogen gas is drawn either from a LN2 tank or stand alone industrial grade nitrogen cyclinder.

10.2 Gas standards – Both the primary standards and secondary standards are from Linde Gas North, which are traceable to NIST standards. Each set is comprised of 65 target analyte mixes. The primary source standards have a different lot number from the secondary sources. All standards are at a concentration of 1.0 ppm each in a balance of nitrogen. The working standard is prepared at 10 ppbv.

10.3 Gasoline Standard - 93% high octane gasoline is purchased annually from a local gas station.

10.4 Cryogenic media – Liquid nitrogen.

10.5 4-Bromofluorobenzene (BFB) - BFB is introduced as a gaseous surrogate standard for monitoring both mass spectrometer tuning and surrogate recovery monitoring.

10.6 Internal standards (Bromochloromethane, Chlorobenzene-d5 and 1,4-Difluorobenzene) and surrogate standard (4-BFB), supplied by Linde Gas North is introduced as gaseous standards for quantitative measurement and also for monitoring the sensitivity and recovery of the analytical system. The stock standard mix is 1.0ppmv of each constituent and the working standard is made at a concentration of 50.0ppbv.

10.7 Perfluorotributylamine (PFTBA) - PFTBA is introduced through a batch inlet system and is used for mass spectrometer tuning. The MS is tuned with PFTBA after cleaning the source or whenever BFB fails the required tuning criteria.

10.8 Solvents – methanol - reagent grade (purge and trap grade or higher).

10.9 Distilled water for canister humidification.

11 SAMPLE PRESERVATION AND HOLDING TIMES

11.1 Samples collected in Tedlar bags have a recommended holding time of 3 days from the date of collection. Samples should be stored away from light and at room temperature. Samples collected in Tedlar bags may be transferred into a pre-cleaned canister to prolong the holding time. Note that a pressurization factor may apply upon transfer of the sample.

11.2 Samples collected in canisters have a recommended holding time of 30 days from the date of collection. Samples should be stored at room temperature.

12 QUALITY CONTROL

12.1 Performance sensitivity check

A method detection limit (MDL) study will be performed at least once per year. In addition, the low standard associated with each initial calibration curve will be assessed to determine whether instrument sensitivity is adequate to achieve the reporting detection limits.

12.2 QC REQUIREMENTS

Prior to analysis of samples, initial and continuing calibration procedures must be adhered.

12.2.1 Method Blank

A method blank is analyzed with each batch of samples (not to exceed 20 samples). Batching can also be project specific. It should be carried through all stages of sample preparation and measurement. Method blanks must be analyzed on all instruments used to analyze the samples.

12.2.2 Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD)

A LCS and LCSD are prepared and/or analyzed at a frequency of 20 samples per matrix. Batching can also be project specific. It should be carried through all stages of sample preparation and measurement.

12.2.3 Sample duplicate

Sample duplicates are prepared at a frequency of 20 samples per matrix. Sample duplicates are analyzed only when specified by the client's project. It should be carried through all stages of sample preparation and measurement.

12.2.4 Surrogate

4-Bromofluorobenzene surrogate is added to all standards, QC samples and samples.

13 CALIBRATION AND STANDARDIZATION

13.1 System Performance Check

13.1.1 Prior to the analysis of standards, blanks and samples, the instrument performance check standard bromofluorobenzene (BFB) needs to be analyzed and meet the criteria shown in Attachment 1.

13.1.2 The instrument performance check standard consists of 50 ng or less of BFB and is analyzed once per 24-hr time period of operation or every 20 samples, whichever is more frequent

13.1.3 The BFB acceptance criteria must be met. If the acceptance criteria are not met, the GC/MS needs to be retuned or other corrective action (maintenance) needs to be done to achieve the acceptance criteria.

13.1.4 A humidified, zero air blank is prepared in a certified, evacuated clean canister, by injecting 0.2mL of pre-boiled, de-ionized (DI) water and pressurizing the canister to 30.0psig using zero grade air. This blank is analyzed following analysis of the daily calibration standard and if needed, prior to analysis of any samples to verify that the analytical system is free from any background contamination. The blank is analyzed at least once in a 24-hour analytical sequence. If analysis of the zero air blank shows concentrations for any of the target analytes greater than or equal to the Practical Quantitation Limit (PQL) or Report Limit (RL) for that compound, the analytical system must be cleaned and zero air blank reanalyzed. If by re-running the blank, the target analytes are still above the PQL, then the DL for the failing analytes in the blank and subsequent samples can be raised to compensate for this issue until the contamination problem can be resolved at a later time.

13.2 Initial Calibration

13.2.1 At least a 5-point calibration standards are analyzed. (The following calibration levels are recommendation for a dual mode analysis (Scan and SIM). The actual levels are left to the discretion of the analyst as long as a minimum of five points is analyzed, with one point at the PQL.):

SCAN Mode: 0.5 ppbv to 20 ppbv
SIM Mode: 0.01ppbv to 20 ppbv (10 pptv to 20000 pptv)

Calibration Level	Conc. ppbv	Conc of Source Std, ppbv	Vol of Source Std, mL	Vol of 10ppbv IS, mL
0.01	0.01	0.1	40	40
0.02	0.02	0.1	80	40
0.1	0.1	0.1	400	40
0.5	0.5	10	20	40
1.0	1.0	10	40	40
2.5	2.5	10	100	40
5	5.0	10	200	40
10	10.0	10	400	40
15	15.0	10	600	40
20	20.0	10	800	40
ICV@5	5.0	10	200	40

13.2.2 Tabulate the area response of the characteristic ions against concentration for each compound and each internal standard. Calculate response factors (RF) for each compound relative to one of the internal standards.

13.2.3 Using the RFs from the initial calibration, calculate the percent relative standard deviation (%RSD) for each compound. The percent relative standard deviation (%RSD) should be less than 30% for each compound with at most two exceptions up to a limit of 40%.

13.2.4 The relative retention time (RRT) for each compound at each calibration level must be within 0.06 RRT units of the mean RRT for the compound.

13.2.5 The retention time shift for each of the internal standards at each calibration level must be within 20 s of the mean retention time over the initial calibration range for each internal standard.

13.2.6 An initial calibration verification (ICV) standard is analyzed after each calibration set. It has the same requirements as the continuing calibration standard.

13.3 Continuing Calibration

13.3.1 A continuing calibration verification (CCV) of the calibration curve must be performed once every 24 hours. It is performed after the GC/MS system check standard (BFB) has met the tuning criteria. The CCV must contain all target compounds. CCV is prepared as follows:

Calibration Level	Conc. ppbv	Conc of Source Std, ppbv	Vol of Source Std, mL	Vol of 10ppbv IS, mL
CCV	5.0	10	200	40

13.3.2 The percent difference between the target compounds RFs in the continuing calibration verification and initial calibration must be < 30% for all target compounds

13.3.3 Relative retention times must be within 0.06 RRT units of the initial calibration.

13.3.4 The area for any of the internal standard in the sample should not change by 40% from the average IS area count in the initial calibration.

Internal standard absolute retention time must not vary by more than +/- 20 seconds.

14 PROCEDURE

14.1 Instrument Operating Conditions

14.1.1 Suggested Gas Chromatograph Conditions:

Inlet setting:

Injector Temperature:	150°C
Mode:	Split
Pressure:	8.5112 psi
Split Flow:	60mL/min
Split ratio:	40:1
Septum Purge flow:	3 mL/min
Purge time:	0.6 minute
Total flow:	64.5 mL/min
Carrier Gas:	Helium
Nominal Initial Pressure:	10.52 psi
Carrier Gas Flow:	1.5 mL/min
Average velocity:	31.404 cm/sec

Oven Temperature Program:

Ramp	°C/min	Next °C	Hold
Initial	40		5
Ramp 1	7	140	0
Ramp 2	18	200	5

14.1.2 Mass Spectrometer Conditions:

Source Temperature:	230°C
Oven Temperature:	150 °C
Scan Range:	30-280 amu
MSD Transfer Line:	220°C
Mode:	Acquire Both Scan and SIM Data

14.1.3 Preconcentrator Conditions

Stream: Sample
Preflush (sec): 5
Trap (cc/min): 30
Volume (cc): 0

Stream: Internal Standard
Preflush (sec): 5
Trap (cc/min): 60
Volume (cc): 100

Stream: Analytical Standard
Preflush (sec): 5
Trap (cc/min): 60
Volume (cc): 0

Stream: Sweep/Purge
Preflush (sec): 5
Trap (cc/min): 60

Module2:

Trap Temp (°C): -40
Preheat? No
Preheat Temp (°C): 50
Desorb Temp (°C): 180
Bake Temp (°C): 190
Desorb Time (min): 3.5
Bake Time (min): 10
Bulk 2:
Trap Temp (°C): 30
Desorb Temp (°C): 60
Bake Temp (°C): 150

Module3:

Trap Temp (°C): -160
Focus? No

Volume (cc): 75

Stream: M1 -> M2
Preflush (sec):
Trap (cc/min): 5
Volume (cc): 20

Module1:
Trap Temp (°C): -40
Preheat? Yes
Preheat Temp (°C): 10
Desorb Temp (°C): 10
Bake Temp (°C): 150
Bake Time (min): 10
Bulk 1:
Trap Temp (°C): 10
Desorb Temp (°C): 10
Bake Temp (°C): 150

Inject Temp (°C): 150
Inject Time (min): 2
Bake Temp (°C): 100
Bake Time (min): 7
Bake on Event Ex#:3
Total Time (min): 24.5
Trap Temp (°C): -160

Misc:
Sample Xfer Temp (°C): 80
GC Xfer Temp (°C): 120
MPOS Valve Temp (°C): 120
Wait for GC before injecting
Active GC: GC1
Pressure: 120
MPOS Valve Temp (°C): 120

14.2 Standard Preparation

14.2.1 Volatile organic gas standards are prepared from gas mixtures purchased from reputable manufacturers (Linde Gas North, Scott Specialty Gases, Supelco, Spectra Gasses, Restek), or prepared from neat compounds. The mixtures can be used as is or diluted with other gasses to obtain standards at the concentrations desired.

14.2.2 Volatile organic gas standards can be prepared in Tedlar bags or stainless steel canisters depending on the concentration need and/or the stability of the compounds (refer to Standard Preparation SOP for detailed discussion).

See Standard Preparation SOP for further details

14.3 Batch QCs Preparation

14.3.1 Method Blank

The method blank is prepared by filling a cleaned and evacuated canister with humidified ultra high-purity (UHP) nitrogen. It is then analyzed in the same way a sample would be including the addition of internal standard and surrogates. See standard prep SOP for details.

The laboratory method blank results should not contain any analyte of interest greater than the reporting limit.

14.3.2 Laboratory Control Samples (LCS)

The LCS consists of a canister containing a subset of the target compounds at 10 ppbv concentration, and must be from a differing source than the calibration standards.

A minimum of 10% of the target analytes is tracked for recovery and should be representative of the target list.

14.4 Sample Preparation

14.4.1 Canister Receipt

14.4.1.1 All canister samples should be at room temperature before analysis. The overall condition of each sample canister is observed. Any signs of canister damage or missing tags or labels are immediately reported to the client. Any discrepancy between information recorded on the sample Chain-of-Custody or Field Canister data Sheet is reported to the client.

14.4.1.2 Each project is assigned a Workorder number and each canister is logged in when received and given a unique laboratory number (ASSET LABS Sample ID) based on Workorder No. for tracking and reporting purposes. This Sample ID is written on the canister tag for ID purposes. Data pertaining to sample description, date collected and received is entered into the LIMS system.

14.4.1.3 Initial Canister Pressure Check - Upon receipt in the laboratory, a pressure gauge is attached to the canister inlet. The canister valve is opened briefly, and the pressure/vacuum is measured and recorded both on the canister tag and into the laboratory analytical instrument logbook upon analysis. Samples received at sub-ambient pressures are pressurized using zero air to 2 to 15 psig.

14.4.1.4 Sampling Bags - Each sample bag is checked for any signs of leaks or breakage during shipment to the lab. The client is notified if the sample bag has been damaged and sample is lost. Small leaks in the bag are documented on the Chain of Custody (COC) and with client's verbal or written approval; the sample is analyzed before complete loss of sample takes place. Sample results are flagged appropriately. The laboratory also recommends to clients that sample bags be analyzed within 72 hours of sampling.

14.5 Sample Analysis

14.5.1 Analysis of samples can only precede after all the required criteria for tuning, calibration, blank, and LCS/LCSD have been met. The sample canister or sample bag is connected to the inlet of the pre-concentrator Nutech 8900DS. The canister valve or bag valve is opened.

14.5.2 Nutech 8900DS pre-concentrator will simultaneously transfer the sample onto the cryogenic trapping loop together with the internal standards and the surrogate standard (IS/SS).

14.5.3 The Nutech 8900DS pre-concentrator will take 14 steps to inject the sample with IS/SS onto the GC by start of the MS scan.

14.5.4 See Section 14.1 for Instrument operating conditions for EPA Method TO15.

14.5.5 Compound identification is based on comparison of mass spectra and retention time data for sample constituents with those of the standards. Concentrations are calculated in ppbv using the response factors determined from the initial calibration and verified during the continuing calibration verification check. A chemist experienced in the interpretation of mass spectral data reviews all quantitative identification and quantitative measurement values.

15 DATA REDUCTION AND CALCULATIONS

15.1 CALCULATION OF LCS PERCENT RECOVERY

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

For example, if the LCS True Concentration is 5.0 ppbv and the Concentration Found during the analysis is 4.60 ppbv, then (4.60/5.0)*100 = 92% recovery.

15.2 CALCULATION OF MS/MSD PERCENT RECOVERY

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Original Sample Result})}{\text{Spike Concentration}} \times 100$$

For example, if the Spike Concentration is 5.0 ppbv, the Spiked Sample Result is 7.0 ppbv, and the original Sample Result is 2.50 ppb, then (7.0-2.5)/5.0*100 = 90%.

15.3 CALCULATION OF RELATIVE PERCENT DIFFERENCE (RPD)

$$\% \text{ RPD} = \frac{(\text{Original result} - \text{Duplicate result})}{(\text{Original result} + \text{Duplicate result})/2} * 100$$

For example, if the original result is 2.5 ppbv and the duplicate result is 3.0 ppb, then [(2.5-3.0)/(2.5+3.0)/2] *100 = 18.2%

15.4 CALCULATION OF TARGET PARAMETERS

15.4.1 Calculate target analyte concentrations using internal standard quantitation.

The Response Factor (RF) is calculated as follows:

$$RF = (A_x C_{is}/A_{is} C_x)$$

where: A_x = Area of the characteristic ion for the compound being measured.
A_{is} = Area of the characteristic ion of the specific internal standard.
C_{is} = Concentration of the specific internal standard. (ppm)
C_x = Concentration of the compound being measured. (ppm)

The %RSD is calculated as follows:

$$\%RSD = \frac{SD}{X} \times 100$$

where: RSD = Relative Standard Deviation
X = Mean of 5 initial RFs for a compound.
SD = Standard deviation of average Rfs for a compound.

The %Difference is calculated as follows:

$$\%Difference = \frac{Rf_I - Rf_c}{Rf_I} \times 100$$

where: RF_I = Average response factor from the initial calibration.
Rf_c = Response factor from current continuing calibration standard.

15.4.2 CONVERTING UNITS OF PRESSURE AND VACUUM

All calculations requiring the variables of pressure or vacuum are based on units of psia (pounds per square inch, absolute), therefore, any pressure or vacuum measurement must be converted to psia. To convert psig to psia, use the following equation:

Psia = psig + 14.6

To convert inches of mercury to psia:

$$Psia = \frac{(30 - \text{inches of mercury})}{30} \times 14.6$$

15.4.3 CALCULATING SAMPLE RESULTS

Tedlar bag samples generally do not require dilution for analysis unless the concentration of a target analyte exceeds the calibration range.

On the other hand, SUMMA canisters often require dilution upon receipt by the laboratory due to pressure of the canister when receipt. Since the pressure of a SUMMA canister sample received by the laboratory is often slightly negative (approx. -5 inches Hg), dilution gas is added until a final pressure of 5 psi is reached. The resulting dilution factor, known as pressurization factor, must be used to calculate final sample concentrations.

The final concentration for a specific analyte would be calculated as:

Final Conc = n Conc x PF x DF

where:

nConc = normal laboratory concentration
PF = pressurization factor (dilution due to pressurization)
DF = dilution factor (for dilutions due to high sample concentrations)

The Pressurization Factor (PF) would be calculated as follows:

PF = (14.7 psig+APpsig)/(14.7 [1-RV/29.9 in Hg] where:

AP = analysis pressure
RV = vacuum of received can (in. Hg)

Below is a summary table that utilizes above equation based on analysis pressure of 5 psig and vacuum of received can:

Received Vacuum (in, Hg)	-10	-9	-8	-7	-6	5	-4	-3	-2	-1	0
PF	2.01	1.92	1.83	1.75	1.68	1.61	1.55	1.49	1.44	1.39	1.34

15.4.4 REPORTING UNITS AND UNIT CONVERSIONS

The default unit for reporting is part per billion ,ppbv, which inidicates reporting is on a volume per volume basis.

Regulatory agencies sometimes require a different unit for reporting such as µg/L or µg/m^3. Below is the formula for converting results from ppbv to µg/L at standard temperature and pressure of 1 atmosphere and 25ºC:

Results in µg/L = (ppbv X MW/24.46)/1000 where

MW = analyte molecular weight

Some Reporting Unit Conversions are as follows at standard temperature and pressure of 1 atmosphere and 25ºC:

Starting Unit	Conversion Factor	Ending Unit
ppbv	*MW/24.46	µg/m^3
µg/m^3	*24.46/MW	ppbv
µg/L	*1000	µg/m^3
µg/m^3	/1000	µg/L
ppbv	/1000	ppmv
ppbv	(*MW/24.46)/1000	µg/L

15.5 CALCULATON OF NON-TARGET ANALYTES

Where applicable, an estimate of the concentration for non-target analytes can be determined by using the following modifications. The areas A_x and A_{IS} should be from the total ion chromatograms, and the RF for the compound should be assumed 1.

$$\frac{C_{IS}}{A_{IS}} = \frac{C_X}{A_X}$$

Where: A_X = Area of the total ion for the compound being measured.
A_{IS} = Area of the total ion for the specific internal standard.
C_{IS} = Concentration of the specific internal standard.
C_X = Concentration of the compound being measured.

The concentration obtained should be reported indicting (1) that the value is an estimate and (2) which internal standard was used to determine the concentration.

16 METHOD PERFORMANCE

16.1 Method Detection Limit. Before samples are analyzed the MDL for the method analyte must be determined. The method detection limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. The new MDL procedure now also uses method blank results to calculate for MDL. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

Initial MDL Determination:

Process a minimum of seven spiked samples and seven method blank samples through all steps of the method. The samples used for the MDL must be prepared in at least three batches on three separate calendar dates and analyzed on three separate calendar dates. (Preparation and analysis may be on the same day.) Existing data may be used, if compliant with the requirements for

at least three batches, and generated within the last twenty four months. The most recent available data for method blanks and spiked samples must be used.

The value calculated from the spiked samples is called the **MDL_S**. The MDL_S calculation is the same as the old MDL calculation (see below for formula). The method blank samples are used to calculate the **MDL_b**, which is a very similar calculation that also calculates the 99% confidence level that the result is derived from the sample rather from contamination/noise.

Calculate **MDL_S** and **MDL_b as follows:**

The **MDL_S** $= t_{(n-1,\ 1-\alpha\infty=0.99)} * S$

MDL_b $= \bar{X} + t_{(n-1,\ 1-\alpha\infty=0.99)} * S$

Where:

$\bar{X}$ = mean of the method blank results (use zero in place of the mean if the mean is negative)

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.

Number of replicates	Degrees of freedom (n-1)	$t_{cn-1,.99}$)
7	6	3.143
8	7	2.998
9	8	2.896
10	9	2.821
11	10	2.764
12	11	2.718
13	12	2.681
14	13	2.65
15	14	2.624
16	15	2.602

If none of the method blanks give numerical results for an individual analyte, the MDL_b does not apply. A numerical result includes both positive and negative results, including results below the current MDL, but not results of "ND" (not detected) commonly observed when a peak is not present in chromatographic analysis. If some (but not all) of the method blanks for an individual analyte give numerical results, set the MDL_b equal to the highest method blank result.

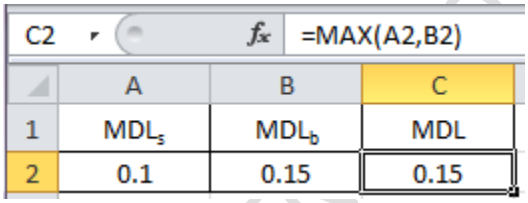
If all of the method blanks for an individual analyte give numerical results, then calculate the MDL_b

If there are multiple instruments that will be assigned the same MDL, then the sample analyses must be distributed across all of the instruments. A minimum of two spiked samples and two method blank samples prepared and analyzed on different calendar dates is required for each instrument. Each analytical batch may contain one spiked sample and one method blank sample run together. A spiked sample and a method blank sample may be analyzed in the same batch, but are not required to be. The same prepared extract may be analyzed on multiple instruments so long as the minimum requirement of seven preparations in at least three separate batches is maintained

The MDL is the higher of the two values (either the MDL_S calculated using spiked samples or the MDL_b calculated using method blanks).

Using Microsoft Excel to determine the MDL:

$$MDL = MAX (MDL_S , MDL_b)$$



Ongoing Annual MDL Verification

During any quarter in which samples are being analyzed, prepare and analyze a minimum of two spiked samples and two method blanks on each instrument, in separate batches, using the same spiking concentration used in initial MDL determination.

Ensure that at least seven spiked samples and seven method blanks are completed for the annual verification. At least once every thirteen months, re-calculate MDL_s and MDL_b from the collected spiked samples. Include data generated within the last twenty four months, but only data with the same spiking level. Include the initial MDL spiked samples, if the data were generated within twenty four months.

Ideally, use all method blank results from the last 24 months for the MDL_b calculation. The laboratory has the option to use only the last six months of method blank data or the fifty most recent method blanks, whichever criteria yields the greater number of method blanks.

The verified MDL is the greater of the MDL_s or MDL_b. If the verified MDL is within 0.5 to 2.0 times the existing MDL, and fewer than 3% of the method blank results (for the individual analyte) have numerical results above the existing MDL, then the existing MDL may optionally be left unchanged. Otherwise, adjust the MDL to the new verification MDL. (The range of 0.5 to 2.0 approximates the 95^{th} percentile confidence interval for the initial MDL determination with six degrees of freedom.)

If more than 5% of the spiked samples do not return positive numerical results that meet all method qualitative identification criteria, then the spiking level must be increased and the initial MDL re-determined.

If the method is altered in a way that can be reasonably expected to change its sensitivity, then re-determine the initial MDL.

16.2 If a new instrument is added to a group of instruments whose data are being pooled to create a single MDL, analyze a minimum of two spiked replicates and two method blank replicates on the new instrument. If both method blank results are below the existing MDL, then the existing MDLb is validated. Combine the new spiked sample results to the existing spiked sample results and recalculate the MDLs. If the recalculated MDLs does not vary by more 0.5 to 2.0 times the existing MDL, then the existing MDLs is validated. If either of these two conditions is not met, then calculate a new MDL.

16.3 Initial Demonstration of Capability (IDOC). Before analyzing any samples, the capability of the analyst and instrument must be initially demonstrated. This can be done by analyzing 4 LCS and calculating the average % recovery and standard deviation. The results should demonstrate precision and bias within acceptable limits representative of the analytical method.

16.4 Proficiency Testing (PT) Studies. The proficiency of the analyst with the analytical method is periodically assessed by performing PT studies. PT samples are blind standards purchased from an independent outside source. The results are compared to a predetermined acceptance limits. Records of all PT studies are maintained by the QA Department. Problems identified through participation in performance evaluation studies are immediately investigated and corrected. Results of the analyses are also used a part of a laboratory certification program to objectively determine the capabilities of a laboratory to achieve high quality results

17 POLLUTION PREVENTION

17.1 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

18 DATA ASSESSMENT AND ACCEPTANCE CRITERIA FOR QUALITY CONTROL MEASURES

18.1 MS Performance

18.1.1 Verification of mass spectrometer tuning with BFB- Analysis of a BFB standard must yield ion abundance in the ranges shown in Attachment 1.

18.1.2 Initial Calibration and Continuing Calibration Checks

18.1.2.1 Initial Calibration for Target Analytes – Initial calibration should be performed from the instrument set up or if the continuing calibration failed. The standard deviations for the RFs must be less than 30% with at most two exceptions up to a limit of 40%. The data is flagged accordingly if these requirements cannot be met.

18.1.2.2 Continuing Calibration for Target Analytes - Calibration for target analytes is checked on a daily basis by monitoring the relative percent difference (RPD) of the RFs from the mean RFs. The percent difference (%D) for each target compound in a daily calibration sequence must be within +/- 30%. If any compounds are outside of these criteria, the data is flagged accordingly.

18.1.2.3 Internal Standard Response - The internal standard area response for the ISTD must be between +/- 40% of the mean response of the ISTD in the most recent valid calibration. The retention time shift should not be more than +/-0.33 minutes from the latest daily calibration check. Only one of the ISTDs, chlorobenzene-d5, is used for quantitation of concentration of all compounds listed in Table 1 and any unknown (library) searches. The second ISTD, Bromochloromethane, is added and used as a reference. Due to its instability, it is not used as a QC control ISTD.

18.1.2.4 Surrogate Standard Response - Calibration for the surrogate is checked on a daily basis by monitoring the relative percent difference (RPD) of the RF from the mean RF. The RPD must be $\leq$ 30% or a new calibration must be established. The retention time shift of surrogate also should not be more than 20 seconds. If the surrogates do not meet performance criteria, check the instrument for any signs of malfunction, check the pressure of the IS/SS mix or re-run the calibration. The surrogates are added to all the calibration standards, blanks, BS/BSD, and all samples. Both surrogates, 1,4-Difluorobenzene and Bromofluorobenzene are monitored, but only one is required to pass criteria. Matrix interference plays a big role in surrogate recoveries.

18.2 DATA ASSESSMENT

18.2.1 Qualitative Analysis

A target analyte is identified by comparison of the sample mass spectrum with a standard reference spectrum. Mass spectra for standard reference should be obtained on the same GC/MS within the same 12 hours as the sample analysis. These standard reference spectra may be obtained through analysis of the calibration standards. Two criteria must be satisfied to verify identification:

(1) Elution of sample component at the same GC relative retention time (RRT) as those of the standard component; and;

(2) Correspondence of the sample component and the standard component mass spectrum.

The sample component RRT must compare within ±0.06 RRT units of the RRT of the standard component. If the coelution of interfering component prohibits accurate assignment of the sample component RRT from the total ion chromatogram, the RRT should be assigned by using extracted ion current profiles for ions unique to the component of interest.

All ions present in the standard mass spectra at a relative intensity greater than 10% (most abundant ion in the spectrum equal 100% must be present in the sample spectrum). The relative intensities of ions specified in (1) must agree within ± 20% between the standard and sample spectra. (Example: for an ion with an abundance of 50% in the standard spectra, the corresponding sample abundance must be between 30 and 70 percent).

If the RSD of a compound's response factor is 30% or less, then the concentration in the extract may be determined using the average response factor (RF) from the initial calibration data.

18.1.1.2 For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the type of analyses being conducted. Guidelines for making tentative identifications are:

(1) Relative intensities of major ions in the reference spectrum (ions > 10% of the most abundant ion) should be present the in the sample spectrum.

(2) The relative intensities of the major ions should agree within ± 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%).

(3) Molecular ions present in the reference spectrum should be present in the sample spectrum.

(4) Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible

background contamination or presence of coeluting compounds.

(5) Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

(6) The lowest reporting limit for a TIC compound is 10% of the nearest internal standard. Those lower than 10% should be reported as "Not Detected".

18.2.2 Quantitative Analysis

When a compound has been identified, the quantitation of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion. Quantitation will take place using the internal standard technique. The internal standard used shall be the one nearest the retention time of that of a given analyte. See Attachment 2 for a table of the primary and secondary ions.

18.2.3 The results are multiplied by any dilution factor that may have been applied to the sample. All results less than the current DLR is entered as "ND" (Not detected). Samples with results falling outside the linear range of the instrument must be diluted such that the results of the diluted sample fall within the linear range.

18.3 Method Blank

a) Surrogate recovery should be within control limits. The current lab control limit is 70-130%.

b) Target analytes present in the method blank at levels less than the reporting PQL.

18.4 Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD) and RPD

a) Spike recovery should be within limits. The current lab control limit is 70-130%.

b) RPD should be $\pm$ 20%.

18.5 Sample Duplicate

RPD should be $\pm$ 20%.

18.6 Surrogate

Surrogate recovery should be within control limits. The current lab control limit is 70-130%.

19 CORRECTIVE ACTIONS FOR OUT OF CONTROL DATA

If data is out-of-control or unacceptable, the laboratory will take steps to ensure valid results.

19.1 The client will be informed of the situation. "Preliminary" results can be released; however, the client is informed that results can change.

19.2 The sample is then re-processed and/or re-analyzed.

19.3 If results are not verified by the same tests or do not correlate to other tests, then the laboratory must also verify container types, mislabeling possibilities, matrix differences between the same client ID (in different bottles), etc.

19.4 Problems with the sample are documented on the case narrative and reported with the final sample results.

20 PREVENTATIVE MAINTENANCE

See Instrument Manual for preventative maintenance of instruments.

21 WASTE MANAGEMENT

21.1 The Sample bags are completely deflated outside the laboratory facility and are disposed of in the laboratory trash.

21.2 Summa canisters are vented (for excess pressure) outside the laboratory facility and are cleaned by a Nutech 2101DS at an appropriate time.

22 DOCUMENT REFERENCES

22.1 Compendium of Methods for the Determination of Toxic Organics in Ambient Air. Second edition Compendium Method TO-14A

22.2 Compendium of Methods for the Determination of Toxic Organics in Ambient Air. Second edition Compendium Method TO-15

22.3 Definition and Procedure for the Determination of the Method Detection Limit, Revision 2, EPA 821-R-16-006, December 2016.

23 ATTACHMENTS

23.1 Attachment 1:BFB Tuning Criteria

23.2 Attachment 2: Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions.

24 DOCUMENT REVISION HISTORY

Date	Description
September 2014	• Initial release
February 2015	• Changed signatories • Updated Company Logo
March 2017	• Updated signatories • Updated Section 6.2 MDL definition • Updated Section 16 MDL procedure • Updated references
July 2018	• Updated signatories

Attachment 1

BFB Tune Criteria

Mass	Ion Abundance Criteria
50	8 to 40 % of m/e 95
75	30 to 66% of m/e 95
95	base peak, 100% relative abundance
96	5 to 9% of m/e 95
173	<2% of m/e 174
174	50-120% of mass 95
175	4 to 9% of mass 174
176	93-101% of mass 174
177	5 to 9% of mass 176

Attachment 2: Summary of Instrument Calibration, Laboratory QC Procedures and Corrective Actions.

EPA TO14 / TO15			
QC Check	**Minimum Frequency**	**Acceptance Criteria**	**Corrective Action**
Check of mass spectral ion intensities using BFB	Prior to initial calibration and calibration verification (once every 24-hr operation or every 20 samples, whichever is more frequent)	As listed in attachment 1	Evaluate system. Retune Instrument.
Five point calibration	Initial calibration prior to sample analysis	**Ave. RF:** %RSD for all analytes ≤ 30% with at most 1 exceptions up to 40%.	If mean %RSD exceeds 30%, evaluate system. Repeat initial calibration.
Second Source calibration verification	With each initial calibration	% D for RF must be < 30% for all target analytes	a. Evaluate system. Correct problem. Rerun standard. b. Reprep standards and recalibrate.
Continuing Calibration Verification (CCV)	After BFB tuning, every 24-hr operation	% D for RF must be < 30% for all target analytes	a. Evaluate system. Correct problem. Rerun standard. b. Reprep standards and recalibrate. Rerun affected samples.
Internal Standards	Each calibration standard and sample	IS area for sample must be within ± 40% of the average count in the initial calibration. IS retention time shift at each calibration level must be ± 20 seconds of the average IS RT over the calibration range	a.Check calculations, standard preparation, instrument malfunction and sample interferences. Rerun the sample. b. Recalibrate the instrument.
Retention time(RT) evaluation	Each sample	Relative retention time (RRT) within ± 0.06 units of RRT in continuing calibration standard.	Correct problem. Check for interferences. Reanalyze all 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) / Laboratory Control Sample Duplicate (LCSD)	Minimum of one LCS per batch of 20 samples.	Recovery criteria (70-130%), 20% RPD	a.Check calculations. Check standards preparation. Check for instrument malfunction. Rerun the LCS. b. If out the second time, recalibrate and reanalyze the entire batch.
Surrogate Spike	Added to every sample including standards and blanks prior to analysis.	Recovery criteria (70-130%),	Check for instrument malfunction. Check for sample interference. Rerun the sample.
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.

ATTACHMENT 6

Laboratory Quality Assurance Manuals and Certifications

QUALITY ASSURANCE MANUAL
Revision 10.0

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for

ASSET LABORATORIES

ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

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Effective Date: May 14, 2018

Quality Assurance Manual

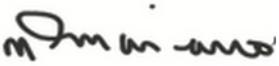
APPROVAL SIGNATURES

05/14/18

Puri Romualdo — ***Date***
President

5/14/18

Quennie Manimtim — ***Date***
Laboratory Manager



5/14/2018

Marycel Mariano — ***Date***
QA Officer

SECTION 1.0 TABLE OF CONTENTS

LIST OF REFERENCED LABORATORY SOPs

SOP No.	Title	Revision No.
GE-JOBS-01	Job Description	5.0
GE-DCONTROL-02	SOPs, Logbooks Generation, Maintenance and Storage	6.0
GE-PROCUREMENT-01	Procurement of Supplies, Material, and Services	6.0
GE-AUDITS-01	External Audits and Internal Audits	6.0
GE-CLIENTS-01	Client Complaints	6.0
GE-NONCONFORM-01	Non Conformance and Corrective Action	7.0
GE-TRAININGPROGRAM-01	Employee Training Program	6.0
GE-ETHICS-01	Ethics and Data Integrity	6.0
GE-SOP-01	Standard Operating Procedures (SOPs)	6.0
GE-MDLS-01	Method Detection Limits and Instrument Detection Limits	7.0
GE-UNCERTAINTY-01	Procedures for Estimating Uncertainty	6.0
GE-MINTEGRATION-01	Manual Integrations	8.0
GE-BALANCES-01	Calibration of Analytical Balances and Top-loading Balances	6.0
GE-THERMOMETER-01	Thermometers	6.0
GE-ICODE-01	Inorganic Standard Codes	6.0
GE-STDCODE-01	Organic Standard Codes	6.0
GE-SUBSAMP-01	Subsampling	5.0
GE-LOGIN-01	Sample Receipt, Control and Login	8.0
GE-DISPOSAL-01	Sample Disposal	6.0
GE-PT-01	Proficiency Testing Program	7.0
GE-CCHARTS-01	Control Charts and Control Limits	8.0

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 The NELAC Institute (TNI) Standard, 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 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 General Manager

The General Manager has the responsibility for the daily operations of ASSET Laboratories, including but not limited to Sales & Marketing, Accounting, Quality Control/ Assurance, Laboratory Operations and Information Technology.

The General Manager is responsible for:

- Overseeing the design and implementation of business practices and protocols throughout the laboratory.
- Ensuring compliance with internal governance, policies and procedures as well as regulatory requirements.
- Ensuring all aspects of people, process and technology are aligned and appropriately enabled to successfully delivery project tasks and results efficiently, accurately and timely.

3.1.3 Business Manager

The Business Manager has the responsibility for the day to day business administration of finance, accounting and human resource operations of ASSET Laboratories.

The Business Manager is responsible for:

- Performing all related business processes for financing operational infrastructure including but not limited to: building leases, equipment leases, auto leases. Ensuring proper business contracts are in place. Ensuring proper funding and cash flow is available for identified equipment. Ensuring lease contracts are standard and consistent with industry practices
- Performing all accounting functions to ensure standard accounting procedures and policies are followed. Ensure financial reporting standards are met.
- Maintaining all ASSET Laboratory certifications to ensure current approvals and authorizations for client projects are up to date and in compliance with stated requirements
- Performing all HR related functions from hiring, resource administration, separation, benefits, 401K coordination, etc.

3.1.4 Laboratory Director/Manager

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), and 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.

- 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

3.1.5 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).

3.1.6 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. 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

3.1.7 Project Manager (PM)

The Project Manager has the overall responsibility for the technical completeness, subcontracting, invoicing, cost control, and adherence to schedules. The PM has to perform the roles of a Document Control Officer. The PM 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

3.1.8 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

3.1.9 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. Staff personnel reports to Department Supervisor/Group Leaders.

ASSET Laboratories personnel responsibilities include but not limited to:

- Performing 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.
- Correcting sample reporting results and QC samples.

3.1.10 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 US laboratory 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 ASSET Laboratories, all protocols, manuals, SOPs and overall quality will be upheld. Dedicated personnel in the US 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 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:

3.1.10.1 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

3.1.10.2 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

3.1.10.3 Quality Assurance

Processing documentation of the following:

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

3.1.10.4 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).

3.1.10.5 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/Manager
Laboratory Director	QA Manager
QA Manager	Laboratory Director
Supervisor/Group Leader	Laboratory Director
Project Manager	QA Manager/Laboratory Director/ 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), regulatory documents (TNI) and client’s QAPP 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.

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. The chemist or analyst in chaarge 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. The PM will inform the clients if there are any non-conformances in sample receipt and sample analysis. Also, the PM 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

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	5 yrs from archival

	Project Folders*	
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. 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 in Nevada 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/Manager, 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/Manager, 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/Manager 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/Manager.

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/Manager 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.

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.

