Voluntary Remediation Program Work Plan

I-10 Avra Valley Mining & Development Site

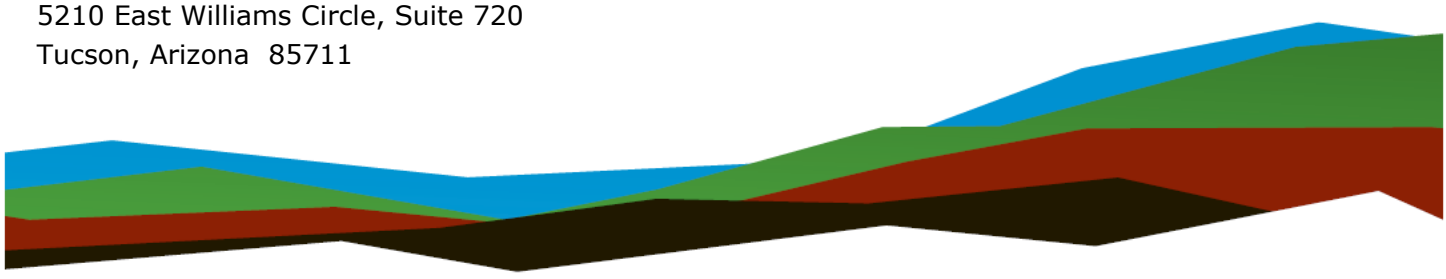
7755 West Avra Valley Road

Marana, Pima County, Arizona 85653

VRP Site Code: 514142-00

March 5, 2025| Project Number: 63237102

Prepared For:
I-10 Avra Valley Mining & Development, LLC
5210 East Williams Circle, Suite 720
Tucson, Arizona 85711



Prepared by:
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March 5, 2025

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Attn: Mr. Thomas Parsons
P (520) 623-5466
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RE: Voluntary Remediation Program Work Plan
I-10 Avra Valley Mining & Development (Site Code: 514142-00)
7755 West Avra Valley Road, Marana, Arizona
Terracon Project No. 63237102520

Dear Mr. Parsons:

Terracon Consultants, Inc. (Terracon) is submitting this Work Plan to guide additional assessment and remediation activities at the I-10 Avra Valley Mining and Development Site under the oversight of the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program. This Work Plan and accompanying Sampling and Analysis Plan (SAP) have been revised in response to comments received from ADEQ in a letter dated July 18, 2024 and email dated September 9, 2024. Please contact Annie McCawley at (520) 798-4823 or at annie.mccawley@terracon.com should you have any questions or comments.

Sincerely,
Terracon

Annie McCawley

Annie McCawley
Senior Staff Scientist

Stewart Dixon
Project Reviewer

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List of Acronyms

Acronym	Definition
%	Percent
°C	Degrees Celsius
Δ	Difference Between Regulatory Threshold and Mean Concentration
n_c	Number of Samples Collected
n_r	Number of Samples Required for Representative Sample
s^2	Sample Variance
$t_{0.80}$	Student's t Value (Probability of 0.20 and Degrees of Freedom for Samples Collected)
$\bar{x}$	Mean Concentration
A.A.C.	Arizona Administrative Code
A.R.S.	Arizona Revised Statutes
ACM	Asbestos-Containing Material
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
AHERA	Asbestos Hazard Emergency Response Act
AOC	Area of Contamination
APN	Assessor's Parcel Number

Acronym	Definition
ARAR	Applicable or Relevant and Appropriate Regulations
AST	Aboveground Storage Tank
AWQS	Aquifer Water Quality Standard
BAP	Benzo(a)pyrene
bgs	Below Ground Surface
CFR	Code of Federal Regulations
CGP	Construction General Permit
COC	Contaminant of Concern
DEUR	Declaration of Environmental Use Restriction
DQI	Data Quality Indicator
DQO	Data Quality Objective
DU	Decision Unit
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
ESpA	Endangered Species Act
GPL	Groundwater Protection Level
GPR	Ground Penetrating Radar
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
IRIS	Integrated Risk Information System
ISM	Incremental Sampling Methodology
ITRC	Interstate Technology and Regulatory Council
LDR	Land Disposal Restriction
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MQO	Measurement Quality Objective
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFA	No Further Action
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NOIA	Notice of Intent to Abandon
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
PACE	Pace Analytical
PAH	Polynuclear Aromatic Hydrocarbon
PCS	Petroleum-Contaminated Soil
PDEQ	Pima County Department of Environmental Quality

Acronym	Definition
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
R^2	Coefficient of Determination
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
RT	Regulatory Threshold
SAP	Sampling and Analysis Plan
SCRC	Site Characterization and Remediation Completion
SOP	Standard Operating Procedure
SRL	Soil Remediation Level
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TAT	Turnaround Time
TCLP	Toxicity Characteristic Leaching Procedure
TEL	Tetra Ethyl Lead
Terracon	Terracon Consultants, Inc.
USCS	Uniform Soil Classification System
USDA	United States Department of Agriculture
USGS	United States Geological Service
UTS	Universal Treatment Standard
VOC	Volatile Organic Compound
Volunteer	I-10 Avra Valley Mining & Development, LLC
VRP	Voluntary Remediation Program
WTI	Western Technologies, Inc.
XRF	X-Ray Fluorescence

1.0 PROJECT OVERVIEW

1.1 Introduction

This Work Plan has been developed to describe activities to be conducted by I-10 Avra Valley Mining & Development, LLC (Volunteer, owner), or occupant, or developer and its consultant to complete closure activities under the oversight of the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP). The property for which closure is being sought is designated as a portion of Pima County Assessor's Parcel Number (APN) 226-01-032E and has an assigned address of 7755 West Avra Valley Road (Site). The Site is owned by I-10 Avra Valley Mining & Development LLC. The general location of the Site is depicted on a topographic map provided as Exhibit 1.

The Site covers approximately 1.6 acres and is developed with several abandoned structures and contains soils and concrete impacted by metals associated with the former ASARCO mine copper ore loading and transfer facility (see Exhibit 2). A portion of the Site stores landscape material and a diesel fuel aboveground storage tank (AST) under the operational control of Kalamazoo Materials, a Site lessee. The Site has been identified within Pima County Board of Supervisors Ordinance 2008-95 which includes details of the Avra Valley Gateway Specific Plan. The Avra Valley Gateway Specific Plan identifies futures site use as "Commerce Center", which are similar to Pima County CPI and CB-2 commercial zoning uses. The Specific Plan restricts residential uses (except as part of a hotel), unless authorized by the Pima County Board of Supervisors.

Soil remediation will be conducted under the VRP Statute found at Title 49, Article 5 of the Arizona Revised Statutes (A.R.S.). This Work Plan, in combination with the Sampling and Analysis Plan (SAP) provided as Attachment A, describes the sample and assessment program development, Site characterization, remedial actions, quality assurance (QA)/quality control (QC), and VRP-required activities that will be completed by the Volunteer and consultant to obtain a determination from ADEQ that no further action is required to remediate soil at the Site (NFA Determination). The completed VRP Work Plan Checklist is provided as Attachment B.

1.2 Site Background

The earliest development at the Site is not known. Aerial photography, circa 1952, shows the Site was developed with a copper ore concentrate loading and transfer facility owned by ASARCO. This included railroad tracks, a railcar scale, headframe, railcar conveyor system, water tower, and other ancillary structures. The facility remained in operation until about 1983 when the facility was abandoned. The site has been used as a sand and gravel sales lot since about 2000.

1.3 Site Closure Objectives

1.3.1 Cleanup Standards

The Volunteer submitted an application to ADEQ to enroll the Site into the VRP dated September 15, 2023. ADEQ documented the Site was accepted into the VRP effective October 25, 2023 and assigned VRP Site Code 514142-00 (See Attachment C). The future Site use has been defined within the Avra Valley Gateway Specific Plan which states the site will be used as a "Commerce Center". The Volunteer desires to remediate the Site such that any uses can be accommodated in the future and, therefore, would like to obtain an NFA Determination.

State of Arizona soil remediation levels (SRLs) are found at Title 18, Chapter 7, Article 2 of the Arizona Administrative Code (A.A.C.) consisting of Sections R18-7-201 through R18-7-209 and Appendices A through D. As specified in these rules, soil must be remediated so that concentrations of listed contaminants remaining in soil are less than:

- Background cleanup standards (R18-7-204)
- Pre-determined cleanup standards (R18-7-205)
- Site-specific cleanup standards (R18-7-206)

Soil cleanup standards allow for the use of the 10^{-5} excess lifetime cancer risk except for known human carcinogens or if the current or intended future use of the Site is a child care facility or school where children under the age of 18 are reasonably expected to be in frequent, repeated contact with the soil. In these cases, the 10^{-6} excess cancer risk must be used.

In addition to achieving cleanup to the cleanup standards above, R18-7-203(B)(1) stipulates that soil must be remediated such that the contaminants of concern (COC) concentrations remaining in soil do not cause or threaten to cause a violation of the State of Arizona Aquifer Water Quality Standards (AWQS) found at 18 A.A.C. 11. Compliance with this requirement is most commonly demonstrated by comparing soil concentrations to Groundwater Protection Levels (GPLs) found in ADEQ's guidance document (ADEQ, 1996)[1]. Similar to the SRL rules, pre-determined GPLs, referred to as minimum GPLs, found in the guidance can be used for the remediation standard or Site-specific GPLs can be calculated from Site data.

1.3.2 Project-Specific Cleanup Standards

Based on the historical Site uses by ASARCO and the results of assessment and characterization activities conducted on and near the Site, an NFA Determination for soil will be sought for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver

[1] ADEQ; A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality; 1996.

(also known as the 8 Resource Conservation Recovery Act (RCRA) metals), copper, manganese, vanadium, and zinc. These metals are collectively referred to as metal COCs in this Work Plan. The Volunteer will conduct remediation and final soil confirmatory characterization to demonstrate Site standards are attained for the following Project-Specific Cleanup Standards:

- Arsenic (Known human carcinogen): Residential SRL with 10^{-6} excess cancer risk factor
- Metal COCs: Residential SRL 10^{-5} excess cancer risk factor or Residential Non-Carcinogen Levels (whichever is lower)
- All Constituents: Minimum GPLs

Summaries of Project-Specific cleanup standards for the metal COCs are provided in Table 1.

1.3.3 Data Quality Objectives

Site-specific Data Quality Objectives (DQOs) were developed to identify the type, quantity, and quality of data needed to support the process to obtain an NFA Determination for COCs in Site soil. This process is described in Section 2.1 of the SAP.

1.4 Available Documents

Assessment activities conducted at the Site are listed below and summarized in Section 2.0. Electronic copies of the previous assessment report were provided to ADEQ with the VRP application.

- Enviro Engineering; *Sample Location Map and Laboratory Report*; December 31, 2001
- Western Technologies, Inc. (WTI); *Phase I Environmental Site Assessment Report, 97 Acres of Partially Developed Land, SWC: I-10 and Avra Valley Road*; April 15, 2004
- WTI; *Environmental Site Assessment Update, 97 Acres of Land, SWC: I-10 and Avra Valley Road*; January 24, 2005
- WTI; *Limited Phase II Site Characterization; Soil Sampling and Copper Ore Loading Area; SWC: I-10 and Avra Valley Road*; May 11, 2005
- WTI; *Contaminated Soil Quantification, 97 Acres of Land, SWC: I-10 and Avra Valley Road;* August 8, 2005
- SCS Engineers; *Phase I Environmental Site Assessment; I-10 Avra Valley Mining & Development Parcel (APN 226-01-0320);* December 4, 2006

- Partner Engineering and Science, Inc.; *Avra Valley I10 Overlay; 7851 West Avra Valley Road;* December 28, 2021
- WTI, *Environmental Soil Assessment; Commercial Property; SWC: I-10 and Avra Valley Road*, March 2, 2022

2.0 SUMMARY OF PREVIOUS ASSESSMENTS

Assessment activities have been conducted at the Site by several environmental contractors since 2001. Previous reports have included the Site (approximately 1.6 acres) incorporated within a larger area (approximately 97 acres) surrounding the Site. Thus, some of the previous findings do not pertain to the Site. Pertinent information from the reports listed in Section 1.4 is provided in the following sections. Summaries of work conducted on the Site that does not directly pertain to Site closure are not provided.

2.1 Enviro Engineering, Inc. Sample Location Map and Laboratory Report (December 2001)

In 2001, Enviro Engineering, Inc. was contracted to provide scientific support and rational for hazard identification and dose-response information in the Integrated Risk Information System (IRIS) program pertaining to chronic exposure to barium. The scope of work included collection of seven soil samples surrounding the former railroad located on the parent parcel of the Site. The samples were analyzed for 8 RCRA metals. Soil cleanup standards were not provided in the report, but soil samples did not contain 8 RCRA metals in concentrations greater than the current ADEQ SRLs or minimum GPLs. The report did not identify sample locations or barium exposure conclusions. Analytical results are provided in Table 2. Current SRLs found at R18-7, Appendix A (effective May, 2007) are provided for reference.

2.2 WTI Phase I ESA (April 2004)

The WTI Phase I Environmental Site Assessment (ESA) was performed for 97 acres of land located at the southwest corner of I-10 and Avra Valley Road which included the Site. WTI identified the 97 acres of land as "the Property", which was reportedly developed with an unused railroad spur; a concrete subgrade storage structure connected to a conveyor system historically used for railroad car repair; an approximate 1,000 gallon AST; two fuel ASTs; two truck scales; a landscape materials sales yard; three concrete lined irrigation channels; three groundwater wells; concrete foundations for several above ground storage tanks; and an unpaved staging area for refuse collection trucks. WTI recommended the following:

- Soil sampling for copper, copper compounds, and copper cyanide should be performed around the copper-concentrate hopper and conveyor assembly
- 55-gallon drums of waste oil and approximately 25 truck batteries on Property should be properly recycled

Based on the Site Plan provided in the Phase I ESA, the 55-gallon drums of waste oil and 25 truck batteries were located at least 500 feet northwest of the current Site.

2.3 WTI ESA Update (January 2005)

The WTI ESA Update includes the 97 acres of land previously addressed within the 2004 WTI Phase I ESA. The WTI ESA Update included analytical results from soil sampling performed in December 2004. The ESA Update reported significant changes to the Property. The changes at the Site included removal of railroad tracks leading up to and beyond the railcar scale. The ESA Update reported the following Recognized Environmental Condition (REC):

- Soil samples taken around the conveyor assembly and railcar scale on December 22, 2004, showed copper levels were present in concentrations greater than the SRLs for residential properties. WTI reported that it was performing a site characterization of this area around the conveyor assembly and railcar scale.

WTI made the following recommendations for further assessment:

- The dross pile at the end of the railroad tracks, south of the railcar hoist should be removed from the Property and properly disposed
- The groundwater wells on the Property should be registered with the Arizona Department of Water Resources (ADWR)
- Should the groundwater wells on the Property not be used, they should be properly abandoned in accordance with the ADWR procedures

2.4 WTI Limited Phase II Site Characterization (May 2005)

The Limited Phase II Site Characterization was performed to further evaluate the findings of WTI's Phase I ESA and ESA Update (Section 2.2 and 2.3). On December 22, 2004, January 19, 2005, February 24, 2005, and March 18, 2005, WTI collected 103 concrete and soil samples, primarily near the copper ore conveyor assembly and railcar scale to estimate the vertical and horizontal extent of potential total copper, cyanide, and heavy metal impacts to soil. The samples were collected from depths ranging from ground surface to 18 inches below ground surface (bgs). The sample locations were referenced from a groundwater well north of the railcar scale. Copper and lead were present in concentrations greater than the SRLs. Soil and concrete sample results are provided in Table 3.

2.5 WTI Contaminated Soil Quantification (August 2005)

This letter report was prepared to quantify the volume of soil containing metals in concentrations greater than SRLs using the findings of the site characterization report (see Section 2.4). WTI recommended soil and gravel should be removed along the former railway track to a depth of 1 foot bgs as follows:

Area 1. Gravel-bed removal – to the following distances from the railcar scale:

- 50 feet north
- 50 feet south
- 320 feet east
- 200 feet west

Area 2. Soil removal - to the following distances from the railcar scale:

- 30 feet north
- 30 feet south
- 90 feet east
- 60 feet west

WTI calculated the soil and gravel volume and weight to be removed from these areas to be approximately 2,259 cubic yards and 2,745 tons, respectively.

2.6 SCS Engineers Phase I ESA (December 2006)

The Phase I ESA was performed for the 97-acre parcel that included the Site. Several RECs were identified, including the following that may have been associated with the Site:

- Contamination on the northeast portion of the site near the former conveyor system and adjoining railroad siding by copper concentrate resulted in soil and pavement exceeding the ADEQ residential SRL for total copper. The extent of contamination has reportedly been defined; however, review of the sample location figure in a previous environmental investigation report shows areas where the lateral extent of contamination has not been defined. The report recommended that approximately 1,926 cubic yards of railroad ballast gravel and 333 cubic yards of soil be removed and characterized and properly disposed, verification samples be collected, and additional sampling and characterization be performed if structures or concrete is removed.
- Railroad ties removed from the railroad siding were piled in various locations along the railroad siding. Railroad ties contain creosote and petroleum hydrocarbons.
- Previous uses of the north-central portion of the site included railcar repair and ladle repair; dark colored soil was observed on a historical aerial photograph in this area, dross was reported in two locations in a previous report, and current darker colored soil was observed in this area. Two dross piles were noted in previous environmental reports in the vicinity of this facility; however, there was no indication as to whether the piles were removed appropriately or if sampling or characterization was performed.

- At least four fuel ASTs have been located on the site parent parcel); none of the ASTs were located on concrete pads and only one reportedly had secondary containment (plastic liner). Apparently minor soil staining was observed associated with the current fuel AST.

Based on these findings, SCS Engineers recommended the following:

- SCS agrees that soil and rock contaminated by copper be removed and disposed appropriately, and that verification sampling be performed following removal of the soil. It appears that the extent of contamination has not been completely defined; therefore, additional sampling and analysis for metals is recommended. Contaminated pavement should also be removed. Areas that could not be observed during the site reconnaissance, such as the subgrade vault beneath the hopper, the railcar scale vault, and the interior of the inaccessible buildings should be investigated to determine if there are environmental issues associated with these areas.
- Investigation, sampling, characterization, and proper disposal of railroad ballast and ties should be performed.
- Soil sampling investigations should be performed in areas currently and previously occupied by fuel ASTs or in areas where the fuel may have been used to evaluate whether there were significant impacts from spillage or leaking of fuel.
- Solid waste disposed on the site should be removed and properly disposed.
- At least one and reportedly three below-grade septic systems may have been installed in the northern portion of the site. SCS recommends that construction on the site take into account the possible presence of septic tank systems in the vicinity of former structures, which may be a geotechnical concern if they have not been properly excavated and filed. Proper procedures should be followed for removal or abandonment of the septic systems and based on the former industrial site uses, SCS recommends collection and analysis of soil samples from septic system locations.
- Two groundwater wells (one on Site and one on parent parcel off-Site), and a third well was reportedly observed during a prior investigation. Any wells located on the site must be registered with ADWR and if not used, must be abandoned in accordance with ADEQ regulations.

2.7 Partner Engineering and Science Inc., Phase I ESA, Avra Valley I10 Overlay (December, 2021)

This Phase I ESA was performed for a portion of the parent parcel located adjoining to the southwest of the Site. The Phase I ESA included a recommendation that a limited

subsurface investigation be conducted to identify the presence or absence of soil contamination due to the historical use of the parent parcel.

2.8 WTI, Environmental Soil Assessment (March, 2022)

The ESA included the results of soil sample collection conducted on December 16, 2021 and February 4, 2021. Soil sample analytical results are provided in Table 4. The December 2021 sampling event included soil sample collection to 12 inches bgs in the vicinity of the copper ore loading area and former railroad lines. The following summarizes the analytical parameters and lists compounds for which analytical results exceed SRLs.

Sample ID	Analytical Parameters	SRL Exceedance
S-1 and S-3	8 RCRA metals and copper	None
S-2 and S-4	Copper	Copper (S-2) exceeds residential SRL
S-5	Copper and polynuclear aromatic hydrocarbons (PAHs)	None
S-6	Copper, PAHs, 8 RCRA metals	▪ Arsenic, cadmium, and lead exceed non-residential SRL ▪ Copper exceeds residential SRL ▪ Benzo(a)pyrene (BAP) exceeds residential SRL for 10^{-5} risk factor.

During the February 2021 sampling event, WTI collected eight soil samples from ground surface and 6 inches bgs in an area southeast of the copper ore loading area. The samples were analyzed for 8 RCRA metals, copper, and silver. One sample (B1S) collected from the surficial soil contained arsenic in concentrations greater than the residential SRL and copper in a concentration greater than the non-residential SRL. Based on the findings of the two sampling events, WTI recommended proper soil management within the area and to the depths shown in Figure A of their report. The area in the WTI figure is similar to the VRP Site boundary, with removal of soil to 12 inches bgs along the railway bed and to 36 inches bgs within the area near the copper ore railcar scale.

3.0 SITE SETTING

3.1 Summary of Soil Impacts

The Site investigations described in Section 2.0 were conducted to estimate the extent and magnitude of soil impact to the Site from releases associated with historical Site activities conducted by ASARCO. Approximate soil sample locations are shown on Exhibit 3. Soil sample locations are estimated and are based on distance from the on-Site groundwater well which was used by WTI as the reference to identify soil sample locations in the 2004 WTI 2004 report.

As illustrated in Exhibit 3 and summarized in Table 5, five metals and one PAH were present in site soil samples in concentrations greater than the residential SRL, non-residential SRL, and/or GPL established by ADEQ:

- Arsenic
- Cadmium
- Chromium
- Copper
- Lead
- Benzo(a)pyrene (BAP)

One soil sample (S-6) collect by WTI during the 2022 assessment contained BAP at a concentration of 0.0767 milligrams per kilogram (mg/kg). BAP is present in a concentration greater than the residential SRL with 10^{-6} excess cancer risk factor of 0.069 mg/kg and is less than the ADEQ residential SRL with 10^{-5} excess cancer risk factor of 0.69 mg/kg. The Volunteer will not request an NFA Determination for PAHs and, therefore, further soil assessment and/or remediation will not be conducted.

The extent of soil containing metal COCs in concentrations greater than the residential SRL, non-residential SRL, or minimum GPL has not been fully delineated. However, based on soil sample results from the previous site investigations, an estimate of the Site boundary where additional investigation and remedial actions will be conducted is provided as Exhibit 3. The Site boundary is subject to change based on findings during site excavation and confirmatory sampling. A final survey of the extent of the remedial action will be developed after soil confirmation samples demonstrate that COCs are present in concentrations less than the residential SRLs and/or minimum GPL and will be submitted with the Site Characterization and Remediation Completion (SCRC) Report.

3.2 Site Characteristics

Site Characteristics	
Topography	
Site Elevation	Approximately 2,080 above sea level
Topographic Gradient	Relatively flat area with general gradient towards the west
Closest Surface Water	Santa Cruz River, approximately 530 feet southwest of the Site.
Source: United States Geological Society (USGS) Topographic Map, Marana, Arizona Quadrangle, 2019 Map (Appendix A)	
Soil Characteristics	
Soil Type	Vinton-Anthony sandy loams and Agua very fine sandy loam
Description	Vinton-Anthony sandy loam consists of well-drained loamy fine sands. Permeability of the profile is moderately rapid. Runoff across the profile is slow to moderate and erosion hazard is slight to moderate. Agua very fine sandy loam consists of very deep, well-drained soils formed in stream alluvium from mixed sources. These soils are on floodplains and alluvial fans. Permeability is moderate with slow runoff.
Source: Pima County, Arizona, United States Department of Agriculture (USDA), Natural Resources Conservation Service	
Geology/Hydrogeology	
Formation	Holocene river alluvium (Qr)
Description	Unconsolidated to weakly consolidated sand and gravel in river channels and sand, silt, and clay on floodplains. Also includes young terrace deposits fringing floodplains. (0-10 ka)
Source: USGS Geologic Map of Arizona, 2000, http://data.azgs.az.gov/geologic-map-of-arizona/	
Estimated Depth to First Occurrence of Groundwater	Approximately 150 feet bgs
Source: City of Tucson Water: 2022 Depth to Groundwater Map	
Hydrogeologic Gradient	Towards Northwest
Source: City of Tucson Water: 2022 Groundwater Elevation Map	

4.0 FIELD PREPARATION

4.1 Health and Safety Plan

A Site-specific Health and Safety Plan (HASP) will be developed to assure field activities detailed in this VRP Work Plan are conducted in a manner protective of the safety and health of Site workers and the public. The HASP will be prepared in general accordance with Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910). The purpose of the HASP will be to assign responsibilities, to establish personnel protection standards and mandatory safety practices and procedures, and to provide for contingencies that may occur while operations are being conducted at the Site.

4.2 Underground Utilities Location

The consultant will locate Site utilities before subsurface disturbance occurs and will take precautions to reduce the possibility of damaging existing structures and utilities. Arizona 811 will locate the public utilities in the Site vicinity. The consultant will also contract with a private utility locator to conduct an electromagnetic survey and ground penetrating radar (GPR) to identify underground features, specifically for the presence of underground structures and utilities.

4.3 Compliance with Permits and Regulatory Requirements

The Volunteer and its consultants will comply with applicable local, state, and federal rules and regulations related to the remediation and assessment activities at the Site. The primary regulatory requirements for this project are described below.

4.3.1 Stormwater Pollution Prevention

Construction activities, including those associated with remediation, that disturb more than 1.0 acre and have the potential to enter waters of the United States or a storm drain system must obtain authorization under the National Pollutant Discharge Elimination System (NPDES) regulations prior to the discharge. The Volunteer will obtain authorization through Construction General Permit (CGP) No. AZG2020-001 issued by ADEQ and will comply with the requirements of the General Permit, including implementation of a Stormwater Pollution Prevention Plan (SWPPP) tailored to the Site and submission of a Notice of Intent (NOI).

The consultant will prepare a SWPPP in accordance with the CGP requirements for the remediation activities. The consultant will submit an NOI to be covered under the General Permit using the ADEQ myDEQ online system, pay the applicable fees, and receive authorization to discharge from the ADEQ. The consultant will submit a Notice of Termination (NOT) to ADEQ after remediation activities and Site stabilization are completed.

4.3.2 Dust Control

The Pima County Department of Environmental Quality (PDEQ) has regulatory authority for air quality within Pima County, including fugitive dust generation caused by earthmoving activities impacting 1 acre or more. The Volunteer will obtain a Fugitive Dust Activity Permit from PDEQ and minimize dust generation by:

- Using water to wet exposed soil surfaces, roadways, soil excavation/loading
- Limiting vehicular speeds
- Covering or creating a crust over soil stockpiles
- Discontinuing dust-generating operations during high-wind events

Vehicle track-out will be implemented as described in the SWPPP discussed in Section 4.3.1. In addition, erosion control and stabilization procedures will be implemented as outlined in the plan discussed in Section 4.3.1.

4.3.3 Historic Properties and Threatened and Endangered Species

The requirements of the National Historic Preservation Act (NHPA) or the Endangered Species Act (ESpA) apply to sites where historic properties or threatened and endangered (T&E)-designated species, respectively, are impacted by assessment or cleanup of a site. The consultant concluded historic properties or T&E species were not present on or near the Site. The consultant will continue to monitor the Site and ensure cleanup activities do not negatively impact protected resources discovered on the Site.

4.3.4 Groundwater Well Abandonment

The on-Site groundwater monitoring well will be abandoned in accordance with ADWR regulations. The owner, occupant, or developer will subcontract with a State of Arizona registered driller to conduct the well abandonment activities, register the well, file a Notice of Intent to Abandon (NOIA) with ADWR, and obtain permits from ADWR for the well abandonment.

4.4 Asbestos-Containing Materials

The National Emission Standards for Hazardous Air Pollutants (NESHAP) found at 40 CFR Part 61, Subpart M regulates asbestos fiber emissions and asbestos waste disposal practices. The NESHAP regulation also requires the identification and classification of existing asbestos containing material (ACM) according to friability prior to demolition or renovation activity. PDEQ has been delegated regulatory authority to implement the Asbestos NESHAP regulations.

4.5 Hazardous Waste or Special Waste

Hazardous waste identification, classification, generation, transportation, and disposal are regulated under RCRA in 40 CFR §§ 260 through 273. Hazardous waste regulations may be relevant for discovery of soil or other materials containing COCs in concentrations that would classify the soil or other materials as hazardous waste if it was disposed. If soil or other materials are encountered that, based on the consultant's professional experience, could potentially be classified as a hazardous waste, samples will be collected and analyzed for the appropriate leachable toxicity characteristic analyte concentration using the Toxicity Characteristic Leaching Procedure (TCLP) and analytical method to measure the total concentration of the suspect analyte. Analyte concentrations will be compared to the regulatory level to evaluate whether the excavated soil is a toxic characteristic hazardous waste.

The Volunteer assumes no hazardous waste will be generated at the Site. If hazardous waste is generated, the Volunteer will obtain a Hazardous Waste Generator permit from the United States Environmental Protection Agency (EPA), and transport and dispose hazardous waste at US Ecology in Beatty, Nevada, an off-Site landfill permitted to accept hazardous waste, and manage the process using manifests signed by the Volunteer and including the Volunteer EPA ID number.

Special waste is defined in ARS 49-851(5) as a solid, non-hazardous waste that requires special handling and management to protect public health or the environment and are statutorily listed as a special waste. Petroleum-contaminated soil (PCS) is designated as a special waste and is defined as soil excavated for storage, treatment, or disposal that contains certain petroleum product-based constituents in concentrations greater than the SRLs.

4.6 Land Disposal Restrictions

RCRA defines land disposal to include "any placement of such hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave". Therefore, land disposal restrictions, generally include the "placement" of hazardous waste in a land disposal unit. EPA generally defines placement in a land disposal unit to mean the placement of hazardous waste into one of these units, not movement within a unit. Therefore, in accordance with the EPA's Area of Contamination (AOC) Policy[2], excavated soil that is potentially hazardous waste, that will remain in the area of contamination until the soil is profiled, transported, and disposed, does not meet the definition of a hazardous waste. The excavated material

[2] EPA, Office of Solid Waste and Emergency Response; Memorandum; *Use of the Area of Contamination (AOC) Concept During RCRA Cleanups*; March 13, 1995.

may be moved and placed in a temporary on-Site stockpile area awaiting disposal of the material in a RCRA Subtitle C or Subtitle D landfill, as discussed in Section 5.9.

Land disposal restrictions (LDRs) apply to soil to be transported and disposed off-Site. On May 26, 1998, EPA promulgated Alternative LDR treatment standards specific to contaminated soils (see 63 FR 28555 and 40 CFR 268.49). The Alternative LDR treatment standards encourage more cost-effective cleanup of hazardous contaminated soil.[3] ADEQ adopted portions of 40 CFR 268.49 into the Arizona Administrative Code Title 18, Chapter 8, Section 268. Therefore, the Alternative LDR treatment standards are applicable to potentially contaminated soil generated at this Site and disposed off-Site. The applicable Alternative LDR treatment regulations are found at 40 CFR 269.49(c) and state that prior to land disposal, contaminated soil subject to LDRs must be treated according to the Universal Treatment Standard (UTS) specified in 40 CFR 268.48 or:

- Treatment must achieve 90 percent (%) reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP); or
- Treatment must achieve reduction of constituent concentrations less than 10 times the UTS identified in 40 CFR 268.48 Table UTS. Treatment to 10 times the UTS is not required.

As an example, the UTS for lead is 0.75 milligrams per liter (mg/L) as analyzed by TCLP, and ten times the UTS is 7.5 mg/L. The hazardous waste characteristic level is 5.0 mg/L, which is less than 10 times the lead UTS of 7.5 mg/L. Therefore, the hazardous waste characteristic level of 5.0 mg/L will be used as the applicable treatment standard (rather than the UTS or Alternative LDR treatment standard), and only soil containing lead in a concentration less than 5.0 mg/L as analyzed by the TCLP will be transported and disposed off-Site as a non-hazardous waste. The UTS and Alternative LDR treatment standard are listed in Table 1.

4.7 Schedule

Project milestones, including report submittal to ADEQ, are expected to be completed in accordance with the schedule provided as Table 6.

[3] EPA; *Guidance on Demonstrating Compliance With the Land Disposal Restrictions Alternative Soil Treatment Standards, Final Guidance (EPA530-R-02-003)*"; July 2002).

5.0 SITE REMEDIATION

Site characterization and remediation will be conducted in accordance with the general procedures outlined in this Work Plan and in accordance with the detailed requirements outlined in the SAP. Standard Operating Procedures (SOPs) for field sampling are provided in Section 5.0 of the SAP.

Site remediation will be conducted by excavating, transporting, and disposing soil containing metal COCs in concentrations greater than the residential SRL and GPL. Historical site assessment data indicates copper is the predominant Site contaminant; thus, copper will be used as the primary indicator to guide excavation activities.

In general, soil excavation in the DUs will consist of the following steps which are further discussed in the following sections:

1. The site features will be demolished, transported, and disposed of off Site.
2. Soil will be excavated in areas and to depths defined in the Work Plan based on historical Site operations.
3. DUs that require excavation (DU1, DU2, DU3, DU7, and DU8) will be screened with a hand-held X-ray fluorescence (XRF) instrument after initial excavation to the depths indicated in Exhibit 4 to evaluate whether the soil contains copper in a concentration greater than the residential SRL. Based on previous data, DU4, DU5, and DU6 are not expected to contain COCs in concentrations greater than the residential SRLs and, therefore are not expected to be excavated or screened using the XRF instrument. However, if excavation is required, the XRF instrument will also be used to screen excavation floor and excavation sidewalls in these three DUs.
    - If the XRF measurement is less than the screening level, no additional excavation will be conducted, and confirmatory samples will be collected using an incremental sampling methodology (ISM).
    - If the XRF measurement is greater than the screening level, additional excavation will be conducted using the XRF instrument to define the limits of excavation.
4. If the analytical results demonstrate that copper is not present in a concentration greater than the residential SRL, the sample will be analyzed for the remainder of the metal COCs.
    - If the analytical results demonstrate that copper or other metal COCs are present in a concentration greater than the residential SRL, additional excavation will be conducted using the XRF instrument to define the limits of excavation.
    - If the analytical results demonstrate that the metal COCs are not present in a concentration greater than the residential SRL, the DU will be considered to be characterized and remediated, and no further work will be conducted in the DU.

Soil underlying the railcar scale concrete foundation and subgrade conveyor system will be characterized using analysis of discrete samples collected under these features after these features have been removed. Soil samples collected in these areas will be submitted to the analytical laboratory for analysis of metal COCs. These samples will not be screened using the XRF instrument.

5.1 Site Demolition

Prior to demolition activities, an asbestos inspection will be performed by an Asbestos Hazard Emergency Response Act (AHERA) certified building inspector. If asbestos is identified during the asbestos inspection, asbestos will be removed by a state-licensed asbestos abatement contractor and properly disposed at the Durham Regional Landfill or other landfill certified to accept ACM waste.

The Volunteer will submit an asbestos NESHAP Activity Permit Application and Notification of Demolition and Renovation form to PDEQ. Required information to be provided in the form includes date asbestos inspection was performed, amount/type of asbestos identified, asbestos waste transporter, and disposal site.

Once asbestos has been removed and PDEQ authorizes demolition of the structures, the Volunteer will remove structures, equipment, and debris from the Site prior to soil excavation, including the subgrade conveyor system and concrete railcar scale foundation. The groundwater well will be abandoned in accordance with ADWR requirements. Metal and other recyclable materials will be transported and disposed at an appropriate facility. Debris (generally consisting of concrete, vegetation, fuel AST liner, and similar materials) will be transported and disposed as non-hazardous waste to the Los Reales Landfill in Tucson.

5.2 DU and Sample Area Selection

Soil assessment for the purposes of obtaining an NFA Determination will be conducted using ISM and discrete sampling. ISM will be used to characterize soil across the majority of the site. It is not practical to collect soil samples underlying the railcar scale foundation and the subgrade conveyor system using ISM; therefore, discrete soil samples will be collected from these two areas. The discrete samples will be collected from native soil underlying these features using an excavator after the features have been removed to allow for an accurate representation of the conditions of the soil. Sample collection using ISM and discrete sampling procedures is described in the following sections.

5.2.1 Decision Unit Selection

The majority of the Site has been divided into eight areas for purposes of confirmation sampling using ISM. Decision Unit (DU) boundaries within these areas are illustrated on Exhibit 4 and the area and volume of each DU are provided in Table 7. The DUs were selected based on the following criteria:

- Operations conducted in the area (railcar loading, railway, support operations, and vacant land)
- Depth of potential metal COCs impact (0.5 inches bgs to 2 feet bgs) as depicted on Exhibit 4
- Requirement to characterize excavation (sidewalls and excavation floor)

Excavation to the depths shown in Table 7 will be conducted in areas 1, 2, 3, 7, and 8; therefore, these five areas will each contain one excavation floor DU (designated as DU1-EX, DU2-EX, DU3-EX, DU7-EX, and DU8-EX) and one sidewall DU (designated as DU1-SW, DU2-SW, DU3-SW, DU7-SW, and DU8-SW). Sidewall samples that exceed soil cleanup standards may extend the excavation dimensions beyond the Site boundary depicted on Exhibits 7A and 7B. The Site boundary shown on the exhibits is not the property boundary, and sampling can be expanded beyond the Site boundary, if needed, based on the analytical results. If analytical results demonstrate that additional excavation is required in the DU, the DUs at deeper depths will be labelled with an alphabetic character beginning with A (e.g., DU1-EX-A and DU1-SW-A).

Based on historical site assessment results, soil excavation may not be required in areas 4, 5, and 6 and DUs in these areas will be designated as DU4, DU5, and DU6. If the analytical results from the initial characterization in DU-4, DU-5, and DU-6 demonstrate that soil excavation is required in these areas, the DUs at deeper depths will be labelled with an alphabetic character beginning with A (e.g., DU1-EX-A and DU1-SW-A).

The horizontal extent (size) of the DUs was selected based on the assumption that there is relatively normal distribution of contaminants across the DU and, therefore, Interstate Technology and Regulatory Council (ITRC, 2022)[4] guidance that the DUs cover less than 0.5 acres is valid. It should be noted that the vertical and lateral extent of the impacted soil has not been fully delineated and the DU locations and Site boundaries may change based on site characterization analytical results. If the DU boundaries are expanded, the consultant will assure that no DU exceeds ½ acre. Additional DUs may be identified if different soil types are encountered.

Prior to initiating closure activities, the locations of each corner of the DU will be identified and placed into a Keyhole Markup Language (.kml) file. The .kml file will be uploaded to a Global Positioning System (GPS) unit with sub-meter accuracy which will be used to mark the corner points (north, south, east, and west) of the DUs in the field.

[4] ITRC; *Incremental Sampling (ISM) Update;* October 2022.

5.2.2 Discrete Sample Selection

The use of ISM to characterize soil underlying the railcar scale concrete foundation and subgrade conveyor system is not practical because these features extend to approximately 20 feet below ground surface. Therefore, discrete samples will be collected from eight locations in soil underlying these features after these features have been removed (four sample locations from soil underlying the railcar scale and four locations underlying the subgrade conveyor system as discussed further in Section 5.5 and shown on Exhibits 5A and 5B. The samples will be collected from native soil about 3 feet below the underlying features which will provide an accurate characterization of metals concentrations underlying the features.

5.3 Soil Screening Using XRF Instrumentation

The consultant will use a hand-held XRF analyzer to estimate the copper concentration in soil to guide the limits of soil excavation only. XRF measurements will not be used to demonstrate that COCs in soil are present in concentrations less than Project-Specific cleanup standards and, therefore, will not be used to support the Volunteer's request for site closure.

Prior to initiating soil excavation, the consultant will collect 15 soil samples from areas on the Site that previous soil sample results indicate have varying copper concentrations. The 15 locations were selected using data from the 2005 WTI Limited Phase II Site Characteristic Report (discussed in section 2.4) to encompass a range of copper concentrations. The sample locations are shown in Exhibit 6 and listed in the table below.

Sample Name	Copper Concentrations (mg/kg)
AV-39	210,000
AV-1	120,000
AV-57	78,000
AV-46	34,000
AV-6	18,000
AV-84	15,000
AV-15	6,000
AV-82	4,300
AV-56	3,100
AV-8	2,900
AV-64	1,500
AV-22	540
AV-30	400
AV-85	200
AV-90	93

At each sampling location, a clean disposable trowel will be used to collect approximately 200 grams of soil. The sample will be spread out over butcher paper approximately 1.5 feet by 1.5 feet in size, and large, organic debris and nonrepresentative material (e.g., twigs, leaves, roots, rock) will be removed. Each corner of the paper will be lifted alternately, rolling the soil over on itself and toward the opposite corner. The soil will be rolled at least 20 times. Approximately 5 grams of soil will be removed and placed into a disposable polyethylene sample cup (or equivalent), approximately 31 to 40 millimeters in diameter. The concentration of copper in the soil sample will be measured using the XRF analyzer. The remaining prepared soil will be placed in a 2-ounce clear glass jar and shipped to the laboratory for analysis of copper using EPA Method 6010.

The XRF results and analytical laboratory results will be evaluated using linear regression analysis to develop a correlation between XRF readings and analytical laboratory data. XRF measurements and corresponding analytical data will be plotted and a linear regression model will be developed to estimate the relationship between the two analytical datasets. The coefficient of determination (R^2), which measures how well the linear regression equation fits the data, will be calculated and used to select the excavation screening level to guide excavation activities. R^2 measures the relationship between the two datasets with higher R^2 values signifying greater correlation and the ability to use a higher screening level for soil excavation.

Attachment D provides an example of the use of linear regression. Copper concentrations from previous site assessments are listed along with hypothetical XRF measurements. Linear regression is applied to the datasets and an R^2 value of 99.58% is calculated, indicating there is a strong correlation between the XRF measurements and analytical laboratory data. In this case, a conservative screening value of 2,520 mg/kg, which is equal to 90% of the residential SRL of 2,800 mg/kg, would be used to define the limits of excavation. Therefore, copper concentration in the excavation floor and sidewall will be measured by the XRF instrument during soil excavation and excavation will be discontinued when XRF measurements of copper are less than 2,520 mg/kg. Confirmatory soil samples will then be collected and submitted for laboratory analysis of metal COCs for closure purposes in accordance with Section 5.4.

5.4 DU Confirmation Sampling

5.4.1 Incremental Sample Location

ISM will be used to verify soil in the excavation sidewalls and floor remaining after excavation contains metal COCs in concentrations less than the residential SRL. Confirmatory soil sampling in the 13 DUs will be performed in accordance with ITRC guidance recommends that a minimum of 30 incremental samples be collected from each DU, each DU be less than 0.5 acres, and the field soil sampling mass should be greater than 1 kilogram per DU.

Excavation Floor and Near Surface Sampling

A sampling grid, consisting of at least 30 incremental samples will be established across each excavation floor DU area as illustrated on Exhibit 7A. The DU geometry and site features may dictate that the number of samples per row may vary. Incremental samples will be collected along the grid line at the spacing calculated using the following equation:

$$Sample\ Spacing = \left(\frac{grid\ length\ (ft)}{n-1}\right)$$

Where: n = number of increments along grid line.

Sidewalls

After excavation of the DUs, the length of the sidewalls in each DU will be measured and sample locations will be established using the sample spacing equation above. A sampling grid consisting of at least 30 incremental samples will be established across the sidewalls of each DU area as illustrated on Exhibit 7B. Grid lines will be marked in the field and incremental sampling locations will be established using a tape measure and marked with a pin flag or similar.

5.4.2 DU Sample Collection

Excavation floor (DU-EX-1, DU-EX-2, DU-EX-3, DU-EX-7, and DU-EX-8) samples, excavation sidewall (DU-SW-1, DU-SW-2, DU-SW-3, DU-SW-7, and DU-SW-8) samples, and near surface (DU4, DU5, and DU6) samples will be collected using the following procedure:

1. A clean stainless steel or plastic scoop or trowel will be used to remove soil from each incremental sampling location within the excavation floor and excavation sidewalls to a depth of 6 inches. Soil and slough will be removed to expose native soil at the terminus of the hole.
2. A clean stainless steel core sampler with a 1-inch inside diameter will be driven 2 inches into soil below the terminus of the hole resulting in an incremental soil mass of approximately 60 grams.
3. The core sampler will be withdrawn and the soil sample will be placed into an unused 1-gallon plastic bag.
4. Samples will be collected from the remaining incremental sample locations in the DU generating a DU soil mass of approximately 1.8 kilograms.
5. The soil sample will be handled in accordance with the procedures outlined in Section 5.8 and shipped to Pace Analytical (Pace) for analysis.

5.4.3 Analytical Laboratory Sample Handling and Preparation

Pace will handle, process, prepare, and analyze samples in accordance with the Pace SOP provided in Attachment B in the SAP. The procedures are summarized below:

1. The incremental sample will be emptied from the 1-gallon plastic bag into a stainless steel bowl and mixed with a stainless steel spoon to homogenize the soil.
2. The incremental sample will be transferred from the mixing bowl onto a clean, pre-weighed stainless steel pan, and vegetation or other non-soil material will be removed and discarded. The pan plus sample will be weighed, and the sample will be disaggregated by hand.
3. The sample will be allowed to dry at room temperature for 24 hours and the weight of the pan plus sample will be obtained. If the difference between the initial weight and the weight after the 24-hour drying period is within 10%), the sample will be considered to be dried; otherwise, the sample will be allowed to dry in additional 12-hour increments until the weights are within 10%.
4. The entire dried sample will be placed into a shatterbox or equivalent and ground for 3 minutes.
5. The ground sample will be passed through a #10 mesh sieve (2 millimeters), and the screened soil will be placed on a clean pan.
6. A subsample, consisting of at least thirty sample increments, will be collected and the appropriate soil weight will be collected from the subsample aliquot for analysis of metal COCs. Soil samples will also be collected from the subsample aliquot for quality control analysis.

5.5 Discrete Sampling

5.5.1 Railcar Scale Soil Sample Collection Procedures

The consultant will remove the railcar scale and then collect soil samples from four locations at about 3 feet in native soil below the excavation. The samples will be collected by using an excavator to remove about 3 feet of soil from the top of the excavation and the soil sample will be collected directly from the excavator bucket. Analytical results from samples collected from soil along the perimeter and underlying the railcar scale will be compared to the cleanup standards listed in Table 1.

5.5.2 Conveyor System Soil Sample Procedures

The former conveyor system, located northwest of the railcar scale, includes a subgrade concrete vault with abandoned conveyor equipment (e.g., metal conveyor, conduit, metal railings). The west end, where ore was dumped into the subgrade vault, is the deepest portion of the concrete vault and is estimated to extend to about 40 feet bgs. The depth of the concrete at the east end is estimated to be less than 5 feet bgs.

The consultant will remove the conveyor and then collect soil samples from four locations at about 3 feet in native soil below the excavation. The samples will be collected by using an

excavator to remove about 3 feet of soil from the top of the excavation and the soil sample will be collected directly from the excavator bucket. Analytical results from samples collected from soil underlying the conveyor system will be compared to the cleanup standards listed in Table 1.

5.5.3 Contingency Sampling Analysis

If the analytical data demonstrates that the soil contains metal COCs in concentrations greater than the SRL or GPLs, additional samples will be collected from step out borings the location of which will be selected based on review of the analytical results and professional judgment, and after consultation with ADEQ.

5.6 Quality Control Sample Collection

As discussed in Sections 2.2 and 2.5.1 of the SAP, QC samples will be collected to evaluate whether Measurement Quality Objectives (MQOs) for the Data Quality Indicators (DQIs) are achieved. Specifically, the following field QC samples will be collected:

- **Field Replicate.** Field replicates are two additional samples that are collected from locations in the immediate vicinity of the primary sample. Replicate samples will be collected, handled, shipped, and prepared for analysis in the analytical laboratory in the same manner as the primary samples as described in Section 5.4. Replicate samples will be analyzed for metal COCs. The Relative Standard Deviation (RSD) between the sample analytical results will be calculated and compared to the project MQO in accordance with the procedures outlined in Section 2.2.1 of the SAP.

- **Field Duplicate.** A field duplicate is a second sample collected at the same location as the primary sample. Duplicate samples are collected simultaneously or in immediate succession, following identical collection procedures, and treated in the same manner during shipment, storage, and analysis. Results from duplicate sampling are used to calculate the Relative Percent Difference (RPD) to evaluate sampling and analytical precision. Agreement between duplicate sample results generally indicates good sampling and analytical precision. Conversely, poor agreement between results may indicate sample heterogeneity, especially soil samples. Field duplicates will be collected at a frequency of 10% of the primary assessment samples collected or once per sampling day, whichever is more frequent. The duplicate sample will be analyzed for all laboratory analyses requested for the primary sample.

- **Matrix Spike (MS)/Matrix Spike Duplicate (MSD).** A matrix spike sample will consist of an aliquot of the actual field sample spiked with a known concentration of target analytes and is used to evaluate potential soil sample matrix properties that may affect sample extraction and analysis. Sufficient soil sample volume will be provided with each sample delivery group to allow for MS/MSD analyses.

- **Equipment Blank.** An equipment blank will be used to evaluate sample accuracy and is a sample collected by passing distilled water over and through non-disposable, decontaminated sampling equipment. The equipment blank will be analyzed for metal COCs. One equipment blank will be collected for each sampling day.

5.7 Additional Assessment and Remediation Requirements

Once samples have been submitted to the laboratory and analyzed, the analytical results will be compared to Project-Specific cleanup standards. If analytical results demonstrate that COCs are not present in concentrations greater than the Project-specific cleanup standards, no additional assessment or remedial activities will be conducted, and the Volunteer will initiate procedures to obtain the NFA Determination.

Additional remedial options will be considered if a metal COC is present in a concentration greater than the Project-Specific cleanup standard and additional assessment and remediation is required. The Volunteer will work collaboratively to identify additional actions, including use of a Declaration of Environmental Use Restriction (DEUR) mechanism to obtain site closure or additional remedial action, and will revise the Work Plan for review and approval by ADEQ. The Volunteer understands that conducting additional work prior to approval of the revised Work Plan will be done at risk.

5.8 Sample Handling, Packaging, and Analytical Methods

Samples will be handled and managed in accordance with the procedures outlined in Sections 6.2, 6.3, and 6.4 of the SAP. Samples will be placed in appropriate sample containers in accordance with Section 4.0 of the SAP. Soil samples will be designated in accordance with the nomenclature system provided in Section 6.1 of the SAP. A label containing the sample number, sample date, sample time, and requested analyses will be affixed to the sample container. Glass sample containers will be placed in protective wrapping (bubble wrap) and then placed into a resealable plastic bag (zip lock). The samples will be placed in a sample cooler and bagged wet ice will be added to the cooler to chill the soil samples to 4 degrees Celsius (°C). Samples will be transported to the analytical laboratory under chain-of-custody procedures and a 10-day turn-around time (TAT) for analysis will be requested.

Samples will be submitted to Pace, an Arizona Department of Health Services (ADHS)-certified laboratory (Certification No. AZ0612) for analysis of metal COCs using the analytical methods listed in Section 7.0 of the SAP. The consultant will maintain required chain-of-custody control over samples as outlined in Section 6.2 of the SAP. Soil samples will be classified in accordance with the Unified Soil Classification System (USCS).

5.9 Soil Stockpile Sampling

Excavated soil containing metal COCs in concentrations greater than the residential SRL or minimum GPL will be stockpiled on-Site pending completion of profiling for landfill acceptance. Excavated soil will be placed on 40-mil plastic sheeting in DU4, DU5, or DU6 after analytical results demonstrate that no excavation is required. Dust generation and stormwater discharge will be minimized by placing straw wattles or silt fences around the perimeter of the soil stockpile and using water to create a crust over the soil stockpile.

Soil must be characterized to evaluate whether the soil is classified as a hazardous waste or a special waste. If excavated soil is classified as a hazardous waste or special waste, the soil will remain on Site and segregated from non-hazardous soil pending off-Site transportation and disposal to a landfill permitted to accept hazardous waste or special waste. Hazardous waste or special waste will be properly transported and disposed following applicable local, state, and federal rules and regulations. The procedures that will be used for these classification purposes are described in Section 5.10 and Section 5.11.

5.10 Hazardous Waste Characterization

Landfill acceptance requirements and RCRA regulations found at 40 CFR 262.11(d)(2) require the stockpiled soil to be tested by obtaining a representative sample and analyzing the sample using the test methods described below. As defined in RCRA, a representative sample *means a "sample of a universe or whole (e.g., waste pile, lagoon, ground water) which can be expected to exhibit the average properties of the universe or whole".* Therefore, a sampling design identifying the method and number of samples to be collected must be developed to meet the representative sample requirements. The procedures outlined in Chapter 9 of EPA's SW-846 Compendium (herein referenced as SW-846)[5] will be used to develop the sampling plan.

Stockpiled soil will be segregated by DU and, based on historical analytical data and soil mixing that will occur during soil excavation, the distribution of contaminant concentration throughout the individual soil stockpile is assumed to be relatively homogeneous. Therefore, simple random sampling will be used to collect the appropriate number of samples from each soil stockpile as calculated using Equation 8 of the SW-846 guidance:

$$n_r = \frac{(t^2_{0.20})(s^2)}{\Delta^2}$$

where: n_r = number of samples required to be collected to establish representative soil stockpile sample

[5] EPA; *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846), Chapter 9*; September 1986.

$t_{0.20}$ = Student's t value for a probability of 0.20 and based on the appropriate degrees of freedom for n_c
n_c = number of previous samples
s^2 = sample variance
Δ = RT - $\overline{x}$
RT = Regulatory level for toxic characteristic
$\overline{x}$ = mean concentration of analyte concentration

Previous analytical data results from the WTI Phase II Site Characterization summarized in Table 3 was used to estimate $\overline{x}$ and s^2 used in the Equation 8 of SW-846. The RT value for the hazardous waste determination is equal to the minimum soil concentration at which the concentration of the extract produced using the TCLP, EPA Method 1311, potentially contains the COC in a concentration greater than the regulatory level for the toxic characteristic found at 40 CFR 261.24(b).

The "Rule of 20" was used to calculate the RT value. The "Rule of 20" factor derives from the 20:1 liquid-to-solid ratio employed in the TCLP. To apply this principle, the total analyte concentration result (in mg/kg) is divided by 20 and compared to the regulatory limit for the analyte (mg/L). If the result is less than the regulatory limit for the analyte, then the solid waste is not considered a hazardous waste for the analyte characteristic. In other words, if the total concentration of an analyte is less than 20 times the hazardous waste regulatory limit, then the sample cannot leach enough of that constituent to fail the regulatory limit, even if all the chemical dissolved into the extraction fluid. The toxicity characteristic regulatory level is established in 40 CFR 261.24(b) for eight metals (referred to as 8 RCRA metals), PAHs, and VOCs. The regulatory level, along with the product of 20 times the regulatory limit are provided in Table E-1 of Attachment E.

The required number of samples to obtain a representative sample of the soil stockpile was calculated using the RT values provided in Table E-2 of Attachment E. The *n* samples will be composited and submitted for analysis using the methods provided in Table 1 of the SAP. Six samples will be required to obtain a representative sample from the soil stockpile using the calculation illustrated in Attachment E.

5.11 Special Waste Evaluation

If materials are encountered that, based on the consultant's professional experience, could potentially be classified as PCS or other special waste, the consultant will collect soil samples and analyze the samples for volatile organic compounds (VOCs), 8 RCRA metals, PAHs, and tetraethyl lead (TEL) in accordance with ADEQ guidance[6]. If analytical results demonstrate the material is a special waste, the Volunteer will obtain an Arizona Special Waste Identification Number and transport and dispose PCS using a Special Waste Manifest.

[6] ADEQ; Fact Sheet; Petroleum Contaminated Soil (PCS) Sampling Plan (Publication Number: FS-19-24

5.12 Analytical Laboratory Quality Assurance and Quality Control

Analytical laboratory data will be subject to the QC requirements outlined in the SAP. Quality control samples will be collected and used to evaluate the relative quality of field collection and analytical laboratory procedures. This evaluation will be conducted primarily by comparing DQIs to analytical results and field and analytical laboratory procedures. DQIs are discussed in Section 2.2 of the SAP and required QC samples are discussed in Section 2.3 and 2.5 of the SAP.

Data verification will be performed on 100% of analytical laboratory data and data validation will be performed on 10% of the analytical data to support data usability analysis.

5.13 Equipment Decontamination

Decontamination procedures will be conducted in accordance with ASTM D5088-90, *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites*. Non-disposable sampling equipment will be decontaminated after each use by washing with non-phosphate detergent and tap water, then given a final rinse in either distilled or deionized water and allowed to air dry. Spent wash waters used to clean sampling equipment, will be poured onto the Site soil and allowed to evaporate. Care will be taken not to allow this water to run off to unimpacted portions of the Site. Disposable gloves will be changed between each sample location.