Method detection limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. The new MDL procedure now also uses method blank results to calculate for MDL. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

Initial MDL Determination:

Process a minimum of seven spiked samples and seven method blank samples through all steps of the method. The samples used for the MDL must be

prepared in at least three batches on three separate calendar dates and analyzed on three separate calendar dates. (Preparation and analysis may be on the same day.) Existing data may be used, if compliant with the requirements for at least three batches, and generated within the last twenty four months. The most recent available data for method blanks and spiked samples must be used.

The value calculated from the spiked samples is called the **MDL_S**. The MDL_S calculation is the same as the old MDL calculation (see below for formula). The method blank samples are used to calculate the **MDL_b**, which is a very similar calculation that also calculates the 99% confidence level that the result is derived from the sample rather from contamination/noise.

Calculate **MDL_S** and **MDL_b as follows:**

The **MDL_S** $= t_{(n-1,\ 1-\alpha\infty=0.99)} * S$

MDL_b $= \bar{X} + t_{(n-1,\ 1-\alpha\infty=0.99)} * S$

Where:

$\bar{X}$ = mean of the method blank results (use zero in place of the mean if the mean is negative)

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.

Number of replicates	Degrees of freedom (n-1)	$t_{cn-1,.99}$)
7	6	3.143
8	7	2.998
9	8	2.896
10	9	2.821
11	10	2.764
12	11	2.718
13	12	2.681
14	13	2.65
15	14	2.624
16	15	2.602

If none of the method blanks give numerical results for an individual analyte, the MDLb does not apply. A numerical result includes both positive and negative results, including results below the current MDL, but not results of "ND" (not detected) commonly observed when a peak is not present in chromatographic analysis. If some (but not all) of the method blanks for an individual analyte give

numerical results, set the MDLb equal to the highest method blank result.

If all of the method blanks for an individual analyte give numerical results, then calculate the MDLb

If there are multiple instruments that will be assigned the same MDL, then the sample analyses must be distributed across all of the instruments. A minimum of two spiked samples and two method blank samples prepared and analyzed on different calendar dates is required for each instrument. Each analytical batch may contain one spiked sample and one method blank sample run together. A spiked sample and a method blank sample may be analyzed in the same batch, but are not required to be. The same prepared extract may be analyzed on multiple instruments so long as the minimum requirement of seven preparations in at least three separate batches is maintained

The MDL is the higher of the two values (either the MDL_S calculated using spiked samples or the MDL_b calculated using method blanks).

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.

Ongoing Annual MDL Verification

During any quarter in which samples are being analyzed, prepare and analyze a minimum of two spiked samples and two method blanks on each instrument, in separate batches, using the same spiking concentration used in initial MDL determination.

Ensure that at least seven spiked samples and seven method blanks are completed for the annual verification. At least once every thirteen months, re-calculate MDLs and MDLb from the collected spiked samples. Include data generated within the last twenty four months, but only data with the same spiking level. Include the initial MDL spiked samples, if the data were generated within twenty four months.

Ideally, use all method blank results from the last 24 months for the MDLb calculation. The laboratory has the option to use only the last six months of method blank data or the fifty most recent method blanks, whichever criteria yields the greater number of method blanks.

The verified MDL is the greater of the MDLs or MDLb. If the verified MDL is within 0.5 to 2.0 times the existing MDL, and fewer than 3% of the method blank results (for the individual analyte) have numerical results above the existing MDL, then the existing MDL may optionally be left unchanged. Otherwise, adjust the MDL to the new verification MDL. (The range of 0.5 to 2.0 approximates the 95th percentile confidence interval for the initial MDL determination with six degrees of freedom.)

If more than 5% of the spiked samples do not return positive numerical results that meet all method qualitative identification criteria, then the spiking level must be increased and the initial MDL re-determined.

If the method is altered in a way that can be reasonably expected to change its sensitivity, then re-determine the initial MDL.

If a new instrument is added to a group of instruments whose data are being pooled to create a single MDL, analyze a minimum of two spiked replicates and two method blank replicates on the new instrument. If both method blank results are below the existing MDL, then the existing MDLb is validated. Combine the new spiked sample results to the existing spiked sample results and recalculate the MDLs. If the recalculated MDLs does not vary by more 0.5 to 2.0 times the existing MDL, then the existing MDLs is validated. If either of these two conditions is not met, then calculate a new MDL.

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 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° 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, August 28, 2017, "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 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.

25.11 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
9.0	April 2017	• Changed signatories and key personnel • Updated laboratory certifications • Updated MDL definition and procedure • Updated Appendices
10.0	May 2018	• Changed signatories and key personnel • Added General Manager and Business Manager in Section 3.0 Organization • Updated laboratory certifications • Removed reference to DoD QA manual • Updated Appendices • Updated Org Chart • Updated Tables of Holding Time and Preservation of temperature from 4ºC to ≤6ºC

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.

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

Where: S = standard deviation of the replicate analyses

$t_{(n-1,\ 1-\alpha\alpha=0.99)}$ = 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.

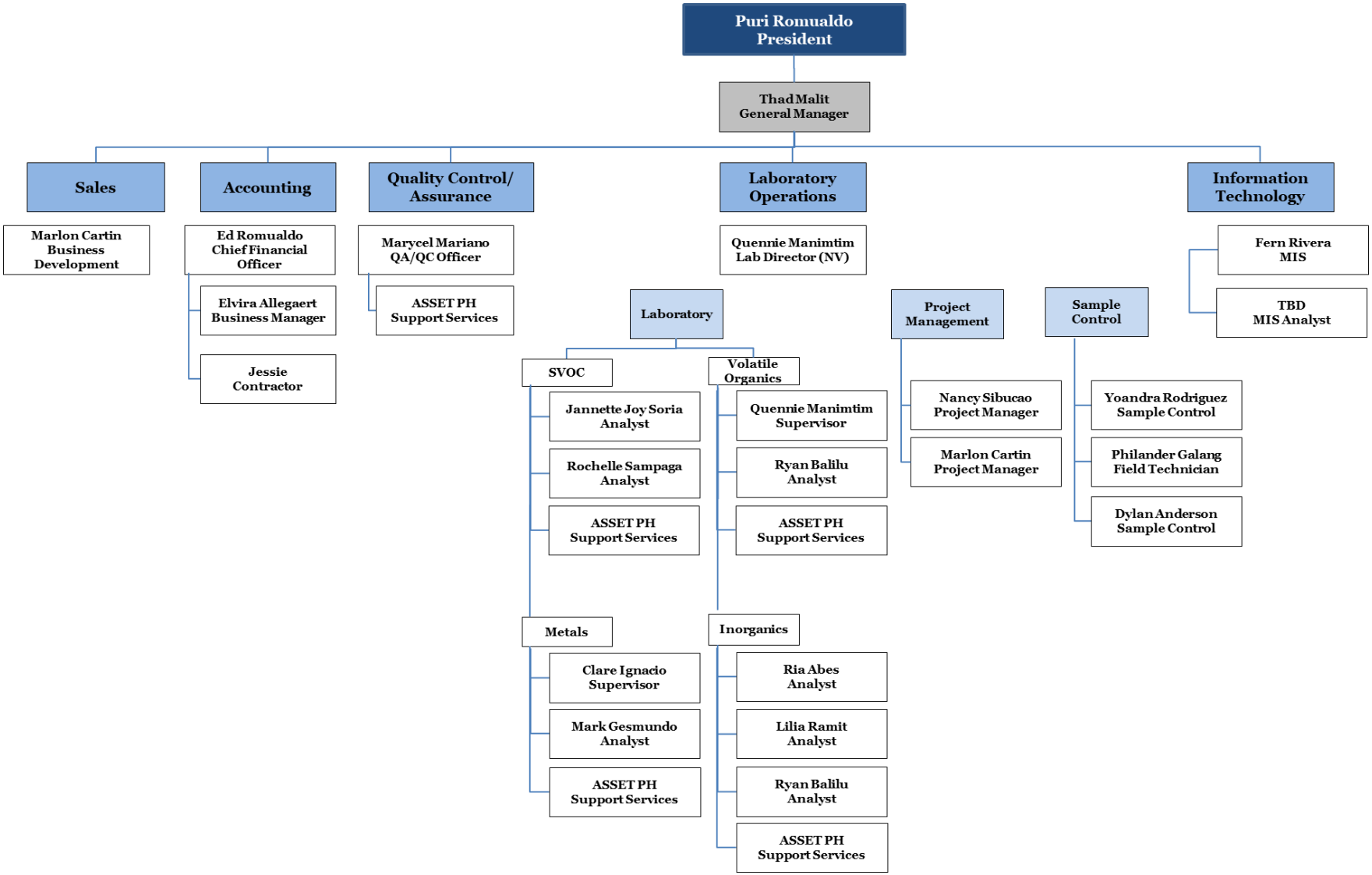
VOCs is an acronym for **Volatile Organic Compounds**. The term VOCs commonly refers to the list of compounds contained in EPA Method 8240 or the longer list of EPA Method 8260.

APPENDIX B

ORGANIZATIONAL CHART AND LIST OF KEY PERSONNEL

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

ASSET Laboratories – Las Vegas Laboratory Organizational Chart



ASSET Laboratories Key Personnel

Name, Experience, Education	Title	Responsibilities
Puri Romualdo **40 Years**;8 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*	• 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.
Quennie Manimtim **11 Years;** Inorganic and Organic Chemist *M.S., Agricultural Chemistry minor in Environmental Science* *BS Chemistry*	*Laboratory Manager/Director*	• 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 President.
Marycel Mariano **15 Years;** Organic Chemist *BS Chemistry*	*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 Labs 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 Labs data validation process and Electronic Data Deliverables
Marlon Cartin **12 Years;** Sample Control Officer/Project Manager *B.S. Chemistry*	*Project Manager*	• 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 President

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

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

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 ± 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 < 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.

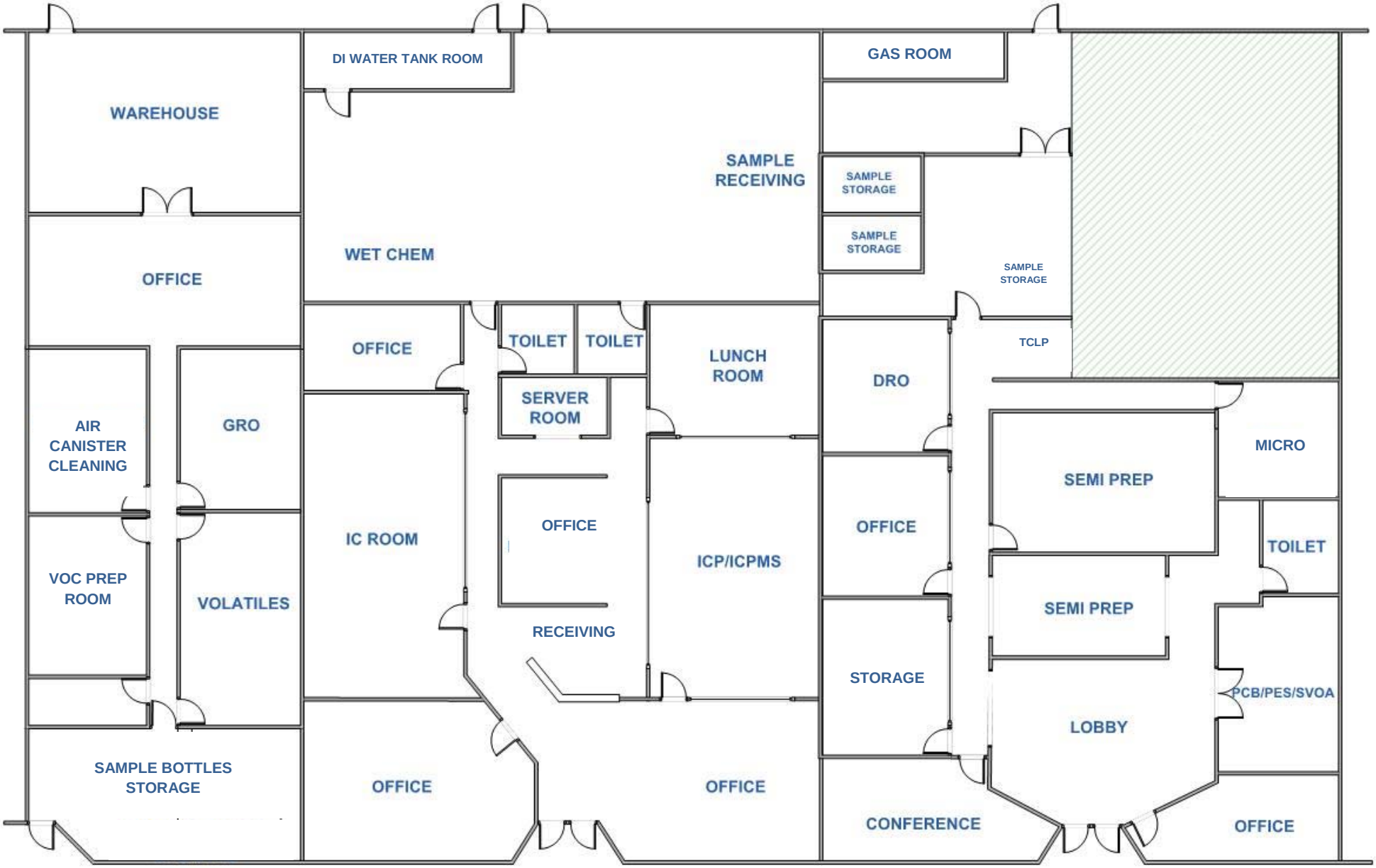
Spectrophotometer Tests			
Calibration QC Check	**Frequency**	**Acceptance Criteria**	**Corrective Action**
Initial Calibration	Initial calibration prior to sample analysis	r > 0.995	Evaluate system. Repeat calibration.
Initial calibration verification (second source) ICV	With each initial calibration	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

05/10/2018

APPENDIX G

LIST OF INSTRUMENTATION AND EQUIPMENT

EQUIPMENT LIST

(Updated 05/01/18)

Volatile Organics- EPA Method TO3 and TO15			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	6890/7890A
1	GC Mass Spectrometer	Agilent	5975
1	Purge & Trap Concentrator	Tekmar	3000
1	Auto Sampler	Nutech	3602
2	Data System	Agilent	Chemstation
1	Pre-concentrator	Nutech	8900 DS
3	Computers	Dell/HP	
Volatile Organics- EPA Method 8015B GRO and 8260B			
Qty	**Equipment**	**Make**	**Model**
3	Gas Chromatograph	Agilent	7820A/6890N
2	GC Mass Spectrometer	Agilent	5977E/5975
2	P&T Concentrator, Autosampler	Tekmar	Atom X
1	Auto Sampler	Varian	Archon
3	Data System	Agilent	Chemstation
3	Computers	Dell	
2	Printers	HP	
1	Purge and Trap Concentrator	Tekmar	3100
Semi-volatile Organics- EPA Method 8015B DRO			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	5890 Series II w/2 FID
2	Liquid Auto Sampler	Agilent	7673
2	Data System	Agilent	Chemstation
2	Computer	Dell	
1	Printer	HP	
Semi-volatile Organics- EPA Method 8081/8082			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	5890/6890
2	Liquid Auto Sampler	Agilent	7683
2	Data System	Agilent	Chemstation
2	Computer	Dell	
1	Printer	HP	

Semi-volatile Organics- EPA Method 8270C			
Qty	**Equipment**	**Make**	**Model**
2	Gas Chromatograph	Agilent	6890
2	GC Mass Spectrometer	Agilent	5973 MSD
2	Liquid Auto Sampler	Agilent	7683
2	Data System	Agilent	Chemstation
2	Computer	Dell	
1	Printer	HP	
Metals- EPA Method 6000/200.7/200.8 Series			
Qty	**Equipment**	**Make**	**Model**
2	Inductively Coupled Plasma	Perkin Elmer	Optima 4300DV and 7300DV
2	Inductively Coupled Plasma_Mass Spectrophotometer	Perkin Elmer/Agilent	ELAN DRC Plus/7700
4	Auto Sampler	Perkin Elmer/Agilent	AS93 plus/ASX 500
4	Chiller	Polyscience/Agilent	
4	Computer	Dell/HP	
3	Printer	HP	
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	
1	Printer	HP	
Classical Wet Chemistry			
Qty	**Equipment**	**Make**	**Model**
1	Analytical Balance	Ohaus	Explorer
1	Convection Oven	Thermo	Precision
1	pH Meter	VWR	Symphony
1	Turbidimeter	Oakton	T-100
1	Computer	Dell	
1	Printer	Agilent	
1	Conductivity meter	VWR	
1	UV/VIS Spectrophotometer	Thermo	Helios Gamma
1	Easy Chem	Systea Scientific	Easy Chem Plus

Inorganics- EPA Method 300/218.6/7199/TOC			
Qty	**Equipment**	**Make**	**Model**
5	Ion Chromatograph	Dionex	ICS-5000, ICS-2000, ICS 1500
1	Ion Chromatograph	Dionex	DX-100
5	Data System	Dionex	Integrated w/instrument
1	TOC Analyzer	Tekmar	Fusion
5	Auto Sampler	Dionex	AS40, AS DV
5	Computer	Dell	
2	Printer	Agilent	
Sample Preparation Chemistry			
Qty	**Equipment**	**Make**	**Model**
3	Hot Block Digester	Env.Express	-----
1	Computer	Dell	
7	Fume Hood	Genie Scientific/Custom	Custom
3	Sonicator	Tekmar	Various
1	Hot Plate	Corning/Linberg/Thermolyne	
1	Microwave	CEM	Mars 6
2	TCLP Rotator	Environmental Express	-----
3	Top Loading Balance	Sartorius/Mettler	B310S
2	TurboVap Concentrator	Zymark/Caliper	TurboVap II
2	Refrigerator		
1	Solvent evaporation system	Horizon Technology	Spped-Vap II 9000
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	T3750
1	UV Lamp	UL Lab equipment	6 watt, 365 nm
1	Autoclave	Pelton Crane	-
Sample Control			
Qty	**Equipment**	**Make**	**Model**
1	Top Loading Balance	Sartorius	B310S
50	Sample Coolers	Miscellaneous	Various sizes
6	Refrigerator	VWR/Custom	4°C coolers

2	Computer	Dell	
2	Printer/Copier/Fax	HP	
2	Barcode Printer	WASP	
1	Barcode Scanner	E Sky	
3	Freezer	GE/Whirlpool	
Document Control/Client Services			
Qty	**Equipment**	**Make**	**Model**
3	Computer	Dell	
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
6	Fire Extinguishers	Underwriter Laboratories	First Alert
5	Portable Eye Wash/Plumbed	Various	
1	Spill Containment Set-up	Labconco	-----
1	Spill Kit	Labconco	-----
Field/Courier Services			
3	Field Truck	Ford	Escape /F150/Silverado
1	pH meter	VWR	Symphony

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, ≤6 °C
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, ≤6 °C
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, ≤6 °C
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, ≤6 °C

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	≤6 °C
GRO(EnCore)	5035/8015B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6 °C
GRO (NaHSO4 preserved)	5035/8015B	14 days	(3) 5g/sample	2 pre-weighed NaHSO4 preserved VOA + 1 pre-weighed MeOH preserved VOA	≤6 °C, NaHSO4, MeOH
Purgeable Halocarbons/Aromatics	8260(8021B list)	14 days	5	4 oz glass jar w/Teflon lid	≤6 °C
GRO/BTEX/MTBE	8015B/8021B	14 days	5	4 oz glass jar w/Teflon lid	≤6 °C
TPH(g) (EnCORE)	5035/8015B (M)	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6 °C
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	≤6 °C, NaHSO4, MeOH
VOCs	8260B	14 days	5	4 oz glass jar w/Teflon lid	≤6 °C
VOCs (EnCORE)	5035/8260B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6 °C
VOCs (NaHSO4 & MeOH preserved)	5035/8260B	14 days	(3) 5g/sample	2 pre-weighed NaHSO4 preserved VOA + 1 pre-weighed MeOH preserved VOA	≤6 °C, NaHSO4, MeOH

Semivolatile Organics in Water					
Parameter	***Method***	***Holding Time***	***Min. Vol. (mL)***	***Container Type***	***Preservation***
DRO	8015B	7*	1000	1 L amber glass	≤6 °C **
Pesticides, Organochlorine	8081A/608	7*	1000	1 L amber glass	≤6 °C **
1.1 PCBs	8082/608	7*	1000	1 L amber glass	≤6 °C **
SVOCs (BNAs)	625/8270C	7*	1000	1 L amber glass	≤6 °C **
1,4-Dioxane	8270C Isotope Dilution	7*	1000	1 L amber glass	≤6 °C **
TPH (d)	8015B (M)	7*	1000	1 L amber glass	≤6 °C **
TPH-CC (C8-C40)	8015B (M)	7*	1000	1 L amber glass	≤6 °C **

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	≤6 °C
PCBs	EPA 8082	14*	30	4 oz glass jar w/Teflon lid	≤6 °C
Pesticides, Organochlorine	EPA 8081A	14*	30	4 oz glass jar w/Teflon lid	≤6 °C
SVOCs (BNAs)	EPA 8270C	14*	30	4 oz glass jar w/Teflon lid	≤6 °C
TPH(d)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	≤6 °C
TPH-CC (C8-C40)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	≤6 °C

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, ≤6 °C
Alkalinity	SM 2320B	14 days	100	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Ammonia	SM 4500-NH3C	28 days	100	500 mL, plastic or glass	Cool, ≤6 °C, H2SO4 to pH < 2
Biochemical Oxygen Demand	SM5210B	48 hours	300	1 L, plastic or glass	Cool, ≤6 °C
Bromide	300.0	28 days	50	125 mL, 4oz plastic	Cool, ≤6 °C
cBOD	SM5210B	48 hours	300	1 L, 32oz plastic	Cool, ≤6 °C
Chemical Oxygen Demand	410.4	28 days	50	125 mL, 4oz plastic	Cool, ≤6 °C, H2SO4 to pH < 2
Chloride	SM 4500-Cl- C, 300.0	28 days	50	125 mL, 4oz plastic	Cool, ≤6 °C
Chlorine, Free	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, ≤6 °C
Chlorine, Total Residual	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, ≤6 °C
Color	SM2120B	48 hours	100	250 mL, 8oz plastic or glass	Cool, ≤6 °C
Cyanide, Amenable	SM 4500-CN G	14 days	250	250 mL, 8oz plastic	Cool, ≤6 °C; 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, ≤6 °C; 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, ≤6 °C
Nitrate-Nitrite	SM 4500-NO3 E	28 days	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C, H2SO4 to pH < 2
Nitrite	300.0; SM 4500-NO2 B	48 hours	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Oil and Grease - HEM	1664	28 days	1000	32oz, glass	Cool, ≤6 °C, 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	≤6 °C
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, ≤6 °C, H2SO4 to pH < 2
Phosphate,Ortho	300.0; 365.3; SM 4500-P E	48 hours	50	125 mL, 4oz plastic	Cool, ≤6 °C
Phosphorus, Total	365.3; SM4500-PE	28 days	100	125 mL, 4oz plastic	Cool, ≤6 °C, H2SO4 to pH < 2
Solids, Total (TS)	SM 2540 B	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Total Dissolved (TDS)	SM 2540 C	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Total Suspended (TSS)	SM 2540 D	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Settleable (SS)	SM 2540 F	48 hours	1000	1 L , 32oz plastic	Cool, ≤6 °C
Solids, Volatile (VS)	160.4	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Specific Conductance	120.1	24 hours	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Sulfate	300.0	28 days	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
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, ≤6 °C
Sulfide, Total	SM 4500-S-2 D	7 days	100	500 mL, Plastic or Glass	Cool, 4 °C, add zinc acetate, pH > 9
Surfactants (MBAS)	SM 5540 C	48 hours	200	250 mL, 8oz plastic	Cool, ≤6 °C
Total Organic Carbon (TOC)	SM 5310B	28 days	40	40 mL VOA	Cool, ≤6 °C, H2SO4 to pH < 2
Total Organic Halides (TOX)	9020	28 days	200	500 mL, amber glass	Cool, ≤6 °C, H2SO4 to pH < 2
TRPH	1664	28 days	1000	1 L, glass	Cool, ≤6 °C, H2SO4 to pH < 2
Turbidity	180.1	48 Hours	50	125 mL, plastic or glass	Cool, ≤6 °C

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	≤6 °C
Bromide	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chemical Oxygen Demand (COD)	410.4(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chloride	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chromium IV (Hexavalent Chromium)	7196A	21 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Amenable	9010B/9014	14 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Reactive	SW 846 Ch.7	14 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Total	9010B/9014	14 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Ignitability (Flashpoint)	1010	14 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Moisture Content	ASTM D2216	ASAP	10	4 oz glass jar w/Teflon lid	≤6 °C
Nitrogen, Nitrate	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C
Nitrogen, Nitrite	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C
Oil and Grease (HEM)	1664(M)	28 days	30	4 oz glass jar w/Teflon lid	≤6 °C
Perchlorate	314.0 (M)	28	50	125 ml HDPE	≤6 °C
pH	9045C / 9040B	ASAP	10	4 oz glass jar w/Teflon lid	≤6 °C
Phenolics, Total	420.1 (M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Phosphate, Ortho	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C C
Phosphate, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Phosphorus, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfate	300.0(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfide, Reactive	SW 846 Ch.7	7 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfide, Total	9030B/EPA 376.2(M)	7 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Total Organic Carbon (TOC)	9060	28 days	2	4 oz glass jar w/Teflon lid	≤6 °C
TRPH	1664SGT/ HEM (M)	28 days	30	4 oz glass jar w/Teflon lid	≤6 °C

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, ≤6 °C
Hexavalent Chromium	218.6	28 days	50	250 mL, 8oz plastic	Cool to ≤6 °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	≤6 °C
ICP Metals	EPA 6010B	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C
ICP/MS Metals	EPA 6020	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C
Sodium	EPA 7770	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C
Potassium	EPA 7610	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C
Mercury	EPA 7471A	28 days	5	4 oz glass jar w/Teflon lid	≤6 °C

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	HNO_3, pH < 2
Metals, except Mercury	180 days	NA	180 days	16oz plastic	360 days	HNO_3, 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

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: 11110 Artesia Blvd., Ste B, 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:**			
Address:	**Company:**	**Address:**			
Address:	**Email:**				
Phone: **Fax:**	**Address:**	**Email to:**	**PO#**		
Submitted By:		**Phone:**	**Fax:**		
Title:	**Phone:** **Fax:**				
Signature: **Date:**	**Sampled By:**				
I hereby authorize ASSET Labs to perform the tests indicated below:	*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.*				
Project Name:	*Signature:* *Date*				
Project Number:					

EDD Requirement		QA/QC		Sampe Receipt Condition	Y	N
Excel EDD	☐	RTNE	☐			
Geotracker	☐	RWQCB	☐	1. Chilled	☐	☐
Labspec	☐	CalTrans	☐	2. Headspace	☐	☐
Others	☐	Level III	☐	3. Container Intact	☐	☐
Specify:		LEVEL IV	☐	4. Seal Present	☐	☐
		Regulatory	☐	5. IR number		
Global ID:		Specify State:		6. Method of Cooling		
				Sample Temp:		

Matrix			
Ground	☐	Sediment	☐
Potable	☐	Soil	☐
NPDES	☐	Other Solid	☐
Surface	☐		

Item No.	Laboratory Work Order No.	Sample ID/Location	Date	Time	Water	Solid	Others	Analyses Requested	Turn Around Time	No. of container	Container Type	PRESERVATION	Remarks
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

Courier:

Tracking No.

Relinquished by (Signature and Printed Name):	Received by (Signature and Printed Name): Date / Time
Relinquished by (Signature and Printed Name):	Received by (Signature and Printed Name): Date / Time
Relinquished by (Signature and Printed Name):	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.
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 = <=6°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

APPENDIX J

CONTROL LIMITS

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

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

Matrix: **FILTER**

	MS			RPD *		LCS	
Analyte	Lower Limit	Upper Limit		Limit		Lower Limit	Upper Limit
Arsenic				20		85	115
Lead				20		85	115

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

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: May 15, 2017

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: May 15, 2017

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
Nitrate as N (PGE)	80	120	20	80	120
Nitrogen, Nitrite	80	120	20	90	110
Phosphorous, Diss oPO4 (RTNE)	80	120	20	90	110
Orthophosphate (PGE)	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: May 15, 2017

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: May 15, 2017

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	78	114	18	78	114
TRPH	EPA 1664	64	132	34	64	132

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: May 15, 2017

EPA 8081

Matrix: **WATER**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
4,4´-DDD	43	134	20
4,4´-DDE	33	129	20
4,4´-DDT	36	138	20
Aldrin	31	117	20
alpha-BHC	41	132	20
alpha-Chlordane	35	135	20
beta-BHC	43	121	20
delta-BHC	46	136	20
Dieldrin	47	135	20
Endosulfan I	44	138	20
Endosulfan II	49	137	20
Endosulfan sulfate	46	138	20
Endrin	41	150	20
Endrin aldehyde	49	138	20
Endrin ketone	48	142	20
gamma-BHC	41	126	20
gamma-Chlordane	41	127	20
Heptachlor	25	128	20
Heptachlor epoxide	44	126	20
Methoxychlor	30	143	20

Surrogate

Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	22	111
Tetrachloro-m-xylene	30	109

Effective Date: May 15, 2017

EPA 8081

Matrix: **SOIL**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
4,4´-DDD	49	133	30
4,4´-DDE	46	122	30
4,4´-DDT	51	134	30
Aldrin	39	137	30
alpha-BHC	51	122	30
alpha-Chlordane	51	123	30
beta-BHC	47	117	30
delta-BHC	51	132	30
Dieldrin	56	129	30
Endosulfan I	45	135	30
Endosulfan II	57	130	30
Endosulfan sulfate	56	130	30
Endrin	55	142	30
Endrin aldehyde	51	126	30
Endrin ketone	53	136	30
gamma-BHC	50	117	30
gamma-Chlordane	53	122	30
Heptachlor	49	136	30
Heptachlor epoxide	51	120	30
Methoxychlor	47	138	30

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	33	122
Tetrachloro-m-xylene	34	119

Effective Date: May 15, 2017

EPA 8082

Matrix: **WATER**

	LCS/LCSD/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	47	123	20
Aroclor 1260	55	131	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	27	130
Tetrachloro-m-xylene	24	110

Matrix: **SOIL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	50	120	20
Aroclor 1260	50	133	20

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	29	142	20
Aroclor 1260	25	142	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Decachlorobiphenyl	48	130
Tetrachloro-m-xylene	40	130

Effective Date: May 15, 2017

Matrix: **OIL**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Aroclor 1016	60	140	20
Aroclor 1260	42	152	20

Surrogate	Lower Limit	Upper Limit
Decachlorobiphenyl	41	154
Tetrachloro-m-xylene	33	152

Effective Date: May 15, 2017

8015B _ DIESEL

Matrix: **WATER HIGH LEVEL**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	58	122	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	45	131

Matrix: **WATER LOW LEVEL**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	59	133	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	50	135

Effective Date: May 15, 2017

Matrix: **SOIL HIGH LEVEL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	59	126	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	44	151	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	66	132

Matrix: **SOIL LOW LEVEL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	53	111	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Diesel	18	136	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
p_Terphenyl	43	128

Effective Date: May 15, 2017

8015B _ GAS

Matrix: **WATER**

	LCS/MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	74	133	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Chlorobenzene-d5	72	143

Matrix: **SOIL**

	LCS		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	74	127	

	MS/MSD		RPD
Analyte	Lower Limit	Upper Limit	Limit
Gasoline	27	144	20

	Surrogate	
Analyte	Lower Limit	Upper Limit
Chlorobenzene-d5	46	157

Effective Date: May 15, 2017

8270SIM

Matrix: **WATE**

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	**RPD**
1-Methylnaphthalene	38	107	20
2-Methylnaphthalene	43	115	20
Acenaphthene	42	111	20
Acenaphthylene	42	115	20
Anthracene	43	110	20
Benzo(a)anthracene	46	121	20
Benzo(a)pyrene	44	111	20
Benzo(b)fluoranthene	46	118	20
Benzo(g,h,i)perylene	35	118	20
Benzo(k)fluoranthene	42	130	20
Chrysene	39	113	20
Dibenz(a,h)anthracene	31	126	20
Fluoranthene	49	115	20
Fluorene	44	114	20
Indeno(1,2,3-cd)pyrene	41	121	20
Naphthalene	37	112	20
Phenanthrene	47	110	20
Pyrene	51	117	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	22	130
2-Fluorobiphenyl	24	130
4-Terphenyl-d14	37	130
Nitrobenzene-d5	19	130

Effective Date: May 15, 2017

8270SIM

Matrix: **SOIL**

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	**RPD**
1-Methylnaphthalene	44	109	20
2-Methylnaphthalene	42	117	20
Acenaphthene	46	109	20
Acenaphthylene	45	114	20
Anthracene	45	101	20
Benzo(a)anthracene	38	119	20
Benzo(a)pyrene	43	103	20
Benzo(b)fluoranthene	31	126	20
Benzo(g,h,i)perylene	26	118	20
Benzo(k)fluoranthene	42	123	20
Chrysene	45	109	20
Dibenz(a,h)anthracene	33	118	20
Fluoranthene	48	111	20
Fluorene	47	112	20
Indeno(1,2,3-cd)pyrene	31	119	20
Naphthalene	43	109	20
Phenanthrene	39	114	20
Pyrene	48	113	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	25	130
2-Fluorobiphenyl	23	130
4-Terphenyl-d14	24	130
Nitrobenzene-d5	22	130

Effective Date: May 15, 201

8260B _ VOC

Matrix: **WATER**

LCS/LCSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	80	122	20
1,1,1-Trichloroethane	80	125	20
1,1,2,2-Tetrachloroethane	76	124	20
1,1,2-Trichloroethane	80	120	20
1,1-Dichloroethane	67	128	20
1,1-Dichloroethene	66	131	20
1,1-Dichloropropene	80	132	20
1,2,3-Trichlorobenzene	76	122	20
1,2,3-Trichloropropane	75	121	20
1,2,4-Trichlorobenzene	73	121	20
1,2,4-Trimethylbenzene	80	125	20
1,2-Dibromo-3-chloropropane	66	129	20
1,2-Dibromoethane	80	120	20
1,2-Dichlorobenzene	80	120	20
1,2-Dichloroethane	80	120	20
1,2-Dichloropropane	80	120	20
1,3,5-Trimethylbenzene	80	128	20
1,3-Dichlorobenzene	80	120	20
1,3-Dichloropropane	80	120	20
1,4-Dichlorobenzene	80	120	20
2,2-Dichloropropane	69	136	20
2-Butanone	10	171	20
2-Chlorotoluene	80	118	20
2-Hexanone	34	157	20
4-Chlorotoluene	80	122	20
4-Isopropyltoluene	80	133	20
4-Methyl-2-pentanone	62	129	20
Acetone	13	180	20
Benzene	80	120	20
Bromobenzene	80	120	20
Bromochloromethane	80	120	20
Bromodichloromethane	80	120	20
Bromoform	67	130	20
Bromomethane	21	148	20
Carbon disulfide	47	129	20
Carbon tetrachloride	76	138	20
Chlorobenzene	80	120	20
Chloroethane	67	155	20
Chloroform	79	120	20
Chloromethane	33	145	20
cis-1,2-Dichloroethene	80	120	20
cis-1,3-Dichloropropene	80	121	20
Cyclohexanone	42	149	20
Dibromochloromethane	77	131	20
Dibromomethane	80	120	20
Dichlorodifluoromethane	40	169	20
Di-isopropyl ether	53	135	20
Ethyl Acetate	60	128	20

LCS/LCSD

Analyte	Lower	Upper	RPD
Ethyl Ether	39	128	20
Ethyl tert-butyl ether	55	134	20
Ethylbenzene	80	121	20
Freon-113	47	132	20
Hexachlorobutadiene	80	132	20
Iodomethane	7	126	20
Isopropylbenzene	59	128	20
m,p-Xylene	80	124	20
Methylene chloride	68	126	20
MTBE	65	120	20
Naphthalene	67	123	20
n-Butylbenzene	74	139	20
n-Propylbenzene	87	129	20
o-Xylene	80	123	20
sec-Butylbenzene	80	133	20
Styrene	80	122	20
Tert-amyl methyl ether	77	120	20
Tert-Butanol	43	134	20
tert-Butylbenzene	80	130	20
Tetrachloroethene	80	129	20
Toluene	80	120	20
trans-1,2-Dichloroethene	75	122	20
trans-1,3-Dichloropropene	80	121	20
Trichloroethene	80	120	20
Trichlorofluoromethane	71	149	20
Vinyl acetate	51	150	20
Vinyl chloride	53	146	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichloroethane-d4	73	127
Dibromofluoromethane	80	121
Toluene-d8	80	120
4-Bromofluorobenzene	80	120

8260B _ VOC

Matrix: **WATER**

MS/MSD **MS/MSD**

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	79	123	20
1,1,1-Trichloroethane	76	133	20
1,1,2,2-Tetrachloroethane	72	124	20
1,1,2-Trichloroethane	76	120	20
1,1-Dichloroethane	67	130	20
1,1-Dichloroethene	63	135	20
1,1-Dichloropropene	80	139	20
1,2,3-Trichlorobenzene	71	122	20
1,2,3-Trichloropropane	69	120	20
1,2,4-Trichlorobenzene	66	125	20
1,2,4-Trimethylbenzene	67	139	20
1,2-Dibromo-3-chloropropane	65	120	20
1,2-Dibromoethane	78	120	20
1,2-Dichlorobenzene	80	120	20
1,2-Dichloroethane	78	120	20
1,2-Dichloropropane	79	120	20
1,3,5-Trimethylbenzene	57	154	20
1,3-Dichlorobenzene	80	120	20
1,3-Dichloropropane	80	120	20
1,4-Dichlorobenzene	80	120	20
2,2-Dichloropropane	61	144	20
2-Butanone	9	120	20
2-Chlorotoluene	78	126	20
2-Hexanone	18	132	20
4-Chlorotoluene	80	128	20
4-Isopropyltoluene	78	142	20
4-Methyl-2-pentanone	57	125	20
Acetone	0	120	20
Benzene	56	145	20
Bromobenzene	80	120	20
Bromochloromethane	78	120	20
Bromodichloromethane	80	120	20
Bromoform	64	126	20
Bromomethane	13	157	20
Carbon disulfide	47	131	20
Carbon tetrachloride	72	143	20
Chlorobenzene	80	120	20
Chloroethane	62	172	20
Chloroform	73	120	20
Chloromethane	33	146	20
cis-1,2-Dichloroethene	74	124	20
cis-1,3-Dichloropropene	80	123	20
Cyclohexanone	9	161	20
Dibromochloromethane	75	126	20
Dibromomethane	79	120	20
Dichlorodifluoromethane	29	184	20
Di-isopropyl ether	48	138	20
Ethyl Acetate	45	130	20