5.14 Transportation and Disposal Plan

Soil or other materials containing concentrations of metal COCs above their respective Project-Specific cleanup standards or classified as a hazardous waste may be generated from Site activities. Material that may potentially be classified as hazardous waste will be profiled for acceptance at a landfill legally certified to accept the material. The procedures outlined in Section 5.10 will be followed to characterize the material. Once the waste is profiled and approved by the appropriately certified landfill, Non-Hazardous Waste manifests or Hazardous Waste manifests will be prepared to document transportation and disposal of the soil or other material. Non-Hazardous Waste and Hazardous Waste manifests will have a unique serial number associated with the truck transporting the soil for disposal and will accompany each truck from the Site to the disposal landfill. Each manifest will be signed by the Volunteer or authorized agent for the Volunteer. Manifests signed by the generator or authorized representative, transporter, and disposal facility will be retained and copies will be included with the Site Remediation Report.

5.15 Site Restoration

The consultant will stabilize the disturbed areas of the Site in accordance with the SWPPP described in Section 4.3.1.

6.0 DISPOSAL OF RESIDUAL MATERIALS

Sampling personnel will generate different types of potentially contaminated investigation-derived waste (IDW) that will include the following in the process of collecting environmental samples at the Site during field activities:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Excess soil from sampling
- Decontamination water

The EPA's National Contingency Plan requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. IDW will be managed in accordance with Office of Emergency and Remedial Response (OERR) guidance (OERR, 1991)[7]. In addition, other legal and practical considerations that may affect the handling of IDW will be considered. Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. PPE and disposable equipment that is to be disposed that can still be reused will be rendered inoperable before disposal in the refuse dumpster.

Excess soil from sampling activities will be returned to the DU from which the sample was collected if metal COCs are present in concentrations less than cleanup standards; otherwise excess soil will be disposed with excavated soil. Spent wash waters used to clean sampling equipment, will be poured onto an area of the Site from which sampling activities were conducted and allowed to evaporate. Care will be taken not to allow this water to run off to unimpacted areas of the Site.

[7] EPA; *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02; May 1991.*

7.0 DOCUMENTATION

7.1 Work Plan Distribution

The Volunteer is responsible for ensuring that each project member has access to the most current version of the project Work Plan, including subsequent addenda or revisions.

7.2 Field Operation Recordkeeping

Field notes will be kept in field logbooks. Logbooks will be used to record pertinent field activity information. A field logbook will be dedicated to this project and will not be used for other projects. Documentation in the field logbook will be sufficient to reconstruct the field activities situation without relying on the memories of the field team members. Information recorded at the beginning of the day will include, but not be limited to the following:

- Project name
- Date and time
- Name of field personnel entering information on each respective page
- Weather conditions
- Names of personnel on Site, including subcontractors and Site visitors
- Health and safety information, including PPE level
- Field calibration information
- GPS coordinates, including datum and accuracy

Information recorded during each sampling point will include, as applicable, but not be limited to the following:

- Sampling location (sampling point identification)
- Sample identification
- Sample depth
- Sample media
- Description of sample
- Chemical analysis requested, sample container, and preservative
- Modifications to the sampling plan
- Sampling observations
- Field equipment readings
- QC samples collected
- Field sketches, when appropriate

Entries will be made in blue or black indelible ink and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the logbook change. Each page in the field logbook will be signed and dated at the bottom of the page by any team member making entries on the page.

The field logbooks will be identified on the cover by the project name, project number, and logbook number. The logbooks will be stored in the field project files when not in use. At completion of the field activities, the original field logbooks will be retained in the project file.

7.3 Records Disposition

Project files and records will be permanently retained by the Volunteer. The analytical laboratory will store the original hardcopy and electronic raw data of the analytical data packages produced for this project for 5 years. The level of information regarding sample analyses (calibration records, run logs, etc.) will be such that the analytical processes can be reconstructed within that time.

8.0 Closure Documentation

A SCRC Report will be prepared within 60 days after receipt of analytical laboratory results. The SCRC Report will summarize sampling and analysis activities and evaluate generated data in comparison to applicable regulatory requirements, primarily residential SRLs and minimum GPLs. The final report will contain results, data, and sampling description necessary to assess the DQIs of the reported analytical results. The report will specify the type of sample (blank, waste, etc.), sampling date, sampling location, analytical method, method detection limit, and analytical result. The report will detail the amount and type of material removed, final Site confirmatory assessment of metal COCs in soil, and rationale for a request for an NFA Determination for soil from ADEQ. The VRP Remediation Report form (see Attachment F) will be completed and included as an attachment to the SCRC Report. The SCRC Report will be sealed by a Professional Engineer or Registered Geologist registered in the State of Arizona.

After ADEQ approval of the Closure Report, the Volunteer will prepare a report to request an NFA Determination for soil for the metal COCs at the Site. The report will illustrate the boundaries of the Site for which the NFA determination is being sought and will be prepared pursuant to A.R.S. § 49-181, which specifies requirements for the content of the report. The report will provide information in response to the specific requirements of § 49-181 (A)(1), § 49-181 (A)(2), § 49-181 (A)(3), § 49-181 (A)(4), § 49-181 (A)(5), § 49-181 (A)(6), § 49-181 (A)(7).

9.0 COMMUNITY INVOLVEMENT

Community Involvement activities will be conducted by the Volunteer in accordance with the requirements of A.R.S. 49-175 and 49-176. As outlined in A.R.S. 49-176(A)(2), community involvement activities must be conducted appropriate to the scope and schedule of the remediation, including:

(a) Site remediation fieldwork expected to result in noise, light, odor, dust, or other adverse off-Site impacts
(b) Remediation that will take more than 180 days to complete

Neither of these conditions apply to the proposed remedial action. However, based on direction from VRP, the Volunteer has notified the surrounding community of the planned remediation activities by posting an informational sign on the Site. The language for the proposed sign was provided by ADEQ prior to posting. The informational sign notifying the public that remediation of the Site is occurring under the oversight of ADEQ's VRP was posted within the surrounding area of the site. The sign included contact information for ADEQ and the Volunteer. Copies of the informational signs and photos of their posted location is provided in Attachment G.

Once the ADEQ has completed an initial review of the VRP Work Plan, a 30-day notice period will commence for the public to comment on the Work Plan and comments will be incorporated into a revised Work Plan, as applicable and appropriate. The Volunteer will submit a revised Work Plan incorporating public comment and will initiate Site work only upon ADEQ's final review and approval of the revised Work Plan.

The Volunteer will establish a document repository accessible to the public where information regarding the Site and the remediation is available for review. The repository Site will be established at the Volunteer's office located at 5210 East Williams Circle, Suite 720 in Tucson, Arizona 85711 and will be accessible during normal business hours or by appointment.

Upon submittal of the request for an NFA Determination from ADEQ, the Volunteer will provide general notice of the request to the public, make the Site Remediation Report available to the public, and provide opportunity for comment for 30 days. The Volunteer will conduct a public meeting prior if warranted by public response and if requested by ADEQ.

TABLES

TABLE 1
Regulatory Standards, Reporting Limits,
Quality Control Parameters - Soil

Analyte	CAS Registry Number	Cleanup Standards (mg/kg)					Toxicity Characteristic Limit (mg/L)	UTS (mg/L)	10 times UTS (mg/L)
		Residential SRL			Non-Residential SRL	Minimum GPL			
		Carcinogen		Non-Carcinogen					
		10^{-6} Risk	10^{-5} Risk						
Arsenic	7440-38-2	10	10	10	10	290	5.0	5.0	50
Barium	7440-39-3	---	---	15,000	170,000	12,000	100.0	21.0	210
Cadmium	7440-43-9	---	---	39	510	29	1.0	0.11	1.1
Chromium	7440-47-3	---	---	120,000	1,000,000	590	5.0	0.60	6.0
Lead	7439-92-1	---	---	400	800	290	5.0	0.75	7.5
Mercury	7487-94-7	---	---	23	310	12	1.0	0.025	0.25
Selenium	7782-49-2	---	---	390	5,100	290	5.0	5.7	57
Silver	7440-22-4	---	---	390	5,100	NE	0.2	0.14	1.4
Copper	7440-48-4	---	---	3,100	41,000	NE	NE	NE	NE
Manganese	7439-96-5	---	---	3,300	32,000	NE	NE	NE	NE
Vanadium	7440-62-2	---	---	78	1,000	NE	NE	1.6	16
Zinc	7440-66-6	---	---	23,000	310,000	NE	NE	4.3	43

Analyte	CAS Registry Number	RDL (mg/kg)	MDL (mg/kg)	LCS - Low (%)	LCS - High (%)	LCS RPD (%)	MS - Low (%)	MS - High (%)	MS RPD (%)
Arsenic	7440-38-2	1.00	0.5180	80	120	20	75	125	20
Barium	7440-39-3	0.50	0.0852	80	120	20	75	125	20
Cadmium	7440-43-9	0.50	0.0471	80	120	20	75	125	20
Chromium	7440-47-3	1.00	0.1330	80	120	20	75	125	20
Lead	7439-92-1	0.5	0.2080	80	120	20	75	125	20
Mercury	7487-94-7	0.04	0.0180	80	120	20	75	125	20
Selenium	7782-49-2	1.00	0.7640	80	120	20	75	125	20
Silver	7440-22-4	5.00	0.1270	80	120	20	75	125	20
Copper	7440-48-4	1.00	0.40	80	120	20	75	125	20
Manganese	7439-96-5	1.00	0.1330	80	120	20	75	125	20
Vanadium	7440-62-2	1.00	0.5060	80	120	20	75	125	20
Zinc	7440-66-6	5.00	0.832	80	120	20	75	125	20

Notes:

Reporting Limits from SGS North America Inc
CAS - Chemical Abstract Service
SRL - Soil Remediation Level
GPL - Groundwater Protection Level
UTS - Universal Treatment Standard

mg/kg - milligrams per kilogram
mg/L - milligrams per liter
NE - Standard not established
'--- Compound not designated to this chemical classification

RDL - Reported Detection Limit
MDL - Method Detection Limit
LCS - Laboratory Control Sample
RPD - Relative Percent Difference
MS - Matrix Spike

TABLE 2
Soil Sample Analytical Results
Enviro Engineering, Inc. (2001)

Analyte	CAS Registration Number	Cleanup Standards[(1)]					Sample ID					
		Residential SRL			Non-Residential SRL	Minimum GPL	1	2	3	4	5	6
		Carcinogen		Non-Carcinogen			Analytical Result (mg/kg)					
		10^{-6} Risk	10^{-5} Risk									
Arsenic	7440-38-2	10	10	10	10	290	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Barium	7440-39-3	---	---	15,000	170,000	12,000	**22**	**22**	**20**	**92**	**29**	**30**
Cadmium	7440-43-9	---	---	39	510	29	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (total)[1]	7440-47-3	30	---	120,000	1,000,000	590	<2.5	<2.5	<2.5	**5.6**	<2.5	<2.5
Lead	7439-92-1	---	---	400	800	290	<5	<5	<5	**9.8**	<5	<5
Selenium	7782-49-2	---	---	390	5,100	290	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Silver	7440-22-4	---	---	390	5,100	NE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Mercury	7487-94-7	---	---	23	310	NE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-48-4	---	---	3,100	41,000	NE	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	7439-96-5	---	---	3,300	32,000	NE	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	7440-62-2	---	---	78	1,000	NE	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	7440-66-6	---	---	23,000	310,000	NE	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

[(1)] - Soil Remediation Levels made by final rulemaking at 13 A.A.R. 971, Effective May 5, 2007.
Soil samples collected December 2001
8 RCRA metals analyzed using EPA Methods 6010D/7471B
RCRA - Resource Conservation and Recovery Act
Cleanup Standards and Detection Limits Measured in milligrams per kilogram
CAS - Chemical Abstract Service
SRL - Soil Remediation Level
GPL - Groundwater Protection Level
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
'--- Compound not designated to this chemical classification

690 Analyte present in concentration greater than analytical laboratory RDL
N/A - sample not analyzed for this consituent

VRP Work Plan
I-10 Avra Valley Mining Development LLC Site
Marana, Arizona
VRP Site Code: 514142-00

TABLE 3
Soil Sample Analytical Results
WTI Limited Phase II Site Characterization (2005)

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	AV-1	AV-2	AV-3	†AV-4	†AV-5	†AV-6	AV-7	AV-8	AV-9	AV-10	AV-11	AV-12	AV-13	AV-14	AV-14A
				Sample Depth (surface or "bgs")	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18	Surface
				Collection Date	12/22/2004							12/18/2004							
				Analytical Result (mg/kg)															
Arsenic	7440-38-2	10	10		NA	NA	NA	NA	NA	NA	<500	NA	NA	<5.0	NA	NA	NA	NA	NA
Barium	7440-39-3	5,300	110,000		NA	NA	NA	NA	NA	NA	<500	NA	NA	**140**	NA	NA	NA	NA	NA
Cadmium	7440-43-9	38	850		NA	NA	NA	NA	NA	NA	<50	NA	NA	<0.50	NA	NA	NA	NA	NA
Chromium[1]	7440-47-3	2,100	4,500		NA	NA	NA	NA	NA	NA	**690**	NA	NA	**6.3**	NA	NA	NA	NA	NA
Lead	7439-92-1	400	2,000		NA	NA	NA	NA	NA	NA	<500	NA	NA	**12**	NA	NA	NA	NA	NA
Selenium	7782-49-2	380	8,500		NA	NA	NA	NA	NA	NA	<1,000	NA	NA	<10	NA	NA	NA	NA	NA
Silver	7440-22-4	380	8,500		NA	NA	NA	NA	NA	NA	<250	NA	NA	<2.5	NA	NA	NA	NA	NA
Mercury	7487-94-7	6.7	180		NA	NA	NA	NA	NA	NA	<0.10	NA	NA	<0.10	NA	NA	NA	NA	NA
Copper	7440-48-4	2,800	63,000		**120,000**	**100,000**	**38,000**	**42,000**	**45,000**	**18,000**	NA	**2,900**	**130,000**	**60**	**25**	**13,000**	**17**	**29**	**260**
Amenable Cyanide	None	NP	NP		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	AV-15	AV-16	AV-17	AV-18	AV-19	AV-20	AV-21	AV-22	AV-23	AV-24	AV-25	AV-26	AV-27	AV-28	AV-29
				Sample Depth (surface or "bgs")	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 19	Surface	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18
				Collection Date	1/18/2005														
				Analytical Result (mg/kg)															
Arsenic	7440-38-2	10	10		NA	NA	NA	NA	NA	<5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	5,300	110,000		NA	NA	NA	NA	NA	**110**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	38	850		NA	NA	NA	NA	NA	<0.50	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium[1]	7440-47-3	2,100	4,500		NA	NA	NA	NA	NA	**6**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	400	2,000		NA	NA	NA	NA	NA	**12**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	380	8,500		NA	NA	NA	NA	NA	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	380	8,500		NA	NA	NA	NA	NA	<2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7487-94-7	6.7	180		NA	NA	NA	NA	NA	<0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	7440-48-4	2,800	63,000		**6,000**	**36,000**	**22**	**30**	**75,000**	**68**	**24**	**540**	**2,800**	**14,000**	**27**	**39**	**67,000**	**3,800**	**200**
Amenable Cyanide	None	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
Amenable and total cyanide analyzed using EPA Method 9010B/9014
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
CAS - Chemical Abstract Service
SRL - Soil Remediation Level applicable at time of Western Technologies Incorporated Limited Phase II Site Characterization, May 2005 (WTI, 2005)
mg/kg - milligram per kilogram
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
NP - SRL not provided in WTI report (WTI, 2005)

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than applicable residential SRL
120,000	Analyte present in concentration greater than applicable non-residential SRL
<500	Reported analytical laboratory RDL greater than SRL

TABLE 3
Soil Sample Analytical Results
WTI Limited Phase II Site Characterization (2005)

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	Sample Depth (surface or "bgs")	Collection Date	Analytical Result (mg/kg)													
				AV-30	AV-31	AV-32	AV-33	AV-34	AV-35	AV-36	AV-37	AV-38	AV-39	AV-40	AV-41	AV-42	AV-43	AV-44
				Surface	Surface	Surface	8 - 10	15 - 18	Surface	10	15 - 18	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18
				1/18/2005														
Arsenic	7440-38-2	10	10	<5.0	NA	NA	NA	NA	<5.0	NA	NA	NA	NA	<5.0	NA	NA	NA	NA
Barium	7440-39-3	5,300	110,000	**120**	NA	NA	NA	NA	**150**	NA	NA	NA	NA	**100**	NA	NA	NA	NA
Cadmium	7440-43-9	38	850	<0.50	NA	NA	NA	NA	**7.7**	NA	NA	NA	NA	<0.50	NA	NA	NA	NA
Chromium[1]	7440-47-3	2,100	4,500	**5.6**	NA	NA	NA	NA	<20	NA	NA	NA	NA	**5.6**	NA	NA	NA	NA
Lead	7439-92-1	400	2,000	**12**	NA	NA	NA	NA	<50	NA	NA	NA	NA	**12**	NA	NA	NA	NA
Selenium	7782-49-2	380	8,500	<10	NA	NA	NA	NA	<100	NA	NA	NA	NA	<10	NA	NA	NA	NA
Silver	7440-22-4	380	8,500	<2.5	NA	NA	NA	NA	<25	NA	NA	NA	NA	<2.5	NA	NA	NA	NA
Mercury	7487-94-7	6.7	180	<0.10	NA	NA	NA	NA	<0.10	NA	NA	NA	NA	<0.10	NA	NA	NA	NA
Copper	7440-48-4	2,800	63,000	**400**	**80,000**	**22,000**	**3,800**	**160**	**6,000**	**380**	**220**	**15,000**	**210,000**	**40**	**290**	**76,000**	**1,600**	**310**
Amenable Cyanide	None	NP	NP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	Sample Depth (surface or "bgs")	Collection Date	Analytical Result (mg/kg)													
				AV-45	AV-46	AV-47	AV-48	AV-49	AV-50	AV-51	AV-52	AV-53	AV-54	AV-55	AV-56	AV-57	AV-58	AV-59
				Surface	Surface	8 - 10	15 - 19	Surface	8 - 10	15 - 18	Surface	Surface	8 - 10	15 - 18	Surface	Surface	Surface	8 - 10
				1/18/2005														
Arsenic	7440-38-2	10	10	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	<1,000
Barium	7440-39-3	5,300	110,000	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	<1,000
Cadmium	7440-43-9	38	850	NA	NA	NA	NA	<100	NA	NA	NA	NA	<100	NA	NA	NA	NA	<100
Chromium[1]	7440-47-3	2,100	4,500	NA	NA	NA	NA	<400	NA	NA	NA	NA	<400	NA	NA	NA	NA	<400
Lead	7439-92-1	400	2,000	NA	NA	NA	NA	**2,300**	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	<1,000
Selenium	7782-49-2	380	8,500	NA	NA	NA	NA	<2,000	NA	NA	NA	NA	<2,000	NA	NA	NA	NA	<2,000
Silver	7440-22-4	380	8,500	NA	NA	NA	NA	<500	NA	NA	NA	NA	<500	NA	NA	NA	NA	<500
Mercury	7487-94-7	6.7	180	NA	NA	NA	NA	**1.0**	NA	NA	NA	NA	**1.3**	NA	NA	NA	NA	**0.19**
Copper	7440-48-4	2,800	63,000	**8,000**	**34,000**	**28,000**	**28,000**	**130,000**	**26,000**	**44,000**	**6,700**	**100,000**	**200,000**	**520**	**3,100**	**78,000**	**77,000**	**25,000**
Amenable Cyanide	None	NP	NP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
Amenable and total cyanide analyzed using EPA Method 9010B/9014
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
CAS - Chemical Abstract Service
SRL - Soil Remediation Level applicable at time of Western Technologies Incorporated Limited Phase II Site Characterization, May 2005 (WTI, 2005)
mg/kg - milligram per kilogram
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
NP - SRL not provided in WTI report (WTI, 2005)

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1

VRP Work Plan
I-10 Avra Valley Mining Development LLC Site
Marana, Arizona
VRP Site Code: 514142-00

TABLE 3
Soil Sample Analytical Results
WTI Limited Phase II Site Characterization (2005)

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	AV-60	AV-61	AV-62	AV-63	AV-64	AV-65	AV-66	AV-67	AV-68	AV-69	AV-70	AV-71	AV-72	AV-74	AV-75
				Sample Depth (surface or "bgs)	15 - 18	Surface	8 - 10	15 - 18	Surface	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18	Surface	Surface	Surface
				Collection Date	1/18/2005													2/24/2005	
				Analytical Result (mg/kg)															
Arsenic	7440-38-2	10	10		NA	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	5,300	110,000		NA	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	38	850		NA	NA	NA	NA	NA	NA	NA	<50	NA	NA	NA	NA	NA	NA	NA
Chromium[1]	7440-47-3	2,100	4,500		NA	NA	NA	NA	NA	NA	NA	<200	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	400	2,000		NA	NA	NA	NA	NA	NA	NA	**590**	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	380	8,500		NA	NA	NA	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	380	8,500		NA	NA	NA	NA	NA	NA	NA	<250	NA	NA	NA	NA	NA	NA	NA
Mercury	7487-94-7	6.7	180		NA	NA	NA	NA	NA	NA	NA	<0.43	NA	NA	NA	NA	NA	NA	NA
Copper	7440-48-4	2,800	63,000		**77,000**	**48,000**	**6,500**	**7,600**	**1,500**	**1,900**	**11,000**	**23,000**	**62,000**	**12,000**	**20,000**	**3,300**	**340**	**17,000**	**26,000**
Amenable Cyanide	None	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	AV-76	*AV-77	AV-78	*AV-79	AV-80	AV-81	AV-82	AV-83	AV-84	AV-85	AV-86	AV-87	*AV-88	AV-89	AV-90
				Sample Depth (surface or "bgs)	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
				Collection Date	2/24/2005													3/18/2005	
				Analytical Result (mg/kg)															
Arsenic	7440-38-2	10	10		NA	<5.0	NA	<5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1,000
Barium	7440-39-3	5,300	110,000		NA	**180**	NA	**63**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1,000
Cadmium	7440-43-9	38	850		NA	<0.50	NA	<0.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<100
Chromium[1]	7440-47-3	2,100	4,500		NA	**17**	NA	**16**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<400
Lead	7439-92-1	400	2,000		NA	**22**	NA	**11**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1,000
Selenium	7782-49-2	380	8,500		NA	<10	NA	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2,000
Silver	7440-22-4	380	8,500		NA	<2.5	NA	<2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<500
Mercury	7487-94-7	6.7	180		NA	<0.10	NA	<0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.19**
Copper	7440-48-4	2,800	63,000		**26,000**	**62**	**120**	**18**	**26,000**	**6,000**	**4,300**	**14,000**	**15,000**	**200**	**1,800**	**34**	**36**	**520**	**93**
Amenable Cyanide	None	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
Amenable and total cyanide analyzed using EPA Method 9010B/9014
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
CAS - Chemical Abstract Service
SRL - Soil Remediation Level applicable at time of Western Technologies Incorporated Limited Phase II Site Characterization, May 2005 (WTI, 2005)
mg/kg - milligram per kilogram
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
NP - SRL not provided in WTI report (WTI, 2005)

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than applicable residential SRL
120,000	Analyte present in concentration greater than applicable non-residential SRL
<500	Reported analytical laboratory RDL greater than SRL

TABLE 3
Soil Sample Analytical Results
WTI Limited Phase II Site Characterization (2005)

Analyte	CAS Registration Number	Residential SRL	Non-Residential SRL	Sample ID	AV-91	AV-92	AV-93	AV-94	AV-95	AV-96	AV-97	AV-98	AV-99	AV-100	AV-101	AV-102	AV-103
				Sample Depth (surface or "bgs")	Surface	Surface	Surface	Surface	Surface	Surface	10	Surface	10	Surface	10	Surface	10
				Collection Date	3/18/2005												
				Analytical Result (mg/kg)													
Arsenic	7440-38-2	10	10		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	5,300	110,000		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	38	850		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium[1]	7440-47-3	2,100	4,500		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	400	2,000		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	380	8,500		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	380	8,500		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7487-94-7	6.7	180		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	7440-48-4	2,800	63,000		**5,600**	**130**	**170**	**320**	**460**	**3,800**	**800**	**1,800**	**210**	**19**	**58**	**54,000**	**54**
Amenable Cyanide	None	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Cyanide	57-12-5	NP	NP		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
Amenable and total cyanide analyzed using EPA Method 9010B/9014
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
CAS - Chemical Abstract Service
SRL - Soil Remediation Level applicable at time of Western Technologies Incorporated Limited Phase II Site Characterization, May 2005 (WTI, 2005)
mg/kg - milligram per kilogram
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
NP - SRL not provided in WTI report (WTI, 2005)

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than applicable residential SRL
120,000	Analyte present in concentration greater than applicable non-residential SRL
<500	Reported analytical laboratory RDL greater than SRL

TABLE 4
Soil Sample Analytical Results
WTI Environmental Soil Assessment (2022)

Analyte	CAS Registration Number	Cleanup Standards					Sample ID												
		Residential SRL			Non-Residential SRL	Minimum GPL	S-1	S-2	S-3	S-4	S-5	S-6	B1S	B16	B2S	B26	B3S	B36	B4S	B46
		Carcinogen		Non-Carcinogen			12	12	12	12	12	12	Surface	6	Surface	6	Surface	6	Surface	6
		10^{-6} risk	10^{-5} risk				12/16/2021						2/4/2022							
8 RCRA Metals and Copper																				
Arsenic	7440-38-2	10	10	10	10	290	**3.2**	NA	<0.067	NA	NA	**1,100**	**11**	**4.6**	**4.2**	**2.3**	**3.4**	**2.6**	**3.8**	**4.4**
Barium	7440-39-3	---	---	15,000	170,000	12,000	**96**	NA	**2.4**	NA	NA	**210**	**140**	**110**	**150**	**100**	**78**	**56**	**110**	**140**
Cadmium	7440-43-9	---	---	39	510	29	**1.1**	NA	**56**	NA	NA	**2,700**	**6.7**	**1.6**	**0.57**	**0.29**	**0.25**	**0.18**	**1.2**	**0.38**
Chromium[1]	7440-47-3	---	---	120,000	1,000,000	590	**8.3**	NA	**0.47**	NA	NA	**31**	**16**	**11**	**12**	**8.7**	**9.2**	**7.4**	**11**	**11**
Lead	7439-92-1	---	---	400	800	290	**13**	NA	**7.1**	NA	NA	**9,200**	**140**	**31**	**16**	**10**	**11**	**8.5**	**30**	**16**
Selenium	7782-49-2	---	---	390	5,100	290	<10	NA	**14**	NA	NA	**100**	<1.0	**3.9**	**1.9**	**2.5**	**2.1**	**1.4**	**3.4**	**3**
Silver	7440-22-4	---	---	390	5,100	NE	<0.25	NA	<10	NA	NA	**13**	**3.2**	**0.35**	<0.25	<0.25	<0.25	<0.25	0.32	<0.25
Mercury	7487-94-7	---	---	23	310	12	<0.067	NA	<0.25	NA	NA	**3.0**	**0.14**	**0.22**	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Copper	7440-48-4	---	---	3,100	41,000	NE	**230**	**4,300**	**520**	**520**	**1,700**	**4,600**	**12,000**	**2,100**	**300**	**22**	**43**	**16**	**1,400**	**79**
Polynuclear Aromatic Hydrocarbons (PAHs)																				
Anthracene	120-12-7	---	---	22,000	240,000	NE	NA	NA	NA	NA	<0.00600	**0.00819**	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	83-32-9	---	---	3,700	29,000	NE	NA	NA	NA	NA	<0.00600	<0.00600	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	208-96-8	---	---	---	---	NE	NA	NA	NA	NA	<0.00600	**0.0139**	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	56-55-3	0.69	6.9	---	21	NE	NA	NA	NA	NA	**0.00180**	**0.0670**	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	50-32-8	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	**0.00290**	**0.0767**	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	205-99-2	0.69	6.9	---	21	NE	NA	NA	NA	NA	**0.00347**	**0.140**	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	191-24-2	---	---	---	---	NE	NA	NA	NA	NA	**0.00318**	**0.0687**	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	207-08-9	6.9	69	---	210	NE	NA	NA	NA	NA	<0.00600	**0.0486**	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	218-01-9	68	680	---	2,000	NE	NA	NA	NA	NA	**0.00235**	**0.0883**	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	<0.00600	**0.0164**	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	---	---	2,300	22,000	NE	NA	NA	NA	NA	**0.00317**	**0.163**	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	86-73-7	---	---	2,700	26,000	NE	NA	NA	NA	NA	<0.00600	<0.00600	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	0.69	6.9	---	21	NE	NA	NA	NA	NA	**0.00295**	**0.0748**	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	91-20-3	---	---	56	190	NE	NA	NA	NA	NA	<0.00600	**0.00488**	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	85-01-8	---	---	---	---	NE	NA	NA	NA	NA	<0.00600	**0.0815**	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0	---	---	2,300	29,000	NE	NA	NA	NA	NA	**0.00414**	**0.148**	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	90-12-0	---	---	---	---	NE	NA	NA	NA	NA	<0.00600	<0.0200	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	91-57-6	---	---	---	---	NE	NA	NA	NA	NA	<0.00600	<0.0200	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene (beta-Chloronaphthalene)	91-58-7	---	---	110	110	NE	NA	NA	NA	NA	<0.00600	<0.0200	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010D/7471B
RCRA - Resource Conservation and Recovery Act
PAHs analyzed using EPA Method 8270C-SIM
bgs - inches below ground surface
CAS - Chemical Abstract Service
SRL - Soil Remediation Level
mg/kg - milligram per kilogram
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values
NA - Not Analyzed
'--- Compound not designated to this chemical classification
NE - Standard not established

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than residential SRL
120,000	Analyte present in concentration greater than non-residential SRL
31	Sample potentially contains Chromium(IV) in concentration greater than residential SRL

TABLE 5
Constituents Present in Soil in Concentrations Greater Than Current Cleanup Standards

Analyte	CAS Registration Number	Cleanup Standard [1,2]					Sample ID													
							Sample Depth (surface or "bgs")													
							Collection Date													
							Analytical Result (mg/kg)													
		Residential SRL			Non-Residential SRL	Minimum GPL	AV-1	AV-2	AV-3	†AV-4	†AV-5	†AV-6	AV-7	AV-9	AV-12	AV-15	AV-16	AV-19	AV-24	AV-27	AV-28
		Carcinogen		Non-Carcinogen			Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	8 - 10
		10^{-6} risk	10^{-5} risk				12/22/2004							12/18/2005					1/18/2005		
Arsenic	7440-38-2	10	10	10	10	290	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	---	---	15,000	170,000	12,000	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	---	---	39	510	29	NA	NA	NA	NA	NA	NA	<50	NA	NA	NA	NA	NA	NA	NA	NA
Chromium[3]	7440-47-3	---	---	120,000	1,000,000	590	NA	NA	NA	NA	NA	NA	**690**	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	---	---	400	800	290	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	---	---	390	5,100	290	NA	NA	NA	NA	NA	NA	<1,000	NA	NA	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	---	---	390	5,100	NE	NA	NA	NA	NA	NA	NA	<250	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7487-94-7	---	---	23	310	12	NA	NA	NA	NA	NA	NA	<0.10	NA	NA	NA	NA	NA	NA	NA	NA
Copper	7440-48-4	---	---	3,100	41,000	NE	**120,000**	**100,000**	**38,000**	**42,000**	**45,000**	**18,000**	NA	**130,000**	**13,000**	**6,000**	**36,000**	**75,000**	**14,000**	**67,000**	**3,800**
Benzo(a)pyrene	50-32-8	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	NA	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	CAS Registration Number	Cleanup Standard [1,2]					Sample ID													
							Sample Depth (surface or "bgs")													
							Collection Date													
							Analytical Result (mg/kg)													
		Residential SRL			Non-Residential SRL	Minimum GPL	AV-31	AV-32	AV-33	AV-35	AV-38	AV-39	AV-42	AV-45	AV-46	AV-47	AV-48	AV-49	AV-50	AV-51	AV-52
		Carcinogen		Non-Carcinogen			Surface	Surface	8 - 10	Surface	Surface	Surface	Surface	Surface	Surface	8 - 10	15 - 19	Surface	8 - 10	15 - 18	Surface
		10^{-6} risk	10^{-5} risk				1/18/2005														
Arsenic	7440-38-2	10	10	10	10	290	NA	NA	NA	<5.0	NA	NA	NA	NA	NA	NA	NA	<1,000	NA	NA	NA
Barium	7440-39-3	---	---	15,000	170,000	12,000	NA	NA	NA	**150**	NA	NA	NA	NA	NA	NA	NA	<1,000	NA	NA	NA
Cadmium	7440-43-9	---	---	39	510	29	NA	NA	NA	**7.7**	NA	NA	NA	NA	NA	NA	NA	<100	NA	NA	NA
Chromium[3]	7440-47-3	---	---	120,000	1,000,000	590	NA	NA	NA	<20	NA	NA	NA	NA	NA	NA	NA	<400	NA	NA	NA
Lead	7439-92-1	---	---	400	800	290	NA	NA	NA	<50	NA	NA	NA	NA	NA	NA	NA	**2,300**	NA	NA	NA
Selenium	7782-49-2	---	---	390	5,100	290	NA	NA	NA	<100	NA	NA	NA	NA	NA	NA	NA	<2,000	NA	NA	NA
Silver	7440-22-4	---	---	390	5,100	NE	NA	NA	NA	<25	NA	NA	NA	NA	NA	NA	NA	<500	NA	NA	NA
Mercury	7487-94-7	---	---	23	310	12	NA	NA	NA	<0.10	NA	NA	NA	NA	NA	NA	NA	**1.0**	NA	NA	NA
Copper	7440-48-4	---	---	3,100	41,000	NE	**80,000**	**22,000**	**3,800**	**6,000**	**15,000**	**210,000**	**76,000**	**8,000**	**34,000**	**28,000**	**28,000**	**130,000**	**26,000**	**44,000**	**6,700**
Benzo(a)pyrene	50-32-8	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
mg/kg - milligram per kilogram
CAS - Chemical Abstract Service
(1) - Soil Remediation Levels made by final rulemaking at 13 A.A.R. 971, Effective May 5, 2007.
(2) - Groundwater Protection Levels (GPLs) established in "A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality" (ADEQ, 1996)
ADEQ - Arizona Department of Environmental Quality

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than applicable residential SRL
120,000	Analyte present in concentration greater than applicable non-residential SRL
<500	Reported analytical laboratory RDL greater than SRL
690	Analyte present in concentration greater than GPL

TABLE 5
Constituents Present in Soil in Concentrations Greater Than Current Cleanup Standards

Analyte	CAS Registration Number	Cleanup Standard [1,2]					Sample ID													
							Sample Depth (surface or "bgs")													
							Collection Date													
							Analytical Result (mg/kg)													
		Residential SRL			Non-Residential SRL	Minimum GPL	AV-53	AV-54	AV-56	AV-57	AV-58	AV-59	AV-60	AV-61	AV-62	AV-63	AV-66	AV-67	AV-68	AV-69	AV-70
		Carcinogen		Non-Carcinogen			Surface	8 - 10	Surface	Surface	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18	Surface	8 - 10	15 - 18	Surface	8 - 10
		10^{-6} risk	10^{-5} risk				1/18/2005													
Arsenic	7440-38-2	10	10	10	10	290	NA	<1,000	NA	NA	NA	<1,000	NA	NA	NA	NA	NA	<500	NA	NA	NA
Barium	7440-39-3	---	---	15,000	170,000	12,000	NA	<1,000	NA	NA	NA	<1,000	NA	NA	NA	NA	NA	<500	NA	NA	NA
Cadmium	7440-43-9	---	---	39	510	29	NA	<100	NA	NA	NA	<100	NA	NA	NA	NA	NA	<50	NA	NA	NA
Chromium[1]	7440-47-3	---	---	120,000	1,000,000	590	NA	<400	NA	NA	NA	<400	NA	NA	NA	NA	NA	<200	NA	NA	NA
Lead	7439-92-1	---	---	400	800	290	NA	<1,000	NA	NA	NA	<1,000	NA	NA	NA	NA	NA	**590**	NA	NA	NA
Selenium	7782-49-2	---	---	390	5,100	290	NA	<2,000	NA	NA	NA	<2,000	NA	NA	NA	NA	NA	<1,000	NA	NA	NA
Silver	7440-22-4	---	---	390	5,100	NE	NA	<500	NA	NA	NA	<500	NA	NA	NA	NA	NA	<250	NA	NA	NA
Mercury	7487-94-7	---	---	23	310	12	NA	**1.3**	NA	NA	NA	**0.19**	NA	NA	NA	NA	NA	**0.43**	NA	NA	NA
Copper	7440-48-4	---	---	3,100	41,000	NE	**100,000**	**200,000**	**3,100**	**78,000**	**77,000**	**25,000**	**77,000**	**48,000**	**6,500**	**7,600**	**11,000**	**23,000**	**62,000**	**12,000**	**20,000**
Benzo(a)pyrene	50-32-8	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	CAS Registration Number	Cleanup Standard [1,2]					Sample ID													
							Sample Depth (surface or "bgs")													
							Collection Date													
							Analytical Result (mg/kg)													
		Residential SRL			Non-Residential SRL	Minimum GPL	AV-74	AV-75	AV-76	AV-80	AV-81	AV-82	AV-83	AV-84	AV-91	AV-96	AV-98	AV-102	S-2	S-6	B1S
		Carcinogen		Non-Carcinogen			Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	12	12	12
		10^{-6} risk	10^{-5} risk				2/24/2005								3/18/2005						
Arsenic	7440-38-2	10	10	10	10	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1,100**	**11**
Barium	7440-39-3	---	---	15,000	170,000	12,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**210**	**140**
Cadmium	7440-43-9	---	---	39	510	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2,700**	**6.7**
Chromium[1]	7440-47-3	---	---	120,000	1,000,000	590	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**31**	**16**
Lead	7439-92-1	---	---	400	800	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**9,200**	**140**
Selenium	7782-49-2	---	---	390	5,100	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**100**	<1.0
Silver	7440-22-4	---	---	390	5,100	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**13**	**3.2**
Mercury	7487-94-7	---	---	23	310	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3**	**0.14**
Copper	7440-48-4	---	---	3,100	41,000	NE	**17,000**	**26,000**	**26,000**	**26,000**	**6,000**	**4,300**	**14,000**	**15,000**	**5,600**	**3,800**	**1,800**	**54,000**	**4,300**	**4,600**	**12,000**
Benzo(a)pyrene	50-32-8	0.069	0.69	---	2.1	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0767**	NA

Notes:

8 RCRA metals and copper analyzed using EPA Methods 6010B/7471B
RCRA - Resource Conservation and Recovery Act
"bgs - inches below ground surface
mg/kg - milligram per kilogram
CAS - Chemical Abstract Service
(1) - Soil Remediation Levels made by final rulemaking at 13 A.A.R. 971, Effective May 5, 2007.
(2) - Groundwater Protection Levels (GPLs) established in "A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality" (ADEQ, 1996)
ADEQ - Arizona Department of Environmental Quality
[1] - SRL calculated based on sum of individual Chromium(III) and Chromium(VI) SRL values

690	Analyte present in concentration greater than analytical laboratory RDL
38,000	Analyte present in concentration greater than applicable residential SRL
120,000	Analyte present in concentration greater than applicable non-residential SRL
<500	Reported analytical laboratory RDL greater than SRL
690	Analyte present in concentration greater than GPL

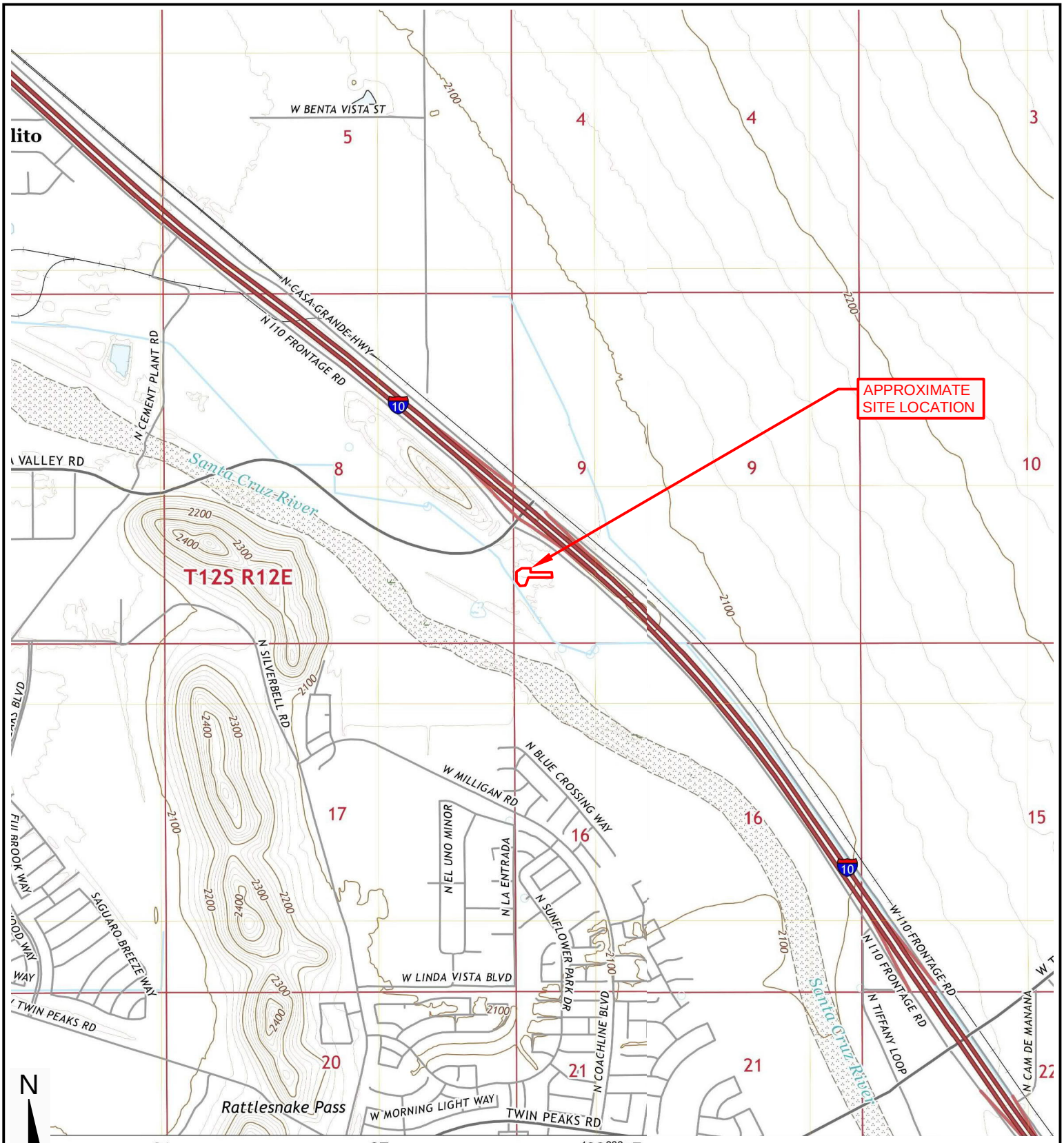
TABLE 6
PROJECT MILESTONE SCHEDULE

Milestone	Anticipated Completion Date
Work Plan submitted to ADEQ	June 2024
Work Plan reviewed and comments provided from ADEQ	August 2024
Revised Work Plan submitted to ADEQ	August 2024
Work Plan reviewed and comments provided from ADEQ	November 2024
Revised Work Plan submitted to ADEQ	February 2025
ADEQ Work Plan approval	April 2025
30-Day Work Plan Comment Period	May 2025
Field Work Commences	July 2025
Site remediation and confirmation sampling completed	August 2025
Site Characterization and Remediation Completion report submitted to ADEQ	October 2025
Site Characterization and Remediation Completion report reviewed and comments provided from ADEQ	December 2025
Revised Work Plan submitted to ADEQ	January 2026
NFA Determination Report submitted to ADEQ	March 2026
ADEQ Review and NFA Determination Issuance	April 2026

TABLE 7
DECISION UNIT AREA AND SOIL VOLUME

Excavation Floor				
Decision Unit	**Area (square feet)**	**Area (acre)**	**Excavation Depth (feet)**	**Volume (cubic yards)**
DU1-EX	11,495	0.26	1	426
DU2-EX	13,570	0.31	1	503
DU3-EX	4,985	0.11	1	185
DU7-EX	10,150	0.23	0.5	188
DU8-EX	6,230	0.14	2	461
Excavation Sidewall				
Decision Unit	**Perimeter (feet)**	**Excavation Depth (feet)**	**Sample Depth (feet)**	**Volume (cubic yards)**
DU1-SW	454	1	0.5	8
DU2-SW	505	1	0.5	9
DU3-SW	330	1	0.5	6
DU7-SW	505	0.5	0.5	5
DU8-SW	340	2	0.5	13
Near Surface Samples				
Decision Unit	**Area (square feet)**	**Area (acre)**	**Sample Depth (feet)**	**Volume (cubic yards)**
DU-4	9,735	0.22	0.5	180
DU-5	7,200	0.17	0.5	133
DU-6	5,865	0.13	0.5	109

EXHIBITS



U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP

STATE OF ARIZONA QUADRANGLES
MARANA 2021
RUELAS CANYON 2021

0 1000' 2,000' 4,000'

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. LOCATIONS ARE APPROXIMATE.

Project Mngr:	DRS
Approved By:	SD
Checked By:	TRW
Drawn By:	DBM

Project No.	63237102
Scale:	1" = 2000'
Date:	04/17/2024
File No.	63237102EI.DWG

Terracon
Consulting Engineers and Scientists
355 South Euclid, Suite 107 Tucson, AZ 85719
PH. (520) 798-4844 FAX. (520) 792-2539

SITE LOCATION

VOLUNTARY REMEDIATION PROGRAM WORK PLAN (SITE CODE: 514142-00)
I-10 AVRA VALLEY MINING & DEVELOPMENT, LLC SITE
7755 W AVRA VALLEY ROAD
MARANA, ARIZONA

EXHIBIT 1

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. LOCATIONS ARE APPROXIMATE.

Project Mngr:	DRS
Approved By:	SD
Checked By:	TRW
Drawn By:	DBM

Project No.	63237102
Scale:	NTS
Date:	04/17/2024
File No.	63237102.DWG

Terracon
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355 South Euclid, Suite 107 Tucson, AZ 85719
PH. (520) 798-4844 FAX. (520) 792-2539

SITE DIAGRAM AND KEY FEATURES

VOLUNTARY REMEDIATION PROGRAM WORK PLAN (SITE CODE: 514142-00)
I-10 AVRA VALLEY MINING & DEVELOPMENT, LLC SITE
7755 W AVRA VALLEY ROAD
MARANA, ARIZONA

EXHIBIT 2

Image source: PIMA COUNTY ONLINE PARCEL VIEWER, 2024

VAULTED RAILCAR SCALE
LINED FUEL AST
METAL HEAD FRAME
METAL SHED
SUBGRADE CONVEYOR SYSTEM
GROUND WATER WELL
OFFICE TRAILER
WATER TOWER
FORMER RAILWAY LINE
Site Boundary

AV-92 AV-94 AV-93 AV-81 AV-6 AV-46 AV-47 AV-48 AV-24 AV-25 AV-26 AV-16 AV-17 AV-18
S-3 AV-58 AV-59 AV-60 AV-66 AV-67 AV-68 AV-65 AV-57 AV-5 AV-32 AV-33 AV-34 AV-39 AV-40 AV-41 AV-31 AV-23 AV-15 AV-8 AV-9 AV-10 AV-11
AV-85 AV-84 AV-83 AV-82 AV-1 AV-2 AV-3 S-5 AV-74 AV-75 AV-76 AV-96 AV-97 AV-98 AV-99
AV-89 S-1 S-2 AV-69 AV-70 AV-71 AV-102 AV-103 AV-19 AV-20 AV-21 SS-6
AV-53 AV-54 AV-55 AV-42 AV-43 AV-44 AV-27 AV-28 AV-29
AV-61 AV-62 AV-63 AV-49 AV-50 AV-51 AV-35 AV-36 AV-37 AV-12 AV-13 AV-14 AV-100 AV-101
AV-72 AV-64 AV-91 AV-56 AV-52 AV-45 AV-38 AV-30 AV-22 AV-14A
AV-90
S-4 AV-80 AV-78

B1S-6 B2S-6 B3S-6 B4S-6

N

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. ALL LOCATIONS ARE APPROXIMATE.

0 20' 40'
APPROXIMATE SCALE

LEGEND

- COCs present in soil samples in concentrations less than residential SRLs
- COCs present in soil samples in concentrations less than non-residential SRLs
- COCs present in soil samples in concentrations above non-residential SRLs

Note: Samples AV-7, AV-77, AV-79, AV-86, AV-87, AV-88, and AV-95 were collected outside the site boundary and are not shown on this Exhibit. These samples did not contain metal Contaminants of Concern (COCs) Concern (COCs) in concentrations greater than the Arizona Department of Environmental Quality (ADEQ) Soil Remediation Levels (SRLs).

Project Mngr:	DRS
Drawn By:	KLJ
Checked By:	TRW
Approved By:	DBM
Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	8/8/2024

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SOIL SAMPLE LOCATIONS AND SITE BOUNDARY

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
(SITE CODE: 514142-00)
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT 3

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Image source: PIMA COUNTY ONLINE PARCEL VIEWER, 2024

VAULTED RAILCAR SCALE

LINED FUEL AST

METAL HEAD FRAME

METAL SHED

SUBGRADE CONVEYOR SYSTEM

GROUND WATER WELL

OFFICE TRAILER

WATER TOWER

DU7EX
DU7SW

Site Boundary

DU8EX
DU8SW

DU2EX
DU2SW

DU1EX
DU1SW

DU4

DU3EX
DU3SW

FORMER RAILWAY LINE

DU5

DU6

N

0 20' 40'
APPROXIMATE SCALE

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- Top 2 feet of soil will be removed
- Top 12 inches of soil will be removed
- Top 6 inches of soil will be removed above the center portion

Project Mngr: DRS	Project No.: 63237102
Drawn By: KLJ	Scale: as shown
Checked By: TRW	File No.: see left margin
Approved By: DBM	Date: 8/8/2024

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DECISION UNITS AND ASSUMED SOIL EXCAVATION DEPTH

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
(SITE CODE: 514142-00)
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT 4

n:\environmental\tucson\2023\63237102 avra valley\cad\63237102_vrp.dwg / tab: Exh 4 Decision Units

Image source: PIMA COUNTY ONLINE PARCEL VIEWER, 2024

METAL HEAD FRAME

LINED FUEL AST

CONCRETE PAD

METAL SHED

VAULTED RAILCAR SCALE

SUBGRADE CONVEYOR SYSTEM

FORMER RAILWAY LINE

See Exhibit 5B

A

A'

B

B'

CS-1

CS-2

CS-3

CS-4

SC-1

SC-2

SC-3

SC-4

N

0 5' 10'
APPROXIMATE SCALE

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

PROPOSED SOIL SAMPLE LOCATIONS

Project Mngr:	DRS
Drawn By:	KLJ
Checked By:	TRW
Approved By:	DBM

Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	10/31/2024

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DISCRETE SAMPLE LOCATIONS UNDER THE RAILCAR SCALE & CONVEYOR SYSTEM

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT
5A

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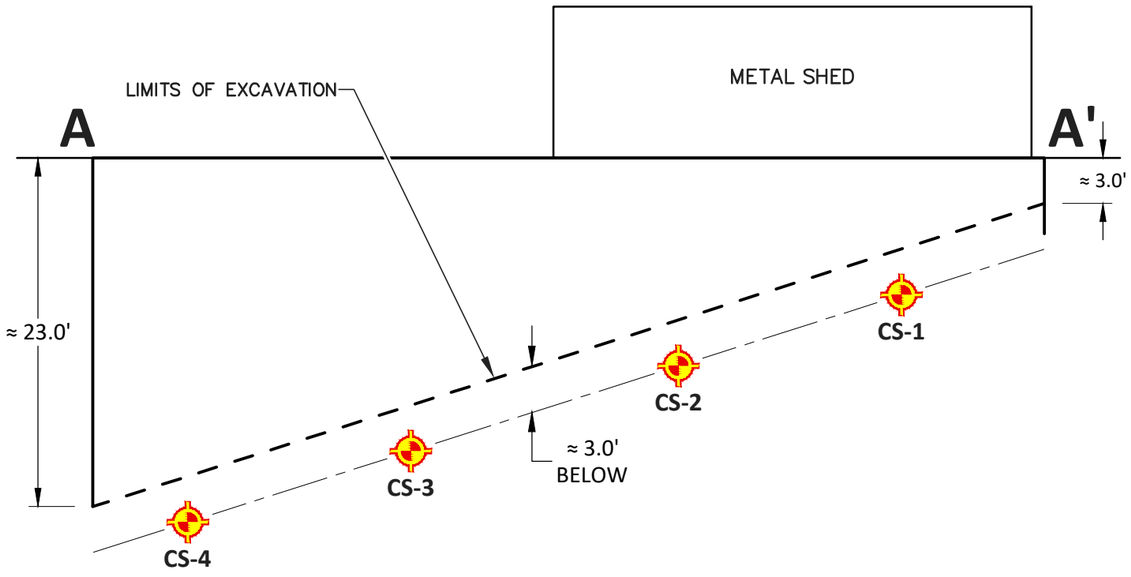
CONVEYOR SYSTEM



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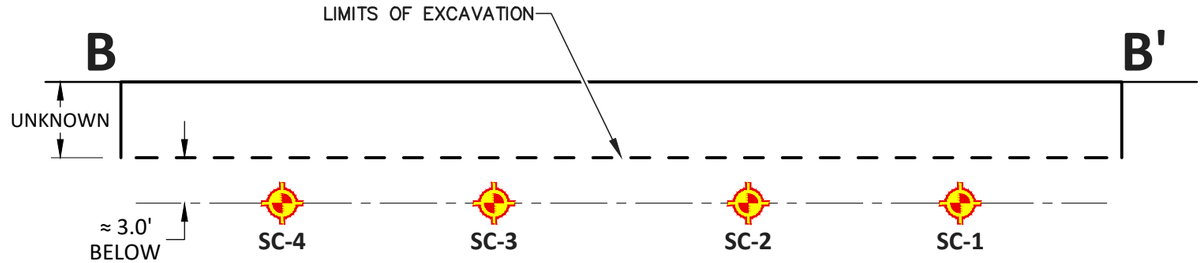

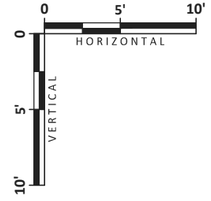

LEGEND

Project Mngr:	TRW
Drawn By:	KLJ
Checked By:	BJG
Approved By:	BJG

Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	11/18/2024

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SECTION VIEWS - DISCRETE SAMPLE LOCATIONS UNDER THE RAILCAR SCALE & CONVEYOR SYSTEM

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT
5B

n:\environmental\tucson\2023\63237102 avra valley\cad\63237102_vrp.dwg / tab: Exh 5B Sections-Conveyor and Scale

Image source: PIMA COUNTY ONLINE PARCEL VIEWER, 2024

VAULTED RAILCAR SCALE
LINED FUEL AST
METAL HEAD FRAME
METAL SHED
SUBGRADE CONVEYOR SYSTEM
GROUND WATER WELL
OFFICE TRAILER
WATER TOWER
AV-6
Site Boundary
AV-57
AV-15
AV-8
AV-85
AV-84
AV-82
AV-46
AV-39
AV-1
AV-64
AV-56
AV-30
AV-22
AV-90
FORMER RAILWAY LINE

N

0 20' 40'
APPROXIMATE SCALE

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- COCs present in soil samples in concentrations less than residential SRLs
- COCs present in soil samples in concentrations less than non-residential SRLs
- COCs present in soil samples in concentrations above non-residential SRLs

Note: Samples AV-7, AV-77, AV-79, AV-86, AV-87, AV-88, and AV-95 were collected outside the site boundary and are not shown on this Exhibit. These samples did not contain metal Contaminants of Concern (COCs) Concern (COCs) in concentrations greater than the Arizona Department of Environmental Quality (ADEQ) Soil Remediation Levels (SRLs).

Project Mngr:	DRS
Drawn By:	KLJ
Checked By:	TRW
Approved By:	DBM

Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	8/8/2024

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PROPOSED SAMPLES FOR CORRELATING THE XRF TO THE LABORATORY COPPER CONCENTRATIONS

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT
6

n: \environmental\tucson\2023\63237102 avra valley\cad\63237102_wrp.dwg / tab: Exh 6 Proposed Correlation Samples

Image source: PIMA COUNTY ONLINE PARCEL VIEWER, 2024

DU7EX
DU7SW

D'

B

See
Exhibit
7B

A

A'

DU8EX
DU8SW

DU2EX
DU2SW

DU1EX
DU1SW

DU7EX
DU7SW

C'

C

D

B'

See
Exhibit
7B

N

0 8' 16'
APPROXIMATE SCALE

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

DU1EX
DU1SW — DECISION UNIT

INCREMENTAL SAMPLE LOCATION

Project Mngr:	DRS
Drawn By:	KLJ
Checked By:	TRW
Approved By:	DBM

Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	10/30/2024

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TYPICAL DECISION UNIT INCREMENTAL SAMPLE LOCATIONS - EXCAVATION FLOOR

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT
7A

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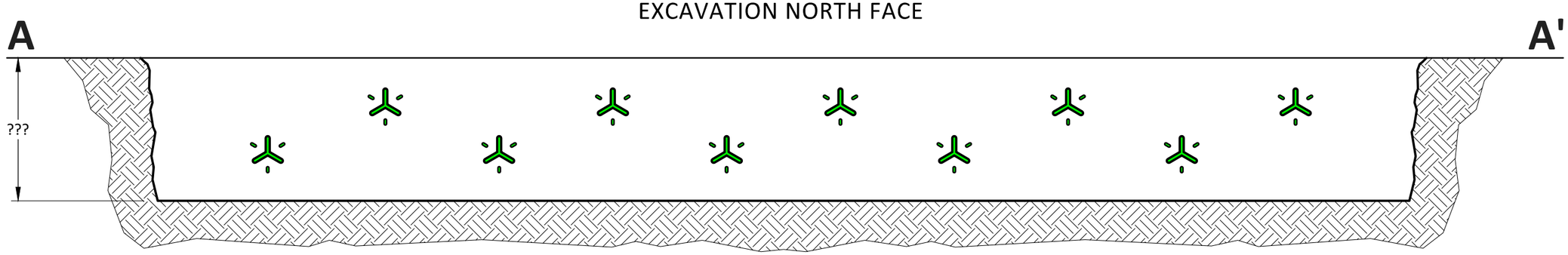
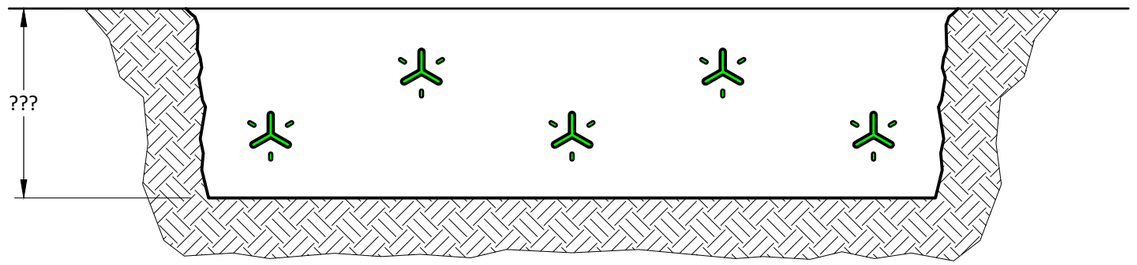
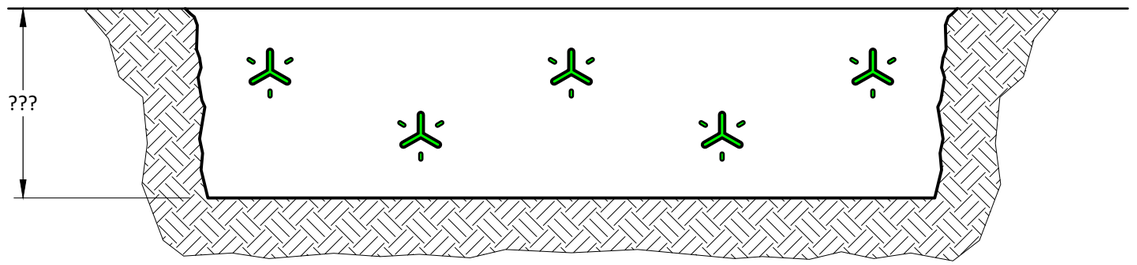
EXCAVATION NORTH FACE



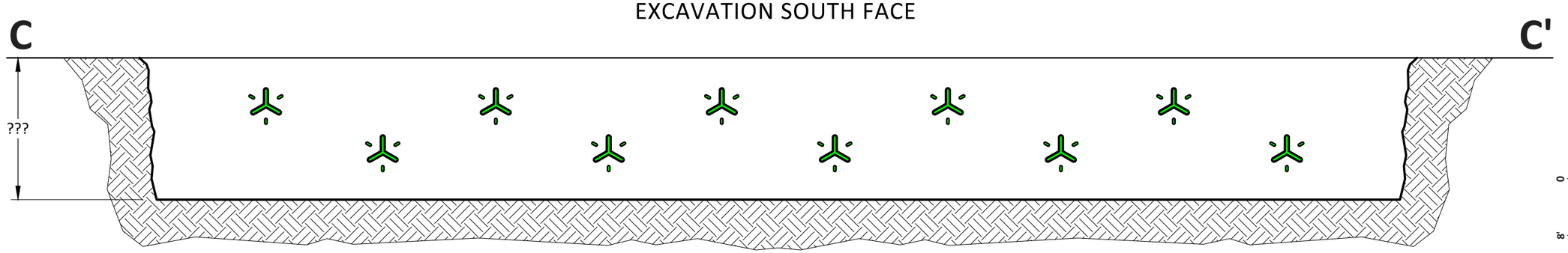
EXCAVATION EAST FACE

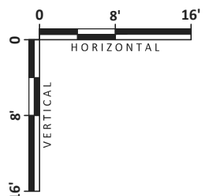


EXCAVATION WEST FACE



EXCAVATION SOUTH FACE





LEGEND

DU1EX
DU1SW
DECISION UNIT

INCREMENTAL SAMPLE LOCATION

Project Mngr:	DRS
Drawn By:	KLJ
Checked By:	TRW
Approved By:	DBM

Project No.:	63237102
Scale:	as shown
File No.:	see left margin
Date:	10/31/2024

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SECTION VIEWS - TYPICAL DECISION UNIT INCREMENTAL SAMPLE LOCATIONS - EXCAVATION SIDE WALL

VOLUNTARY REMEDIATION PROGRAM WORK PLAN
I-10 Avra Valley Mining & Development, LLC Site
7851 West Avra Valley Road Marana, Arizona 85653

EXHIBIT
7B

n:\environmental\tucson\2023\63237102 avra valley\cad\63237102_vrp.dwg / tab: Exh 7B Sections-Excavation

ATTACHMENT A

SAMPLING AND ANALYSIS PLAN

Sampling and Analysis Plan Voluntary Remediation Program Work Plan

I-10 Avra Valley Mining & Development Site

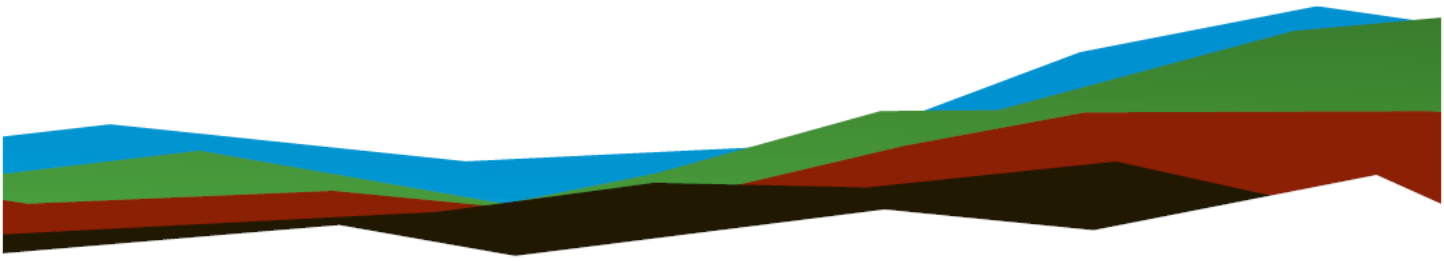
7755 West Avra Valley Road

Marana, Pima County, Arizona 85653

VRP Site Code: 514142-00

March 5, 2025 | Project Number: 63237102

Prepared For:
I-10 Avra Valley Mining & Development, LLC
5210 East Williams Circle, Suite 720
Tucson, Arizona 85711



Prepared by:
Terracon Consultants, Inc.
Tucson, Arizona

Nationwide
Terracon.com
Facilities
Environmental
Geotechnical
Materials

Table of Contents

Exhibits

Tables

Attachments

List of Acronyms

Acronym	Definition
%	Percent
%R	Percent Recovery
±	Plus or Minus
ºC	Degrees Centigrade
≤	Less Than or Equal To
95% UCL	95 Percent Upper Confidence of the Mean Concentration
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
APN	Assessor's Parcel Number
AUL	Activity and Use Limitation
BAP	Benzo(a)pyrene
CCV	Continuing Calibration Verification
COC	Contaminant of Concern
DO	Dissolved Oxygen
DQI	Data Quality Indicator
DQO	Data Quality Objective
DU	Decision Unit
EDD	Electronic Data Deliverable
EPA	United States Environmental Protection Agency
GPL	Groundwater Protection Level
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
ISM	Incremental Sampling Methodology
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
MQO	Measurement Quality Objective
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NFA	No Further Action
NIST	National Institute of Standards and Technology
Pace	Pace Analytical
PAH	Polynuclear Aromatic Hydrocarbon
PE	Performance Evaluation

Acronym	Definition
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPrP	Quality Assurance Program Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RDL	Reported Detection Limit
RPD	Relative Percent Difference
RPS	Remedial Projects Section
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SRL	Soil Remediation Level
Terracon	Terracon Consultants, Inc.
VRP	Voluntary Remediation Program
XRF	X-Ray Fluorescence

1.0 PURPOSE AND PROJECT TEAM

1.1 Plan Purpose

This Sampling and Analysis Plan (SAP), in conjunction with the Voluntary Remediation Program (VRP) Work Plan, presents the functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives (DQOs) associated with remediation, monitoring, and confirmation characterization of the property owned by I-10 Avra Valley Mining & Development in Marana, Arizona (Site). The Site is designated as a portion of Pima County Assessor's Parcel Number (APN) 226-01-032E and has an assigned address of 7755 West Avra Valley Road. The general location of the Site is depicted on a topographic map provided as Exhibit 1. The Site covers approximately 1.6 acres and is developed with several abandoned structures associated with the former ASARCO mine copper ore loading and transfer facility.

This SAP is intended to support the project activities described in the VRP Work Plan. This SAP was prepared to meet the requirements of the Arizona Department of Environmental Quality's (ADEQ's) VRP Data Quality Plan for Work Plan/SAP Development (revised October 15, 2021). The SAP also incorporates provisions found in the ADEQ's Remedial Projects Section (RPS) Quality Assurance Program Plan (QAPrP).

The goal of the activities described in the VRP Work Plan and SAP is to conduct soil remediation and confirmation characterization to obtain an unconditional No Further Action (NFA) determination for ten metal compounds in Site soil from ADEQ VRP without an encumbrance such as an environmental use restriction or activity and use limitation (AUL) on the property title. The ten metal compounds are collectively referenced as metal contaminants of concern (COCs) and include arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver (also known as the 8 Resource Conservation Recovery Act (RCRA) 8 metals), copper, manganese, vanadium, and zinc. The future Site use has not been defined; however, it will likely be zoned for mixed commercial and/or residential uses. As such, the appropriate remedial goals for Site soil (hereafter referred to Project-specific cleanup standards) are the ADEQ pre-determined residential soil remediation levels (SRLs) and minimum Groundwater Protection Levels (GPLs) for soil.

The following five metals and one polycyclic aromatic hydrocarbon (PAH) were identified during previous Site investigations as being present in soil at concentrations greater than the Project-specific cleanup standards:

- Arsenic
- Cadmium

- Chromium
- Copper
- Lead
- Benzo(a)pyrene (BAP)

One soil sample (S-6) collect by WTI during the 2022 assessment contained BAP at a concentration of 0.0767 milligrams per kilogram (mg/kg). BAP is present in a concentration greater than the residential SRL with 10^{-6} excess cancer risk factor of 0.069 milligrams per kilogram (mg/kg) and is less than the ADEQ residential SRL with 10^{-5} excess cancer risk factor of 0.69 mg/kg. I-10 Avra Valley Development & Mining, LLC (Volunteer) will not request an NFA Determination for PAHs and, therefore, further soil assessment and/or remediation will not be conducted to address BAP-impacted soil.

1.2 Project-Specific Cleanup Standards

Based on the historical Site use and the results of assessment and characterization activities conducted on and near the Site, an NFA Determination for soil will be sought for the metal COCs listed in Table 1. The Volunteer will conduct remediation and final confirmatory soil sampling to demonstrate Project-specific standards are attained for the following:

- Arsenic (Known human carcinogen): Residential SRL with 10^{-6} excess cancer risk factor
- 8 RCRA Metals, copper, manganese, vanadium, and zinc: Residential SRL 10^{-5} excess cancer risk factor or Residential Non-Carcinogen Levels (whichever is lower)
- All Constituents: Minimum GPLs

The primary exposure routes of these constituents are:

- Inhalation of airborne vapors, mists, or particles containing contaminants
- Skin Absorption

The SAP will be distributed to those individuals who will participate in the project, including those with the Volunteer, consultant, and other significant subcontractors involved in the project. Addenda and/or revisions to the SAP can be initiated by the Volunteer or consultant. In general, an addendum will be written when unforeseen or significant changes have occurred. A revision will not be required for minor changes in scope.

1.3 Assigned Personnel

The assigned personnel may be subject to change based on the who is conducting the work (Volunteer, owner, or occupant, or developer) and their selected consultant. Currently, the following individuals will be assigned to this project:

I-10 Avra Valley Development & Mining, LLC

Thomas Parsons – Site Owner Representative

Terracon

Project Manager – Annie McCawley

Sampling Team Leader – Annie McCawley

Quality Assurance Coordinator – Chris Bartley

Peer Reviewer – Stewart Dixon

Field Sampling – Breana Quesada

Pace Analytical

Analytical Laboratory Project Manager – Daphne Richards

2.0 PROJECT TECHNCIAL DESIGN

2.1 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) have been developed to outline the overall purpose and approach the analytical data are intended to support. DQOs have been prepared according to the United States Environmental Protection Agency (EPA) "seven-step" process described in EPA's guidance for DQOs[1]. To achieve these objectives, a data quality management program will be an integral part of the investigation.

Step 1: Problem Statement

1. The Site soil has been impacted by the historical ASARCO uses of the Site as a copper ore loading and transfer facility
2. Select metals have impacted soil at levels above the Project-specific cleanup standards
3. The horizontal and vertical extent of COC impacts are not fully delineated at the Site
4. Future site use is compromised due to the presence of Site contaminants
5. Excavated soil may contain COCs that would cause the soil to be classified as a hazardous waste
6. ADEQ requires remediation and final Site characterization to be conducted in a manner outlined in an approved Work Plan

Step 2: Identify the Decision

1. Define appropriate investigation procedures and soil and sample collection methods to further assess the vertical and horizontal extent of soil impacted by the COCs
2. Evaluate the vertical and horizontal extent of impacts of the COCs above the Project-specific cleanup standards
3. Evaluate excavated soil for disposal purposes

Step 3: Identify Inputs to the Decision

1. Volunteer budget, schedule, and Site end-use requirements and limitations

[1] EPA; Guidance for the Data Quality Objective Process (QA/G4); August 2000.

2. Results of the previous assessments conducted at the Site
3. ADEQ acceptance of remedial action and site characterization
4. Soil cleanup standards that are applicable to the Site and COCs
5. Analytical results from final site characterization for NFA Determination request

Step 4: Define the Boundaries of the Study

1. The estimated Site boundaries have been estimated based on prior site assessments, aerial photographs and visual indications of impacts
2. The boundaries of the Site are subject to change based on field screening activities using X-Ray Fluorescence (XRF) readings for copper and visual indications of impacts
3. Defined boundaries will be finalized once closure confirmation soil sampling results have been assessed

Step 5: Develop a Decision Rule

1. If soil samples collected from the thirteen decision units (DUs) do not contain COCs in concentrations greater than the Project-specific cleanup standard, no additional assessment or remediation will be required and a NFA can be requested from ADEQ
2. If COCs are identified in concentrations greater than Project-specific cleanup standards, additional excavation will be completed such that soil remaining on the Site will contain COCs in concentrations less than the Project-specific cleanup standards

Step 6: Specify Tolerable Limits on Decision Errors

1. If the Site is not adequately characterized and/or remediated, remaining COCs may pose a potential source of soil and/or groundwater contamination and leave unresolved concerns about the nature and extent of contamination at the Site
2. A false negative is defined as considering soil remaining on the Site to meet Project-specific cleanup standards, when analytes are actually present in these areas above Project-specific cleanup standards in concentrations that could contribute to risk to human health and the environment
3. A false positive is defined as considering the soil or groundwater to contain analytes above Project-specific cleanup standards, when the converse is true. This may result in additional expense for soil remediation

Step 7: Optimize the Data

1. The actions described in the VRP Work Plan and this SAP will be taken to evaluate if Site soil contains COCs in concentrations below the Project-specific cleanup standards

2. Additional assessment and remediation planning samples will be collected and analyzed as described in the VRP Work Plan and this SAP to optimize the data

2.2 DATA QUALITY INDICATORS

This section identifies the data quality indicators (DQIs) for the DQOs; defines the elements of the QC program for field operations and analytical laboratory analyses; and defines the requirements for precision, accuracy, completeness, representativeness, comparability, and sensitivity. Acceptable results are those values that fall within the acceptable range for the specified Measurement Quality Objectives (MQOs). Corrective actions for unacceptable results for specific testing methods are detailed in the Work Plan and this SAP.

2.2.1 Precision

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions. Precision is evaluated by measuring the agreement among individual measurements of the same property under similar conditions. When incremental sampling methodology (ISM) is used, precision is also evaluated by confirming that the data is normally distributed and, therefore, the incremental sampling approach is valid. Field precision is measured through the collection and analysis of field duplicate samples and field replicate samples. Additionally, prior to site characterization and remediation, precision will be measured through correlation between XRF readings of copper in soil and laboratory results of copper in soil.

Duplicate Analysis

Precision will be measured as the relative percent difference (RPD) between duplicate analyses when the analyte concentration is greater than five times the method detection limit (MDL) and as an absolute concentration based on the MDL when the analyte concentration is less than five times the MDL. When analyte concentrations are more than five times the MDL, RPD in percent (%) is calculated using the following equation:

$$RPD = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100,$$

where D_1 is the first sample value and D_2 is the second sample value (duplicate)

The MQO for field precision is an RPD of 50 percent for soil samples.

Replicate Analysis

Replicate results are assessed using the relative standard deviation (RSD) for the Decision Unit. The RSD is calculated using the following equation:

$$RSD\% = \frac{100s}{\overline{x}}$$

where $\overline{x}$ is the mean concentration of the replicate sample set and *s* is the standard deviation of the replicate samples.

One field replicate set (consisting of a primary sample and two replicate samples) will be collected from each DU to test the assumption that distributional and compositional heterogeneity is properly accounted for through selection of the DU sizing, number of increments, and sample volume and, therefore, the incremental sampling approach is valid. It is assumed that ISM adequately addresses the site heterogeneity if the RSD is 35% or less. If the RSD is exceeded, the 95% upper confidence limit of the mean concentration (95% UCL) will be calculated using ProUCL. The 95% UCL will be applied to each DU.

Analytical Laboratory

Analytical laboratory precision is measured through the analysis of analytical laboratory control sample and analytical laboratory control sample duplicates (LCS/LCSD), matrix spike/matrix spike duplicates (MS/MSD), or sample duplicates. The analytical laboratory will perform MS/MSD analyses at a rate of one for every 20 samples. RPD values within 35% will be considered precise without further discussion. The results will be flagged if one or more sample results fall outside the acceptance criteria. Samples will not be re-extracted and analyzed unless the results also fall outside the analytical laboratory-derived limits based on historical data and EPA recommended limits.

The MQO for analytical laboratory precision are:

- RPD of less than or equal to (≤) 20% between duplicate blank spikes
- RPD for analytical laboratory LCS and MS listed in Table 1.

2.2.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systematic error. It reflects the total error associated with a measurement. Simply put, accuracy is the measure of closeness of data to their true values. A measurement is accurate when the value reported does not differ beyond acceptable limits from the true value or known concentration of the spike or

standard. Analytical laboratory accuracy is expressed as the percent recovery (%R), which is calculated as follows:

$$\%\ R = \left(\frac{Xs - Xu}{T}\right) x100\%$$

where *Xs,* is the measured value of the spiked sample, *Xu* is the measured value of the unspiked sample, and T is the true value of the spike solution added.

Sampling field accuracy is generally assessed through the analysis of equipment blanks if non-disposable sampling equipment is used, field blanks, and trip blanks. The Project Manager or his/her designee will decide which type(s) of blank samples are collected based on professional opinion. Equipment blanks will be collected at a rate of one equipment blank sample per every 20 samples of the primary samples collected or once per sampling day, whichever is more frequent and analyzed for the COCs.

The MQOs for field accuracy are:

- Absence of analytes in equipment blank samples
- Calibration standards within ±5% of expected range of certified value

Analytical laboratory accuracy will be calculated at a rate of one for every 20 investigative samples. Accuracy goals for parameters to be analyzed will be in accordance with specific EPA methods applied. Results will be calculated and compared to the analytical laboratory-specific matrix accuracy and LCS objectives. If one or more sample results fall outside the acceptance criteria, they will be flagged. Samples will not be re-extracted and analyzed unless the results also fall outside the laboratory-derived limits based on historical data and EPA recommended limits.

The MQO for analytical laboratory accuracy are:

- LCS and MS recoveries within acceptable ranges listed in Table 1
- LCS/LCSD and MS/MSD recovery in accordance with analytical laboratory limits listed in Table 1
- Constituents in the method blank detected in concentrations less than the analytical laboratory RDL

2.2.3 Completeness

Completeness is the amount of valid data obtained compared to the amount that could be expected under ideal conditions. The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The formula for calculation of completeness is, as follows:

$$\%\ Completeness = \left(\frac{Number\ of\ Valid\ \ Results}{Number\ of\ Possible\ \text{Results}}\right)$$

Acquiring 100 percent of the data planned is difficult due to unexpected circumstances, adverse weather conditions, equipment problems, analytical laboratory error, and loss of samples or samples that are invalid because they do not meet all of the analytical laboratory sample acceptance criteria. Field completeness will be 80% or better for non-critical samples and 90 percent or better for critical samples. Samples will be considered critical if they are subject to definitive analyses and compared to cleanup levels. Non-critical samples will involve field screening samples used to direct the exploration in the field. The analytical laboratory completeness objective is for 100 percent of the field samples to be analyzed, with greater than 90 percent meeting QC objectives.

2.2.4 Representativeness

Representativeness is the degree to which data accurately and precisely represent selected characteristics of the media sampled. The following factors determine the representativeness of the data: sampling location, sampling frequency, sample type, sample collection methods, sample preservation, sample holding times, and analytical methods used. Representativeness of data collection is addressed by careful preparation of sampling and analysis programs.

This Project-specific SAP addresses representativeness of field data by specifying sufficient and proper numbers and locations of samples incorporating appropriate sampling methodologies specifying proper sample collection techniques and decontamination procedures and establishing proper field QA/QC procedures. Proper field techniques and procedures will be adhered to. Deviations from the Work Plan will be noted in the field notes.

The MQO for field representativeness are:

- Samples collected from representative location using appropriate sampling equipment, containers, and preservatives

Representativeness in the analytical laboratory is ensured by using proper analytical procedures and appropriate methods, meeting analytical holding times, and meeting QC criteria for each method. It is the analytical laboratory Project Manager and QA Manager's responsibility to ensure that the proper methods and criteria are employed by the analytical laboratory. Deviations from the SAP or analytical laboratory standard operating procedures (SOPs) will be documented in the case narrative.

2.2.5 Comparability

Comparability is an expression of confidence with which one data set can be compared to

another. The objective of comparability is to ensure that data developed during the investigation are comparable to Site knowledge and adequately address applicable criteria or standards established by the appropriate regulatory agency.

The comparability goal is achieved through the use of standard field techniques. These include, but are not limited to, the project prescribed techniques for sample collection and field parameter measurements. A detailed description of field techniques is included in this SAP. Proper field techniques and procedures will be adhered to, and deviations from the SAP will be noted in the field notes.

The comparability of analytical laboratory data will be ensured by the analytical laboratory personnel having reviewed the SAP and having a working knowledge of the analytical SOPs. The analytical laboratory QA manager (or designee) will also ensure comparable data by reviewing data generated and verifying the correct methods have been used. The data reviewer will also review the data to ensure compliance with the various method requirements.

2.2.6 Sensitivity

Sensitivity is a measure of the analytical detection or quantification limits. A detection limit is the minimum amount of analyte that can be consistently measured and reported with a high degree of confidence that the analyte concentration is above background response. A quantification limit is that amount that can be consistently quantified with acceptable precision and accuracy. This is also referred to as the Reported Detection Limit (RDL).

The analytical laboratory RDLs will be established and verified as outlined in the analytical methods and in accordance with licensure rules. This Project-specific SAP includes COC lists with corresponding detection limits and appropriate action limits. Where applicable, the analytical laboratory quantitation limits required for this project must be at or below Project-specific cleanup standards. Failure of the analytical laboratory to achieve the quantitation limits specified in this SAP may result in the qualification or rejection of data and initiate re-sampling/re-analysis based on sensitivity.

2.3 SAMPLE POINTS AND TYPES

Soil assessment using ISM will be used to characterize the metals concentration remaining in soil in excavation sidewalls and floor as described in Section 5.4 of the Work Plan. Thirteen primary ISM composite samples will be collected, and one replicate sample set each will be collected from a sidewall and excavation floor, and a near surface samples (three replicate samples total for the project). Assessment of soil underlying the railcar scale concrete foundation and subgrade conveyor system will be characterized using discrete soil sampling from an excavator as described in Section 5.5 of the Work Plan.

The following anticipated number of QC samples and methods will be collected:

- Replicates (ISM soil characterization): three composite samples, one each from excavation sidewall, excavation floor, and near surface
- Duplicates (Deep soil characterization): two grab samples, one duplicate sample collected from soil underlying the railcar scale and one duplicate sample collected from soil underlying the conveyor system
- Equipment blanks (grab): four grab samples will be collected, one each sampling day

Application of ISM to this Site is based on professional judgment, experience with the ADEQ VRP, and guidance provided by EPA and other commonly-accepted entities, specifically Interstate Technology and Regulatory Council (ITRC) guidance.[2]

2.4 PARAMETERS TO BE MEASURED

Soil samples will be analyzed using EPA Methods listed in Table 1.

2.5 QUALITY CONTROL ACTIVITIES

The overall QA objective is to implement QC procedures during field and analytical laboratory activities that will provide data with the degree of quality consistent with the intended use. Internal QC checks are used to evaluate whether analytical activities are in control and to estimate the effect a sample matrix may have on data being collected. This section describes both the field and analytical laboratory QC checks that will be used for the evaluation of data.

2.5.1 Field QC Checks

The data quality indicators for the assessment of data quality, including the field objectives for precision, accuracy, completeness, representativeness, comparability, and sensitivity, are outlined in Section 2.2.

Duplicate Samples

A field duplicate is a second sample collected at the same location as the primary sample. Duplicate samples are collected simultaneously or in immediate succession, following identical collection procedures, and treated in the same manner during shipment, storage, and analysis. The field duplicates are submitted "blind" and numbered such that they cannot be readily identified by analytical laboratory personnel.

[2] ITRC; Incremental Sampling Methodology (ISM) Update (ISM-2); October 2020.

The primary and duplicate sample identifiers must be recorded in the field logbook or on the field sampling forms to facilitate comparison of analytical results.

Results from duplicate sampling are used to evaluate sampling and analytical precision. Agreement between duplicate sample results generally indicates good sampling and analytical precision. Conversely, poor agreement between results may indicate sample heterogeneity, especially soil samples. Field duplicates will be collected at a frequency of 10% of the primary assessment samples collected or once per sampling day, whichever is more frequent. The duplicate sample will be analyzed for all analytical laboratory analyses requested for the primary sample.

The RPD will be calculated using duplicate and original sample results. The result will then be compared to the RPD limits specific to the aliquot matrix. If the RPD is exceeded, corrective action will be conducted by reviewing the field logbook to evaluate whether the sample matrix was likely homogeneous or heterogeneous and reviewing the analytical laboratory quality control data to qualitatively assess overall analytical laboratory performance. The result from the primary sample will be the value incorporated in the final report and used for assessment activities.

Replicate Samples

Replicate samples (two additional samples) will be collected with primary samples in one DU sidewall and one DU excavation floor and submitted to the analytical laboratory for analysis of metal COCs. Replicate samples will be collected along the same grid used for the initial samples, but the sampling points will be varied from the initial sampling point along each location. Replicate samples will be collected in the same manner as the initial samples. The analytical results from the initial sample and the two replicate samples will be used to calculate the RSD for the DU.

Equipment Blanks

Non-disposable sampling equipment that is used repeatedly throughout the project will be decontaminated between sample locations and depths. After the equipment is decontaminated and allowed to air dry, an equipment blank will be collected by pouring distilled or de-ionized water over and over the sampling equipment and into sample containers provided by the analytical laboratory. Equipment blanks will be collected at a frequency of one equipment blank sample per every 20 samples of the primary samples collected or once per sampling day, whichever is more frequent. The equipment blanks will then be submitted to the analytical laboratory for analyses of the COCs associated with the samples collected using the decontaminated equipment.

Inspection and Acceptance Requirements for Supplies and Consumables

Field sampling supplies and consumables will be inspected and evaluated for use by the consultant. The consultant will verify preserved containers obtained from the analytical laboratory have not been tampered with since preservation. Potable and deionized decontamination water will be inspected to ensure the supplier's seal is intact. Where applicable, analytical laboratory or vendor calibration sheets will be reviewed and placed in the job file. No standard solutions, buffers, or other chemical additives will be used if the expiration date has passed. It is the responsibility of the sampling manager or designee to verify the suitability of supplies and consumables and restock, as necessary.

2.5.2 Laboratory Quality Control Checks

The data quality indicators for the measurement of analytical laboratory data including the objectives for precision, accuracy, completeness, representativeness, comparability, and sensitivity are outlined in Section 2.2. The analytical laboratory QC samples have been selected based on the DQOs for this project and established analytical method requirements and are outlined below. However, additional QC samples may be required by the analytical laboratory to satisfy the analytical laboratory internal QC policies.

Method Blank

A method blank is a sample of ASTM Type II or analyte free (deionized) water that is carried through each step of the preparation and analytical method. Method blank samples are used to assess potential contamination attributed to analytical laboratory operations during sample preparation and analysis. A method blank sample is required for each analytical batch of 20 or fewer samples.

Instrument Blank

An instrument blank is a sample of ASTM Type H or analyte-free (deionized) or non-contaminated solid that is analyzed with associated calibrations of analytical laboratory instruments. Instrument blank results are used to assess potential contamination attributed to calibration procedures.

Internal Standards

An internal standard is a standard of known concentration added to each sample and carried through the entire determination procedure as a reference for calibrating and controlling the precision bias of the analytical method. Internal standards are generally used for organic analyses only.

Matrix Spikes and Matrix Spike Duplicates

Matrix spikes are known concentrations of analytes added to a sample and carried through each step of the preparation and analytical method. The results of matrix spikes are reported in %R and are evaluated to assess potential matrix interferences. A matrix

duplicate (or analytical laboratory duplicate) is a separate aliquot of a sample taken from the sample container and carried through each step of the preparation and analytical method. The results of MSDs are reported as RPD and are evaluated to assess analytical laboratory and method precision.

Laboratory Control Samples/Laboratory Control Sample Duplicates

LCSs and LCSDs are analytical laboratory-generated samples used to monitor the day-to-day performance of analytical methods (sensitivity, calibration, and memory effects). An LCS may be a purchased standard or a method blank spiked with known concentrations of target analytes. The LCS is carried through each step of the preparation and analytical method. LCS results should be reported in percent recoveries and used to assess the accuracy and precision of the analytical process independent of matrix effects. Controlling analytical laboratory operations with LCSs (rather than surrogates or matrix spikes) offers the advantage of being able to differentiate low recoveries due to procedural errors with those because of matrix effects.

Continuing-Calibration Verification

Continuing calibration verification (CCV) is achieved by the routine analysis of a standard of known concentration. The verification standard concentration is usually at or near the midpoint of the linear calibration curve. CCV for linear calibrations involves the calculation of the percent drift or percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard.

Performance Evaluation Samples

Blind performance evaluation (PE) samples may be submitted to the analytical laboratory at the direction of ADEQ or the Volunteer. QC issues that may trigger the need for the submission of PE samples include confirmed quality issues detected through data validation or unexpected or unexplained sample results.

If requested, blind PE samples will be prepared in similar sample containers as the project field samples and shipped from the field to the analytical laboratory for analysis. The blind PE samples will be prepared using National Institute of Standards and Technology (NIST) or EPA certified standards. The project-specific PE samples will contain known concentrations of the analytes of interest. Analytical laboratory results will be evaluated against the original Certificates of Analyses for precision and accuracy.

2.6 SAMPLE LOCATION INFORMATION

The proposed DU locations are shown on Exhibit 2. The sampling grid will be developed prior to actual sample collection.

2.7 SPECIAL SAMPLE REQUIREMENTS

Special sample requirements have not been identified.

3.0 TRAINING REQUIREMENTS

Sampling personnel are required to successfully complete a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) safety course and applicable refresher training in accordance with federal regulations. Staff are also expected to be trained on sampling for hazardous materials as well as to have read and be familiar with the Health and Safety Plan (HASP) and SAP. Detailed health and safety training requirements are detailed in the Project-specific HASP. Management will provide for the protection of the personal safety and health of workers on Site, including the selection, provision, testing, decontamination, and disposal of personal protective equipment (PPE) and required medical monitoring. Personnel will comply with applicable worker safety, health laws and regulations. Field staff will exercise reasonable professional judgment regarding safety and possible cessation of services for safety reasons.

Documents containing interpretation of results and conclusions will be sealed by an Arizona-registered professional qualified to perform the subject work.

Specific training requirements may be necessary for personnel operating field analytical or sampling equipment or specialized equipment, such as the XRF analyzer, global positioning system, or other instruments. Manufacturer's requirements and recommendations for use, calibration, and maintenance will be followed. Calibration activities will be recorded in the daily field book.

Full Health and Safety training requirements are detailed in the Project-specific HASP.

4.0 FIELD SAMPLING TABLE

The sample containers, preservatives, and holding times listed for the metal COCs are presented in Table 2. The analytical laboratory will provide new, pre-preserved sample containers as needed for sample collection. In addition, the analytical laboratory will maintain the certificate of cleanliness for the containers should any questions arise in the future. Samples that require preservation will be preserved according to established EPA requirements for each EPA method used for analysis. Suitable measures will be taken to ensure that storage requirements (i.e., temperature) are maintained in the field, during transport to the analytical laboratory, and during storage at the analytical laboratory. Sample temperature will be recorded by the analytical laboratory upon receipt.

5.0 FIELD SAMPLING REQUIREMENTS

SOPs provided in Attachment A will be employed to conduct the activities described in the Work Plan and SAP.

6.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

6.1 SAMPLE DESIGNATION

The sample designation system is defined in the following subsections for proper identification and tracking of samples in the field and analytical laboratory. This sample designation system is designed such that each sample receives a unique identifier. A label will be affixed to each container and will include the sample number, sampler's initials, collection date and time, location, requested analysis, preservative, and client name.

6.1.1 XRF Correlation

Soil samples collected to evaluate the correlation between XRF measurements and analytical laboratory results:

SS-Pre-#

Where: SS-Pre – discrete soil sample collected during preliminary phase of the Project
– where # begins with 1 and is sequentially increases by 1 for each sample collected

6.1.2 DU Sidewall Soil Samples

Soil samples collected from DU sidewalls for closure characterization:

SS-DUSW-#

Where: SS – composite soil sample collected from DU sidewall
DUSW – DU sidewall
– DU number

6.1.3 DU Excavation Floor Soil Samples

Soil samples collected from DU excavation floor for closure characterization:

SS-DUEX -#

Where: SS – composite soil sample collected from DU excavation floor
DUEX – DU excavation floor
– DU number

6.1.4 DU Near Surface Soil Samples

Soil samples collected from DU excavation floor for closure characterization:

SS-DU#

Where: SS – composite soil sample collected from near surface DU
– DU number

6.1.5 Soil Underlying Railcar Scale

Discrete samples collected from soil underlying the railcar scale:

SS-RCS#-D

Where: SS – discrete soil sample collected from the DU
– sample location number beginning with 1 and increasing by 1 for each location
D – depth of sample collection (feet bgs)

6.1.6 Soil Underlying Conveyor System

Soil samples collected from soil:

SS-CVS#-D

Where: SS – discrete soil sample collected from the DU
– sample location number beginning with 1 and increasing by 1 for each location
D – depth of sample collection (feet bgs)

6.1.7 Replicate Samples From ISM DUs

Replicate samples collected from the DUs 1 through 7 will be designated as follows:

RS-#-DU+

Where: RS – Replicate sample
– replicate sample number from DU
DU+ – Decision unit from which replicate sample was collected

6.1.8 Duplicate Samples From Discrete Samples

Duplicate soil samples will be submitted blind to the laboratory using the same sample designations as noted in 6.1.5. and 6.1.6. A false depth or DU number will be recorded on the CoC in order to create a blind laboratory submittal. The actual depth and DU will be recorded within the field logbook.

6.1.9 Soil Stockpile Samples

The soil samples collected from the soil stockpiles will be identified as follows:

STP-DU-#

Where: STP – Soil Stockpile
DU – Decision unit from which sample(s) collected
–begins with 1 and is sequentially increases by 1 for each sample collected

6.1.10 Equipment Blanks

Equipment blank samples will be designated as follows:

EB-#-mmddyy

Where: EB – Equipment Blank
- sample identification number
mmddyy – month, day, and year of collection

6.2 CHAIN-OF-CUSTODY PROCEDURES

The analytical laboratory will provide chain-of-custody forms, cooler custody seals, and sample labels which will be completed by the sampler(s). Custody of samples will be maintained and documented from the time of sample collection to completion of the analyses. The sampler(s) will be responsible for the care and custody of the samples until they are relinquished for delivery to the analytical laboratory or accepted by an analytical laboratory representative. A sample is under a person's custody if one or more of the following conditions are met:

- In the person's physical possession
- In view of the person after that person has taken possession
- Secured by that person so that no one can tamper with the sample
- Secured by that person in an area that is restricted to authorized personnel

The chain-of-custody will be submitted to the analytical laboratory with all samples and will contain the following information:

- Project number
- Date and time of sample collection
- Sample matrix description
- Analyses requested

- Preservation, if applicable
- Number and type of containers used
- Any special handling or analysis requirements
- Signature of person collecting the samples
- Signature(s) of persons involved in the sample custody
- Sample identification

The chain-of-custody form will be filled out using a pen with indelible ink capable of making carbon copies. When the samples are transferred from one party to another, the individuals will sign, date, and note the time on the form. The original form will accompany the samples to the analytical laboratory in the shipping cooler. Sampling personnel will retain a copy of the chain-of-custody when samples are relinquished.

The following procedures will be used as applicable when packing and transporting samples to analytical laboratory staff:

- Use of watertight ice chests and coolers
- Use of ice (for example, cubes, shaved) to maintain proper refrigeration of the samples at 4 degrees centigrade (°C)
- Packing material placed within the cooler to ensure container integrity
- Paperwork placed inside a waterproof bag inside the cooler
- Cooler lid taped closed with packaging tape and signed custody seal if transported by entity other than sampling or analytical laboratory staff

After collection, samples will be transported in a timely manner to the analytical laboratory. The analytical laboratory will be notified in advance of sample delivery. Sample coolers will be delivered to the analytical laboratory by sampling personnel or courier or sent via commercial carrier.

The chain-of-custody will list the primary and field QC samples identifiers. For duplicates, a separate sample number will be assigned and submitted blind to the analytical laboratory in accordance with the sample designation provided in Sections 6.1.4. The duplicate sample identification will be recorded in the field logbook or sampling forms. Equipment blanks will be identified as "EB" and numbered sequentially and with the date of collection. Samples collected for QC purposes will be specified for analysis by a notation on the sample container label and the chain-of-custody.

6.3 ANALYTICAL LABORATORY CUSTODY PROCEDURES

Upon receipt, the analytical laboratory will check samples for label identifications and complete chain-of-custody documentation. The sample integrity will be confirmed, and the temperature will be measured immediately after the cooler is opened and recorded on the chain-of-custody. Discrepancies between the chain-of-custody documentation and sample labels, or problems encountered that may affect the sample integrity must be noted and communicated to the consultant. Problems that may affect the sample integrity include:

- Inadequate sample preservation
- Sample containers broken, leaking, or containing insufficient volume
- Holding time exceeded
- Temperature blank, if included, less than 2° C or greater than 6° C (when time since sample was collected is greater than 2 hours)

A unique identification number will be assigned by the analytical laboratory. This number will be cross-referenced to the field sample designation to reduce the possibility of reporting errors. Access to the sample control area will be restricted to prevent unauthorized contact with samples, extracts, or documentation. Samples and sample extracts will be retained by the analytical laboratory a minimum of 30 days following the issuance of the final analytical laboratory report.

6.4 HANDLING AND PACKAGING

Assessment samples will be stored in a portable cooler preserved with wet ice at 4^{o} C until received by the analytical laboratory. Adequate packing materials will be used to protect sample container integrity and preservation. Samples stored overnight will be secured to prevent tampering.

For samples that are shipped via commercial carrier, samples will be placed in a rigid shipping container (for example, an insulated cooler). The following outlines the packaging procedures that will be followed for shipment of samples:

- If the cooler has a drain plug, it will be sealed to prevent leaking
- The bottom of the cooler will be lined with bubble wrap to prevent breakage during shipment
- Glass sample containers will be wrapped in bubble wrap to prevent breakage.
- Samples will be placed in sturdy coolers lined with a large plastic bag that will serve as secondary containment

- The appropriate chain-of-custody forms will be enclosed in a plastic zip-lock bag and taped to the inside cooler lid
- Empty space in the cooler will be filled with packing material to prevent movement and breakage during shipment
- Ice used to preserve samples will be double sealed in two plastic zip-lock bags and placed on top and around the samples to chill them to the required temperature.
- If samples are shipped via commercial carrier, each cooler will be securely taped shut and a custody seal will be affixed to seal the interface of lid and body of the cooler

For shipped samples, the following information will be recorded and maintained:

- Project number
- Total number of samples shipped to the analytical laboratory
- Carrier, air bill numbers, method of shipment (for example, priority next day)
- Shipment date and when it should be received by the analytical laboratory
- Irregularities or anticipated problems associated with the samples

Appropriate shipping regulations and guidelines will be followed when shipping samples.

7.0 ANALYTICAL METHOD REQUIREMENTS

Samples will be submitted to Pace Analytical (Pace), an Arizona Department of Health Services (ADHS)-certified analytical laboratory (Certification No. AZ0612). RDLs and MDLs for the COCs are provided in Table 1. Analytical laboratory RDLs are less than the Project-specific cleanup standards for the COCs. Pace's Quality Assurance Manual is provided in Attachment B.

Previous analysis of soil samples collected from the site required sample dilution because samples containing metals in concentrations greater than the upper limit of the analytical method calibration curve must be diluted to produce an analyte concentration that is within the calibration curve. Sample dilution has the associated effect of increasing the analytical laboratory reporting limit by a factor equal to the dilution factor which may cause the reporting limit to be greater than the cleanup level. For this project, samples containing copper or other metals in a concentration greater than the upper limit of the calibration curve will be diluted and the diluted sample will be analyzed for copper concentration. Analysis for the remaining COCs will be conducted using undiluted samples; note however, that some analytes in the undiluted samples may be reported with "E" qualifiers, indicating that they are above the known linear area of the standard curve. For analytes with both diluted detections and "E"-qualified detections, the diluted detection will be reported and used to support site management decisions.

8.0 FIELD INSTRUMENT, EQUIPMENT, AND SUPPLIES

8.1 LIST OF EQUIPMENT NEEDED

The following equipment, including decontamination equipment, will be used in the field to collect soil samples:

- VRP Work Plan and SAP
- Maps/Site plans
- Calculator
- Personal protective equipment
- GPS unit
- Tape measure
- Survey stakes/rebar and flags
- Camera
- Ziplock bags
- XRF analyzer and case (includes equipment and calibration standards)
- XRF polyethylene sample cups (31- to 40-millimeter diameter)
- Butcher paper
- Stainless steel and disposable trowels or spoons
- Decontamination brushes
- Distilled/deionized water
- Plastic sheeting
- Nitrile gloves
- Plastic buckets (5-gallon)
- Non-phosphate detergent (Alconox)
- Sample containers
- Logbooks
- Ball point pens and permanent marker pens
- Sample container labels
- Chain-of-custody forms and custody seals
- Sample coolers and ice

Field sampling supplies and consumables will be inspected and evaluated for use by the consultant. Sample jars provided by the analytical laboratory will be visually inspected to ensure the integrity. The consultant will verify preserved containers obtained from the analytical laboratory have not been tampered with since preservation. Potable and deionized decontamination water will be inspected to ensure the supplier's seal is intact.

8.2 FIELD INSTRUMENT CALIBRATION

An XRF analyzer will be used to measure copper concentration in soil. Field equipment will be calibrated each day before beginning fieldwork (at a minimum) in accordance with manufacturer directions. Calibration information will be recorded in a logbook or on forms that will be maintained in the project files. The following information will be recorded:

- Equipment type (for example, XRF)

- Manufacturer and model number
- Date of latest calibration
- Calibration standard type, concentration, manufacturer lot number, date, pressure (if gas), as applicable
- Dates of use
- Name of person who performed calibration check
- Corrective action if necessary

Entries will be recorded when each instrument is calibrated. Entries will be made in ink. Corrections will be made by crossing a line through the error and entering the correct information. Changes will be dated and initialed. No entries will be obliterated or rendered unreadable.

9.0 ASSESSMENT AND OVERSIGHT

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 Manager 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.

9.1 CORRECTIVE ACTIONS

The following section identifies the corrective actions necessary to address field, analytical laboratory, and data verification/validation problems. In general, corrective actions will be initiated whenever DQIs suggest DQOs have not been met. Corrective actions will begin with identifying the source of the problem. Potential problem sources include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination. The first level of responsibility for identifying problems and initiating corrective action is with the analytical laboratory analysts and field personnel. The second level of responsibility lies with any person reviewing the data. Corrective actions may include more staff training, equipment repair followed by a preventive maintenance program, or removal of the source of systemic contamination. Once resolved, the corrective action procedure will be documented, and if DQOs were not met, the samples in question may need to be collected again and reanalyzed using a properly functioning system.

Corrective action that requires changes to the Work Plan or SAP are defined as major corrective actions. Major corrective actions include, but are not limited to, measures that change the number of samples collected, alter previously selected sampling locations, or impact the project QC objectives. In addition, some re-sampling activities may be considered a major corrective action (e.g., re-sampling of a complete monitoring round). The consultant will be responsible for contacting the Volunteer and the Volunteer to discuss major corrective actions, if needed. Major corrective actions will be approved by ADEQ and the Volunteer before implementation by the consultant.

9.1.1 Field Corrective Action

Corrective action in the field relates to inspection of equipment, procedures, and problems found during data review. The consultant's Project Manager is responsible for the initiation and implementation of corrective actions with respect to the field sampling operations and responsible for ensuring field sampling procedures are followed. Corrective actions may include training field personnel, modifying field procedures, and re-sampling.

9.1.2 Laboratory Corrective Action

Corrective action will be taken in the analytical laboratory if method-specific QC or project-specific DQOs are not met or as a result of problems identified during data review. The

analytical laboratory will notify the consultant if a transportation problem (for example, broken sample container, nonconforming temperature blanks) has occurred. The analytical laboratory's QA officer, in consultation with the consultant's Project Manager, is responsible for implementing corrective actions in the laboratory, from sample receipt to final data deliverable. It is the analytical laboratory's QA officer and the consultant's Project Manager's combined responsibility to see that analytical and sampling procedures are followed as specified and the data generated meet the acceptance criteria. Corrective actions for the laboratory may include the following:

- Reanalyzing and/or re-extracting samples
- Correcting laboratory procedures
- Recalibrating instruments using freshly prepared standards
- Replacing QA/QC materials, as appropriate
- Training laboratory personnel in correct sample preparation and analysis

Whenever corrective action is deemed necessary, the analytical laboratory will verify the following steps are taken:

- The problem is defined
- The cause of the problem is identified
- Appropriate corrective action is determined
- Corrective action is implemented and its effectiveness verified
- Control is reestablished

The corrective actions will be documented according to the analytical laboratory's Quality Assurance Manual and SOPs.

9.1.3 Data Validation and Verification Corrective Action

During data review, results may be encountered that do not correlate well with expectations, with other results, or with results from other methods performed on the same samples. Such situations may trigger inquiries into raw data. The consultant's Project Manager is responsible for initiating, overseeing implementation, and documenting corrective actions required during the data verification process. Some examples of discrepancies noted during data verification include missed holding time, QC samples outside evaluation criteria, and sample dilution problems. Corrective actions may require re-sampling by field personnel or re-analysis by the laboratory. Each corrective action must be documented.

9.2 PERFORMANCE AND SYSTEM AUDITS

Audit activities are established and directed by the consultant to ensure field and laboratory activities are performed in compliance with project requirements. This section describes responsibilities and methods for scheduling, conducting, and documenting audits of field and laboratory activities.

9.2.1 Field Performance and Systems Audits

The consultant will be responsible for data integrity during field sampling activities. Corrective actions and the results of those actions, if any, will be documented in the field logbook or on field forms. Criteria to ensure data integrity during field sampling events are those detailed in this SAP. The field assessment activities include the following inspections:

- Field screening activities
- Decontamination procedures and frequency of decontamination
- Sample collection and handling (for example, method of collecting samples, use of PPE, sample packing
- Chain-of-custody documents

Field audits are not required but may be performed in the event significant discrepancies are identified that warrant evaluation. These discrepancies may include continued field contamination problems or continued sample handling concerns. Assessment activities and associated corrective action, if any, will be documented by the consultant. ADEQ or the Volunteer may elect, at their discretion, to assess field activities.

9.2.2 Laboratory Performance and Systems Assessments

Analytical laboratory audits generally include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, adherence to QA/QC protocols, and data reporting. The analytical laboratory will be responsible for the policies and procedures associated with internal assessments including data review procedures. The analytical laboratory's QA Manager is responsible for the initiation, implementation, and documentation of assessment activities and corrective actions, if any.

10.0 DATA REVIEW, VALIDATION, AND USABILITY

10.1 DATA REVIEW AND ANALYSIS

Final analytical laboratory data packages will be provided by Pace, an ADHS-certified analytical laboratory and will meet the applicable EPA guidance requirements.[3] The consultant's QA Coordinator will perform data verification of the entire data package. Data outliers and anomalies will be evaluated by the analytical laboratory and data flags and/or discussions will be placed in an analytical report in accordance with *Arizona Laboratory Data Qualifiers, Revision 3.0 (September 20, 2007)* which are provided in Attachment C. After verification is completed, qualifiers will be assigned to the data points that are affected by the quality control outliers. The qualifiers will indicate the analyte concentrations that may be affected by laboratory or field contamination, unusable because of quality control deficiencies, and/or estimated due to possible bias or reduced confidence in the results.

10.2 HARDCOPY DATA

Analytical data will contain the necessary sample results and quality control data to evaluate the DQOs defined for this project. The analytical laboratory report will be submitted to the consultant for use in the data verification/validation process. The hardcopy data will be an exact copy of the original data, which will be secured at the analytical laboratory and will include, at a minimum the following:

- Narrative, cross-reference, chain of custody, and method references
- Analytical results with cross-references to analytical batch
- Surrogate recoveries (as applicable)
- Calibration summary
- Blank results
- Analytical laboratory control sample recoveries
- Duplicate sample results or duplicate spike recoveries
- Sample spike recoveries
- Instrument tuning summary
- Associated raw data
- Data outliers

[3] EPA; Laboratory Documentation Required for Data Evaluation (R9/QA004.2); August 2001.

10.3 ELECTRONIC DATA FORMAT

The electronic data deliverable (EDD) will be submitted by the analytical laboratory to the consultant, who will verify that the deliverable is in an acceptable format and that all elements needed are present before importing the data into the database. Problems incurred during the import will be remedied before the data is used.

For analytes that are assigned an "R" or rejected validation code, the numeric fields containing concentration and detection limit information are assigned a null value. This is to ensure that rejected data are not inadvertently used during future data analyses. In addition to changes based on rejected results as described above, other changes to the reported analytical laboratory results (detection limits, concentrations, etc.) may be required as a result of data validation activities. For example, detection limits reported by the analytical laboratory may be increased during data validation for some results that do not meet specific quality assurance guidelines. In these cases, changes to the database will be performed in accordance with the data validation report during data validation entry. After required changes are completed, 100 percent of the changes will be quality checked.

11.0 DOCUMENTATION AND DELIVERY

11.1 FIELD NOTES

This section discusses recordkeeping in the field that may occur through a combination of logbooks, preprinted forms, photographs, or other documentation.

11.1.1 Field Logbooks

Field logbooks will be used to document where, when, how, and from whom vital project information is obtained. Documentation in the field logbook will be sufficient to reconstruct the field activities without relying on the memories of the field team members. Field notes will be kept in bound field logbooks. Logbooks will be used to record pertinent field activity information. A field logbook will be dedicated to this project and will not be used for other projects. Information recorded each day will include the following:

- Project name
- Date and time
- Name and signature of field personnel entering information on each respective page
- Weather conditions
- Names of personnel on Site, including subcontractors and Site visitors
- Health and safety information, including PPE level
- Instrument calibration information
- Number of samples collected and matrix
- GPS coordinates of sample locations, including datum and accuracy
- Record of on-Site measurements, including results and time
- Sample delivery information
- Deviations from VRP Work Plan, SAP, or HASP procedures will be recorded in the logbook with an explanation of the reason for the deviation

Information recorded during each sampling point will include the following:

- Sampling location (sampling point identification
- Sample identification
- Sample depth
- Sample media
- Description of sample

- Sampler name(s)
- Chemical analysis requested, sample container, and preservative
- Any modifications to the sampling plan
- Sampling observations (if applicable)
- QC samples collected (as applicable)
- Field sketches, when appropriate

Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sampling location will be entered into the logbook and physical reference points will be labeled. If possible, distances to the reference points will be given. Sample locations will also be surveyed using a hand-held global positioning system (GPS) unit. The sampling locations will be indicated on a site map that will be prepared as part of the final report summarizing field activities and analytical results.

Entries will be made in blue or black indelible ink, and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark, and the change initialed and dated by the team member making the logbook change. Each page in the field logbook will be signed and dated at the bottom of the page by any team member making entries on the page. Pages in the logbook will be consecutively numbered.

The field logbooks will be identified on the cover by the project name, project number, and logbook number. The logbooks will be stored in the field project files when not in use. At completion of the field activities, the original field logbooks will be retained in the project file.

11.1.2 Photographs

Photographs will be taken at the sampling locations and at other areas of interest on the Site. Photographs will serve to corroborate information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

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

11.2 LABELING

Samples will be clearly and precisely labeled for proper identification in the field and for tracking in the analytical laboratory. The samples will have pre-assigned, identifiable, and

unique numbers. At a minimum, the sample labels will contain the following information: sample designation, date of collection, analytical parameter(s), and method of preservation.

11.3 SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

Chain-of-Custody procedures described in Section 6.2 will be used for sample collection and delivery.

11.4 SAMPLE DELIVERY TO LABORATORY

Sample containers will be placed in a secure location and delivered to the subcontracted analytical laboratory. The consultant will sign over custody of the samples to the analytical laboratory on the chain-of-custody form. The subcontracted analytical laboratory will then provide the consultant with a copy of the chain-of-custody form for our records. The samples will be shipped per the subcontracted analytical laboratory Quality Assurance Manual and/or SOPs.

11.5 LABORATORY DATA REPORTING FORMAT AND CONTENT

Analytical reports will contain the sample results and QA/QC data to evaluate the DQOs defined for the project. Data generated by the analytical laboratory will be retained and submitted by the consultant in electronic format. Analytical results will include appropriate elements identified in the EPA Region 9 January 1990 document titled *Laboratory Documentation Requirements for Data Validation* and will include, at a minimum, the following:

- Analytical laboratory name and Arizona Department of Health Services license number
- Case narrative
- Cross-reference of sample identification number and analytical laboratory number
- Chain-of-custody
- Dates of sample collection and analysis
- Analytical results and method references
- Analytical laboratory MDLs and RDLs
- Surrogate recoveries (as applicable), method blanks, laboratory duplicates
- Calibration summary
- MS/MSD, LCS/LCSD, and blank spike references
- Data outlier summary
- Analytical laboratory approval

The analytical laboratory will typically provide the analytical reports within 15 working days of sample receipt. Omissions or insufficient levels of detail will be corrected by the analytical laboratory.

11.6 RECORDS DISPOSITION

Project files and records will be stored by the consultant until the NFA Determination has been issued by ADEQ. The project files will then be moved to a facility designated by the Volunteer's permanent storage if the records need to be retained for a longer period.

The analytical laboratory will store the original hardcopy and electronic raw data of the analytical data packages produced for this project for three years. The level of information regarding sample analyses (calibration records, run logs, etc.) will be such the analytical processes can be reconstructed within that time.