Analyte	Lower	Upper	RPD
Ethyl Ether	40	126	20
Ethyl tert-butyl ether	56	130	20
Ethylbenzene	80	126	20
Freon-113	49	135	20
Hexachlorobutadiene	76	136	20
Iodomethane	0	148	20
Isopropylbenzene	56	135	20
m,p-Xylene	80	130	20
Methylene chloride	0	187	20
MTBE	61	120	20
Naphthalene	54	125	20
n-Butylbenzene	67	148	20
n-Propylbenzene	80	139	20
o-Xylene	80	129	20
sec-Butylbenzene	80	144	20
Styrene	33	153	20
Tert-amyl methyl ether	67	120	20
Tert-Butanol	20	156	20
tert-Butylbenzene	80	140	20
Tetrachloroethene	69	146	20
Toluene	76	120	20
trans-1,2-Dichloroethene	69	128	20
trans-1,3-Dichloropropene	78	120	20
Trichloroethene	72	132	20
Trichlorofluoromethane	66	160	20
Vinyl acetate	22	162	20
Vinyl chloride	44	159	20

8260B _ VOC

Matrix: **SOIL**

LCS/LCSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	79	123	20
1,1,1-Trichloroethane	77	126	20
1,1,2,2-Tetrachloroethane	75	127	20
1,1,2-Trichloroethane	78	120	20
1,1-Dichloroethane	60	134	20
1,1-Dichloroethene	67	129	20
1,1-Dichloropropene	80	132	20
1,2,3-Trichlorobenzene	77	127	20
1,2,3-Trichloropropane	72	125	20
1,2,4-Trichlorobenzene	72	128	20
1,2,4-Trimethylbenzene	80	130	20
1,2-Dibromo-3-chloropropane	70	128	20
1,2-Dibromoethane	80	121	20
1,2-Dichlorobenzene	80	126	20
1,2-Dichloroethane	78	120	20
1,2-Dichloropropane	80	120	20
1,3,5-Trimethylbenzene	80	129	20
1,3-Dichlorobenzene	80	124	20
1,3-Dichloropropane	80	123	20
1,4-Dichlorobenzene	80	125	20
2,2-Dichloropropane	64	135	20
2-Butanone	20	168	20
2-Chlorotoluene	80	123	20
2-Hexanone	39	157	20
4-Chlorotoluene	80	128	20
4-Isopropyltoluene	80	136	20
4-Methyl-2-pentanone	65	130	20
Acetone	11	176	20
Benzene	80	120	20
Bromobenzene	80	120	20
Bromochloromethane	79	120	20
Bromodichloromethane	80	120	20
Bromoform	72	129	20
Bromomethane	32	152	20
Carbon disulfide	50	127	20
Carbon tetrachloride	74	135	20
Chlorobenzene	80	123	20
Chloroethane	69	153	20
Chloroform	76	120	20
Chloromethane	47	135	20
cis-1,2-Dichloroethene	80	120	20
cis-1,3-Dichloropropene	80	127	20
Cyclohexanone	30	176	20
Dibromochloromethane	80	127	20
Dibromomethane	79	120	20
Dichlorodifluoromethane	26	188	20
Di-isopropyl ether	56	129	20
Ethyl Acetate	63	127	20

LCS/LCSD

Analyte	Lower	Upper	RPD
Ethyl Ether	43	129	20
Ethyl Tert-butyl ether	62	124	20
Ethylbenzene	80	123	20
Freon-113	48	130	20
Hexachlorobutadiene	77	134	20
Iodomethane	9	134	20
Isopropylbenzene	66	129	20
m,p-Xylene	80	126	20
Methylene chloride	65	131	20
MTBE	70	120	20
Naphthalene	69	124	20
n-Butylbenzene	79	138	20
n-Propylbenzene	80	132	20
o-Xylene	80	127	20
sec-Butylbenzene	80	134	20
Styrene	80	124	20
Tert-amyl methyl ether	76	120	20
Tert-Butanol	42	137	20
tert-Butylbenzene	80	134	20
Tetrachloroethene	80	127	20
Toluene	78	118	20
trans-1,2-Dichloroethene	74	124	20
trans-1,3-Dichloropropene	79	127	20
Trichloroethene	80	123	20
Trichlorofluoromethane	68	148	20
Vinyl acetate	47	149	20
Vinyl chloride	61	137	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichloroethane-d4	71	154
Dibromofluoromethane	80	128
Toluene-d8	80	120
4-Bromofluorobenzene	80	125

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8260B _ VOC

Matrix: **SOIL**

MS/MSD

Analyte	Lower	Upper	RPD
1,1,1,2-Tetrachloroethane	51	129	20
1,1,1-Trichloroethane	56	128	20
1,1,2,2-Tetrachloroethane	35	170	20
1,1,2-Trichloroethane	63	134	20
1,1-Dichloroethane	50	123	20
1,1-Dichloroethene	54	126	20
1,1-Dichloropropene	63	131	20
1,2,3-Trichlorobenzene	13	147	20
1,2,3-Trichloropropane	51	158	20
1,2,4-Trichlorobenzene	19	134	20
1,2,4-Trimethylbenzene	40	145	20
1,2-Dibromo-3-chloropropane	52	171	20
1,2-Dibromoethane	65	145	20
1,2-Dichlorobenzene	44	134	20
1,2-Dichloroethane	62	129	20
1,2-Dichloropropane	58	126	20
1,3,5-Trimethylbenzene	44	142	20
1,3-Dichlorobenzene	41	130	20
1,3-Dichloropropane	64	142	20
1,4-Dichlorobenzene	42	128	20
2,2-Dichloropropane	45	136	20
2-Butanone	3	227	20
2-Chlorotoluene	42	132	20
2-Hexanone	27	206	20
4-Chlorotoluene	43	135	20
4-Isopropyltoluene	43	144	20
4-Methyl-2-pentanone	59	169	20
Acetone	2	203	20
Benzene	58	122	20
Bromobenzene	44	130	20
Bromochloromethane	60	132	20
Bromodichloromethane	58	125	20
Bromoform	50	154	20
Bromomethane	40	120	20
Carbon disulfide	33	123	20
Carbon tetrachloride	56	131	20
Chlorobenzene	56	123	20
Chloroethane	30	146	20
Chloroform	56	119	20
Chloromethane	39	131	20
cis-1,2-Dichloroethene	34	141	20
cis-1,3-Dichloropropene	53	139	20
Cyclohexanone	10	202	20
Dibromochloromethane	59	140	20
Dibromomethane	64	134	20
Dichlorodifluoromethane	12	200	20
Di-isopropyl ether	41	127	20
Ethyl Acetate	13	178	20

Analyte	Lower	Upper	RPD
Ethyl Ether	36	128	20
Ethyl Tert-butyl ether	52	120	20
Ethylbenzene	54	125	20
Freon-113	34	128	20
Hexachlorobutadiene	33	127	20
Iodomethane	14	120	20
Isopropylbenzene	25	141	20
m,p-Xylene	52	130	20
Methylene chloride	53	123	20
MTBE	59	128	20
Naphthalene	30	154	20
n-Butylbenzene	31	142	20
n-Propylbenzene	47	138	20
o-Xylene	54	130	20
sec-Butylbenzene	49	139	20
Styrene	50	127	20
Tert-amyl methyl ether	53	135	20
Tert-Butanol	31	223	20
tert-Butylbenzene	48	140	20
Tetrachloroethene	56	125	20
Toluene	54	119	20
trans-1,2-Dichloroethene	60	116	20
trans-1,3-Dichloropropene	54	142	20
Trichloroethene	33	153	20
Trichlorofluoromethane	30	161	20
Vinyl acetate	6	159	20
Vinyl chloride	43	140	20

Effective Date: May 15, 2017

8270C _ SVOC

Matrix: **WATER**

LCS/LCSD/MS/MSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	28	98	20
1,2-Dichlorobenzene	27	91	20
1,2-Diphenylhydrazine	39	138	20
1,3-Dichlorobenzene	24	87	20
1,4-Dichlorobenzene	26	89	20
2,4,5-Trichlorophenol	49	118	20
2,4,6-Trichlorophenol	52	112	20
2,4-Dichlorophenol	47	105	20
2,4-Dimethylphenol	46	109	20
2,4-Dinitrophenol	33	111	20
2,4-Dinitrotoluene	46	118	20
2,6-Dinitrotoluene	45	112	20
2-Chloronaphthalene	40	100	20
2-Chlorophenol	44	101	20
2-Methylnaphthalene	35	100	20
2-Methylphenol	46	111	20
2-Nitroaniline	41	135	20
2-Nitrophenol	45	106	20
3,3´-Dichlorobenzidine	27	117	20
3-Nitroaniline	37	140	20
3/4-Methylphenol	44	104	20
4,6-Dinitro-2-methylphenol	49	121	20
4-Bromophenyl-phenylether	56	114	20
4-Chloro-3-methylphenol	54	113	20
4-Chloroaniline	26	124	20
4-Chlorophenyl-phenylether	51	114	20
4-Methylphenol	44	104	20
4-Nitroaniline	37	151	20
4-Nitrophenol	17	111	20
Acenaphthene	51	103	20
Acenaphthylene	49	102	20
Aniline	13	112	20
Anthracene	55	108	20
Benzidine (M)	10	121	20
Benzo(a)anthracene	58	111	20
Benzo(a)pyrene	54	112	20
Benzo(b)fluoranthene	48	128	20
Benzo(g,h,i)perylene	41	126	20
Benzo(k)fluoranthene	44	124	20
Benzoic acid	13	82	20
Benzyl alcohol	22	103	20
Bis(2-chloroethoxy)methane	44	111	20
Bis(2-chloroethyl)ether	21	142	20
Bis(2-chloroisopropyl)ether	20	126	20
Bis(2-ethylhexyl)phthalate	54	128	20
Butylbenzylphthalate	51	126	20
Carbazole	49	143	20
Chrysene	56	111	20

Analyte	Lower	Upper	RPD
Di-n-butylphthalate	50	129	20
Di-n-octylphthalate	46	131	20
Dibenz(a,h)anthracene	48	124	20
Dibenzofuran	43	109	20
Diethylphthalate	54	121	20
Dimethylphthalate	60	116	20
Fluoranthene	52	116	20
Fluorene	54	111	20
Hexachlorobenzene	41	119	20
Hexachlorobutadiene	22	114	20
Hexachlorocyclopentadiene	13	98	20
Hexachloroethane	23	88	20
Indeno(1,2,3-cd)pyrene	46	120	20
Isophorone	49	119	20
N-Nitrosodi-n-propylamine	41	115	20
N-Nitrosodimethylamine	18	91	20
N-Nitrosodiphenylamine	58	114	20
Naphthalene	42	99	20
Nitrobenzene	34	103	20
Pentachlorophenol	38	119	20
Phenanthrene	56	115	20
Phenol	23	81	20
Pyrene	52	116	20
Pyridine	15	59	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	17	130
2,4,6-Tribromophenol	24	124
2-Chlorophenol-d4	18	130
2-Fluorobiphenyl	21	130
2-Fluorophenol	19	130
4-Terphenyl-d14	20	135
Nitrobenzene-d5	13	118
Phenol-d5	18	130

Effective Date: May 15, 2017

8270C _ SVOC

Matrix: **SOIL**

LCS/MS/MSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	33	103	20
1,2-Dichlorobenzene	30	102	20
1,2-Diphenylhydrazine	37	139	20
1,3-Dichlorobenzene	30	97	20
1,4-Dichlorobenzene	31	99	20
2,4,5-Trichlorophenol	47	114	20
2,4,6-Trichlorophenol	51	109	20
2,4-Dichlorophenol	49	103	20
2,4-Dimethylphenol	48	106	20
2,4-Dinitrophenol	16	109	20
2,4-Dinitrotoluene	46	112	20
2,6-Dinitrotoluene	44	108	20
2-Chloronaphthalene	41	100	20
2-Chlorophenol	46	104	20
2-Methylnaphthalene	37	103	20
2-Methylphenol	48	113	20
2-Nitroaniline	34	146	20
2-Nitrophenol	45	105	20
3,3´-Dichlorobenzidine	19	111	20
3-Nitroaniline	31	146	20
3/4-Methylphenol	49	105	20
4,6-Dinitro-2-methylphenol	21	124	20
4-Bromophenyl-phenylether	54	108	20
4-Chloro-3-methylphenol	55	110	20
4-Chloroaniline	19	112	20
4-Chlorophenyl-phenylether	41	118	20
4-Methylphenol	49	105	20
4-Nitroaniline	38	142	20
4-Nitrophenol	34	129	20
Acenaphthene	52	102	20
Acenaphthylene	51	102	20
Aniline	11	119	20
Anthracene	54	106	20
Benzidine (M)	8	95	20
Benzo(a)anthracene	58	107	20
Benzo(a)pyrene	55	106	20
Benzo(b)fluoranthene	52	118	20
Benzo(g,h,i)perylene	49	114	20
Benzo(k)fluoranthene	52	109	20
Benzoic acid	19	98	20
Benzyl alcohol	33	106	20
Bis(2-chloroethoxy)methane	38	117	20
Bis(2-chloroethyl)ether	23	130	20
Bis(2-chloroisopropyl)ether	22	128	20
Bis(2-ethylhexyl)phthalate	47	130	20
Butylbenzylphthalate	57	118	20
Carbazole	44	138	20
Chrysene	53	111	20

Analyte	Lower	Upper	RPD
Di-n-butylphthalate	54	118	20
Di-n-octylphthalate	48	132	20
Dibenz(a,h)anthracene	55	113	20
Dibenzofuran	45	105	20
Diethylphthalate	56	115	20
Dimethylphthalate	57	113	20
Fluoranthene	54	109	20
Fluorene	55	108	20
Hexachlorobenzene	41	113	20
Hexachlorobutadiene	30	122	20
Hexachlorocyclopentadiene	12	102	20
Hexachloroethane	30	102	20
Indeno(1,2,3-cd)pyrene	53	109	20
Isophorone	47	125	20
N-Nitrosodi-n-propylamine	42	113	20
N-Nitrosodimethylamine	28	125	20
N-Nitrosodiphenylamine	56	109	20
Naphthalene	44	105	20
Nitrobenzene	33	108	20
Pentachlorophenol	21	128	20
Phenanthrene	55	109	20
Phenol	44	107	20
Pyrene	53	109	20
Pyridine	19	90	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	36	130
2,4,6-Tribromophenol	32	133
2-Chlorophenol-d4	39	130
2-Fluorobiphenyl	46	130
2-Fluorophenol	34	118
4-Terphenyl-d14	42	124
Nitrobenzene-d5	40	130
Phenol-d5	34	112

Effective Date: May 15, 2017

APPENDIX K

FAX COVER PAGE

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
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

3151 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 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.: **2676**

Expiration Date: **7/31/2018**

Effective Date: **7/1/2017**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

CALIFORNIA
Water Boards

State Water Resources Control Board

August 11, 2017

Puri Romualdo
ASSET Laboratories
3151 West Post Road
Las Vegas, NV 89118

Dear Puri Romualdo: Certificate No. 2676

This notice advises 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" list. The certificate shall remain in effect until **July 31, 2018** unless it is revoked. This certificate is subject to an annual fee as determined by HSC 100860.1(a).

The application for renewal of this certificate must be received 90 days prior to the expiration date to remain in force according to HSC 100845(a). You must submit annual Proficiency Testing results before the due date of your annual fee to remain in compliance.

Any change in laboratory location or alteration to laboratory structure that could adversely affect quality of analysis in certified methods require notification prior to the change. Notification is also required for a transfer in ownership or appointment of new laboratory director within 30 days of 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.

Please contact our office at (916) 323-3431 or elapca@waterboards.ca.gov with questions.

Sincerely,

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

Enclosure

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

ASSET Laboratories

3151 West Post Road
Las Vegas, NV 89118
Phone: (702) 307-2659

Certificate No. 2676
Expiration Date 7/31/2018

Field of Testing: 101 - Microbiology of Drinking Water

101.050	005	Total Coliform P/A	SM9223B (Colilert 18)
101.050	006	E. coli P/A	SM9223B (Colilert 18)
101.050	007	Total Coliform (Enumeration)	SM9223B (Colilert 18 Quantity Tray)
101.050	008	E. coli (Enumeration)	SM9223B (Colilert 18 Quantity Tray)

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.015	001	Hydrogen Ion (pH)	EPA 150.1
102.026	001	Calcium	EPA 200.7
102.026	002	Magnesium	EPA 200.7
102.026	003	Potassium	EPA 200.7
102.026	006	Hardness (calculation)	EPA 200.7
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate (as N)	EPA 300.0
102.030	007	Nitrite (as N)	EPA 300.0
102.030	008	Phosphate, Ortho (as P)	EPA 300.0
102.030	009	Sulfate	EPA 300.0
102.045	001	Perchlorate	EPA 314.0
102.100	001	Alkalinity	SM2320B-1997
102.120	001	Hardness (calculation)	SM2340B-1997
102.130	001	Conductivity	SM2510B-1997
102.140	001	Residue, Filterable TDS	SM2540C-1997
102.150	001	Chloride	SM4110B-2000
102.150	002	Fluoride	SM4110B-2000
102.150	003	Nitrate	SM4110B-2000
102.150	004	Nitrite	SM4110B-2000
102.150	005	Phosphate, Ortho	SM4110B-2000
102.150	006	Sulfate	SM4110B-2000
102.262	001	Total Organic Carbon TOC	SM5310C-2000
102.263	001	Dissolved Organic Carbon (DOC)	SM5310C-2000

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7

As of 8/11/2017 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
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	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
103.311	001	Chromium (VI)	EPA 218.7
Field of Testing: 106 - Radiochemistry of Drinking Water			
106.092	001	Uranium	EPA 200.8
Field of Testing: 108 - Inorganic Chemistry of Wastewater			
108.020	001	Conductivity	EPA 120.1
108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
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
108.113	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	005	Silica, Dissolved	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	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
108.264	001	Phosphate, Ortho	EPA 365.3
108.265	001	Phosphorus, Total	EPA 365.3
108.381	001	Oil and Grease	EPA 1664A
108.381	002	Oil & Grease Total	EPA 1664 Rev. B
108.410	001	Alkalinity	SM2320B-1997
108.420	001	Hardness (calculation)	SM2340B-1997
108.442	001	Residue, Non-filterable TSS	SM2540D-1997
108.443	001	Residue, Settleable	SM2540F-1997
108.448	001	Bromide	SM4110B-2000
108.448	002	Chloride	SM4110B-2000
108.448	003	Fluoride	SM4110B-2000
108.448	004	Nitrate	SM4110B-2000
108.448	006	Nitrate-nitrite	SM4110B-2000

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

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	025	Titanium	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	012	Molybdenum	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
109.445	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
111.170	000	Organochlorine Pesticides and PCBs	EPA 608
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
114.241	001	Corrosivity - pH Determination	EPA 9045C
Field of Testing: 115 - Extraction Test of Hazardous Waste			
115.021	001	TCLP Inorganics	EPA 1311
115.022	001	TCLP Extractables	EPA 1311
115.023	001	TCLP Volatiles	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
117.110	000	Extractable Organics	EPA 8270C
117.210	000	Organochlorine Pesticides	EPA 8081A
117.220	000	PCBs	EPA 8082
117.240	000	Organophosphorus Pesticides	EPA 8141A
Field of Testing: 120 - Physical Properties of Hazardous Waste			
120.020	001	Ignitability	EPA 1020A
120.080	001	Corrosivity - pH Determination	EPA 9045C

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

3151 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 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.: **2676**

Expiration Date: **7/31/2018**

Effective Date: **7/1/2017**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

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: 7/31/2018

Certificate Number: NV009222018-1

Donald LaFara, Program Manager, 08/09/2017

State of Nevada Department of Conservation and Natural Resources
Division of Environmental Protection
Laboratory Scope of Accreditation

EPA Number: *NV00922* **Attachment to Certificate Number: NV009222018-1** **Expiration Date: 7/31/2018**

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	8/1/2017	7/31/2018	Certified
EPA 1664A	n-Hexane Extractable Material (O&G)	8/1/2017	7/31/2018	Certified
EPA 1664A (SGT-HEM)	n-Hexane Extractable Material - Silica Gel Treated (HEM-SGT)	8/1/2017	7/31/2018	Certified
EPA 1664B	n-Hexane Extractable Material (O&G)	8/1/2017	7/31/2018	Certified
EPA 1664B (SGT-HEM)	n-Hexane Extractable Material - Silica Gel Treated (HEM-SGT)	8/1/2017	7/31/2018	Certified
EPA 180.1	Turbidity	8/1/2017	7/31/2018	Certified
EPA 200.7	Aluminum	8/1/2017	7/31/2018	Certified
EPA 200.7	Antimony	8/1/2017	7/31/2018	Certified
EPA 200.7	Arsenic	8/1/2017	7/31/2018	Certified
EPA 200.7	Barium	8/1/2017	7/31/2018	Certified
EPA 200.7	Beryllium	8/1/2017	7/31/2018	Certified
EPA 200.7	Bismuth	8/1/2017	7/31/2018	Certified
EPA 200.7	Boron	8/1/2017	7/31/2018	Certified
EPA 200.7	Cadmium	8/1/2017	7/31/2018	Certified
EPA 200.7	Calcium	8/1/2017	7/31/2018	Certified
EPA 200.7	Calcium hardness as CaCO3	8/1/2017	7/31/2018	Certified
EPA 200.7	Chromium	8/1/2017	7/31/2018	Certified
EPA 200.7	Cobalt	8/1/2017	7/31/2018	Certified
EPA 200.7	Copper	8/1/2017	7/31/2018	Certified
EPA 200.7	Hardness by calculation	8/1/2017	7/31/2018	Certified
EPA 200.7	Iron	8/1/2017	7/31/2018	Certified
EPA 200.7	Lead	8/1/2017	7/31/2018	Certified
EPA 200.7	Magnesium	8/1/2017	7/31/2018	Certified
EPA 200.7	Manganese	8/1/2017	7/31/2018	Certified
EPA 200.7	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 200.7	Nickel	8/1/2017	7/31/2018	Certified
EPA 200.7	Potassium	8/1/2017	7/31/2018	Certified
EPA 200.7	Selenium	8/1/2017	7/31/2018	Certified
EPA 200.7	Silica as SiO2	8/1/2017	7/31/2018	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: NV009222018-1** **Expiration Date: 7/31/2018**

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	Silver	8/1/2017	7/31/2018	Certified
EPA 200.7	Sodium	8/1/2017	7/31/2018	Certified
EPA 200.7	Strontium	8/1/2017	7/31/2018	Certified
EPA 200.7	Tellurium	8/1/2017	7/31/2018	Certified
EPA 200.7	Thallium	8/1/2017	7/31/2018	Certified
EPA 200.7	Tin	8/1/2017	7/31/2018	Certified
EPA 200.7	Titanium	8/1/2017	7/31/2018	Certified
EPA 200.7	Vanadium	8/1/2017	7/31/2018	Certified
EPA 200.7	Zinc	8/1/2017	7/31/2018	Certified
EPA 200.8	Aluminum	8/1/2017	7/31/2018	Certified
EPA 200.8	Antimony	8/1/2017	7/31/2018	Certified
EPA 200.8	Arsenic	8/1/2017	7/31/2018	Certified
EPA 200.8	Barium	8/1/2017	7/31/2018	Certified
EPA 200.8	Beryllium	8/1/2017	7/31/2018	Certified
EPA 200.8	Boron	8/1/2017	7/31/2018	Certified
EPA 200.8	Cadmium	8/1/2017	7/31/2018	Certified
EPA 200.8	Calcium	8/1/2017	7/31/2018	Certified
EPA 200.8	Chromium	8/1/2017	7/31/2018	Certified
EPA 200.8	Cobalt	8/1/2017	7/31/2018	Certified
EPA 200.8	Copper	8/1/2017	7/31/2018	Certified
EPA 200.8	Iron	8/1/2017	7/31/2018	Certified
EPA 200.8	Lead	8/1/2017	7/31/2018	Certified
EPA 200.8	Magnesium	8/1/2017	7/31/2018	Certified
EPA 200.8	Manganese	8/1/2017	7/31/2018	Certified
EPA 200.8	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 200.8	Nickel	8/1/2017	7/31/2018	Certified
EPA 200.8	Potassium	8/1/2017	7/31/2018	Certified
EPA 200.8	Selenium	8/1/2017	7/31/2018	Certified
EPA 200.8	Silica as SiO2	8/1/2017	7/31/2018	Certified
EPA 200.8	Silver	8/1/2017	7/31/2018	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: NV009222018-1** **Expiration Date: 7/31/2018**

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	Sodium	8/1/2017	7/31/2018	Certified
EPA 200.8	Strontium	8/1/2017	7/31/2018	Certified
EPA 200.8	Thallium	8/1/2017	7/31/2018	Certified
EPA 200.8	Tin	8/1/2017	7/31/2018	Certified
EPA 200.8	Titanium	8/1/2017	7/31/2018	Certified
EPA 200.8	Vanadium	8/1/2017	7/31/2018	Certified
EPA 200.8	Zinc	8/1/2017	7/31/2018	Certified
EPA 218.6	Chromium VI	8/1/2017	7/31/2018	Certified
EPA 245.1	Mercury	8/1/2017	7/31/2018	Certified
EPA 300.0	Bromide	8/1/2017	7/31/2018	Certified
EPA 300.0	Chloride	8/1/2017	7/31/2018	Certified
EPA 300.0	Fluoride	8/1/2017	7/31/2018	Certified
EPA 300.0	Nitrate as N	8/1/2017	7/31/2018	Certified
EPA 300.0	Nitrate-nitrite	8/1/2017	7/31/2018	Certified
EPA 300.0	Nitrite as N	8/1/2017	7/31/2018	Certified
EPA 300.0	Orthophosphate as P	8/1/2017	7/31/2018	Certified
EPA 300.0	Sulfate	8/1/2017	7/31/2018	Certified
EPA 314.0	Perchlorate	8/1/2017	7/31/2018	Certified
EPA 353.2	Nitrate-nitrite	3/1/2018	7/31/2018	Certified
EPA 365.3	Orthophosphate as P	8/1/2017	7/31/2018	Certified
EPA 365.3	Phosphorus, total	8/1/2017	7/31/2018	Certified
EPA 608	4,4'-DDD	8/1/2017	7/31/2018	Certified
EPA 608	4,4'-DDE	8/1/2017	7/31/2018	Certified
EPA 608	4,4'-DDT	8/1/2017	7/31/2018	Certified
EPA 608	Aldrin	8/1/2017	7/31/2018	Certified
EPA 608	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 608	alpha-Chlordane (cis-Chlordane)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1016 (PCB-1016)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1221 (PCB-1221)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1232 (PCB-1232)	8/1/2017	7/31/2018	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: NV009222018-1** **Expiration Date: 7/31/2018**

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	Aroclor-1242 (PCB-1242)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1248 (PCB-1248)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1254 (PCB-1254)	8/1/2017	7/31/2018	Certified
EPA 608	Aroclor-1260 (PCB-1260)	8/1/2017	7/31/2018	Certified
EPA 608	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 608	Chlordane (tech.)	8/1/2017	7/31/2018	Certified
EPA 608	delta-BHC	8/1/2017	7/31/2018	Certified
EPA 608	Dieldrin	8/1/2017	7/31/2018	Certified
EPA 608	Endosulfan I	8/1/2017	7/31/2018	Certified
EPA 608	Endosulfan II	8/1/2017	7/31/2018	Certified
EPA 608	Endosulfan sulfate	8/1/2017	7/31/2018	Certified
EPA 608	Endrin	8/1/2017	7/31/2018	Certified
EPA 608	Endrin aldehyde	8/1/2017	7/31/2018	Certified
EPA 608	gamma-BHC (Lindane)	8/1/2017	7/31/2018	Certified
EPA 608	Heptachlor	8/1/2017	7/31/2018	Certified
EPA 608	Heptachlor epoxide	8/1/2017	7/31/2018	Certified
EPA 608	Toxaphene (Chlorinated camphene)	8/1/2017	7/31/2018	Certified
EPA 624	1,1,1,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,1,1-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,1,2,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,1,2-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,1-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,1-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 624	1,2,3-Trichloropropane	8/1/2017	7/31/2018	Certified
EPA 624	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 624	1,2,4-Trimethylbenzene	8/1/2017	7/31/2018	Certified
EPA 624	1,2-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 624	1,2-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 624	1,2-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 624	1,3,5-Trimethylbenzene	8/1/2017	7/31/2018	Certified

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Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 624	1,3-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 624	1,4-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 624	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2017	7/31/2018	Certified
EPA 624	2-Chloroethyl vinyl ether	8/1/2017	7/31/2018	Certified
EPA 624	2-Hexanone	8/1/2017	7/31/2018	Certified
EPA 624	4-Methyl-2-pentanone (MIBK)	8/1/2017	7/31/2018	Certified
EPA 624	Acetone	8/1/2017	7/31/2018	Certified
EPA 624	Acetonitrile	8/1/2017	7/31/2018	Certified
EPA 624	Acrolein (Propenal)	8/1/2017	7/31/2018	Certified
EPA 624	Acrylonitrile	8/1/2017	7/31/2018	Certified
EPA 624	Benzene	8/1/2017	7/31/2018	Certified
EPA 624	Bromodichloromethane	8/1/2017	7/31/2018	Certified
EPA 624	Bromoform	8/1/2017	7/31/2018	Certified
EPA 624	Carbon disulfide	8/1/2017	7/31/2018	Certified
EPA 624	Carbon tetrachloride	8/1/2017	7/31/2018	Certified
EPA 624	Chlorobenzene	8/1/2017	7/31/2018	Certified
EPA 624	Chlorodibromomethane (Dibromochloromethane)	8/1/2017	7/31/2018	Certified
EPA 624	Chloroethane (Ethyl chloride)	8/1/2017	7/31/2018	Certified
EPA 624	Chloroform	8/1/2017	7/31/2018	Certified
EPA 624	cis-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 624	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 624	Dibromomethane (Methylene bromide)	8/1/2017	7/31/2018	Certified
EPA 624	Dichlorodifluoromethane (Freon-12)	8/1/2017	7/31/2018	Certified
EPA 624	Di-isopropylether (DIPE)	8/1/2017	7/31/2018	Certified
EPA 624	Ethylbenzene	8/1/2017	7/31/2018	Certified
EPA 624	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 624	m+p-xylene	8/1/2017	7/31/2018	Certified
EPA 624	Methyl bromide (Bromomethane)	8/1/2017	7/31/2018	Certified
EPA 624	Methyl chloride (Chloromethane)	8/1/2017	7/31/2018	Certified
EPA 624	Methyl tert-butyl ether (MTBE)	8/1/2017	7/31/2018	Certified

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Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 624	Methylene chloride (Dichloromethane)	8/1/2017	7/31/2018	Certified
EPA 624	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 624	o-Xylene	8/1/2017	7/31/2018	Certified
EPA 624	Styrene	8/1/2017	7/31/2018	Certified
EPA 624	T-amylmethylether (TAME)	8/1/2017	7/31/2018	Certified
EPA 624	Tetrachloroethylene (Perchloroethylene)	8/1/2017	7/31/2018	Certified
EPA 624	Toluene	8/1/2017	7/31/2018	Certified
EPA 624	trans-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 624	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 624	Trichloroethene (Trichloroethylene)	8/1/2017	7/31/2018	Certified
EPA 624	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2017	7/31/2018	Certified
EPA 624	Vinyl acetate	8/1/2017	7/31/2018	Certified
EPA 624	Vinyl chloride	8/1/2017	7/31/2018	Certified
EPA 624	Xylene (total)	8/1/2017	7/31/2018	Certified
EPA 625	1,2,4,5-Tetrachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 625	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 625	2,3,4,6-Tetrachlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4,5-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4,6-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4-Dichlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4-Dimethylphenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4-Dinitrophenol	8/1/2017	7/31/2018	Certified
EPA 625	2,4-Dinitrotoluene (2,4-DNT)	8/1/2017	7/31/2018	Certified
EPA 625	2,6-Dinitrotoluene (2,6-DNT)	8/1/2017	7/31/2018	Certified
EPA 625	2-Chloronaphthalene	8/1/2017	7/31/2018	Certified
EPA 625	2-Chlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2017	7/31/2018	Certified
EPA 625	2-Methylnaphthalene	8/1/2017	7/31/2018	Certified
EPA 625	2-Methylphenol (o-Cresol)	8/1/2017	7/31/2018	Certified
EPA 625	2-Nitroaniline	8/1/2017	7/31/2018	Certified

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Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 625	2-Nitrophenol	8/1/2017	7/31/2018	Certified
EPA 625	3 & 4-Methylphenol (m & p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 625	3,3'-Dichlorobenzidine	8/1/2017	7/31/2018	Certified
EPA 625	3-Methylphenol	8/1/2017	7/31/2018	Certified
EPA 625	3-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 625	4-Bromophenyl phenyl ether	8/1/2017	7/31/2018	Certified
EPA 625	4-Chloro-3-methylphenol	8/1/2017	7/31/2018	Certified
EPA 625	4-Chloroaniline	8/1/2017	7/31/2018	Certified
EPA 625	4-Chlorophenyl phenylether	8/1/2017	7/31/2018	Certified
EPA 625	4-Methylphenol (p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 625	4-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 625	4-Nitrophenol	8/1/2017	7/31/2018	Certified
EPA 625	Acenaphthene	8/1/2017	7/31/2018	Certified
EPA 625	Acenaphthylene	8/1/2017	7/31/2018	Certified
EPA 625	Aniline	8/1/2017	7/31/2018	Certified
EPA 625	Anthracene	8/1/2017	7/31/2018	Certified
EPA 625	Benzidine	8/1/2017	7/31/2018	Certified
EPA 625	Benzo(a)anthracene	8/1/2017	7/31/2018	Certified
EPA 625	Benzo(a)pyrene	8/1/2017	7/31/2018	Certified
EPA 625	Benzo(b)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 625	Benzo(g,h,i)perylene	8/1/2017	7/31/2018	Certified
EPA 625	Benzo(k)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 625	Benzoic acid	8/1/2017	7/31/2018	Certified
EPA 625	Benzyl alcohol	8/1/2017	7/31/2018	Certified
EPA 625	bis(2-Chloroethoxy)methane	8/1/2017	7/31/2018	Certified
EPA 625	bis(2-Chloroethyl) ether	8/1/2017	7/31/2018	Certified
EPA 625	bis(2-Chloroisopropyl) ether, (2,2'-Oxybis(1-chloropropane))	8/1/2017	7/31/2018	Certified
EPA 625	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2017	7/31/2018	Certified
EPA 625	Butyl benzyl phthalate	8/1/2017	7/31/2018	Certified
EPA 625	Carbazole	8/1/2017	7/31/2018	Certified

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Matrix: ***CWA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 625	Chrysene	8/1/2017	7/31/2018	Certified
EPA 625	Dibenz(a,h) anthracene	8/1/2017	7/31/2018	Certified
EPA 625	Dibenzofuran	8/1/2017	7/31/2018	Certified
EPA 625	Diethyl phthalate	8/1/2017	7/31/2018	Certified
EPA 625	Dimethyl phthalate	8/1/2017	7/31/2018	Certified
EPA 625	Di-n-butyl phthalate	8/1/2017	7/31/2018	Certified
EPA 625	Di-n-octyl phthalate	8/1/2017	7/31/2018	Certified
EPA 625	Fluoranthene	8/1/2017	7/31/2018	Certified
EPA 625	Fluorene	8/1/2017	7/31/2018	Certified
EPA 625	Hexachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 625	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 625	Hexachlorocyclopentadiene	8/1/2017	7/31/2018	Certified
EPA 625	Hexachloroethane	8/1/2017	7/31/2018	Certified
EPA 625	Indeno(1,2,3-cd) pyrene	8/1/2017	7/31/2018	Certified
EPA 625	Isophorone	8/1/2017	7/31/2018	Certified
EPA 625	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 625	Nitrobenzene	8/1/2017	7/31/2018	Certified
EPA 625	n-Nitrosodimethylamine	8/1/2017	7/31/2018	Certified
EPA 625	n-Nitrosodi-n-propylamine	8/1/2017	7/31/2018	Certified
EPA 625	n-Nitrosodiphenylamine	8/1/2017	7/31/2018	Certified
EPA 625	Pentachlorophenol	8/1/2017	7/31/2018	Certified
EPA 625	Phenanthrene	8/1/2017	7/31/2018	Certified
EPA 625	Phenol	8/1/2017	7/31/2018	Certified
EPA 625	Pyrene	8/1/2017	7/31/2018	Certified
EPA 625	Pyridine	8/1/2017	7/31/2018	Certified
SM 2130 B	Turbidity	8/1/2017	7/31/2018	Certified
SM 2320 B	Alkalinity as CaCO3	8/1/2017	7/31/2018	Certified
SM 2340 B	Calcium hardness as CaCO3	8/1/2017	7/31/2018	Certified
SM 2340 B	Hardness by calculation	8/1/2017	7/31/2018	Certified
SM 2340 C	Total hardness as CaCO3	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
SM 2510 B	Conductivity	8/1/2017	7/31/2018	Certified
SM 2540 B	Residue-total, dissolved and suspended	8/1/2017	7/31/2018	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2017	7/31/2018	Certified
SM 2540 D	Residue-nonfilterable (TSS)	8/1/2017	7/31/2018	Certified
SM 2540 F	Residue-settleable	8/1/2017	7/31/2018	Certified
SM 3500-Cr B	Chromium VI	8/1/2017	7/31/2018	Certified
SM 3500-Cr C	Chromium VI	8/1/2017	7/31/2018	Certified
SM 4110 B	Bromide	8/1/2017	7/31/2018	Certified
SM 4110 B	Chloride	8/1/2017	7/31/2018	Certified
SM 4110 B	Fluoride	8/1/2017	7/31/2018	Certified
SM 4110 B	Nitrate as N	8/1/2017	7/31/2018	Certified
SM 4110 B	Nitrate-nitrite	8/1/2017	7/31/2018	Certified
SM 4110 B	Nitrite as N	8/1/2017	7/31/2018	Certified
SM 4110 B	Orthophosphate as P	8/1/2017	7/31/2018	Certified
SM 4110 B	Sulfate	8/1/2017	7/31/2018	Certified
SM 4500-H+ B	pH	8/1/2017	7/31/2018	Certified
SM 4500-$NO3^{-}$ F	Nitrate-N (by calculation)	8/1/2017	7/31/2018	Certified
SM 4500-$NO3^{-}$ F	Nitrate-nitrite	8/1/2017	7/31/2018	Certified
SM 4500-$NO3^{-}$ F	Nitrite as N	8/1/2017	7/31/2018	Certified
SM 4500-P E	Orthophosphate as P	8/1/2017	7/31/2018	Certified
SM 4500-P E	Phosphorus, total	8/1/2017	7/31/2018	Certified
SM 5310 C	Total organic carbon	8/1/2017	7/31/2018	Certified
Discipline: Microbiology				
IDEXX Quanti-Tray® using Colilert®-18Hr®	E. coli enumeration	8/1/2017	7/31/2018	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.