12.0 DATA CERTIFICATION

I-10 Avra Valley Development & Mining, LLC (as the Volunteer) and the Volunteer's consultant will sign the certification statement provided below and will ensure that data quality meets project objectives. The statement will certify data representativeness, comparability, completeness, and usability and will be included in the final Site Characterization and Remediation Completion Report.

Certification:

I, [Name and Professional Registration] do certify

a. Data are appropriate to address study objectives (methods, MDLs, parameters)

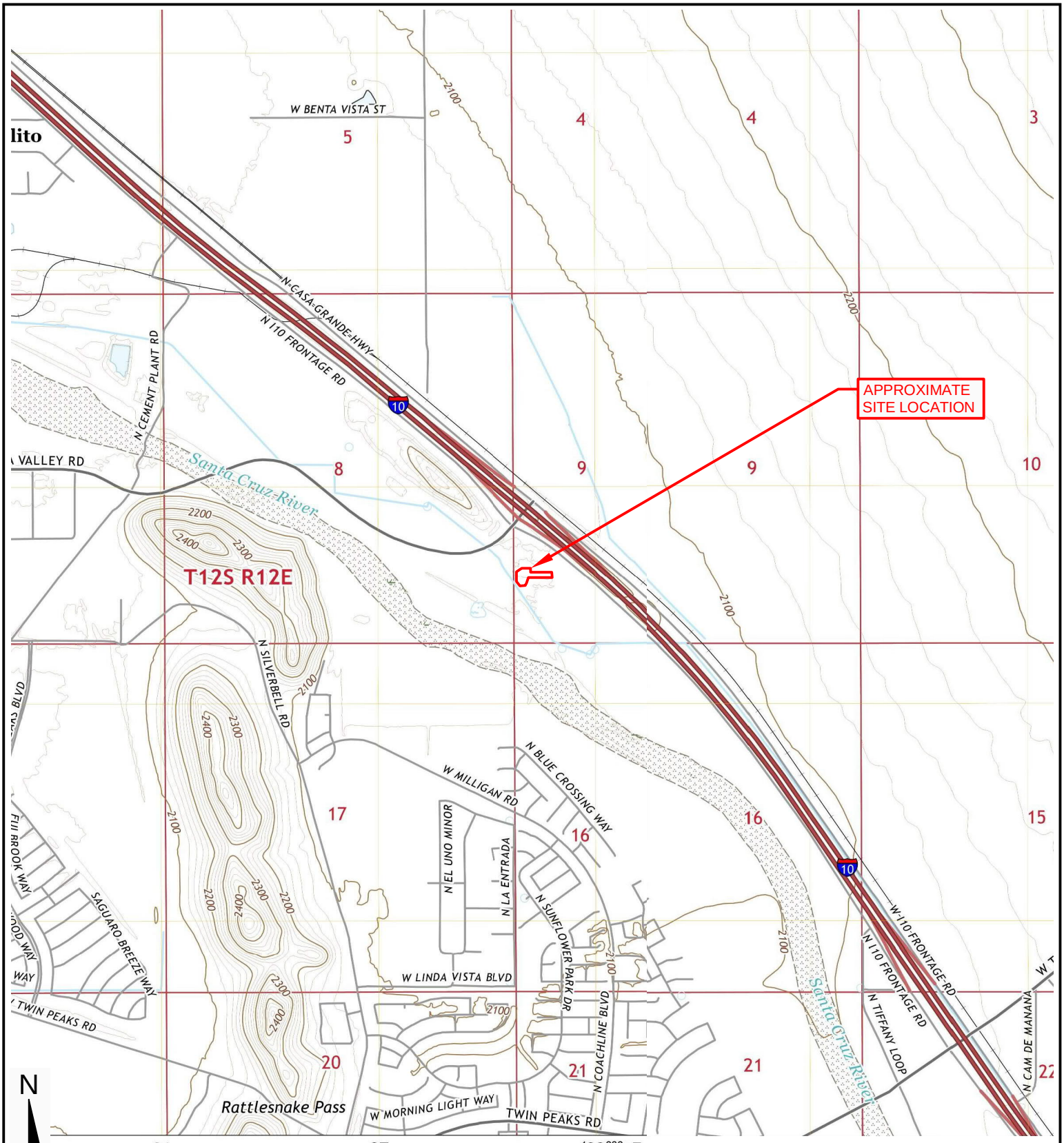
b. Data were collected in accordance with [name of company that conducted sampling] quality management program

c. Sample design (i.e., representativeness) was developed and executed according to professional standards for environmental work

d. Field and analytical laboratory QC meet objectives (duplicate reproducibility, spike recoveries, field and lab blanks), appropriate data flags used in data tables, and unusable or rejected data are flagged appropriately

e. Deviations or exceptions of any of the above are specifically noted in the body of the report

EXHIBITS



U.S.G.S. 7.5 MINUTE SERIES TOPOGRAPHIC MAP

STATE OF ARIZONA QUADRANGLES
MARANA 2021
RUELAS CANYON 2021

0 1000' 2,000' 4,000'

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. LOCATIONS ARE APPROXIMATE.

Project Mngr:	DRS
Approved By:	SD
Checked By:	TRW
Drawn By:	DBM

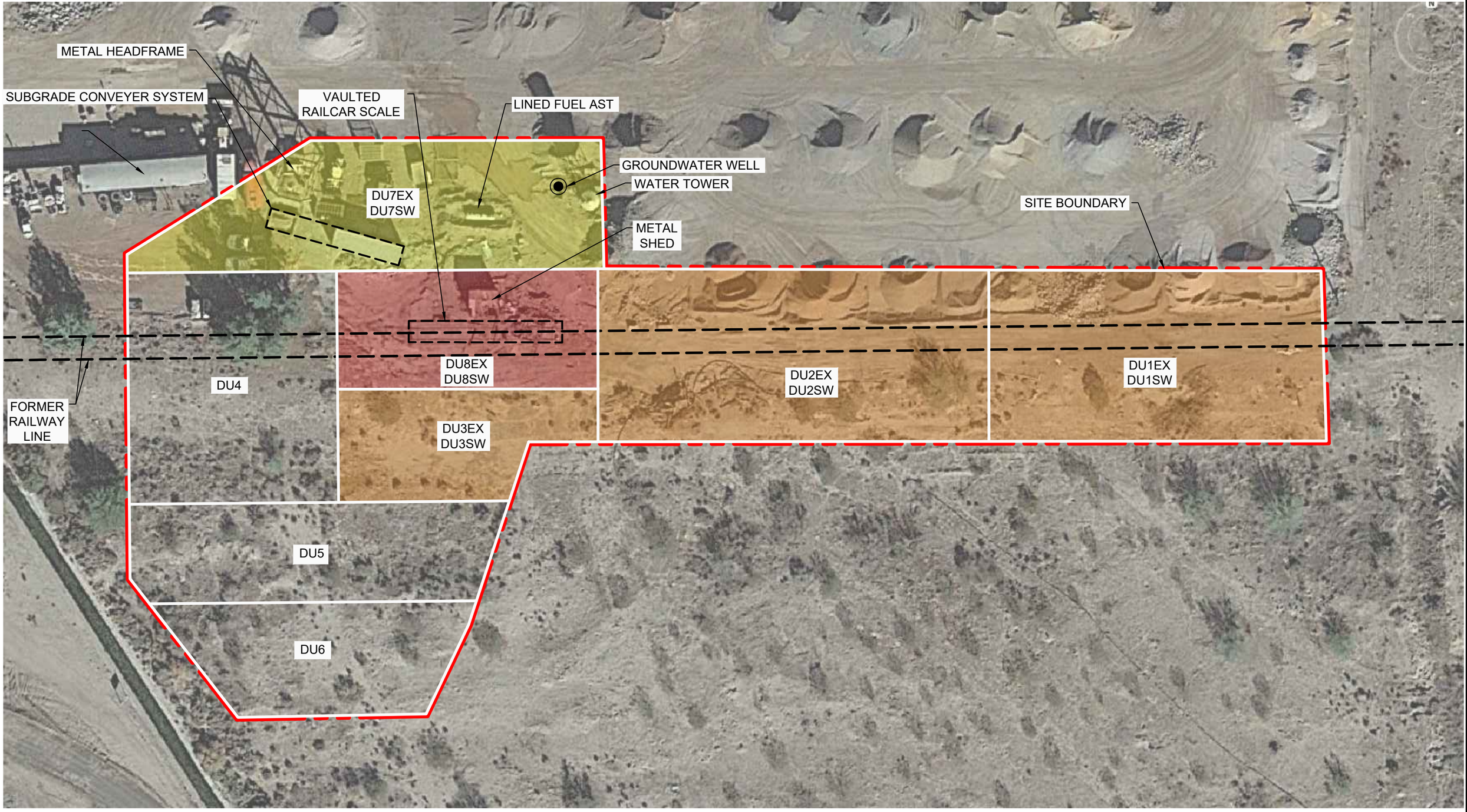
Project No.	63237102
Scale:	1" = 2000'
Date:	04/17/2024
File No.	63237102EI.DWG

Terracon
Consulting Engineers and Scientists
355 South Euclid, Suite 107 Tucson, AZ 85719
PH. (520) 798-4844 FAX. (520) 792-2539

SITE LOCATION

VOLUNTARY REMEDIATION PROGRAM WORK PLAN (SITE CODE: 514142-00)
I-10 AVRA VALLEY MINING & DEVELOPMENT, LLC SITE
7755 W AVRA VALLEY ROAD
MARANA, ARIZONA

EXHIBIT 1



LEGEND

- Top 2 feet of soil will be removed
- Top 12 inches of soil will be removed
- Top 6 inches of soil will be removed above the center portion

DIAGRAM IS INTENDED FOR GENERAL USE ONLY, AND IS NOT FOR CONSTRUCTION PURPOSES. LOCATIONS ARE APPROXIMATE.

Project Mngr:	DRS
Approved By:	SD
Checked By:	TRW
Drawn By:	DBM
Project No.	63237102
Scale:	NTS
Date:	04/17/2024
File No.	63237102.DWG

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Consulting Engineers and Scientists
355 South Euclid, Suite 107 Tucson, AZ 85719
PH. (520) 798-4844 FAX. (520) 792-2539

DECISION UNITS AND ASSUMED SOIL EXCAVATION DEPTH

VOLUNTARY REMEDIATION PROGRAM WORK PLAN (SITE CODE: 514142-00)
I-10 AVRA VALLEY MINING & DEVELOPMENT, LLC SITE
7755 W AVRA VALLEY ROAD
MARANA, ARIZONA

EXHIBIT 2

TABLES

TABLE 1
Regulatory Standards, Reporting Limits, Quality Control Parameters - Soil

Analyte	CAS Registry Number	EPA Analytical Method	Cleanup Standards				
			Residential SRL			Non-Residential SRL	Minimum GPL
			Carcinogen		Non-Carcinogen		
			10^{-6} Risk	10^{-5} Risk			
Arsenic	7440-38-2	6010	10	10	10	10	290
Barium	7440-39-3	6010	---	---	15,000	170,000	12,000
Cadmium	7440-43-9	6010	---	---	39	510	29
Chromium	7440-47-3	6010	---	---	120,000	1,000,000	590
Lead	7439-92-1	6010	---	---	400	800	290
Mercury	7487-94-7	7471	---	---	23	310	12
Selenium	7782-49-2	6010	---	---	390	5,100	290
Silver	7440-22-4	6010	---	---	390	5,100	---
Copper	7440-48-4	6010	---	---	3,100	41,000	---
Manganese	7439-96-5	6010	---	---	3,300	32,000	---
Vanadium	7440-62-2	6010	---	---	78	1,000	---
Zinc	7440-66-6	6010	---	---	23,000	310,000	---

Analyte	CAS Registry Number	EPA Analytical Method	RDL (mg/kg)	MDL (mg/kg)	LCS - Low (%)	LCS - High (%)	LCS RPD (%)	MS - Low (%)	MS - High (%)	MS RPD (%)
Arsenic	7440-38-2	6010	1.00	0.5180	80	120	20	75	125	20
Barium	7440-39-3	6010	0.50	0.0852	80	120	20	75	125	20
Cadmium	7440-43-9	6010	0.50	0.0471	80	120	20	75	125	20
Chromium	7440-47-3	6010	1.00	0.1330	80	120	20	75	125	20
Lead	7439-92-1	6010	0.5	0.2080	80	120	20	75	125	20
Mercury	7487-94-7	7471	0.04	0.0180	80	120	20	75	125	20
Selenium	7782-49-2	6010	1.00	0.7640	80	120	20	75	125	20
Silver	7440-22-4	6010	5.00	0.1270	80	120	20	75	125	20
Copper	7440-48-4	6010	1.00	0.40	80	120	20	75	125	20
Manganese	7439-96-5	6010	1.00	0.1330	80	120	20	75	125	20
Vanadium	7440-62-2	6010	1.00	0.5060	80	120	20	75	125	20
Zinc	7440-66-6	6010	5.00	0.832	80	120	20	75	125	20

Notes:

Reporting Limits from Pace Analytical for EPA Method 8260
CAS - Chemical Abstract Service
EPA - US Environmental Protection Agency
RDL - Reported Detection Limit
MDL - Method Detection Limit
SRL - Soil Remediation Level
GPL - Groundwater Protection Level
NE - SRL or GPL not established
'--- Compound not designated to this chemical classification
mg/kg - milligrams per kilogram
LCS - Laboratory Control Sample
RPD - Relative Percent Difference
MS - Matrix Spike

TABLE 2

Field Sampling Requirements

Matrix	Analyte	Analytical Method	Number Samples	Number Duplicates	Number Replicates	Number Field Blanks	Sample Volume	Sample Container	Preservation	Holding Time
Soil – Prescreening Soil Samples	Copper	6010	15	0	0	None	2 oz	4 oz, clear glass	None	6 months
Soil – DU Excavation Sidewalls (DU1, DU2, DU3, DU7, DU8)	Metal COCs	6010/7470	5	0	1	See Equipment Blank	30 increments per DU/60 g sample per increment/1,800 g per DU	1 gallon sealable plastic bag	Cool to 4°C	28 days - Mercury 6 months – all others
Soil – DU Excavation Floor (DU1, DU2, DU3, DU7, DU8)	Metal COCs	6010/7470	5	0	1	See Equipment Blank	30 increments per DU/60 g sample per increment/1,800 g per DU	1 gallon sealable plastic bag	Cool to 4°C	28 days - Mercury 6 months – all others
Soil – Near Surface (DU4, DU5, DU6)	Metal COCs	6010/7470	3	0	1	See Equipment Blank	30 increments per DU/60 g sample per increment/1,800 g per DU	1 gallon sealable plastic bag	Cool to 4°C	28 days - Mercury 6 months – all others
Soil – Soil Underlying Railcar Scale	Metal COCs	6010/7470	4	1	0	See Equipment Blank	4 oz	8 oz, clear glass	None	28 days - Mercury 6 months – all others
Soil – Soil Underlying conveyor System	Metal COCs	6010/7470	4	1	0	See Equipment Blank	4 oz	8 oz, clear glass	Cool to 4°C	28 days - Mercury 6 months – all others
Solid – Excavation Stockpile (Waste Determination)	Leachable Metal COCs	1311/6010	5	0	0	0	4 oz	8 oz, clear glass	Cool to 4°C	Extraction: 14 days Analysis: 28 days - Mercury Analysis: 6 months – all others
Water (Equipment Blank)	Metal COCs	6010/7470	N/A	N/A	N/A	4	250 mL	250 mL, HDPE	HNO3, pH < 2	28 days - Mercury 6 months – all other metal COCs

Assumptions and Calculations:

Metal COCs analyzed using United States Environmental Protection Agency (EPA) Methods 6010/7471
Metal COCs consist of arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, manganese, vanadium, and zinc
Replicate samples, consisting of one primary and two co-located samples, will be collected from each DU sidewall and DU excavation floor
Equipment blank collected at a frequency of 1 blank per sample day. Assume 4 sample days = 4 samples
Five stockpile samples will be required for soil characterization prior to disposal

COC – Contaminant of Concern
DU – Decision Unit
oz – ounce
g - grams
HDPE – high density polyethylene
°C – degrees Centigrade
mL – milliliter
HNO3 – Nitric acid

ATTACHMENT A

Terracon Standard Operating Procedures

Standard Operating Procedure E.0038

Title: **Soil Excavation Procedures**	SOP Number: **SOP E.0038**
Issue Date: April 2022	Revision Date (within 3 years): March 2025
Prepared by: Derek Koller	Approved by: Ken Olson/Kitty Hiortdahl
	Page 1 of 4

1. OBJECTIVE

General procedures for completing test trenches/test pits during an environmental investigation.

2. BACKGROUND

Soil excavation has been a common activity during environmental both assessment and response to address impacts to soil and will continue to be a routine activity considered to address soil and fill impacts at a broad range of sites. Soil excavation has the benefit of offering the ability to see a much broader cross-section of native soil, impacted media and fill, thus expanding the understanding of a site, while allowing samples to be collected as part of site characterization.

3. EQUIPMENT

a) Personal Protection Equipment **(**i.e. hardhat, reflective safety vest, impact-resistant gloves, steel-toe boots, safety glasses, hearing protection)

b) Shovels (flat and spade) and hand-trowel

c) Camera

d) Clipboard

e) Pen – Indelible ink for field notebook, test pit log, and sample labels

f) Field notebook

g) Test pit log

h) Backhoe

i) Power washer

j) Laboratory sampling containers

k) Terracore Samplers if VOC sampling is being conducted

l) Nitrile Gloves (for environmental sampling)

m) Field screening devices (PID, FID, XRF, etc.)

n) Cooler with ice (for sample storage)

o) Measuring tape

p) Decontamination equipment

q) Robber Gloves (for deconning equipment)

r) Stakes and caution tape if excavations are left open prior to backfilling

4. DOCUMENTATION

a) Complete the necessary documentation of site conditions and field data in accordance with SOP E.0018 Basic Recordkeeping and Field Documentation as appropriate. Complete chain of custody in accordance with E.0026 Chain of Custody Documentation as appropriate.

b) Use Terracon forms or locally generated forms for data collection tabulation when collected via paper forms or collect electronically when using electronic forms such as Device Magic.

c) IDENTIFY SPECIFIC FORM AS APPROPRIATE FOR ACTIVITY.

5. PERSONAL PROTECTIVE EQUIPMENT/SAFETY

a) Identify specific hazards associated with implementation of this SOP and include discussion and mitigation measures in project Health and Safety Plan (including discussion of requirement/need for utility clearance for SOP implementation). Discuss during Pre-task Planning/Kick-off Meetings.

b) Wear and maintain Terracon-approved PPE at project sites and in laboratories as required by project, task, and/or work environment, except when in a PPE-Free Zone. This includes use of the Core PPE Kit.

c) Reevaluate risks and necessary actions during initial site mobilization, each day and when conditions or activities change.

6. PROCEDURES

a) Stake locations of anticipated work areas.

b) Locate all public and private utilities in work area.

c) Upon completion of utility locate begin soil excavation with backhoe. Place removed soils at a safe distance away from the excavation. Complete all excavations in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

d) Excavate soil at 2-foot intervals to desired depth. Field screen grab samples of removed soils from backhoe bucket using selected field screening instrument (at least one sample per 10 cubic yards of soil removed).

e) Prior to collecting soil samples for laboratory analysis, decontaminate backhoe bucket by scraping loose soils from bucket.

f) Re-advance backhoe bucket to desired sample depth and sampling point and collect soil into backhoe bucket. Lift bucket to surface for environmental technician to collect sample from bucket.

g) At completion of sampling, measure width, length, and depth of test pit and map on Test Pit log.

h) Document soil lithology and presence of apparent non-native materials in field notebook. Take photographs as warranted. Minimum of one photograph per test pit for inclusion in digital test pit log.

i) Backfill and test pit and compact soils with backhoe bucket at 2-foot intervals. Note, if this is not performed immediately, surround test pit with caution tape until which time this task can be completed.

j) Stake boundaries of test pit or mark boundaries using GPS.

7. REFERENCES

a) Review operating manuals for all equipment used for this SOP.

b) Review local/state specific requirements and modify field practices to conform to local/state requirements as appropriate.

c) TBD-add any others.

8. TRAINING

a) Training of new hires and less-experienced staff to be completed by skilled project staff, PM, APR or SME.

b) Check Terracon University for training modules that may be available.

Standard Operating Procedure E.100

Title: **Surface & Near-Surface Bulk Sampling**	SOP Number: **SOP E.100**
Issue Date: April 2022	Revision Date (within 3 years): March 2025
Prepared by: Mike Reif	Approved by: Dan Schneider
	Page 1 of 4

1. OBJECTIVE

To provide standard procedure for collecting surface and near-surface soil samples of unconsolidated materials with hand tools as surface soils, tailings, spoils or other waste materials appropriate to project conditions.

Samples are collected from the surface to a depth of approximately four (~4) inches. Near-surface soil/tailings/spoils samples are collected from the surface to a depth of approximately four to twelve (~4-12) inches from original surface. The original surface may be ground surface or the exposed horizontal or vertical surface of material excavated in mass from the subsurface.

Grab sampling is appropriate to conditions and projects where the end use of the sample is not overly sensitive to disturbance and handling in the course of collection. Grab sampling should not be applied where the sample is used for field or laboratory measurements of low levels of readily volatile organic compounds. Grab sampling is appropriate for general field screening and as a field guide to directing environmental excavation, if compatible with the physical properties of the chemical(s) to be measured. Grab sampling should not be used for samples intended to represent in-situ, undisturbed subsurface conditions.

Sufficient sample will be collected for the analysis that will be performed as prescribed by the project documents. Soil descriptions will be completed for each collected soil sample using the general terminology of the unified soil classification system (ASTM D2487). Descriptions shall be recorded in field books.

2. BACKGROUND

No specific background pertinent to this SOP.

3. EQUIPMENT

a) Rigid sampling equipment such as a trowel or shovel of inert material relative to the chemical(s) of concern and capable of reaching the depths prescribed for surface and near-surface soils.

b) Disposable gloves.

c) Chemical-resistant work gloves (cut designation of 3 or greater).

d) Laboratory prepared sample containers.

e) Roll of plastic sheeting.

f) Plastic trash bag for collecting expended supplies.

g) Field documentation forms or project logbook.

h) Chain-of-Custody forms for samples intended for laboratory analysis.

i) Marking pencils or indelible markers that will not leave residues which can cause interference with laboratory testing procedures.

4. DOCUMENTATION

a) a) Complete the necessary documentation of site conditions and field data in accordance with SOP E.0018 Basic Recordkeeping and Field Documentation as appropriate. Complete chain of custody in accordance with E.0026 Chain of Custody Documentation as appropriate.

b) b) Use Terracon forms or locally generated forms for data collection tabulation when collected via paper forms or collect electronically when using electronic forms such as Device Magic.

c) c) IDENTIFY SPECIFIC FORM AS APPROPRIATE FOR ACTIVITY.

5. PERSONAL PROTECTIVE EQUIPMENT/SAFETY

a) Identify specific hazards associated with implementation of this SOP and include discussion and mitigation measures in project Health and Safety Plan (including discussion of requirement/need for utility clearance for SOP implementation). Discuss during Pre-task Planning/Kick-off Meetings.

b) Wear and maintain Terracon-approved PPE at project sites and in laboratories as required by project, task, and/or work environment, except when in a PPE-Free Zone. This includes use of the Core PPE Kit.

c) Reevaluate risks and necessary actions during initial site mobilization, each day and when conditions or activities change.

6. PROCEDURES

Select the location. Identify it with a unique designation for the project. Diagram or otherwise describe the location on field forms or in the logbook relative to a fixed benchmark that will allow the specific location to be re-visited in the future, if necessary. If appropriate, estimate the vertical elevation of the sample and record.

If the grab sample is constructed of multiple aliquots to represent averaging of conditions in soils/tailings/spoils, diagram or otherwise describe the area represented by the constructed sample. Diagram or otherwise accurately describe sub-sample locations on forms or in the logbook relative to a fixed benchmark that will allow the specific sub-sample locations to be re-visited in the future, if necessary. If appropriate, estimate the vertical elevation of the sub-samples and record.

At each location before collecting the soil sample, put on a clean pair of disposable chemical-resistant gloves.

Collect each sample by hand using procedures and equipment/tools specified by the project manager.

Place the sample directly into the laboratory prepared sample container(s) and complete the sample label and Chain-of-Custody as instructed by the project manager.

If intended for laboratory analysis, preserve the sample as required by project plans.

7. REFERENCES

a) Review operating manuals for all equipment used for this SOP.

b) Review local/state specific requirements and modify field practices to conform to local/state requirements as appropriate.

c) **ASTM E1903-97** Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process.

8. TRAINING

a) Training of new hires and less-experienced staff to be completed by skilled project staff, PM, APR or SME.

b) Check Terracon University for training modules that may be available.

SOP 6

Hollow-Stem Auger Drilling and Soil Sampling

Introduction

Hollow-stem auger drilling techniques may be used to advance intermediate depth borings of 100 feet or less. Standard operating procedures for hollow-stem auger drilling and soil sampling are described below.

Preliminaries

Final soil boring locations will be marked or staked in the field and coordinated with the Terracon project manager and, if necessary, the client's project manager. Blue Stakes utility clearance will be requested for each drilling location to identify any subsurface utilities prior to drilling and sampling. If required, drilling and/or monitoring well permits will be requested by supplying the appropriate forms to the corresponding regulatory agency.

Boring locations will be located the following distances from overhead power lines:

Power Lines Nominal System (kV)	Minimum Required Clearance (ft)
0-50	10
51-100	12
101-200	15
201-300	20
301-500	25
501-750	35
751-1000	45

All drilling and sampling equipment will be decontaminated with a steam cleaner prior to drilling. This equipment includes all drill pipe, auger flights, split-spoon samplers, brass sleeves, stainless steel bowls and spoons, tools, and non-packaged well screen and casing. Steam cleaning will be conducted after placing equipment, tools, and non-packaged screen and casing on racks or sawhorses to keep them off the ground. After steam cleaning is completed, the equipment will remain off the ground until it is used.

Borings will be located according to the site-specific work plan. No borings will be drilled within 5 feet of marked underground utility lines or within 10 feet of active overhead power lines. Boring locations will be adjusted, as necessary.

Drilling Equipment and Procedures

A truck-mounted hollow-stem auger drill rig will be used to drill borings of 100 feet or less. Augers will be sized to accommodate the well casing diameter, if a well is to be installed in the borehole. A center plug will be used to prevent liquefied sands from entering the inside of the auger string as the borehole is advanced. No lubricants, circulating fluid, drilling muds, or other additives will be used during drilling.

Soil Sampling Equipment

The following equipment will be used to conduct soil sampling:

- Split-spoon samplers and sand catcher (supplied by the driller)
- Chemical resistant gloves
- Appropriate personal protection equipment according to the HASP
- Sealable plastic bags
- Brass sleeves, end caps, and Teflon tape
- Sample labels
- Laboratory-supplied glass soil sample jars and labels (optional)
- Stainless steel putty knife
- Stainless steel bowl and spoon
- Photoionization detector (PID)
- Cooler and ice
- Munsell color chart
- Unified Soil Classification System (USCS) chart
- Decontamination equipment

All sampling equipment will be decontaminated prior to mobilizing to the site.

Soil Sampling Procedures

Samples will be driven at intervals specified in the work plan. At a minimum, samples will be driven at 5-foot intervals, if lithologic data is needed. A sand catcher will be placed at the end of the sampler so that unconsolidated soils are not lost as the sampler is retrieved from the borehole. The sampler will be advanced by blows from a 140-pound downhole hammer. The number of blows required to drive the sampler 6 inches will be recorded on the Soil Boring Log Form.

Each site-specific sampling plan will identify the appropriate sample containers used to collect soil samples. In general, brass sleeves will be used for samples being analyzed for volatile and semi-volatile organic compounds. If sample analytes do not include volatile or semi-volatile organic compounds, laboratory supplied glass jars may be used. Otherwise, samples should be submitted in brass or plastic sleeves. Headspace readings will be collected from adjacent soils, as described in SOP 1.

Brass sleeves in the sampler will be separated using a stainless-steel putty knife and the soil between the sleeves will be carefully cut so that the soil within the sleeve is flush at each end. Immediately after the sleeves are separated, the first brass sleeves positioned directly above the sampler shoe will be reserved for possible volatile and semi-volatile organic compound (VOC and semi-VOC) analyses. This will be performed by immediately placing a sheet of Teflon tape over the end of each sleeve and then placing the sleeve caps over the Teflon tape. Each brass sleeve will be sealed so that there is little or no headspace

between the sample and the Teflon tape. Each brass sleeve will be labeled with the sample identification and immediately placed in an iced cooler to maintain a temperature of 4°C. If no other analytes are required, the remaining sample will be used for soil classification according to SOP 1.

Selection of Soil Samples for Laboratory Chemical Analysis

In general, the sample sleeve associated with the highest headspace reading will be submitted for VOC and semi-VOC analysis. If headspace readings are zero for all samples, odors, soil staining, and fine-grained (high sorption) lithology will be used as selection criteria.

Soil Boring Abandonment Procedures

Soil borings not used for vapor probe or well installations will be backfilled. If water is not encountered in the boring, the boring will be backfilled with drill cuttings. If water is encountered, the saturated portion of the boring will be backfilled with granular bentonite. Cuttings will be used to backfill the remainder of the boring. Borings that were drilled through asphalt or concrete will be patched to match existing conditions.

Storage and Disposal of Drill Cuttings

If required, drill cuttings and unused soil samples will be containerized in labeled 55-gallon drums and stored in an area that will not disrupt site activities

The final disposition of the soil cuttings will depend on soil analytical results and contract specifications.

Demobilization

After the site has been cleaned and restored as close to its original condition as possible, the drill rig will be moved so that the plastic sheeting can be removed. All drilling and sampling equipment will be decontaminated with a steam cleaner prior to drilling and sampling the next soil boring.

Standard Operating Procedure E.0464

Title: **Sample Handling – Soil (Safety Level D)**	SOP Number: **SOP E.0464**
Issue Date: April 2022	Revision Date (within 3 years): March 2025
Prepared by: Daniel Schneider	Approved by: Ken Olson/Kitty Hortdahl
	Page 1 of 4

1. OBJECTIVE

To obtain a representative soil or sediment sample for chemical analysis. This includes the documentation of sampling methods, and protocols used for sample collection, processing, handling and shipment.

2. BACKGROUND

Soil and sediment sampling have been a common activity during environmental both assessment and response to address impacts to soil and will continue to be a routine activity during site investigation and remediation. Each analyte group often requires specific sampling protocols, sampling containers, preservation and hold times. The work plan should include a complete description of the sample locations, depths, media, purpose and use of sample results, sample container description, preservation and hold times that will direct actual collection and analysis to meet the project objectives.

3. EQUIPMENT

a) Monitoring equipment (PID, FID, multi-gas meters, colormetric detector tubes) as specified by Project Manager;

b) Sampling Device (split barrel sampler, hand auger, hand trowel, shovel, push probe sampler, or other appropriate sampling device);

c) Decontamination Equipment;

d) Laboratory prepared sample containers;

e) Forms including soil boring form, chain-of-custody, etc;

f) Indelible ink pen;

g) Stainless steel bowl for composite sampling;

h) Plastic sheeting;

i) Site map;

j) Measuring wheel;

k) Engineers tape marked in units of feet, tenths of a foot (0.1 ft.), and hundredths of a foot (0.01 ft.);

l) Disposable chemical-resistant gloves; and

m) Chem-wipes

4. DOCUMENTATION

a) Complete the necessary documentation of site conditions and field data in accordance with SOP E.0018 Basic Recordkeeping and Field Documentation as appropriate. Complete chain of custody in accordance with E.0026 Chain of Custody Documentation as appropriate.

b) Use Terracon forms or locally generated forms for data collection tabulation when collected via paper forms or collect electronically when using electronic forms such as Device Magic.

c) IDENTIFY SPECIFIC FORM AS APPROPRIATE FOR ACTIVITY

5. PERSONAL PROTECTIVE EQUIPMENT

a) Identify specific hazards associated with implementation of this SOP and include discussion and mitigation measures in project Health and Safety Plan (including discussion of requirement/need for utility clearance for SOP implementation). Discuss during Pre-task Planning/Kick-off Meetings.

b) Wear and maintain Terracon-approved PPE at project sites and in laboratories as required by project, task, and/or work environment, except when in a PPE-Free Zone. This includes use of the Core PPE Kit.

c) Reevaluate risks and necessary actions during initial site mobilization, each day and when conditions or activities change.

6. PROCEDURES

a) Surficial soil/sampling

i. Determine sample location (set grid, if necessary)
ii. Determine the proper sampling device based on soil type, depth, sample type, etc.
iii. Collect each sample at the specified depth consistently for each sample.

b) Direct Sampling

i. Transfer sample directly from the sampling device to the sample container.
ii. If evaluating for organic vapors, transfer the sample to plastic bag (zip top) for field screening. When appropriate, the sample should be split so as to obtain a sample for screening that is representative of the sample for testing. This can be accomplished by slicing the sample (if cohesive) lengthwise or by using other mechanical means. Care should be taken so as not to over-agitate the sample, especially if volatile organic compound testing is required.
iii. Document visual and physical characteristics

c) Composite sampling (non-volatile only)

i. Transfer equal volume/weight of sample from each location/depth to a stainless-steel mixing bowl
ii. Use a hand trowel or spoon to mix the soil sample
iii. If the sample size is very large, composite on a large sheet of clean plastic or stainless-steel sheet pan or mix equal volumes from numerous composite samples.
iv. If soils are cohesive, break up clumps.
v. Spread soil uniformly on plastic sheet or in bottom of stainless-steel bowl or stainless-steel tray and divide into quarters.
vi. Obtain equal quantity of soil from each sample for transfer to sample container (without mixing or break up).

d) Decontamination

i. Decontamination procedures should be specified by the project manager.
ii. Decontamination procedures for UST sites includes an Alconoxâ detergent scrub followed by a clean water rinse.
iii. Decontamination fluids are to be collected and replenished between sample locations (each boring) to reduce the potential for cross contamination.

e) Sample preservation - store in cooler with ice. Use preservative as appropriate for the analytes tested.

f) Sample documentation

i. Complete field documentation and chain-of-custody form. Data to be recorded includes sampling location, methodology, depth, visual and physical characteristics, time and date.

7. REFERENCES

a) Review operating manuals for all equipment used for this SOP.

b) Review local/state specific requirements and modify field practices to conform to local/state requirements as appropriate.

c) TBD-add any others.

8. TRAINING

a) Training of new hires and less-experienced staff to be completed by skilled project staff, PM, APR or SME.

b) Check Terracon University for training modules that may be available.

ATTACHMENT B

Pace Analytical Laboratory Incremental Sampling Methodology Standard Operating Procedure and Quality Assurance Manual

Document Information

Document Number: ENV-SOP-MTJL-0112 **Revision:** 04

Document Title: Multi-Increment Sampling

Department(s): SVOA

Date Information

Effective Date: 08 Sep 2020

Notes

Document Notes:

All Dates and Times are listed in: Central Time Zone

Signature Manifest

Document Number: ENV-SOP-MTJL-0112 **Revision:** 04

Title: Multi-Increment Sampling

All dates and times are in Central Time Zone.

ENV-SOP-MTJL-0112

QM Approval

Name/Signature	Title	Date	Meaning/Reason
Michael Jones (006596)	Quality Analyst 1	08 Sep 2020, 07:46:49 AM	Approved

Management Approval

Name/Signature	Title	Date	Meaning/Reason
James Burns (006456)	Manager - EHS	02 Sep 2020, 10:37:09 AM	Approved
Christopher Johnson (006487)	Manager - Operations	03 Sep 2020, 12:13:06 PM	Approved

Pace Analytical™

TEST METHOD STANDARD OPERATING PROCEDURE
TITLE: Multi-Increment Sampling
TEST METHOD: NA
ISSUER: Pace Analytical National Center for Testing & Innovation

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1.0 Scope and Application

1.1 Appendix A of EPA Method 8330B (SW-846) specifically addresses field sampling. The appendix provides guidance for explosive residue sample collection, handling, and laboratory processing techniques. Method 8330B recommends the use of multi-increment (MI) sampling, which involves the extraction of a representative portion of material from within a single decision unit which will adequately address potential compositional and distributional heterogeneity. In MI sampling, several increments from the same decision unit are combined to form one sample that is submitted for laboratory analysis. The procedures for MI sampling are specifically designed to minimize sampling error and provide a more scientifically-representative mean concentration of the contaminant(s) present in the decision unit.

1.2 Initial demonstration for achieving samples size below 75µm per DOD/DOE QSM is on file in the QA department.

2.0 Summary of Method

2.1 Samples are dried, ground, and homogenized before subsamples are taken for sample preparation.

3.0 Interferences

3.1 Care must be taken to not cross-contaminate samples during the drying, sieving, and grinding procedures. Grinding blanks are required to verify procedure is free from cross contamination.

3.2 The drying process may result in quantitative losses of some analytes. Project Managers may consider eliminating the drying process prior to analysis or removing poor performers from the target analyte list if drying is required.

4.0 Definitions

4.1 Sieve: A device made of wire mesh held in a frame through which finer particles of a mixture of various sizes may be passed to separate them from coarser ones or through which soft materials may be forced for reduction to fine particles.

4.2 Shatterbox: A device for mechanically pulverizing a sample or material.

4.3 Ball Mill: A device using ceramic pellets and rotation in a closed container to pulverize the contents.

4.4 Refer to the Laboratory Quality Manual for a glossary of common lab terms and definitions.

5.0 Health and Safety

5.1 The toxicity or carcinogenicity of each chemical material used in the laboratory has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable.

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5.2 The laboratory maintains documentation of hazard assessments and OSHA regulations regarding the safe handling of the chemicals specified in each method. Safety data sheets for all hazardous chemicals are available to all personnel. Employees must abide by the health, safety and environmental (HSE) policies and procedures specified in this SOP and in the Pace National Chemical Hygiene / Safety Manual.

5.3 Personal protective equipment (PPE) such as safety glasses, gloves, and a laboratory coat must be worn in designated areas and while handling samples and chemical materials to protect against physical contact with samples that contain potentially hazardous chemicals and exposure to chemical materials used in the procedure.

5.4 Concentrated corrosives present additional hazards and are damaging to skin and mucus membranes. Use these acids in a fume hood whenever possible with additional PPE designed for handing these materials. If eye or skin contact occurs, flush with large volumes of water. When working with acids, always add acid to water to prevent violent reactions. Any processes that emit large volumes of solvents (evaporation/concentration processes) must be in a hood or apparatus that prevents employee exposure.

5.5 Contact your supervisor or local HSE coordinator with questions or concerns regarding safety protocol or safe handling procedures for this procedure.

6.0 Sample Collection, Preservation, Holding Time, and Storage

6.1 Samples should be collected in accordance with a sampling plan and procedures appropriate to achieve the regulatory, scientific, and data quality objectives for the project.

6.2 Pace National will typically receive samples in 4-8oz containers for processing.

7.0 Equipment and Supplies

7.1 Sieve: 10mesh

7.2 Grinder: Shatterbox or equivalent capable of reducing particle size to <75µm

7.3 Drying rack

8.0 Reagents and Standards

8.1 All reagents and standards must be recorded in the appropriate preparation log and assigned a unique number. See ENV-SOP-MTJL-0041, *Standard Logger – Tree Operation*. Additional information regarding reagent preparation can be found in the Standards Logger (Tree) digital archive system. All spiking solutions and surrogate standard solutions should be replaced at least every six months or sooner if a problem is detected unless otherwise noted.

8.2 A weekly check sample is purchased and ran through the entire process, except drying, as allowed per method. Acceptance criteria is determined by the company supplying the standard and will change with each lot received.

9.0 Procedure

9.1 All sample contents within the container are emptied in to a pan/weigh boat and dried to a constant weight.

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9.1.1 A Blank matrix must be dried with samples.

9.1.2 Obtain a clean pan/weigh boat and record the tare weight.

9.1.3 Empty the entire contents of the sample container into the pan/weigh boat.

9.1.4 Using gloved hands break the soil into small pieces as necessary to facilitate the drying process. Use fresh gloves for each sample to prevent cross contamination.

9.1.5 Record the initial weight of the entire sample.

9.1.6 After the initial weight is obtained, dry the sample at room temperature in a hood for approximately 24 hours. Then obtain a 2nd sample weight.

9.1.7 Continue the drying process for approximately 12 hours and obtain a 3rd sample weight.

9.1.8 Two consecutive weights of less than 10% difference, taken approximately 12 hours apart, is considered to be dried to a constant weight.

9.1.9 Dates/Times are recorded as well as the ambient temperature with each weighing of samples.

9.2 For all methods or when client-specific data quality objectives (DQOs) require grinding, dried sample is introduced into the shatterbox or equivalent. The entire sample must be ground. If multiple portions are ground separately, the aliquots must be combined prior to subsampling for extraction. Samples are ground up to Three minute intervals. Intervals and duration are dependent on the sample matrix and analytes of interest for the specific project. The Blank and weekly check sample must also proceed through this step.

9.3 Dried sample material is passed through a 10mesh (2mm) sieve (may be assisted using gloved hands). Do not intentionally include vegetation unless project specifications include this requirement. Depending on sample matrix, sieving may be performed initially to facilitate the drying process.

9.4 The Blank matrix is ground at the end of each batch. A blank will also be ground after any sample of known concentration above detectable limits, including quality control samples.

9.5 Each sample/QC is spread into a pan in order to perform sufficient subsampling of the final sample aliquot. At least 30 sample increments must be taken for the subsampling procedure. The sample volume extracted for analysis should represent the entire ground sample.

NOTE: If sample volume does not allow 30 aliquots, a note will be made on the extraction log.

9.6 Add surrogate to each sample/QC and spike MS/D after the initial extraction weight is acquired.

9.7 See the specific method extraction SOP for further processing information.

10.0 Data Analysis and Calculations

10.1 See the Laboratory Quality Assurance Manual for equations for common calculations.

11.0 Quality Control and Method Performance

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11.1 Analyst Qualifications and Training

11.1.1 Employees that perform any step of this procedure must have a completed Read and Acknowledgment Statement for this version of the SOP in their training record. In addition, prior to unsupervised (independent) work on any client sample, analysts that prepare or analyze samples must have successful initial demonstration of capability (IDOC) and must successfully demonstrate on-going proficiency on an annual basis. Successful means the initial and on-going DOC met criteria, documentation of the DOC is complete, and the DOC record is in the employee's training file. Refer to ENV-SOP-MTJL-0015, *Technical Training and Personnel Qualifications for Chemistry* for more information.

12.0 Data Review And Corrective Action

12.1 Data Review

12.1.1 Pace National's data review process includes a series of checks performed at different stages of the analytical process by different people to ensure that SOPs were followed, the analytical record is complete and properly documented, proper corrective actions were taken for QC failure and other nonconformance(s), and that test results are reported with proper qualification.

12.1.2 The review steps and checks that occur as employees complete tasks and review their own work is called primary review.

12.1.3 All data and results are also reviewed by an experienced peer or supervisor. Secondary review is performed to verify SOPs were followed, that calibration, instrument performance, and QC criteria were met and/or proper corrective actions were taken, qualitative ID and quantitative measurement is accurate, all manual integrations are justified and documented in accordance with the Pace National's SOP for manual integration, calculations are correct, the analytical record is complete and traceable, and that results are properly qualified.

12.1.4 A third-level review, called a completeness check, is performed by reporting or project management staff to verify the data report is not missing information and project specifications were met.

12.1.5 Refer to ENV-SOP-MTJL-0014, *Data Handling and Reporting* and ENV-SOP-MTJL-0038, *Data Review* for specific instructions and requirements for each step of the data review process.

12.2 Corrective Action

12.2.1 Corrective action is expected any time QC or sample results are not within acceptance criteria. If corrective action is not taken or was not successful, the decision/outcome must be documented in the analytical record. The primary analyst has primary responsibility for taking corrective action when QA/QC criteria are not met. Secondary data reviewers must verify that appropriate action was taken and/or that results reported with QC failure are properly qualified.

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13.0 Pollution Prevention and Waste Management

13.1 Pace National proactively seeks ways to minimize waste generated during our work processes. Some examples of pollution prevention include but are not limited to: reduced solvent extraction, solvent capture, use of reusable cycletainers for solvent management, and real-time purchasing.

13.2 The EPA requires that laboratory waste management practices be conducted consistent with all applicable federal and state laws and regulations. Excess reagents, samples and method process wastes must be characterized and disposed of in an acceptable manner in accordance with Pace National's Chemical Hygiene Plan / Safety Manual.

14.0 Modifications

14.1 Pace National is set up currently to process from 4oz/8oz/16oz/32oz jars that have been prepared in the field from bulk containers. Pace National cannot currently process bulk samples for this method.

14.2 Due to limited sample volume received as listed in 14.1:

14.2.1 Duplicate subsampling is performed rather than triplicate

14.3 A weekly check sample is performed to verify the MIS process in lieu of processed LCS.

15.0 Responsibilities

15.1 Pace National employees that perform any part this procedure in their work activities must have a signed Read and Acknowledgement Statement in their training file for this version of the SOP. The employee is responsible for following the procedures in this SOP and handling temporary departures from this SOP in accordance with Pace National's policy for temporary departure.

15.2 Pace National supervisors/managers are responsible for training employees on the procedures in this SOP and monitoring the implementation of this SOP in their work area.

16.0 Attachments

16.1 Not applicable to this SOP

17.0 References

17.1 Nitroaromatics, Nitramines, and Nitrate Esters by High Performance Liquid Chromatography (HPLC), SW-846 Method 8330B, Revision 2, October 2006, Appendix A.

17.2 Quality Systems Manual (QSM) for Environmental Laboratories, Department of Defense (DoD), Version 5.1, 2017.

TEST METHOD STANDARD OPERATING PROCEDURE
TITLE: Multi-Increment Sampling
TEST METHOD: NA
ISSUER: Pace Analytical National Center for Testing & Innovation

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18.0 Revision History

Current Version (Pace National):

Date	Description of Revisions
9/1/2020	Technical and quality review. Deleted sections 9.2 and 9.3. Added sections 9.2 and 9.3. Revised section 14.1.

Superseded Versions (ESC Lab Sciences SOP #330377):

Version	Date	Description of Revisions
1	4/1/2016	SOP Origination.
2	4/17/2017	Technical and quality review and update. Header and signature block re-formatting. Revised Sections 2.1.2, 3.1, 8.1, 8.3, 9.0, 13.0, 14.1, and 14.2.
3	7/31/18	Technical and quality review and update. Changed logo. Revised Sections 8.3, 8.4, 8.5, 11.2. Added Sections 7.1, 8.1.1-8.1.9, 13.2, and 13.3

Superseded Versions (Pace National):

Date	Description of Revisions
7/31/2019	Converted SOP over to new format. Revised section 9.5. Added section 1.2. Deleted sections 9.4, 14.2.2 and renumbered as necessary.
7/16/2020	Technical and quality review.

Management Approval:

Angel Ramey Approved on 3/17/2022 2:30:20 PM
Christabel Fernandes-Monteiro Approved on 3/18/2022 1:42:44 PM
Christopher Herndon Approved on 3/16/2022 9:33:00 AM
Heidi Ferrell Approved on 3/15/2022 11:20:08 AM
James Burns Approved on 3/15/2022 10:56:08 AM
Jarred Willis Approved on 3/17/2022 1:48:08 PM
Jeremiah Gupton Approved on 3/21/2022 1:25:03 PM
John Davis Approved on 3/17/2022 1:28:09 PM
John Vann Approved on 3/17/2022 1:28:15 PM
Kayla Coble Approved on 3/15/2022 5:02:28 PM
Kyle Moore Approved on 3/22/2022 8:11:10 AM
Matthew Ferrell Approved on 3/15/2022 10:58:50 AM
Rounal Eidson Approved on 3/23/2022 2:21:03 PM
Shakir Wani Approved on 3/21/2022 4:25:38 PM
Tommy Mellette Approved on 3/15/2022 11:28:44 AM
William Mock Approved on 3/18/2022 10:02:33 AM
Ziyad Rajabi Approved on 3/18/2022 10:07:42 AM
Robert Johnson Approved on 3/23/2022 2:43:08 PM
Elizabeth Turner Approved on 3/23/2022 3:51:44 PM
Rebecca King Approved on 3/23/2022 6:22:27 PM

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TITLE PAGE

LABORATORY QUALITY MANUAL

Prepared for:

Pace Analytical National Center for Testing and Innovation
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Quality Manual Approval Signatories

Approval of this quality manual by managerial personnel is recorded on the Signature Manifest located before the Title Page of this manual.

The individuals listed below represent the management team that was in place on the effective date of this version of the manual for the following location:

Pace Analytical National Center for Testing and Innovation
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Each of the following individuals is a signatory for the quality manual for the location listed above. The application of their signature to the manual signifies their commitment to communicate, implement, and uphold the requirements, policies and procedures specified in this manual and their commitment to continuously improve the effectiveness of the quality management system based on customer feedback and internal assessment.

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[1] Members of the local management team are subject to change during the lifecycle of this document version.
[2] Include if different from the physical address and phone number of the facility.
[3]This individual serves as an Acting Technical Manager for TNI for one or more fields of accreditation.

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This quality manual (manual) outlines the quality management system (QMS) and management structure of the laboratories and service centers affiliated with the environmental sciences (ENV) division of Pace Analytical Services, LLC (PAS). A laboratory is defined by ENV as any facility, however named, that provides testing, sampling, or field measurement services. When the term 'laboratory" is used in this manual, the term refers to all locations listed on the Title Page of this manual and in Section 4.1.3 unless otherwise specified.

The ENV quality management system is also referred to as the quality program throughout this document. In this context, the phrase "quality management system" and "quality program" are synonymous and may be referred to by the acronym QMS.

The quality management system is the collection of policies and processes established by ENV management to consistently meet customer requirements and expectations, and to achieve the goals of providing PAS customers with high quality, cost-effective, analytical measurements and services.

The quality management system is also intended to establish conformance[1] and compliance with the current versions of the following international and national quality system standards:

- ISO/IEC 17025: *General requirements for the competence of testing and calibration laboratories*
- NELAC/TNI Standard Volume 1: *Management and Technical Requirements for Laboratories Performing Environmental Analysis*

[1]The statement of conformity to these Standards pertains only to testing and sampling activities carried out by the laboratory at its physical address, in temporary or mobile facilities, in-network, or by laboratory personnel at a customer's facility.

In addition to the international and national standards, the quality management system is designed to achieve regulatory compliance with the various federal and state programs for which the laboratory provides compliance testing and/or holds certification or accreditation. When federal or state requirements do not apply to all ENV locations, the requirements for compliance to those specifications are provided in addendum to this manual or in other documents that supplement the manual. Customer-specific project and program requirements are not included in the manual in order to maintain client confidentiality.

- A list of accreditation and certifications held by each laboratory associated with this manual is provided in Appendix A.
- A list of analytical testing capabilities offered by each laboratory associated with this manual is provided in Appendix B.

1.2 Scope and Application

This manual applies to each of the PAS locations listed on the Title Page.

The manual was prepared from the quality manual template (template) created by ENV corporate quality personnel. The template outlines the minimum requirements ENV management considers necessary for every ENV location, regardless of scope of services or number of personnel, to establish in order to maintain a quality management system that achieves the objectives of the Quality Policy (See 4.2.2). In this regard, the template is the mechanism used by the corporate officers (a.k.a. 'top

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management') to communicate their expectations and commitment for the quality program to ENV personnel.

Each location also has the responsibility to comply with federal and state regulatory and program requirements for which it provides analytical services and holds certification or accreditation. When those requirements are more stringent than the template, the requirements for compliance are provided in addendum to this manual or in other documents that supplement the manual. This document structure maintains consistency in the presentation of the quality management system across the network while providing the location a mechanism to describe and achieve compliance requirements on a program basis.

1.2.1 Quality Manual Template

The quality manual template is developed by the Corporate Quality Director with contribution and input from corporate quality personnel and the corporate officers. Approval of the template by the corporate officers (aka "top management") confirms their commitment to develop and maintain a quality management system appropriate for the analytical services offered by the organization and to communicate their expectations of the quality program to all personnel.

The template and instructions for use of the template are released by corporate quality personnel to the quality assurance manager responsible for each location (Local QM). The local QM uses the template to prepare the laboratory's manual by following the instructions provided. Since the template provides the minimum requirements by which ENV locations must abide, the laboratory may not alter the font, structure or content of the template except where specified by instruction to do so. As previously stated, program specific requirements are provided in addendum or in documents that supplement this manual.

The template is reviewed by corporate quality personnel annually and updated if needed. More frequent review and revision may be necessary to manage change, to maintain conformance and compliance to relevant standards, or to meet customer expectations.

See standard operating procedure (SOP) ENV-SOP-CORQ-00015 *Document Management and Control* for more information.

1.2.2 Laboratory Quality Manual

The manual is approved and released to personnel under the authority of local management whose signatures are identified on the Manual Signatory Page of this manual. The manual is reviewed annually, and location specific information is updated, if needed. More frequent review and revision may be necessary when there are significant changes to the organizational structure, capabilities, and resources of the laboratory. Review and revision of the manual is managed by the local QM. If review indicates changes to the main body of the manual are necessary to maintain conformance and compliance to relevant standards, or to meet customer expectations, the local QM will notify corporate quality personnel to initiate review and/or revision of the template.

See SOP ENV-SOP-CORQ-00015 *Document Management and Control* for more information.

1.2.3 References to Supporting Documents

The template and the manual include references to other laboratory documents that support the quality management system such as policies and standard operating procedures (SOPs).

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These references include the document's document control number and may include the document title.

This information is subject to change. For example, an SOP may be converted to a policy or the document's title may change. For these types of administrative changes, the manual and template are updated to reflect the editorial change during the manual's next scheduled review/revision cycle or the next time a new version of the manual is released, whichever is sooner.

The local QM maintains a current list of controlled documents used at each location that support the quality management system. This list, known as the "Master List", lists each document used by document control number, title, version, effective date, and reference to any document(s) that the current version supersedes. When there is a difference between the manual and the Master List, the document information in the Master List takes precedence. The current Master List is readily available to personnel for their use and cross-reference. Parties external to the laboratory should contact the laboratory for the most current version.

2.0 REFERENCES

References used to prepare this manual include:

- "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act." Federal Register, 40 CFR Part 136, most current version.
- "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846.
- "Methods for Chemical Analysis of Water and Wastes", EPA 600-4-79-020, 1979 Revised 1983, U.S. EPA.
- U.S. EPA Contract Laboratory Program Statement of Work for Organic Analysis, current version.
- U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Analysis, current version.
- "Standard Methods for the Examination of Water and Wastewater." Current Edition APHA-AWWA-WPCF.
- "Annual Book of ASTM Standards", Section 4: Construction, Volume 04.04: Soil and Rock; Building Stones, American Society of Testing and Materials.
- "Annual Book of ASTM Standards", Section 11: Water and Environmental Technology, American Society of Testing and Materials.
- "NIOSH Manual of Analytical Methods", U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, most current version.
- "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water", U.S. EPA, Environmental Monitoring and Support Laboratory – Cincinnati (Sep 1986).
- Quality Assurance of Chemical Measurements, Taylor, John K.; Lewis Publishers, Inc. 1987.
- Methods for Non-conventional Pesticides Chemicals Analysis of Industrial and Municipal Wastewater, Test Methods, EPA-440/1-83/079C.
- Environmental Measurements Laboratory (EML) Procedures Manual, HASL-300, US DOE, February 1992.

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- Requirements for Quality Control of Analytical Data, HAZWRAP, DOE/HWP-65/R1, July 1990.
- Quality Assurance Manual for Industrial Hygiene Chemistry, AIHA, most current version.
- National Environmental Laboratory Accreditation Conference (NELAC) Standard- most current version.
- ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories, 2nd Edition 2005-05-15; 3rd Edition 2017-11

  The following are implemented by normative reference to ISO/IEC 17025:

  - ISO/IEC Guide 99, *International vocabulary of metrology –Basic and general concepts and associated terms*
  - ISO/IEC 17000, *Conformity assessment – Vocabulary and general principles*
- Department of Defense Quality Systems Manual (QSM), most current version.
- TNI (The NELAC Institute) Standard, 2009 and 2016 versions.
- UCMR Laboratory Approval Requirements and Information Document, most current version.
- US EPA Drinking Water Manual, most current version.

3.0 TERMS AND DEFINITIONS

Refer to Appendix C for terms, acronyms, and definitions used in this manual and in other documents used by the laboratory to support the quality management system.

4.0 MANAGEMENT REQUIREMENTS

4.1 Organization

4.1.1 Legal Identity

Pace Analytical Services, LLC is authorized under the State of Minnesota to do business as a limited liability company.

4.1.1.1 Change of Ownership

If there is a change of ownership, if a location goes out of business, or if the entire organization ceases to exist, Pace Analytical Services, LLC ensures that regulatory authorities are notified of the change within the time-frame required by each state agency for which the location is certified or accredited.

Requirements for records and other business information are addressed in the ownership transfer agreement or in accordance with appropriate regulatory requirements, whichever takes precedence.

4.1.2 Compliance Responsibility

Laboratory management has the responsibility and authority to establish and implement procedures and to maintain sufficient resources necessary to assure its activities are carried out in such a way to meet the compliance requirements of the quality management system.

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4.1.3 Scope of the Quality Management System

The quality management system applies to work carried out at each location covered by this manual including permanent facilities, at sites away from its permanent facilities, or in associated temporary or mobile facilities.

The permanent and mobile facilities to which this manual applies are listed on the Title Page of this manual.

4.1.4 Organization History and Information

Founded in 1978, Pace Analytical Services, LLC (PAS) is a privately held scientific services firm operating one of the largest full-service contract laboratory and service center networks in the United States. The company's network offers inorganic, organic and radiochemistry testing capabilities; specializing in the analysis of trace level contamination in air, drinking water, groundwater, wastewater, soil, biota, and waste.

With over 90 laboratories and services centers in the contiguous US and in Puerto Rico, the network provides project support for thousands of industry, consulting, engineering and government professionals.

PAS delivers the highest standard of testing and scientific services in the market. We offer the most advanced solutions in the industry, backed by truly transparent data, a highly trained team, and the service and support that comes from four decades of experience.

4.1.4.1 Organization Structure

Each location maintains a local management structure under the oversight and guidance of corporate personnel. Local management is responsible for making day-to-day decisions regarding the operations of the facility, implementing the quality management system, upholding the requirements of the quality program, and for supervision of personnel.

Local management is provided by the Regional Vice-President - Operations (RVPO), Corporate Quality Program Manager (QPM), General Manager (GM), Quality Manager (QM), and department specific management and supervisory personnel.

The GM reports to a Vice-President of Operations (RVPO), who is responsible for the management of multiple laboratories and service centers across the division. The RVPO reports directly to the Chief Operating Officer (COO).

The QM reports to a Quality Program Manager (QPM), who is responsible for managing quality personnel for multiple locations across the division. The QPM reports directly to the Corporate Quality Director (CQD). The QM also maintains an indirect reporting relationship to the GM of each location that the QM manages.

Technical oversight for each location is provided by corporate personnel, RVPO, QPM, GM, QM, and department-specific management.

Refer to the organization charts provided in Appendix D to view the management structure, reporting relationships, and the interrelationships between positions.

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4.1.5 Management Requirements

4.1.5.1 Personnel

The laboratory is staffed with administrative and technical personnel who perform and verify work under the supervision of managerial personnel.

- Technical personnel include analysts and technicians that generate or contribute to the generation of analytical data and managerial personnel that oversee day to day supervision of laboratory operations. Including the reporting of analytical data and results, monitoring QA/QC performance, and monitoring the validity of analysis to maintain data integrity and reliability.
- Administrative personnel support the day-to-day activities of the laboratory.
- IT personnel maintain the information technology systems and software used at the laboratory.
- Client services personnel include project managers and support staff that manage projects.
- Managerial personnel make day-to-day and long-term decisions regarding the operations of the facility, supervise personnel, implement the quality management system and uphold the requirements of the quality program.

All personnel regardless of responsibilities are expected to carry out their duties in accordance with the policies and processes outlined in this manual and in accordance with standard operating procedures (SOPs) and other quality system documents. The laboratory's policies and procedures are designed for impartiality and integrity. When these procedures are fully implemented, personnel remain free from undue pressure and other influences that adversely impact the quality of their work or data.

4.1.5.1.1 Key Personnel

Key personnel include the management positions that have the authority and responsibility to plan, direct, and control, activities of the division (corporate) or the laboratory.

The following tables list key personnel positions by PAS job title and the position's primary deputy:

Key Personnel: Corporate

Key Personnel	Primary Deputy
Chief Executive Officer	Chief Operating Officer
Chief Operating Officer	Chief Executive Officer
Chief Compliance Officer	Quality Director
Corporate Quality Director	Chief Compliance Officer
Health and Safety Director	Chief Compliance Officer
IT Director	LIMS Administrator, however named.

Key Personnel: Laboratory

Key Personnel	Primary Deputy

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Regional Vice President - Operations	Chief Operating Officer or as designated.
Quality Program Manager	A different QPM or Corporate Quality Director
General Manager	Regional Vice President of Operations
Quality Manager	Quality Program Manager
Manager – Client Services	General Manager or as designated.
Local IT	Corporate IT Director or as designated.
Department Manager	General Manager
Technical Director[1]/Manager[1] Acting Technical Manager TNI	Another qualified employee
Operations Manager[1]	General Manager

[1] *Position may not be staffed at each location.*

Some state certification programs require the agency to be notified when there has been a change in key personnel. Program-specific requirements and timeframes for notification by agency, are tracked and upheld by the local QM, when these requirements apply.

4.1.5.2 Roles and Responsibilities

The qualifications, duties, and responsibilities for each position are detailed in job descriptions maintained by PAS's corporate Human Resource's Department (HR).

The following summaries briefly identify the responsibility of key personnel positions in relation to the ENV quality management system.

Chief Executive Officer (CEO): The CEO has overall responsibility for performance of the organization and endorses the quality program. Working with corporate and laboratory management, the CEO provides the leadership and resources necessary for ENV locations to achieve the goals and objectives of the quality management system and quality policy statement.

Chief Operating Officer (COO): The COO oversees all aspects of operations management including, strategic planning, budget, capital expenditure, and management of senior management personnel for ENV In this capacity, the COO provides leadership and resources necessary to help top management at each ENV location achieve the goals and objectives of the quality management system and quality policy statement.

Chief Compliance Officer (CCO): The CCO oversees the quality assurance and environmental health and safety programs (EHS) for each business unit. The CCO is responsible for planning and policy development for these groups to ensure regulatory compliance and to manage risk. The position provides leadership and guidance necessary for all PAS locations to achieve the goals and objectives of the quality and EHS programs.

The CCO also serves as the Ethics Officer (ECO). The ECO develops the Ethics and Data Integrity Policy and Training Program and provides oversight for reporting and investigation of ethical misconduct to maintain employee confidentiality during the process. The ECO provides guidance and instruction for follow-up actions necessary to remedy the situation and deter future recurrence.

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Corporate Director of Quality (CQD): The Corporate Director of Quality is responsible for developing and maintaining the ENV quality program under guidance and assistance from the CEO, COO, and CCO. This position develops corporate quality policy and procedure and analyzes metric data and other performance indicators to assess and communicate the effectiveness of the quality program to top management. The position provides leadership and guidance for implementation of the quality program across all ENV locations.

Corporate Quality Program Manager (QPM): The Quality Program Manager is responsible for managing the implementation of the ENV quality program for one or more locations in the network. Working with the CQD and local laboratory management to which they are assigned, the QPM provides leadership, guidance and resources, including allocation of personnel, necessary to achieve the goals of ENV quality program.

Corporate Director of Information Technology: The Corporate Director of IT oversees the systems and processes of information technology used to support the quality program. These systems include Laboratory Information Management Systems (LIMS); data acquisition, reduction, and reporting software; virus-protection, communication tools, and ensuring the integrity and security of electronic data.

Regional Vice-President of Operations): The RVPO has full responsibility for administrative and operations management and performance of a group of ENV laboratories and service centers. Working with the COO and local laboratory management, the RVPO provides leadership, guidance and resources, including allocation of personnel, necessary to achieve the goals of ENV quality program.

General Manager (GM): The GM is responsible for the overall performance and administrative and operations management of an ENV location and associated service center(s). This position is responsible to provide leadership and resources, including allocation and supervision of personnel, necessary for the location to implement and achieve the goals of the PAS quality program. In this capacity, the position assures laboratory personnel are trained on and understand the structure and components of the quality program defined in this manual as well as the policies and procedures in place to implement the quality management system.

The GM of NELAC/TNI Accredited laboratories is also responsible for the designation of technical personnel to serve as acting technical managers for TNI for the fields of accreditation held by the laboratory (See Section 4.1.5.2.1) and for notifying the accreditation body (AB) of any extended absence or reassignment of these designations.

Quality Manager (QM): The QM oversees and monitors implementation of the quality management system for each ENV location assigned and communicates deviations to laboratory management. The QM is independent of the operation activities for which they provide oversight and has the authority to carry out the roles and responsibilities of their position without outside influence.

Additionally, in accordance with the TNI Standard, the QM:

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- serves as the focal point for QA/QC and oversees review of QC data for trend analysis;
- evaluates data objectively and perform assessments without outside influence;
- has documented training and experience in QA/QC procedures and the laboratory's quality system;
- has a general knowledge of the analytical methods offered by the laboratory;
- coordinates and conducts internal systems and technical audits;
- notifies laboratory management of deficiencies in the quality system;
- monitors corrective actions;
- provides support to technical personnel and may serve as the primary deputy for the acting TNI Technical Manager(s).

Manager-Client Services (CSM): This position is responsible for training and management of client facing staff that serve as the liaison between PAS and the customer to ensure that projects are successfully managed to meet the expectations and needs of PAS customers. This position is also responsible for sharing positive and negative customer feedback with laboratory management so that this information may be used to improve the quality program.

Local IT Manager, however named: Local IT managers are responsible for maintaining the IT systems used to support the quality program. These systems include Laboratory Information Management Systems (LIMS); data acquisition, reduction, and reporting software; virus-protection, communication tools, and ensuring the integrity and security of electronic data.

Department Manager (DM): The DM is responsible for administrative and operations management and implementation of the quality management system in the work area he/she oversees. These responsibilities include but are not limited to: training and supervision of personnel, monitoring work activity to maintain compliance with this manual, SOPs, policies and other instructional documents that support the quality management system; method development, validation and the establishment and implementation of SOPs to assure regulatory compliance and suitability for intended purpose; monitoring QA/QC performance, proper handling and reporting of nonconforming work, purchasing of supplies and equipment adequate for use, maintaining instrumentation and equipment in proper working order and calibration, and general maintenance of administrative and technical processes and procedures established by the laboratory.

Operations Manager (OM): The OM is responsible for management of production and/or other duties assigned by the GM.

4.1.5.2.1 Acting Technical Manager (TNI Accreditation):

For ENV locations that are NELAC/TNI accredited:

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The TNI Standard specifies requirements for the qualification and duties of technical personnel with managerial responsibility. These requirements are associated in the Standard to the designation 'technical manager(s), however named'. These responsibilities may be assigned to multiple individuals and are not associated with any specific job title.

The TNI requirements for personnel that provide technical oversight correlate with ENV job descriptions for Department Manager or Supervisor. However, the duties may be assigned to any PAS employee that meets the TNI specified qualifications.

Personnel assigned this designation retain their assigned job title. The job title may be appended with *"acting as technical manager for TNI"* and the technology or field of accreditation for which the employee is approved, if necessary.

When TNI Accreditation Bodies (AB) refer to these employees as 'technical manager' or 'technical director' on the official certificate or the scope of accreditation, this reference is referring to their approval to carry out duties of the 'technical manager, however named' as specified in the TNI Standard.

In accordance with the TNI Standard, the acting Technical Manager(s) for TNI are responsible for monitoring the performance of QC/QA in the work areas they oversee.

If the absence of any employee that is approved as acting technical manager for TNI exceeds 15 calendar days, the duties and responsibilities specified in the TNI Standard are temporarily reassigned to another employee that meets the qualifications for the technology or field of accreditation. If the employee's absence exceeds 35 calendar days, the QM will formally notify the TNI primary AB of the absence and the details of reassignment of duties in writing.

Refer to the applicable TNI Standard for requirements for technical oversight and required qualifications of the acting Technical Manager(s) for each discipline (chemical, limited inorganic chemistry, and microbiology).

4.1.5.3 Conflict of Interest

A conflict of interest is a situation where a person has competing interests. Laboratory management looks for potential conflict of interest and undue pressures that might arise in work activities and then includes countermeasures in policies and procedures to mitigate or eliminate the conflict.

See policy COR-POL-0004 *Ethics Policy* for more information.

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4.1.5.4 Confidentiality

Laboratory management is committed to preserving the confidentiality of PAS customers and confidentiality of business information.

Procedures used by the laboratory to maintain confidentiality include:

- A Confidentiality Agreement which all employees are required to sign at the time of employment and abide by the conditions of throughout employment;
- Record retention and disposal procedures that assure confidentiality is maintained;
- Physical access controls and encryption of electronic data; and
- Protocol for handling Confidential Business Information (CBI).

Client information obtained or created during work activities is considered confidential and is protected from intentional release to any person or entity other than the client or the client's authorized representative, except when the laboratory is required by law to release confidential information to another party, such as a regulatory agency or for litigation purposes. In which case, the laboratory will notify the client of the release of information and the information provided.

The terms of client confidentiality are included in ENV Standard Terms and Conditions (T&C). With the acceptance of ENV Terms and Conditions and/or the implicit contract for analytical services that occurs when the client sends samples to the laboratory for testing, the client authorizes PAS to release confidential information when required.

See policy COR-POL-0004 *Ethics Policy* for more information.

4.1.5.5 Communication

Communication is defined as the imparting or exchanging of news and information. Effective (good) communication occurs when the person(s) you are exchanging information with actively gets the point and understands it.

4.1.5.5.1 Workplace Communication

Good communication in the workplace is necessary to assure work is done correctly, efficiently, and in accordance with client expectations.

Instructions for how to carry out work activities are communicated to personnel via written policy, standard operating procedures, and standard work instructions.

Information about laboratory performance (positive and negative) and ideas for improvement are communicated using various communication channels such as face to face meetings, video conferencing, conference calls, email, memoranda, written reports, and posters.

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4.1.5.5.2 External Communication

Communication with external parties such as customers, vendors, business partners, and regulatory agencies takes place every day.

Laboratory management ensure personnel learn to communicate in professional and respectful ways in order to build strong relationships and learn to communicate effectively to avoid misunderstanding.

4.2 Quality Management System

4.2.1 Quality Management System Objectives

The objectives of the laboratory's quality management system are to provide clients with consistent, exemplary professional service, and objective work product that is of known and documented quality that meets their requirements for data usability and regulatory compliance.

Objective work product is analytical services, data, test results, and information that is not influenced by personal feeling or opinions. The quality of being objective is also known as 'impartiality'.

4.2.1.1 Impartiality

The laboratory achieves and maintains impartiality by implementing and adhering to the policies and processes of the quality management system, which are based on industry accepted standards and methodologies.

The laboratory's procedures for handling nonconforming work (See 4.9), corrective and preventive actions (See 4.11, 4.12) and management review (See 4.15) are the primary mechanisms used to identify risk to impartiality and to prompt actions necessary to eliminate or reduce the threat when risk to impartiality is suspected or confirmed.

4.2.1.2 Risk and Opportunity Assessment

Risks are variables that make achieving the goals and objectives of the quality management system uncertain. An opportunity is something that has potential positive consequences for the laboratory.

Laboratory personnel manage risks and opportunities on a daily basis by carrying out the processes that make up the quality management system. Some of the ways in which the quality management system is designed to identify, minimize, or eliminate risk on a daily basis include but are not limited to:

- Capability and capacity reviews of each analytical service request to assure the laboratory can meet the customer's requirements;
- Maintenance of accreditation and certification for test methods in multiple states and programs to cover a broad range of jurisdiction for regulatory compliance;
- SOPs and other controlled instructional documents are provided to personnel to eliminate variability in process. These documents include actions to counter risk

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factors inherent in the process and are reviewed on a regular basis for on-going suitability and relevancy;

- Participation in proficiency testing programs and auditing activities to verify on-going competency and comparability in performance;
- Provision of on-the-job training and established protocol for quality control (QC) corrective action for nonconforming events;
- An established program for ethics, and data integrity;
- Tiered data review process;
- Culture of continuous improvement;
- Monitoring activities to assess daily and long-term performance; and
- Annual critical review of the effectiveness of the quality management system.

ENV also promotes a continuous improvement culture based on the principles of lean manufacturing. These principles include 3P (Process, Productivity, Performance) and Kaizen. 3P is a platform used by Pace to share best practices and standardization across the network to achieve operational excellence. Kaizen is a team-based process used to implement tools and philosophies of lean to reduce waste and achieve flow with the purpose of improving both external and internal customer satisfaction. ENV's lean programs and activities help to mitigate risk because they generate a collective understanding of vulnerabilities and utilize group-effort to develop and implement solutions at all levels.

Risk and opportunities may also be formally identified using specific risk and opportunity assessment methods such as SWOT Analysis (Strength, Weakness, Opportunity, Threats) and 3-Stage Impact/Probability Grids.

4.2.1.3 Communication of the Quality Management System

This manual is the primary mechanism used by laboratory management to communicate the quality management system to laboratory personnel.

To assure personnel understand and implement the quality program outlined in the manual:

- All laboratory personnel are required to sign a Read and Acknowledgement Statement to confirm the employee has: 1) been informed of the manual by laboratory management, 2) has access to the manual, 3) has read the manual 4) understands the content of the manual, and 5) agrees to abide by the requirements, policies and procedures therein.
- Personnel are informed that the manual provides the "what" of the quality management system. The "how to" implementation of the quality management system is provided in policy, SOPs, standard work instructions, and other controlled instructional documents.

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4.2.2 Quality Policy Statement

The quality policy of the laboratory is to provide customers with data of known and documented quality fit for their intended purpose. The laboratory achieves this policy by implementing the quality management system defined in this manual, by following industry accepted protocol for analytical testing and quality assurance and quality control (QA/QC) activities, by conformance with published and industry accepted testing methodologies, and by compliance with international and national standards for the competency and/or accreditation of testing laboratories.

Intrinsic to this policy statement is each of the following principles:

- The laboratory will provide customers with reliable, consistent, and professional service. This is accomplished by making sure the laboratory has the resources necessary to maintain capability and capacity; that staff are trained and competent to perform the tasks they are assigned; that client-facing staff are trained and prepared to find solutions to problems and to assist customers with their needs for analytical services. Customer feedback, both positive and negative, is shared with personnel and used to identify opportunities for improvement.
- The laboratory maintains a quality program that complies with applicable state, federal, and industry standards for analytical testing and competency.

  ISO/IEC 17025 and the TNI (The NELAC Institute) Standard is used by ENV to establish the minimum requirements of the ENV quality program.

  ISO/IEC 17025 is a competency standard that outlines the general requirements for the management system for calibration and testing laboratories. It is the primary quality system standard from which other quality system standards, such as the TNI Standard, are based. The TNI Standards are consensus standards that provides management and technical requirements for laboratories performing environmental analysis.
- Laboratory management provides training to personnel so that all personnel are familiar with the quality management system outlined in this manual and that they understand that implementation of the quality management system is achieved by adherence to the organization's policies and procedures.
- Laboratory management continuously evaluates and improves the effectiveness of the quality management system by responding to customer feedback, and other measures of performance, such as but not limited to: the results of internal/external audits, proficiency testing, metrics, trend reports, and annual and periodic management reviews.

4.2.2.1 Ethics Policy / Data Integrity Program

PAS has established a comprehensive ethics and data integrity program that is communicated to all PAS employees in order that they understand what is expected of them. The program is designed to promote a mindset of ethical behavior and professional conduct that is applied to all work activities.

The key elements of the PAS Ethics / Data Integrity Program include:

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- Ethics Policy (COR-POL-0004);
- Ethics Officer;
- Standardized data integrity training course taken by all new employees on hire and a yearly refresher data integrity training course for all existing employees;
- Policy Acknowledgement Statements that all PAS personnel, including contract and temporary, are required to sign at the time of employment and again during annual refresher training to document the employee's commitment and obligation to abide by the company's standards for ethics, data integrity and confidentiality;
- SOPs that provide instructions for how to carry out a test method or process to assure tasks are done correctly and consistently by each employee;
- On the Job Training;
- Data integrity monitoring activities which include, but are not limited to, primary, secondary and completeness data reviews, internal technical and system audits, data audits, data surveillance, and proficiency testing; and
- Confidential reporting process for alleged ethics and data integrity issues.

All laboratory managers are expected to provide a work environment where personnel feel safe and can report unethical or improper behavior in complete confidence without fear of retaliation. Retaliation against any employee that reports a concern is not tolerated.

PAS has engaged Lighthouse Services, Inc. to provide personnel with an anonymous reporting process available to them 24 hours a day/7 days per week. The alert line may be used by any employee to report possible violations of the company's ethics and data integrity program. When using the reporting process, the employee does need to specify the location of concern and when reporting by email, also include the company name. Messages are collected, documented, reviewed, and will be followed up on by the Ethics Compliance Officer to resolve the matter. Investigations concerning data integrity are kept confidential.

Lighthouse Compliance Alert Lines:

English Speaking US & Canada	(844) 940-0003
Spanish Speaking North America	(800) 216-1288
Internet	www/lighthouse-services.com/pacelabs
Email	reports@lighthouse-services.com

4.2.3 Management Commitment: Quality Management System

Evidence of management's commitment for the development, maintenance, and on-going improvement of the quality management system is provided by the application of their signature of approval to this manual. Their signature confirms they understand their responsibility to implement the quality management system outlined in this manual, to

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communicate the quality program to personnel, and to uphold requirements of the program during work activities.

4.2.4 Management Commitment: Customer Service

Management communicates the importance of meeting customer and regulatory requirements to personnel by training personnel on the quality management system outlined in this manual, implementing the quality management system outlined in this manual, and upholding these requirements for all work activities.

4.2.5 Supporting Procedures

Documents that support this manual and quality management system are referenced throughout this manual. The structure of the document management system is outlined in SOP ENV-SOP-CORQ-0015 *Document Management and Control* and summarized in the following subsections.

4.2.5.1 Quality Management System Document Structure

Documents associated with the quality management system are classified into document types that identify the purpose of the document and establish how the document is managed and /or controlled.

Document types are ranked to establish which documents takes precedence when there is an actual or perceived conflict between documents and to establish the hierarchal relationships between documents. The ranking system also provides information to document writers and reviewers to assure downline documents are in agreement with documents of higher rank. Project specific documents are not ranked because client specific requirements are not incorporated into general use documents in order to maintain client confidentiality.

Examples: ENV QMS Documents: Internal

Document Type	Purpose
Quality Manual	Outlines the laboratory's quality management system and structure and how it works for a system including policy, goals, objectives and detailed explanation of the system and the requirements for implementation of system. Includes roles and responsibilities, relationships, procedures, systems and other information necessary to meet the objectives of the system described.
Policy	Provide requirements and rules for a PAS process and is used to set course of actions and to guide and influence decisions. Policy describes the "what", not the "how".
Standard Operating Procedure	Provide written and consistent set of instructions or steps for execution of a routine process, method, or set of tasks performed by PAS. Includes both fundamental and operational elements for implementation of the systems described in PAS manual(s). Assures that activities are performed properly in accordance with applicable requirements. Designed to ensure consistency, protect EHS of employees and environment, prevent failure in the process and ensure compliance with company and regulatory requirements. SOPs describes the "how" based on policy.
Standard Work Instruction	Provide step by step visual and/or written instruction to carry out a specific task to improve competency, minimize variability, reduce work injury and strain, or to boost efficiency and quality of work (performance). SWI are associated with an SOP unless the task described is unrelated to generation of or contribution to environmental data or analytical results.
Template	Pre-formatted document that serves as a starting point for a new document.

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Guide	Provide assistance to carry out a task.
Form	Used for a variety of purposes such as to provide a standardized format to record observations, to provide information to supplement an SOP.
Guidance	Non-binding advice used to explain internal policies, procedures, or practices.

Example: ENV QMS Documents: External

Certificate	Lists parameters, methods, and matrices for which the laboratory is certified/accredited to perform within the jurisdiction of the issuing regulatory agency or accreditation body.
Reference Document	Provide information, protocol, instructions, and/or requirements. Issued by the specifier. Examples include quality system standards such as ISO/IEC, TNI, DoD and published referenced methods such as Standard Methods, ASTM, SW846, EPA, and federal and state regulatory bodies.
Project Document	Provides requirements necessary to meet individual client expectations for intended use of data. Examples include project quality assurance plans (QAPP), client-program technical specifications, contracts, and other agreements.

Document Hierarchy

Rank	Document
1	Reference Documents
2	Corporate Manual
3	Corporate Policy
4	Corporate SOP
5	Corporate SWI, Templates, Guides, Forms, Guidance
6	Laboratory Manual
7	Laboratory SOP
8	Laboratory SWI, Templates, Guide, Forms, Guidance
NA	Project Documents

4.2.6 Roles and Responsibilities

The roles and responsibilities for technical management and the quality manager is provided in section 4.1.5.2.

4.2.7 Change Management

When significant changes to the ENV quality management system are planned, these changes are managed by corporate quality personnel to assure that the integrity of the quality management system is maintained.

4.3 Document Control

4.3.1 General

The laboratory's procedures for document control are provided in SOP ENV-SOP-CORQ-0015 *Document Management and Control.*

The laboratory uses electronic document management software (eDMS) to carry out the document control procedures of the SOP. eDMS automates the process for unique document identification, version control, approval, access, and archival. The eDMS software used by ENV restricts access to archived documents except to authorized users to prevent the use of obsolete documents.

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The local QM maintains a master list of controlled documents used at the laboratory. The master list includes the document control number, document title, and current revision status and is made available to personnel for their reference.

See SOP ENV-SOP-CORQ-0015 *Document Management and Control* for more information.

4.3.2 Document Approval and Issue

Documents that support the quality management system are reviewed by qualified personnel and approved by laboratory management prior to release for general use.

Only the approved versions of documents are available to personnel for use unless use of a draft document is authorized by management.

See SOP ENV-SOP-CORQ-0015 *Document Management and Control* for more information.

4.3.3 Document Review and Change

Unless a more frequent review is required by regulatory, certification or accreditation program the laboratory formally reviews documents at least every two years to ensure the document remains current, appropriate, and relevant.

Documents are also informally reviewed every time the document is used. Personnel are expected to refer to and follow instructions in controlled documents when they carry out their work activities. Consequently, any concerns or problems with the document should be caught and brought to the attention of laboratory management on an on-going basis.

Documents are revised whenever necessary to ensure the document remains usable and correct. Older document versions and documents no longer needed are made obsolete and archived for historical purposes.

ENV does not allow hand-edits to documents. If an interim change is needed pending re-issue of the document, the interim change is communicated to those that use the document using a formal communication channel, such as SOP Change in Progress form, email, or memorandum.

The document review, revision, and archival process is managed by quality personnel at the location from which the document was released using the procedures established in SOP ENV-SOP-CORQ-0015 *Document Management and Control.*

4.4 Analytical Service Request, Tender, and Contract Review

The laboratory's management and/or client service personnel perform thorough reviews of requests and contracts for analytical services to verify the laboratory has the capability, capacity, and resources necessary to successfully meet the customer's needs. These review procedures are described in laboratory SOP ENV-SOP-MTJL-0009, *Contract Review*.

The procedures in this SOP(s) are established to ensure that:

- The laboratory understands the purpose of data collection in order to ensure the test methods requested are appropriate for the intended use of the data and capable of meeting the client's data quality objectives;

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- The laboratory and any subcontractor has the capability, capacity, and resources to meet the project requirements and expectations within the requested time frame for delivery of work product;
- Any concerns that arise from review are discussed and resolved with the client; and
- The results of review and any correspondence with the client related to this process and/or any changes made to the contract are recorded and retained for historical purposes.

Capability review confirms that the in-network laboratories and any potential subcontractors hold required certification/accreditation for the test method, matrix, and analyte and verifies the laboratory can achieve the client's target compound list and data quality objectives (DQOs) for analytical sensitivity and reporting limits, QA/QC protocol, and hardcopy test report and electronic data deliverable (EDD) formats.

Capacity review verifies that the in-network laboratories and any potential subcontractors are able to handle the sample load and deliver work production within the delivery timeframe requested.

Resource review verifies that the laboratory and any potential subcontractors have adequate qualified personnel with the skills and competency to perform the test methods and services requested and sufficient and proper equipment and instrumentation needed to perform the services requested.

4.5 Subcontracting and In-Network Work Transfer

The terms 'subcontract' and "subcontracting" refers to work sent to a business external to Pace Analytical Services, LLC (PAS) and the term 'subcontractor' refers to these external businesses, which are also called vendors.

Work transferred within the ENV network is referred to as interregional work orders (IRWO) and network laboratories are referred to as IRWO, IR, or a network laboratory.

The network of ENV laboratories offers comprehensive analytical capability and capacity to ensure PAS can meet a diverse range of client needs for any type of project. If the laboratory receives a request for analytical services and it cannot fulfill the project specifications, the laboratory's client services team will work with the client to place the work within the ENV network. When it is not possible to place the work within network, the laboratory will, with documented client approval, subcontract the work to a subcontractor that has the capabilities to meet the project specifications and can meet the same commitment agreed on between the laboratory and the client. Some client programs require client consent even for in-network work transfer, and when this applies, the client services team obtains consent as required. The laboratory retains the record of client notification and their consent in the project record for historical purposes.

Whenever work is transferred to a subcontractor or an in-network laboratory, the laboratory responsible for management of the project verifies each of these qualifications:

- The subcontractor or in network laboratory has the proper accreditation/certifications required for the project and these are current; and
- The use of the subcontractor or in network laboratory is approved by the client and/or regulatory agency, when approval is required. Record of approval is retained in the project record.

All subcontractor laboratories must maintain a quality management system like ENV and that complies with ISO/IEC 17025 and the TNI Standard(s).

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ENV also evaluates and pre-qualifies subcontractors as part of the company's vendor qualification program. The complete list of approved vendors is maintained by the corporate procurement department and is made available to all ENV locations. Pre-qualification of a subcontractor does not negate the requirement for the placing laboratory to verify the capability, capacity, and resources of any selected subcontractor on a project-specific basis to confirm the subcontractor can meet the client's needs.

For both subcontracting and in-network work transfer, the project specifications are always communicated to the subcontractor or the in-network laboratory by the project manager so that the laboratory performing the work is aware of and understands these requirements.

The procedures for subcontracting are outlined in laboratory SOP ENV-SOP-MTJL-0019, *Subcontracting*.

4.6 Purchasing Services and Supplies

Vendors that provide services and supplies to the laboratory are prequalified to verify the vendor's capability to meet the needs of PAS. These needs include but are not limited to competitive pricing, capacity to fill purchase orders, quality of product, customer service, and business reputation and stability. The records of vendor evaluation and the list of approved vendors is maintained by the corporate procurement department.

The procedures for vendor qualification are specified in the corporate process for vendor qualification, however named.

The laboratory may purchase goods and services from any supplier on the approved vendor list.

The specifications (type, class, grade, tolerance, purity, etc.) of supplies, equipment, reagents, standard reference materials and other consumables used in the testing process are specified in SOPs. The SOP specifications are based on the governing requirements of the approved reference methods and any additional program driven regulatory specification, such as drinking water compliance. All requisitions for materials and consumables are approved by the department supervisor to confirm the purchase conforms with specified requirements. After approval the requisition is handled by the laboratory's designated purchasing agent. On receipt, the product is inspected and verified before use, when applicable.

The laboratory's procedure for the purchase of services and supplies is specified in laboratory SOP ENV-SOP-MTJL-0020, *Materials Procurement for Analytical Processes*.

4.7 Customer Service

Project details and management is handled by the laboratory's customer service team. Each customer is assigned a Project Manager (PM) that is responsible for review of contract requirements and handling laboratory to customer communication about the project status.

4.7.1 Commitment to Meet Customer Expectations

The laboratory cooperates and works closely with our customers to ensure their needs are met and to establish their confidence in the laboratory's capability to meet their needs for analytical services and expectations for service.

The PM is the customer's primary point of contact for each analytical service request. The PM gathers information from the customer to ensure the details of their request are understood. After samples are received, the PM monitors the progress of the project and alerts

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the customer of any delays or excursions that may adversely impact data usability. Laboratory supervisors are expected to keep the PM informed of project status and any delays or major issues, so that the PM can keep the client informed.

The laboratory encourages customers to visit the laboratory to learn more about the laboratory's capabilities, observe performance and to meet laboratory personnel.

ENV customers expect confidentiality. Laboratory personnel will not divulge or release information to a third party without proper authorization unless the information is required for litigation purposes. See Section 4.1.5.4 of this manual and policy COR-POL-0004 *Ethics Policy* for more information on the laboratory's policy for client confidentiality.

4.7.2 Customer Feedback

The laboratory actively seeks positive and negative feedback from customers through surveys and direct communication. Information from the client about their experience working with the laboratory and their satisfaction with work product is used to enhance processes and practices and to improve decision making. Customer feedback is communicated to laboratory management and corporate personnel in management reports and analyzed yearly during management review (See 4.15) to identify risk and opportunity. Corrective, preventive, or continuous improvement actions are taken based on nature of and/or feedback trends.

Also see sections 4.9, 4.10, 4.11, 4.12, 4.14, and 4.15 for more information about how customer feedback is managed by the laboratory and used to enhance the quality management system.

4.8 Complaints

Complaints provide opportunities to improve processes and build stronger working relationships with our clients.

The laboratory's complaint resolution process includes three steps. First, handle and resolve the complaint to mutual satisfaction. Second, perform corrective action to prevent recurrence (See 4.11). Third, record and track the complaint and use these records for risk and opportunity assessment and preventive action (See 4.12).

4.9 Nonconforming Work

4.9.1 Definition of Nonconforming Work

Nonconforming work is work that does not conform to customer requirements, standard specifications, laboratory policies and procedures, or that does not meet acceptance criteria.

The discovery of non-conforming work comes from various sources which include, but are not limited to:

- results of quality control samples and instrument calibrations;
- quality checks on consumables and materials;
- general observations of laboratory personnel;
- data review;
- proficiency testing;
- internal and external audits;

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- complaints and feedback;
- management review and reports; and
- regulatory and certification and accreditation actions.

The way in which the laboratory handles nonconforming work depends on the significance and impact (risk) of the issue. Some issues may simply require correction, others may require investigation, corrective action (See 4.11) and/or data recall (See 4.16). When the laboratory releases data and test results associated with nonconforming QC and acceptance criteria, test results are qualified, or non-conformances are noted in the final analytical report to apprise the data user of the situation. (See 5.10)

Nonconforming work also includes unauthorized departure from laboratory policies, procedures and test methods. Authorized departures are explained in the following subsections. Situations that do not conform to these conditions are considered unauthorized departure(s).

4.9.1.1 Authorized Departure from SOP

An authorized departure from a test method SOP is one that has been reviewed and approved by the Department Manager, designated Acting Technical Manager for TNI for the discipline the SOP pertains to (Chemistry, Inorganic Chemistry, Microbiology), Quality Manager, or the General Manager. Management review is conducted to confirm the departure does not conflict with regulatory compliance requirements for which the data will be used or does not adversely affect data integrity. The departure may originate from client request or may be necessary to overcome a problem.

An authorized departure from administrative or process-oriented SOP is typically necessary to correct an error in the SOP. These departure requests are reviewed and pre-approved by the QA Manager.

Documentation of SOP departures and approval decisions are retained by the laboratory as evidence that the departure was authorized. When necessary, approved departures from test method SOPs are noted in the final test report to advise the data user of any ramification to data quality.

4.9.1.2 Authorized Departure from Test Methods (Method Modifications)

When test results are associated to a published reference test method, the laboratory's test method SOP must be consistent with the test method. If the test method is mandated for use by a specific regulatory program such as drinking water or wastewater or a certification or accreditation program, such as TNI/NELAC, the SOP must also comply with or include these requirements. If the procedures in the SOP are modified from the test method, these modifications must be clearly identified in the SOP. The conditions under which the laboratory may establish an SOP that is modified from these reference documents, and what is considered a modification are specified in ENV-SOP-CORQ-0011 *Method Validation and Instrument Verification.*

Modifications that do not meet the requirements of this SOP (ENV-SOP-CORQ-0011) are unauthorized. Client requests to deviate from the test method are handled

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as client requests to depart from the test method SOP since it is the SOP that the laboratory follows when performing work.

4.9.1.3 Stop Work Authority

Stop Work Authority provides laboratory personnel with the responsibility and obligation to stop work when there is a perceived unsafe condition or behavior that may result in an unwanted event.

All laboratory and corporate personnel have the authority to stop work when needed to preserve data integrity or safety of workers.

Once a stop work order has been initiated and the reason for doing so is confirmed valid; laboratory management is responsible for immediate correction and corrective action (see section 4.11) before resumption of work.

4.10 Continuous Improvement

The laboratory's quality management system is designed to achieve continuous improvement through the implementation of the quality policy and objectives outlined in this manual. Information about the laboratory's activities and performance is gained from many sources such as customer feedback, audits, QC, trend analysis, business analytics, management reports, proficiency testing, and management systems review. This information is subsequently used during the laboratory's corrective action (see section 4.11) and preventive action (see section 4.12) processes and during annual review of the management system (see section 4.15) to establish goals and objectives for improvement.

ENV also promotes a continuous improvement culture based on the principles of lean manufacturing. These principles include 3P (Process, Productivity, Performance) and Kaizen. 3P is a platform used by Pace to share best practices and standardization across the network to achieve operational excellence. Kaizen is a team-based process used to implement tools and philosophies of lean to reduce waste and achieve flow with the purpose of improving both external and internal customer satisfaction.

4.11 Corrective Action

Corrective action is a process used to eliminate the cause of a detected nonconformity. It is not the same as a correction. A correction is an action taken to fix an immediate problem. The goal of the corrective action process is to find the underlying cause(s) of the problem and to put in place fixes to prevent the problem from happening again. The corrective action process, referred to as CAPA by ENV, is one of the most effective tools used by the laboratory to prevent nonconforming work, identify risk and opportunity, and improve service to our customers.

The laboratory has two general processes for corrective action:

The process used for actions taken in response to day to day quality control (QC) and acceptance criteria exceptions (nonconformance) that occur during the day to day testing process are called corrections. These events do not usually include formal methods for cause analysis; instead the reason for the failure is investigated through troubleshooting or other measures. Required actions for correction of routine nonconformance is specified in laboratory SOPs. When corrective action is not taken, cannot be taken, or is not successful, test results associated with the nonconforming work are qualified in the final test report. Documentation of the nonconformance and corrective action taken is documented in the analytical record.

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A 7 stage corrective action process is used when there is a problem or departure from the quality management system, technical activities, or when the extent of a single problem has significant impact on data, regulatory compliance or customer needs. These problems are identified through various activities such as but not limited to: quality control trends, internal and external audits, management review, customer feedback, and general observation.

The laboratory's 7 Stage CAPA Process includes:

1) Identification and Containment
2) Evaluation
3) Investigation
4) Cause Analysis
5) Action Plan
6) Implementation
7) Follow Up and Effectiveness Review

The 7 stage CAPA process may be initiated by any employee. Once the process is initiated it is overseen and coordinated by laboratory management. The CAPA process is documented using a software-based workflow process called Qualtrax. The Qualtrax CAPA record includes tracking information, dates, individuals involved, those responsible for action plan implementation and follow-up, and timelines and due dates.

ENV's procedures for corrective action, are specified in corporate SOP ENV-SOP-CORQ-0018, *Procedure for Corrective and Preventive Action.* Additional explanation about certain aspects of the laboratory's corrective action process are outlined in the next three subsections.

4.11.1 Cause Analysis

Cause analysis is the process of investigation used by the laboratory to identify the underlying cause(s) of the problem. Once causal factors are identified, ways to mitigate the causal factors are reviewed and corrective action(s) most likely to eliminate the problem are selected.

The laboratory uses different methods to conduct this analysis. The most common approach is 5-Why, but fishbone diagrams, or even brainstorming may be appropriate depending on the situation. The method used is documented in the CAPA record.

4.11.2 Effectiveness Review

Monitoring corrective actions for effectiveness is an activity shared by laboratory supervisors and quality assurance personnel. Effectiveness means the actions taken were sustainable and appropriate. Sustainable means the change is still in place. Appropriate means the action(s) taken prevented recurrence of the problem since the time corrective action was taken.

The timeframe in which effectiveness review takes place depends on the event and is recorded in the CAPA record with any addition actions that need to be taken.

Corrective action trends are also monitored by laboratory management and used to identify opportunities for preventive action or to gain lessons learned when actions taken were not adequate to solve the problem. See Section 4.12 (Preventive Action) and 4.15 (Management Review) for more information.

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4.11.3 Additional Audits

When non-conformities or other problems cast doubt on compliance with the laboratory's policies, procedures, or compliance to regulatory requirements; the quality manager schedules a special audit of the area of activity in accordance with Section 4.14.1 as soon as possible. These special audits are used to determine the scope of the problem and to provide information for the CAPA process. Additional full-scale audits are done when a serious issue or risk to the laboratory's business is identified.

4.12 Preventive Action

Preventive action is an action taken to eliminate the cause of a potential nonconformity and to achieve improvement. Preventive action is a forward-thinking process designed to prevent problems opposed to reacting to them (corrective action).

Some examples of preventative action include, but are not limited to:

- Scheduled instrument maintenance (Preventative maintenance)
- Addition of Staff and Equipment
- Professional Development Activities
- Implementation of New Technology

The laboratory looks for opportunities for preventive action from a variety of sources including but not limited to: employee idea's, customer feedback, business partners input, trend analysis, business analytics, management reviews, proficiency testing results, lean management events, and risk-benefit analysis.

Laboratory management evaluates the success of preventive actions taken in any given year during annual management review. See Section 4.15 for more information.

4.12.1 Change Management

Preventive actions may sometimes result in significant changes to processes and procedures used by the laboratory. Laboratory management evaluates the risks and benefits of change and includes in its implementation of change process, actions to minimize or eliminate any risk. The types of changes for which risk are considered and managed include: infrastructure change, change in analytical service offerings, certification or accreditation status, instrumentation, LIMS changes, and changes in key personnel.

4.13 Control of Records

A record is a piece of evidence about the past, especially an account of an act or occurrence kept in writing or some other permanent form. Laboratory records document laboratory activities and provide evidence of conformity to the requirements established in the quality management system. These records may be hardcopy or electronic on any form of media.

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4.13.1 General Requirements

4.13.1.1 Procedure

The requirements for control of records is specified in corporate policy ENV-POL-CORQ-0013 *Record Management*. The procedure used to implement the policy is described in laboratory SOP ENV-SOP-MTJL-0003, *Document Control and Distribution.*

The policy is established to assure quality and technical records are identified, retained, indexed, and filed to allow for retrieval during the entire retention time frame. During storage, records are kept secure and protected from deterioration. At the end of the retention time, the records are disposed of properly in order to maintain client confidentiality and to protect the interests of the company.

In general, laboratory records fall into three categories: quality, technical, and administrative.

Examples of each are provided in the following table:

Record Type	Includes Records of:
Quality	Document Types listed in SOP ENV-SOP-CORQ-0015 Audits: Internal and External Certificates and Scopes of Accreditation Corrective & Preventive Action Management Review Data Investigations Method Validation Instrument Verification Training Records
Technical	Raw Data Logbooks Certificates of Traceability Analytical Record Test Reports & Project Information Technical Training Records & Demonstration of Capability
Administrative	Personnel Records Finance/Business

4.13.1.2 Record Legibility and Storage

Records are designed to be legible and to clearly identify the information recorded. Manual entries are made in indelible ink; automated entries are in a typeface and of sufficient resolution to be read. The records identify laboratory personnel that performed the activity or entered the information. Records are archived and stored in a way that they are retrievable. Access to archived records is controlled and managed.

For records stored electronically, the capability to restore or retrieve the electronic record is maintained for the entire retention period. Hardcopy records are filed and stored in a suitable environment to protect from damage, deterioration, or loss. Hardcopy records may be scanned to PDF for retention. Scanned records must be checked against the hardcopy to verify the scan is complete and legible.

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Administrative records are kept for a minimum of 5 years and technical and quality records are kept for 10 years unless otherwise specified by the client or regulatory program.

The date from which retention time is calculated depends on the record. In general, the retention time of technical records of original observation and measurement is calculated from the date the record is created. If the technical record is kept in a chronological logbook, the date of retention may be calculated from the date the logbook is archived. The retention time of test reports and project records, which are considered technical records, is calculated from the date the test report was issued. The retention time of quality records is usually calculated from the date the record is archived.

Refer to the record management policy and the laboratory SOP for more information.

4.13.1.3 Security

The laboratory is a secure facility and access to records is restricted to laboratory personnel.

4.13.1.4 Electronic Records

The data systems used to store electronic records is backed up in accordance with laboratory SOP ENV-SOP-MTJL-0010, *Protection and Transfer of Laboratory Records*. Access to archived records stored electronically is maintained by personnel responsible for management of the electronic system.

4.13.1.5 Electronic Signature Policy

Work done by ENV locations include activities that require the application of a signature. Some of this work product is in electronic format and signatures are applied electronically.

The Electronic Signatures in Global and National Commerce Act (E-Sign Act) clarifies that electronic signatures are legally valid and enforceable under United States law.

ENV's policy for use and application of electronic signatures is specified in corporate policy ENV-POL-CORQ-0014 *Electronic Signature Policy*.

All employees of ENV, including temporary and contract personnel, must sign an Electronic Signature Agreement to acknowledge that they understand and accept that work activities performed by them may be authenticated with application of an electronic signature and that electronic signature has the same validity as a handwritten signature. Their signed agreement also confirms the individual has read and understands the policy and agrees to abide by the requirements for use of electronic signature stated in the policy.

4.13.2 Technical Records

In addition to the requirements specified in subsections 4.13.1.1 through 4.13.1.5, the requirements in the following subsections also apply to technical records.

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4.13.2.1 Description

Technical records are the accumulation of data and information generated from the analytical process. These records may include forms, worksheets, workbooks, checklists, notes, raw data, calibration records, final test reports, and project record. The accumulated record essentially needs to provide adequate detail to historically reconstruct the process and identify the personnel that performed the tasks associated with a test result.

4.13.2.2 Real Time Recordkeeping

Personnel are instructed and expected to always record observations, data, and calculations at the time they are made. Laboratory managers are responsible to assure that data entries, whether made electronically or on hardcopy, are identifiable to the task.

4.13.2.3 Error Correction

Errors in records must never be erased, deleted or made illegible. Use of correction fluid, such as white-out is prohibited. In hardcopy records, the error is corrected by a single strike through the original entry and the new entry recorded alongside or footnoted to allow for readability. Corrections are initialed and dated by the person making the correction. If the correction is not self-explanatory, a reason for the correction is recorded.

For electronic records, equivalent measures of error correction or traceability of changes made is kept. For example, audit trails provide records of change.

Maintenance of proper practices for error correction is monitored through the tiered data review process described in Section 5.9.3. Laboratory records are reviewed throughout the data review process. Individuals performing these reviews flag errors that are not properly corrected and bring these to the attention of the department manager or supervisor of the work area in which the record was generated so that the problem may be addressed and corrected with the individual(s) that did not make the correction properly.

4.14 Audits

The laboratory performs internal systems and technical audits to assess implementation of the QMS and compliance to this manual and to procedures, such as policy, SOP and SWI. Since the processes in this manual are based on the relevant quality system standards and regulatory and accreditation/certification program requirements the laboratory provides services for, the internal audits also assess on-going compliance to these programs.

The laboratory is also audited by external parties such as regulatory agencies, customers, consultants and non-government assessment bodies (NGAB).

Information from internal and external audits is used by laboratory management to address compliance concerns and opportunities where improvement will increase the reliability of data.

Deficiencies, observations and recommendations from audits are managed by the local QM using the laboratory's formal CAPA process. See Section 4.11 for more information.

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4.14.1 Internal Audit

The laboratory's internal audit program is managed by the local QM in accordance with an audit plan established at the beginning of each calendar year. The schedule is prepared to assure that all areas of the laboratory are reviewed over the course of the year. Conformance to the schedule is reported to both laboratory management and corporate quality personnel in a monthly QA report prepared by the quality manager.

Although the local QM creates the audit schedule, it is the shared responsibility of local management to assure the schedule is maintained. Laboratory supervisors cooperate with the quality personnel to provide the auditors with complete access to the work area, personnel, and records needed.

Internal audits are performed by personnel approved by the quality manager. In general, personnel may not audit their own activities unless it can be demonstrated that an effective and objective audit will be carried out. The auditor must be trained, qualified, and familiar enough with the objectives, principles, and procedures of laboratory operations to be able to perform a thorough and effective evaluation.

The laboratory's internal audit program ensures daily practice is consistent with laboratory's SOPs and to verify SOPs are compliant with policy and procedures. Test reports are audited to verify the final product is consistent with customer/project requirements, the work was carried out in accordance with policy and SOPs, the SOP complies with the cited reference method, test results are accurate, and of known and documented quality and properly qualified, when necessary.

Special audits are performed ad hoc to follow up on a specific issue such as a client complaint, negative feedback, concerns of data integrity or ethics, or a problem identified through other audits. Special audits may be scheduled or unscheduled. Unscheduled internal audits are conducted whenever doubts are cast on the laboratory's compliance with regulatory requirements or its own policies and procedures. These unscheduled internal audits may be conducted at any time and may be performed without an announcement to laboratory personnel.

When observations and findings from any audit (internal or external) cast doubt on the validity of the laboratory's testing results, the laboratory takes immediate action to initiate investigate the problem and take corrective action. (Also see 4.11 and 4.16)

The laboratory's internal audit program and auditing procedures are further described in laboratory SOP ENV-SOP-MTJL-0005, *Internal Audits*.

4.14.1.1 Corporate Compliance Audit

ENV locations are also periodically audited by corporate quality personnel to assess the location's compliance to ENV's quality management program and to evaluate the effectiveness of implementation of the policies and procedures that make up the quality management system. The purpose of the compliance audit is to identify risks and opportunities and to assist laboratory management achieve the goals and objectives of the company's quality program.

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4.15 Management Review

The management team formally reviews the management system of each location under their purview on an annual basis to assess for on-going suitability and effectiveness and to establish goals, objectives, and action plans for the upcoming year.

The process and procedures used to conduct this review are outlined in corporate SOP ENV-SOP-CORQ-0005 *Management Review*.

At a minimum, the following topics are reviewed and discussed:

- The on-going suitability of policies and procedures including EHS and waste management;
- Reports from managerial and supervisory personnel including topics discussed at regular management meetings held throughout the year;
- The outcome of recent internal audits;
- Corrective and preventive actions;
- Assessments by external bodies;
- The results of interlaboratory comparisons or proficiency tests;
- Changes in the volume and type of the work;
- Customer and personnel feedback, including complaints;
- Effectiveness of improvements / preventive actions made since last review;
- Internal and external issues of relevance and risk identification;
- A review of the status of actions from prior management reviews; and
- Other relevant factors, such as quality control activities, resources, and staff training.

The discussion and results of this review are documented in a formal report prepared by laboratory management. This report includes a determination of the effectiveness of the management system and its processes; goals and objectives for improvements in the coming year with timelines and responsibilities, and any other need for change.

Goals and action items from annual management systems review are shared with local employees and with corporate management to highlight focus areas for improvement in addition to areas in which the laboratory has excelled.

4.16 Data Integrity

ENV's procedures for the investigation and response to events that may affect data integrity are described in the corporate SOPs for data inquiries and data recall and corrective and preventive action, however named.

Customers whose data are affected by these events are notified in a timely manner, usually within 30 days after the impact of the problem is understood. Some accreditation programs also require notification to the accreditation body (AB) within a certain timeframe from date of discovery when

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the underlying cause of the issue impacts accreditation. The laboratory follows any program or project specific client notification requirements for notification, when applicable.

5.0 TECHNICAL REQUIREMENTS

5.1 General

Many factors contribute to the correctness and reliability of the technical work performed by the laboratory. These factors fall under these general categories:

- Human Performance
- Facility and Environmental Conditions
- Test Method Performance and Validation
- Measurement Traceability
- Handling of Samples

The impact of each of these factors varies based on the type of work performed. To minimize negative effects from each of these factors, the laboratory accounts for the contribution from each of these categories when developing test method and process (administrative) SOPs, evaluating personnel qualifications and competence, and in the selection of equipment and supplies used.

5.2 Personnel

5.2.1 Personnel Qualifications

The laboratory's program for personnel management is structured to ensure personnel are selected, qualified, and competent to perform the roles and responsibilities of their position based on education, experience, and training.

Qualifications, duties, responsibilities, and authorities of each position are specified in job descriptions maintained by corporate HR (See Section 5.2.4). These job descriptions provide the general basis for the selection of personnel for hire and are used by the laboratory to communicate to personnel the duties, responsibilities, and authorities of their position.

The term "personnel" refers to individuals employed by the laboratory directly as full-time, part-time, or temporary, and individuals employed by the laboratory by contract, such as through an employment agency. The term "personnel" is used interchangeably with the term "employee" throughout this manual. For purposes of this manual, these terms are equivalent.

The personnel management program is structured to establish and maintain records for each of the following:

- Selection of personnel;
- Training of personnel;
- Supervision of personnel;
- Authorization of personnel; and
- Monitoring Competence of personnel.

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5.2.1.1 Competence

Competence is the ability to apply a skill or series of skills to complete a task or series of tasks correctly within defined expectations.

Competence for technical personnel authorized by ENV to provide opinion and interpretation of data to customers also includes the demonstrated ability to:

- Apply knowledge, experience, and skills needed to safely and properly use equipment, instrumentation, and materials required to carry out testing and other work activities in accordance with manufacturer specifications and laboratory SOPs;
- Understand and apply knowledge of general regulatory requirements necessary to achieve regulatory compliance in work product; and
- Understand the significance of departures and deviations from procedure that may occur during the analytical testing process and the capability and initiative to troubleshoot and correct the problem, document the situation and decision-making process, and to properly qualify the data and analytical results.

The laboratory's requirements for the competence of personnel (education, qualification, work experience, technical skills, and responsibilities) are specified in job descriptions created by management and kept by human resources (HR). The job description provides the basis for the selection of personnel for each position.

An employee is considered competent when he/she has completed required training.

The policies and standard operating procedures (SOPs) for the following topics are established by management as minimum required training for all personnel:

- Ethics and Data Integrity
- Quality Manual
- Safety Manual
- Quality Management System
- Technical Process and Procedure relevant to their job tasks
- Successful Demonstration of Capability (DOC) – Analytical Personnel Only

Personnel are initially authorized competent to independently carry out their assigned duties when required training is complete and documented.

Records of required training and qualification provide the record of competence for the individual. Qualification records may include but are not limited to diploma, transcripts, and curriculum vitae (CV).

The on-going competence of each employee is monitored by laboratory management through on-the-job performance. Analytical employees are also required to successfully complete another demonstration of capability for each test method performed on an annual basis.

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5.2.2 Training (Required)

ENV's training requirements are outlined in policies COR-POL-0023 *Mandatory Training Policy,* COR-POL-0004 *Ethics Policy*, and laboratory SOP ENV-SOP-MTJL-0015, *Technical Training and Personnel Qualifications,* ENV-SOP-MTJL-0274, *Technical Training and Personnel Qualifications for Biomonitoring – Aquatic Toxicity, Mold, and Microbiology.*

5.2.2.1 Required Training

The laboratory's training program includes these elements:

- Scheduling of Required Training
- Execution of Required Training
- Documentation and Tracking of Required Training
- Evaluation of Training Effectiveness

Required training is delivered using various methods that incorporate techniques that appeal to the main learning styles: visual, aural, linguistic, and kinesthetic. Techniques include, on-the-job, instructor-led, self-study, eLearning, and blended.

The employee's direct supervisor is responsible for oversight of completion of the employee's required training and for providing adequate time to the employee to complete training assignments. Both the supervisor and employee are responsible to make sure the employee's training status and training records for required training are current and complete.

The status of completion of required training is monitored by the local QM, who provides the status to the GM at least monthly or more frequently, if necessary, to ensure required training for personnel is complete and up to date.

The following subsections describe the elements of ENV's required training program.

5.2.2.1.1 New Hire Training

New hire training requirements apply to new personnel and to existing employees starting in a new position or different work area.

Required new hire training includes each of the following:

- Ethics and Data Integrity (See 5.2.2.1.3)
- Quality Manual / Quality Management System (See 5.2.2.1.4)
- Safety Manual and any training requirements specified in the manual.
- Policies & SOPs relevant to their job tasks
- Technical personnel that test samples must also successfully complete an initial demonstration of capability (IDOC) for the test methods performed before independently testing customer samples. (See 5.2.2.1.5). Independent testing means handling of

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client samples without direct supervision of the work activity by the supervisor or a qualified trainer.

All required training must be current and complete before the employee is authorized to work independently. Until then, the employee's direct supervisor is responsible for review and acceptance of the employee's work product.

5.2.2.1.2 On-Going Training

Personnel receive on-going training in each of the following topics:

- Ethics and Data Integrity (See 5.2.2.1.3)
- Quality Manual / Quality Management System (See 5.2.2.1.4)
- Safety Training
- Changes to Policies & SOPs
- Technical employees that carry out testing must also successfully complete on-going demonstration of capability (CDOC) for all test methods performed on an annual basis. (See 5.2.2.1.5)

Personnel are expected to maintain their DOCs current and complete and to complete training assignments in a timely manner.

5.2.2.1.3 Ethics and Data Integrity Training

Data integrity training is provided to all new personnel and refresher data integrity training is provided to all employees on an annual basis. Personnel are required to acknowledge they 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.

Completion of data integrity training is documented by employee signature to provide evidence that the employee has participated in training on this topic and understand their obligations related to data integrity.

The following topics and activities are covered:

- Policy for honesty and full disclosure in all analytical reporting;
- Prohibited Practices;
- How and when to report data integrity issues;
- Record keeping. The training emphasizes the importance of proper written documentation on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially nonconforming;

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- Training Program, including discussion regarding all data integrity procedures;
- Data integrity training documentation;
- In-depth procedures for data monitoring; and
- Specific examples of breaches of ethical behavior such as improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards.