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Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline: Chemistry				
EPA 314.0M	Perchlorate	8/1/2017	7/31/2018	Certified
EPA 6010	Aluminum	8/1/2017	7/31/2018	Certified
EPA 6010	Antimony	8/1/2017	7/31/2018	Certified
EPA 6010	Arsenic	8/1/2017	7/31/2018	Certified
EPA 6010	Barium	8/1/2017	7/31/2018	Certified
EPA 6010	Beryllium	8/1/2017	7/31/2018	Certified
EPA 6010	Bismuth	8/1/2017	7/31/2018	Certified
EPA 6010	Boron	8/1/2017	7/31/2018	Certified
EPA 6010	Cadmium	8/1/2017	7/31/2018	Certified
EPA 6010	Calcium	8/1/2017	7/31/2018	Certified
EPA 6010	Chromium	8/1/2017	7/31/2018	Certified
EPA 6010	Cobalt	8/1/2017	7/31/2018	Certified
EPA 6010	Copper	8/1/2017	7/31/2018	Certified
EPA 6010	Iron	8/1/2017	7/31/2018	Certified
EPA 6010	Lead	8/1/2017	7/31/2018	Certified
EPA 6010	Magnesium	8/1/2017	7/31/2018	Certified
EPA 6010	Manganese	8/1/2017	7/31/2018	Certified
EPA 6010	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 6010	Nickel	8/1/2017	7/31/2018	Certified
EPA 6010	Potassium	8/1/2017	7/31/2018	Certified
EPA 6010	Selenium	8/1/2017	7/31/2018	Certified
EPA 6010	Silica as SiO2	8/1/2017	7/31/2018	Certified
EPA 6010	Silver	8/1/2017	7/31/2018	Certified
EPA 6010	Sodium	8/1/2017	7/31/2018	Certified
EPA 6010	Strontium	8/1/2017	7/31/2018	Certified
EPA 6010	Tellurium	8/1/2017	7/31/2018	Certified
EPA 6010	Thallium	8/1/2017	7/31/2018	Certified
EPA 6010	Tin	8/1/2017	7/31/2018	Certified
EPA 6010	Titanium	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 6010	Vanadium	8/1/2017	7/31/2018	Certified
EPA 6010	Zinc	8/1/2017	7/31/2018	Certified
EPA 6020	Aluminum	8/1/2017	7/31/2018	Certified
EPA 6020	Antimony	8/1/2017	7/31/2018	Certified
EPA 6020	Arsenic	8/1/2017	7/31/2018	Certified
EPA 6020	Barium	8/1/2017	7/31/2018	Certified
EPA 6020	Beryllium	8/1/2017	7/31/2018	Certified
EPA 6020	Boron	8/1/2017	7/31/2018	Certified
EPA 6020	Cadmium	8/1/2017	7/31/2018	Certified
EPA 6020	Calcium	8/1/2017	7/31/2018	Certified
EPA 6020	Chromium	8/1/2017	7/31/2018	Certified
EPA 6020	Cobalt	8/1/2017	7/31/2018	Certified
EPA 6020	Copper	8/1/2017	7/31/2018	Certified
EPA 6020	Iron	8/1/2017	7/31/2018	Certified
EPA 6020	Lead	8/1/2017	7/31/2018	Certified
EPA 6020	Magnesium	8/1/2017	7/31/2018	Certified
EPA 6020	Manganese	8/1/2017	7/31/2018	Certified
EPA 6020	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 6020	Nickel	8/1/2017	7/31/2018	Certified
EPA 6020	Potassium	8/1/2017	7/31/2018	Certified
EPA 6020	Selenium	8/1/2017	7/31/2018	Certified
EPA 6020	Silver	8/1/2017	7/31/2018	Certified
EPA 6020	Sodium	8/1/2017	7/31/2018	Certified
EPA 6020	Strontium	8/1/2017	7/31/2018	Certified
EPA 6020	Thallium	8/1/2017	7/31/2018	Certified
EPA 6020	Tin	8/1/2017	7/31/2018	Certified
EPA 6020	Titanium	8/1/2017	7/31/2018	Certified
EPA 6020	Vanadium	8/1/2017	7/31/2018	Certified
EPA 6020	Zinc	8/1/2017	7/31/2018	Certified
EPA 7196	Chromium VI	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 7199	Chromium VI	8/1/2017	7/31/2018	Certified
EPA 7470	Mercury	8/1/2017	7/31/2018	Certified
EPA 8015	Diesel range organics (DRO)	8/1/2017	7/31/2018	Certified
EPA 8015	Gasoline range organics (GRO)	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDD	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDE	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDT	8/1/2017	7/31/2018	Certified
EPA 8081	Aldrin	8/1/2017	7/31/2018	Certified
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 8081	alpha-Chlordane (cis-Chlordane)	8/1/2017	7/31/2018	Certified
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 8081	Chlordane (tech.)	8/1/2017	7/31/2018	Certified
EPA 8081	delta-BHC	8/1/2017	7/31/2018	Certified
EPA 8081	Dieldrin	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan I	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan II	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan sulfate	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin aldehyde	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin ketone	8/1/2017	7/31/2018	Certified
EPA 8081	gamma-BHC (Lindane)	8/1/2017	7/31/2018	Certified
EPA 8081	gamma-Chlordane (trans-Chlordane)	8/1/2017	7/31/2018	Certified
EPA 8081	Heptachlor	8/1/2017	7/31/2018	Certified
EPA 8081	Heptachlor epoxide	8/1/2017	7/31/2018	Certified
EPA 8081	Methoxychlor	8/1/2017	7/31/2018	Certified
EPA 8081	Toxaphene (Chlorinated camphene)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1016 (PCB-1016)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1016 in Oil (PCB-1016 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1221 (PCB-1221)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1232 (PCB-1232)	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Non Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8082	Aroclor-1242 (PCB-1242)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1242 in Oil (PCB-1242 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1248 (PCB-1248)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1254 (PCB-1254)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1254 in Oil (PCB-1254 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1260 (PCB-1260)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1260 in Oil (PCB-1260 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1262 (PCB-1262)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1268 (PCB-1268)	8/1/2017	7/31/2018	Certified
EPA 8082	PCB Aroclor Identification (PCBs as Aroclors)	8/1/2017	7/31/2018	Certified
EPA 8082	PCBs In Oil	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,1,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,1-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloropropene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,3-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,3-Trichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,4-Trimethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,3,5-Trimethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,3-Dichlorobenzene	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8260	1,3-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,4-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,4-Dioxane (1,4- Diethyleneoxide)	8/1/2017	7/31/2018	Certified
EPA 8260	2,2-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2017	7/31/2018	Certified
EPA 8260	2-Chloroethyl vinyl ether	8/1/2017	7/31/2018	Certified
EPA 8260	2-Chlorotoluene	8/1/2017	7/31/2018	Certified
EPA 8260	2-Hexanone	8/1/2017	7/31/2018	Certified
EPA 8260	4-Chlorotoluene	8/1/2017	7/31/2018	Certified
EPA 8260	4-Isopropyltoluene (p-Cymene)	8/1/2017	7/31/2018	Certified
EPA 8260	4-Methyl-2-pentanone (MIBK)	8/1/2017	7/31/2018	Certified
EPA 8260	Acetone	8/1/2017	7/31/2018	Certified
EPA 8260	Acetonitrile	8/1/2017	7/31/2018	Certified
EPA 8260	Acrolein (Propenal)	8/1/2017	7/31/2018	Certified
EPA 8260	Acrylonitrile	8/1/2017	7/31/2018	Certified
EPA 8260	Allyl chloride (3-Chloropropene)	8/1/2017	7/31/2018	Certified
EPA 8260	Benzene	8/1/2017	7/31/2018	Certified
EPA 8260	Bromobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Bromochloromethane	8/1/2017	7/31/2018	Certified
EPA 8260	Bromodichloromethane	8/1/2017	7/31/2018	Certified
EPA 8260	Bromoform	8/1/2017	7/31/2018	Certified
EPA 8260	Carbon disulfide	8/1/2017	7/31/2018	Certified
EPA 8260	Carbon tetrachloride	8/1/2017	7/31/2018	Certified
EPA 8260	Chlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Chlorodibromomethane (Dibromochloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Chloroethane (Ethyl chloride)	8/1/2017	7/31/2018	Certified
EPA 8260	Chloroform	8/1/2017	7/31/2018	Certified
EPA 8260	cis-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 8260	cis-1,4-Dichloro-2-butene	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Dibromomethane (Methylene bromide)	8/1/2017	7/31/2018	Certified
EPA 8260	Dichlorodifluoromethane (Freon-12)	8/1/2017	7/31/2018	Certified
EPA 8260	Di-isopropylether (DIPE)	8/1/2017	7/31/2018	Certified
EPA 8260	Ethyl acetate	8/1/2017	7/31/2018	Certified
EPA 8260	Ethyl methacrylate	8/1/2017	7/31/2018	Certified
EPA 8260	Ethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2017	7/31/2018	Certified
EPA 8260	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 8260	Iodomethane (Methyl iodide)	8/1/2017	7/31/2018	Certified
EPA 8260	Isobutyl alcohol (2-Methyl-1-propanol, Isobutanol)	8/1/2017	7/31/2018	Certified
EPA 8260	Isopropylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	m+p-xylene	8/1/2017	7/31/2018	Certified
EPA 8260	Methacrylonitrile	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl bromide (Bromomethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl chloride (Chloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl methacrylate	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl tert-butyl ether (MTBE)	8/1/2017	7/31/2018	Certified
EPA 8260	Methylene chloride (Dichloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 8260	n-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	n-Propylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	o-Xylene	8/1/2017	7/31/2018	Certified
EPA 8260	Propionitrile (Ethyl cyanide)	8/1/2017	7/31/2018	Certified
EPA 8260	sec-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Styrene	8/1/2017	7/31/2018	Certified
EPA 8260	T-amylmethylether (TAME)	8/1/2017	7/31/2018	Certified
EPA 8260	tert-Butyl alcohol (TBA)	8/1/2017	7/31/2018	Certified
EPA 8260	tert-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Tetrachloroethylene (Perchloroethylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Toluene	8/1/2017	7/31/2018	Certified

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EPA 8260	trans-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 8260	trans-1,4-Dichloro-2-butene	8/1/2017	7/31/2018	Certified
EPA 8260	Trichloroethene (Trichloroethylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2017	7/31/2018	Certified
EPA 8260	Vinyl acetate	8/1/2017	7/31/2018	Certified
EPA 8260	Vinyl chloride	8/1/2017	7/31/2018	Certified
EPA 8260	Xylene (total)	8/1/2017	7/31/2018	Certified
EPA 8270	1,1'-Biphenyl (BZ-0)	8/1/2017	7/31/2018	Certified
EPA 8270	1,2,4,5-Tetrachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2-Diphenylhydrazine	8/1/2017	7/31/2018	Certified
EPA 8270	1,3-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,4-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	2,3,4,6-Tetrachlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4,5-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4,6-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dimethylphenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dinitrophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dinitrotoluene (2,4-DNT)	8/1/2017	7/31/2018	Certified
EPA 8270	2,6-Dinitrotoluene (2,6-DNT)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Chloronaphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	2-Chlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methylnaphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methylphenol (o-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	2-Nitrophenol	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8270	3 & 4-Methylphenol (m & p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	3,3'-Dichlorobenzidine	8/1/2017	7/31/2018	Certified
EPA 8270	3-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Bromophenyl phenyl ether	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chloro-3-methylphenol	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chloroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chlorophenyl phenylether	8/1/2017	7/31/2018	Certified
EPA 8270	4-Methylphenol (p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	4-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Nitrophenol	8/1/2017	7/31/2018	Certified
EPA 8270	Acenaphthene	8/1/2017	7/31/2018	Certified
EPA 8270	Acenaphthylene	8/1/2017	7/31/2018	Certified
EPA 8270	Acetophenone	8/1/2017	7/31/2018	Certified
EPA 8270	Aniline	8/1/2017	7/31/2018	Certified
EPA 8270	Anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Atrazine	8/1/2017	7/31/2018	Certified
EPA 8270	Benzaldehyde	8/1/2017	7/31/2018	Certified
EPA 8270	Benzidine	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(a)anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(a)pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(b)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(g,h,i)perylene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(k)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzoic acid	8/1/2017	7/31/2018	Certified
EPA 8270	Benzyl alcohol	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroethoxy)methane	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroethyl) ether	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroisopropyl) ether, (2,2'-Oxybis(1-chloropropane))	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2017	7/31/2018	Certified
EPA 8270	Butyl benzyl phthalate	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8270	Caprolactam	8/1/2017	7/31/2018	Certified
EPA 8270	Carbazole	8/1/2017	7/31/2018	Certified
EPA 8270	Chrysene	8/1/2017	7/31/2018	Certified
EPA 8270	Dibenz(a,h) anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Dibenzofuran	8/1/2017	7/31/2018	Certified
EPA 8270	Diethyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Dimethyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Di-n-butyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Di-n-octyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Fluorene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorocyclopentadiene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachloroethane	8/1/2017	7/31/2018	Certified
EPA 8270	Indeno(1,2,3-cd) pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Isophorone	8/1/2017	7/31/2018	Certified
EPA 8270	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	Nitrobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodimethylamine	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodi-n-propylamine	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodiphenylamine	8/1/2017	7/31/2018	Certified
EPA 8270	Pentachlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	Phenanthrene	8/1/2017	7/31/2018	Certified
EPA 8270	Phenol	8/1/2017	7/31/2018	Certified
EPA 8270	Pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Pyridine	8/1/2017	7/31/2018	Certified
EPA 9056	Bromide	8/1/2017	7/31/2018	Certified
EPA 9056	Fluoride	8/1/2017	7/31/2018	Certified
EPA 9056	Nitrate as N	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 9056	Nitrite as N	8/1/2017	7/31/2018	Certified
EPA 9056	Orthophosphate as P	8/1/2017	7/31/2018	Certified
EPA 9056	Sulfate	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
Discipline: Chemistry				
EPA 1020	Ignitability	8/1/2017	7/31/2018	Certified
EPA 1311-Metals	TCLP extracted Metals	8/1/2017	7/31/2018	Certified
EPA 1311-Pest	TCLP extracted Pesticides	8/1/2017	7/31/2018	Certified
EPA 1311-SOCs	TCLP extracted SOCs	8/1/2017	7/31/2018	Certified
EPA 1311-VOCs	TCLP extracted VOCs	8/1/2017	7/31/2018	Certified
EPA 1312-Metals	SPLP extracted Metals	8/1/2017	7/31/2018	Certified
EPA 1312-SOCs	SPLP extracted SOCs	8/1/2017	7/31/2018	Certified
EPA 1312-VOCs	SPLP extracted VOCs	8/1/2017	7/31/2018	Certified
EPA 314.0M	Perchlorate	8/1/2017	7/31/2018	Certified
EPA 6010	Aluminum	8/1/2017	7/31/2018	Certified
EPA 6010	Antimony	8/1/2017	7/31/2018	Certified
EPA 6010	Arsenic	8/1/2017	7/31/2018	Certified
EPA 6010	Barium	8/1/2017	7/31/2018	Certified
EPA 6010	Beryllium	8/1/2017	7/31/2018	Certified
EPA 6010	Boron	8/1/2017	7/31/2018	Certified
EPA 6010	Cadmium	8/1/2017	7/31/2018	Certified
EPA 6010	Calcium	8/1/2017	7/31/2018	Certified
EPA 6010	Chromium	8/1/2017	7/31/2018	Certified
EPA 6010	Cobalt	8/1/2017	7/31/2018	Certified
EPA 6010	Copper	8/1/2017	7/31/2018	Certified
EPA 6010	Iron	8/1/2017	7/31/2018	Certified
EPA 6010	Lead	8/1/2017	7/31/2018	Certified
EPA 6010	Magnesium	8/1/2017	7/31/2018	Certified
EPA 6010	Manganese	8/1/2017	7/31/2018	Certified
EPA 6010	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 6010	Nickel	8/1/2017	7/31/2018	Certified
EPA 6010	Potassium	8/1/2017	7/31/2018	Certified
EPA 6010	Selenium	8/1/2017	7/31/2018	Certified
EPA 6010	Silver	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 6010	Sodium	8/1/2017	7/31/2018	Certified
EPA 6010	Strontium	8/1/2017	7/31/2018	Certified
EPA 6010	Thallium	8/1/2017	7/31/2018	Certified
EPA 6010	Tin	8/1/2017	7/31/2018	Certified
EPA 6010	Titanium	8/1/2017	7/31/2018	Certified
EPA 6010	Vanadium	8/1/2017	7/31/2018	Certified
EPA 6010	Zinc	8/1/2017	7/31/2018	Certified
EPA 6020	Aluminum	8/1/2017	7/31/2018	Certified
EPA 6020	Antimony	8/1/2017	7/31/2018	Certified
EPA 6020	Arsenic	8/1/2017	7/31/2018	Certified
EPA 6020	Barium	8/1/2017	7/31/2018	Certified
EPA 6020	Beryllium	8/1/2017	7/31/2018	Certified
EPA 6020	Boron	8/1/2017	7/31/2018	Certified
EPA 6020	Cadmium	8/1/2017	7/31/2018	Certified
EPA 6020	Calcium	8/1/2017	7/31/2018	Certified
EPA 6020	Chromium	8/1/2017	7/31/2018	Certified
EPA 6020	Cobalt	8/1/2017	7/31/2018	Certified
EPA 6020	Copper	8/1/2017	7/31/2018	Certified
EPA 6020	Iron	8/1/2017	7/31/2018	Certified
EPA 6020	Lead	8/1/2017	7/31/2018	Certified
EPA 6020	Magnesium	8/1/2017	7/31/2018	Certified
EPA 6020	Manganese	8/1/2017	7/31/2018	Certified
EPA 6020	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 6020	Nickel	8/1/2017	7/31/2018	Certified
EPA 6020	Potassium	8/1/2017	7/31/2018	Certified
EPA 6020	Selenium	8/1/2017	7/31/2018	Certified
EPA 6020	Silver	8/1/2017	7/31/2018	Certified
EPA 6020	Sodium	8/1/2017	7/31/2018	Certified
EPA 6020	Strontium	8/1/2017	7/31/2018	Certified
EPA 6020	Thallium	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 6020	Tin	8/1/2017	7/31/2018	Certified
EPA 6020	Titanium	8/1/2017	7/31/2018	Certified
EPA 6020	Vanadium	8/1/2017	7/31/2018	Certified
EPA 6020	Zinc	8/1/2017	7/31/2018	Certified
EPA 7196	Chromium VI	8/1/2017	7/31/2018	Certified
EPA 7199	Chromium VI	8/1/2017	7/31/2018	Certified
EPA 7471	Mercury	8/1/2017	7/31/2018	Certified
EPA 8015	Diesel range organics (DRO)	8/1/2017	7/31/2018	Certified
EPA 8015	Gasoline range organics (GRO)	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDD	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDE	8/1/2017	7/31/2018	Certified
EPA 8081	4,4'-DDT	8/1/2017	7/31/2018	Certified
EPA 8081	Aldrin	8/1/2017	7/31/2018	Certified
EPA 8081	alpha-BHC (alpha-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 8081	alpha-Chlordane (cis-Chlordane)	8/1/2017	7/31/2018	Certified
EPA 8081	beta-BHC (beta-Hexachlorocyclohexane)	8/1/2017	7/31/2018	Certified
EPA 8081	Chlordane (tech.)	8/1/2017	7/31/2018	Certified
EPA 8081	delta-BHC	8/1/2017	7/31/2018	Certified
EPA 8081	Dieldrin	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan I	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan II	8/1/2017	7/31/2018	Certified
EPA 8081	Endosulfan sulfate	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin aldehyde	8/1/2017	7/31/2018	Certified
EPA 8081	Endrin ketone	8/1/2017	7/31/2018	Certified
EPA 8081	gamma-BHC (Lindane)	8/1/2017	7/31/2018	Certified
EPA 8081	gamma-Chlordane (trans-Chlordane)	8/1/2017	7/31/2018	Certified
EPA 8081	Heptachlor	8/1/2017	7/31/2018	Certified
EPA 8081	Heptachlor epoxide	8/1/2017	7/31/2018	Certified
EPA 8081	Methoxychlor	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8081	Toxaphene (Chlorinated camphene)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1016 (PCB-1016)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1016 in Oil (PCB-1016 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1221 (PCB-1221)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1232 (PCB-1232)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1242 (PCB-1242)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1242 in Oil (PCB-1242 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1248 (PCB-1248)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1254 (PCB-1254)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1254 in Oil (PCB-1254 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1260 (PCB-1260)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1260 in Oil (PCB-1260 in Oil)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1262 (PCB-1262)	8/1/2017	7/31/2018	Certified
EPA 8082	Aroclor-1268 (PCB-1268)	8/1/2017	7/31/2018	Certified
EPA 8082	PCBs In Oil	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,1,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,1-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2,2-Tetrachloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8/1/2017	7/31/2018	Certified
EPA 8260	1,1,2-Trichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	1,1-Dichloropropene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,3-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,3-Trichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2,4-Trimethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dibromo-3-chloropropane (DBCP, Dibromochloropropane)	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dibromoethane (EDB, Ethylene dibromide)	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dichlorobenzene	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8260	1,2-Dichloroethane	8/1/2017	7/31/2018	Certified
EPA 8260	1,2-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,3,5-Trimethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,3-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	1,3-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	1,4-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	2,2-Dichloropropane	8/1/2017	7/31/2018	Certified
EPA 8260	2-Butanone (Methyl ethyl ketone, MEK)	8/1/2017	7/31/2018	Certified
EPA 8260	2-Chlorotoluene	8/1/2017	7/31/2018	Certified
EPA 8260	2-Hexanone	8/1/2017	7/31/2018	Certified
EPA 8260	4-Chlorotoluene	8/1/2017	7/31/2018	Certified
EPA 8260	4-Isopropyltoluene (p-Cymene)	8/1/2017	7/31/2018	Certified
EPA 8260	4-Methyl-2-pentanone (MIBK)	8/1/2017	7/31/2018	Certified
EPA 8260	Acetone	8/1/2017	7/31/2018	Certified
EPA 8260	Acrolein (Propenal)	8/1/2017	7/31/2018	Certified
EPA 8260	Acrylonitrile	8/1/2017	7/31/2018	Certified
EPA 8260	Benzene	8/1/2017	7/31/2018	Certified
EPA 8260	Bromobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Bromochloromethane	8/1/2017	7/31/2018	Certified
EPA 8260	Bromodichloromethane	8/1/2017	7/31/2018	Certified
EPA 8260	Bromoform	8/1/2017	7/31/2018	Certified
EPA 8260	Carbon disulfide	8/1/2017	7/31/2018	Certified
EPA 8260	Carbon tetrachloride	8/1/2017	7/31/2018	Certified
EPA 8260	Chlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Chlorodibromomethane (Dibromochloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Chloroethane (Ethyl chloride)	8/1/2017	7/31/2018	Certified
EPA 8260	Chloroform	8/1/2017	7/31/2018	Certified
EPA 8260	cis-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	cis-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Dibromomethane (Methylene bromide)	8/1/2017	7/31/2018	Certified

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Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Dichlorodifluoromethane (Freon-12)	8/1/2017	7/31/2018	Certified
EPA 8260	Di-isopropylether (DIPE)	8/1/2017	7/31/2018	Certified
EPA 8260	Ethyl acetate	8/1/2017	7/31/2018	Certified
EPA 8260	Ethylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Ethyl-t-butylether (ETBE) (2-Ethoxy-2-methylpropane)	8/1/2017	7/31/2018	Certified
EPA 8260	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 8260	Iodomethane (Methyl iodide)	8/1/2017	7/31/2018	Certified
EPA 8260	Isopropylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	m+p-xylene	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl bromide (Bromomethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl chloride (Chloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Methyl tert-butyl ether (MTBE)	8/1/2017	7/31/2018	Certified
EPA 8260	Methylene chloride (Dichloromethane)	8/1/2017	7/31/2018	Certified
EPA 8260	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 8260	n-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	n-Propylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	o-Xylene	8/1/2017	7/31/2018	Certified
EPA 8260	sec-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Styrene	8/1/2017	7/31/2018	Certified
EPA 8260	T-amylmethylether (TAME)	8/1/2017	7/31/2018	Certified
EPA 8260	tert-Butyl alcohol (TBA)	8/1/2017	7/31/2018	Certified
EPA 8260	tert-Butylbenzene	8/1/2017	7/31/2018	Certified
EPA 8260	Tetrachloroethylene (Perchloroethylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Toluene	8/1/2017	7/31/2018	Certified
EPA 8260	trans-1,2-Dichloroethylene	8/1/2017	7/31/2018	Certified
EPA 8260	trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Trichloroethene (Trichloroethylene)	8/1/2017	7/31/2018	Certified
EPA 8260	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	8/1/2017	7/31/2018	Certified
EPA 8260	Vinyl acetate	8/1/2017	7/31/2018	Certified
EPA 8260	Vinyl chloride	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8260	Xylene (total)	8/1/2017	7/31/2018	Certified
EPA 8270	1,1'-Biphenyl (BZ-0)	8/1/2017	7/31/2018	Certified
EPA 8270	1,2,4,5-Tetrachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2,4-Trichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,2-Diphenylhydrazine	8/1/2017	7/31/2018	Certified
EPA 8270	1,3-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	1,4-Dichlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	2,3,4,6-Tetrachlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4,5-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4,6-Trichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dichlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dimethylphenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dinitrophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2,4-Dinitrotoluene (2,4-DNT)	8/1/2017	7/31/2018	Certified
EPA 8270	2,6-Dinitrotoluene (2,6-DNT)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Chloronaphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	2-Chlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methylnaphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	2-Methylphenol (o-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	2-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	2-Nitrophenol	8/1/2017	7/31/2018	Certified
EPA 8270	3 & 4-Methylphenol (m & p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	3,3'-Dichlorobenzidine	8/1/2017	7/31/2018	Certified
EPA 8270	3-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Bromophenyl phenyl ether	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chloro-3-methylphenol	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chloroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Chlorophenyl phenylether	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	4-Methylphenol (p-Cresol)	8/1/2017	7/31/2018	Certified
EPA 8270	4-Nitroaniline	8/1/2017	7/31/2018	Certified
EPA 8270	4-Nitrophenol	8/1/2017	7/31/2018	Certified
EPA 8270	Acenaphthene	8/1/2017	7/31/2018	Certified
EPA 8270	Acenaphthylene	8/1/2017	7/31/2018	Certified
EPA 8270	Acetophenone	8/1/2017	7/31/2018	Certified
EPA 8270	Aniline	8/1/2017	7/31/2018	Certified
EPA 8270	Anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Atrazine	8/1/2017	7/31/2018	Certified
EPA 8270	Benzaldehyde	8/1/2017	7/31/2018	Certified
EPA 8270	Benzidine	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(a)anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(a)pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(b)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(g,h,i)perylene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzo(k)fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Benzoic acid	8/1/2017	7/31/2018	Certified
EPA 8270	Benzyl alcohol	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroethoxy)methane	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroethyl) ether	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Chloroisopropyl) ether, (2,2'-Oxybis(1-chloropropane))	8/1/2017	7/31/2018	Certified
EPA 8270	bis(2-Ethylhexyl)phthalate,(DEHP, Di(2-ethylhexyl) phthalate)	8/1/2017	7/31/2018	Certified
EPA 8270	Butyl benzyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Caprolactam	8/1/2017	7/31/2018	Certified
EPA 8270	Carbazole	8/1/2017	7/31/2018	Certified
EPA 8270	Chrysene	8/1/2017	7/31/2018	Certified
EPA 8270	Dibenz(a,h) anthracene	8/1/2017	7/31/2018	Certified
EPA 8270	Dibenzofuran	8/1/2017	7/31/2018	Certified
EPA 8270	Diethyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Dimethyl phthalate	8/1/2017	7/31/2018	Certified

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Matrix: ***RCRA (Solid & Waste Materials)***

Method	Analyte	Start Date	Date Expires	Status
EPA 8270	Di-n-butyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Di-n-octyl phthalate	8/1/2017	7/31/2018	Certified
EPA 8270	Fluoranthene	8/1/2017	7/31/2018	Certified
EPA 8270	Fluorene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorobutadiene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachlorocyclopentadiene	8/1/2017	7/31/2018	Certified
EPA 8270	Hexachloroethane	8/1/2017	7/31/2018	Certified
EPA 8270	Indeno(1,2,3-cd) pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Isophorone	8/1/2017	7/31/2018	Certified
EPA 8270	Naphthalene	8/1/2017	7/31/2018	Certified
EPA 8270	Nitrobenzene	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodimethylamine	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodi-n-propylamine	8/1/2017	7/31/2018	Certified
EPA 8270	n-Nitrosodiphenylamine	8/1/2017	7/31/2018	Certified
EPA 8270	Pentachlorophenol	8/1/2017	7/31/2018	Certified
EPA 8270	Phenanthrene	8/1/2017	7/31/2018	Certified
EPA 8270	Phenol	8/1/2017	7/31/2018	Certified
EPA 8270	Pyrene	8/1/2017	7/31/2018	Certified
EPA 8270	Pyridine	8/1/2017	7/31/2018	Certified
EPA 9045	Corrosivity (pH)	8/1/2017	7/31/2018	Certified

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Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
Discipline: Chemistry				
EPA 150.1	pH	8/1/2017	7/31/2018	Certified
EPA 180.1	Turbidity	2/22/2018	7/31/2018	Certified
EPA 200.7	Aluminum	8/1/2017	7/31/2018	Certified
EPA 200.7	Barium	8/1/2017	7/31/2018	Certified
EPA 200.7	Beryllium	8/1/2017	7/31/2018	Certified
EPA 200.7	Boron	8/1/2017	7/31/2018	Certified
EPA 200.7	Cadmium	8/1/2017	7/31/2018	Certified
EPA 200.7	Calcium	8/1/2017	7/31/2018	Certified
EPA 200.7	Calcium hardness as CaCO3	8/1/2017	7/31/2018	Certified
EPA 200.7	Chromium	8/1/2017	7/31/2018	Certified
EPA 200.7	Copper	8/1/2017	7/31/2018	Certified
EPA 200.7	Hardness by calculation	8/1/2017	7/31/2018	Certified
EPA 200.7	Iron	8/1/2017	7/31/2018	Certified
EPA 200.7	Magnesium	8/1/2017	7/31/2018	Certified
EPA 200.7	Manganese	8/1/2017	7/31/2018	Certified
EPA 200.7	Nickel	8/1/2017	7/31/2018	Certified
EPA 200.7	Potassium	8/1/2017	7/31/2018	Certified
EPA 200.7	Silica as SiO2	8/1/2017	7/31/2018	Certified
EPA 200.7	Silver	8/1/2017	7/31/2018	Certified
EPA 200.7	Sodium	8/1/2017	7/31/2018	Certified
EPA 200.7	Zinc	8/1/2017	7/31/2018	Certified
EPA 200.8	Aluminum	8/1/2017	7/31/2018	Certified
EPA 200.8	Antimony	8/1/2017	7/31/2018	Certified
EPA 200.8	Arsenic	8/1/2017	7/31/2018	Certified
EPA 200.8	Barium	8/1/2017	7/31/2018	Certified
EPA 200.8	Beryllium	8/1/2017	7/31/2018	Certified
EPA 200.8	Boron	8/1/2017	7/31/2018	Certified
EPA 200.8	Cadmium	8/1/2017	7/31/2018	Certified
EPA 200.8	Chromium	8/1/2017	7/31/2018	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.

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Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
EPA 200.8	Copper	8/1/2017	7/31/2018	Certified
EPA 200.8	Lead	8/1/2017	7/31/2018	Certified
EPA 200.8	Manganese	8/1/2017	7/31/2018	Certified
EPA 200.8	Molybdenum	8/1/2017	7/31/2018	Certified
EPA 200.8	Nickel	8/1/2017	7/31/2018	Certified
EPA 200.8	Selenium	8/1/2017	7/31/2018	Certified
EPA 200.8	Silver	8/1/2017	7/31/2018	Certified
EPA 200.8	Thallium	8/1/2017	7/31/2018	Certified
EPA 200.8	Uranium (Nat.) Activity, Calculated	8/1/2017	7/31/2018	Certified
EPA 200.8	Uranium (Nat.) Total Mass	8/1/2017	7/31/2018	Certified
EPA 200.8	Vanadium	8/1/2017	7/31/2018	Certified
EPA 200.8	Zinc	8/1/2017	7/31/2018	Certified
EPA 218.7	Chromium VI	8/1/2017	7/31/2018	Certified
EPA 245.1	Mercury	8/1/2017	7/31/2018	Certified
EPA 300.0	Bromide	2/22/2018	7/31/2018	Certified
EPA 300.0	Chloride	8/1/2017	7/31/2018	Certified
EPA 300.0	Fluoride	8/1/2017	7/31/2018	Certified
EPA 300.0	Nitrate as N	8/1/2017	7/31/2018	Certified
EPA 300.0	Nitrite as N	8/1/2017	7/31/2018	Certified
EPA 300.0	Orthophosphate as P	8/1/2017	7/31/2018	Certified
EPA 300.0	Sulfate	8/1/2017	7/31/2018	Certified
EPA 314.0	Perchlorate	8/1/2017	7/31/2018	Certified
SM 2320 B	Alkalinity as CaCO3	8/1/2017	7/31/2018	Certified
SM 2340 B	Calcium hardness as CaCO3	8/1/2017	7/31/2018	Certified
SM 2340 B	Hardness by calculation	8/1/2017	7/31/2018	Certified
SM 2510 B	Conductivity	8/1/2017	7/31/2018	Certified
SM 2540 C	Residue-filterable (TDS)	8/1/2017	7/31/2018	Certified
SM 4110 B	Chloride	8/1/2017	7/31/2018	Certified
SM 4110 B	Fluoride	8/1/2017	7/31/2018	Certified
SM 4110 B	Nitrate as N	8/1/2017	7/31/2018	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: NV009222018-1** **Expiration Date: 7/31/2018**

ASSET Laboratories
3151-3153 W. Post Rd Las Vegas, NV 89118-

Matrix: ***SDWA (Potable Water)***

Method	Analyte	Start Date	Date Expires	Status
SM 4110 B	Nitrite as N	8/1/2017	7/31/2018	Certified
SM 4110 B	Orthophosphate as P	8/1/2017	7/31/2018	Certified
SM 4110 B	Sulfate	8/1/2017	7/31/2018	Certified
SM 4500-H+ B	pH	8/1/2017	7/31/2018	Certified
SM 5310 C	Dissolved organic carbon (DOC)	8/1/2017	7/31/2018	Certified
SM 5310 C	Total organic carbon	8/1/2017	7/31/2018	Certified
Discipline: Microbiology				
IDEXX Colilert®-18	Escherichia coli	8/1/2017	7/31/2018	Certified
IDEXX Colilert®-18	Total coliforms	8/1/2017	7/31/2018	Certified
IDEXX Quanti-Tray® with Colilert®-18 under SWTR	E. coli enumeration	8/1/2017	7/31/2018	Certified
IDEXX Quanti-Tray® with Colilert®-18 under SWTR	Total Coliform Enumeration	8/1/2017	7/31/2018	Certified

OREGON

Environmental Laboratory Accreditation Program

ASSET Laboratories

NELAP Recognized

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.

Christopher L. Redman, BA
Oregon State Public Health Laboratory
ORELAP Program Manager
7202 NE Evergreen Parkway, Suite 100
Hillsboro, OR 97124

EFFECTIVE DATE : 01/30/2018

EXPIRATION DATE : 01/29/2019

Certificate No : 4046 - 006

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

3151 W. Post Road

Certificate: 4046 - 006

Las Vegas, NV 89118

Issue Date: 1/30/2018 Expiration Date: 1/29/2019

As of 1/30/2018 this list supersedes all previous lists for this certificate number.

MATRIX	Reference	Code	Analyte	Code	Description
Air					
	EPA TO-15			10248803	VOCs collected in Canisters by GC/MS
		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		

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Air	EPA TO-15	4680	cis-1,3-Dichloropropene		
		4555	Cyclohexane		
		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
		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)		

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Air	EPA TO-15 GC/MS SIM	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		
		4700	trans-1,2-Dichloroethylene		
		4685	trans-1,3-Dichloropropylene		
		5170	Trichloroethene (Trichloroethylene)		
		5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)		
	EPA TO-3			10249000	Cryogenic Trapping
		4375	Benzene		
		4765	Ethylbenzene		
		9408	Gasoline range organics (GRO)		
		5000	Methyl tert-butyl ether (MTBE)		
		5140	Toluene		
		5260	Xylene (total)		
Drinking Water	EPA 200.7 4.4			10013806	ICP - metals
		1000	Aluminum		
		1005	Antimony		
		1010	Arsenic		
		1015	Barium		
		1020	Beryllium		
		1025	Boron		
		1030	Cadmium		
		1035	Calcium		
		1040	Chromium		

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Environmental Laboratory Accreditation Program

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Drinking Water	EPA 200.7 4.4	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
		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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Drinking Water	EPA 200.8 5.4	1190	Zinc		
	EPA 218.6 3.3			10028009	Dissolved Hexavalent Chromium by Ion Chromatography
		1045	Chromium VI		
	EPA 245.1 3			10036609	Mercury by Cold Vapor Atomic Absorption
		1095	Mercury		
	EPA 314.0 EPA 314.0			10277006	Perchlorate in Drinking Water by Ion Chromatography
		1895	Perchlorate		
Non-Potable Water	EPA 200.7 4.4			10013806	ICP - metals
		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		

ASSET Laboratories

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EPA CODE: NV00922

Certificate: 4046 - 006

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Non-Potable Water

EPA 200.8 5.4			10014605	Metals by ICP-MS
	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		
	1160	Strontium		
	1165	Thallium		
	1175	Tin		
	1180	Titanium		
	1185	Vanadium		
	1190	Zinc		
EPA 218.6 3.3			10028009	Dissolved Hexavalent Chromium by Ion Chromatography
	1045	Chromium VI		
EPA 245.1 3			10036609	Mercury by Cold Vapor Atomic Absorption
	1095	Mercury		
EPA 3010A			10133605	Acid Digestion of Aqueous samples and Extracts for Total Metals
	8031	Extraction/Preparation		
EPA 314.0 EPA 314.0			10277006	Perchlorate in Drinking Water by Ion Chromatography
	1895	Perchlorate		
EPA 3510C			10138202	Separatory Funnel Liquid-liquid extraction
	8031	Extraction/Preparation		

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ASSET Laboratories

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Non-Potable Water

EPA 5030B			10153409	Purge and trap for aqueous samples
	8031	Extraction/Preparation		
EPA 6010B			10155609	ICP - AES
	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		
	1150	Silver		
	1155	Sodium		
	1160	Strontium		
	1165	Thallium		
	1175	Tin		
	1180	Titanium		
	1185	Vanadium		
	1190	Zinc		
EPA 6020			10156000	Inductively Coupled Plasma-Mass Spectrometry
	1000	Aluminum		
	1005	Antimony		
	1010	Arsenic		
	1015	Barium		
	1020	Beryllium		
	1025	Boron		
	1030	Cadmium		
	1035	Calcium		
	1040	Chromium		
	1050	Cobalt		

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Non-Potable Water

EPA 6020				
	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
	1095	Mercury		
EPA 8015B			10173601	Non-halogenated organics using GC/FID
	9369	Diesel range organics (DRO)		
	9408	Gasoline range organics (GRO)		
	9499	Motor Oil		
EPA 8081A			10178606	Organochlorine Pesticides by GC/ECD
	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		
	7520	Endosulfan sulfate		
	7540	Endrin		
	7530	Endrin aldehyde		
	7535	Endrin ketone		

Non-Potable Water

EPA 8081A	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
	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
	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		

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

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Certificate: 4046 - 006

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Non-Potable Water

EPA 8260B	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
	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 (Cumene)
	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

Non-Potable Water

EPA 8260B	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
	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	
	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	

Non-Potable Water

EPA 8270C	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		
EPA 8270C SIM			10242407	Semivolatile Organic compounds by GC/MS Selective Ion Monitoring
	6380	1-Methylnaphthalene		
	6385	2-Methylnaphthalene		
	5500	Acenaphthene		
	5505	Acenaphthylene		

Non-Potable Water

EPA 8270C SIM	5555	Anthracene	
	5575	Benzo(a)anthracene	
	5580	Benzo(a)pyrene	
	5605	Benzo(e)pyrene	
	5590	Benzo(g,h,i)perylene	
	5600	Benzo(k)fluoranthene	
	5585	Benzo[b]fluoranthene	
	5855	Chrysene	
	5895	Dibenz(a,h) anthracene	
	6265	Fluoranthene	
	6270	Fluorene	
	6315	Indeno(1,2,3-cd) pyrene	
	5005	Naphthalene	
	6615	Phenanthrene	
	6665	Pyrene	

Solids

EPA 3050B			10135601	Acid Digestion of Sediments, Sludges, and soils
	8031	Extraction/Preparation		
EPA 3060A			10136604	Alkaline Digestion for Hexavalent Chromium
	8031	Extraction/Preparation		
EPA 3546			10141205	Microwave Extraction
	8031	Extraction/Preparation		
EPA 3550B			10141807	Ultrasonic Extraction
	8031	Extraction/Preparation		
EPA 3580A			10143007	Waste Dilution
	8031	Extraction/Preparation		
EPA 5035A			10284807	Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
	8031	Extraction/Preparation		
EPA 6010B			10155609	ICP - AES
	1000	Aluminum		
	1005	Antimony		
	1010	Arsenic		
	1015	Barium		
	1020	Beryllium		
	1025	Boron		
	1030	Cadmium		
	1035	Calcium		
	1040	Chromium		
	1050	Cobalt		

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

3151 W. Post Road

Certificate: 4046 - 006

Las Vegas, NV 89118 Issue Date: 1/30/2018 Expiration Date: 1/29/2019

As of 1/30/2018 this list supersedes all previous lists for this certificate number.

Solids	EPA 6010B	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	
	EPA 6020			10156000 Inductively Coupled Plasma-Mass Spectrometry
		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	

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Solids

EPA 7199 EPA 7199			10163005	Determination of Hexavalent Chromium in Drinking Water, Groundwater and Industrial Wastewater Effluents by Ion Chromatography
	1045	Chromium VI		
EPA 7471A			10166208	Mercury in Solid Waste by Cold Vapor Atomic Absorption
	1095	Mercury		
EPA 8015B			10173601	Non-halogenated organics using GC/FID
	9369	Diesel range organics (DRO)		
	9408	Gasoline range organics (GRO)		
	9499	Motor Oil		
EPA 8081A			10178606	Organochlorine Pesticides by GC/ECD
	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		
	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
	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)		

Solids

EPA 8082	8905	Aroclor-1254 (PCB-1254)	
	8910	Aroclor-1260 (PCB-1260)	
EPA 8260B		10184802	Volatile Organic Compounds by purge and trap GC/MS
	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	
	4400	Bromoform	
	4450	Carbon disulfide	

Solids

	EPA 8260B	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 (Cumene)	
		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
		5155	1,2,4-Trichlorobenzene	
		4610	1,2-Dichlorobenzene	

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

3151 W. Post Road

Certificate: 4046 - 006

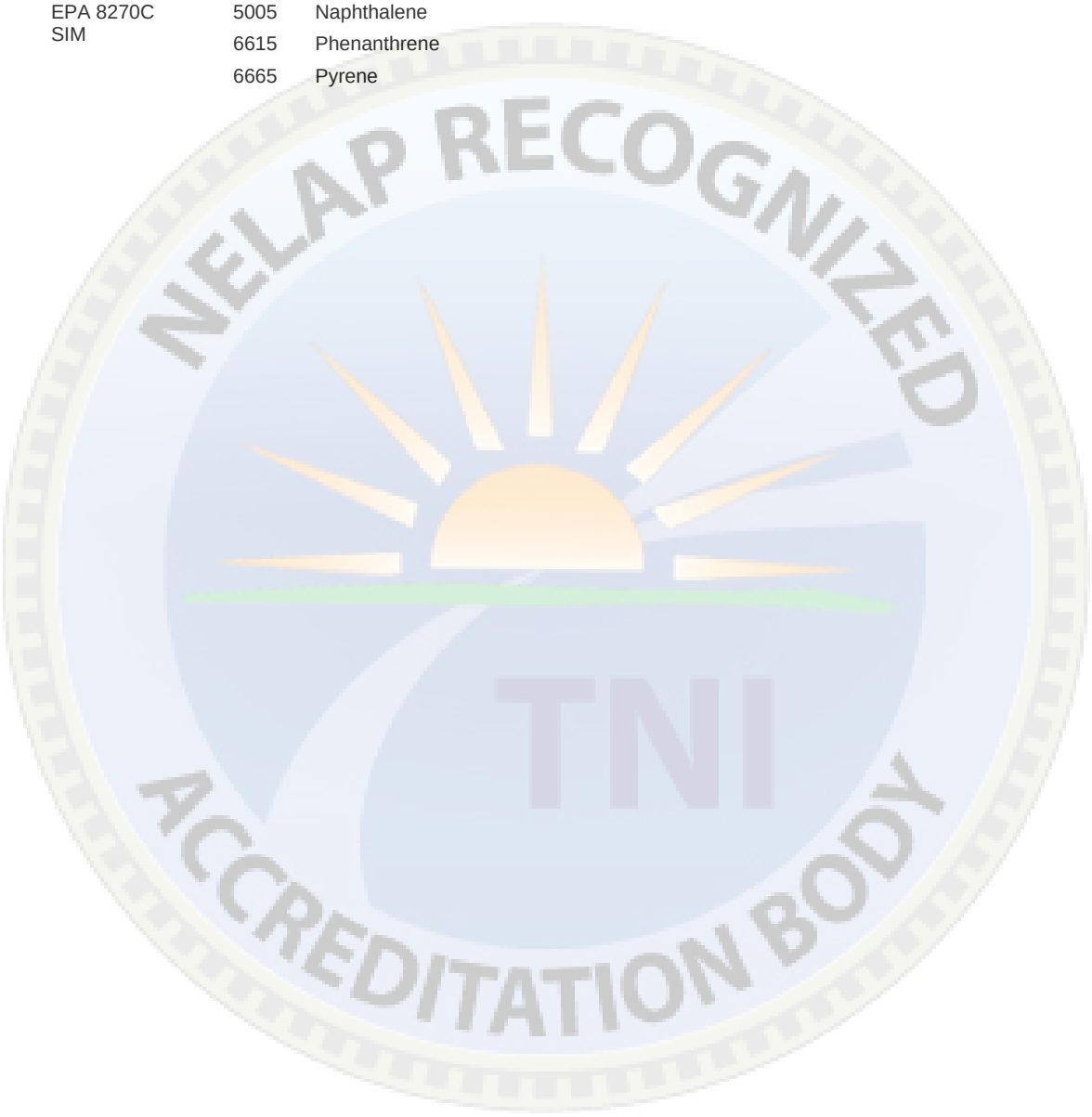
Las Vegas, NV 89118 Issue Date: 1/30/2018 Expiration Date: 1/29/2019

As of 1/30/2018 this list supersedes all previous lists for this certificate number.

Solids	EPA 8270C	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
		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

Solids	EPA 8270C	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	
	EPA 8270C SIM			10242407 Semivolatile Organic compounds by GC/MS Selective Ion Monitoring
		6380	1-Methylnaphthalene	
		6385	2-Methylnaphthalene	
		5500	Acenaphthene	
		5505	Acenaphthylene	
		5555	Anthracene	
		5575	Benzo(a)anthracene	
		5580	Benzo(a)pyrene	
		5605	Benzo(e)pyrene	
		5590	Benzo(g,h,i)perylene	
		5600	Benzo(k)fluoranthene	
		5585	Benzo[b]fluoranthene	
		5855	Chrysene	
		5895	Dibenz(a,h) anthracene	
		6265	Fluoranthene	
		6270	Fluorene	
		6315	Indeno(1,2,3-cd) pyrene	

Solids	EPA 8270C SIM	5005	Naphthalene
		6615	Phenanthrene
		6665	Pyrene



ASSET Laboratories **Date:** 05-Aug-19

Test Code: TO15_UGM3
Test Number: EPA TO15
Test Name: VOCs in Air by GCMS
Matrix: Air **Units:** ug/m³

METHOD DETECTION / REPORTING LIMITS

Updated: 4/21/2017
UpdateBy: dbo

Type	Analyte	Synonym	MDL	PQL
A	1,1,1-Trichloroethane		1.18600	2.73
A	1,1,2,2-Tetrachloroethane		1.54400	3.43
A	1,1,2-Trichloroethane		1.19600	2.73
A	1,1-Dichloroethane		1.16400	2.02
A	1,1-Dichloroethene		1.28100	1.98
A	1,2,4-Trichlorobenzene		0.51100	18.55
A	1,2,4-Trimethylbenzene		0.93700	2.46
A	1,2-Dibromoethane		1.92600	3.84
A	1,2-Dichloro-1,1,2,2-tetrafluoroethane		1.88700	13.98
A	1,2-Dichlorobenzene		1.36000	3.01
A	1,2-Dichloroethane		0.90100	2.02
A	1,2-Dichloropropane		0.83300	2.31
A	1,3,5-Trimethylbenzene		0.90400	2.46
A	1,3-Butadiene		0.59400	1.11
A	1,3-Dichlorobenzene		1.28000	3.01
A	1,4-Dichlorobenzene		1.26600	3.01
A	1,4-Dioxane		0.66500	1.8
A	2-Butanone		0.73100	2.95
A	2-Hexanone		0.68700	4.1
A	4-ethyltoluene		0.96300	2.46
A	4-Methyl-2-pentanone		0.71500	4.1
A	Acetone		0.79400	4.75
A	Acrolein		1.15000	1.15
A	Benzene		0.67900	1.6
A	Benzyl chloride		0.45700	5.18
A	Bromodichloromethane		1.52600	3.35
A	Bromoform		2.54600	5.17
A	Bromomethane		1.17700	1.94
A	Carbon disulfide		0.87300	1.56
A	Carbon tetrachloride		1.48700	3.15
A	Chlorobenzene		1.17400	2.3
A	Chloroethane		0.58600	1.32
A	Chloroform		1.19900	2.44
A	Chloromethane		0.55900	1.03
A	cis-1,2-Dichloroethene		1.00400	1.98
A	cis-1,3-Dichloropropene		0.86200	2.27
A	Cyclohexane		0.71400	1.72
A	Dibromochloromethane		2.37100	4.26
A	Dichlorodifluoromethane		1.13600	2.47
A	Ethanol		0.25300	0.94
A	Ethyl Acetate		0.76100	1.8
A	Ethylbenzene		0.76900	2.17
A	Freon-113		2.55500	3.83
A	Hexachlorobutadiene		1.55300	10.67
A	Isopropyl Alcohol		0.81000	1.23
A	m,p-Xylene		1.65000	4.34

ASSET Laboratories **Date:** 05-Aug-19

Test Code: TO15_UGM3
Test Number: EPA TO15
Test Name: VOCs in Air by GCMS
Matrix: Air **Units:** ug/m³

METHOD DETECTION / REPORTING LIMITS

Updated: 11/13/2014
UpdateBy: GlenG

Type	Analyte	Synonym	MDL	PQL
A	Methyl methacrylate		2.05000	2.05
A	Methylene Chloride		1.20400	3.47
A	MTBE		0.87200	7.21
A	n-Heptane		0.53600	2.05
A	n-Hexane	hexane	0.57800	1.76
A	Naphthalene		0.24900	18.337
A	o-Xylene		1.06700	2.17
A	Propylene		0.28100	0.86
A	Styrene		0.85800	2.13
A	Tetrachloroethene		1.66600	3.39
A	Tetrahydrofuran		0.58300	1.47
A	Toluene		0.71600	1.88
A	trans-1,2-Dichloroethene		0.93900	1.98
A	trans-1,3-Dichloropropene		0.93800	2.27
A	Trichloroethene		1.05600	2.69
A	Trichlorofluoromethane		1.85000	2.81
A	Vinyl acetate		0.75800	3.52
A	Vinyl Chloride		0.71500	1.28
I	Bromochloromethane (IS)		0.00000	0
I	1,4-Difluorobenzene		0.00000	0
I	Chlorobenzene - d5		0.00000	0
S	4-Bromofluorobenzene		0.00000	0
X	Bromochloromethane		0.00000	0

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.

Stephanie Ringsage

Stephanie Ringsage
Oregon State Public Health Laboratory
ORELAP Program Manager
7202 NE Evergreen Parkway, Suite 100
Hillsboro, OR 97124

EFFECTIVE DATE : 01/30/2020

EXPIRATION DATE : 01/29/2021

Certificate No : 4046 - 008

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

3151 W. Post Road

Certificate: 4046 - 008

Las Vegas, NV 89118

Issue Date: 1/30/2020 Expiration Date: 1/29/2021

As of 1/30/2020 this list supersedes all previous lists for this certificate number.

MATRIX	Reference	Code	Analyte	Code	Description
Air					
	EPA TO-15			10248803	VOCs collected in Canisters by GC/MS
		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		

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Air	EPA TO-15	4680	cis-1,3-Dichloropropene		
		4555	Cyclohexane		
		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
		5185	1,1,1-Trichloro-2,2,2-trifluoroethane (Freon 113a)		
		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		

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Air	EPA TO-15 GC/MS SIM	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	
		4700	trans-1,2-Dichloroethylene	
		4685	trans-1,3-Dichloropropylene	
		5170	Trichloroethene (Trichloroethylene)	
		5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	
	EPA TO-3			10249000 Cryogenic Trapping
		4375	Benzene	
		4765	Ethylbenzene	
		9408	Gasoline range organics (GRO)	
		5000	Methyl tert-butyl ether (MTBE)	
		5140	Toluene	
		5260	Xylene (total)	
Drinking Water	EPA 200.7 4.4			10013806 ICP - metals
		1000	Aluminum	
		1005	Antimony	
		1010	Arsenic	
		1015	Barium	
		1020	Beryllium	
		1025	Boron	
		1030	Cadmium	

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Drinking Water

EPA 200.7 4.4			
	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	
	1185	Vanadium	
	1190	Zinc	
EPA 200.8 5.4		10014605	Metals by ICP-MS
	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	

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Drinking Water	EPA 200.8 5.4	1185	Vanadium		
		1190	Zinc		
	EPA 218.6 3.3			10028009	Dissolved Hexavalent Chromium by Ion Chromatography
		1045	Chromium VI		
	EPA 245.1 3			10036609	Mercury by Cold Vapor Atomic Absorption
		1095	Mercury		
	EPA 314.0 EPA 314.0			10277006	Perchlorate in Drinking Water by Ion Chromatography
		1895	Perchlorate		
Non-Potable Water	EPA 200.7 4.4			10013806	ICP - metals
		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		

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Non-Potable Water

EPA 200.8 5.4			10014605	Metals by ICP-MS
	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		
	1160	Strontium		
	1165	Thallium		
	1175	Tin		
	1180	Titanium		
	1185	Vanadium		
	1190	Zinc		
EPA 218.6 3.3			10028009	Dissolved Hexavalent Chromium by Ion Chromatography
	1045	Chromium VI		
EPA 245.1 3			10036609	Mercury by Cold Vapor Atomic Absorption
	1095	Mercury		
EPA 3010A			10133605	Acid Digestion of Aqueous samples and Extracts for Total Metals
	8031	Extraction/Preparation		
EPA 314.0 EPA 314.0			10277006	Perchlorate in Drinking Water by Ion Chromatography
	1895	Perchlorate		
EPA 3510C			10138202	Separatory Funnel Liquid-liquid extraction
	8031	Extraction/Preparation		

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Non-Potable Water

EPA 5030B			10153409	Purge and trap for aqueous samples
	8031	Extraction/Preparation		
EPA 6010B			10155609	ICP - AES
	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		
	1155	Sodium		
	1160	Strontium		
	1165	Thallium		
	1175	Tin		
	1180	Titanium		
	1185	Vanadium		
	1190	Zinc		
EPA 6020			10156000	Inductively Coupled Plasma-Mass Spectrometry
	1000	Aluminum		
	1005	Antimony		
	1010	Arsenic		
	1015	Barium		
	1020	Beryllium		
	1025	Boron		
	1030	Cadmium		
	1035	Calcium		
	1040	Chromium		
	1050	Cobalt		
	1055	Copper		

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Non-Potable Water

EPA 6020				
	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
	1095	Mercury		
EPA 8015B			10173601	Non-halogenated organics using GC/FID
	9369	Diesel range organics (DRO)		
	9408	Gasoline range organics (GRO)		
	9499	Motor Oil		
EPA 8081A			10178606	Organochlorine Pesticides by GC/ECD
	7355	4,4'-DDD		
	7360	4,4'-DDE		
	7365	4,4'-DDT		
	7025	Aldrin		
	7110	alpha-BHC (alpha-Hexachlorocyclohexane)		
	7115	beta-BHC (beta-Hexachlorocyclohexane)		
	7250	Chlordane (tech.)		
	7240	cis-chlordane (alpha-Chlordane)		
	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)		

Non-Potable Water

EPA 8081A	7685	Heptachlor		
	7690	Heptachlor epoxide		
	7810	Methoxychlor		
	8250	Toxaphene (Chlorinated camphene)		
	7245	trans-chlordane (gamma-Chlordane)		
EPA 8082			10179007	Polychlorinated Biphenyls (PCBs) by GC/ECD
	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
	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		

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Non-Potable Water	EPA 8260B	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
		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 (Cumene)
		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)

Non-Potable Water

EPA 8260B	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
	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	
	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	

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Non-Potable Water	EPA 8270C	5580	Benzo(a)pyrene		
		5590	Benzo(g,h,i)perylene		
		5600	Benzo(k)fluoranthene		
		5585	Benzo[b]fluoranthene		
		5610	Benzoic acid		
		5630	Benzyl alcohol		
		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		
	EPA 8270C SIM			10242407	Semivolatile Organic compounds by GC/MS Selective Ion Monitoring
		6380	1-Methylnaphthalene		
		6385	2-Methylnaphthalene		
		5500	Acenaphthene		
		5505	Acenaphthylene		
		5555	Anthracene		
		5575	Benzo(a)anthracene		
		5580	Benzo(a)pyrene		

Non-Potable Water

	EPA 8270C SIM	5605	Benzo(e)pyrene		
		5590	Benzo(g,h,i)perylene		
		5600	Benzo(k)fluoranthene		
		5585	Benzo[b]fluoranthene		
		5855	Chrysene		
		5895	Dibenz(a,h) anthracene		
		6265	Fluoranthene		
		6270	Fluorene		
		6315	Indeno(1,2,3-cd) pyrene		
		5005	Naphthalene		
		6615	Phenanthrene		
		6665	Pyrene		

Solids

	EPA 3050B			10135601	Acid Digestion of Sediments, Sludges, and soils
		8031	Extraction/Preparation		
	EPA 3060A			10136604	Alkaline Digestion for Hexavalent Chromium
		8031	Extraction/Preparation		
	EPA 3546			10141205	Microwave Extraction
		8031	Extraction/Preparation		
	EPA 3550B			10141807	Ultrasonic Extraction
		8031	Extraction/Preparation		
	EPA 3580A			10143007	Waste Dilution
		8031	Extraction/Preparation		
	EPA 5035A			10284807	Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
		8031	Extraction/Preparation		
	EPA 6010B			10155609	ICP - AES
		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		

ASSET Laboratories

3151 W. Post Road

Las Vegas, NV 89118

EPA CODE: NV00922

Certificate: 4046 - 008

Issue Date: 1/30/2020 Expiration Date: 1/29/2021

As of 1/30/2020 this list supersedes all previous lists for this certificate number.

Solids	EPA 6010B	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		
	EPA 6020			10156000	Inductively Coupled Plasma-Mass Spectrometry
		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 EPA 7199			10163005	Determination of Hexavalent Chromium in Drinking Water, Groundwater and Industrial Wastewater Effluents by Ion Chromatography
		1045	Chromium VI		

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Solids

EPA 7471A			10166208	Mercury in Solid Waste by Cold Vapor Atomic Absorption
	1095	Mercury		
EPA 8015B			10173601	Non-halogenated organics using GC/FID
	9369	Diesel range organics (DRO)		
	9408	Gasoline range organics (GRO)		
	9499	Motor Oil		
EPA 8081A			10178606	Organochlorine Pesticides by GC/ECD
	7355	4,4'-DDD		
	7360	4,4'-DDE		
	7365	4,4'-DDT		
	7025	Aldrin		
	7110	alpha-BHC (alpha-Hexachlorocyclohexane)		
	7115	beta-BHC (beta-Hexachlorocyclohexane)		
	7250	Chlordane (tech.)		
	7240	cis-chlordane (alpha-Chlordane)		
	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)		
	7685	Heptachlor		
	7690	Heptachlor epoxide		
	7810	Methoxychlor		
	8250	Toxaphene (Chlorinated camphene)		
	7245	trans-chlordane (gamma-Chlordane)		
EPA 8082			10179007	Polychlorinated Biphenyls (PCBs) by GC/ECD
	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)		

Solids	EPA 8260B		10184802	Volatile Organic Compounds by purge and trap GC/MS

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
4400	Bromoform
4450	Carbon disulfide
4455	Carbon tetrachloride
4475	Chlorobenzene

Solids	EPA 8260B	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 (Cumene)		
		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
		5155	1,2,4-Trichlorobenzene		
		4610	1,2-Dichlorobenzene		
		6221	1,2-Diphenylhydrazine		
		4615	1,3-Dichlorobenzene		

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4046

ASSET Laboratories

EPA CODE: NV00922

3151 W. Post Road

Certificate: 4046 - 008

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Solids	EPA 8270C	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
		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

Solids	EPA 8270C	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	
	EPA 8270C SIM			10242407 Semivolatile Organic compounds by GC/MS Selective Ion Monitoring
		6380	1-Methylnaphthalene	
		6385	2-Methylnaphthalene	
		5500	Acenaphthene	
		5505	Acenaphthylene	
		5555	Anthracene	
		5575	Benzo(a)anthracene	
		5580	Benzo(a)pyrene	
		5605	Benzo(e)pyrene	
		5590	Benzo(g,h,i)perylene	
		5600	Benzo(k)fluoranthene	
		5585	Benzo[b]fluoranthene	
		5855	Chrysene	
		5895	Dibenz(a,h) anthracene	
		6265	Fluoranthene	
		6270	Fluorene	
		6315	Indeno(1,2,3-cd) pyrene	
		5005	Naphthalene	
		6615	Phenanthrene	

OREGON

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Solids	EPA 8270C SI	6665	Pyrene

ATTACHMENT 7

Field Forms

bec environmental, inc.
Environmental Services

Ambient Air Sample Log

Project:_____

Canister ID	Location	Initial pressure	Beginning Sampling Date/ Time	Ending Sampling Date/ TIme	Final Pressure	Analytes / Analysis

ATTACHMENT 8

Chains of Custody

ASSET LABORATORIES
ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

CHAIN OF CUSTODY RECORD

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

Client:	**Report to:**	**Bill to:**	**EDD Requirement**	**QA/QC**	**Sampe Receipt Condition**
Address:	**Company:**	**Address:**	Excel EDD ☐	RTNE ☐	Y / N
Address:	**Email:**		Geotracker ☐	RWQCB ☐	1. Chilled ☐ ☐
			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:** *I hereby authorize ASSET Labs to perform the tests indicated below:*	**Sampled By:** *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.*				Courier:
Project Name:	*Signature:* / *Date*				Tracking No.
Project Number:					

Matrix

Ground ☐	Sediment ☐	Potable ☐	Soil ☐
NPDES ☐	Other Solid ☐	Surface ☐	

Item No.	Laboratory Work Order No.	Sample ID/Location	Date	Time	Water	Solid	Others	Analyses Requested														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 = 4ºC
Z = Zn(AC)$_2$	O = NaOH	T = $Na_2S_2O_3$	
Others/Specify:			

Container Type:

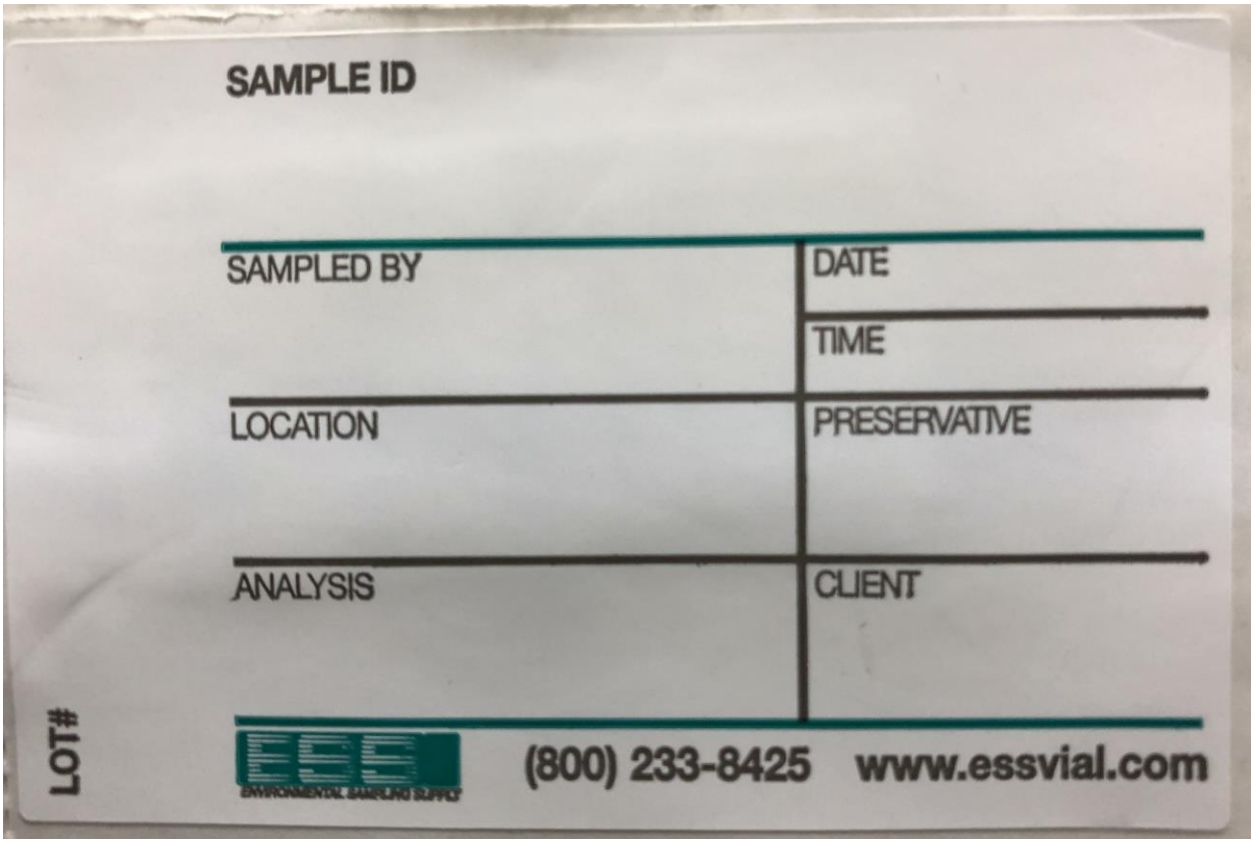
T = Tube	V = VOA	P = Pint
J = Jar	B = Tedlar	G = Glass
M = Metal	P = Plastic	C = Can

White = Laboratory Copy Yellow = Customer's Copy

ATTACHMENT 9

Sample Labels

Laboratory Sample ID Label



ATTACHMENT 10

Health and Safety Plan

bec environmental, inc.
Environmental Services

Nye County Courthouse Phase II ESA
Site-Specific
Health and Safety Plan

1 PROJECT INFORMATION

Project Name:	Nye County Courthouse Phase II ESA		
Site Location (see Figure 1 – Site Map):	1 Frankie Street, Tonopah, NV 89049		
Site Description:	In-use building in rural downtown area.		
Project Objective(s):	Ambient air sampling and visual assessment of building material		
Project Start Date:	January 6, 2021	***Anticipated Completion Date:***	January 7, 2021

2 PERSONNEL

Field Safety Supervisor:	Kelly Sheehan	Phone:	702-808-8899
BEC Office Contact:	Eileen Christensen	Phone (24 hour):	702-340-8228
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	

3 HAZARD ANALYSIS (CHECK ALL THAT APPLY):

Task/Operation (Check all Applicable):

☒ Air Sampling/Monitoring
☐ Asbestos Survey
☐ Biological Sampling
☐ Biological Monitoring/Evaluation
☐ Ecological Study
☐ Erosion Control
☐ Groundwater Sampling
☐ Inspections: _____
☐ Lead Risk Assessment
☐ Perimeter Monitoring
☐ Radon Measurement Survey
☐ Site Survey
☐ Sample Collection/Transportation
☐ Soil Excavation
☐ Soil Sampling
☐ Staging Supplies
☐ Subsurface Soil Sampling – Drilling
☐ Subsurface Soil Sampling – Hand Auger
☐ Surface Soil Sampling
☐ Traffic Controls
☐ Water Sampling
☒ Other (Describe): Visual assessment of building material homogenous areas

4 CHEMICAL HAZARDS (INCLUDE ALL THAT APPLY):

Chemical Name	*Source*	*Concentration*	*Exposure Limits*
n/a	n/a	n/a	n/a

**Exposure limits are those established by OSHA as the Permissible Exposure Limits (PEL) as of the date of the Site Specific HASP.*

5 BIOLOGICAL HAZARDS (CHECK ALL THAT APPLY):

☒ No Biological Hazards
☐ Small Mammals/Droppings
☐ Insect Bites and Stings
☐ Mold
☐ Snakes
☐ Poisonous Plants
☐ Rabies – Bats/Other Animals
☐ Other (Describe): _____

6 PHYSICAL HAZARDS (CHECK ALL THAT APPLY):

- ☐ Abandoned Mine Access
- ☒ Cold Weather Operations
- ☐ Compressed Gas – Storage & Use
- ☐ Demolition Operations/Oversight
- ☐ Dust/Inhalation Hazards
- ☐ Drilling Rig Operations/Oversight
- ☐ Electrical Hazards
- ☐ Ergonomics: Heavy Lifting/Moving, Repetitive Motion, etc.
- ☐ Hand Tool Use
- ☐ Hazardous Chemicals/Materials
- ☐ Heavy Equipment Operation/Oversight
- ☐ Helicopter Operations
- ☐ High Pressure Water Use
- ☐ Hot Weather Operations
- ☒ Housekeeping Hazards (Slips, Trips, Falls, Sharp Objects, etc.)
- ☐ Inadequate Illumination
- ☐ Inclement Weather
- ☐ Ladder Use
- ☐ Noise
- ☐ Remote Site Location
- ☐ Rough Terrain
- ☒ Traffic On or Near Site
- ☐ Trenching and Excavation Operations
- ☐ Welding/Cutting/Brazing Operations

For each item checked, see the associated Slip Sheet following this Plan.

7 WORK PRACTICE CONTROLS

Personal Protective Equipment:

- ☐ Steel-toed Boots
- ☐ Gloves
- ☐ Hard Hat
- ☒ Long Pants
- ☐ Hearing Protection
- ☐ Other (Describe): _____
- ☐ Sunscreen
- ☐ Safety Glasses/Sunglasses
- ☐ Respirators
- ☒ Layers of Clothing

Describe work practice controls as appropriate: Field personnel will always keep cell phone on them due to solo travel. COVID-19 protocols will be followed as indicated in the attached BEC COVID-19 Field Plan.

8 FIELD WORK ITEMS CHECKLIST

- ☒ Vehicle Safety Kit
- ☐ 2-way Radios (extra batteries)
- ☒ Digital Camera (extra batteries)
- ☒ Cell Phone with Car Charger
- ☐ GPS Units (extra batteries)
- ☐ Binoculars
- ☐ Topographic Map
- ☒ First Aid Kit
- ☒ Fire Extinguisher
- ☒ Portable Eye-Wash Kit
- ☒ Copy of the HASP
- ☐ Mileage Clipboard
- ☒ SPOT GPS Device

Other Items:

9 ACKNOWLEDGEMENT

I have read and understand the Nye County Courthouse Phase II ESA Site Specific Health and Safety Plan.