All PAS personnel, including contract and temporary, are required to sign an "Attestation of Ethics and Confidentiality" at the time of employment and during annual refresher training. This document clearly identifies inappropriate and questionable behavior. Violations of this document result in serious consequences, including prosecution and termination, if necessary.

Also see SOP-ENV-COR-POL-0004 *Ethics Policy* for more information.

5.2.2.1.4 Management System Document Training

The Quality Manual and ENV manuals, policies, and SOPs are the documents used by regulatory bodies and PAS customers to verify the laboratory's capability, competency, and compliance with their requirements and expectations.

In addition to on-the-job training, employees must have a signed Read and Acknowledgement Statement (R&A) on record for the laboratory quality manual, and the policies and SOPs relating to his/her job responsibilities. This statement, whether signed by the employee electronically or by wet signature, confirms that the employee has received, read, and understands the content of the document, that the employee agrees to follow the document when carrying out their work tasks; and the employee understands that unauthorized change to procedures in an SOP is not allowed except in accordance with the SOP departure policy (See 4. 9.1).

See SOP ENV-CORQ-0016 *Standard Operating Procedures and Standard Work Instructions* for more information.

5.2.2.1.5 Demonstration of Capability (DOC)

Demonstration of capability is based on the employee's capability to achieve acceptable precision and accuracy for each analyte reported by the laboratory for the test method using the laboratory's test method SOP.

Technical employees must complete an initial demonstration of capability (IDOC) prior to independent work on client samples analyzed by the test methods they perform. After successful IDOC,

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the employee must demonstrate continued proficiency (CDOC) for the test method on an annual basis. If more than a year has passed since the employee last performed the method; then capability must be re-established with an IDOC.

Records of IDOC and CDOC are kept in the employee's training file.

5.2.2.2 Effectiveness of Training

The results of the performance measures used to identify training needs are the same measures used by the laboratory to measure effectiveness of the training program. Improvement in key performance measures suggest the training program is successful (See 5.2.2.1).

Effectiveness of individual employee training is measured by their demonstrated ability to comprehend the training material and apply knowledge and skills gained to their job task. Measurements include but are not limited to:

- Testing of the employee's knowledge of the quality management system, policies, and technical and administrative procedures through various mechanisms, such as quizzes, observation, and interviews.
- Demonstrated ability to convey information correctly and factually in written and verbal communication to internal and external parties.
- Demonstrated ability to carry out tasks in accordance with SOPs and other work instructions.
- Demonstrated ability to make sound decisions based on guidance and information available.
- Demonstrated initiative to seek help or guidance when the employee is unsure of how to proceed.

5.2.2.3 Supplemental Learning

Supplemental learning objectives are established for newly hired personnel to aid in their development of administrative and technical skills. These learning objectives and materials, referred to as Learning Plans (LP), are created and maintained by ENV's 3P program and managed by the employee's direct supervisor.

In addition to LPs, PAS maintains a wide variety of supplemental learning courses that are made available to all PAS employees for professional development. These learning materials, maintained by PAS's corporate training personnel, are accessed via the company's employee portal, PaceConnect. The learning may be self-initiated based on an employee's interest or may be assigned to the employee at the discretion of management as professional development as part of an employee's annual goals. Supplemental learning courses and learning plan activities are not prerequisites for competency (Section 5.2.1.1) and are not part of the required QMS training specified in Section 5.2.2.1.

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5.2.3 Personnel Supervision

Every employee is assigned a direct supervisor, however named, who is responsible for their supervision. Supervision is the set of activities carried out by the supervisor to oversee the progress and productivity of the employees that report to them.

General supervisory responsibilities may include but are not limited to:

- Hiring Employees
- Training Employees
- Performance Management
- Development, oversight, and execution of personnel training plans
- Monitoring personnel work product to assure the work is carried out in accordance with this quality manual, policies, SOPs, and other documents that support the quality management system.

5.2.4 Job Descriptions

Job Descriptions that define the required education, qualifications, experience, skills, roles and responsibilities, and reporting relationships for each PAS position are established by top management and kept by corporate HR. PAS laboratories use these job descriptions as the source of positions and job titles for the laboratory. The job descriptions apply to employees who are directly employed by PAS, part-time, temporary, technical and administrative and by those that are under contract with PAS through other means.

The job descriptions include the education, expertise, and experience required for the position and the responsibilities and duties, including any supervisory or managerial duties assigned to the position.

5.2.5 Authorization of Technical Personnel

Laboratory management authorizes technical personnel to perform the technical aspects of their position after it has been verified that the employee meets the qualifications for the position, has successfully completed required training (Section 5.2.2.1), and the employee has completed initial demonstrated capability (Section 5.2.2.1.5). After initial authorization, technical personnel are expected to maintain a current and complete training record, demonstrate on-going capability at least annually for each test method performed, and produce reliable results through accurate analysis of certified reference materials, proficiency testing samples, and/or routine quality control samples in order to remain authorized to continue to perform their duties.

Records to support authorization including, education, experience, training, and other evaluations are kept by the laboratory.

5.3 Accommodations and Facilities

5.3.1 Facilities

The laboratory is designed to support the correct performance of procedures and to not adversely affect measurement integrity or safety. Access to the laboratory is controlled by various measures, such as card access, locked doors, main entry. Visitors to the laboratory are

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required to sign-in and to be escorted by laboratory personnel during their visit. A visitor is any person that is not an employee of the laboratory.

5.3.2 Environmental Conditions

The laboratory is equipped with energy sources, lighting, heating, and ventilation necessary to facilitate proper performance of calibrations and tests. The laboratory ensures that housekeeping, electromagnetic interference, humidity, line voltage, temperature, sound and vibration levels are appropriately controlled to ensure the integrity of specific measurement results and to prevent adverse effects on accuracy or increases in the uncertainty of each measurement.

Environmental conditions are monitored, controlled, and recorded as required by the relevant specifications, methods, and procedures. Laboratory operations are stopped if it is discovered that the laboratory's environmental conditions jeopardize the analytical results.

5.3.3 Separation of Incompatible Activities

The layout and infrastructure of each work area including air handling systems, power supplies, and gas supplies of each laboratory work area is specifically designed for the type of analytical activity performed. Effective separation between incompatible work activities is maintained. For example, sample storage, preparation, and chemical handling for volatile organic analysis (VOA) is kept separate from semi-volatile organic (SVOA).

The laboratory separates samples known or suspected to contain high concentration of analytes from other samples to avoid the possibility for cross-contamination. If contamination is found, the source of contamination is investigated and resolved in accordance with laboratory SOPs.

5.3.4 Laboratory Security

Security is maintained by controlled access to the building and by surveillance of work areas by authorized personnel. Access is controlled to each area depending on the required personnel, the sensitivity of the operations performed, and possible safety concerns. The main entrance is kept unlocked during normal business hours for visitors and is continuously monitored by laboratory staff. All visitors must sign a visitor's log, and a staff member must accompany them during the duration of their stay.

5.3.5 Good Housekeeping

The laboratory ensures good housekeeping practices in work areas to maintain a standard of cleanliness necessary for analytical integrity and personnel health and safety. Minimally, these measures include regular cleaning of the work area. Where necessary, areas are periodically monitored to detect and resolve specific contamination and/or possible safety issues.

5.4 Test Methods

5.4.1 General Requirements

The laboratory uses test methods and procedures that are appropriate for the scope of analytical services the laboratory offers.

Instructions on the use and operation of equipment and sample handling, preparation, and analysis of samples are provided in SOPs. The instructions in SOPs may be supplemented

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with other documents including but not limited to, standard work instructions (SWI), manuals, guides, project documents and reference documents.

These documents are managed using the procedures described in SOP ENV-SOP-CORQ-0015 *Document Management and Control* and SOP ENV-SOP-CORQ-0016 *Standard Operating Procedures and Standard Work Instructions.*

5.4.2 Method Selection

The test methods and protocols used by the laboratory are selected to meet the needs of the customer, are appropriate for the item tested and intended use of the data, and to conform with regulatory requirements when regulatory requirements apply.

In general, the test methods offered are industry accepted methods published by international, regional, or national standards. The laboratory bases its procedure on the latest approved edition of a method unless it is not appropriate or possible to do so, or unless regulatory requirements specify otherwise.

The laboratory confirms that it can perform the test method and achieve desired outcome before analyzing samples (see section 5.4.5). If there is a change in the published analytical method, then the confirmation is repeated.

When a customer does not specify the test method(s) to be used, the laboratory may suggest test methods that are appropriate for the intended use of the data and the type of samples to be tested. The laboratory will also inform customers when test methods requested are considered inappropriate for their purpose and/or out of date. This discourse takes place during review of analytical service requests (See Section 4.4).

5.4.3 Laboratory Developed Methods

A laboratory developed method is a method developed from scratch (no published source method), a procedure that modifies the chemistry from the source method, or a procedure that exceeds the scope and application of the source method.

Laboratory developed methods must be validated prior to use (see section 5.4.5) and the procedure documented in a test method SOP.

The requirements for non-standard methods (Section 5.4.4) also apply to laboratory developed methods.

5.4.4 Non-standard Methods

A non-standard method is a method that is not published or approved for use by conventional industry standards for the intended purpose of the data. Non-standard methods must be validated prior to use (see section 5.4.5) and the procedure developed and documented in a test method SOP.

At a minimum, the following information must be included in the procedure:

- Title / Identification of Method;
- Scope and Application;
- Description of the type of item to be analyzed;
- Parameters or quantities and ranges to be determined;

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- Apparatus and equipment, including technical performance requirements;
- Reference standards and reference materials required;
- Environmental conditions required and any stabilization period needed; and
- Description of the procedure, including:
    - Affixing identification marks, handling, transporting, storing and preparing of items;
    - Checks to be made before the work is started;
    - Verifying equipment function and, where required, calibrating and/or adjusting the equipment before each use;
    - Method of recording the observations and results;
    - Any safety measures to be observed;
    - Criteria and/or requirements for approval/rejection;
    - Data to be recorded and method of analysis and presentation; and
    - Uncertainty or procedure for estimating uncertainty.

Use of a non-standard method for testing must be agreed upon with the customer. The agreement, which is retained by the laboratory in the project record, must include the specifications of the client's requirements, the purpose of testing, and their authorization for use of the non-standard method.

5.4.5 Method Validation

5.4.5.1 Validation Description

Validation is the process of conformation and the provision of objective evidence that the stated requirements for a specific method/procedure are fulfilled.

The laboratory's requirements and procedures for method validation are outlined in SOP ENV-SOP-CORQ-0011 *Method Validation and Instrument Verification.*

5.4.5.2 Validation Summary

All test methods offered by the laboratory are validated before use to confirm the procedure works and the data and results achieved meet the goals for the method and repeated when there are major changes to the laboratory procedure.

Results of validation are retained are kept in accordance with method validation SOP and the corporate policy ENV-CORQ-POL-0013 *Record Management.*

5.4.5.3 Validation of Customer Need

The validation process includes review of accuracy, precision, sensitivity, selectivity, linearity, repeatability, reproducibility, robustness, and cross-sensitivity of the procedure against general customer needs to ensure the laboratory's procedure will meet those needs.

The following subsections highlight some of these concepts:

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5.4.5.3.1 Accuracy

Accuracy is the degree to which the result of a measurement, calculation, or specification conforms to the correct value or a standard. When the result recovers within a range from the known value (control limit); the result generated using the laboratory's test method SOP is considered accurate.

5.4.5.3.2 Precision

Precision refers to the closeness of two or more measurements to each other. It is generally measured by calculating the relative percent difference (RPD) or relative standard deviation (RSD) from results of separate analysis of the same sample. Precision provides information about repeatability, reproducibility, and robustness of the laboratory's procedure.

5.4.5.3.3 Limits of Detection (LOD) (Chemistry)

The LOD is the minimum result which can be reliably discriminated from a blank with a predetermined confidence level. The LOD establishes the limit of method sensitivity and is also known as the detection limit (DL) or the method detection limit (MDL).

Values below the LOD cannot be reliably measured and are not reported by the laboratory unless otherwise specified by regulatory program or test method.

The LOD is established during method validation and after major changes to the analytical system or procedure that affect sensitivity are made.

5.4.5.3.4 Limits of Quantitation (LOQ) and Reporting Limit (RL)

The LOQ is the minimum level, concentration, or quantity of a target analyte that can be reported with a specified degree of confidence. The LOQ is established at the same time as the LOD.

The LLOQ is the value of the lowest calibration standard included in the calibration curve. The LLOQ establishes the lower limit of quantitation.

The LOQ and LLOQ represent quantitative sensitivity of the test method.

- The LOQ must always be equal to or greater than the LLOQ and the LLOQ must always be greater than the LOD.
- Any reported value (detect or non-detect) less than the LLOQ is a qualitative value.

The RL is the value to which the presence of a target analyte is reported as detected or not detected. The RL is project-defined based on project data quality objectives (DQO). In the absence of

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project specific requirements, the RL is usually set to the LOQ or the LLOQ.

The laboratory's procedures for LOD/LOQ determination is detailed in laboratory SOP ENV-SOP-MTJL-0016, *Method Detection Limits (MDL, Limits of Detection (LOD) and Limits of Quantitation (LOQ).*

The local SOP is based on guidance provided by corporate quality and must comply with 40CFR 136 Appendix B and the TNI Standard.

5.4.5.3.5 Linearity

Linearity is a mathematical concept applied to calibration models that employ multiple points to establish a calibration range used for quantitative analysis. Linearity is measured differently based on the calibration model. In general, if linearity is demonstrated then the slope of the response of standards are sufficiently close to one another. The accuracy of the linear regression and non-linear curves is verified by checking percent error or relative standard error (RSE), which is the process of refitting calibration data back to the model to determine if the results are accurate. For linear curves that use average calibration or response factor, error is measured by relative standard difference (RSD).

Linearity also establishes the range of quantitation for the test method used which directly impacts the sensitivity of the test method and uncertainty in measurement results. As previously noted, the LLOQ establishes the lower limit of quantitation. Similarly, the upper range of linearity establishes the upper limit of quantitation. In general, results outside of this range are considered qualitative values. However, some inorganic methods allow for extension of the linear range above the upper limit of quantitation when accuracy at this value is verified.

Linearity can also be used to establish repeatability, reproducibility, and robustness of the laboratory's test method. When linearity is demonstrated using a specific calibration model during method validation, then use of this same calibration model to achieve linearity on a day to day basis confirms the laboratory's method is repeatable, reproducible, and robust.

5.4.5.3.6 Demonstration of Capability (DOC)

The DOC performed during method validation confirms that the procedure demonstrated acceptable precision and accuracy. The procedure used for DOC for method validation is the same as described in section 5.2.2.1.5 for demonstration of analyst capability.

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5.4.6 Measurement Uncertainty

The laboratory provides an estimate of uncertainty in testing measurements when required or on client request. In general, the uncertainty of the test method is reflected in the control limits used to evaluate QC performance. (See 5.9.1.1.9). ISO/IEC supports this concept with language that reads when a well-recognized test method specifies limits to the values of the major source of uncertainty of measurement and specifies the form of presentation of calculated results, the laboratory has satisfied the requirements on analytical uncertainty by following the test method and reporting instructions.

When measurement uncertainty cannot be satisfied through control limits, the laboratory will provide a reasonable estimation of uncertainty. A reasonable estimation is based on knowledge of method performance and previous experience. When estimating the analytical uncertainty, all uncertainty components which are of importance in the given situation are taken into account.

5.4.7 Control of Data

The laboratory has policies and processes in place to assure that reported data is free from calculation and transcription errors, that quality control is reviewed and evaluated before data is reported, and to address manual calculation and integration.

5.4.7.1 Calculations, Data Transfer, Reduction and Review

Whenever possible, calculations, transfer of data, and data reduction are performed using validated software programs (See 5.4.7.2).

If manual calculations are performed, the results of these calculations are verified during the data review process outlined in section 5.9.3.

5.4.7.1.1 Manual Integration

The laboratory's policy and procedures for manual integration are provided in corporate SOP ENV-SOP-CORQ-0006 *Manual Integration*.

This SOP includes the conditions under which manual integration is allowed and the requirements for documentation.

Required documentation of manual integration includes:

- complete audit trail to permit reconstruction of before and after results;
- identification of the analyst that performed the integration and the reason the integration was performed; and
- identification of the individual(s) that reviewed the integration and verified the integration was done and documented in compliance with the SOP.

5.4.7.2 Use of Computers and Automated Acquisition

Whenever possible the laboratory uses software and automation for the acquisition, processing, recording, reporting, storage, and/or retrieval of data.

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Software applications developed by PAS are validated by corporate IT for adequacy before release for general use. Commercial off the shelf software is considered sufficiently validated when the laboratory follows the manufacturer or vendor's manual for set-up and use. Records of validation are kept by the corporate information technology (IT) group or by the local laboratory, whichever group performed the validation.

The laboratory's process for the protection of data stored in electronic systems include:

- Individual user names and passwords for Laboratory Information Management Systems (LIMS) and auxiliary systems used to store or process data.
- Employee Training in Computer Security Awareness
- Validation of spreadsheets used for calculations to verify formulas and logic yield correct results and protection of these cells to prevent unauthorized change.
- Operating system and file access safeguards
- Protection from Computer Viruses
- Regular system backup; and testing of retrieved data

The laboratory's process for software development and testing process includes:

- Verification the software application works as expected and is adequate for use and fulfills compliance requirements, such as the need to record date/time of data generation.
- Change control to assure requests for changes are reviewed and approved by management before the change is made.
- Communication channels to assure all staff are aware of changes made.
- Version Control and maintenance of historical records.

These procedures are detailed in laboratory SOPs ENV-SOP-MTJL-0058, *Information Technology Processes*.

5.5 Equipment

5.5.1 Availability of Equipment

The laboratory is furnished with all equipment and instrumentation necessary to correctly perform the tests offered in compliance with the specifications of the test method and to achieve the accuracy and sensitivity required.

5.5.2 Calibration

Equipment and instrumentation are checked prior to use to verify it performs within tolerance for its intended application.

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Laboratory management is made aware of the status of equipment and instrumentation and any needs for either on a daily basis. This information is obtained during laboratory walkthroughs (LDM) that are conducted as part of the laboratory's lean program.

5.5.2.1 Support Equipment

The laboratory confirms support equipment is in proper working order and meets the specifications for general laboratory use prior to placement in service with intermediate checks thereafter. Equipment that does not meet specifications is removed from service until repaired or replaced. Records of repair and maintenance activities are maintained.

Procedures used to carry out and record these checks are outlined laboratory in SOP ENV-SOP-MTJL-0047, *Lockout/Tagout*, SOP ENV-SOP-MTJL-0056, *Instrument Transport*

5.5.2.2 Analytical Instruments

Analytical instruments are checked prior to placement in service in accordance with SOP ENV-SOP-CORQ-0011 *Method Validation and Instrument Verification.* After the initial service date, the calibration of instruments and verification calibration is performed in accordance with local test method SOPs.

The calibration procedures in the test method SOPs comply with the requirements for acceptable calibration practices outlined in corporate policy ENV-POL-CORQ-0005 *Acceptable Calibration Practices*, the reference methods, and any applicable regulatory or program requirements.

5.5.3 Equipment Use and Operation

Equipment is operated and maintained by laboratory personnel that are trained on the test method SOP. Up-to-date instructions and procedures for the use and maintenance of analytical equipment are included in SOPs and/or supplemental documents such as standard work instructions (SWI) or instrument manuals which are made readily accessible in the work area to all laboratory personnel.

5.5.4 Equipment Identification

The laboratory uniquely identifies equipment by serial number or any other unique ID system, when practical. The identifier is included in the equipment list maintained by the quality department.

5.5.5 Equipment Lists and Records

5.5.5.1 Equipment List

The laboratory maintains a master list of equipment that includes information about the equipment including a description, manufacturer, serial number, date placed in service, condition when received, identity, and the current location in the laboratory. The date of purchase is tracked by the procurement record. The equipment list(s) for each location covered by this manual is provided in Appendix E.

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5.5.5.2 Equipment Records

In addition to the equipment list, the laboratory maintains records of equipment that include:

- Verification that equipment conforms with specifications.
- Calibration records including dates, results, acceptance criteria, and next calibration dates.
- Maintenance plan and records
- Records of damage, malfunction, or repair

The laboratory follows an equipment maintenance program designed to optimize performance and to prevent instrument failure which is described in laboratory SOP ENV-SOP-MTJL-0047, *Lockout/Tagout*, SOP ENV-SOP-MTJL-0056, *Instrument Transport.* or in individual test method SOPs.

The maintenance program includes routine maintenance activities which are performed as recommended by the manufacturer at the frequency recommended and non-routine maintenance, which is performed to resolve a specific problem such as degradation of peak resolution, shift in calibration relationship, loss of sensitivity, or repeat failure of instrument performance checks and quality control samples.

Maintenance is performed by laboratory personnel or by outside service providers.

All maintenance activities performed by laboratory personnel are recorded by the individual(s) that performed the activity at the time the maintenance was performed in an instrument maintenance log.

The maintenance record minimally includes the date of maintenance, the initials of the person(s) performing maintenance, a description of the activity performed, why (when the maintenance is non-routine), and the return to analytical control. When maintenance is performed by an external vendor, the laboratory staples the service record into hardcopy maintenance logs or scans the record for easy retrieval. The laboratory provides unrestricted access to instrument maintenance logs in order to promote good instrument maintenance and recordkeeping practices.

If an instrument must be moved, the laboratory will use safe practices for handling and transport to minimize damage and contamination.

5.5.6 Out of Service Protocol

Equipment that has been subjected to overloading, mishandling, gives suspect results, has been shown to be defective, or is performing outside of specified limits is taken out of service and either removed from the work area or labeled to prevent accidental use until it has been repaired and verified to perform correctly.

When analytical equipment is taken out of service, the laboratory examines the potential effect it may have had on previous analytical results to identify any non-conforming work. (See section 4.9).

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5.5.7 Calibration Status

The laboratory labels support equipment to indicate calibration status, whenever practicable or otherwise maintains the calibration status in a visible location in the work area. These procedures are described in laboratory SOP ENV-SOP-MTJL-0047, *Lockout/Tagout*, SOP ENV-SOP-MTJL-0056, *Instrument Transport.*

The calibration status of analytical instruments is documented in the analytical record. Analysts verify on-going acceptability of calibration status prior to use and with instrument performance check standards. These procedures are described in test method SOPs.

5.5.8 Returned Equipment Checks

When equipment or an instrument is sent out of the laboratory for service, the laboratory ensures that the function and calibration status of the equipment is checked and shown to be satisfactory before the equipment is returned to service. These procedures are outlined in SOP ENV-SOP-CORQ-0011 *Method Validation and Instrument Verification.*

5.5.9 Intermediate Equipment Checks

The laboratory performs intermediate checks on equipment to verify the on-going calibration status. For example, most test methods require some form of continuing calibration verification check and these procedures are included in the test method SOP. Periodic checks of support equipment are also performed; see laboratory SOP ENV-SOP-MTJL-0373 *Instrument Maintenance*, and ENV-SOP-CORQ-0003 *General Documentation Requirements.*

5.5.10 Safeguarding Equipment Integrity

The laboratory safeguards equipment integrity using a variety of mechanisms that include but are not limited to:

- Adherence to manufacturer's specification for instrument use so that settings do not exceed manufacturer's recommendation or stress the performance of the equipment.
- Established maintenance programs.
- Transparent maintenance records and unrestricted access to maintenance logs.
- Validation and approval of software before use.
- Audits to confirm instrument settings are consistent with SOPs.
- On-the-job training for safe and proper use of laboratory equipment.

5.6 Measurement Traceability

5.6.1 General

Measurement traceability refers to a property of a measurement result whereby the result can be related to a reference through an unbroken chain of calibration, each contributing to the measurement uncertainty. Traceability requires an established calibration hierarchy of equipment (instruments) used during testing including equipment used for subsidiary measurements. The laboratory assures this equipment is calibrated prior to being put into service and that the reference standard and materials used for calibration are traceable to the international standard of units (SI) or national measurement standard.

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When strict traceability to SI units cannot be made, the laboratory establishes traceability with the use of reference standards and equipment obtained from competent suppliers that provide calibration certificates and/or certificates of analysis (COA).

5.6.2 Equipment Correction Factors

When correction factors are used to adjust results the laboratory will assure that results in computer software are also updated. For example, if the direct instrument or reading output must be corrected based on preparation factor or concentration factors, laboratory management will assure the corrected result is also updated in the software.

5.6.3 Specific Requirements

5.6.3.1 Requirements for Calibration Laboratories

The laboratory does not offer calibration services to customers.

5.6.3.2 Requirements for Testing Laboratories

The laboratory has procedures in place to verify equipment is calibrated prior to being put into service (See 5.5.2) and ensures the reference standard and materials used for calibration are traceable to the international standard of units (SI) or national measurement standard. When strict traceability to SI units cannot be made, the laboratory establishes traceability with the use of reference standards and equipment obtained from competent suppliers that provide calibration certificates and/or certificates of analysis (COA).

5.6.4 Reference Standards and Reference Materials

5.6.4.1 Reference Standards

The laboratory uses reference standards of measurement to verify adequacy of working weights and thermometers. The working weight is the weight(s) used for daily balance calibration checks and the working thermometers are used for temperature measurements on a daily basis.

Intermediate checks of the working reference measurement standards are performed to verify adequacy between calibration from an external calibration laboratory. The measurements from working weights and thermometers are compared to measurements taken by the reference standard which is traceable to SI or a national standard. The reference weights and thermometers are used solely for verification purposes unless the laboratory can prove that daily use does not adversely affect performance of the reference standard.

The laboratory performs intermediate checks of the working weights at least annually.

Working thermometers (glass and digital) are checked against the reference thermometer prior to placement in service to establish a correction factor and then rechecked annually (glass) or quarterly (digital) thereafter.

The calibration of liquid in glass reference thermometers is verified every 5 years and the calibration of digital reference thermometers is verified annually by an ISO/IEC 17025 accredited calibration laboratory or service provider that provides traceability to a national standard.

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The calibration of the reference weight(s) is verified every 5 years by an ISO/IEC 17025 accredited calibration laboratory.

If criteria for the intermediate checks or recertification is not acceptable, the impact on previously reported results is evaluated using the process for evaluation of nonconforming work (See 4.9).

See laboratory SOP ENV-SOP-MTJL-0041, *Standards Logger – Tree Operation* and SOP ENV-SOP-MTJL-0042, *Standards Recertification* for more information about this process.

5.6.4.2 Reference Materials

The laboratory purchases chemical reference materials (also known as stock standards) from vendors that are accredited to ISO 17034 or Guide 34. Purchased reference materials must be received with a Certificate of Analysis (COA) where available. If a reference material cannot be purchased with a COA, it must be verified by analysis and comparison to a certified reference material and/or there must be a demonstration of capability for characterization. COA are reviewed for adequacy and retained by the laboratory for future reference.

All prepared standards, reference materials, and reagents are verified to meet the requirements of the test method through routine analyses of quality control samples.

The laboratory procedure for traceability and use of these materials is provided in laboratory SOP ENV-SOP-MTJL-0041, *Standards Logger – Tree Operation* and SOP ENV-SOP-MTJL-0023, *Storage of Consumables/Supplies*.

This SOP includes each of the following requirements:

- Procedures for documentation of receipt and tracking. The record of entry includes name of the material, the lot number, receipt date, and expiration date.
- Storage conditions and requirements. Reference materials must be stored separately from samples, extracts, and digestates.
- Requirements to assure that preparations of intermediate or working solutions are recorded and assigned a unique identification number for tracking. Records of preparation include the lot number of the stock standard(s) used, the type and lot number of the solvent, the formulation, date, expiration date, and the preparer's initials. The lot number of the working standards is recorded in the analytical record to provide traceability to the standard preparation record. The preparation record provides traceability to the COA, which is traceable to SI or the national measurement standard.
- A requirement that the expiration dates of prepared standards may not exceed the expiration date of the parent standard. Standards, reference materials, and reagents are not used after their expiration dates unless it is not possible to procure a new standard and the reliability of the expired material is verified and documented by the laboratory using a procedure approved by corporate quality personnel. Otherwise, the expired material is promptly removed from the work

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area or clearly labeled as acceptable for qualitative/troubleshooting purposes only.

- The second source materials used for verification of instrument calibration are obtained from a different manufacturer or may be a different lot from the same manufacturer.
- Procedures to check reference materials for degradation and replacement of material if degradation or evaporation is suspected.
- Procedures for labeling. At a minimum the container must identify the material, the ID of the material and the expiration date. Original containers should also be labeled with date opened.

5.6.4.3 Intermediate Checks

Checks to confirm the calibration status of standards and materials are described in laboratory SOPs. These checks include use of second source standards and reference materials reserved only for the purpose of calibration checks.

5.6.4.4 Transport and Storage

The laboratory handles and transports reference standards and materials in a manner that protects the integrity of the materials. Reference standard and material integrity is protected by separation from incompatible materials and/or minimizing exposure to degrading environments or materials. Standards and reference materials are stored separately from samples, extracts, and digestates. All standards are stored according to the manufacturer's recommended conditions. Temperatures colder than the manufacturer's recommendation are acceptable if it does not compromise the integrity of the material (e.g. remains in liquid state and does not freeze solid). In the event a standard is made from more than a single source with different storage conditions, the standard will be stored according to the conditions specified in the analytical method.

See the applicable analytical SOPs for specific reference material storage and transport protocols.

5.7 Sampling

Sampling refers to the field collection of samples and to subsamples taken by the laboratory for analysis from the field collected sample.

Subsampling procedures are included in each test method SOP or a stand-alone SOP to assure the aliquot used for testing is representative of the field collected sample.

The requirements in the following subsections apply when field sampling is performed by the laboratory.

5.7.1 Sampling Plans and SOPs

When the laboratory performs field collection of samples, sampling is carried out in accordance with a written sample plan prepared by the customer or by the laboratory and by relevant sampling SOPs. These documents are made readily accessible at the sampling

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location. Sampling plans and SOPs are, whenever reasonable, based on appropriate governing methods and address the factors to be controlled to ensure the validity of the analytical results.

5.7.2 Customer Requested Deviations

When the customer requires deviations, additions, or exclusions from the documented laboratory sampling plan and/or procedure, the laboratory records the client's change request in detail with the sampling record, communicates the change to sampling personnel, and includes this information in the final test report.

5.7.3 Recordkeeping

The laboratory assures the sampling record includes the sampling procedure used, any deviations from the procedure, the date and time of sampling, the identification of the sampler, environmental conditions (if relevant), and the sampling location.

5.8 Sample Management & Handling

5.8.1 Procedures

The laboratory's procedures for sample management and handling are outlined in laboratory SOP ENV-SOP-MTJL-0045, *Sample Dilution Policy*, ENV-SOP-MTJL-0060, *Sample Receiving,* ENV-SOP-MTJL-0061, *Sample Storage, Disposal and Sample Control Technicians,* ENV-SOP-MTJL-0064, *Sample Shipping*, ENV-SOP-MTJL-0066, *Cold Storage Management*, ENV-SOP-MTJL-0288, *Method 1622/1623 Sample Receiving*, ENV-SOP-MTJL-0342, *Radioactive Sample Receiving, Handling, and Shipping.*

The procedures in these SOPs are established to maintain the safe handling and integrity of samples from transport, storage, to disposal and during all processing steps to maintain client confidentiality, and to protect the interests of PAS and its customers.

5.8.1.1 Chain of Custody

All samples received by the laboratory must be accompanied with a Chain of Custody (COC) record. The COC provides information about the samples collected and submitted for testing and documents the possession of samples from time of collection to receipt by the laboratory.

The COC record must minimally include the following information:

- Client name, address, phone number;
- Project Reference;
- Client Sample Identification (Client ID);
- Date, Time, and Location of Sampling;
- Sampler's Name or Initials;
- Matrix;
- Type of container, and total number collected for each sample;
- Preservatives;
- Analyses Requested;

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- Mode of collection;
- Any special instructions; and
- The date and time and signature of each sample transfer from time of collection to receipt in the laboratory. When the COC is transported inside the cooler, independent couriers do not sign the COC, the shipping manifests and/or air bills are the records of possession during transport. The shipping manifest must be retained as part of the COC record and included in the test report when required (See Section 5.10.3).

A complete and legible COC is required. If the laboratory observes that the COC is incomplete or illegible, the client is contacted for resolution. The COC must be filled out in indelible ink. Personnel correct errors by drawing a single line through the initial entry so the entry is not obscured, entering the correct information, and initialing, and dating the change.

5.8.1.2 Legal Chain of Custody

Legal chain of custody is a chain of custody protocol used for evidentiary or legal purposes. The protocol is followed by the laboratory when requested by customer or where mandated by a regulatory program.

Legal chain of custody (COC) protocol establishes an intact, continuous record of the physical possession*, storage, and disposal of "samples" which includes sample aliquots, and sample extracts/digestates/distillates.

Legal COC records account for all time periods associated with the samples and identifies all individuals who physically handled individual samples. Legal COC begins at the point established by legal authority, which is usually at the time the sample containers are provided by the laboratory for sample collect or when sample collection begins.

*A sample is in someone's custody if:

- It is in one's physical possession;
- It is in one's view after being in one's physical possession;
- It has been in one's physical possession and then locked or sealed so that no one can tamper with it; and/or
- It is kept in a secure area, restricted to authorized personnel only.

Refer to laboratory SOP ENV-SOP-MTJL-0060, *Sample Receiving,* and ENV-SOP-MTJL-0288, *Method 1622/1623 Sample Receiving* for more information.

5.8.2 Unique Identification

Each sample is assigned a unique identification number by the laboratory (Lab ID) after the sample has been checked and accepted by the laboratory in accordance with the laboratory's sample acceptance policy (See 5.8.3). The Lab ID is affixed to the sample container using a durable label.

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The unique identification of samples also applies to subsamples, and prepared samples, such as extracts, digestates, etc.

The lab ID is linked to the field ID (client ID) in the laboratory's record. Both IDs are linked to the testing activities performed on the sample and the documentation records of the test.

Also see 5.8.4.

5.8.3 Sample Receipt Checks and Sample Acceptance Policy

The laboratory checks the condition and integrity of samples on receipt and compares the labels on the sample containers to the COC record. Any problem or discrepancy is recorded. If the problem impacts the suitability of the sample for analysis or if the documentation is incomplete, the client is notified for resolution. Decisions and instructions from the client are maintained in the project record.

5.8.3.1 Sample Receipt Checks

The following checks are performed:

- Verification that the COC is complete and legible.
- Verification that each sample's container label includes the client sample ID, the date and time of collection and the preservative in indelible ink.
- The container type and preservative are appropriate for each test requested.
- Adequate volume is received for each test requested.
- Visual inspection for damage or evidence of tampering.
- Visual inspection for presence of headspace in VOA vials. (VOA = volatile organic analysis).
- Thermal Preservation: Generally, for chemical testing methods for which thermal preservation is required, temperature on receipt is acceptable if the measurement is above freezing but <6°C. The requirements for thermal preservation vary based on test method or by regulatory program. For example, for microbiology, temperature on receipt is acceptable if the measurement is <10°C. Refer to the laboratory's SOP for sample receipt for specific requirements. For samples that are hand-delivered to the laboratory immediately after sample collection, there must be evidence that the chilling process began immediately after sample collection and prior to delivery of the samples to the laboratory or service center, such as arrival of the samples on ice.
- Chemical Preservation
- Holding Time: Sample receiving personnel are trained to recognize tests where the holding time is 48 hours or less and to expedite the log-in of these samples. Except for tests with immediate holding times (15 minutes from time of collection or less), when samples are received out of hold, the laboratory will notify the client and request instruction. If the decision is made to proceed with analysis, the final test report will include notation of this instruction.

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5.8.3.2 Sample Acceptance Policy

The laboratory maintains a sample acceptance policy in accordance with regulatory guidelines to clearly establish the circumstances in which sample receipt is accepted or rejected.

When receipt does not meet criteria for any one of these conditions, the laboratory must document the noncompliance, contact the customer, and either reject the samples or fully document any decisions to proceed with testing. In accordance with regulatory specifications, test results associated with receipt conditions that do not meet criteria are qualified in the final test report.

All samples received must meet each of the following criteria:

- Be listed on a complete and legible COC;
- Be received in properly labeled sample containers;
- Be received in appropriate containers that identify preservative;
- The COC must include the date and time of collection for each sample;
- The COC must include the test method requested for each sample;
- Be in appropriate sample containers with clear documentation of the preservatives used;
- Be received within holding time. Any samples received beyond the holding time will not be processed without prior customer approval;
- Have sufficient sample volume to proceed with the analytical testing. If insufficient sample volume is received, analysis will not proceed without customer approval; and
- Be received within appropriate temperature ranges unless program requirements or customer contractual obligations mandate otherwise. The cooler temperature is recorded directly on the COC.

  Samples that are delivered to the laboratory immediately after collection are considered acceptable if there is evidence that the chilling process has been started. For example, by the arrival of the samples on ice. If samples arrive that are not compliant with these temperature requirements, the customer will be notified. The analysis will NOT proceed unless otherwise directed by the customer. If less than 72 hours remain in the hold time for the analysis, the analysis may be started while the customer is contacted to avoid missing the hold time. Data associated with any deviations from the above sample acceptance policy requirements will be appropriately qualified.

5.8.4 Sample Control and Tracking

The samples are controlled and tracked using the Laboratory Information Management System (LIMS). The LIMS stores information about the samples and project. The process of entering information into the LIMS is called log-in and these procedures are described in

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laboratory SOP ENV-SOP-MTJL-0060, *Sample Receiving, ENV-SOP-MTJL-0288, Method 1622/1623 Sample Receiving,* ENV-SOP-MTJL- 0342, *Radioactive Sample Receiving, Handling, and Shipping*. After log-in, a label is generated and affixed to each sample container. Information on this label, such as the lab ID, links the sample container to the information in LIMS.

At a minimum, the following information is entered during log-in:

- Client Name and Contact Information;
- The laboratory ID linked to the client ID;
- Date and time of sample collection;
- Date and time of sample receipt;
- Matrix; and
- Tests Requested.

5.8.5 Sample Storage, Handling, and Disposal

The laboratory procedures for sample storage, handling and disposal are detailed in laboratory SOPs ENV-SOP-MTJL-0061, *Sample Storage, Disposal and Sample Control Technicians,* ENV-SOP-MTJL-0066, *Cold Storage Management,* ENV-SOP-MTJL-0315, *Sample and Waste Disposal or Return.*

5.8.5.1 Sample Storage

The samples are stored according to method and regulatory requirements as per test method SOPs. Samples are stored away from all standards, reagents, or other potential sources of contamination and stored in a manner that prevents cross contamination. Volatile samples are stored separately from other samples. All sample fractions, extracts, leachates, and other sample preparation products are stored in the same manner as actual samples or as specified by the analytical method.

Refrigerated storage areas are maintained at ≤6°C (but not frozen) and freezer storage areas are maintained at <-10°C, unless otherwise required per method or program. The temperature of each storage area is checked and documented at least once for each day of use. If the temperature falls outside the acceptable limits, then corrective actions are taken and appropriately documented.

The laboratory is operated under controlled access protocols to ensure sample and data integrity. Visitors must register at the front desk and be properly escorted while on-site. Samples are taken to the appropriate storage location immediately after sample receipt and log-in procedures are completed. All sample storage areas have limited access. Samples are removed from storage areas by designated personnel and returned to the storage areas as soon as possible after the required sample quantity has been taken.

5.8.5.2 Sample Retention and Disposal

The procedures used by the laboratory for sample retention and disposal are detailed in laboratory SOP ENV-SOP-MTJL-0061, *Sample Storage, Disposal and Sample Control Technicians,* ENV-SOP-MTJL-0066, *Cold Storage Management,* ENV-SOP-MTJL-0315, *Sample and Waste Disposal or Return.*

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In general, unused sample volume and prepared samples such as extracts, digestates, distillates and leachates (samples) are retained by the laboratory for the timeframe necessary to protect the interests of the laboratory and the customer.

Samples may be stored at ambient temperature when all analyses are complete, the hold time is expired, the report has been delivered, and/or when allowed by the customer or program. Samples requiring storage beyond the minimum sample retention time due to special requests or contractual obligations may be stored at ambient temperature unless the laboratory has a capacity and their presence does not compromise the integrity of other samples.

After this period expires, non-hazardous samples are properly disposed of as non-hazardous waste. The preferred method for disposition of hazardous samples is to return the excess sample to the customer.

5.9 Assuring the Quality of Test Results

5.9.1 Quality Control (QC) Procedures

The laboratory monitors the validity and reliability of test results using quality control (QC) samples that are prepared and analyzed concurrently with field samples in the same manner as field samples. QC results are always associated to and reported with the field samples they were prepared and analyzed with from the same preparation or analytical batch. See the glossary for definition of preparation and analytical batch.

The results of QC performed during the testing process are used by the laboratory to assure the results of analysis are consistent, comparable, accurate, and/or precise within a specified limit. When the results are not within acceptance criteria or expectations for method performance, correction and corrective action(s) are taken. These actions may include retesting or reporting of data with qualification to alert the end user of the situation.

Other QC measures performed include the use of certified reference materials (see 5.6.4), participation in interlaboratory proficiency testing (see 5.9.1.2), verification that formulae used for reduction of data and calculation of results is accurate (see 5.9.3), on-going monitoring of environmental conditions that could impact test results (see 5.3.2), and evaluation and verification of method selectivity and sensitivity (see 5.4.5).

QC results are also used by the laboratory to monitor performance statistical trends over time and to establish acceptance criteria when no method or regulatory criteria exist. (See 5.9.1.1.9)).

5.9.1.1 Essential QC

Although the general principles of QC for the testing process apply to all testing, the QC protocol used for each test depends on the type of test performed.

QC protocol used by the laboratory to monitor the validity of the test are specified in test method SOPs. The SOP includes QC type, frequency, acceptance criteria, corrective actions, and procedures for reporting of nonconforming work.

These requirements in the SOP conform to the reference method and any applicable regulations or certification and accreditation program requirement for which results of the test are used. When a project requires more stringent QC protocol than specified in the SOP, project specification is followed. When the project requires less

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stringent QC protocol, the project specification may be followed as an authorized departure from the SOP when the project specifications meet the requirements in the mandated method and any regulatory compliance requirements for which the data will be used.

The following are examples of essential QC for Chemistry:

5.9.1.1.1 Second Source Standard (ICV/QCS)

The second source standard is a standard obtained from a different vendor than the vendor of the standards used for calibration or it may be from a different lot from the same vendor when there are limited vendors that offer the material. It is a positive control used to verify the accuracy of a new calibration relative to the purity of the standards used for calibration. This check is referred to in test method and quality system standards as the initial calibration verification (ICV) or quality control sample (QCS). The second source standard is analyzed immediately after the calibration and before analysis of any samples. When the ICV is not within acceptance criteria, a problem with the purity or preparation of the standards may be indicated.

5.9.1.1.2 Continuing Calibration Verification (CCV)

CCV results are used to determine if the analytical response has significantly changed since initial calibration. If the response of the CCV is within criteria, the calibration is considered valid. If not, there is a problem that requires further investigation. Actions taken are technology and method specific.

5.9.1.1.3 Method Blank (MB) / Other Blanks

A method blank is a negative control used to assess for contamination during the prep/analysis process. The MB consists of a clean matrix, similar to the associated samples that is known to be free of analytes of interest. The MB, unless otherwise specified by the test method, is processed with and carried through all preparation and analytical steps as the associated samples.

In general, contamination is suspected when the target analyte is detected in the MB above the reporting limit. Some programs may require evaluation of the MB to ½ the reporting limit or the detection limit. When contamination is evident, the source is investigated, and corrections are taken to reduce or eliminate it. Analytical results associated with MB that does not meet criteria are qualified in the final test report.

Other types of blanks that serve as negative controls in the process may include:

- Trip Blanks (VOA)
- Storage Blanks

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- Equipment Blanks
- Field Blanks
- Calibration Blanks
- Cleanup Blanks
- Instrument Blanks

5.9.1.1.4 Laboratory Control Sample (LCS)

The LCS is positive control used to measure the accuracy of process in a blank matrix. The LCS is spiked by the laboratory with a known amount of analyte. The spike is a standard solution that is pre-made or prepared from a certified reference standard. Like the MB, unless otherwise specified in the test method, the LCS is processed with and carried through all preparation and analytical steps as the associated samples.

When the percent recovery (%R) of the LCS is within the established control limit, sufficient accuracy has been achieved. If not, the source of the problem is investigated and corrected, and the procedure may be repeated. Analytical results associated with LCS that does not meet criteria are qualified in the final test report.

5.9.1.1.5 Matrix Spike (MS) and Matrix Spike Duplicate (MSD)

Matrix spikes measure the effect the sample matrix has on precision and accuracy of the determinative test method. The MS and MSD are replicates of a client sample that is spiked with known amount of target analyte.

Due to the heterogeneity of matrices even of the same general matrix type, matrix spike results mostly provide information on the effect of the matrix to the client whose sample was used and on samples of the same matrix from the same sampling site. Therefore, MS should be client-specific when the impact of matrix on accuracy and precision is a project data quality objective. When there is not a client-specified MS for any sample in the batch, the laboratory randomly selects a sample from the batch; the sample selected at random is called a "batch" matrix spike.

The MS/MSD results for percent recovery and relative percent difference are checked against control limits. Because the performance of matrix spikes is matrix-dependent, the result of matrix spikes is not used to determine the acceptability of the test.

5.9.1.1.6 Sample Duplicate (SD)

A sample duplicate is a second replicate of sample that is prepared and analyzed in the laboratory along another replicate. The SD is used to measure precision.

The relative percent difference between replicates are evaluated against the method or laboratory derived criteria for relative percent

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difference (RPD), when this criterion is applicable. If RPD is not met, associated test results are reported with qualification.

5.9.1.1.7 Surrogates

Surrogates are compounds that mimic the chemistry of target analytes but are not expected to occur naturally in real world samples. Surrogates are added to each sample and matrix QC samples (MS, MSD, SD) at known concentration to measure the impact of the matrix on the accuracy of method performance. Surrogates are also added to the positive and negative control samples (MB, LCS) to evaluate performance in a clean matrix, and included in the calibration standards and calibration check standards.

The percent recovery of surrogates is evaluated against method-specified limits or statistically derived in-house limits. Project-specific limits and/or program-specific limits are used when required. Results with surrogate recovery out of limits in samples are reported with qualification. Samples with surrogate failures can also be re-extracted and/or re-analyzed to confirm that the out-of-control value was caused by the matrix of the sample and not by some other systematic error.

5.9.1.1.8 Internal Standards

Internal Standards are compounds not expected to occur naturally in field samples. They are added to every standard and sample at a known concentration prior to analysis for the purpose of adjusting the response factor used in quantifying target analytes. The laboratory follows specific guidelines for the treatment of internal standard recoveries and further information can be found in the applicable laboratory SOP.

5.9.1.1.9 QC Acceptance Criteria and Control Limits

The QC acceptance criteria are specified in test method SOPs. The criteria in the SOP are based on the requirements in the published test method or regulatory program. When there are no established acceptance criteria, the laboratory develops acceptance criteria in accordance with recognized industry standards.

Some methods and programs require the laboratory to establish control limits for LCS, MS/MSD, and surrogate evaluation using historical data. Laboratory developed limits are referred to as "in-house" control limits. In-house control limits represent ± 3 Standard Deviations (99% confidence level) from the average recovery of at least 20 data points generated using the same preparation and analytical procedure in a similar matrix.

See laboratory SOP ENV-SOP-MTJL-0017, *Generation of Control Limits* for more information about the procedures used to establish in-house control limits.

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5.9.1.2 Proficiency Testing (PT)

The laboratory participates in interlaboratory proficiency testing (PT) studies to measure performance of the test method and to identify or solve analytical problems. PT samples measure laboratory performance through the analysis of unknown samples provided by an external source.

The PT samples are obtained from accredited proficiency testing providers (PTP) and handled as field samples which means they are included in the laboratory's normal analytical processes and do not receive extraordinary attention due to their nature.

The laboratory does not share PT samples with other laboratories, does not communicate with other laboratories regarding current PT sample results during the duration of the study, and does not attempt to obtain the assigned value of any PT sample from the PT provider.

The laboratory investigates and implements corrective action whenever PT results are scored unacceptable by the PT provider.

The frequency of PT participation is based on the certification and accreditation requirements held by the laboratory.

5.9.2 QC Corrective Action

When the results of QC are not within acceptance criteria or expectations for method performance, correction and corrective action(s) are taken per the specifications in the test method SOP. These actions may include retesting or reporting of data with qualification to alert the end user of the situation.

5.9.3 Data Review

The laboratory uses a tiered system for data review. The tiered process provides sequential checks to verify data transfer is complete; manual calculations, if performed, are correct, manual integrations are appropriate and documented, calibration and QC requirements are met, appropriate corrective action was taken when required, test results are properly qualified, process and test method SOPs were followed, project specific requirements were met, when applicable, and the test report is complete.

The sequential process includes three tiers referred to as primary review, secondary review, and administrative/completeness review.

Detailed procedures for the data review process are described in laboratory SOP ENV-SOP-MTJL-0038, *Data Review*. The general expectations for the tiered review process are described in the following sections:

5.9.3.1 Primary Review

Primary review is performed by the individual that performed the task. All laboratory personnel are responsible for review of their work product to assure it is complete, accurate, documented, and consistent with policy and SOPs.

Checks performed during primary review include but are not limited to:

- Verification that data transfer and acquisition is complete

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- Manual calculations, if performed, are documented and accurate
- Manual integrations, if performed, are documented and comply with SOP ENV-SOP-CORQ-006 *Manual Integration*
- Calibration and QC criteria were met, and/or proper correction and corrective actions were taken, and data and test results associated with QC and criteria exceptions are properly qualified
- Work is consistent with SOPs and any other relevant instructional document such as SWI, program requirements, or project QAPP

5.9.3.2 Secondary Review

Secondary review is performed by a qualified peer or supervisor. Secondary review is essentially a repeat of the checks performed during primary review by another person. In addition to the checks of primary review, secondary review includes chromatography review to check the accuracy of quantitative analyte identification.

5.9.3.3 Completeness Review

Completeness review is an administrative review performed prior to release of the test report to the customer. Completeness review verifies that the final test report is complete and meets project specification. This review also assures that information necessary for the client's interpretation of results are explained in the case narrative or footnoted in the test report.

5.9.3.4 Data Audits

In addition to the 3-tier data review process, test reports may be audited by local quality personnel to verify compliance with SOPs and to check for data integrity, technical accuracy, and regulatory compliance. These audits are not usually done prior to issuance of the test report to the customer. The reports chosen for the data audits are selected at random.

If any problems with the data or test results are found during the data audit, the impact of the nonconforming work is evaluated using the process described in Section 4.9.

Also see Section 4.14 for internal audits.

5.9.4 Calibration Certificates

The laboratory does not perform calibration activities for its customers and calibration certificates are not offered or issued.

5.9.5 Opinions and Interpretations

The laboratory provides objective data and information to its customers of sufficient detail for their interpretation and decision making. Objective data and information are based solely on fact and does not attempt to explain the meaning (interpret) or offer a view or judgement

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(opinion). Sometimes the customer may request the laboratory provide opinion or interpretation to assist them with their decisions about the data.

When opinions and interpretations are included in the test report, the laboratory will document the basis upon which the opinions and interpretations have been made and clearly identify this content as opinion or interpretation in the test report.

Examples of opinion and interpretation include but are not limited to:

- The laboratory's viewpoint on how a nonconformance impacts the quality of the data or usability of results.
- The laboratory's judgment of fulfillment of contractual requirements.
- Recommendations for how the customer should use the test results and information.
- Suggestions or guidance to the customer for improvement.

When opinions or interpretations are verbally discussed with the customer, the content of these conversations is summarized by the laboratory and kept in the project record.

5.9.6 Subcontractor Reports

When analytical work has been subcontracted to an organization external to PAS, the test report from the subcontractor is included in its entirety as an amendment to the final test report.

Test results performed by multiple locations within the PAS network may be merged into a single test report. The test report issued clearly identifies the location and address of each network location that performed testing, and which tests they performed. (See 5.10.2)

5.9.7 Electronic Transmission of Results

When test results and/or reports are submitted to the customer through electronic transmission, the procedures established in this manual for confidentiality and protection of data apply.

5.9.8 Format of Test Reports

The test formats offered by the laboratory are designed to accommodate each type of analytical test method carried out by the laboratory and to minimize the possibility of misunderstanding or misuse of analytical results. The format of electronic data deliverables (EDD) follow the specifications for the EDD.

5.9.9 Amendments to Test Reports

Test reports that are revised or amended by the laboratory after date of release of the original final test report to the customer are issued as a new test report that is clearly identified as an amendment or revision and that includes a reference to the originally issued final test report.

The customer is the organization doing business with PAS external to PAS.

Changes made to test results and data before the final test report is issued to the customer are not amendments or revisions, these are corrections to errors found during the laboratory's data verification and review process.

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The laboratory's procedure for report amendments and revision are outlined in laboratory SOP ENV-SOP-MTJL-0033, *Report Revision*.

5.10 Reporting

5.10.1 General Requirements

The laboratory reports results of testing in a way that assures the results are clear, and unambiguous. All data and results are reviewed prior to reporting to assure the results reported are accurate and complete.

Test results are summarized in test reports that include all information necessary for the customer's interpretation of the test results. Additional information necessary to clarify the data or disclose nonconformance, exceptions, or deviations that occurred during the analytical process are also reported to the customer in the test report.

The specifications for test reports and EDD are established between the laboratory and the customer at the time the request for analytical services is initiated. The report specifications include the test report format, protocol for the reporting limit (RL), conventions for the reporting of results less than the limit of quantitation (LOQ), and specification for the use of project or program specific data qualifiers. Information about review of analytical service requests is provided in Section 4.4.

5.10.2 Test Reports: Required Items

Test Reports are prepared by the laboratory at the end of the testing process. The format of the report depends on the level of reporting requested by the customer. The laboratory offers a variety of standardized test report formats and can provide custom test report formats, when necessary.

The level of detail required in the test report depends on the customer's needs for data verification, validation, and usability assessments that occur after the laboratory releases the test report to the customer. The test report formats offered by the laboratory provide gradient levels of detail to meet the unique needs of each customer. The laboratory project manager helps the customer select the test report format that best meets their needs. When a specific report format or protocol is required for a regulatory or program compliance, the laboratory project manager must ensure the test report selected meets those requirements.

Every test report issued by the laboratory includes each of the following items:

a) Title

b) Name and phone number of a point of contact from the laboratory issuing the report.

c) Name and address of the laboratory where testing was performed. When testing is done at multiple locations within network (IRWO), the report must clearly identify which network laboratory performed each test and must include the physical address of each laboratory.

d) Unique identification of the test report and an identifier on each page of the report to link each page to the test report and clear identification of the end of the report.

e) The name and address of the customer

f) Identification of test methods used

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g) Cross reference between client sample identification number (Sample ID) and the laboratory's identification number for the sample (Lab ID) to provide unambiguous identification of samples.

h) The date of receipt of samples, condition of samples on receipt, and identification of any instance where receipt of the samples did not meet sample acceptance criteria.

i) Date and times of sample collection, receipt, preparation, and analysis.

j) Test results and units of measurement, and qualification of results associated with QC criteria exceptions, and identification of reported results outside of the calibration range.

k) All chains of custody (COC) including records of internal transfer between locations within the PAS network.

l) Name, title, signature of the person(s) authorizing release of the test report and date of release.

m) A statement that the results in the test report relate only to the items tested.

n) Statement that the test report may not be reproduced except in full without written approval from the laboratory.

5.10.3 Test Reports: Supplemental Items

5.10.3.1 Supplemental Requirements

The following items are included in the test report when required or relevant:

a) Shipping manifests / bill of ladings as applicable when common couriers are utilized for shipment of samples,

b) Explanation of departure from test method SOPs including, what the departure was and why it was necessary.

c) Statistical methods used. (Required for Whole Effluent Toxicity)

d) For solid samples, specification that results are reported on a dry weight or wet weight basis.

e) Signed Affidavit, when required by client or regulatory agency.

f) A statement of compliance / non-compliance with requirements or specifications (client, program, or standard) that includes identification of test results that did not meet acceptance criteria.

g) When requested by the client, statement of estimated measurement uncertainty. In general, for environmental testing, estimated uncertainty of measurement is extrapolated from LCS control limits. Control limits incorporate the expected variation of the data derived from the laboratory's procedure. When the control limits are specified by the test method or regulatory program, the control limits represent the expected variation of the test method and/or matrices for which the test method was designed.

h) Opinions and Interpretations

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i) If a claim of accreditation/certification is included in the test report, identification of any test methods or analytes for which accreditation/certification is not held by the laboratory if the accrediting body offers accreditation/certification for the test method/analyte. The fields of accreditation/certification vary between agencies and it cannot be presumed that because accreditation/certification is not held that it is offered or required.

j) Certification Information, including certificate number and issuing body.