Printed Name and Signature	**Date**

Figure 1 – Site Map

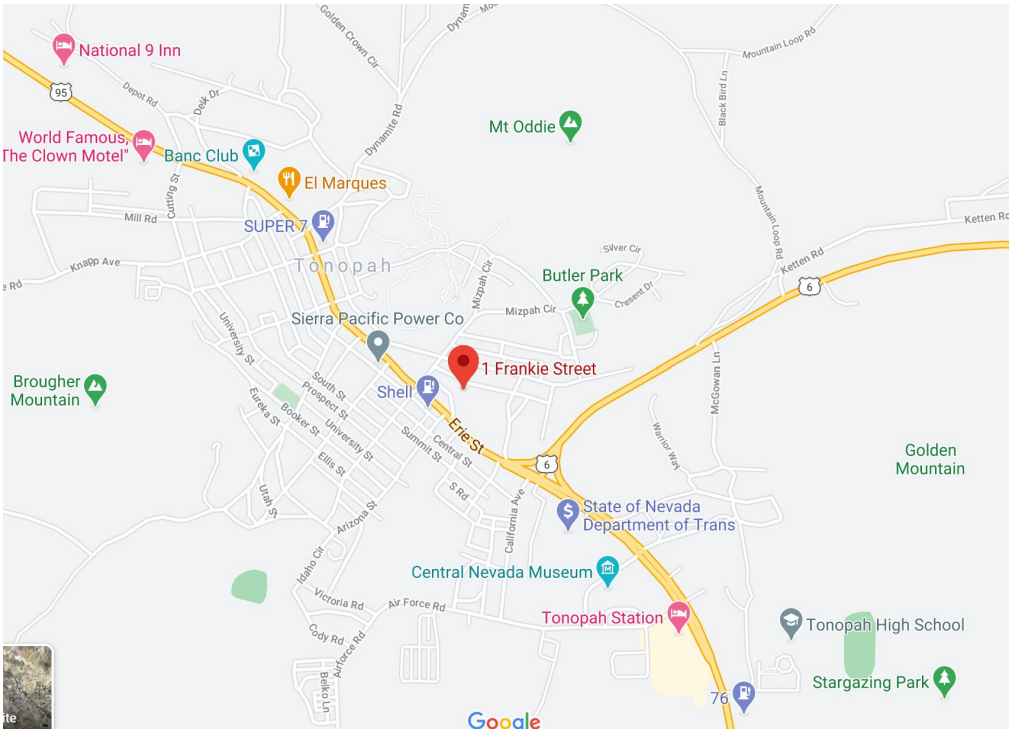
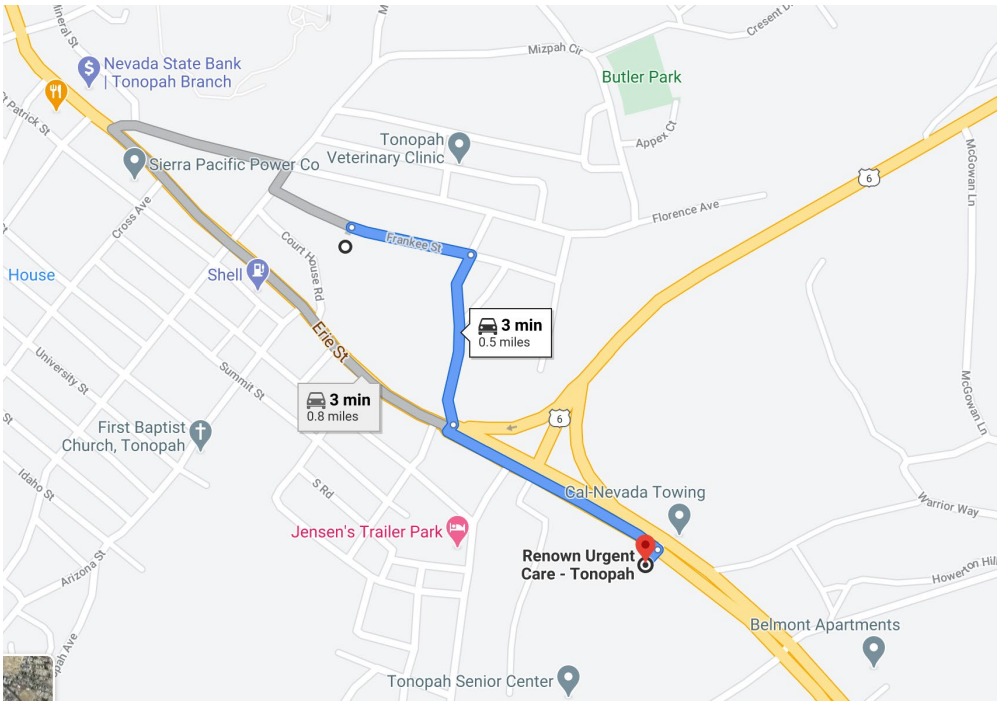


Figure 2 – Emergency Action Map



bec environmental, inc.
Environmental Services

Adverse Site Condition Procedures and Safety Slip Sheets

bec environmental, inc.
Environmental Services

ADVERSE SITE CONDITION PROCEDURES

☐ Unable to locate site
- Check maps (printed or digital)
- Verify the GPS has the correct coordinates entered.
  - UTM vs. Lat. Long.
  - UTM Zone 11 (Nevada)
  - NAD27, NAD83, WGS
- Call point of contact with BEC and/or the governing agency

☐ Site inaccessible
- Research other possible access routes
- If feasible, return to site at a later date
- Notify BEC and governing agency of difficulty
- Do not attempt to access if conditions do not allow it to be done safely

☐ Unknown individuals at or around site
- Try to determine professional association either at a distance, or during conversation through the vehicle window
- Determine current activities of individual(s)
- If uncomfortable about the individual(s) activity, return at a later time or date
- Notify BEC of the presence of individuals in the area and of determinations made of whether or not to proceed with work at the site

☐ Unexpected site safety hazards
- Notify the Field Safety Supervisor and follow up with the BEC office contact in instances of an unexpected site safety hazard, weapon, etc., for further direction.
- As a result of unexpected site conditions, an additional hazard analysis may be required. Notify the Field Safety Supervisor and contact the BEC Safety Officer for further direction.
- Photograph and clearly mark the area of the safety hazard and record the GPS location.

☐ Vehicle problems
- Troubleshoot mechanical problems
  - Verify the vehicle is in park
  - Verify battery cables are secure
  - Check fuel level
  - Contact BEC office personnel and/or the truck rental company
- If vehicle is stuck, determine action necessary to free the vehicle
  - If possible, use the shovel to dig the tires out
  - If unable to free the vehicle, call the BEC contact for assistance and direction
- If there is an accident with another vehicle, get all of the pertinent information from the other driver, take photos, write down a description of the events that happened and contact BEC and the appropriate legal authority with jurisdiction over the area

☐ Injury
- Attend to the injured individual immediately
- Call for an ambulance if necessary
- Notify BEC contact
- Take notes on incident that led to the injury and the action taken to assist the individual
- Upon return to the BEC office, restock any supplies used in the field
- Submit Emergency Event Report Form to Supervisor, as appropriate

Cold Weather Operations

A cold environment forces the body to work harder to maintain its temperature. When temperatures drop below normal and wind speed increases, heat can leave your body more rapidly. Cold stress is a very real problem during the cold weather. However, cold stress can be a problem even in warmer weather.

Hypothermia

Hypothermia occurs when body heat is lost faster than it can be replaced and the normal body temperature (98.6°F) drops to less than 95°F. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F), if a person becomes chilled from rain, sweat, or submersion in cold water.

Symptoms: Shivering, fatigue, loss of coordination, confusion and disorientation, blue skin. As the body temperature continues to fall, symptoms will worsen, shivering will stop, pupils become dilated, pulse and breathing become slowed, and loss of consciousness can occur. May die if help is not received immediately.

First Aid: Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Move the person to a warm, dry area. Remove wet clothes and replace them with dry clothes (if available), cover the body (including the head and neck) with layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag). Do not cover the face. If help is more than 30 minutes away: First, warm the center of the body by placing hot packs and warm bottles at sides of chest, neck, head and in groin. If conscious, give the person warm sweetened drinks (no alcohol), to help increase their body temperature. Never try to give a drink to an unconscious person.

If a person is not breathing or has no pulse:

- Call 911 immediately for emergency medical assistance.
- Treat the person as per instructions for hypothermia but be very careful and do not try to give an unconscious person fluids.
- Check him/her for signs of breathing and for a pulse. Check for 60 seconds.
- If after 60 seconds the affected worker is not breathing and does not have a pulse, trained workers may administer rescue breathing for 3 minutes.
- Recheck for breathing and pulse, check for 60 seconds.
- If the worker is still not breathing and has no pulse, continue rescue breathing.
- Only start chest compressions per the direction of the 911 operator or emergency medical services. Chest compressions are recommended only if the patient will not receive medical care within 3 hours.
- Reassess patient's physical status periodically.

Frostbite

Frostbite is an injury to the body that is caused by freezing of the skin and underlying tissues. The lower the temperature, the more quickly frostbite will occur. Frostbite typically affects nose, ears, chin, fingers and toes.

Symptoms: Reduced blood flow to hands and feet. Reddened skin develops gray/white patches or skin appears bluish or pale and waxy. Numbness or aching in the affected part. Tingling or stinging. Blisters may occur in the affected part, in severe cases.

First Aid: Follow the recommendations described above for hypothermia. Do not rub or massage the affected area to warm it because this action can cause more damage. Do not apply snow/water. Do not break blisters. Loosely cover and protect the area from contact. Immerse the affected area in warm (not hot) water if medical help is not available. Keep in mind if a frostbitten area is rewarmed and gets frozen again, more tissue damage will occur. It is safer for the frostbitten area to be rewarmed by medical professionals. Give warm sweetened drinks (no alcohol), if the person is conscious.

Trench Foot / Immersion Foot

Trench foot is an injury to the feet caused by prolonged exposure to wet and cold conditions. However, it can occur at temperatures as high as 60 degrees Fahrenheit if the feet are constantly wet.

Symptoms: Reddening of the skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under the skin, gangrene (skin may turn dark purple, blue, or gray)

First Aid: Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Remove the shoes, or boots, and wet socks. Dry the feet. Avoid walking on feet, as this may cause tissue damage.

Chilblains

Chilblains are ulcers caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees Fahrenheit.

Symptoms: Redness, itching, possible blistering. Inflammation, possible ulceration in severe cases

First Aid: Avoid scratching. Slowly warm the skin. Use corticosteroid creams to relieve itching and swelling. Keep blisters and ulcers clean and covered

Cold Weather Mitigative Actions:

- Monitor your physical condition and that of your coworkers.
- Wear appropriate clothing for all weather conditions. Consider wet or damp conditions, even if the temperature is above freezing.
- Recommendations for working in cold environments:
    - The type of fabric worn makes a difference. Consider clothing options made from wool, silk and most synthetics, which retain insulation even when wet. Cotton loses its insulation value when it becomes wet.
    - Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing.
    - Innermost Layer: Wool, silk or synthetic to keep moisture away from the body.
    - Middle Layer: Wool or synthetic fabric to provide insulation even when wet.
    - Outer Layer: Wind and rain protection that allows ventilation to prevent overheating.
- Wear a hat or hood to reduce the amount of body heat that escapes from your head.
- Use a knit mask or scarf to cover the ears, face and mouth (if needed).
- Use insulated gloves to protect the hands (water resistant if necessary).
- Wear insulated and waterproof boots.
- Have spare clothing available, in case your current outfit becomes wet.
- Have a warm liquid available to mitigate the effects of cold stress.
- Include chemical hot packs in your first aid kit.
- Avoid touching cold metal surfaces with bare skin.

Recommendations for Personal Protective Equipment

- Gloves
- Long Pants
- Layers of Clothing
- Hand Warmers

Housekeeping Hazards

Hazards associated with poor housekeeping include increased danger of slip, trip and fall, injuries from sharp objects, chemical releases and fire. Moving about on-site during drilling activities creates the potential for slips, trips, and falls of workers. This is especially true during inclement weather conditions. All on-site personnel must be alert to their surroundings to anticipate hazards and avoid (where possible, mitigate) them.

Mitigative Actions:

- ***Slips, Trips, and Falls***
  - Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes shall be equipped with covers.
  - Garbage and other waste shall be disposed of at frequent and regular intervals.
  - When not in use, tools and equipment shall be stored in designated locations.
  - Arrange stored materials to prevent tipping, falling, collapsing, rolling, or spreading.
  - Nest hoses and cords to avoid trips.
  - Keep walkways and doorways clear of obstructions.
  - Keep working surfaces dry, when possible. If a wet process is used, drainage must be maintained and dry standing places made available, or workers provided with protective footgear when such means are not practicable.

- ***Sharp Objects***
  - During the course of construction, alteration, or repairs, form and scrap lumber with protruding nails, and all other debris, shall be kept cleared from work areas, passageways, and stairs, in and around buildings or other structures.
  - Dunnage, lumber, or shoring material in which there are visibly protruding nails shall be removed from the immediate work area or if left in the area, the nails shall be rendered harmless.

Recommendations for Personal Protective Equipment:

- Non-slip shoes
- Full coverage clothing
- Hard Hat
- Gloves
- Safety Glasses

Traffic On or Near Work Site

Workers in areas where there are moving vehicles and traffic are exposed to struck-by hazards. Work zones are used to move traffic in an approved direction and are typically identified by signs, cones, barrels, and barriers.

Mitigative Actions:

- Traffic control plans must be in place for the movement of vehicles in areas where there are also workers conducting other tasks.
- Limiting motorist intrusions into the work zone can be concrete, water, sand, or collapsible barriers, crash cushions, and truck-mounted attenuators.
- Flagger stations should be illuminated. Lighting for workers on foot and equipment operators is to be at least 5 foot-candles or greater.
- Where lighting is not sufficient, flares or chemical lighting should be used.
- Operators and workers on foot need to know the visibility limits and the "blind spots" for each vehicle on site.

Recommendations for Personal Protective Equipment:

- High Visibility Clothing

BEC COVID-19 Field Safety Plan

COVID-19 Specific Safety Precautions while Conducting Fieldwork

Prepared By:
BEC Environmental, Inc.
7241 West Sahara Avenue, Suite 120
Las Vegas, Nevada 89117
(702) 304-9830
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Date Created: *March 2020*
Updated: *October 2020*

bec environmental, inc.
Environmental Services

Table of Contents

BACKGROUND

COVID-19 (Novel Coronavirus Disease 2019) is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus (coronavirus, like the flu, has been around for a very long time). Coronavirus disease (old and new strains) spreads primarily through contact with an infected person when they cough or sneeze. It also spreads when a person touches a surface or object that has the virus on it, then touches their eyes, nose, or mouth. The disease causes respiratory illness (like the flu) with symptoms such as a cough, fever, and in more severe cases, difficulty breathing.

Due to heightened concerns of COVID-19 transmission, it is important we all take extra precautions to keep ourselves, our coworkers, and our community safe and healthy. BEC is committed to conducting business activities in a manner to protect employees, clients/teaming partners/vendors, and the organization, relying on guidance from the Centers for Disease Control (CDC) and state and local governments. Based on the current evaluation, BEC's 2020 field efforts should be modified or delayed whenever possible. As we move into the field season, it is critical that team members in hotels, rental vehicles, or airplanes follow recommended health and safety measures to prevent the infection and spread of COVID-19, and ensure they have access to the tools they need to be safe and successful. This document is intended to provide guidance on communication expectations, prepping for communal living (i.e., hotel stays), pre-cleaning and maintaining clean field trucks and equipment, personal hygiene, mobilization and demobilization expectations, and how to respond if one of our team members displays symptoms. In the context of this document, mobilization and demobilization refer to any activities which involve travel away from the office (Las Vegas) for purposes of work.

Please note, all directives in this document are fluid and will be adjusted based on updated guidance from BEC's Officers, the CDC, or state and local governments. Email communications will be utilized to provide the most current information on COVID-19 should conditions or recommended precautions change. For immediate questions or concerns, please communicate with supervisors, project manager, or a BEC Officer.

1 PRE-FIELDWORK

1.1 Personal Preparedness

Team members should review current travel restrictions prior to scheduling fieldwork outside of Clark County, Nevada.

Team members should avoid physically attending any conferences, trainings, workshops, parties, or other large public gatherings until local, state, and/or federal public health officials declare it is safe to do so.

Team members with pending fieldwork should prepare their home and an overnight bag prior to the scheduled fieldwork. A state-wide or nation-wide quarantine may be put into effect, requiring a stay at the field location longer than scheduled.

The CDC recommends everyone get the flu shot, when available, to ensure flu symptoms are not mistaken with COVID-19 symptoms. All team members are strongly encouraged to get the current season's flu shot as soon as possible and stay current on all other CDC recommended vaccines.

1.2 Communication

All Project Managers are to communicate daily with Team members regarding field staff health conditions. If any of the scheduled field staff begin to feel ill within the two weeks prior to any scheduled fieldwork, a potential alternate for the fieldwork should be identified.

Any travel planned or conducted within the two weeks prior to scheduled fieldwork, or any large events attended during this period, should be discussed with a supervisor and the project manager.

Team Members feeling ill, and especially those with COVID-19-like symptoms, WILL NOT report for fieldwork. They must complete the Daily Wellness Questionnaire for each day of fieldwork and communicate directly with their supervisor and project manager about their health concerns. The health and safety of our team members if more important than any Project. If any field staff display illness symptoms, they will not be approved for fieldwork and will be encouraged to use sick leave. An alternate team member will participate in the fieldwork if the type of project allows for the substitution. Any field employee displaying COVID-19-like symptoms will be encouraged to seek medical attention immediately.

Team members who have been a caretaker for someone who is or was ill, who share a residence with someone who has exhibited symptoms of COVID-19, or who have come into close contact with someone who has a laboratory-confirmed COVID-19 diagnosis in the past 14 days should communicate directly with their supervisor or project manager to discuss alternatives or potential issues. According to the CDC's update on October 21, 2020, "close contact" means someone who was within 6 feet of an infected person for a cumulative total of 15 minutes or more over a 24-hour period* starting from 2 days before illness onset (or, for asymptomatic patients, 2 days prior to test specimen collection) until the time the patient is isolated.

**Individual exposures added together over a 24-hour period (e.g., three 5-minute exposures for a total of 15 minutes).*

1.3 Approval

Approval for a team member to participate in fieldwork will require approval from the member's supervisor and the project manager. This approval will be based on:

- Field staff current health condition
- Potential past risk of exposure to someone else who has tested positive for COVID-19, or has displayed COVID-19-like symptoms
- CDC definitions for high-risk individuals
- The locations of identified COVID-19 hotspots and local regulations regarding public movements

2 PREPPING FOR FIELDWORK AND MOBILIZATION

It is of the utmost importance to practice good hygiene during travel and in the field. Health and hygiene items to bring to the field include hand sanitizer, disinfecting wipes, and latex or nitrile gloves. If disinfecting wipes are not available, bring paper towels and disinfecting spray.

Travel itineraries and booking information must be submitted to the Team Member's supervisor for approval, and Site-Specific Health and Safety Plans must be reviewed by the BEC Safety Officer, with special attention being paid to COVID-19 field practices.

2.1 Vehicle Preparation and Cleaning

Practice caution when traveling in trucks, with equipment, or personal goods potentially touched by other people. Wipe down all steering wheels, door handles, common contact areas on the sides of doors, center consoles, display knobs, field equipment, gasoline pumps, and food product packaging to avoid potentially transporting germs to a different community. Wearing latex or nitrile gloves when cleaning or handling these surfaces is also recommended. Follow the same vehicle cleaning standards with utility-task vehicles and all-terrain vehicles.

Two people may share a field vehicle to and from the job site. It is strongly recommended each passenger wears a facemask while inside the vehicle. Alternatively, a physical barrier (i.e.: plastic sheeting) inside the vehicle may used between the passengers in place of facemasks to prevent the spread of airborne droplets. The physical barrier must not obstruct the driver's view of windows and mirrors, and must be either replaced or sanitized if driver and passenger switch. In addition, it is recommended that both passengers wear disposable gloves when sharing a vehicle. Commonly-touched surfaces (steering wheel, seatbelt, gear shifter, lock and window controls, radio and climate control knobs, etc.) should be disinfected if driver and passenger switch, and at the beginning and end of the workday.

2.2 Air Travel

At this time, air travel is permitted for project work, subject to authorization from a BEC Officer. Check the departing and arriving airports, airline, the CDC, and the FAA for information and safeguards pertaining to COVID-19 while traveling via air. BEC encourages Team Members traveling by air to wear a facemask during travel activities, exercise frequent hand hygiene, and practice social distancing in public areas. Be aware that some airlines may also require travelers to wear facemasks.

2.3 Hotel Stays

Each team member will have their own hotel room, with their own bathroom, should a hotel stay be necessary during fieldwork. Guests will not be permitted. Any work-related discussions or meetings will be conducted either in the field using social distancing precautions or electronically.

Immediately upon arrival to the hotel room, wash your hands with antimicrobial soap to help ensure any microbes from travel or fieldwork activities will not be transferred to room surfaces. After washing your hands, it is recommended that all surfaces be wiped or cleaned with an antimicrobial-rated cleaner. Do not forget counters; interior and exterior door handles; cabinet handles; medicine cabinet handles; appliance handles, buttons, and knobs such as on the refrigerator or microwave; toilets; faucet handles; shower knobs; tv remotes; light switches, and other frequently touched surfaces, such as shoulder-height on doors where we push them closed.

3 CONDUCTING FIELDWORK

3.1 Safety Meetings

Any safety (tailgate) meeting forms should detail appropriate personal protective equipment relevant for safe project work. All tailgate meetings will be used to check each team member's physical health, including reviewing the daily wellness check questions recommended by the Southern Nevada Health District:

- Do you have a new cough that you cannot attribute to another health condition?
- Do you have new shortness of breath that you cannot attribute to another health condition?
- Do you have any two of the following symptoms: Fever (100.4°F or higher), chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell?
- Have you come into close contact (CDC definition as of October 21, 2020) with someone who has a laboratory-confirmed COVID-19 diagnosis in the past 14 days?

Tailgate meetings will include discussions on personal hygiene, communication requirements, and emergency response action plans relevant to COVID-19 spread or quarantines.

3.2 Personal Hygiene

Avoid close contact with others; it is recommended individuals keep at least a minimum of six feet apart. Do not shake hands, hug, or touch people unnecessarily. An elbow bump, foot tap, or a nod are good alternatives for handshakes. Avoid touching your face. Sneeze or cough into a tissue and then throw it away, or into your elbow. If you accidentally sneeze or cough into your hands, wash them immediately. Regularly wash your hands for at least 20 seconds with antimicrobial soap or hand sanitizer throughout the day, especially before and after eating or touching common surfaces.

If at any point you feel unsafe working with others in the field who are not exercising COVID-19 precautions such as wearing a face mask or practicing social distancing, you are permitted to leave the work site. The health and safety of Team Members is more important than any project. Contact your project manager or Eileen Christensen for further guidance, recommendations, or field support.

3.2.1 In the Field

Follow the standard CDC recommendations above for personal hygiene even when in the field. This is especially important when handling shared equipment. Wipe down field equipment daily with antimicrobial spray or wipes. Wipe down field truck steering wheels, door handles, display knobs and center consoles daily or if there is a switch in user. Use hand sanitizer regularly, especially before eating, after eating, or if you sneeze or cough into your hands. Wear a cloth facemask, as recommended by the CDC. Look out for fellow fieldworkers and encourage them to do the same.

Exercise social/physical distancing when in the field with coworkers by maintaining at least a six-foot distance from others. In certain circumstances, social distancing may not be feasible based on the task at hand. In these instances, Team Members should wear face coverings in accordance with CDC

requirements and frequently practice good hand hygiene. Additionally, if social distancing measures are unable to be followed while conducting field work, a COVID-19 Job Hazard Analysis form must be filled out by the field workers and attached with this COVID-19 Fieldwork Safety Plan for Site Specific Health and Safety Plans.

3.2.2 In the Community

When stopping anywhere to or from the field, such as a restaurant or gas station, wash your hands with antimicrobial soap prior to leaving the establishment if available. Use a paper towel or an elbow to exit the bathroom/building. Consider using gloves to pump gas and practice safe donning-doffing techniques. This helps to reduces the risk of picking up microbes from fellow travelers. In cases where antibacterial soap is not available, use the hand sanitizer in your COVID field kit.

When entering public establishments, wearing a facemask is recommended, and is required in many places. Please note that as public restrictions are lifted, facemasks may be required by public directives or by individual business owners.

Upon returning to the hotel room or office, avoid touching surfaces until after washing your hands.

4 ACTION PLAN FOR POTENTIAL INFECTION

If you or a co-worker becomes ill, contact the appropriate supervisor or project manager immediately. Anyone showing signs of COVID-19 will be required to cease fieldwork activities and encouraged to seek immediate medical attention (COVID-19 symptoms are listed below). The sick team member/field staff may be quarantined in their hotel room.

Sick and caretaking team members should wash their hands frequently and immediately before and after touching communal surfaces (food dishes, shared spaces, etc.). If possible, supervisory staff may consider evacuating all team members not displaying symptoms to other housing. Please consider potential spread to the community when making this decision.

5 COVID-19 SYMPTOMS

COVID-19 symptoms may not appear for two days to two weeks after exposure. Symptoms may be slight or severe and may not necessarily all occur at the same time. People who have these symptoms may have COVID-19 (This list does not include all possible symptoms):

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

Look for emergency warning signs* for COVID-19. If someone is showing any of these signs, seek emergency medical care immediately:

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion
- Inability to wake or stay awake
- Bluish lips or face

**This list is not all possible symptoms. Please call your medical provider for any other symptoms that are severe or concerning to you.*

6 DEMOBILIZATION

6.1 Communication

Project managers and/or supervisors are to communicate daily with field staff. Additionally, extra care should be taken as field staff demobilize, paying special attention to:

- where team members are coming from and going to relative to COVID-19 hotspots.
- team member current health conditions.
- whether or not there are nation-wide or state-wide quarantines in place restricting travel.
- whether team members have been exposed to people showing symptoms.

6.2 Preparation

Practice personal hygiene methods described above during demobilization. Clean all field equipment thoroughly before returning it to the office or its usual storage location. Prior to returning the field vehicle, clean the interior and exterior surfaces to the same standards as when the vehicle was received.

6.3 Post-Demobilization

Please continue to evaluate your health daily and communicate directly with your supervisor if you start to feel ill after demobilization.

For Team members scheduled to re-mobilize for another field effort soon after returning, continue to practice the personal hygiene standards described above, avoid large gatherings, and get enough rest. Sleep deprivation lowers immune system responses, making potential illnesses much worse. Communicate directly with supervisors about health needs and if illness symptoms appear after demobilization, or if other potential contacts (friends, nearby family, coworkers, etc.) have become ill.

APPENDIX D

Site-Specific Health & Safety
Plan Documentation

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Nye County Courthouse Phase II ESA
Site-Specific
Health and Safety Plan

1 PROJECT INFORMATION

Project Name:	Nye County Courthouse Phase II ESA		
Site Location (see Figure 1 – Site Map):	1 Frankie Street, Tonopah, NV 89049		
Site Description:	In-use building in rural downtown area.		
Project Objective(s):	Ambient air sampling and visual assessment of building material		
Project Start Date:	January 6, 2021	***Anticipated Completion Date:***	January 7, 2021

2 PERSONNEL

Field Safety Supervisor:	Kelly Sheehan	Phone:	702-808-8899
BEC Office Contact:	Eileen Christensen	Phone (24 hour):	702-340-8228
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	
Site Worker:		Phone:	

3 HAZARD ANALYSIS (CHECK ALL THAT APPLY):

Task/Operation (Check all Applicable):

☒ Air Sampling/Monitoring
☐ Asbestos Survey
☐ Biological Sampling
☐ Biological Monitoring/Evaluation
☐ Ecological Study
☐ Erosion Control
☐ Groundwater Sampling
☐ Inspections: _____
☐ Lead Risk Assessment
☐ Perimeter Monitoring
☐ Radon Measurement Survey
☐ Site Survey
☐ Sample Collection/Transportation
☐ Soil Excavation
☐ Soil Sampling
☐ Staging Supplies
☐ Subsurface Soil Sampling – Drilling
☐ Subsurface Soil Sampling – Hand Auger
☐ Surface Soil Sampling
☐ Traffic Controls
☐ Water Sampling
☒ Other (Describe): Visual assessment of building material homogenous areas

4 CHEMICAL HAZARDS (INCLUDE ALL THAT APPLY):

Chemical Name	*Source*	*Concentration*	*Exposure Limits*
n/a	n/a	n/a	n/a

**Exposure limits are those established by OSHA as the Permissible Exposure Limits (PEL) as of the date of the Site Specific HASP.*

5 BIOLOGICAL HAZARDS (CHECK ALL THAT APPLY):

☒ No Biological Hazards
☐ Small Mammals/Droppings
☐ Insect Bites and Stings
☐ Mold
☐ Snakes
☐ Poisonous Plants
☐ Rabies – Bats/Other Animals
☐ Other (Describe): _____

6 PHYSICAL HAZARDS (CHECK ALL THAT APPLY):

- ☐ Abandoned Mine Access
- ☒ Cold Weather Operations
- ☐ Compressed Gas – Storage & Use
- ☐ Demolition Operations/Oversight
- ☐ Dust/Inhalation Hazards
- ☐ Drilling Rig Operations/Oversight
- ☐ Electrical Hazards
- ☐ Ergonomics: Heavy Lifting/Moving, Repetitive Motion, etc.
- ☐ Hand Tool Use
- ☐ Hazardous Chemicals/Materials
- ☐ Heavy Equipment Operation/Oversight
- ☐ Helicopter Operations
- ☐ High Pressure Water Use
- ☐ Hot Weather Operations
- ☒ Housekeeping Hazards (Slips, Trips, Falls, Sharp Objects, etc.)
- ☐ Inadequate Illumination
- ☐ Inclement Weather
- ☐ Ladder Use
- ☐ Noise
- ☐ Remote Site Location
- ☐ Rough Terrain
- ☒ Traffic On or Near Site
- ☐ Trenching and Excavation Operations
- ☐ Welding/Cutting/Brazing Operations

For each item checked, see the associated Slip Sheet following this Plan.

7 WORK PRACTICE CONTROLS

Personal Protective Equipment:

- ☐ Steel-toed Boots
- ☐ Gloves
- ☐ Hard Hat
- ☒ Long Pants
- ☐ Hearing Protection
- ☐ Other (Describe): _____
- ☐ Sunscreen
- ☐ Safety Glasses/Sunglasses
- ☐ Respirators
- ☒ Layers of Clothing

Describe work practice controls as appropriate: Field personnel will always keep cell phone on them due to solo travel. COVID-19 protocols will be followed as indicated in the attached BEC COVID-19 Field Plan.

8 FIELD WORK ITEMS CHECKLIST

- ☒ Vehicle Safety Kit
- ☐ 2-way Radios (extra batteries)
- ☒ Digital Camera (extra batteries)
- ☒ Cell Phone with Car Charger
- ☐ GPS Units (extra batteries)
- ☐ Binoculars
- ☐ Topographic Map
- ☒ First Aid Kit
- ☒ Fire Extinguisher
- ☒ Portable Eye-Wash Kit
- ☒ Copy of the HASP
- ☐ Mileage Clipboard
- ☒ SPOT GPS Device

Other Items:

9 ACKNOWLEDGEMENT

I have read and understand the Nye County Courthouse Phase II ESA Site Specific Health and Safety Plan.

Printed Name and Signature	**Date**
Kelly Sheehan	1/6/2021
Kelly Sheehan	1/7/2021

Figure 1 – Site Map

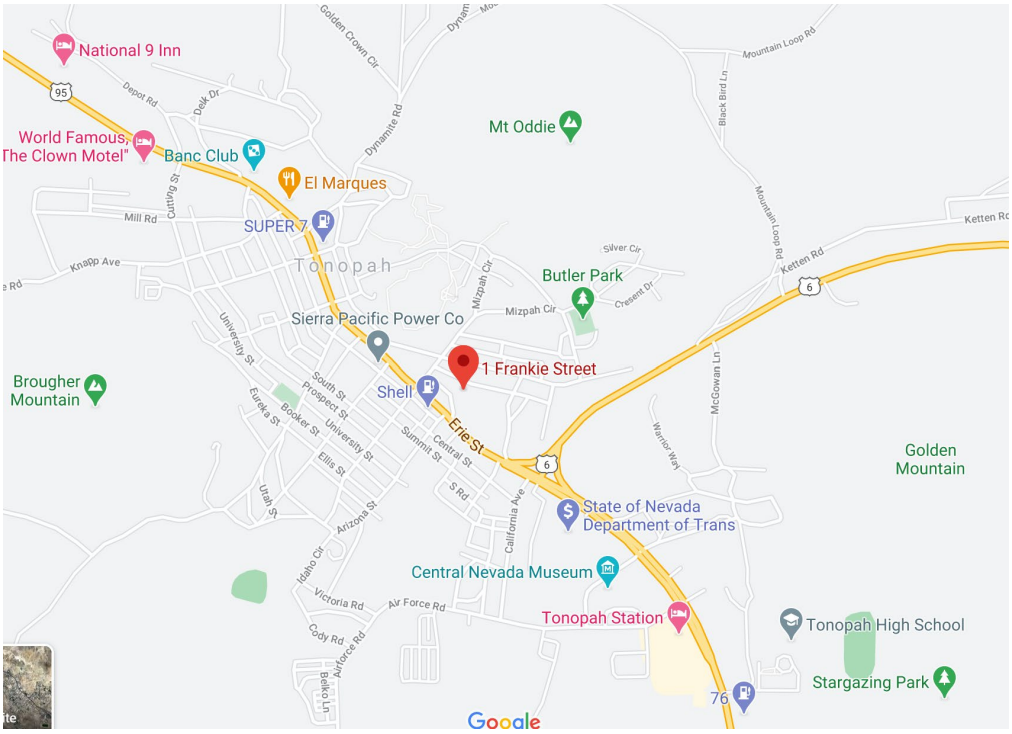
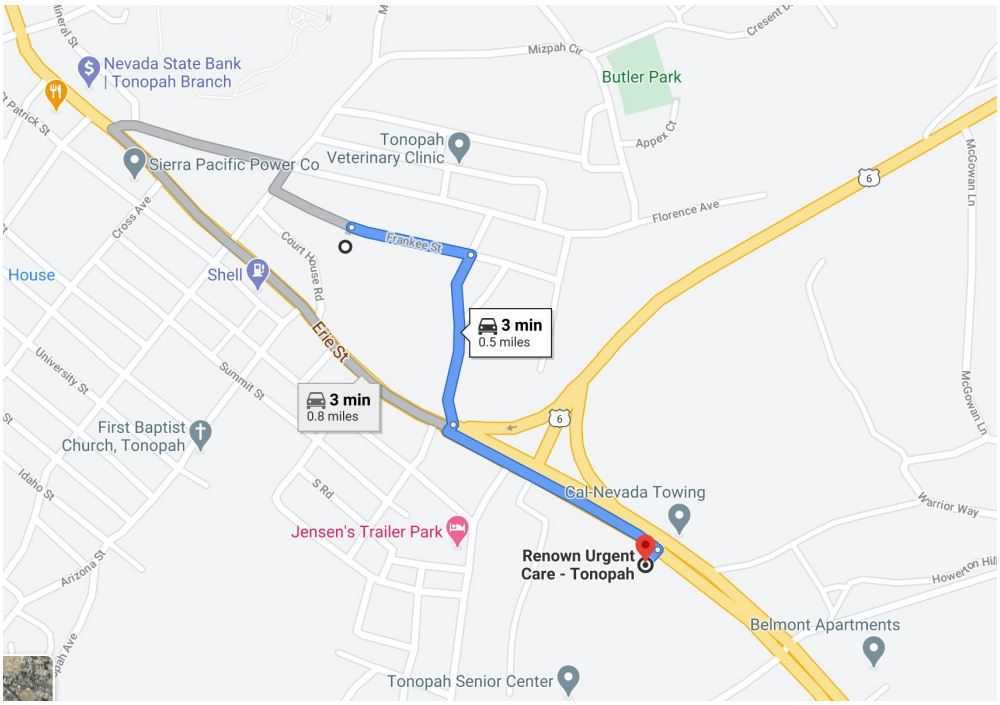


Figure 2 – Emergency Action Map



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Adverse Site Condition Procedures and Safety Slip Sheets

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ADVERSE SITE CONDITION PROCEDURES

☐ Unable to locate site
- Check maps (printed or digital)
- Verify the GPS has the correct coordinates entered.
  - UTM vs. Lat. Long.
  - UTM Zone 11 (Nevada)
  - NAD27, NAD83, WGS
- Call point of contact with BEC and/or the governing agency

☐ Site inaccessible
- Research other possible access routes
- If feasible, return to site at a later date
- Notify BEC and governing agency of difficulty
- Do not attempt to access if conditions do not allow it to be done safely

☐ Unknown individuals at or around site
- Try to determine professional association either at a distance, or during conversation through the vehicle window
- Determine current activities of individual(s)
- If uncomfortable about the individual(s) activity, return at a later time or date
- Notify BEC of the presence of individuals in the area and of determinations made of whether or not to proceed with work at the site

☐ Unexpected site safety hazards
- Notify the Field Safety Supervisor and follow up with the BEC office contact in instances of an unexpected site safety hazard, weapon, etc., for further direction.
- As a result of unexpected site conditions, an additional hazard analysis may be required. Notify the Field Safety Supervisor and contact the BEC Safety Officer for further direction.
- Photograph and clearly mark the area of the safety hazard and record the GPS location.

☐ Vehicle problems
- Troubleshoot mechanical problems
  - Verify the vehicle is in park
  - Verify battery cables are secure
  - Check fuel level
  - Contact BEC office personnel and/or the truck rental company
- If vehicle is stuck, determine action necessary to free the vehicle
  - If possible, use the shovel to dig the tires out
  - If unable to free the vehicle, call the BEC contact for assistance and direction
- If there is an accident with another vehicle, get all of the pertinent information from the other driver, take photos, write down a description of the events that happened and contact BEC and the appropriate legal authority with jurisdiction over the area

☐ Injury
- Attend to the injured individual immediately
- Call for an ambulance if necessary
- Notify BEC contact
- Take notes on incident that led to the injury and the action taken to assist the individual
- Upon return to the BEC office, restock any supplies used in the field
- Submit Emergency Event Report Form to Supervisor, as appropriate

Cold Weather Operations

A cold environment forces the body to work harder to maintain its temperature. When temperatures drop below normal and wind speed increases, heat can leave your body more rapidly. Cold stress is a very real problem during the cold weather. However, cold stress can be a problem even in warmer weather.

Hypothermia

Hypothermia occurs when body heat is lost faster than it can be replaced and the normal body temperature (98.6°F) drops to less than 95°F. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F), if a person becomes chilled from rain, sweat, or submersion in cold water.

Symptoms: Shivering, fatigue, loss of coordination, confusion and disorientation, blue skin. As the body temperature continues to fall, symptoms will worsen, shivering will stop, pupils become dilated, pulse and breathing become slowed, and loss of consciousness can occur. May die if help is not received immediately.

First Aid: Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Move the person to a warm, dry area. Remove wet clothes and replace them with dry clothes (if available), cover the body (including the head and neck) with layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag). Do not cover the face. If help is more than 30 minutes away: First, warm the center of the body by placing hot packs and warm bottles at sides of chest, neck, head and in groin. If conscious, give the person warm sweetened drinks (no alcohol), to help increase their body temperature. Never try to give a drink to an unconscious person.

If a person is not breathing or has no pulse:

- Call 911 immediately for emergency medical assistance.
- Treat the person as per instructions for hypothermia but be very careful and do not try to give an unconscious person fluids.
- Check him/her for signs of breathing and for a pulse. Check for 60 seconds.
- If after 60 seconds the affected worker is not breathing and does not have a pulse, trained workers may administer rescue breathing for 3 minutes.
- Recheck for breathing and pulse, check for 60 seconds.
- If the worker is still not breathing and has no pulse, continue rescue breathing.
- Only start chest compressions per the direction of the 911 operator or emergency medical services. Chest compressions are recommended only if the patient will not receive medical care within 3 hours.
- Reassess patient's physical status periodically.

Frostbite

Frostbite is an injury to the body that is caused by freezing of the skin and underlying tissues. The lower the temperature, the more quickly frostbite will occur. Frostbite typically affects nose, ears, chin, fingers and toes.

Symptoms: Reduced blood flow to hands and feet. Reddened skin develops gray/white patches or skin appears bluish or pale and waxy. Numbness or aching in the affected part. Tingling or stinging. Blisters may occur in the affected part, in severe cases.

First Aid: Follow the recommendations described above for hypothermia. Do not rub or massage the affected area to warm it because this action can cause more damage. Do not apply snow/water. Do not break blisters. Loosely cover and protect the area from contact. Immerse the affected area in warm (not hot) water if medical help is not available. Keep in mind if a frostbitten area is rewarmed and gets frozen again, more tissue damage will occur. It is safer for the frostbitten area to be rewarmed by medical professionals. Give warm sweetened drinks (no alcohol), if the person is conscious.

Trench Foot / Immersion Foot

Trench foot is an injury to the feet caused by prolonged exposure to wet and cold conditions. However, it can occur at temperatures as high as 60 degrees Fahrenheit if the feet are constantly wet.

Symptoms: Reddening of the skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under the skin, gangrene (skin may turn dark purple, blue, or gray)

First Aid: Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Remove the shoes, or boots, and wet socks. Dry the feet. Avoid walking on feet, as this may cause tissue damage.

Chilblains

Chilblains are ulcers caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees Fahrenheit.

Symptoms: Redness, itching, possible blistering. Inflammation, possible ulceration in severe cases

First Aid: Avoid scratching. Slowly warm the skin. Use corticosteroid creams to relieve itching and swelling. Keep blisters and ulcers clean and covered

Cold Weather Mitigative Actions:

- Monitor your physical condition and that of your coworkers.
- Wear appropriate clothing for all weather conditions. Consider wet or damp conditions, even if the temperature is above freezing.
- Recommendations for working in cold environments:
    - The type of fabric worn makes a difference. Consider clothing options made from wool, silk and most synthetics, which retain insulation even when wet. Cotton loses its insulation value when it becomes wet.
    - Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing.
    - Innermost Layer: Wool, silk or synthetic to keep moisture away from the body.
    - Middle Layer: Wool or synthetic fabric to provide insulation even when wet.
    - Outer Layer: Wind and rain protection that allows ventilation to prevent overheating.
- Wear a hat or hood to reduce the amount of body heat that escapes from your head.
- Use a knit mask or scarf to cover the ears, face and mouth (if needed).
- Use insulated gloves to protect the hands (water resistant if necessary).
- Wear insulated and waterproof boots.
- Have spare clothing available, in case your current outfit becomes wet.
- Have a warm liquid available to mitigate the effects of cold stress.
- Include chemical hot packs in your first aid kit.
- Avoid touching cold metal surfaces with bare skin.

Recommendations for Personal Protective Equipment

- Gloves
- Long Pants
- Layers of Clothing
- Hand Warmers

Housekeeping Hazards

Hazards associated with poor housekeeping include increased danger of slip, trip and fall, injuries from sharp objects, chemical releases and fire. Moving about on-site during drilling activities creates the potential for slips, trips, and falls of workers. This is especially true during inclement weather conditions. All on-site personnel must be alert to their surroundings to anticipate hazards and avoid (where possible, mitigate) them.

Mitigative Actions:

- ***Slips, Trips, and Falls***
  - Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes shall be equipped with covers.
  - Garbage and other waste shall be disposed of at frequent and regular intervals.
  - When not in use, tools and equipment shall be stored in designated locations.
  - Arrange stored materials to prevent tipping, falling, collapsing, rolling, or spreading.
  - Nest hoses and cords to avoid trips.
  - Keep walkways and doorways clear of obstructions.
  - Keep working surfaces dry, when possible. If a wet process is used, drainage must be maintained and dry standing places made available, or workers provided with protective footgear when such means are not practicable.

- ***Sharp Objects***
  - During the course of construction, alteration, or repairs, form and scrap lumber with protruding nails, and all other debris, shall be kept cleared from work areas, passageways, and stairs, in and around buildings or other structures.
  - Dunnage, lumber, or shoring material in which there are visibly protruding nails shall be removed from the immediate work area or if left in the area, the nails shall be rendered harmless.

Recommendations for Personal Protective Equipment:

- Non-slip shoes
- Full coverage clothing
- Hard Hat
- Gloves
- Safety Glasses

Traffic On or Near Work Site

Workers in areas where there are moving vehicles and traffic are exposed to struck-by hazards. Work zones are used to move traffic in an approved direction and are typically identified by signs, cones, barrels, and barriers.

Mitigative Actions:

- Traffic control plans must be in place for the movement of vehicles in areas where there are also workers conducting other tasks.
- Limiting motorist intrusions into the work zone can be concrete, water, sand, or collapsible barriers, crash cushions, and truck-mounted attenuators.
- Flagger stations should be illuminated. Lighting for workers on foot and equipment operators is to be at least 5 foot-candles or greater.
- Where lighting is not sufficient, flares or chemical lighting should be used.
- Operators and workers on foot need to know the visibility limits and the "blind spots" for each vehicle on site.

Recommendations for Personal Protective Equipment:

- High Visibility Clothing

BEC COVID-19 Field Safety Plan

COVID-19 Specific Safety Precautions while Conducting Fieldwork

Prepared By:
BEC Environmental, Inc.
7241 West Sahara Avenue, Suite 120
Las Vegas, Nevada 89117
(702) 304-9830
www.becnv.com

Date Created: *March 2020*
Updated: *October 2020*

bec environmental, inc.
Environmental Services

Table of Contents

BACKGROUND

COVID-19 (Novel Coronavirus Disease 2019) is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus (coronavirus, like the flu, has been around for a very long time). Coronavirus disease (old and new strains) spreads primarily through contact with an infected person when they cough or sneeze. It also spreads when a person touches a surface or object that has the virus on it, then touches their eyes, nose, or mouth. The disease causes respiratory illness (like the flu) with symptoms such as a cough, fever, and in more severe cases, difficulty breathing.

Due to heightened concerns of COVID-19 transmission, it is important we all take extra precautions to keep ourselves, our coworkers, and our community safe and healthy. BEC is committed to conducting business activities in a manner to protect employees, clients/teaming partners/vendors, and the organization, relying on guidance from the Centers for Disease Control (CDC) and state and local governments. Based on the current evaluation, BEC's 2020 field efforts should be modified or delayed whenever possible. As we move into the field season, it is critical that team members in hotels, rental vehicles, or airplanes follow recommended health and safety measures to prevent the infection and spread of COVID-19, and ensure they have access to the tools they need to be safe and successful. This document is intended to provide guidance on communication expectations, prepping for communal living (i.e., hotel stays), pre-cleaning and maintaining clean field trucks and equipment, personal hygiene, mobilization and demobilization expectations, and how to respond if one of our team members displays symptoms. In the context of this document, mobilization and demobilization refer to any activities which involve travel away from the office (Las Vegas) for purposes of work.

Please note, all directives in this document are fluid and will be adjusted based on updated guidance from BEC's Officers, the CDC, or state and local governments. Email communications will be utilized to provide the most current information on COVID-19 should conditions or recommended precautions change. For immediate questions or concerns, please communicate with supervisors, project manager, or a BEC Officer.

1 PRE-FIELDWORK

1.1 Personal Preparedness

Team members should review current travel restrictions prior to scheduling fieldwork outside of Clark County, Nevada.

Team members should avoid physically attending any conferences, trainings, workshops, parties, or other large public gatherings until local, state, and/or federal public health officials declare it is safe to do so.

Team members with pending fieldwork should prepare their home and an overnight bag prior to the scheduled fieldwork. A state-wide or nation-wide quarantine may be put into effect, requiring a stay at the field location longer than scheduled.

The CDC recommends everyone get the flu shot, when available, to ensure flu symptoms are not mistaken with COVID-19 symptoms. All team members are strongly encouraged to get the current season's flu shot as soon as possible and stay current on all other CDC recommended vaccines.

1.2 Communication

All Project Managers are to communicate daily with Team members regarding field staff health conditions. If any of the scheduled field staff begin to feel ill within the two weeks prior to any scheduled fieldwork, a potential alternate for the fieldwork should be identified.

Any travel planned or conducted within the two weeks prior to scheduled fieldwork, or any large events attended during this period, should be discussed with a supervisor and the project manager.

Team Members feeling ill, and especially those with COVID-19-like symptoms, WILL NOT report for fieldwork. They must complete the Daily Wellness Questionnaire for each day of fieldwork and communicate directly with their supervisor and project manager about their health concerns. The health and safety of our team members if more important than any Project. If any field staff display illness symptoms, they will not be approved for fieldwork and will be encouraged to use sick leave. An alternate team member will participate in the fieldwork if the type of project allows for the substitution. Any field employee displaying COVID-19-like symptoms will be encouraged to seek medical attention immediately.

Team members who have been a caretaker for someone who is or was ill, who share a residence with someone who has exhibited symptoms of COVID-19, or who have come into close contact with someone who has a laboratory-confirmed COVID-19 diagnosis in the past 14 days should communicate directly with their supervisor or project manager to discuss alternatives or potential issues. According to the CDC's update on October 21, 2020, "close contact" means someone who was within 6 feet of an infected person for a cumulative total of 15 minutes or more over a 24-hour period* starting from 2 days before illness onset (or, for asymptomatic patients, 2 days prior to test specimen collection) until the time the patient is isolated.

**Individual exposures added together over a 24-hour period (e.g., three 5-minute exposures for a total of 15 minutes).*

1.3 Approval

Approval for a team member to participate in fieldwork will require approval from the member's supervisor and the project manager. This approval will be based on:

- Field staff current health condition
- Potential past risk of exposure to someone else who has tested positive for COVID-19, or has displayed COVID-19-like symptoms
- CDC definitions for high-risk individuals
- The locations of identified COVID-19 hotspots and local regulations regarding public movements

2 PREPPING FOR FIELDWORK AND MOBILIZATION

It is of the utmost importance to practice good hygiene during travel and in the field. Health and hygiene items to bring to the field include hand sanitizer, disinfecting wipes, and latex or nitrile gloves. If disinfecting wipes are not available, bring paper towels and disinfecting spray.

Travel itineraries and booking information must be submitted to the Team Member's supervisor for approval, and Site-Specific Health and Safety Plans must be reviewed by the BEC Safety Officer, with special attention being paid to COVID-19 field practices.

2.1 Vehicle Preparation and Cleaning

Practice caution when traveling in trucks, with equipment, or personal goods potentially touched by other people. Wipe down all steering wheels, door handles, common contact areas on the sides of doors, center consoles, display knobs, field equipment, gasoline pumps, and food product packaging to avoid potentially transporting germs to a different community. Wearing latex or nitrile gloves when cleaning or handling these surfaces is also recommended. Follow the same vehicle cleaning standards with utility-task vehicles and all-terrain vehicles.

Two people may share a field vehicle to and from the job site. It is strongly recommended each passenger wears a facemask while inside the vehicle. Alternatively, a physical barrier (i.e.: plastic sheeting) inside the vehicle may used between the passengers in place of facemasks to prevent the spread of airborne droplets. The physical barrier must not obstruct the driver's view of windows and mirrors, and must be either replaced or sanitized if driver and passenger switch. In addition, it is recommended that both passengers wear disposable gloves when sharing a vehicle. Commonly-touched surfaces (steering wheel, seatbelt, gear shifter, lock and window controls, radio and climate control knobs, etc.) should be disinfected if driver and passenger switch, and at the beginning and end of the workday.

2.2 Air Travel

At this time, air travel is permitted for project work, subject to authorization from a BEC Officer. Check the departing and arriving airports, airline, the CDC, and the FAA for information and safeguards pertaining to COVID-19 while traveling via air. BEC encourages Team Members traveling by air to wear a facemask during travel activities, exercise frequent hand hygiene, and practice social distancing in public areas. Be aware that some airlines may also require travelers to wear facemasks.

2.3 Hotel Stays

Each team member will have their own hotel room, with their own bathroom, should a hotel stay be necessary during fieldwork. Guests will not be permitted. Any work-related discussions or meetings will be conducted either in the field using social distancing precautions or electronically.

Immediately upon arrival to the hotel room, wash your hands with antimicrobial soap to help ensure any microbes from travel or fieldwork activities will not be transferred to room surfaces. After washing your hands, it is recommended that all surfaces be wiped or cleaned with an antimicrobial-rated cleaner. Do not forget counters; interior and exterior door handles; cabinet handles; medicine cabinet handles; appliance handles, buttons, and knobs such as on the refrigerator or microwave; toilets; faucet handles; shower knobs; tv remotes; light switches, and other frequently touched surfaces, such as shoulder-height on doors where we push them closed.

3 CONDUCTING FIELDWORK

3.1 Safety Meetings

Any safety (tailgate) meeting forms should detail appropriate personal protective equipment relevant for safe project work. All tailgate meetings will be used to check each team member's physical health, including reviewing the daily wellness check questions recommended by the Southern Nevada Health District:

- Do you have a new cough that you cannot attribute to another health condition?
- Do you have new shortness of breath that you cannot attribute to another health condition?
- Do you have any two of the following symptoms: Fever (100.4°F or higher), chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell?
- Have you come into close contact (CDC definition as of October 21, 2020) with someone who has a laboratory-confirmed COVID-19 diagnosis in the past 14 days?

Tailgate meetings will include discussions on personal hygiene, communication requirements, and emergency response action plans relevant to COVID-19 spread or quarantines.

3.2 Personal Hygiene

Avoid close contact with others; it is recommended individuals keep at least a minimum of six feet apart. Do not shake hands, hug, or touch people unnecessarily. An elbow bump, foot tap, or a nod are good alternatives for handshakes. Avoid touching your face. Sneeze or cough into a tissue and then throw it away, or into your elbow. If you accidentally sneeze or cough into your hands, wash them immediately. Regularly wash your hands for at least 20 seconds with antimicrobial soap or hand sanitizer throughout the day, especially before and after eating or touching common surfaces.

If at any point you feel unsafe working with others in the field who are not exercising COVID-19 precautions such as wearing a face mask or practicing social distancing, you are permitted to leave the work site. The health and safety of Team Members is more important than any project. Contact your project manager or Eileen Christensen for further guidance, recommendations, or field support.

3.2.1 In the Field

Follow the standard CDC recommendations above for personal hygiene even when in the field. This is especially important when handling shared equipment. Wipe down field equipment daily with antimicrobial spray or wipes. Wipe down field truck steering wheels, door handles, display knobs and center consoles daily or if there is a switch in user. Use hand sanitizer regularly, especially before eating, after eating, or if you sneeze or cough into your hands. Wear a cloth facemask, as recommended by the CDC. Look out for fellow fieldworkers and encourage them to do the same.

Exercise social/physical distancing when in the field with coworkers by maintaining at least a six-foot distance from others. In certain circumstances, social distancing may not be feasible based on the task at hand. In these instances, Team Members should wear face coverings in accordance with CDC

requirements and frequently practice good hand hygiene. Additionally, if social distancing measures are unable to be followed while conducting field work, a COVID-19 Job Hazard Analysis form must be filled out by the field workers and attached with this COVID-19 Fieldwork Safety Plan for Site Specific Health and Safety Plans.

3.2.2 In the Community

When stopping anywhere to or from the field, such as a restaurant or gas station, wash your hands with antimicrobial soap prior to leaving the establishment if available. Use a paper towel or an elbow to exit the bathroom/building. Consider using gloves to pump gas and practice safe donning-doffing techniques. This helps to reduces the risk of picking up microbes from fellow travelers. In cases where antibacterial soap is not available, use the hand sanitizer in your COVID field kit.

When entering public establishments, wearing a facemask is recommended, and is required in many places. Please note that as public restrictions are lifted, facemasks may be required by public directives or by individual business owners.

Upon returning to the hotel room or office, avoid touching surfaces until after washing your hands.

4 ACTION PLAN FOR POTENTIAL INFECTION

If you or a co-worker becomes ill, contact the appropriate supervisor or project manager immediately. Anyone showing signs of COVID-19 will be required to cease fieldwork activities and encouraged to seek immediate medical attention (COVID-19 symptoms are listed below). The sick team member/field staff may be quarantined in their hotel room.

Sick and caretaking team members should wash their hands frequently and immediately before and after touching communal surfaces (food dishes, shared spaces, etc.). If possible, supervisory staff may consider evacuating all team members not displaying symptoms to other housing. Please consider potential spread to the community when making this decision.

5 COVID-19 SYMPTOMS

COVID-19 symptoms may not appear for two days to two weeks after exposure. Symptoms may be slight or severe and may not necessarily all occur at the same time. People who have these symptoms may have COVID-19 (This list does not include all possible symptoms):

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

Look for emergency warning signs* for COVID-19. If someone is showing any of these signs, seek emergency medical care immediately:

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion
- Inability to wake or stay awake
- Bluish lips or face

**This list is not all possible symptoms. Please call your medical provider for any other symptoms that are severe or concerning to you.*

6 DEMOBILIZATION

6.1 Communication

Project managers and/or supervisors are to communicate daily with field staff. Additionally, extra care should be taken as field staff demobilize, paying special attention to:

- where team members are coming from and going to relative to COVID-19 hotspots.
- team member current health conditions.
- whether or not there are nation-wide or state-wide quarantines in place restricting travel.
- whether team members have been exposed to people showing symptoms.

6.2 Preparation

Practice personal hygiene methods described above during demobilization. Clean all field equipment thoroughly before returning it to the office or its usual storage location. Prior to returning the field vehicle, clean the interior and exterior surfaces to the same standards as when the vehicle was received.

6.3 Post-Demobilization

Please continue to evaluate your health daily and communicate directly with your supervisor if you start to feel ill after demobilization.

For Team members scheduled to re-mobilize for another field effort soon after returning, continue to practice the personal hygiene standards described above, avoid large gatherings, and get enough rest. Sleep deprivation lowers immune system responses, making potential illnesses much worse. Communicate directly with supervisors about health needs and if illness symptoms appear after demobilization, or if other potential contacts (friends, nearby family, coworkers, etc.) have become ill.

APPENDIX E

Analytical Reports and COCs

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

Client: BEC Environmental, Inc.	Report to: Rachel Kistler	Bill to: Rachel Schlick	EDD Requirement	QA/QC	Sampe Receipt Condition
Address: 7241 West Sahara Avenue, Suite 120	Company: BEC Environmental, Inc.	Address: 7241 West Sahara Avenue Suite 120	Excel EDD ☐	RTNE ☐	Y N
Address: Las Vegas, NV 89117	Email: rachelk@becnv.com	Las Vegas, NV 89117	Geotracker ☐	RWQCB ☐	1. Chilled ☐ ☐
Phone: 702-304-9830 Fax:	Address: 7241 West Sahara Avenue, Suite 120	Email to: rachels@becnv.com PO#	Labspec ☐	CalTrans ☐	2. Headspace ☐ ☐
Submitted By: Kelly Sheehan, kellys@becnv.com	Las Vegas, NV 89117	Phone: 702-304-9830 Fax:	Others ☐	Level III ☐	3. Container Intact ☐ ☐
Title: Environmental Scientist	Phone: 702-304-9830 Fax:		Specify:	LEVEL IV ☐	4. Seal Present ☐ ☐
Signature: Date:	Sampled By: Kelly Sheehan, kellys@becnv.com		Global ID:	Regulatory ☐	5. IR number
I hereby authorize ASSET Labs to perform the tests indicated below:	*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.*			Specify State:	6. Method of Cooling
Project Name: Nye County Courthouse Phase II	Signature: Date				Sample Temp:
Project Number: 018.17.001					

Item No.	Laboratory Work Order No.	Sample ID/Location	Date	Time	Matrix: Water	Solid	Others	Analyses Requested: TO-15	Turn Around Time	No. of container	Container Type	PRESERVATION	Remarks
1		IA-CH-B	1/7/21	1:32p			Air	X					
2		IA-CH-01	1/7/21	1:42p			Air	X					
3		IA-CH-02	1/7/21	1:47p			Air	X					
4													
5													
6													
7													
8													
9													
10													
11													
12													

Matrix: Ground ☐ Sediment ☐ Potable ☐ Soil ☐ NPDES ☐ Other Solid ☐ Surface ☐

Courier:

Tracking No.

Relinquished by (Signature and Printed Name):	Date / Time	Received by (Signature and Printed Name):	Date / Time
[signature]	1/8/21 1055A	FEW MW	1/8/21 1055
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 Laboratories 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

January 21, 2021

Rachel Kistler
BEC Environmental, Inc.
7241 W. Sahara Ave Ste 120
Las Vegas, NV 89117

TEL: (702) 304-9830
FAX: (702) 304-9839

Workorder No.: N043689

RE: Nye County Courthouse Phase II, 018.17.001

Attention: Rachel Kistler

Enclosed are the results for sample(s) received on January 08, 2021 by ASSET Laboratories. The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (702) 307-2659 if I can be of further assistance to your company.

Sincerely,

for

Nancy Sibucao
Laboratory Director

CLIENT: BEC Environmental, Inc.
Project: Nye County Courthouse Phase II, 018.17.001
Lab Order: N043689

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Analytical comments for EPA TO15:

Laboratory Control Sample (LCS) outside recovery criteria on analyte Acetone. NELAC standard allows for three analytes in marginal exceedence based on 51-70 analytes.

CLIENT: BEC Environmental, Inc.
Project: Nye County Courthouse Phase II, 018.17.001
Lab Order: N043689
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N043689-001A	IA-CH-B	Air	1/7/2021 1:32:00 PM	1/8/2021	1/15/2021
N043689-002A	IA-CH-01	Air	1/7/2021 1:42:00 PM	1/8/2021	1/15/2021
N043689-003A	IA-CH-02	Air	1/7/2021 1:47:00 PM	1/8/2021	1/15/2021

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-001

Client Sample ID: IA-CH-B
Collection Date: 1/7/2021 1:32:00 PM
Matrix: AIR

VOCS IN AIR BY GCMS

EPA TO15

RunID: **NV00922-MS6_210113A** QC Batch: **R150051** PrepDate: Analyst: **HG**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	0.237	0.775		ppbv	1	1/13/2021 04:30 PM
1,1,2,2-Tetrachloroethane	ND	0.199	0.775		ppbv	1	1/13/2021 04:30 PM
1,1,2-Trichloroethane	ND	0.263	0.775		ppbv	1	1/13/2021 04:30 PM
1,1-Dichloroethane	ND	0.194	0.775		ppbv	1	1/13/2021 04:30 PM
1,1-Dichloroethene	ND	0.244	0.775		ppbv	1	1/13/2021 04:30 PM
1,2,4-Trichlorobenzene	ND	0.107	3.88		ppbv	1	1/13/2021 04:30 PM
1,2,4-Trimethylbenzene	ND	0.151	0.775		ppbv	1	1/13/2021 04:30 PM
1,2-Dibromoethane	ND	0.243	0.775		ppbv	1	1/13/2021 04:30 PM
Freon 114	ND	0.419	3.10		ppbv	1	1/13/2021 04:30 PM
1,2-Dichlorobenzene	ND	0.131	0.775		ppbv	1	1/13/2021 04:30 PM
1,2-Dichloroethane	ND	0.254	0.775		ppbv	1	1/13/2021 04:30 PM
1,2-Dichloropropane	ND	0.216	0.775		ppbv	1	1/13/2021 04:30 PM
1,3,5-Trimethylbenzene	ND	0.158	0.775		ppbv	1	1/13/2021 04:30 PM
1,3-Dichlorobenzene	ND	0.108	0.775		ppbv	1	1/13/2021 04:30 PM
1,4-Dichlorobenzene	ND	0.0908	0.775		ppbv	1	1/13/2021 04:30 PM
2-Butanone	ND	0.248	1.55		ppbv	1	1/13/2021 04:30 PM
2-Hexanone	ND	0.279	1.55		ppbv	1	1/13/2021 04:30 PM
4-ethyltoluene	ND	0.182	0.775		ppbv	1	1/13/2021 04:30 PM
4-Methyl-2-pentanone	ND	0.249	1.55		ppbv	1	1/13/2021 04:30 PM
Acetone	1.72	0.288	3.10	J	ppbv	1	1/13/2021 04:30 PM
Benzene	ND	0.253	0.775		ppbv	1	1/13/2021 04:30 PM
Benzyl chloride	ND	0.156	1.55		ppbv	1	1/13/2021 04:30 PM
Bromodichloromethane	ND	0.224	0.775		ppbv	1	1/13/2021 04:30 PM
Bromoform	ND	0.127	0.775		ppbv	1	1/13/2021 04:30 PM
Bromomethane	ND	0.220	0.775		ppbv	1	1/13/2021 04:30 PM
Carbon disulfide	ND	0.212	0.775		ppbv	1	1/13/2021 04:30 PM
Carbon tetrachloride	ND	0.230	0.775		ppbv	1	1/13/2021 04:30 PM
Chlorobenzene	ND	0.208	0.775		ppbv	1	1/13/2021 04:30 PM
Chloroethane	ND	0.286	0.775		ppbv	1	1/13/2021 04:30 PM
Chloroform	ND	0.196	0.775		ppbv	1	1/13/2021 04:30 PM
Chloromethane	0.542	0.285	0.775	J	ppbv	1	1/13/2021 04:30 PM
cis-1,2-Dichloroethene	ND	0.225	0.775		ppbv	1	1/13/2021 04:30 PM
cis-1,3-Dichloropropene	ND	0.194	0.775		ppbv	1	1/13/2021 04:30 PM
Dibromochloromethane	ND	0.251	0.775		ppbv	1	1/13/2021 04:30 PM
Dichlorodifluoromethane	0.512	0.234	0.775	J	ppbv	1	1/13/2021 04:30 PM
Ethylbenzene	ND	0.214	0.775		ppbv	1	1/13/2021 04:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-001

Client Sample ID: IA-CH-B
Collection Date: 1/7/2021 1:32:00 PM
Matrix: AIR

VOCS IN AIR BY GCMS

EPA TO15

RunID: **NV00922-MS6_210113A** QC Batch: **R150051** PrepDate: Analyst: **HG**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Freon-113	ND	0.206	0.775		ppbv	1	1/13/2021 04:30 PM
Hexachlorobutadiene	ND	0.122	1.55		ppbv	1	1/13/2021 04:30 PM
m,p-Xylene	ND	0.394	1.55		ppbv	1	1/13/2021 04:30 PM
Methylene Chloride	ND	0.200	1.55		ppbv	1	1/13/2021 04:30 PM
MTBE	ND	0.272	3.10		ppbv	1	1/13/2021 04:30 PM
o-Xylene	ND	0.177	0.775		ppbv	1	1/13/2021 04:30 PM
Styrene	ND	0.245	0.775		ppbv	1	1/13/2021 04:30 PM
Tetrachloroethene	ND	0.197	0.775		ppbv	1	1/13/2021 04:30 PM
Toluene	ND	0.242	0.775		ppbv	1	1/13/2021 04:30 PM
trans-1,2-Dichloroethene	ND	0.163	0.775		ppbv	1	1/13/2021 04:30 PM
trans-1,3-Dichloropropene	ND	0.208	0.775		ppbv	1	1/13/2021 04:30 PM
Trichloroethene	ND	0.185	0.775		ppbv	1	1/13/2021 04:30 PM
Trichlorofluoromethane	ND	0.158	0.775		ppbv	1	1/13/2021 04:30 PM
Vinyl acetate	ND	0.272	1.55		ppbv	1	1/13/2021 04:30 PM
Vinyl Chloride	ND	0.242	0.775		ppbv	1	1/13/2021 04:30 PM
Surr: 4-Bromofluorobenzene	94.0	0	70-130		%REC	1	1/13/2021 04:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified	DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-002

Client Sample ID: IA-CH-01
Collection Date: 1/7/2021 1:42:00 PM
Matrix: AIR

VOCS IN AIR BY GCMS

EPA TO15

RunID: **NV00922-MS6_210113A** QC Batch: **R150051** PrepDate: Analyst: **HG**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	0.275	0.900		ppbv	1	1/13/2021 05:15 PM
1,1,2,2-Tetrachloroethane	ND	0.231	0.900		ppbv	1	1/13/2021 05:15 PM
1,1,2-Trichloroethane	ND	0.306	0.900		ppbv	1	1/13/2021 05:15 PM
1,1-Dichloroethane	ND	0.225	0.900		ppbv	1	1/13/2021 05:15 PM
1,1-Dichloroethene	ND	0.284	0.900		ppbv	1	1/13/2021 05:15 PM
1,2,4-Trichlorobenzene	ND	0.124	4.50		ppbv	1	1/13/2021 05:15 PM
1,2,4-Trimethylbenzene	ND	0.175	0.900		ppbv	1	1/13/2021 05:15 PM
1,2-Dibromoethane	ND	0.282	0.900		ppbv	1	1/13/2021 05:15 PM
Freon 114	ND	0.486	3.60		ppbv	1	1/13/2021 05:15 PM
1,2-Dichlorobenzene	ND	0.152	0.900		ppbv	1	1/13/2021 05:15 PM
1,2-Dichloroethane	ND	0.295	0.900		ppbv	1	1/13/2021 05:15 PM
1,2-Dichloropropane	ND	0.251	0.900		ppbv	1	1/13/2021 05:15 PM
1,3,5-Trimethylbenzene	ND	0.183	0.900		ppbv	1	1/13/2021 05:15 PM
1,3-Dichlorobenzene	ND	0.125	0.900		ppbv	1	1/13/2021 05:15 PM
1,4-Dichlorobenzene	ND	0.105	0.900		ppbv	1	1/13/2021 05:15 PM
2-Butanone	ND	0.288	1.80		ppbv	1	1/13/2021 05:15 PM
2-Hexanone	ND	0.324	1.80		ppbv	1	1/13/2021 05:15 PM
4-ethyltoluene	ND	0.211	0.900		ppbv	1	1/13/2021 05:15 PM
4-Methyl-2-pentanone	ND	0.289	1.80		ppbv	1	1/13/2021 05:15 PM
Acetone	11.2	0.335	3.60		ppbv	1	1/13/2021 05:15 PM
Benzene	ND	0.293	0.900		ppbv	1	1/13/2021 05:15 PM
Benzyl chloride	ND	0.181	1.80		ppbv	1	1/13/2021 05:15 PM
Bromodichloromethane	ND	0.260	0.900		ppbv	1	1/13/2021 05:15 PM
Bromoform	ND	0.148	0.900		ppbv	1	1/13/2021 05:15 PM
Bromomethane	ND	0.256	0.900		ppbv	1	1/13/2021 05:15 PM
Carbon disulfide	ND	0.246	0.900		ppbv	1	1/13/2021 05:15 PM
Carbon tetrachloride	ND	0.267	0.900		ppbv	1	1/13/2021 05:15 PM
Chlorobenzene	ND	0.241	0.900		ppbv	1	1/13/2021 05:15 PM
Chloroethane	ND	0.333	0.900		ppbv	1	1/13/2021 05:15 PM
Chloroform	ND	0.228	0.900		ppbv	1	1/13/2021 05:15 PM
Chloromethane	ND	0.331	0.900		ppbv	1	1/13/2021 05:15 PM
cis-1,2-Dichloroethene	ND	0.261	0.900		ppbv	1	1/13/2021 05:15 PM
cis-1,3-Dichloropropene	ND	0.225	0.900		ppbv	1	1/13/2021 05:15 PM
Dibromochloromethane	ND	0.291	0.900		ppbv	1	1/13/2021 05:15 PM
Dichlorodifluoromethane	0.594	0.272	0.900	J	ppbv	1	1/13/2021 05:15 PM
Ethylbenzene	ND	0.248	0.900		ppbv	1	1/13/2021 05:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-002

Client Sample ID: IA-CH-01
Collection Date: 1/7/2021 1:42:00 PM
Matrix: AIR

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
VOCS IN AIR BY GCMS							
			EPA TO15				
RunID: **NV00922-MS6_210113A** QC Batch: **R150051**				PrepDate:			Analyst: **HG**
Freon-113	ND	0.240	0.900		ppbv	1	1/13/2021 05:15 PM
Hexachlorobutadiene	ND	0.142	1.80		ppbv	1	1/13/2021 05:15 PM
m,p-Xylene	ND	0.457	1.80		ppbv	1	1/13/2021 05:15 PM
Methylene Chloride	ND	0.233	1.80		ppbv	1	1/13/2021 05:15 PM
MTBE	ND	0.316	3.60		ppbv	1	1/13/2021 05:15 PM
o-Xylene	ND	0.206	0.900		ppbv	1	1/13/2021 05:15 PM
Styrene	ND	0.284	0.900		ppbv	1	1/13/2021 05:15 PM
Tetrachloroethene	ND	0.229	0.900		ppbv	1	1/13/2021 05:15 PM
Toluene	1.75	0.281	0.900		ppbv	1	1/13/2021 05:15 PM
trans-1,2-Dichloroethene	ND	0.190	0.900		ppbv	1	1/13/2021 05:15 PM
trans-1,3-Dichloropropene	ND	0.242	0.900		ppbv	1	1/13/2021 05:15 PM
Trichloroethene	ND	0.215	0.900		ppbv	1	1/13/2021 05:15 PM
Trichlorofluoromethane	ND	0.184	0.900		ppbv	1	1/13/2021 05:15 PM
Vinyl acetate	ND	0.316	1.80		ppbv	1	1/13/2021 05:15 PM
Vinyl Chloride	ND	0.281	0.900		ppbv	1	1/13/2021 05:15 PM
Surr: 4-Bromofluorobenzene	96.4	0	70-130		%REC	1	1/13/2021 05:15 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified	DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-003

Client Sample ID: IA-CH-02
Collection Date: 1/7/2021 1:47:00 PM
Matrix: AIR

VOCS IN AIR BY GCMS

EPA TO15

RunID: **NV00922-MS6_210113A** QC Batch: **R150051** PrepDate: Analyst: **HG**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	0.286	0.935		ppbv	1	1/13/2021 06:00 PM
1,1,2,2-Tetrachloroethane	ND	0.240	0.935		ppbv	1	1/13/2021 06:00 PM
1,1,2-Trichloroethane	ND	0.318	0.935		ppbv	1	1/13/2021 06:00 PM
1,1-Dichloroethane	ND	0.234	0.935		ppbv	1	1/13/2021 06:00 PM
1,1-Dichloroethene	ND	0.295	0.935		ppbv	1	1/13/2021 06:00 PM
1,2,4-Trichlorobenzene	ND	0.129	4.68		ppbv	1	1/13/2021 06:00 PM
1,2,4-Trimethylbenzene	ND	0.182	0.935		ppbv	1	1/13/2021 06:00 PM
1,2-Dibromoethane	ND	0.293	0.935		ppbv	1	1/13/2021 06:00 PM
Freon 114	ND	0.505	3.74		ppbv	1	1/13/2021 06:00 PM
1,2-Dichlorobenzene	ND	0.158	0.935		ppbv	1	1/13/2021 06:00 PM
1,2-Dichloroethane	ND	0.307	0.935		ppbv	1	1/13/2021 06:00 PM
1,2-Dichloropropane	ND	0.261	0.935		ppbv	1	1/13/2021 06:00 PM
1,3,5-Trimethylbenzene	ND	0.190	0.935		ppbv	1	1/13/2021 06:00 PM
1,3-Dichlorobenzene	ND	0.130	0.935		ppbv	1	1/13/2021 06:00 PM
1,4-Dichlorobenzene	ND	0.110	0.935		ppbv	1	1/13/2021 06:00 PM
2-Butanone	ND	0.299	1.87		ppbv	1	1/13/2021 06:00 PM
2-Hexanone	ND	0.337	1.87		ppbv	1	1/13/2021 06:00 PM
4-ethyltoluene	ND	0.220	0.935		ppbv	1	1/13/2021 06:00 PM
4-Methyl-2-pentanone	ND	0.301	1.87		ppbv	1	1/13/2021 06:00 PM
Acetone	4.79	0.348	3.74		ppbv	1	1/13/2021 06:00 PM
Benzene	ND	0.305	0.935		ppbv	1	1/13/2021 06:00 PM
Benzyl chloride	ND	0.188	1.87		ppbv	1	1/13/2021 06:00 PM
Bromodichloromethane	ND	0.270	0.935		ppbv	1	1/13/2021 06:00 PM
Bromoform	ND	0.153	0.935		ppbv	1	1/13/2021 06:00 PM
Bromomethane	ND	0.266	0.935		ppbv	1	1/13/2021 06:00 PM
Carbon disulfide	ND	0.256	0.935		ppbv	1	1/13/2021 06:00 PM
Carbon tetrachloride	ND	0.277	0.935		ppbv	1	1/13/2021 06:00 PM
Chlorobenzene	ND	0.250	0.935		ppbv	1	1/13/2021 06:00 PM
Chloroethane	ND	0.346	0.935		ppbv	1	1/13/2021 06:00 PM
Chloroform	ND	0.237	0.935		ppbv	1	1/13/2021 06:00 PM
Chloromethane	ND	0.343	0.935		ppbv	1	1/13/2021 06:00 PM
cis-1,2-Dichloroethene	ND	0.271	0.935		ppbv	1	1/13/2021 06:00 PM
cis-1,3-Dichloropropene	ND	0.234	0.935		ppbv	1	1/13/2021 06:00 PM
Dibromochloromethane	ND	0.302	0.935		ppbv	1	1/13/2021 06:00 PM
Dichlorodifluoromethane	0.673	0.283	0.935	J	ppbv	1	1/13/2021 06:00 PM
Ethylbenzene	ND	0.258	0.935		ppbv	1	1/13/2021 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified
DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Lab Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001
Lab ID: N043689-003