5.10.3.2 Test Reports: Sampling Information

The following items are included in the test report when samples are collected by the laboratory or when this information is necessary for the interpretation of test results:

a) Date of Sampling.

b) Unambiguous identification of material samples.

c) Location of sampling including diagrams, sketches, or photographs.

d) Reference to the sampling plan and procedures used.

e) Details of environmental conditions at time of sample that may impact test results.

f) Any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned.

6.0 REVISION HISTORY

This Version:

Section	Description of Change
All	Removed all mention of satellite locations.
Quality Manual Approval Signatories	Removed personnel no longer required to sign; added additional personnel required to sign.
Equipment List	Added new instruments; removed instruments no longer in use

This document supersedes the following documents:

Document Number	Title	Version
ENV-MAN-CORQ-0001	Quality Manual	00
ENV-MAN-MTJL-0001	Quality Manual	00

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7.0 APPENDICES

7.1 Appendix A: Certification / Accreditation Listing

The certifications / accreditation lists provided in this manual represent those that were held by the named location on the effective date of this manual. This information is subject to change without notice and must not be considered valid proof of certification or accreditation status. Current certificates are maintained by the local QM and a copy of the certificate is posted to ENV eDMS Portal for access by all ENV employees. External parties should contact the laboratory for the most current information.

7.1.1 Mt. Juliet

Authority	ID	Authority	ID
Alabama	40660	North Carolina	Env375
Alaska	UST-080	North Dakota	R-140
Arizona	AZ0612	Ohio EPA/VAP	CL0069
Arkansas	88-0469	Oklahoma	9915
California	2932	Oregon	TN200002
Colorado	None	Pennsylvania	68-02979
Connecticut	PH-0197	Rhode Island	221
Florida	E87487	South Carolina	84004
Georgia DW	923	South Dakota	Pending
Georgia	None	Tennessee DW	2006
Idaho	TN00003	Tennessee DW Micro	2006
Illinois	200008	Texas-Env.	T 104704245-07-TX
Indiana	C-TN-01	Texas-Mold	LAB0152
Iowa	364	Utah	TN000032019-9
Kansas	E-10277	Vermont	VT2006
Kentucky DW	90010	Virginia VELAP	460132
Kentucky UST	16	Washington	C1915
Kentucky WW	90010	West Virginia	233
Louisiana	Agency ID 30792	West Virginia Crypto	9966 M
Louisiana DW	LA150002	Wisconsin	998093910
Maine	TN0002	Wyoming	A2LA
Maryland	324	A2LA	1461.01
Massachusetts	M-TN003	AIHA-LAP	100789
Michigan	9958	DOD	1461.01
Minnesota	047-999-395	EPA	TN00003
Mississippi	None	EPA Region 8	
Missouri	340	USDA	S-67674
Montana	CERT0086		
Nebraska	NA		
Nevada	TN-03-2002-34		
New Hampshire	2975		
New Jersey-NELAP	TN002		
New Mexico	None		
New York	11742		
North Carolina Aquatic Tox.	41		
North Carolina DW	DW21704		

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7.2 Appendix B: Capability Listing

The capabilities listed in this Appendix were held by the location referenced on the effective date of this manual. This information is subject to change without notice. External parties should contact the laboratory for the most current information.

Table Legend:

- Air = Air
- DW = Drinking Water
- NPW = Non-Potable Water
- SCM = Solid and Chemical Materials
- Waste = Non-Aqueous Phase Liquid (NAPL), Oil
- Tissue = Biota and Tissue

7.2.1 Mt. Juliet

Parameter		Method	Matrices							
			Air	DW	NPW	SCM	Waste	Tissue		
1,1,1,2-Tetrachloroethane	EPA 5030				X					
1,1,1,2-Tetrachloroethane	EPA 624.1			X						
1,1,1,2-Tetrachloroethane	EPA 8260B			X	X					
1,1,1,2-Tetrachloroethane	EPA 8260C			X	X					
1,1,1,2-Tetrachloroethane	EPA 8260D			X	X					
1,1,1,2-Tetrachloroethane	SM 6200 B-2011			X						
1,1,1,2-Tetrachloroethane	EPA 524.2		X							
1,1,1-Trichloroethane	EPA 624.1			X						
1,1,1-Trichloroethane	EPA 8260B			X	X					
1,1,1-Trichloroethane	EPA 8260C			X	X					
1,1,1-Trichloroethane	EPA 8260D			X	X					
1,1,1-Trichloroethane	EPA TO-15	X								
1,1,1-Trichloroethane	EPA TO-15 GC/MS SIM	X								
1,1,1-Trichloroethane	SM 6200 B-2011			X						
1,1,1-Trichloroethane	EPA 524.2		X							
1,1,2,2-Tetrachloroethane	EPA 624.1			X						
1,1,2,2-Tetrachloroethane	EPA 8260B			X	X					
1,1,2,2-Tetrachloroethane	EPA 8260C			X	X					
1,1,2,2-Tetrachloroethane	EPA 8260D			X	X					
1,1,2,2-Tetrachloroethane	EPA TO-15	X								

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1,1,2,2-Tetrachloroethane	EPA TO-15 GC/MS SIM	X								
1,1,2,2-Tetrachloroethane	SM 6200 B-2011			X						
1,1,2,2-Tetrachloroethane	EPA 524.2		X							
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 624.1			X						
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260B			X	X					
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260C			X	X					
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260D			X	X					
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA TO-15	X								
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	SM 6200 B-2011			X						
1,1,2-Trichloroethane	EPA 624.1			X						
1,1,2-Trichloroethane	EPA 8260B			X	X					
1,1,2-Trichloroethane	EPA 8260C			X	X					
1,1,2-Trichloroethane	EPA 8260D			X	X					
1,1,2-Trichloroethane	EPA TO-15	X								
1,1,2-Trichloroethane	EPA TO-15 GC/MS SIM	X								
1,1,2-Trichloroethane	SM 6200 B-2011			X						
1,1,2-Trichloroethane	EPA 524.2		X							
1,1'-Biphenyl (BZ-0) (Biphenyl)	EPA 8270C			X	X					
1,1'-Biphenyl (BZ-0) (Biphenyl)	EPA 8270D			X						
1,1-Dichloroethane	EPA 624.1			X						
1,1-Dichloroethane	EPA 8260B			X	X					
1,1-Dichloroethane	EPA 8260C			X	X					
1,1-Dichloroethane	EPA 8260D			X	X					
1,1-Dichloroethane	EPA TO-15	X								
1,1-Dichloroethane	EPA TO-15 GC/MS SIM	X								
1,1-Dichloroethane	SM 6200 B-2011			X						
1,1-Dichloroethane	EPA 524.2		X							
1,1-Dichloroethene	EPA 524.2		X							
1,1-Dichloroethylene	EPA 624.1			X						
1,1-Dichloroethylene	EPA 8260B			X	X					
1,1-Dichloroethylene	EPA 8260C			X	X					
1,1-Dichloroethylene	EPA 8260D			X	X					
1,1-Dichloroethylene	EPA TO-15	X								

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1,1-Dichloroethylene	EPA TO-15 GC/MS SIM	X								
1,1-Dichloroethylene	SM 6200 B-2011			X						
1,1-Dichloropropene	EPA 524.2		X							
1,1-Dichloropropene	EPA 624 (extended)			X						
1,1-Dichloropropene	EPA 624.1			X						
1,1-Dichloropropene	EPA 8260B			X	X					
1,1-Dichloropropene	EPA 8260C			X	X					
1,1-Dichloropropene	EPA 8260D			X	X					
1,1-Dichloropropene	SM 6200 B-2011			X						
1,1-dimethylethyl ester (tert-Butyl Formate)	EPA 8260B			X	X					
1,1-dimethylethyl ester (tert-Butyl Formate)	EPA 8260C			X						
1,1-dimethylethyl ester (tert-Butyl Formate)	EPA 8260D			X						
1,2,3,4-Tetrachlorobenzene	EPA 8270C			X	X					
1,2,3,4-Tetrachlorobenzene	EPA 8270D			X	X					
1,2,3,4-Tetrachlorobenzene	EPA 8270E			X	X					
1,2,3,5-Tetrachlorobenzene	EPA 625.1			X						
1,2,3,5-Tetrachlorobenzene	EPA 8270C			X	X					
1,2,3,5-Tetrachlorobenzene	EPA 8270D			X	X					
1,2,3,5-Tetrachlorobenzene	EPA 8270E			X	X					
1,2,3-Trichlorobenzene	EPA 524.2		X							
1,2,3-Trichlorobenzene	EPA 624 (extended)			X						
1,2,3-Trichlorobenzene	EPA 624.1			X						
1,2,3-Trichlorobenzene	EPA 8260B			X	X					
1,2,3-Trichlorobenzene	EPA 8260C			X	X					
1,2,3-Trichlorobenzene	EPA 8260D			X	X					
1,2,3-Trichlorobenzene	SM 6200 B-2011			X						
1,2,3-Trichloropropane	EPA 504.1		X							
1,2,3-Trichloropropane	EPA 624.1			X						
1,2,3-Trichloropropane	EPA 8260B			X	X					
1,2,3-Trichloropropane	EPA 8260C			X	X					
1,2,3-Trichloropropane	EPA 8260D			X	X					
1,2,3-Trichloropropane	SM 6200 B-2011			X						
1,2,3-Trichloropropane	EPA 524.2		X							

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1,2,3-Trimethylbenzene	EPA 624.1			X						
1,2,3-Trimethylbenzene	EPA 8260B			X	X					
1,2,3-Trimethylbenzene	EPA 8260C			X	X					
1,2,3-Trimethylbenzene	EPA 8260D			X	X					
1,2,3-Trimethylbenzene	EPA TO-15	X								
1,2,4,5-Tetrachlorobenzene	EPA 625.1			X						
1,2,4,5-Tetrachlorobenzene	EPA 8270C			X	X					
1,2,4,5-Tetrachlorobenzene	EPA 8270D			X	X					
1,2,4,5-Tetrachlorobenzene	EPA 8270E			X	X					
1,2,4-Trichlorobenzene	EPA 624.1			X						
1,2,4-Trichlorobenzene	EPA 625.1			X						
1,2,4-Trichlorobenzene	EPA 8260B			X	X					
1,2,4-Trichlorobenzene	EPA 8260C			X	X					
1,2,4-Trichlorobenzene	EPA 8260D			X	X					
1,2,4-Trichlorobenzene	EPA 8270C			X	X					
1,2,4-Trichlorobenzene	EPA 8270D			X	X					
1,2,4-Trichlorobenzene	EPA 8270E			X	X					
1,2,4-Trichlorobenzene	EPA TO-15	X								
1,2,4-Trichlorobenzene	SM 6200 B-2011			X						
1,2,4-Trichlorobenzene	EPA 524.2		X							
1,2,4-Trimethylbenzene	EPA 624.1			X						
1,2,4-Trimethylbenzene	EPA 8260B			X	X					
1,2,4-Trimethylbenzene	EPA 8260C			X	X					
1,2,4-Trimethylbenzene	EPA 8260D			X	X					
1,2,4-Trimethylbenzene	EPA TO-15	X								
1,2,4-Trimethylbenzene	SM 6200 B-2011			X						
1,2,4-Trimethylbenzene	EPA 524.2		X							
1,2-Dibromo-3-chloropropane	EPA 504.1		X							
1,2-Dibromo-3-chloropropane	EPA 524.2		X							
1,2-Dibromo-3-chloropropane (DBCP)	EPA 624.1			X						
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8011			X	X					
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260B			X	X					
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260C			X	X					

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1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260D			X	X					
1,2-Dibromo-3-chloropropane (DBCP)	SM 6200 B-2011			X						
1,2-Dibromoethane	EPA 504.1		X							
1,2-Dibromoethane	EPA 524.2		X							
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 624.1			X						
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8011			X	X					
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260B			X	X					
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260C			X	X					
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260D			X	X					
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-15	X								
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-15 GC/MS SIM	X								
1,2-Dibromoethane (EDB, Ethylene dibromide)	SM 6200 B-2011			X						
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)	EPA TO-15	X								
1,2-Dichlorobenzene	EPA 624.1			X						
1,2-Dichlorobenzene	EPA 625.1			X						
1,2-Dichlorobenzene	EPA 8260B			X	X					
1,2-Dichlorobenzene	EPA 8260C			X	X					
1,2-Dichlorobenzene	EPA 8260D			X	X					
1,2-Dichlorobenzene	EPA 8270C			X	X					
1,2-Dichlorobenzene	EPA 8270D			X	X					
1,2-Dichlorobenzene	EPA 8270E			X	X					
1,2-Dichlorobenzene	EPA TO-15	X								
1,2-Dichlorobenzene	SM 6200 B-2011			X						
1,2-Dichlorobenzene	EPA 524.2		X							
1,2-Dichloroethane	EPA 524.2		X							
1,2-Dichloroethane (Ethylene dichloride)	EPA 624.1			X						
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260B			X	X					
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260C			X	X					
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260D			X	X					
1,2-Dichloroethane (Ethylene dichloride)	EPA TO-15	X								
1,2-Dichloroethane (Ethylene dichloride)	EPA TO-15 GC/MS SIM	X								
1,2-Dichloroethane (Ethylene dichloride)	SM 6200 B-2011			X						
1,2-Dichloropropane	EPA 624.1			X						

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1,2-Dichloropropane	EPA 8260B			X	X					
1,2-Dichloropropane	EPA 8260C			X	X					
1,2-Dichloropropane	EPA 8260D			X	X					
1,2-Dichloropropane	EPA TO-15	X								
1,2-Dichloropropane	EPA TO-15 GC/MS SIM	X								
1,2-Dichloropropane	SM 6200 B-2011			X						
1,2-Dichloropropane	EPA 524.2		X							
1,2-Diphenylhydrazine	EPA 625.1			X						
1,2-Diphenylhydrazine	EPA 8270C			X	X					
1,2-Diphenylhydrazine	EPA 8270D			X	X					
1,2-Diphenylhydrazine	EPA 8270E			X	X					
1,3,5-Trimethylbenzene	EPA 524.2		X							
1,3,5-Trimethylbenzene	EPA 624.1			X						
1,3,5-Trimethylbenzene	EPA 8260B			X	X					
1,3,5-Trimethylbenzene	EPA 8260C			X	X					
1,3,5-Trimethylbenzene	EPA 8260D			X	X					
1,3,5-Trimethylbenzene	EPA TO-15	X								
1,3,5-Trimethylbenzene	SM 6200 B-2011			X						
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 625.1			X						
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270C			X	X					
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270D			X	X					
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270E			X	X					
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8330			X	X					
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8330A			X	X					
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8330B			X	X					
1,3-Butadiene	EPA 624.1			X						
1,3-Butadiene	EPA 8260B			X						
1,3-Butadiene	EPA 8260C			X						
1,3-Butadiene	EPA 8260D			X						
1,3-Butadiene	EPA TO-15	X								
1,3-Dichlorobenzene	EPA 624.1			X						
1,3-Dichlorobenzene	EPA 625.1			X						
1,3-Dichlorobenzene	EPA 8260B			X	X					

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1,3-Dichlorobenzene	EPA 8260C			X	X					
1,3-Dichlorobenzene	EPA 8260D			X	X					
1,3-Dichlorobenzene	EPA 8270C			X	X					
1,3-Dichlorobenzene	EPA 8270D			X	X					
1,3-Dichlorobenzene	EPA 8270E			X	X					
1,3-Dichlorobenzene	EPA TO-15	X								
1,3-Dichlorobenzene	SM 6200 B-2011			X						
1,3-Dichlorobenzene	EPA 524.2		X							
1,3-Dichloropropane	EPA 624 (extended)			X						
1,3-Dichloropropane	EPA 624.1			X						
1,3-Dichloropropane	EPA 8260B			X	X					
1,3-Dichloropropane	EPA 8260C			X	X					
1,3-Dichloropropane	EPA 8260D			X	X					
1,3-Dichloropropane	SM 6200 B-2011			X						
1,3-Dichloropropane	EPA 524.2		X							
1,3-Dichloropropene	EPA 624 (extended)			X						
1,3-Dinitrobenzene (1,3-DNB)	EPA 625.1			X						
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270C			X	X					
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270D			X	X					
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270E			X	X					
1,3-Dinitrobenzene (1,3-DNB)	EPA 8330			X	X					
1,3-Dinitrobenzene (1,3-DNB)	EPA 8330A			X	X					
1,3-Dinitrobenzene (1,3-DNB)	EPA 8330B			X	X					
1,3-Hexachlorobutadiene	EPA 8260B			X						
1,3-Hexachlorobutadiene	EPA 8260C			X						
1,3-Hexachlorobutadiene	EPA 8260D			X						
1,3-Hexachlorobutadiene	EPA 8270D			X						
1,3-Hexachlorobutadiene	EPA 8270E			X						
1,3-Hexachlorobutadiene	EPA TO-15	X								
1,4-Dichlorobenzene	EPA 624.1			X						
1,4-Dichlorobenzene	EPA 625.1			X						
1,4-Dichlorobenzene	EPA 8260B			X	X					
1,4-Dichlorobenzene	EPA 8260C			X	X					

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1,4-Dichlorobenzene	EPA 8260D			X	X					
1,4-Dichlorobenzene	EPA 8270C			X	X					
1,4-Dichlorobenzene	EPA 8270D			X	X					
1,4-Dichlorobenzene	EPA 8270E			X	X					
1,4-Dichlorobenzene	EPA TO-15	X								
1,4-Dichlorobenzene	EPA TO-15 GC/MS SIM	X								
1,4-Dichlorobenzene	SM 6200 B-2011			X						
1,4-Dichlorobenzene	EPA 524.2		X							
1,4-Dinitrobenzene	EPA 625.1			X						
1,4-Dinitrobenzene	EPA 8270C			X	X					
1,4-Dinitrobenzene	EPA 8270D			X	X					
1,4-Dinitrobenzene	EPA 8270E			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 624.1			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 625.1 SIM			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260B			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260B SIM			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260C			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260C SIM			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260D			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260D SIM			X	X					
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8270C			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8270C SIM			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8270D			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8270D SIM			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8270E			X						
1,4-Dioxane (1,4-Diethyleneoxide)	EPA TO-15	X								
1,4-Dioxane (1,4-Diethyleneoxide)	SM 6200 B-2011			X						
1,4-Naphthoquinone	EPA 625.1			X						
1,4-Naphthoquinone	EPA 8270C			X	X					
1,4-Naphthoquinone	EPA 8270D			X	X					
1,4-Naphthoquinone	EPA 8270E			X	X					
1,4-Phenylenediamine	EPA 625.1			X						
1,4-Phenylenediamine	EPA 8270C			X	X					

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1,4-Phenylenediamine	EPA 8270D			X	X					
1,4-Phenylenediamine	EPA 8270E			X	X					
1-Chloronaphthalene	EPA 625.1			X						
1-Chloronaphthalene	EPA 8270C			X	X					
1-Chloronaphthalene	EPA 8270D			X	X					
1-Chloronaphthalene	EPA 8270E			X	X					
1-Methylnaphthalene	EPA 610 (HPLC)			X						
1-Methylnaphthalene	EPA 625.1 SIM			X						
1-Methylnaphthalene	EPA 8260B			X	X					
1-Methylnaphthalene	EPA 8260C			X	X					
1-Methylnaphthalene	EPA 8260D				X					
1-Methylnaphthalene	EPA 8270C			X	X					
1-Methylnaphthalene	EPA 8270C SIM			X	X					
1-Methylnaphthalene	EPA 8270D			X	X					
1-Methylnaphthalene	EPA 8270D SIM			X	X					
1-Methylnaphthalene	EPA 8270E			X	X					
1-Methylnaphthalene	EPA 8270E SIM			X	X					
1-Methylnaphthalene	EPA 8310			X	X					
1-Methylnaphthalene	SM 6200 B-2011			X						
1-Naphthylamine	EPA 625.1			X						
1-Naphthylamine	EPA 8270C			X	X					
1-Naphthylamine	EPA 8270D			X	X					
1-Naphthylamine	EPA 8270E			X	X					
2,2,4-Trimethylpentane (Isooctane)	EPA 624.1			X						
2,2,4-Trimethylpentane (Isooctane)	EPA 8260B			X	X					
2,2,4-Trimethylpentane (Isooctane)	EPA 8260C			X	X					
2,2,4-Trimethylpentane (Isooctane)	EPA 8260D			X	X					
2,2,4-Trimethylpentane (Isooctane)	EPA TO-15	X								
2,2,4-Trimethylpentane (Isooctane)	SM 6200 B-2011			X						
2,2-Dichloropropane	EPA 524.2		X							
2,2-Dichloropropane	EPA 624 (extended)			X						
2,2-Dichloropropane	EPA 624.1			X						
2,2-Dichloropropane	EPA 8260B			X	X					

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2,2-Dichloropropane	EPA 8260C			X	X					
2,2-Dichloropropane	EPA 8260D			X	X					
2,2-Dichloropropane	SM 6200 B-2011			X						
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-	EPA 625.1			X						
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-	EPA 8270C			X	X					
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-	EPA 8270D			X	X					
2,2'-Oxybis(1-chloropropane), bis(2-Chloro-1-	EPA 8270E			X	X					
2,3,4,6-Tetrachlorophenol	EPA 625.1			X						
2,3,4,6-Tetrachlorophenol	EPA 8270C			X	X					
2,3,4,6-Tetrachlorophenol	EPA 8270D			X	X					
2,3,4,6-Tetrachlorophenol	EPA 8270E			X	X					
2,3-Dichloroaniline	EPA 625.1			X						
2,4,5-T	EPA 8151A			X	X					
2,4,5-T	SM 6640 B-2001			X						
2,4,5-T	SM 6640 B-2006			X						
2,4,5-Trichlorophenol	EPA 625.1			X						
2,4,5-Trichlorophenol	EPA 8270C			X	X					
2,4,5-Trichlorophenol	EPA 8270D			X	X					
2,4,5-Trichlorophenol	EPA 8270E			X	X					
2,4,6-Trichlorophenol	EPA 625.1			X						
2,4,6-Trichlorophenol	EPA 8270C			X	X					
2,4,6-Trichlorophenol	EPA 8270D			X	X					
2,4,6-Trichlorophenol	EPA 8270E			X	X					
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330			X	X					
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330A			X	X					
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330B			X	X					
2,4-D	EPA 8151A			X	X					
2,4-D	SM 6640 B-2001			X						
2,4-D	SM 6640 B-2006			X						
2,4-DB	EPA 8151A			X	X					
2,4-Dichlorophenol	EPA 625.1			X						
2,4-Dichlorophenol	EPA 8270C			X	X					
2,4-Dichlorophenol	EPA 8270D			X	X					

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2,4-Dichlorophenol	EPA 8270E			X	X					
2,4-Dimethylphenol	EPA 625.1			X						
2,4-Dimethylphenol	EPA 8270C			X	X					
2,4-Dimethylphenol	EPA 8270D			X	X					
2,4-Dimethylphenol	EPA 8270E			X	X					
2,4-Dinitrophenol	EPA 625.1			X						
2,4-Dinitrophenol	EPA 8270C			X	X					
2,4-Dinitrophenol	EPA 8270D			X	X					
2,4-Dinitrophenol	EPA 8270E			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 625.1			X						
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270C			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270E			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330A			X	X					
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330B			X	X					
2,6-Dichlorophenol	EPA 625.1			X						
2,6-Dichlorophenol	EPA 8270C			X	X					
2,6-Dichlorophenol	EPA 8270D			X	X					
2,6-Dichlorophenol	EPA 8270E			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 625.1			X						
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270C			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270E			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330A			X	X					
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330B			X	X					
2,6-Toluenediisocyanate	EPA 8270C			X						
2,6-Toluenediisocyanate	EPA 8270D			X						
2,6-Toluenediisocyanate	EPA 8270E			X						
2-Acetylaminofluorene	EPA 625.1			X						
2-Acetylaminofluorene	EPA 8270C			X	X					
2-Acetylaminofluorene	EPA 8270D			X	X					

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2-Acetylaminofluorene	EPA 8270E			X	X					
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330			X	X					
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330A			X	X					
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330B			X	X					
2-Butanone (Methyl ethyl ketone, MEK)	EPA 624.1			X						
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260B			X	X					
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260C			X	X					
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260D			X	X					
2-Butanone (Methyl ethyl ketone, MEK)	EPA TO-15	X								
2-Butanone (Methyl ethyl ketone, MEK)	SM 6200 B-2011			X						
2-Chloroethyl vinyl ether	EPA 624.1			X						
2-Chloroethyl vinyl ether	EPA 8260B			X	X					
2-Chloroethyl vinyl ether	EPA 8260C			X	X					
2-Chloroethyl vinyl ether	EPA 8260D			X	X					
2-Chloroethyl vinyl ether	SM 6200 B-2011			X						
2-Chloronaphthalene	EPA 625.1			X						
2-Chloronaphthalene	EPA 8270C			X	X					
2-Chloronaphthalene	EPA 8270C SIM				X					
2-Chloronaphthalene	EPA 8270D			X	X					
2-Chloronaphthalene	EPA 8270D SIM				X					
2-Chloronaphthalene	EPA 8270E			X	X					
2-Chloronaphthalene	EPA 8270E SIM				X					
2-Chlorophenol	EPA 625.1			X						
2-Chlorophenol	EPA 8270C			X	X					
2-Chlorophenol	EPA 8270D			X	X					
2-Chlorophenol	EPA 8270E			X	X					
2-Chlorotoluene	EPA 524.2		X							
2-Chlorotoluene	EPA 624 (extended)			X						
2-Chlorotoluene	EPA 624.1			X						
2-Chlorotoluene	EPA 8260B			X	X					
2-Chlorotoluene	EPA 8260C			X	X					
2-Chlorotoluene	EPA 8260D			X	X					
2-Chlorotoluene	EPA TO-15	X								

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2-Chlorotoluene	SM 6200 B-2011			X						
2-Hexanone	EPA 524.2		X							
2-Hexanone	EPA 624.1			X						
2-Hexanone	EPA 8260B			X	X					
2-Hexanone	EPA 8260C			X	X					
2-Hexanone	EPA 8260D			X	X					
2-Hexanone	EPA TO-15	X								
2-Hexanone	SM 6200 B-2011			X						
2-methyl-2-butanol (tert-Amyl alcohol)	EPA 624.1			X						
2-methyl-2-butanol (tert-Amyl alcohol)	EPA 8260B			X	X					
2-methyl-2-butanol (tert-Amyl alcohol)	EPA 8260C			X	X					
2-methyl-2-butanol (tert-Amyl alcohol)	EPA 8260D			X	X					
2-methyl-2-butanol (tert-Amyl alcohol)	SM 6200 B-2011			X						
2-Methyl-2-pentanol	EPA 8260B			X	X					
2-Methyl-2-pentanol	EPA 8260C			X	X					
2-Methyl-2-pentanol	EPA 8260D				X					
2-methyl-2-pentanol (ethyl tert-butyl alcohol)	EPA 8260B			X	X					
2-methyl-2-pentanol (ethyl tert-butyl alcohol)	EPA 8260D			X						
2-methyl-2-pentanol (ethyl tert-butyl alcohol)	SM 6200 B-2011			X						
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	EPA 625.1			X						
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	EPA 8270C			X	X					
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	EPA 8270D			X	X					
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	EPA 8270E			X	X					
2-Methylaniline (o-Toluidine)	EPA 625.1			X						
2-Methylaniline (o-Toluidine)	EPA 8270C			X	X					
2-Methylaniline (o-Toluidine)	EPA 8270D			X	X					
2-Methylaniline (o-Toluidine)	EPA 8270E			X	X					
2-Methylnaphthalene	EPA 610 (HPLC)			X						
2-Methylnaphthalene	EPA 625.1			X						
2-Methylnaphthalene	EPA 625.1 SIM			X						
2-Methylnaphthalene	EPA 8260B			X	X					
2-Methylnaphthalene	EPA 8260C			X	X					
2-Methylnaphthalene	EPA 8260D			X	X					

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2-Methylnaphthalene	EPA 8270C			X	X					
2-Methylnaphthalene	EPA 8270C SIM			X	X					
2-Methylnaphthalene	EPA 8270D			X	X					
2-Methylnaphthalene	EPA 8270D SIM			X	X					
2-Methylnaphthalene	EPA 8270E			X	X					
2-Methylnaphthalene	EPA 8270E SIM			X	X					
2-Methylnaphthalene	EPA 8310			X	X					
2-Methylnaphthalene	EPA TO-15	X								
2-Methylnaphthalene	MADEP EPH			X	X					
2-Methylnaphthalene	SM 6200 B-2011			X						
2-Methylphenol (o-Cresol)	EPA 625.1			X						
2-Methylphenol (o-Cresol)	EPA 8270C			X	X					
2-Methylphenol (o-Cresol)	EPA 8270D			X	X					
2-Methylphenol (o-Cresol)	EPA 8270E			X	X					
2-Naphthylamine	EPA 625.1			X						
2-Naphthylamine	EPA 8270C			X	X					
2-Naphthylamine	EPA 8270D			X	X					
2-Naphthylamine	EPA 8270E			X	X					
2-Nitroaniline	EPA 625.1			X						
2-Nitroaniline	EPA 8270C			X	X					
2-Nitroaniline	EPA 8270D			X	X					
2-Nitroaniline	EPA 8270E			X	X					
2-Nitrodiphenylamine	EPA 8270C			X	X					
2-Nitrodiphenylamine	EPA 8270D			X	X					
2-Nitrodiphenylamine	EPA 8270E			X	X					
2-Nitroguanidine (Nitroguanidine)	EPA 8330A (extended)			X	X					
2-Nitroguanidine (Nitroguanidine)	EPA 8330B (extended)			X	X					
2-Nitrophenol	EPA 625.1			X						
2-Nitrophenol	EPA 8270C			X	X					
2-Nitrophenol	EPA 8270D			X	X					
2-Nitrophenol	EPA 8270E			X	X					
2-Nitropropane	EPA 624.1			X						
2-Nitropropane	EPA 8260B			X	X					

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2-Nitropropane	EPA 8260C			X	X					
2-Nitropropane	EPA 8260D			X	X					
2-Nitropropane	SM 6200 B-2011			X						
2-Nitrotoluene	EPA 8330			X	X					
2-Nitrotoluene	EPA 8330A			X	X					
2-Nitrotoluene	EPA 8330B			X	X					
2-Picoline (2-Methylpyridine)	EPA 625.1			X						
2-Picoline (2-Methylpyridine)	EPA 8270C			X	X					
2-Picoline (2-Methylpyridine)	EPA 8270D			X	X					
2-Picoline (2-Methylpyridine)	EPA 8270E			X	X					
2-Sec-butyl-4,6-dinitrophenol (DNBP, Dinoseb)	EPA 8151A			X						
3,3'-Dichlorobenzidine	EPA 625.1			X						
3,3'-Dichlorobenzidine	EPA 8270C			X	X					
3,3'-Dichlorobenzidine	EPA 8270D			X	X					
3,3'-Dichlorobenzidine	EPA 8270E			X	X					
3,3-dimethyl-1-butanol	EPA 624.1			X						
3,3-dimethyl-1-butanol	EPA 8260B			X	X					
3,3-dimethyl-1-butanol	EPA 8260C			X	X					
3,3-dimethyl-1-butanol	EPA 8260D			X	X					
3,3-dimethyl-1-butanol	SM 6200 B-2011			X						
3,3'-Dimethylbenzidine	EPA 625.1			X						
3,3'-Dimethylbenzidine	EPA 8270C			X	X					
3,3'-Dimethylbenzidine	EPA 8270D			X	X					
3,3'-Dimethylbenzidine	EPA 8270E			X	X					
3+4 Methylphenol	EPA 625.1			X						
3+4 Methylphenol	EPA 8270C			X	X					
3+4 Methylphenol	EPA 8270D			X	X					
3+4 Methylphenol	EPA 8270E				X					
3-Methylcholanthrene	EPA 625.1			X						
3-Methylcholanthrene	EPA 8270C			X	X					
3-Methylcholanthrene	EPA 8270D			X	X					
3-Methylcholanthrene	EPA 8270E			X	X					
3-Methylphenol (m-Cresol)	EPA 625.1			X						

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3-Nitroaniline	EPA 625.1			X						
3-Nitroaniline	EPA 8270C			X	X					
3-Nitroaniline	EPA 8270D			X	X					
3-Nitroaniline	EPA 8270E			X	X					
3-Nitrotoluene	EPA 8330			X	X					
3-Nitrotoluene	EPA 8330A			X	X					
3-Nitrotoluene	EPA 8330B			X	X					
4,4'-DDD	EPA 608.3			X						
4,4'-DDD	EPA 8081A			X	X					
4,4'-DDD	EPA 8081B			X	X					
4,4'-DDE	EPA 608.3			X						
4,4'-DDE	EPA 8081A			X	X					
4,4'-DDE	EPA 8081B			X	X					
4,4'-DDT	EPA 608.3			X						
4,4'-DDT	EPA 8081A			X	X					
4,4'-DDT	EPA 8081B			X	X					
4,4'-Methylenebis(2-chloroaniline)	EPA 8270C			X	X					
4,4'-Methylenebis(2-chloroaniline)	EPA 8270D			X	X					
4,4'-Methylenebis(2-chloroaniline)	EPA 8270E				X					
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330			X	X					
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330A			X	X					
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330B			X	X					
4-Aminobiphenyl	EPA 625.1			X						
4-Aminobiphenyl	EPA 8270C			X	X					
4-Aminobiphenyl	EPA 8270D			X	X					
4-Aminobiphenyl	EPA 8270E			X	X					
4-Bromophenyl phenyl ether	EPA 625.1			X						
4-Bromophenyl phenyl ether	EPA 625.1 SIM			X						
4-Bromophenyl phenyl ether	EPA 8270C			X	X					
4-Bromophenyl phenyl ether	EPA 8270D			X	X					
4-Bromophenyl phenyl ether	EPA 8270E			X	X					
4-Chloro-3-methylphenol	EPA 625.1			X						
4-Chloro-3-methylphenol	EPA 8270C			X	X					

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4-Chloro-3-methylphenol	EPA 8270D			X	X					
4-Chloro-3-methylphenol	EPA 8270E			X	X					
4-Chloroaniline	EPA 625.1			X						
4-Chloroaniline	EPA 8270C			X	X					
4-Chloroaniline	EPA 8270D			X	X					
4-Chloroaniline	EPA 8270E			X	X					
4-Chlorophenyl phenylether	EPA 625.1			X						
4-Chlorophenyl phenylether	EPA 8270C			X	X					
4-Chlorophenyl phenylether	EPA 8270D			X	X					
4-Chlorophenyl phenylether	EPA 8270E			X	X					
4-Chlorotoluene	EPA 524.2		X							
4-Chlorotoluene	EPA 624 (extended)			X						
4-Chlorotoluene	EPA 624.1			X						
4-Chlorotoluene	EPA 8260B			X	X					
4-Chlorotoluene	EPA 8260C			X	X					
4-Chlorotoluene	EPA 8260D			X	X					
4-Chlorotoluene	SM 6200 B-2011			X						
4-Dimethyl aminoazobenzene	EPA 8270C				X					
4-Dimethyl aminoazobenzene	EPA 8270D				X					
4-Dimethyl aminoazobenzene	EPA 8270E				X					
4-Ethyltoluene	EPA 8260B			X						
4-Ethyltoluene	EPA TO-15	X								
4-Isopropyltoluene	EPA 524.2		X							
4-Isopropyltoluene (p-Cymene)	EPA 624 (extended)			X						
4-Isopropyltoluene (p-Cymene)	EPA 624.1			X						
4-Isopropyltoluene (p-Cymene)	EPA 8260B			X	X					
4-Isopropyltoluene (p-Cymene)	EPA 8260C			X	X					
4-Isopropyltoluene (p-Cymene)	EPA 8260D			X	X					
4-Isopropyltoluene (p-Cymene)	SM 6200 B-2011			X						
4-Methyl-2-pentanone (MIBK)	EPA 624.1			X						
4-Methyl-2-pentanone (MIBK)	EPA 8260B			X	X					
4-Methyl-2-pentanone (MIBK)	EPA 8260C			X	X					
4-Methyl-2-pentanone (MIBK)	EPA 8260D			X	X					

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4-Methyl-2-pentanone (MIBK)	EPA TO-15	X								
4-Methyl-2-pentanone (MIBK)	SM 6200 B-2011			X						
4-Methylphenol (p-Cresol)	EPA 625.1			X						
4-Methylphenol (p-Cresol)	EPA 8270C			X	X					
4-Methylphenol (p-Cresol)	EPA 8270D			X	X					
4-Methylphenol (p-Cresol)	EPA 8270E			X	X					
4-Nitroaniline	EPA 625.1			X						
4-Nitroaniline	EPA 8270C			X	X					
4-Nitroaniline	EPA 8270D			X	X					
4-Nitroaniline	EPA 8270E			X	X					
4-Nitrophenol	EPA 625.1			X						
4-Nitrophenol	EPA 8270C			X	X					
4-Nitrophenol	EPA 8270D			X	X					
4-Nitrophenol	EPA 8270E			X	X					
4-Nitroquinoline 1-oxide	EPA 625.1			X						
4-Nitroquinoline 1-oxide	EPA 8270C			X	X					
4-Nitroquinoline 1-oxide	EPA 8270D			X	X					
4-Nitroquinoline 1-oxide	EPA 8270E			X	X					
4-Nitrotoluene	EPA 8330			X	X					
4-Nitrotoluene	EPA 8330A			X	X					
4-Nitrotoluene	EPA 8330B			X	X					
5-Nitro-o-toluidine	EPA 625.1			X						
5-Nitro-o-toluidine	EPA 8270C			X	X					
5-Nitro-o-toluidine	EPA 8270D			X	X					
5-Nitro-o-toluidine	EPA 8270E			X	X					
7,12-Dimethylbenz(a) anthracene	EPA 625.1			X						
7,12-Dimethylbenz(a) anthracene	EPA 8270C			X	X					
7,12-Dimethylbenz(a) anthracene	EPA 8270D			X	X					
7,12-Dimethylbenz(a) anthracene	EPA 8270E			X	X					
7h-Dibenzo(c,g) carbazole	EPA 8270C			X	X					
7h-Dibenzo(c,g) carbazole	EPA 8270D			X	X					
7h-Dibenzo(c,g) carbazole	EPA 8270E			X	X					
96-hour LC50	EPA 2000			X						

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a-a-Dimethylphenethylamine	EPA 625.1			X						
a-a-Dimethylphenethylamine	EPA 8270C			X	X					
a-a-Dimethylphenethylamine	EPA 8270D			X	X					
a-a-Dimethylphenethylamine	EPA 8270E			X	X					
Acenaphthene	EPA 610 (HPLC)			X						
Acenaphthene	EPA 625.1			X						
Acenaphthene	EPA 625.1 SIM			X						
Acenaphthene	EPA 8270C			X	X					
Acenaphthene	EPA 8270C SIM			X	X					
Acenaphthene	EPA 8270D			X	X					
Acenaphthene	EPA 8270D SIM			X	X					
Acenaphthene	EPA 8270E			X	X					
Acenaphthene	EPA 8270E SIM			X	X					
Acenaphthene	EPA 8310			X	X					
Acenaphthene	MADEP EPH			X	X					
Acenaphthylene	EPA 610 (HPLC)			X						
Acenaphthylene	EPA 625.1			X						
Acenaphthylene	EPA 625.1 SIM			X						
Acenaphthylene	EPA 8270C			X	X					
Acenaphthylene	EPA 8270C SIM			X	X					
Acenaphthylene	EPA 8270D			X	X					
Acenaphthylene	EPA 8270D SIM			X	X					
Acenaphthylene	EPA 8270E			X	X					
Acenaphthylene	EPA 8270E SIM			X	X					
Acenaphthylene	EPA 8310			X	X					
Acenaphthylene	MADEP EPH			X	X					
Acetaldehyde	EPA TO-15	X								
Acetone	EPA 624.1			X						
Acetone	EPA 8260B			X	X					
Acetone	EPA 8260C			X	X					
Acetone	EPA 8260D			X	X					
Acetone	EPA TO-15	X								
Acetone	SM 6200 B-2011			X						

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Acetone	EPA 524.2		X							
Acetonitrile	EPA 624.1			X						
Acetonitrile	EPA 8260B			X	X					
Acetonitrile	EPA 8260C			X	X					
Acetonitrile	EPA 8260D			X	X					
Acetonitrile	EPA TO-15	X								
Acetonitrile	SM 6200 B-2011			X						
Acetophenone	EPA 625.1			X						
Acetophenone	EPA 8270C			X	X					
Acetophenone	EPA 8270D			X	X					
Acetophenone	EPA 8270E			X	X					
Acetylene	EPA RSK-175 (GC/FID)	X		X						
Acid Digestion of Aqueous samples and Extracts for Total	EPA 3010A			X						
Acid Digestion of Oils for Metals Analysis or ICP	EPA 3031				X					
Acid Digestion of Sediments, Sludges, and soils	EPA 3050B				X					
Acid Digestion of waters for Total Recoverable or Dissolved	EPA 3005A			X						
Acidity, as CaCO3	SM 2310 B-2011			X						
Acrolein (Propenal)	EPA 624.1			X						
Acrolein (Propenal)	EPA 8260B			X	X					
Acrolein (Propenal)	EPA 8260C			X	X					
Acrolein (Propenal)	EPA 8260D			X	X					
Acrolein (Propenal)	EPA TO-15	X								
Acrolein (Propenal)	SM 6200 B-2011			X						
Acrylonitrile	EPA 624.1			X						
Acrylonitrile	EPA 8260B			X	X					
Acrylonitrile	EPA 8260C			X	X					
Acrylonitrile	EPA 8260D			X	X					
Acrylonitrile	EPA TO-15	X								
Acrylonitrile	SM 6200 B-2011			X						
Acute toxicity	EPA 2002 Ceriodaphnia dubia			X						
Alachlor	EPA 507		X	X						
Aldrin	EPA 608.3			X						
Aldrin	EPA 8081A			X	X					

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Aldrin	EPA 8081B			X	X					
Alkalinity as CaCO3	EPA 310.2			X						
Alkalinity as CaCO3	SM 2320 B-2011		X	X						
Allyl chloride (3-Chloropropene)	EPA 624.1			X						
Allyl chloride (3-Chloropropene)	EPA 8260B			X	X					
Allyl chloride (3-Chloropropene)	EPA 8260C			X	X					
Allyl chloride (3-Chloropropene)	EPA 8260D			X	X					
Allyl chloride (3-Chloropropene)	EPA TO-15	X								
Allyl chloride (3-Chloropropene)	SM 6200 B-2011			X						
Alpha Emitting Radium Isotopes	EPA 9315			X	X					
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608.3			X						
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081A			X	X					
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081B			X	X					
alpha-Chlordane	EPA 608.3			X						
alpha-Chlordane	EPA 8081A			X	X					
alpha-Chlordane	EPA 8081B			X	X					
alpha-Terpineol	EPA 625.1			X						
alpha-Terpineol	EPA 8270C			X	X					
alpha-Terpineol	EPA 8270D			X	X					
alpha-Terpineol	EPA 8270E				X					
Alumina Clean-Up	EPA 3610B				X					
Alumina Clean-Up	EPA 3611B				X					
Aluminum	EPA 200.7		X	X						
Aluminum	EPA 200.8		X	X						
Aluminum	EPA 6010B			X	X					
Aluminum	EPA 6010C			X	X					
Aluminum	EPA 6010D			X	X					
Aluminum	EPA 6020			X	X					
Aluminum	EPA 6020A			X	X					
Aluminum	EPA 6020B			X	X					
Amenable cyanide	EPA 9010B				X					
Amenable cyanide	EPA 9010C			X	X					
Amenable cyanide	EPA 9012B			X	X					

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Amenable cyanide	EPA 9014			X	X					
Amenable cyanide	SM 4500-CN⁻ B-2011			X						
Amenable cyanide	SM 4500-CN⁻ G-2011			X						
Americium-241	EPA 907 Modified (ENV-SOP-MTJL-	X		X	X		X			
Ammonia	SM 4500-NH3 B-2011			X						
Ammonia as N	EPA 350.1		X	X	X					
Ammonia as N	SM 4500-NH3 B-2011			X						
Ammonia as N	SM 4500-NH3 G-2011			X						
Aniline	EPA 625.1			X						
Aniline	EPA 8270C			X	X					
Aniline	EPA 8270D			X	X					
Aniline	EPA 8270E			X	X					
Anthracene	EPA 610 (HPLC)			X						
Anthracene	EPA 625.1			X						
Anthracene	EPA 625.1 SIM			X						
Anthracene	EPA 8270C			X	X					
Anthracene	EPA 8270C SIM			X	X					
Anthracene	EPA 8270D			X	X					
Anthracene	EPA 8270D SIM			X	X					
Anthracene	EPA 8270E			X	X					
Anthracene	EPA 8270E SIM			X	X					
Anthracene	EPA 8310			X	X					
Anthracene	MADEP EPH			X	X					
Antimony	EPA 200.7		X	X						
Antimony	EPA 200.8		X	X						
Antimony	EPA 6010B			X	X					
Antimony	EPA 6010C			X	X					
Antimony	EPA 6010D			X	X					
Antimony	EPA 6020			X	X					
Antimony	EPA 6020A			X	X					
Antimony	EPA 6020B			X	X					
Aramite	EPA 625.1			X						
Aramite	EPA 8270C			X	X					

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Aramite	EPA 8270D			X	X					
Aramite	EPA 8270E			X	X					
Aroclor-1016 (PCB-1016)	EPA 600/4-81-045			X						
Aroclor-1016 (PCB-1016)	EPA 608.3			X						
Aroclor-1016 (PCB-1016)	EPA 8082			X	X					
Aroclor-1016 (PCB-1016)	EPA 8082A			X	X					
Aroclor-1016 (PCB-1016) in Oil	EPA 8082A				X					
Aroclor-1221 (PCB-1221)	EPA 600/4-81-045			X						
Aroclor-1221 (PCB-1221)	EPA 608.3			X						
Aroclor-1221 (PCB-1221)	EPA 8082			X	X					
Aroclor-1221 (PCB-1221)	EPA 8082A			X	X					
Aroclor-1221 (PCB-1221) in Oil	EPA 8082A				X					
Aroclor-1232 (PCB-1232)	EPA 600/4-81-045			X						
Aroclor-1232 (PCB-1232)	EPA 608.3			X						
Aroclor-1232 (PCB-1232)	EPA 8082			X	X					
Aroclor-1232 (PCB-1232)	EPA 8082A			X	X					
Aroclor-1232 (PCB-1232) in Oil	EPA 8082A				X					
Aroclor-1242 (PCB-1242)	EPA 600/4-81-045			X						
Aroclor-1242 (PCB-1242)	EPA 608.3			X						
Aroclor-1242 (PCB-1242)	EPA 8082			X	X					
Aroclor-1242 (PCB-1242)	EPA 8082A			X	X					
Aroclor-1242 (PCB-1242) in Oil	EPA 8082A				X					
Aroclor-1248 (PCB-1248)	EPA 600/4-81-045			X						
Aroclor-1248 (PCB-1248)	EPA 608.3			X						
Aroclor-1248 (PCB-1248)	EPA 8082			X	X					
Aroclor-1248 (PCB-1248)	EPA 8082A			X	X					
Aroclor-1248 (PCB-1248) in Oil	EPA 8082A				X					
Aroclor-1254 (PCB-1254)	EPA 600/4-81-045			X						
Aroclor-1254 (PCB-1254)	EPA 608.3			X						
Aroclor-1254 (PCB-1254)	EPA 8082			X	X					
Aroclor-1254 (PCB-1254)	EPA 8082A			X	X					
Aroclor-1254 (PCB-1254) in Oil	EPA 8082A				X					
Aroclor-1260 (PCB-1260)	EPA 600/4-81-045			X						

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Aroclor-1260 (PCB-1260)	EPA 608.3			X						
Aroclor-1260 (PCB-1260)	EPA 8082			X	X					
Aroclor-1260 (PCB-1260)	EPA 8082A			X	X					
Aroclor-1260 (PCB-1260) in Oil	EPA 8082A				X					
Aroclor-1262 (PCB-1262)	EPA 600/4-81-045			X						
Aroclor-1262 (PCB-1262)	EPA 8082			X	X					
Aroclor-1262 (PCB-1262)	EPA 8082A			X	X					
Aroclor-1262 (PCB-1262) in Oil	EPA 8082A				X					
Aroclor-1268 (PCB-1268)	EPA 600/4-81-045			X						
Aroclor-1268 (PCB-1268)	EPA 8082			X	X					
Aroclor-1268 (PCB-1268)	EPA 8082A			X	X					
Aroclor-1268 (PCB-1268) in Oil	EPA 8082A				X					
Arsenic	EPA 200.7		X	X						
Arsenic	EPA 200.8		X	X						
Arsenic	EPA 6010B			X	X					
Arsenic	EPA 6010C			X	X					
Arsenic	EPA 6010D			X	X					
Arsenic	EPA 6020			X	X					
Arsenic	EPA 6020A			X	X					
Arsenic	EPA 6020B			X	X					
Atrazine	EPA 507		X	X						
Atrazine	EPA 625.1			X						
Atrazine	EPA 8141A			X						
Atrazine	EPA 8141B			X						
Atrazine	EPA 8270C			X	X					
Atrazine	EPA 8270D			X	X					
Atrazine	EPA 8270E			X	X					
Azinphos-methyl (Guthion)	EPA 1657			X						
Azinphos-methyl (Guthion)	EPA 8141A			X	X					
Azinphos-methyl (Guthion)	EPA 8141B			X	X					
Barium	EPA 200.7		X	X						
Barium	EPA 200.8		X	X						
Barium	EPA 6010B			X	X					

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Barium	EPA 6010C			X	X					
Barium	EPA 6010D			X	X					
Barium	EPA 6020			X	X					
Barium	EPA 6020A			X	X					
Barium	EPA 6020B			X	X					
Barium-133	DOE 4.5.2.3				X					
Barium-133	EPA 901.1		X							
Barium-133	HASL 300 Ga-01-R				X					
Benzal chloride	EPA 8270C			X	X					
Benzal chloride	EPA 8270D			X	X					
Benzal chloride	EPA 8270E			X	X					
Benzaldehyde	EPA 625.1			X						
Benzaldehyde	EPA 8270C			X	X					
Benzaldehyde	EPA 8270D			X	X					
Benzaldehyde	EPA 8270E			X	X					
Benzene	EPA 602			X						
Benzene	EPA 624.1			X						
Benzene	EPA 8021B			X	X					
Benzene	EPA 8260B			X	X					
Benzene	EPA 8260C			X	X					
Benzene	EPA 8260D			X	X					
Benzene	EPA TO-15	X								
Benzene	EPA TO-15 GC/MS SIM	X								
Benzene	IDNR OA-1			X	X					
Benzene	LUFT GCMS			X	X					
Benzene	MADEP VPH			X	X					
Benzene	OK DEQ GRO			X	X					
Benzene	SM 6200 B-2011			X						
Benzene	EPA 524.2		X							
Benzenethiol	EPA 625.1			X						
Benzenethiol	EPA 8270C			X	X					
Benzenethiol	EPA 8270D			X	X					
Benzenethiol	EPA 8270E				X					

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Benzidine	EPA 625.1			X						
Benzidine	EPA 8270C			X	X					
Benzidine	EPA 8270D			X	X					
Benzidine	EPA 8270E			X	X					
Benzo(a)anthracene	EPA 610 (HPLC)			X						
Benzo(a)anthracene	EPA 625.1			X						
Benzo(a)anthracene	EPA 625.1 SIM			X						
Benzo(a)anthracene	EPA 8270C			X	X					
Benzo(a)anthracene	EPA 8270C SIM			X	X					
Benzo(a)anthracene	EPA 8270D			X	X					
Benzo(a)anthracene	EPA 8270D SIM			X	X					
Benzo(a)anthracene	EPA 8270E			X	X					
Benzo(a)anthracene	EPA 8270E SIM			X	X					
Benzo(a)anthracene	EPA 8310			X	X					
Benzo(a)anthracene	MADEP EPH			X	X					
Benzo(a)pyrene	EPA 610 (HPLC)			X						
Benzo(a)pyrene	EPA 625.1			X						
Benzo(a)pyrene	EPA 625.1 SIM			X						
Benzo(a)pyrene	EPA 8270C			X	X					
Benzo(a)pyrene	EPA 8270C SIM			X	X					
Benzo(a)pyrene	EPA 8270D			X	X					
Benzo(a)pyrene	EPA 8270D SIM			X	X					
Benzo(a)pyrene	EPA 8270E			X	X					
Benzo(a)pyrene	EPA 8270E SIM			X	X					
Benzo(a)pyrene	EPA 8310			X	X					
Benzo(a)pyrene	MADEP EPH			X	X					
Benzo(b)fluoranthene	EPA 610 (HPLC)			X						
Benzo(b)fluoranthene	EPA 625.1			X						
Benzo(b)fluoranthene	EPA 625.1 SIM			X						
Benzo(b)fluoranthene	EPA 8270C			X	X					
Benzo(b)fluoranthene	EPA 8270C SIM			X	X					
Benzo(b)fluoranthene	EPA 8270D			X	X					
Benzo(b)fluoranthene	EPA 8270D SIM			X	X					

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Benzo(b)fluoranthene	EPA 8270E			X	X					
Benzo(b)fluoranthene	EPA 8270E SIM			X	X					
Benzo(b)fluoranthene	EPA 8310			X	X					
Benzo(b)fluoranthene	MADEP EPH			X	X					
Benzo(e)pyrene	EPA 8270D SIM			X	X					
Benzo(e)pyrene	EPA 8270E SIM			X	X					
Benzo(g,h,i)perylene	EPA 610 (HPLC)			X						
Benzo(g,h,i)perylene	EPA 625.1			X						
Benzo(g,h,i)perylene	EPA 625.1 SIM			X						
Benzo(g,h,i)perylene	EPA 8270C			X	X					
Benzo(g,h,i)perylene	EPA 8270C SIM			X	X					
Benzo(g,h,i)perylene	EPA 8270D			X	X					
Benzo(g,h,i)perylene	EPA 8270D SIM			X	X					
Benzo(g,h,i)perylene	EPA 8270E			X	X					
Benzo(g,h,i)perylene	EPA 8270E SIM			X	X					
Benzo(g,h,i)perylene	EPA 8310			X	X					
Benzo(g,h,i)perylene	MADEP EPH			X	X					
Benzo(j)fluoranthene	EPA 8270C			X	X					
Benzo(j)fluoranthene	EPA 8270D			X	X					
Benzo(j)fluoranthene	EPA 8270E			X	X					
Benzo(k)fluoranthene	EPA 610 (HPLC)			X						
Benzo(k)fluoranthene	EPA 625.1			X						
Benzo(k)fluoranthene	EPA 625.1 SIM			X						
Benzo(k)fluoranthene	EPA 8270C			X	X					
Benzo(k)fluoranthene	EPA 8270C SIM			X	X					
Benzo(k)fluoranthene	EPA 8270D			X	X					
Benzo(k)fluoranthene	EPA 8270D SIM			X	X					
Benzo(k)fluoranthene	EPA 8270E			X	X					
Benzo(k)fluoranthene	EPA 8270E SIM			X	X					
Benzo(k)fluoranthene	EPA 8310			X	X					
Benzo(k)fluoranthene	MADEP EPH			X	X					
Benzoic acid	EPA 625.1			X						
Benzoic acid	EPA 8270C			X	X					

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Benzoic acid	EPA 8270D			X	X					
Benzoic acid	EPA 8270E			X	X					
Benzotrichloride	EPA 8270C			X	X					
Benzotrichloride	EPA 8270D			X	X					
Benzotrichloride	EPA 8270E			X	X					
Benzyl alcohol	EPA 625.1			X						
Benzyl alcohol	EPA 8270C			X	X					
Benzyl alcohol	EPA 8270D			X	X					
Benzyl alcohol	EPA 8270E			X	X					
Benzyl chloride	EPA 8270C			X	X					
Benzyl chloride	EPA 8270D			X	X					
Benzyl chloride	EPA 8270E			X	X					
Benzyl chloride	EPA TO-15	X								
Beryllium	EPA 200.7		X	X						
Beryllium	EPA 200.8		X	X						
Beryllium	EPA 6010B			X	X					
Beryllium	EPA 6010C			X	X					
Beryllium	EPA 6010D			X	X					
Beryllium	EPA 6020			X	X					
Beryllium	EPA 6020A			X	X					
Beryllium	EPA 6020B			X	X					
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608.3			X						
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081A			X	X					
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081B			X	X					
Biochemical oxygen demand	SM 5210 B-2011			X						
Biphenyl (1,1'-Biphenyl)	EPA 625.1			X						
Biphenyl (1,1'-Biphenyl)	EPA 8270C			X	X					
Biphenyl (1,1'-Biphenyl)	EPA 8270D			X	X					
Biphenyl (1,1'-Biphenyl)	EPA 8270E			X	X					
bis(2-Chloroethoxy)methane	EPA 625.1			X						
bis(2-Chloroethoxy)methane	EPA 8270C			X	X					
bis(2-Chloroethoxy)methane	EPA 8270D			X	X					
bis(2-Chloroethoxy)methane	EPA 8270E			X	X					