Client Sample ID: IA-CH-02
Collection Date: 1/7/2021 1:47:00 PM
Matrix: AIR

VOCS IN AIR BY GCMS

EPA TO15

RunID: **NV00922-MS6_210113A** QC Batch: **R150051** PrepDate: Analyst: **HG**

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
Freon-113	ND	0.249	0.935		ppbv	1	1/13/2021 06:00 PM
Hexachlorobutadiene	ND	0.147	1.87		ppbv	1	1/13/2021 06:00 PM
m,p-Xylene	1.03	0.475	1.87	J	ppbv	1	1/13/2021 06:00 PM
Methylene Chloride	ND	0.242	1.87		ppbv	1	1/13/2021 06:00 PM
MTBE	ND	0.328	3.74		ppbv	1	1/13/2021 06:00 PM
o-Xylene	ND	0.214	0.935		ppbv	1	1/13/2021 06:00 PM
Styrene	ND	0.295	0.935		ppbv	1	1/13/2021 06:00 PM
Tetrachloroethene	ND	0.238	0.935		ppbv	1	1/13/2021 06:00 PM
Toluene	1.80	0.292	0.935		ppbv	1	1/13/2021 06:00 PM
trans-1,2-Dichloroethene	ND	0.197	0.935		ppbv	1	1/13/2021 06:00 PM
trans-1,3-Dichloropropene	ND	0.251	0.935		ppbv	1	1/13/2021 06:00 PM
Trichloroethene	ND	0.224	0.935		ppbv	1	1/13/2021 06:00 PM
Trichlorofluoromethane	ND	0.191	0.935		ppbv	1	1/13/2021 06:00 PM
Vinyl acetate	ND	0.328	1.87		ppbv	1	1/13/2021 06:00 PM
Vinyl Chloride	ND	0.292	0.935		ppbv	1	1/13/2021 06:00 PM
Surr: 4-Bromofluorobenzene	91.8	0	70-130		%REC	1	1/13/2021 06:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
	Results are wet unless otherwise specified	DO	Surrogate Diluted Out

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **LCS-5000PPTV/5.00** SampType: **LCS** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	5.420	0.500	5.000	0	108	70	130				
1,1,2,2-Tetrachloroethane	5.240	0.500	5.000	0	105	70	130				
1,1,2-Trichloroethane	5.250	0.500	5.000	0	105	70	130				
1,1-Dichloroethane	5.420	0.500	5.000	0	108	70	130				
1,1-Dichloroethene	5.640	0.500	5.000	0	113	70	130				
1,2,4-Trichlorobenzene	4.130	2.50	5.000	0	82.6	70	130				
1,2,4-Trimethylbenzene	5.570	0.500	5.000	0	111	70	130				
1,2-Dibromoethane	5.350	0.500	5.000	0	107	70	130				
Freon 114	5.440	2.00	5.000	0	109	70	130				
1,2-Dichlorobenzene	5.190	0.500	5.000	0	104	70	130				
1,2-Dichloroethane	5.540	0.500	5.000	0	111	70	130				
1,2-Dichloropropane	5.580	0.500	5.000	0	112	70	130				
1,3,5-Trimethylbenzene	5.450	0.500	5.000	0	109	70	130				
1,3-Dichlorobenzene	5.410	0.500	5.000	0	108	70	130				
1,4-Dichlorobenzene	5.370	0.500	5.000	0	107	70	130				
2-Butanone	6.090	1.00	5.000	0	122	70	130				
2-Hexanone	5.890	1.00	5.000	0	118	70	130				
4-ethyltoluene	5.630	0.500	5.000	0	113	70	130				
4-Methyl-2-pentanone	5.990	1.00	5.000	0	120	70	130				
Acetone	6.660	2.00	5.000	0	133	70	130				S
Benzene	5.700	0.500	5.000	0	114	70	130				
Benzyl chloride	5.600	1.00	5.000	0	112	70	130				
Bromodichloromethane	5.540	0.500	5.000	0	111	70	130				
Bromoform	5.480	0.500	5.000	0	110	70	130				
Bromomethane	5.480	0.500	5.000	0	110	70	130				
Carbon disulfide	6.020	0.500	5.000	0	120	70	130				
Carbon tetrachloride	5.440	0.500	5.000	0	109	70	130				
Chlorobenzene	5.270	0.500	5.000	0	105	70	130				
Chloroethane	5.570	0.500	5.000	0	111	70	130				

Qualifiers:

B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S Spike/Surrogate outside of limits due to matrix interference
DO Surrogate Diluted Out
Calculations are based on raw values

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **LCS-5000PPTV/5.00** SampType: **LCS** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloroform	5.400	0.500	5.000	0	108	70	130				
Chloromethane	5.250	0.500	5.000	0	105	70	130				
cis-1,2-Dichloroethene	5.510	0.500	5.000	0	110	70	130				
cis-1,3-Dichloropropene	5.640	0.500	5.000	0	113	70	130				
Dibromochloromethane	5.710	0.500	5.000	0	114	70	130				
Dichlorodifluoromethane	5.550	0.500	5.000	0	111	70	130				
Ethylbenzene	5.540	0.500	5.000	0	111	70	130				
Freon-113	5.540	0.500	5.000	0	111	70	130				
Hexachlorobutadiene	4.880	1.00	5.000	0	97.6	70	130				
m,p-Xylene	11.300	1.00	10.00	0	113	70	130				
Methylene Chloride	5.580	1.00	5.000	0	112	70	130				
MTBE	6.140	2.00	5.000	0	123	70	130				
o-Xylene	5.520	0.500	5.000	0	110	70	130				
Styrene	5.600	0.500	5.000	0	112	70	130				
Tetrachloroethene	5.540	0.500	5.000	0	111	70	130				
Toluene	5.790	0.500	5.000	0	116	70	130				
trans-1,2-Dichloroethene	5.610	0.500	5.000	0	112	70	130				
trans-1,3-Dichloropropene	6.110	0.500	5.000	0	122	70	130				
Trichloroethene	5.610	0.500	5.000	0	112	70	130				
Trichlorofluoromethane	5.550	0.500	5.000	0	111	70	130				
Vinyl acetate	6.290	1.00	5.000	0	126	70	130				
Vinyl Chloride	5.470	0.500	5.000	0	109	70	130				
Surr: 4-Bromofluorobenzene	4.930		5.000		98.6	70	130				

Sample ID: **LCSD-5000PPTV/5.0** SampType: **LCSD** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	5.040	0.500	5.000	0	101	70	130	5.420	7.27	25	
1,1,2,2-Tetrachloroethane	4.700	0.500	5.000	0	94.0	70	130	5.240	10.9	25	

Qualifiers:

B Analyte detected in the associated Method Blank
E Value above quantitation range
H Holding times for preparation or analysis exceeded
J Analyte detected below quantitation limits
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S Spike/Surrogate outside of limits due to matrix interference
DO Surrogate Diluted Out
Calculations are based on raw values

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **LCSD-5000PPTV/5.0** SampType: **LCSD** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,2-Trichloroethane	5.200	0.500	5.000	0	104	70	130	5.250	0.957	25	
1,1-Dichloroethane	5.110	0.500	5.000	0	102	70	130	5.420	5.89	25	
1,1-Dichloroethene	5.110	0.500	5.000	0	102	70	130	5.640	9.86	25	
1,2,4-Trichlorobenzene	3.540	2.50	5.000	0	70.8	70	130	4.130	15.4	25	
1,2,4-Trimethylbenzene	5.110	0.500	5.000	0	102	70	130	5.570	8.61	25	
1,2-Dibromoethane	4.950	0.500	5.000	0	99.0	70	130	5.350	7.77	25	
Freon 114	5.220	2.00	5.000	0	104	70	130	5.440	4.13	25	
1,2-Dichlorobenzene	4.930	0.500	5.000	0	98.6	70	130	5.190	5.14	25	
1,2-Dichloroethane	4.980	0.500	5.000	0	99.6	70	130	5.540	10.6	25	
1,2-Dichloropropane	4.880	0.500	5.000	0	97.6	70	130	5.580	13.4	25	
1,3,5-Trimethylbenzene	5.050	0.500	5.000	0	101	70	130	5.450	7.62	25	
1,3-Dichlorobenzene	5.040	0.500	5.000	0	101	70	130	5.410	7.08	25	
1,4-Dichlorobenzene	4.910	0.500	5.000	0	98.2	70	130	5.370	8.95	25	
2-Butanone	5.640	1.00	5.000	0	113	70	130	6.090	7.67	25	
2-Hexanone	5.650	1.00	5.000	0	113	70	130	5.890	4.16	25	
4-ethyltoluene	5.390	0.500	5.000	0	108	70	130	5.630	4.36	25	
4-Methyl-2-pentanone	5.500	1.00	5.000	0	110	70	130	5.990	8.53	25	
Acetone	6.410	2.00	5.000	0	128	70	130	6.660	3.83	25	
Benzene	5.200	0.500	5.000	0	104	70	130	5.700	9.17	25	
Benzyl chloride	5.200	1.00	5.000	0	104	70	130	5.600	7.41	25	
Bromodichloromethane	5.180	0.500	5.000	0	104	70	130	5.540	6.72	25	
Bromoform	5.090	0.500	5.000	0	102	70	130	5.480	7.38	25	
Bromomethane	5.120	0.500	5.000	0	102	70	130	5.480	6.79	25	
Carbon disulfide	5.610	0.500	5.000	0	112	70	130	6.020	7.05	25	
Carbon tetrachloride	5.060	0.500	5.000	0	101	70	130	5.440	7.24	25	
Chlorobenzene	5.090	0.500	5.000	0	102	70	130	5.270	3.47	25	
Chloroethane	5.160	0.500	5.000	0	103	70	130	5.570	7.64	25	
Chloroform	4.830	0.500	5.000	0	96.6	70	130	5.400	11.1	25	
Chloromethane	4.930	0.500	5.000	0	98.6	70	130	5.250	6.29	25	
cis-1,2-Dichloroethene	5.240	0.500	5.000	0	105	70	130	5.510	5.02	25	

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out

Calculations are based on raw values

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **LCSD-5000PPTV/5.0** SampType: **LCSD** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076251**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
cis-1,3-Dichloropropene	5.290	0.500	5.000	0	106	70	130	5.640	6.40	25	
Dibromochloromethane	5.180	0.500	5.000	0	104	70	130	5.710	9.73	25	
Dichlorodifluoromethane	5.100	0.500	5.000	0	102	70	130	5.550	8.45	25	
Ethylbenzene	5.210	0.500	5.000	0	104	70	130	5.540	6.14	25	
Freon-113	5.220	0.500	5.000	0	104	70	130	5.540	5.95	25	
Hexachlorobutadiene	4.500	1.00	5.000	0	90.0	70	130	4.880	8.10	25	
m,p-Xylene	10.500	1.00	10.00	0	105	70	130	11.30	7.34	25	
Methylene Chloride	5.150	1.00	5.000	0	103	70	130	5.580	8.01	25	
MTBE	5.730	2.00	5.000	0	115	70	130	6.140	6.91	25	
o-Xylene	5.140	0.500	5.000	0	103	70	130	5.520	7.13	25	
Styrene	5.110	0.500	5.000	0	102	70	130	5.600	9.15	25	
Tetrachloroethene	5.160	0.500	5.000	0	103	70	130	5.540	7.10	25	
Toluene	5.200	0.500	5.000	0	104	70	130	5.790	10.7	25	
trans-1,2-Dichloroethene	5.400	0.500	5.000	0	108	70	130	5.610	3.81	25	
trans-1,3-Dichloropropene	5.550	0.500	5.000	0	111	70	130	6.110	9.61	25	
Trichloroethene	5.340	0.500	5.000	0	107	70	130	5.610	4.93	25	
Trichlorofluoromethane	5.220	0.500	5.000	0	104	70	130	5.550	6.13	25	
Vinyl acetate	6.020	1.00	5.000	0	120	70	130	6.290	4.39	25	
Vinyl Chloride	5.040	0.500	5.000	0	101	70	130	5.470	8.18	25	
Surr: 4-Bromofluorobenzene	4.870		5.000		97.4	70	130		0	25	

Sample ID: **MB-R150051** SampType: **MBLK** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076252**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	0.500									
1,1,2,2-Tetrachloroethane	ND	0.500									
1,1,2-Trichloroethane	ND	0.500									
1,1-Dichloroethane	ND	0.500									
1,1-Dichloroethene	ND	0.500									

Qualifiers:

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- Calculations are based on raw values

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **MB-R150051** SampType: **MBLK** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076252**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	2.50									
1,2,4-Trimethylbenzene	ND	0.500									
1,2-Dibromoethane	ND	0.500									
Freon 114	ND	2.00									
1,2-Dichlorobenzene	ND	0.500									
1,2-Dichloroethane	ND	0.500									
1,2-Dichloropropane	ND	0.500									
1,3,5-Trimethylbenzene	ND	0.500									
1,3-Dichlorobenzene	ND	0.500									
1,4-Dichlorobenzene	ND	0.500									
2-Butanone	ND	1.00									
2-Hexanone	ND	1.00									
4-ethyltoluene	ND	0.500									
4-Methyl-2-pentanone	ND	1.00									
Acetone	ND	2.00									
Benzene	ND	0.500									
Benzyl chloride	ND	1.00									
Bromodichloromethane	ND	0.500									
Bromoform	ND	0.500									
Bromomethane	ND	0.500									
Carbon disulfide	ND	0.500									
Carbon tetrachloride	ND	0.500									
Chlorobenzene	ND	0.500									
Chloroethane	ND	0.500									
Chloroform	ND	0.500									
Chloromethane	ND	0.500									
cis-1,2-Dichloroethene	ND	0.500									
cis-1,3-Dichloropropene	ND	0.500									
Dibromochloromethane	ND	0.500									
Dichlorodifluoromethane	ND	0.500									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
S	Spike/Surrogate outside of limits due to matrix interference	DO	Surrogate Diluted Out		Calculations are based on raw values

CLIENT: BEC Environmental, Inc.
Work Order: N043689
Project: Nye County Courthouse Phase II, 018.17.001

ANALYTICAL QC SUMMARY REPORT

TestCode: TO15_FULL

Sample ID: **MB-R150051** SampType: **MBLK** TestCode: **TO15_FULL** Units: **ppbv** Prep Date: RunNo: **150051**
Client ID: **ZZZZZZ** Batch ID: **R150051** TestNo: **EPA TO15** Analysis Date: **1/13/2021** SeqNo: **4076252**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	ND	0.500									
Freon-113	ND	0.500									
Hexachlorobutadiene	ND	1.00									
m,p-Xylene	ND	1.00									
Methylene Chloride	ND	1.00									
MTBE	ND	2.00									
o-Xylene	ND	0.500									
Styrene	ND	0.500									
Tetrachloroethene	ND	0.500									
Toluene	ND	0.500									
trans-1,2-Dichloroethene	ND	0.500									
trans-1,3-Dichloropropene	ND	0.500									
Trichloroethene	ND	0.500									
Trichlorofluoromethane	ND	0.500									
Vinyl acetate	ND	1.00									
Vinyl Chloride	ND	0.500									
Surr: 4-Bromofluorobenzene	4.220		5.000		84.4	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits
S	Spike/Surrogate outside of limits due to matrix interference	DO	Surrogate Diluted Out		Calculations are based on raw values

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

Client: BEC Environmental, Inc.	**Report to:** Rachel Kistler	**Bill to:** Rachel Schlick	EDD Requirement	QA/QC	Sampe Receipt Condition
Address: 7241 West Sahara Avenue, Suite 120	**Company:** BEC Environmental, Inc.	**Address:** 7241 West Sahara Avenue Suite 120	Excel EDD ☐	RTNE ☐	Y N
Address: Las Vegas, NV 89117	**Email:** rachelk@becnv.com	Las Vegas, NV 89117	Geotracker ☐	RWQCB ☐	1. Chilled ☐ ☐
Phone: 702-304-9830 **Fax:**	**Address:** 7241 West Sahara Avenue, Suite 120	**Email to:** rachels@becnv.com **PO#**	Labspec ☐	CalTrans ☐	2. Headspace ☐ ☐
Submitted By: Kelly Sheehan, kellys@becnv.com	Las Vegas, NV 89117	**Phone:** 702-304-9830 **Fax:**	Others ☐	Level III ☐	3. Container Intact ☐ ☐
Title: Environmental Scientist	**Phone:** 702-304-9830 **Fax:**		Specify:	LEVEL IV ☐	4. Seal Present ☐ ☐
Signature: **Date:**	**Sampled By:** Kelly Sheehan, kellys@becnv.com		Global ID:	Regulatory ☐	5. IR number
I hereby authorize ASSET Labs to perform the tests indicated below:	*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.*			Specify State:	6. Method of Cooling
Project Name: Nye County Courthouse Phase II	*Signature:* *Date*				Sample Temp:
Project Number: 018.17.001					

Matrix: Ground ☐ Sediment ☐ Potable ☐ Soil ☐ NPDES ☐ Other Solid ☐ Surface ☐

Analyses Requested: TO-15

Turn Around Time | No. of container | Container Type | PRESERVATION

Courier:

Tracking No.

Item No.	Laboratory Work Order No.	Sample ID/Location	Date	Time	Water	Solid	Others	TO-15	Remarks
1	N043689-01	IA-CH-B	1/7/21	1:32p			Air	X	
2	-02	IA-CH-01	1/7/21	1:42p			Air	X	
3	-03	IA-CH-02	1/7/21	1:47p			Air	X	
4									
5									
6									
7									
8									
9									
10									
11									
12									

Relinquished by (Signature and Printed Name): Kelly Sheehan	Date / Time 1/8/21 1055A	Received by (Signature and Printed Name): FEW MW	Date / Time 1/8/21 1055
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 following 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 Laboratories 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

ASSET Laboratories

Please review the checklist below. Any NO signifies non-compliance. Any non-compliance will be noted and must be understood as having an impact on the quality of the data. All tests will be performed as requested regardless of any compliance issues.

If you have any questions or further instruction, please contact our Project Coordinator at (702) 307-2659.

Cooler Received/Opened On:	1/8/2021	Workorder:	N043689
Rep sample Temp (Deg C):	NA	IR Gun ID:	NA
Temp Blank:	☐ Yes ☑ No		
Carrier name:	Walk-In		
Last 4 digits of Tracking No.:	NA	Packing Material Used:	Carton
Cooling process:	☐ Ice ☐ Ice Pack ☐ Dry Ice ☐ Other ☑ None		

Sample Receipt Checklist

1. Shipping container/cooler in good condition?	Yes ☐	No ☐	Not Present ☐
2. Custody seals intact, signed, dated on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
3. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
4. Chain of custody present?	Yes ☑	No ☐	
5. Sampler's name present in COC?	Yes ☑	No ☐	
6. Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
7. Chain of custody agrees with sample labels?	Yes ☑	No ☐	
8. Samples in proper container/bottle?	Yes ☑	No ☐	
9. Sample containers intact?	Yes ☑	No ☐	
10. Sufficient sample volume for indicated test?	Yes ☑	No ☐	
11. All samples received within holding time?	Yes ☑	No ☐	
12. Temperature of rep sample or Temp Blank within acceptable limit?	Yes ☐	No ☐	NA ☑
13. Water - VOA vials have zero headspace?	Yes ☐	No ☐	NA ☑
14. Water - pH acceptable upon receipt? Example: pH > 12 for (CN,S); pH<2 for Metals	Yes ☐	No ☐	NA ☑
15. Did the bottle labels indicate correct preservatives used?	Yes ☐	No ☐	NA ☑
16. Were there Non-Conformance issues at login?	Yes ☐	No ☐	NA ☑
Was Client notified?	Yes ☐	No ☐	NA ☑

Comments:

For:

Checklist Completed By: FR BHdez 1/11/2021

Reviewed By: MBC 01/11/2021

ASSET Laboratories

WORK ORDER Summary

08-Jan-21

WorkOrder: N043689

Client ID: BECEN02

Project: Nye County Courthouse Phase II, 018.17.001 **QC Level:** RTNE **Date Received:** 1/8/2021

Comments:

Sample ID	Client Sample ID	Date Collected	Date Due	Matrix	Test No	Test Name	Hld	MS	Sub	Storage
N043689-001A	IA-CH-B	1/7/2021 1:32:00 PM	1/19/2021	Air	EPA TO15	VOCs in Air by GCMS	☐	☐	☐	AIR
N043689-002A	IA-CH-01	1/7/2021 1:42:00 PM	1/19/2021		EPA TO15	VOCs in Air by GCMS	☐	☐	☐	AIR
N043689-003A	IA-CH-02	1/7/2021 1:47:00 PM	1/19/2021		EPA TO15	VOCs in Air by GCMS	☐	☐	☐	AIR
N043689-004A	FOLDER	1/19/2020	1/19/2021		Folder	Folder	☐	☐	☐	LAB
			1/19/2021		Folder	Folder	☐	☐	☐	LAB

Conversion of gaseous indoor air pollutants

The general equation is µg/m³ = (ppb)(12.187)(M)/(273.15+ °C)
Where M is molecular weight (g/mol). An atmospheric pressure of 1 atmosphere is assumed.

IA-CH-B			ppb -> µg/m³						
Analyte	M	Temp (in °C)	ppb-PQL	µg/m³-PQL	ppb-MDL	µg/m³-MDL	ppb-Result	µg/m³-Result	Commercial VISL µg/m³
Acetone	58.08	7.8	3.10	7.81	0.288	0.73	1.72	4.33	13500
Benzene	78.11	7.8	0.775	2.626	0.253	0.857	ND	ND	1.57
Ethylbenzene	106.16	7.8	0.775	3.569	0.214	0.985	ND	ND	4.91
Methyl-t-butyl ether (MTBE)	88.15	7.8	3.10	11.85	0.272	1.04	ND	ND	47.2
Styrene	104.15	7.8	0.775	3.501	0.245	1.107	ND	ND	438
Toluene	92.14	7.8	0.775	3.098	0.242	0.967	ND	ND	2190
Xylenes (total)	106.16	7.8	1.55	7.14	0.394	1.81	ND	ND	43.8

IA-CH-O1			ppb -> µg/m³						
Analyte	M	Temp (in °C)	ppb-PQL	µg/m³-PQL	ppb-MDL	µg/m³-MDL	ppb-Result	µg/m³-Result	Commercial VISL µg/m³
Acetone	58.08	21.1	3.6	8.7	0.335	0.8	11.2	26.9	13500
Benzene	78.11	21.1	0.900	2.912	0.293	0.948	ND	ND	1.57
Ethylbenzene	106.16	21.1	0.900	3.957	0.248	1.090	ND	ND	4.91
Methyl-t-butyl ether (MTBE)	88.15	21.1	3.60	13.14	0.316	1.15	ND	ND	47.2
Styrene	104.15	21.1	0.900	3.882	0.284	1.225	ND	ND	438
Toluene	92.14	21.1	0.9	3.43	0.281	1.07	1.75	6.68	2190
Xylenes (total)	106.16	21.1	1.8	7.9	0.457	2.0	ND	ND	43.8

IA-CH-O2			ppb -> µg/m³						
Analyte	M	Temp (in °C)	ppb-PQL	µg/m³-PQL	ppb-MDL	µg/m³-MDL	ppb-Result	µg/m³-Result	Commercial VISL µg/m³
Acetone	58.08	21.1	3.74	9.00	0.348	0.84	4.79	11.52	13500
Benzene	78.11	21.1	0.935	3.025	0.305	0.987	ND	ND	1.57
Ethylbenzene	106.16	21.1	0.935	4.111	0.258	1.134	ND	ND	4.91
Methyl-t-butyl ether (MTBE)	88.15	21.1	3.74	13.65	0.328	1.20	ND	ND	47.2
Styrene	104.15	21.1	0.935	4.033	0.295	1.273	ND	ND	438
Toluene	92.14	21.1	0.935	3.6	0.292	1.1	1.8	6.9	2190
Xylenes (total)	106.16	21.1	1.87	8.22	0.475	2.09	ND	ND	43.8

Equation retrieved from Aarhus University - Danish Centre for Environment and Energy
https://www2.dmu.dk/AtmosphericEnvironment/Expost/database/docs/PPM_conversion.pdf

Molecular weight values obtained from PubChem - National Institute of Health's National Center for Biotechnology Information and US National Library of Medicine
https://pubchem.ncbi.nlm.nih.gov/

APPENDIX F

EPA Vapor Intrusion Screening Levels

Default VISL Results
Commercial Equation Inputs

Output generated 16JAN2021:13:27:52

Variable	Value
Exposure Scenario	Commercial
Temperature for Groundwater Vapor Concentration C	25
THQ (target hazard quotient) unitless	0.1
TR (target risk) unitless	1E-06
AT_w (averaging time - composite worker)	365
EF_w (exposure frequency - composite worker) day/yr	250
ED_w (exposure duration - composite worker) yr	25
ET_w (exposure time - composite worker) hr	8
LT (lifetime) yr	70
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp} > C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc} > C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)
Acetone	67-64-1	Yes	Yes	Yes	Yes	1.35E+04	NC	4.51E+05	9.45E+06	--
Benzene	71-43-2	Yes	Yes	Yes	Yes	1.57E+00	CA	5.24E+01	6.93E+00	No (5)
Ethylbenzene	100-41-4	Yes	Yes	Yes	Yes	4.91E+00	CA	1.64E+02	1.52E+01	Yes (700)
Methyl tert-Butyl Ether (MTBE)	1634-04-4	Yes	Yes	Yes	Yes	4.72E+01	CA	1.57E+03	1.97E+03	--
Styrene	100-42-5	Yes	Yes	Yes	Yes	4.38E+02	NC	1.46E+04	3.90E+03	No (100)
Toluene	108-88-3	Yes	Yes	Yes	Yes	2.19E+03	NC	7.30E+04	8.07E+03	No (1000)
Xylenes	1330-20-7	Yes	Yes	Yes	Yes	4.38E+01	NC	1.46E+03	1.62E+02	Yes (10000)

Chemical	Pure Phase Vapor Concentration C_{vp}\ (25 °C)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (°C)	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (µg/m³)
Acetone	7.23E+08	1.43E+09	25	2.50	CRC89	-		3.09E+01	A	No	-	1.35E+04
Benzene	3.98E+08	4.06E+08	25	1.20	CRC89	7.80E-06	I	3.00E-02	I	No	1.57E+00	1.31E+01
Ethylbenzene	5.48E+07	5.44E+07	25	0.80	CRC89	2.50E-06	C	1.00E+00	I	No	4.91E+00	4.38E+02
Methyl tert-Butyl Ether (MTBE)	1.19E+09	1.22E+09	25	2.00	YAWS	2.60E-07	C	3.00E+00	I	No	4.72E+01	1.31E+03
Styrene	3.58E+07	3.49E+07	25	0.90	CRC89	-		1.00E+00	I	No	-	4.38E+02
Toluene	1.41E+08	1.43E+08	25	1.10	CRC89	-		5.00E+00	I	No	-	2.19E+03
Xylenes	4.56E+07	2.87E+07	25	-		-		1.00E-01	I	No	-	4.38E+01

Chemical Properties
Output generated 16JAN2021:13:27:52

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)
Acetone	67-64-1	Yes	Yes	58.081	PHYSPROP	2.32E+02	PHYSPROP	1.00E+06	PHYSPROP	-	3.50E-05
Benzene	71-43-2	Yes	Yes	78.115	PHYSPROP	9.48E+01	PHYSPROP	1.79E+03	PHYSPROP	5	5.55E-03
Ethylbenzene	100-41-4	Yes	Yes	106.17	PHYSPROP	9.60E+00	PHYSPROP	1.69E+02	PHYSPROP	700	7.88E-03
Methyl tert-Butyl Ether (MTBE)	1634-04-4	Yes	Yes	88.151	PHYSPROP	2.50E+02	PHYSPROP	5.10E+04	PHYSPROP	-	5.87E-04
Styrene	100-42-5	Yes	Yes	104.15	PHYSPROP	6.40E+00	PHYSPROP	3.10E+02	PHYSPROP	100	2.75E-03
Toluene	108-88-3	Yes	Yes	92.142	PHYSPROP	2.84E+01	PHYSPROP	5.26E+02	PHYSPROP	1000	6.64E-03
Xylenes	1330-20-7	Yes	Yes	106.17	PHYSPROP	7.99E+00	PHYSPROP	1.06E+02	PHYSPROP	10000	6.63E-03

Chemical	Henry's Law Constant (unitless)	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Acetone	1.43E-03	PHYSPROP	1.43E-03	329.15	PHYSPROP	5.08E+02	CRC89	6.96E+03	CRC89	2.5	CRC89
Benzene	2.27E-01	PHYSPROP	2.27E-01	353.15	PHYSPROP	5.62E+02	CRC89	7.34E+03	CRC89	1.2	CRC89
Ethylbenzene	3.22E-01	PHYSPROP	3.22E-01	409.25	PHYSPROP	6.17E+02	CRC89	8.50E+03	CRC89	0.8	CRC89
Methyl tert-Butyl Ether (MTBE)	2.40E-02	PHYSPROP	2.40E-02	328.15	PHYSPROP	4.97E+02	CRC89	6.68E+03	CRC89	2	YAWS
Styrene	1.12E-01	PHYSPROP	1.12E-01	418.15	PHYSPROP	6.35E+02	CRC89	8.74E+03	Weast	0.9	CRC89
Toluene	2.71E-01	PHYSPROP	2.71E-01	383.75	PHYSPROP	5.92E+02	CRC89	7.93E+03	Weast	1.1	CRC89
Xylenes	2.71E-01	PHYSPROP	2.71E-01	411.65	PHYSPROP	6.20E+02	YAWS	8.52E+03	Weast	-	

APPENDIX G

Certifications & Resumes

State of Nevada

Department of Conservation and Natural Resources

Division of Environmental Protection

This is to certify that

RACHEL SCHLICK

having given satisfactory evidence of the necessary qualifications as required by the Nevada Revised Statute 459.400 to 459.600, inclusive, and Nevada Administrative Code 459.970 to 459.9729, inclusive, has been granted certification as a

Certified Environment Manager

in the State of Nevada
In testimoney whereof, witness the signature of the Administrator and the Seal of the State of Nevada.

EM2447
Certification Number

10/18/2021
Expiration Date

Greg Lovato, Administrator

State of Nevada
NDEP
Division of Environmental Protection
RACHEL SCHLICK
is certified as an
Certified Environment Manager
in the State of Nevada
EM2447 Expires - 10/18/2021

State of Nevada
NDEP
Division of Environmental Protection
RACHEL SCHLICK
is certified as an
Certified Environment Manager
in the State of Nevada
EM2447 Expires - 10/18/2021

NOTE:

Attached is your official certificate attesting to your certification. Also attached are two (2) pocket cards. Upon request of the Division, client or potential client, a holder of a certificate shall present his certificate for inspection (NAC 459.9729). A pocket card will suffice as proof of certificate at job sites.

You will receive only one (1) notification of expiration and renewal for your certification. It is the certified individual's responsibility to ensure his or her renewal is submitted in a timely manner. There is no grace period (NAC 459.9727).

Any address changes should be forwarded to the Certification coordinator at:

Bureau of Corrective Actions
901 S. Stewart Street, Suite 4001
Carson City, NV 89701-5249

STATE OF NEVADA
DEPARTMENT OF BUSINESS AND INDUSTRY
DIVISION OF INDUSTRIAL RELATIONS
Occupational Safety and Health Administration
Asbestos Control Program

Certifies That Kelly Sheehan

is Licensed As Asbestos Abatement Consultant

License No. I-2166 Expiration Date 11/13/2020

Signature Of Licensee Kelly Sheehan

THE ASBESTOS INSTITUTE

Certifies that

Kelly Sheehan

has attended and received instruction in the EPA approved course

AHERA Building Inspector Refresher

on

October 22, 2020

and successfully completed and passed the competency exam.

Certificate:
ON-4644-8888-102220

Date of Examination:
22-Oct-2020
Date of Expiration:
22-Oct-2021

William T. Cavness
Director

Approved Instructor

THE ASBESTOS INSTITUTE
20033 N. 19th Ave, Building 6, Phoenix, AZ 85027
602-864-6564 – www.theasbestosinstitute.com

This training meets all requirements for asbestos certification under Toxic Substance Control Act Title II.

Team Profile

Rachel Schlick is a Certified Environmental Manager and an Environmental Scientist with BEC. Her professional experience includes brownfields site identification, assessment, and cleanup planning; chemical inventories; Phase I and Phase II Environmental Site Assessments; collection and analysis of aqueous and soil samples contaminated with heavy metals, petroleum hydrocarbons, and other contaminants of concern; NEPA analyses and environmental reviews; surveying, monitoring, and remediating sensitive species and habitats; GIS analysis; and associated reporting and stakeholder coordination.

Rachel's responsibilities include project management, technical reporting, agency communication, and client coordination for brownfields programs. She oversees and performs asbestos surveys, environmental reviews, and site characterizations. She contributes technical expertise to various projects at BEC, including grant applications, community plans, and technical reports.

Rachel has performed biological surveys and monitoring for species protected by the Endangered Species Act, including the Mojave desert tortoise (Gopherus agassizii). She has also monitored and remediated the Mohave tui chub fish (Siphateles bicolor mohavensis) habitat on U.S. Department of Defense firing ranges.

Rachel has worked in community outreach through the Choice Neighborhood Initiative in North Las Vegas and the Rural Desert Southwest Brownfields Coalition across six counties in Nevada and California. Rachel conducted trainings as an instructor for the Environmental Workforce Development and Job Training Program in Pahrump, Nevada.

Rachel received her Associate of Arts in Pre-Engineering from Cerro Coso Community College and her Bachelor of Science in Earth Systems from the University of California, Merced.

Rachel Schlick

Environmental Scientist/ Project Manager

Education and Training

Bachelor of Science, Earth Systems, minor in Applied Math, University of California, Merced

Associate of Arts, Pre-Engineering, Cerro Coso Community College

Desert Tortoise Council Introduction to Surveying, Monitoring, and Handling Techniques Workshop

First Aid/CPR/AED

HUD Region IX Environmental Review

OSHA Class IV Naturally Occurring Asbestos—Asbestos Awareness

PSMJ Project Management Boot Camp

Professional Certifications

Environmental Manager, State of Nevada, Certification Number 2447

NV OSHA Licensed Asbestos Abatement Consultant No. I-1992

AHERA Building Inspector

Water Pollution Control Manager

EPA Lead Risk Assessor

40-Hour OSHA HAZWOPER

Areas of Expertise

- Asbestos inspection
- Brownfields consulting
- Environmental compliance
- Environmental monitoring and surveys
- Project management
- Site characterization
- Soil/water collection and analysis

Team Profile

Kelly Sheehan is an Environmental Technician with BEC. Her professional experience with BEC includes environmental sample collection, site inspections, and research and preparation of Environmental Reviews, Phase I Environmental Site Assessments, Phase II Environmental Site Assessments, Area Wide Plans, Sampling and Analysis Plans, Asbestos Survey Reports, and Health and Safety Plans. She expanded her expertise by becoming an OSHA Certified Asbestos Abatement Consultant, and a Water Pollution Control Manager to conduct water quality assessments and stormwater pollution prevention monitoring and reporting in accordance with federal, state, and local regulations. Her professional experience also includes maintaining and operating a groundwater treatment facility, conducting groundwater sampling, and real-time evaluation of analytical testing.

Kelly graduated from the University of Nevada, Las Vegas in 2017, achieving a bachelor's degree in Urban Affairs with a concentration in Environmental Studies. During her academic career, she participated in several projects involving wilderness conservation, species protection, and trail maintenance in Nevada and California.

Through AmeriCorps, she was a summer intern for the Friends of Nevada Wilderness, an organization responsible for protecting over three million acres of wilderness in the state. Here, she was given the opportunity to create safe trails, learn about policy, and educate children at the YMCA.

Kelly Sheehan

Environmental Scientist

Education and Training

Bachelor of Science, Urban Affairs, with a focus in Environmental Studies, University of Nevada, Las Vegas

Associates of Arts, College of Southern Nevada

First-Aid / CPR / AED

Professional Certifications

40-Hour OSHA HAZWOPER

NSC Defensive Driving

AHERA Building Inspector

NV OSHA Licensed Asbestos Abatement Consultant No. 2166

Water Pollution Control Manager

Commercial Mold Inspector, ILLCRC #1884

Areas of Expertise

- Environmental compliance
- Asbestos inspection
- Soil collection and analysis
- Stormwater pollution prevention planning
- Social Media

Team Profile

Rachel Kistler is an Environmental Scientist at BEC. She has over seven years of combined laboratory research, analytical testing, field research, and environmental health and safety experience. She contributes technical expertise to various projects at BEC, including grant applications, community plans, and technical reports.

She provides program assistance for brownfields activities conducted through the Nevada Brownfields Program and the Rural Desert Southwest Brownfields Coalition, including developing site eligibility applications, performing Phase I and Phase II Environmental Site Assessments, developing Sampling and Analysis Plans, and assisting with hazardous material surveys at multiple locations. She develops environmental reviews in accordance with the National Environmental Policy Act and associated U.S. Department of Housing and Urban Development requirements. She also provides support for economic development, conservation and preservation, research, and planning initiatives for local, state and federal agencies as well as private clients throughout Nevada.

Rachel provides field support for ongoing projects, such as conducting plant and animal surveys, soil sampling and geotechnical support, and environmental site assessments. As a Field Technician, she has monitored sensitive animal populations for various state and federal agencies on federal and public lands in Nevada; collected soil samples in accordance with relevant EPA Methodology; and developed documentation in support of the programs.

Rachel has experience implementing safety programs, including establishing procedures for chemical safety, biosafety, radiation safety, the use and disposal of hazardous materials, and warehouse and manufacturing safety. She has managed Environmental Health and Safety (EH&S) permitting and licensing and has previously been responsible for training staff to fulfill regulatory requirements. She is BEC's Safety Officer, and provides ongoing support for developing BEC's safety program and site-specific health and safety plans.

Rachel earned her Bachelor's Degree in Environmental Science with a concentration in Plant Resources from Virginia Tech in 2011.

Rachel Kistler

Environmental Scientist

Education and Training

Bachelor of Science, Environmental Science, Virginia Tech

First-Aid / CPR / AED

Professional Certifications

Radon Measurement Technician

NRPP ID #110806 RT

40-Hour OSHA HAZWOPER

30-Hour OSHA Construction

Areas of Expertise

- Biological and Environmental Surveys
- Brownfields
- Environmental Compliance
- Environmental Site Assessments
- GIS Support
- Grant writing
- Health and Safety Training and Compliance
- NEPA Analysis and Compliance
- Project Research and Records Review