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bis(2-Chloroethyl) ether	EPA 625.1			X						
bis(2-Chloroethyl) ether	EPA 8270C			X	X					
bis(2-Chloroethyl) ether	EPA 8270D			X	X					
bis(2-Chloroethyl) ether	EPA 8270E			X	X					
Bis(2-Chloroisopropyl) ether	EPA 625.1			X						
Bis(2-Chloroisopropyl) ether	EPA 8270E			X	X					
Bis(2-Chloroisopropyl) ether (2,2-oxybis(1-chloropropane))	EPA 8270C			X	X					
Bis(2-Chloroisopropyl) ether (2,2-oxybis(1-chloropropane))	EPA 8270D			X	X					
bis(2-Ethylhexyl)adipate	EPA 625.1			X						
bis(2-Ethylhexyl)adipate	EPA 625.1 SIM			X						
Bolstar (Sulprofos)	EPA 1657			X						
Bolstar (Sulprofos)	EPA 8141A			X	X					
Bolstar (Sulprofos)	EPA 8141B			X	X					
Boron	EPA 200.7		X	X						
Boron	EPA 200.8			X						
Boron	EPA 6010B			X	X					
Boron	EPA 6010C			X	X					
Boron	EPA 6010D			X	X					
Boron	EPA 6020			X	X					
Boron	EPA 6020A			X	X					
Boron	EPA 6020B			X	X					
Bromide	EPA 300.0		X	X	X					
Bromide	EPA 9056			X	X					
Bromide	EPA 9056A			X	X					
Bromide	SM 4110 B-2011		X	X						
Bromoacetic acid	EPA 552.2		X							
Bromobenzene	EPA 524.2		X							
Bromobenzene	EPA 624 (extended)			X						
Bromobenzene	EPA 624.1			X						
Bromobenzene	EPA 8260B			X	X					
Bromobenzene	EPA 8260C			X	X					
Bromobenzene	EPA 8260D			X	X					
Bromobenzene	SM 6200 B-2011			X						

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Bromochloromethane	EPA 524.2		X							
Bromochloromethane	EPA 624.1			X						
Bromochloromethane	EPA 8260B			X	X					
Bromochloromethane	EPA 8260C			X	X					
Bromochloromethane	EPA 8260D			X	X					
Bromochloromethane	SM 6200 B-2011			X						
Bromodichloromethane	EPA 624.1			X						
Bromodichloromethane	EPA 8260B			X	X					
Bromodichloromethane	EPA 8260C			X	X					
Bromodichloromethane	EPA 8260D			X	X					
Bromodichloromethane	EPA TO-15	X								
Bromodichloromethane	SM 6200 B-2011			X						
Bromoethane (Ethyl Bromide)	EPA 624.1			X						
Bromoethane (Ethyl Bromide)	EPA TO-15	X								
Bromoform	EPA 624.1			X						
Bromoform	EPA 8260B			X	X					
Bromoform	EPA 8260C			X	X					
Bromoform	EPA 8260D			X	X					
Bromoform	EPA TO-15	X								
Bromoform	SM 6200 B-2011			X						
Bromoform	EPA 524.2		X							
Butachlor	EPA 507		X	X						
Butyl benzyl phthalate	EPA 625.1			X						
Butyl benzyl phthalate	EPA 8270C			X	X					
Butyl benzyl phthalate	EPA 8270D			X	X					
Butyl benzyl phthalate	EPA 8270E			X	X					
Cadmium	EPA 200.7		X	X						
Cadmium	EPA 200.8		X	X						
Cadmium	EPA 6010B			X	X					
Cadmium	EPA 6010C			X	X					
Cadmium	EPA 6010D			X	X					
Cadmium	EPA 6020			X	X					
Cadmium	EPA 6020A			X	X					

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Cadmium	EPA 6020B			X	X					
Calcium	EPA 200.7		X	X						
Calcium	EPA 200.8			X						
Calcium	EPA 6010B			X	X					
Calcium	EPA 6010C			X	X					
Calcium	EPA 6010D			X	X					
Calcium	EPA 6020			X	X					
Calcium	EPA 6020A			X	X					
Calcium	EPA 6020B			X	X					
Calcium hardness as CaCO3	EPA 200.7			X						
Calcium hardness as CaCO3	EPA 200.8			X						
Calcium hardness as CaCO3	EPA 6010B			X						
Calcium hardness as CaCO3	EPA 6010C			X	X					
Calcium hardness as CaCO3	EPA 6010D			X						
Calcium hardness as CaCO3	SM 2340 B-2011			X						
California Waste Extraction Test	CCR Chapter 11, Article 5 Appendix II				X					
Caprolactam	EPA 625.1			X						
Caprolactam	EPA 8270C			X	X					
Caprolactam	EPA 8270D			X	X					
Caprolactam	EPA 8270E			X	X					
Carbazole	EPA 625.1			X						
Carbazole	EPA 8270C			X	X					
Carbazole	EPA 8270D			X	X					
Carbazole	EPA 8270E			X	X					
Carbon dioxide	ASTM D1946-90	X								
Carbon dioxide	SM 4500-CO2 D-2011		X	X						
Carbon disulfide	EPA 624.1			X						
Carbon disulfide	EPA 8260B			X	X					
Carbon disulfide	EPA 8260C			X	X					
Carbon disulfide	EPA 8260D			X	X					
Carbon disulfide	EPA TO-15	X								
Carbon disulfide	SM 6200 B-2011			X						
Carbon disulfide	EPA 524.2		X							

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Carbon monoxide	ASTM D1946-90	X								
Carbon tetrachloride	EPA 624.1			X						
Carbon tetrachloride	EPA 8260B			X	X					
Carbon tetrachloride	EPA 8260C			X	X					
Carbon tetrachloride	EPA 8260D			X	X					
Carbon tetrachloride	EPA TO-15	X								
Carbon tetrachloride	EPA TO-15 GC/MS SIM	X								
Carbon tetrachloride	SM 6200 B-2011			X						
Carbon tetrachloride	EPA 524.2		X							
Carbon-14	EPA EERF Method C-01	X		X	X		X			
Carbonaceous BOD, CBOD	SM 5210 B-2011			X						
Carbophenothion	EPA 8141A			X						
Carbophenothion	EPA 8141B			X						
Ceriodaphnia dubia	EPA 1002			X						
Ceriodaphnia dubia	EPA 2002 Ceriodaphnia dubia			X						
Ceriodaphnia dubia	EPA 2002.0			X						
Cesium-134	DOE 4.5.2.3				X					
Cesium-134	EPA 901.1		X	X						
Cesium-134	HASL 300 Ga-01-R				X					
Cesium-137	DOE 4.5.2.3				X					
Cesium-137	EPA 901.1		X	X						
Cesium-137	HASL 300 Ga-01-R				X					
Chemical oxygen demand	EPA 410.4			X						
Chemical oxygen demand	SM 5220 D-2011			X						
Chlorate	EPA 300.0			X						
Chlordane (tech.)	EPA 608.3			X						
Chlordane (tech.)	EPA 8081A			X	X					
Chlordane (tech.)	EPA 8081B			X	X					
Chloride	EPA 300.0		X	X	X					
Chloride	EPA 9056			X	X					
Chloride	EPA 9056A			X	X					
Chloride	SM 4110 B-2011		X	X						
Chlorine	EPA 9076				X					

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Chlorine	SM 4500-Cl G-2011		X	X						
Chloroacetic acid	EPA 552.2		X							
Chlorobenzene	EPA 624.1			X						
Chlorobenzene	EPA 8260B			X	X					
Chlorobenzene	EPA 8260C			X	X					
Chlorobenzene	EPA 8260D			X	X					
Chlorobenzene	EPA TO-15	X								
Chlorobenzene	SM 6200 B-2011			X						
Chlorobenzene	EPA 524.2		X							
Chlorobenzilate	EPA 625.1			X						
Chlorobenzilate	EPA 8270C			X	X					
Chlorobenzilate	EPA 8270D			X	X					
Chlorobenzilate	EPA 8270E			X	X					
Chlorodibromomethane	EPA 524.2		X							
Chlorodibromomethane (dibromochloromethane)	EPA 624.1			X						
Chlorodibromomethane (dibromochloromethane)	EPA 8260B			X	X					
Chlorodibromomethane (dibromochloromethane)	EPA 8260C			X	X					
Chlorodibromomethane (dibromochloromethane)	EPA 8260D			X	X					
Chlorodibromomethane (dibromochloromethane)	EPA TO-15	X								
Chlorodibromomethane (dibromochloromethane)	SM 6200 B-2011			X						
Chloroethane	EPA 524.2		X							
Chloroethane (Ethyl chloride)	EPA 624.1			X						
Chloroethane (Ethyl chloride)	EPA 8260B			X	X					
Chloroethane (Ethyl chloride)	EPA 8260C			X	X					
Chloroethane (Ethyl chloride)	EPA 8260D			X	X					
Chloroethane (Ethyl chloride)	EPA TO-15	X								
Chloroethane (Ethyl chloride)	EPA TO-15 GC/MS SIM	X								
Chloroethane (Ethyl chloride)	SM 6200 B-2011			X						
Chloroform	EPA 624.1			X						
Chloroform	EPA 8260B			X	X					
Chloroform	EPA 8260C			X	X					
Chloroform	EPA 8260D			X	X					
Chloroform	EPA TO-15	X								

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Chloroform	EPA TO-15 GC/MS SIM	X								
Chloroform	SM 6200 B-2011			X						
Chloroform	EPA 524.2		X							
Chloromethane	EPA 524.2		X							
Chloroprene (2-Chloro-1,3-butadiene)	EPA 624.1			X						
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260B			X	X					
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260C			X	X					
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260D			X	X					
Chloroprene (2-Chloro-1,3-butadiene)	SM 6200 B-2011			X						
Chlorpyrifos	EPA 1657			X						
Chlorpyrifos	EPA 8141A			X	X					
Chlorpyrifos	EPA 8141B			X	X					
Chromium	EPA 200.7		X	X						
Chromium	EPA 200.8		X	X						
Chromium	EPA 6010B			X	X					
Chromium	EPA 6010C			X	X					
Chromium	EPA 6010D			X	X					
Chromium	EPA 6020			X	X					
Chromium	EPA 6020A			X	X					
Chromium	EPA 6020B			X	X					
Chromium VI	EPA 218.6		X	X						
Chromium VI	EPA 3060A				X					
Chromium VI	EPA 7196A			X	X					
Chromium VI	EPA 7199			X	X					
Chromium VI	SM 3500-Cr B-2011		X	X						
Chromium VI	SM 3500-Cr C-2011		X	X						
Chromium VI Digestion	EPA 3060A				X					
Chrysene	EPA 610 (HPLC)			X						
Chrysene	EPA 625.1			X						
Chrysene	EPA 625.1 SIM			X						
Chrysene	EPA 8270C			X	X					
Chrysene	EPA 8270C SIM			X	X					
Chrysene	EPA 8270D			X	X					

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Chrysene	EPA 8270D SIM			X	X					
Chrysene	EPA 8270E			X	X					
Chrysene	EPA 8270E SIM			X	X					
Chrysene	EPA 8310			X	X					
Chrysene	MADEP EPH			X	X					
cis-1,2-Dichloroethene	EPA 524.2		X							
cis-1,2-Dichloroethylene	EPA 624.1			X						
cis-1,2-Dichloroethylene	EPA 8260B			X	X					
cis-1,2-Dichloroethylene	EPA 8260C			X	X					
cis-1,2-Dichloroethylene	EPA 8260D			X	X					
cis-1,2-Dichloroethylene	EPA TO-15	X								
cis-1,2-Dichloroethylene	EPA TO-15 GC/MS SIM	X								
cis-1,2-Dichloroethylene	SM 6200 B-2011			X						
cis-1,3-Dichloropropene	EPA 524.2		X							
cis-1,3-Dichloropropene	EPA 624.1			X						
cis-1,3-Dichloropropene	EPA 8260B			X	X					
cis-1,3-Dichloropropene	EPA 8260C			X	X					
cis-1,3-Dichloropropene	EPA 8260D			X	X					
cis-1,3-Dichloropropene	EPA TO-15	X								
cis-1,3-Dichloropropene	EPA TO-15 GC/MS SIM	X								
cis-1,3-Dichloropropene	SM 6200 B-2011			X						
cis-1,4-Dichloro-2-butene	EPA 624.1			X						
cis-1,4-Dichloro-2-butene	EPA 8260B			X	X					
cis-1,4-Dichloro-2-butene	EPA 8260C			X	X					
cis-1,4-Dichloro-2-butene	EPA 8260D			X	X					
cis-1,4-Dichloro-2-butene	SM 6200 B-2011			X						
cis-Diallate	EPA 8270C			X						
cis-Isosafrole	EPA 8270C			X						
Closed-System Purge-and-Trap and Extraction for Volatile	EPA 5035A				X					
Cobalt	EPA 200.7		X	X						
Cobalt	EPA 200.8			X						
Cobalt	EPA 6010B			X	X					
Cobalt	EPA 6010C			X	X					

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Cobalt	EPA 6010D			X	X					
Cobalt	EPA 6020			X	X					
Cobalt	EPA 6020A			X	X					
Cobalt	EPA 6020B			X	X					
Cobalt-60	DOE 4.5.2.3				X					
Cobalt-60	EPA 901.1		X	X						
Cobalt-60	HASL 300 Ga-01-R				X					
Color	SM 2120 B-2011		X	X						
Conductivity	EPA 120.1		X	X						
Conductivity	EPA 9050A			X	X					
Conductivity	SM 2510 B-2011		X	X						
Copper	EPA 200.7		X	X						
Copper	EPA 200.8		X	X						
Copper	EPA 6010B			X	X					
Copper	EPA 6010C			X	X					
Copper	EPA 6010D			X	X					
Copper	EPA 6020			X	X					
Copper	EPA 6020A			X	X					
Copper	EPA 6020B			X	X					
Corrosivity (langlier index)	SM 2320 B-2011		X	X						
Corrosivity (pH)	EPA 9040B			X						
Corrosivity (pH)	EPA 9040C			X						
Corrosivity (pH)	EPA 9045D				X					
Coumaphos	EPA 1657			X						
Coumaphos	EPA 8141A			X	X					
Coumaphos	EPA 8141B			X	X					
Cyanazine	EPA 8141A			X	X					
Cyanazine	EPA 8141B			X	X					
Cyanide	EPA 335.4		X	X						
Cyanide	EPA 9010B			X	X					
Cyanide	EPA 9010C			X	X					
Cyanide	EPA 9012A			X						
Cyanide	EPA 9012B			X	X					

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Cyanide	EPA 9013				X					
Cyanide	EPA 9013A				X					
Cyanide	EPA 9014			X	X					
Cyanide	SM 4500-CN⁻ B-2011		X	X						
Cyanide	SM 4500-CN⁻ C-2011		X	X						
Cyanide	SM 4500-CN⁻ E-2011		X	X						
Cyanide	SM 4500-CN⁻ G-2011		X							
Cyclohexane	EPA 624.1			X						
Cyclohexane	EPA 8260B			X	X					
Cyclohexane	EPA 8260C			X	X					
Cyclohexane	EPA 8260D			X	X					
Cyclohexane	EPA TO-15	X								
Cyclohexane	SM 6200 B-2011			X						
Cyclohexanone	EPA 624.1			X						
Cyclohexanone	EPA 8260B			X	X					
Cyclohexanone	EPA 8260C			X	X					
Cyclohexanone	EPA 8260D			X	X					
Cyclohexanone	SM 6200 B-2011			X						
Dalapon	EPA 8151A			X	X					
Dalapon	SM 6640 B-2001			X						
delta-BHC	EPA 608.3			X						
delta-BHC	EPA 8081A			X	X					
delta-BHC	EPA 8081B			X	X					
Demeton	EPA 1657			X						
Demeton	EPA 8141A			X	X					
Demeton	EPA 8141B			X	X					
Demeton-o	EPA 8141A			X	X					
Demeton-o	EPA 8141B			X	X					
Demeton-s	EPA 8141A			X	X					
Demeton-s	EPA 8141B			X	X					
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate,	EPA 625.1			X						
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate,	EPA 8270C			X	X					
Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate,	EPA 8270D			X	X					

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Di(2-ethylhexyl) phthalate (bis(2-Ethylhexyl)phthalate,	EPA 8270E			X	X					
Diallate	EPA 625.1			X						
Diallate	EPA 8270C			X	X					
Diallate	EPA 8270D			X	X					
Diallate	EPA 8270E			X	X					
Diazinon	EPA 1657			X						
Diazinon	EPA 8141A			X	X					
Diazinon	EPA 8141B			X	X					
Dibenz(a, h) acridine	EPA 625.1			X						
Dibenz(a, h) acridine	EPA 8270C			X	X					
Dibenz(a, h) acridine	EPA 8270D			X	X					
Dibenz(a, h) acridine	EPA 8270E			X	X					
Dibenz(a, j)acridine	EPA 625.1			X						
Dibenz(a, j)acridine	EPA 8270C			X	X					
Dibenz(a, j)acridine	EPA 8270D			X	X					
Dibenz(a, j)acridine	EPA 8270E			X	X					
Dibenz(a,h)anthracene	EPA 610 (HPLC)			X						
Dibenz(a,h)anthracene	EPA 625.1			X						
Dibenz(a,h)anthracene	EPA 625.1 SIM			X						
Dibenz(a,h)anthracene	EPA 8270C			X	X					
Dibenz(a,h)anthracene	EPA 8270C SIM			X	X					
Dibenz(a,h)anthracene	EPA 8270D			X	X					
Dibenz(a,h)anthracene	EPA 8270D SIM			X	X					
Dibenz(a,h)anthracene	EPA 8270E			X	X					
Dibenz(a,h)anthracene	EPA 8270E SIM			X	X					
Dibenz(a,h)anthracene	EPA 8310			X	X					
Dibenz(a,h)anthracene	MADEP EPH			X	X					
Dibenzo(a,e)pyrene	EPA 8270C			X	X					
Dibenzo(a,e)pyrene	EPA 8270D			X	X					
Dibenzo(a,e)pyrene	EPA 8270E			X	X					
Dibenzo(a,h) pyrene	EPA 8270C			X	X					
Dibenzo(a,h) pyrene	EPA 8270D			X	X					
Dibenzo(a,h) pyrene	EPA 8270E			X	X					

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Dibenzo(a,i) pyrene	EPA 8270C			X	X					
Dibenzo(a,i) pyrene	EPA 8270D			X	X					
Dibenzo(a,i) pyrene	EPA 8270E			X	X					
Dibenzofuran	EPA 625.1			X						
Dibenzofuran	EPA 8270C			X	X					
Dibenzofuran	EPA 8270D			X	X					
Dibenzofuran	EPA 8270E			X	X					
Dibromoacetic acid	EPA 552.2		X							
Dibromomethane	EPA 524.2		X							
Dibromomethane (Methylene bromide)	EPA 624.1			X						
Dibromomethane (Methylene bromide)	EPA 8260B			X	X					
Dibromomethane (Methylene bromide)	EPA 8260C			X	X					
Dibromomethane (Methylene bromide)	EPA 8260D			X	X					
Dibromomethane (Methylene bromide)	SM 6200 B-2011			X						
Dicamba	EPA 8151A			X	X					
Dicamba	SM 6640 B-2001			X						
Dichlorobromomethane	EPA 524.2		X							
Dichlorodifluoromethane	EPA 524.2		X							
Dichlorodifluoromethane (Freon-12)	EPA 624.1			X						
Dichlorodifluoromethane (Freon-12)	EPA 8260B			X	X					
Dichlorodifluoromethane (Freon-12)	EPA 8260C			X	X					
Dichlorodifluoromethane (Freon-12)	EPA 8260D			X	X					
Dichlorodifluoromethane (Freon-12)	EPA TO-15	X								
Dichlorodifluoromethane (Freon-12)	SM 6200 B-2011			X						
Dichloroeacetic acid	EPA 552.2		X							
Dichloroprop (Dichlorprop)	EPA 8151A			X	X					
Dichlorovos (DDVP, Dichlorvos)	EPA 1657			X						
Dichlorovos (DDVP, Dichlorvos)	EPA 8141A			X	X					
Dichlorovos (DDVP, Dichlorvos)	EPA 8141B			X	X					
Dichlorvos	EPA 507			X						
Dicyclopentadiene	EPA 8260B			X						
Dicyclopentadiene	EPA 8260C			X						
Dicyclopentadiene	EPA 8260D			X						

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Dicyclopentadiene	EPA TO-15	X								
Dieldrin	EPA 608.3			X						
Dieldrin	EPA 8081A			X	X					
Dieldrin	EPA 8081B			X	X					
Diesel range organics (DRO)	CA LUFT GCMS				X					
Diesel range organics (DRO)	EPA 8015B			X	X					
Diesel range organics (DRO)	EPA 8015C			X	X					
Diesel range organics (DRO)	EPA 8015D			X	X					
Diesel range organics (DRO)	EPA 8270C			X	X					
Diesel range organics (DRO)	EPA 8270D			X	X					
Diesel range organics (DRO)	EPA 8270E				X					
Diesel range organics (DRO)	IDNR OA-2			X	X					
Diesel range organics (DRO)	LUFT GC			X	X					
Diesel range organics (DRO)	LUFT GCMS			X						
Diesel range organics (DRO)	MADEP EPH				X					
Diesel range organics (DRO)	MO-DRO			X	X					
Diesel range organics (DRO)	NWTPH-Dx			X	X					
Diesel range organics (DRO)	OA-2			X						
Diesel range organics (DRO)	OK DEQ DRO			X	X					
Diesel range organics (DRO)	OK DEQ GRO				X					
Diesel range organics (DRO)	WI(95) DRO			X	X					
Diethyl ether	EPA 624.1			X						
Diethyl ether	EPA 8260B			X	X					
Diethyl ether	EPA 8260C			X	X					
Diethyl ether	EPA 8260D			X	X					
Diethyl ether	SM 6200 B-2011			X						
Diethyl phthalate	EPA 625.1			X						
Diethyl phthalate	EPA 8270C			X	X					
Diethyl phthalate	EPA 8270D			X	X					
Diethyl phthalate	EPA 8270E			X	X					
Di-isopropylether (DIPE) (Isopropyl ether)	EPA 624.1			X						
Di-isopropylether (DIPE) (Isopropyl ether)	EPA 8260B			X	X					
Di-isopropylether (DIPE) (Isopropyl ether)	EPA 8260C			X	X					

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Di-isopropylether (DIPE) (Isopropyl ether)	EPA 8260D			X	X					
Di-isopropylether (DIPE) (Isopropyl ether)	SM 6200 B-2011			X						
Dimethoate	EPA 1657			X						
Dimethoate	EPA 625.1			X						
Dimethoate	EPA 8141A			X	X					
Dimethoate	EPA 8141B			X	X					
Dimethoate	EPA 8270C			X	X					
Dimethoate	EPA 8270D			X	X					
Dimethoate	EPA 8270E			X	X					
Dimethyl phthalate	EPA 625.1			X						
Dimethyl phthalate	EPA 8270C			X	X					
Dimethyl phthalate	EPA 8270D			X	X					
Dimethyl phthalate	EPA 8270E			X	X					
Di-n-butyl phthalate	EPA 625.1			X						
Di-n-butyl phthalate	EPA 8270C			X	X					
Di-n-butyl phthalate	EPA 8270D			X	X					
Di-n-butyl phthalate	EPA 8270E			X	X					
Di-n-octyl phthalate	EPA 625.1			X						
Di-n-octyl phthalate	EPA 8270C			X	X					
Di-n-octyl phthalate	EPA 8270D			X	X					
Di-n-octyl phthalate	EPA 8270E			X	X					
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 625.1			X						
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151A			X	X					
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270C			X	X					
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270D			X	X					
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270E			X	X					
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	SM 6640 B-2001			X						
Diphenyl ether (Diphenyl Oxide)	EPA 625.1			X						
Diphenyl ether (Diphenyl Oxide)	EPA 8270C			X	X					
Diphenyl ether (Diphenyl Oxide)	EPA 8270D			X	X					
Diphenyl ether (Diphenyl Oxide)	EPA 8270E			X	X					
Diphenyl ketone (Benzophenone)	EPA 8270C			X						
Diphenyl ketone (Benzophenone)	EPA 8270D			X						

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Diphenyl ketone (Benzophenone)	EPA 8270E			X						
Diphenylamine	EPA 625.1			X						
Diphenylamine	EPA 8270C			X	X					
Diphenylamine	EPA 8270D			X	X					
Diphenylamine	EPA 8270E			X	X					
Dissolved Carbon	SM 5310 B-2011			X						
Dissolved organic carbon (DOC)	EPA 9060			X						
Dissolved organic carbon (DOC)	EPA 9060A			X						
Dissolved organic carbon (DOC)	SM 5310 B-2011			X						
Dissolved organic carbon (DOC)	SM 5310 C-2011		X							
Disulfoton	EPA 1657			X						
Disulfoton	EPA 8141A			X	X					
Disulfoton	EPA 8141B			X	X					
Disulfoton	EPA 8270C			X	X					
Disulfoton	EPA 8270D			X	X					
Disulfoton	EPA 8270E			X	X					
Endosulfan I	EPA 608.3			X						
Endosulfan I	EPA 8081A			X	X					
Endosulfan I	EPA 8081B			X	X					
Endosulfan II	EPA 608.3			X						
Endosulfan II	EPA 8081A			X	X					
Endosulfan II	EPA 8081B			X	X					
Endosulfan sulfate	EPA 608.3			X						
Endosulfan sulfate	EPA 8081A			X	X					
Endosulfan sulfate	EPA 8081B			X	X					
Endrin	EPA 608.3			X						
Endrin	EPA 8081A			X	X					
Endrin	EPA 8081B			X	X					
Endrin aldehyde	EPA 608.3			X						
Endrin aldehyde	EPA 8081A			X	X					
Endrin aldehyde	EPA 8081B			X	X					
Endrin ketone	EPA 608.3			X						
Endrin ketone	EPA 8081A			X	X					

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Endrin ketone	EPA 8081B			X	X					
Enterococci	ASTM D6503-99			X						
Enterococci	Enterolert®			X						
EPH Aliphatic >C10-C12	MADEP EPH			X	X					
EPH Aliphatic >C12-C16	MADEP EPH			X	X					
EPH Aliphatic >C16-C35	MADEP EPH			X	X					
EPH Aliphatic C19-C36	MADEP EPH			X	X					
EPH Aliphatic C9-C18	MADEP EPH			X	X					
EPH Aromatic >C10-C12	MADEP EPH			X	X					
EPH Aromatic >C12-C16	MADEP EPH			X	X					
EPH Aromatic >C16-C21	MADEP EPH			X	X					
EPH Aromatic >C21-C35	MADEP EPH			X	X					
EPH Aromatic C11-C22	MADEP EPH			X	X					
EPH Aromatic C11-C22 Unadjusted	MADEP EPH			X	X					
EPN	EPA 1657			X						
EPN	EPA 8141A			X	X					
EPN	EPA 8141B			X	X					
Escherichia coli	SM 9223 B-2004		X	X						
Ethane	EPA RSK-175 (GC/FID)	X		X						
Ethanol	EPA 624.1			X						
Ethanol	EPA 8015			X						
Ethanol	EPA 8015B			X	X					
Ethanol	EPA 8015C			X	X					
Ethanol	EPA 8015D			X	X					
Ethanol	EPA 8260B			X	X					
Ethanol	EPA 8260C			X	X					
Ethanol	EPA 8260D			X	X					
Ethanol	EPA TO-15	X								
Ethanol	SM 6200 B-2011			X						
Ethene	EPA RSK-175 (GC/FID)	X		X						
Ethion	EPA 8141A			X						
Ethion	EPA 8141B			X						
Ethoprop	EPA 1657			X						

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Ethoprop	EPA 507			X						
Ethoprop	EPA 8141A			X	X					
Ethoprop	EPA 8141B			X	X					
Ethyl acetate	EPA 624.1			X						
Ethyl acetate	EPA 8260B			X	X					
Ethyl acetate	EPA 8260C			X	X					
Ethyl acetate	EPA 8260D			X	X					
Ethyl acetate	EPA TO-15	X								
Ethyl acetate	SM 6200 B-2011			X						
Ethyl methacrylate	EPA 624.1			X						
Ethyl methacrylate	EPA 8260B			X	X					
Ethyl methacrylate	EPA 8260C			X	X					
Ethyl methacrylate	EPA 8260D			X	X					
Ethyl methacrylate	SM 6200 B-2011			X						
Ethyl methanesulfonate	EPA 625.1			X						
Ethyl methanesulfonate	EPA 8270C			X	X					
Ethyl methanesulfonate	EPA 8270D			X	X					
Ethyl methanesulfonate	EPA 8270E			X	X					
Ethylbenzene	CA LUFT GCMS			X	X					
Ethylbenzene	EPA 524.2		X							
Ethylbenzene	EPA 602			X						
Ethylbenzene	EPA 624.1			X						
Ethylbenzene	EPA 8021B			X	X					
Ethylbenzene	EPA 8260B			X	X					
Ethylbenzene	EPA 8260C			X	X					
Ethylbenzene	EPA 8260D			X	X					
Ethylbenzene	EPA TO-15	X								
Ethylbenzene	EPA TO-15 GC/MS SIM	X								
Ethylbenzene	IDNR OA-1			X	X					
Ethylbenzene	MADEP VPH			X	X					
Ethylbenzene	OK DEQ GRO			X	X					
Ethylbenzene	SM 6200 B-2011			X						
Ethylene glycol	EPA 8015B			X	X					

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Ethylene glycol	EPA 8015C			X	X					
Ethylene glycol	EPA 8015D			X	X					
Ethyl-t-butyl ether (ETBE) (2-Ethoxy-2-methylpropane)	EPA 624.1			X						
Ethyl-t-butyl ether (ETBE) (2-Ethoxy-2-methylpropane)	EPA 8260B			X	X					
Ethyl-t-butyl ether (ETBE) (2-Ethoxy-2-methylpropane)	EPA 8260C			X	X					
Ethyl-t-butyl ether (ETBE) (2-Ethoxy-2-methylpropane)	EPA 8260D			X	X					
Ethyl-t-butyl ether (ETBE) (2-Ethoxy-2-methylpropane)	SM 6200 B-2011			X						
Extractable organics halides (EOX)	EPA 9023				X					
Extractable Petroleum Hydrocarbons (EPH)	CT ETPH			X						
Extractable Petroleum Hydrocarbons (EPH)	IDNR OA-2			X	X					
Extractable Petroleum Hydrocarbons (EPH)	MADEP EPH			X	X					
Extractable Petroleum Hydrocarbons (EPH)	NJDEP EPH 10/08			X						
Extractable Petroleum Hydrocarbons (EPH)	TN EPH			X	X					
Extractable Total Petroleum Hydrocarbons	NJDEP EPH 10/08				X					
Famphur	EPA 625.1			X						
Famphur	EPA 8141A			X						
Famphur	EPA 8141B			X						
Famphur	EPA 8270C			X	X					
Famphur	EPA 8270D			X	X					
Famphur	EPA 8270E			X	X					
Fecal coliforms	EPA 1681			X	X					
Fecal coliforms	SM 9223 B-2004			X						
Fensulfothion	EPA 1657			X						
Fensulfothion	EPA 8141A			X	X					
Fensulfothion	EPA 8141B			X	X					
Fenthion	EPA 1657			X						
Fenthion	EPA 8141A			X	X					
Fenthion	EPA 8141B			X	X					
Flash Point	ASTM D93			X	X					
Flash Point	ASTM D93-07			X	X					
Florisil Clean-up	EPA 3620			X						
Florisil Clean-up	EPA 3620C				X					
Fluoranthene	EPA 610 (HPLC)			X						

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Fluoranthene	EPA 625.1			X						
Fluoranthene	EPA 625.1 SIM			X						
Fluoranthene	EPA 8270C			X	X					
Fluoranthene	EPA 8270C SIM			X	X					
Fluoranthene	EPA 8270D			X	X					
Fluoranthene	EPA 8270D SIM			X	X					
Fluoranthene	EPA 8270E			X	X					
Fluoranthene	EPA 8270E SIM			X	X					
Fluoranthene	EPA 8310			X	X					
Fluoranthene	MADEP EPH			X	X					
Fluorene	EPA 610 (HPLC)			X						
Fluorene	EPA 625.1			X						
Fluorene	EPA 625.1 SIM			X						
Fluorene	EPA 8270C			X	X					
Fluorene	EPA 8270C SIM			X	X					
Fluorene	EPA 8270D			X	X					
Fluorene	EPA 8270D SIM			X	X					
Fluorene	EPA 8270E			X	X					
Fluorene	EPA 8270E SIM			X	X					
Fluorene	EPA 8310			X	X					
Fluorene	MADEP EPH			X	X					
Fluoride	EPA 300.0		X	X	X					
Fluoride	EPA 9056			X	X					
Fluoride	EPA 9056A			X	X					
Fluoride	SM 4110 B-2011		X	X						
Fluoride	SM 4500-F^- B-2011			X						
Fluoride	SM 4500-F^- C-2011			X						
Fractional Organic Carbon (FOC)	ASTM D2974				X					
Free cyanide	EPA 9014			X						
Free liquid	EPA 9095A				X					
Free liquid	EPA 9095B			X	X					
Gamma Emitters	DOE 4.5.2.3			X	X					
Gamma Emitters	EPA 901.1		X	X	X					

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Gamma Emitters	HASL 300 Ga-01-R	X		X	X		X			
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 608.3			X						
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081A			X	X					
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B			X	X					
gamma-Chlordane	EPA 608.3			X						
gamma-Chlordane	EPA 8081A			X	X					
gamma-Chlordane	EPA 8081B			X	X					
Gasoline range organics (GRO)	CA LUFT GCMS				X					
Gasoline range organics (GRO)	EPA 8015B			X	X					
Gasoline range organics (GRO)	EPA 8015C			X	X					
Gasoline range organics (GRO)	EPA 8015D			X	X					
Gasoline range organics (GRO)	EPA 8260B			X	X					
Gasoline range organics (GRO)	EPA 8260C			X	X					
Gasoline range organics (GRO)	EPA 8260D			X	X					
Gasoline range organics (GRO)	EPA TO-15	X								
Gasoline range organics (GRO)	IDNR OA-1			X	X					
Gasoline range organics (GRO)	LUFT GC			X	X					
Gasoline range organics (GRO)	LUFT GCMS			X						
Gasoline range organics (GRO)	MADEP VPH				X					
Gasoline range organics (GRO)	MO-GRO			X						
Gasoline range organics (GRO)	NWTPH-Gx			X	X					
Gasoline range organics (GRO)	OK DEQ GRO			X	X					
Gasoline range organics (GRO)	TN GRO			X						
Gasoline range organics (GRO)	WI(95) GRO			X	X					
Gross alpha-beta	EPA 900			X						
Gross alpha-beta	EPA 9310	X		X						
Gross-alpha	EPA 900			X						
Gross-alpha	EPA 900.0 (GPC)		X	X	X					
Gross-alpha	EPA 9310	X		X	X					
Gross-alpha Radium	EPA 900.1			X						
Gross-beta	EPA 900			X						
Gross-beta	EPA 900.0 (GPC)		X	X	X					
Gross-beta	EPA 9310	X		X	X					

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Guanidine Nitrate	EPA 9056			X	X					
Guanidine Nitrate	EPA 9056A			X	X					
Hardness	EPA 130.1		X	X						
Hardness	SM 2340 B-2011		X	X						
Hardness (calc.)	EPA 200.7		X	X						
Hardness (calc.)	EPA 200.8			X						
Hardness (calc.)	SM 2340 B-2011		X	X						
Helium	ASTM D1946-90	X								
Heptachlor	EPA 608.3			X						
Heptachlor	EPA 8081A			X	X					
Heptachlor	EPA 8081B			X	X					
Heptachlor epoxide	EPA 608.3			X						
Heptachlor epoxide	EPA 8081A			X	X					
Heptachlor epoxide	EPA 8081B			X	X					
Heterotrophic plate count	SM 9215 B 2000 (PCA)		X	X						
Hexachlorobenzene	EPA 608.3			X						
Hexachlorobenzene	EPA 625.1			X						
Hexachlorobenzene	EPA 625.1 SIM			X						
Hexachlorobenzene	EPA 8081A			X	X					
Hexachlorobenzene	EPA 8081B			X	X					
Hexachlorobenzene	EPA 8270C			X	X					
Hexachlorobenzene	EPA 8270C SIM			X	X					
Hexachlorobenzene	EPA 8270D			X	X					
Hexachlorobenzene	EPA 8270D SIM			X	X					
Hexachlorobenzene	EPA 8270E			X	X					
Hexachlorobenzene	EPA 8270E SIM				X					
Hexachlorobutadiene	EPA 624.1			X						
Hexachlorobutadiene	EPA 625.1			X						
Hexachlorobutadiene	EPA 8260B			X	X					
Hexachlorobutadiene	EPA 8260C			X	X					
Hexachlorobutadiene	EPA 8260D			X	X					
Hexachlorobutadiene	EPA 8270C			X	X					
Hexachlorobutadiene	EPA 8270D			X	X					

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Hexachlorobutadiene	EPA 8270E			X	X					
Hexachlorobutadiene	EPA TO-15	X								
Hexachlorobutadiene	SM 6200 B-2011			X						
Hexachlorobutadiene	EPA 524.2		X							
Hexachlorocyclopentadiene	EPA 625.1			X						
Hexachlorocyclopentadiene	EPA 8270C			X	X					
Hexachlorocyclopentadiene	EPA 8270D			X	X					
Hexachlorocyclopentadiene	EPA 8270E			X	X					
Hexachloroethane	EPA 624.1			X						
Hexachloroethane	EPA 625.1			X						
Hexachloroethane	EPA 8260B			X	X					
Hexachloroethane	EPA 8260C			X	X					
Hexachloroethane	EPA 8260D			X	X					
Hexachloroethane	EPA 8270C			X	X					
Hexachloroethane	EPA 8270D			X	X					
Hexachloroethane	EPA 8270E			X	X					
Hexachloroethane	SM 6200 B-2011			X						
Hexachlorophene	EPA 625.1			X						
Hexachlorophene	EPA 8270C			X	X					
Hexachlorophene	EPA 8270D			X	X					
Hexachlorophene	EPA 8270E			X	X					
Hexachloropropene	EPA 625.1			X						
Hexachloropropene	EPA 8270C			X	X					
Hexachloropropene	EPA 8270D			X	X					
Hexachloropropene	EPA 8270E			X	X					
Hydroquinone	EPA 625.1			X						
Hydroquinone	EPA 8270C			X						
Hydroquinone	EPA 8270D			X						
IC25 (ON) Growth	EPA 1000.0 - Fathead minnow, 7-day			X						
IC25 Reproduction	EPA 1002.0 - Ceriodaphnia dubia,			X						
IC25 Survival	EPA 1000.0 - Fathead minnow, 7-day			X						
IC25 Survival	EPA 1002.0 - Ceriodaphnia dubia,			X						
Ignitability	EPA 1010			X	X					

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Ignitability	EPA 1010A			X	X					
Indene	EPA 625.1			X						
Indene	EPA 8270C			X	X					
Indene	EPA 8270D			X	X					
Indene	EPA 8270E			X	X					
Indeno(1,2,3-cd)pyrene	EPA 610 (HPLC)			X						
Indeno(1,2,3-cd)pyrene	EPA 625.1			X						
Indeno(1,2,3-cd)pyrene	EPA 625.1 SIM			X						
Indeno(1,2,3-cd)pyrene	EPA 8270C			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8270C SIM			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8270D			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8270D SIM			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8270E			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8270E SIM			X	X					
Indeno(1,2,3-cd)pyrene	EPA 8310			X	X					
Indeno(1,2,3-cd)pyrene	MADEP EPH			X	X					
Inorganic Carbon	SM 5310 B-2011			X						
Iodomethane (Methyl iodide)	EPA 624 (extended)			X						
Iodomethane (Methyl iodide)	EPA 624.1			X						
Iodomethane (Methyl iodide)	EPA 8260B			X	X					
Iodomethane (Methyl iodide)	EPA 8260C			X	X					
Iodomethane (Methyl iodide)	EPA 8260D			X	X					
Iodomethane (Methyl iodide)	EPA TO-15	X								
Iodomethane (Methyl iodide)	SM 6200 B-2011			X						
Iron	EPA 200.7		X	X						
Iron	EPA 200.8			X						
Iron	EPA 6010B			X	X					
Iron	EPA 6010C			X	X					
Iron	EPA 6010D			X	X					
Iron	EPA 6020			X	X					
Iron	EPA 6020A			X	X					
Iron	EPA 6020B			X	X					
Iron-(II) (Ferrous Iron)	SM 3500-Fe B-2011			X						

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Isobutyl alcohol (2-Methyl-1-propanol)	EPA 624.1			X						
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260B			X	X					
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260C			X	X					
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260D			X	X					
Isobutyl alcohol (2-Methyl-1-propanol)	SM 6200 B-2011			X						
Isodrin	EPA 625.1			X						
Isodrin	EPA 8270C			X	X					
Isodrin	EPA 8270D			X	X					
Isodrin	EPA 8270E			X	X					
Isophorone	EPA 625.1			X						
Isophorone	EPA 8270C			X	X					
Isophorone	EPA 8270D			X	X					
Isophorone	EPA 8270E			X	X					
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 624.1			X						
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260B			X	X					
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260C			X	X					
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260D			X	X					
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA TO-15	X								
Isopropyl alcohol (2-Propanol, Isopropanol)	SM 6200 B-2011			X						
Isopropylbenzene	EPA 524.2		X							
Isopropylbenzene (Cumene)	EPA 624 (extended)			X						
Isopropylbenzene (Cumene)	EPA 624.1			X						
Isopropylbenzene (Cumene)	EPA 8260B			X	X					
Isopropylbenzene (Cumene)	EPA 8260C			X	X					
Isopropylbenzene (Cumene)	EPA 8260D			X	X					
Isopropylbenzene (Cumene)	EPA TO-15	X								
Isopropylbenzene (Cumene)	SM 6200 B-2011			X						
Isosafrole	EPA 8270C			X	X					
Isosafrole	EPA 8270D			X	X					
Isosafrole	EPA 8270E			X	X					
Isotopic uranium	ASTM D3972-09 Modified (ENV-SOP-			X						
Isotopic uranium	ASTM D3972-97			X						
Kepone	EPA 625.1			X						

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Kepone	EPA 8270C			X	X					
Kepone	EPA 8270D			X	X					
Kepone	EPA 8270E			X	X					
Kjeldahl nitrogen - total	EPA 351.2			X						
Kjeldahl nitrogen - total	SM 4500-NH3 B-2011			X						
Kjeldahl nitrogen - total	SM 4500-NH3 C-2011			X						
Kjeldahl nitrogen - total	SM 4500-Norg B-2011			X						
Kjeldahl nitrogen - total	SM 4500-Norg C-2011			X						
Kjeldahl nitrogen - total	SM 4500-Norg D-2011			X	X					
LC50 Survival	EPA 2000.0 - Fathead minnow, 48-hr Acute,			X						
LC50 Survival	EPA 2002 Ceriodaphnia dubia			X						
Lead	EPA 200.7		X	X						
Lead	EPA 200.8		X	X						
Lead	EPA 6010B			X	X					
Lead	EPA 6010C			X	X					
Lead	EPA 6010D			X	X					
Lead	EPA 6020			X	X					
Lead	EPA 6020A			X	X					
Lead	EPA 6020B			X	X					
Lead-210	DOE 4.5.2.3			X						
Lead-210	Eichrom OTW01			X						
Lead-210	EICHROM PBS01-12	X		X	X		X			
Lead-210	HASL 300 Ga-01-R			X						
Legionella	Legiolert		X	X						
Lithium	EPA 200.7		X	X						
Lithium	EPA 6010B			X	X					
Lithium	EPA 6010C			X	X					
Lithium	EPA 6010D			X	X					
Lithium	EPA 6020			X						
Lithium	EPA 6020A			X						
Lithium	EPA 6020B			X						
LOEC Survival	EPA 2000			X						
m+p-xylene	EPA 602			X						

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m+p-xylene	EPA 8021B			X	X					
m+p-xylene	EPA 8260B			X	X					
m+p-xylene	EPA 8260C			X	X					
m+p-xylene	EPA 8260D				X					
m+p-xylene	EPA TO-15	X								
m+p-xylene	IDNR OA-1				X					
m+p-xylene	MADEP VPH			X	X					
m+p-xylene	SM 6200 B-2011			X						
Magnesium	EPA 200.7		X	X						
Magnesium	EPA 200.8			X						
Magnesium	EPA 6010B			X	X					
Magnesium	EPA 6010C			X	X					
Magnesium	EPA 6010D			X	X					
Magnesium	EPA 6020			X	X					
Magnesium	EPA 6020A			X	X					
Magnesium	EPA 6020B			X	X					
Malathion	EPA 1657			X						
Malathion	EPA 8141A			X	X					
Malathion	EPA 8141B			X	X					
Manganese	EPA 200.7		X	X						
Manganese	EPA 200.8		X	X						
Manganese	EPA 6010B			X	X					
Manganese	EPA 6010C			X	X					
Manganese	EPA 6010D			X	X					
Manganese	EPA 6020			X	X					
Manganese	EPA 6020A			X	X					
Manganese	EPA 6020B			X	X					
MCPA	EPA 8151A			X	X					
MCPP	EPA 8151A			X	X					
Mercury	EPA 245.1		X	X						
Mercury	EPA 7470A			X						
Mercury	EPA 7471A				X					
Mercury	EPA 7471B				X					

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Merphos	EPA 1657			X						
Merphos	EPA 507			X						
Merphos	EPA 8141A			X	X					
Merphos	EPA 8141B			X	X					
Methacrylonitrile	EPA 624.1			X						
Methacrylonitrile	EPA 8260B			X	X					
Methacrylonitrile	EPA 8260C			X	X					
Methacrylonitrile	EPA 8260D			X	X					
Methacrylonitrile	SM 6200 B-2011			X						
Methane	ASTM D1946-90	X								
Methane	EPA RSK-175 (GC/FID)	X		X						
Methanol	EPA 8015			X						
Methanol	EPA 8015B			X	X					
Methanol	EPA 8015C			X	X					
Methanol	EPA 8015D			X	X					
Methanol	EPA 8260B			X						
Methanol	EPA 8260C			X						
Methanol	EPA TO-15	X								
Methanol	SM 6200 B-2011			X						
Methapyrilene	EPA 625.1			X						
Methapyrilene	EPA 8270C			X	X					
Methapyrilene	EPA 8270D			X	X					
Methapyrilene	EPA 8270E			X	X					
Methoxychlor	EPA 608.3			X						
Methoxychlor	EPA 8081A			X	X					
Methoxychlor	EPA 8081B			X	X					
Methyl acetate	EPA 624.1			X						
Methyl acetate	EPA 8260B			X	X					
Methyl acetate	EPA 8260C			X	X					
Methyl acetate	EPA 8260D			X	X					
Methyl acetate	SM 6200 B-2011			X						
Methyl acrylate	EPA 624.1			X						
Methyl acrylate	EPA 8260B			X	X					

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Methyl acrylate	EPA 8260C			X	X					
Methyl acrylate	EPA 8260D			X	X					
Methyl acrylate	SM 6200 B-2011			X						
Methyl bromide (Bromomethane)	EPA 624.1			X						
Methyl bromide (Bromomethane)	EPA 8260B			X	X					
Methyl bromide (Bromomethane)	EPA 8260C			X	X					
Methyl bromide (Bromomethane)	EPA 8260D			X	X					
Methyl bromide (Bromomethane)	EPA TO-15	X								
Methyl bromide (Bromomethane)	SM 6200 B-2011			X						
Methyl chloride (Chloromethane)	EPA 624.1			X						
Methyl chloride (Chloromethane)	EPA 8260B			X	X					
Methyl chloride (Chloromethane)	EPA 8260C			X	X					
Methyl chloride (Chloromethane)	EPA 8260D			X	X					
Methyl chloride (Chloromethane)	EPA TO-15	X								
Methyl chloride (Chloromethane)	EPA TO-15 GC/MS SIM	X								
Methyl chloride (Chloromethane)	SM 6200 B-2011			X						
Methyl ethyl ketone	EPA 524.2		X							
Methyl iodide	EPA 524.2		X							
Methyl isobutyl ketone	EPA 524.2		X							
Methyl methacrylate	EPA 624.1			X						
Methyl methacrylate	EPA 8260B			X	X					
Methyl methacrylate	EPA 8260C			X	X					
Methyl methacrylate	EPA 8260D			X	X					
Methyl methacrylate	EPA TO-15	X								
Methyl methacrylate	SM 6200 B-2011			X						
Methyl methanesulfonate	EPA 625.1			X						
Methyl methanesulfonate	EPA 8270C			X	X					
Methyl methanesulfonate	EPA 8270D			X	X					
Methyl methanesulfonate	EPA 8270E			X	X					
Methyl parathion (Parathion, methyl)	EPA 1657			X						
Methyl parathion (Parathion, methyl)	EPA 625.1			X						
Methyl parathion (Parathion, methyl)	EPA 8141A			X	X					
Methyl parathion (Parathion, methyl)	EPA 8141B			X	X					

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Methyl parathion (Parathion, methyl)	EPA 8270C			X	X					
Methyl parathion (Parathion, methyl)	EPA 8270D			X	X					
Methyl parathion (Parathion, methyl)	EPA 8270E			X	X					
Methyl tert-butyl ether	EPA 524.2		X							
Methyl tert-butyl ether (MTBE)	EPA 602			X						
Methyl tert-butyl ether (MTBE)	EPA 624.1			X						
Methyl tert-butyl ether (MTBE)	EPA 8021B			X	X					
Methyl tert-butyl ether (MTBE)	EPA 8260B			X	X					
Methyl tert-butyl ether (MTBE)	EPA 8260C			X	X					
Methyl tert-butyl ether (MTBE)	EPA 8260D			X	X					
Methyl tert-butyl ether (MTBE)	EPA TO-15	X								
Methyl tert-butyl ether (MTBE)	IDNR OA-1			X	X					
Methyl tert-butyl ether (MTBE)	LUFT GCMS			X	X					
Methyl tert-butyl ether (MTBE)	MADEP VPH			X	X					
Methyl tert-butyl ether (MTBE)	OK DEQ GRO			X	X					
Methyl tert-butyl ether (MTBE)	SM 6200 B-2011			X						
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	EPA 8330			X	X					
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	EPA 8330A			X	X					
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	EPA 8330B			X	X					
Methylcyclohexane	EPA 624.1			X						
Methylcyclohexane	EPA 8260B			X	X					
Methylcyclohexane	EPA 8260C			X	X					
Methylcyclohexane	EPA 8260D			X	X					
Methylcyclohexane	EPA TO-15	X								
Methylcyclohexane	SM 6200 B-2011			X						
Methylene bromide	EPA 524.2		X							
Methylene chloride	EPA 524.2		X							
Methylene chloride (Dichloromethane)	EPA 624.1			X						
Methylene chloride (Dichloromethane)	EPA 8260B			X	X					
Methylene chloride (Dichloromethane)	EPA 8260C			X	X					
Methylene chloride (Dichloromethane)	EPA 8260D			X	X					
Methylene chloride (Dichloromethane)	EPA TO-15	X								
Methylene chloride (Dichloromethane)	SM 6200 B-2011			X						

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Metolachlor	EPA 507		X	X						
Metribuzin	EPA 507		X	X						
Mevinphos	EPA 1657			X						
Mevinphos	EPA 507			X						
Mevinphos	EPA 8141A			X	X					
Mevinphos	EPA 8141B			X	X					
Microextraction of Organics in Water	EPA 3511			X	X					
Microwave Assisted Acid Digestion of Aqueous Samples	EPA 3015A			X						
Microwave Assisted Acid Digestion of Sediments,	EPA 3051				X					
Microwave Assisted Acid Digestion of Sediments,	EPA 3051A				X					
Microwave Assisted Acid Digestion of Sediments,	EPA 3052				X					
Microwave Extraction	EPA 3546				X					
Mirex	EPA 8270C			X						
Mirex	EPA 8270D			X						
Molybdenum	EPA 200.7		X	X						
Molybdenum	EPA 200.8		X	X						
Molybdenum	EPA 6010B			X	X					
Molybdenum	EPA 6010C			X	X					
Molybdenum	EPA 6010D			X	X					
Molybdenum	EPA 6020			X	X					
Molybdenum	EPA 6020A			X	X					
Molybdenum	EPA 6020B			X	X					
m-Xylene	EPA 624.1			X						
m-Xylene	EPA 8021B			X	X					
m-Xylene	EPA 8260B			X	X					
m-Xylene	EPA 8260C			X	X					
m-Xylene	EPA 8260D			X	X					
m-Xylene	EPA TO-15	X								
m-Xylene	EPA 524.2		X							
Naled	EPA 1657			X						
Naled	EPA 8141A			X	X					
Naled	EPA 8141B			X	X					
Naphthalene	EPA 610 (HPLC)			X						

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Naphthalene	EPA 624.1			X						
Naphthalene	EPA 625.1			X						
Naphthalene	EPA 625.1 SIM			X						
Naphthalene	EPA 8021B			X						
Naphthalene	EPA 8260B			X	X					
Naphthalene	EPA 8260C			X	X					
Naphthalene	EPA 8260D			X	X					
Naphthalene	EPA 8270C			X	X					
Naphthalene	EPA 8270C SIM			X	X					
Naphthalene	EPA 8270D			X	X					
Naphthalene	EPA 8270D SIM			X	X					
Naphthalene	EPA 8270E			X	X					
Naphthalene	EPA 8270E SIM			X	X					
Naphthalene	EPA 8310			X	X					
Naphthalene	EPA TO-15	X								
Naphthalene	MADEP EPH			X	X					
Naphthalene	MADEP VPH			X	X					
Naphthalene	OK DEQ GRO			X	X					
Naphthalene	SM 6200 B-2011			X						
Naphthalene	EPA 524.2		X							
n-Butane	EPA TO-15	X								
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 624.1			X						
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260B			X	X					
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260C			X	X					
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260D			X	X					
n-Butyl alcohol (1-Butanol, n-Butanol)	SM 6200 B-2011			X						
n-Butylbenzene	EPA 524.2		X							
n-Butylbenzene	EPA 624 (extended)			X						
n-Butylbenzene	EPA 624.1			X						
n-Butylbenzene	EPA 8260B			X	X					
n-Butylbenzene	EPA 8260C			X	X					
n-Butylbenzene	EPA 8260D			X	X					
n-Butylbenzene	EPA TO-15	X								

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n-Butylbenzene	SM 6200 B-2011			X						
n-Decane	EPA 625.1			X						
n-Decane	EPA 8270C			X	X					
n-Decane	EPA 8270D			X	X					
n-Decane	EPA 8270E			X	X					
Neptunium-237	EPA 907 Modified (ENV-SOP-MTJL-	X		X	X		X			
n-Heptane	EPA 624.1			X						
n-Heptane	EPA 8260B			X						
n-Heptane	EPA 8260C			X						
n-Heptane	EPA 8260D			X						
n-Heptane	EPA TO-15	X								
n-Hexane	EPA 624.1			X						
n-Hexane	EPA 8260B			X	X					
n-Hexane	EPA 8260C			X	X					
n-Hexane	EPA 8260D			X	X					
n-Hexane	EPA TO-15	X								
n-Hexane	SM 6200 B-2011			X						
n-Hexane Extractable Material (O&G)	EPA 1664A (HEM)			X	X					
n-Hexane Extractable Material (O&G)	EPA 1664A (SGT-HEM)			X						
n-Hexane Extractable Material (O&G)	EPA 1664B			X						
n-Hexane Extractable Material (O&G)	EPA 9070A			X						
n-Hexane Extractable Material (O&G)	EPA 9071A				X					
n-Hexane Extractable Material (O&G)	EPA 9071B				X					
Nickel	EPA 200.7		X	X						
Nickel	EPA 200.8		X	X						
Nickel	EPA 6010B			X	X					
Nickel	EPA 6010C			X	X					
Nickel	EPA 6010D			X	X					
Nickel	EPA 6020			X	X					
Nickel	EPA 6020A			X	X					
Nickel	EPA 6020B			X	X					
Nitrate as N	EPA 300.0		X	X	X					
Nitrate as N	EPA 353.2		X							

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Nitrate as N	EPA 9056			X	X					
Nitrate as N	EPA 9056A			X	X					
Nitrate as N	SM 4110 B-2011		X	X						
Nitrate as N	SM 4500-NO_3^- F-2011		X	X						
Nitrate-Nitrite	EPA 300.0		X	X	X					
Nitrate-Nitrite	EPA 353.2		X	X						
Nitrate-Nitrite	EPA 9056			X	X					
Nitrate-Nitrite	EPA 9056A			X	X					
Nitrate-Nitrite	SM 4110 B-2011		X	X						
Nitrate-Nitrite	SM 4500-NO_3^- F-2011		X	X						
Nitrite as N	EPA 300.0		X	X	X					
Nitrite as N	EPA 353.2		X							
Nitrite as N	EPA 9056			X	X					
Nitrite as N	EPA 9056A			X	X					
Nitrite as N	SM 4110 B-2011		X	X						
Nitrite as N	SM 4500-NO_3^- F-2011		X							
Nitrobenzene	EPA 625.1			X						
Nitrobenzene	EPA 8270C			X	X					
Nitrobenzene	EPA 8270D			X	X					
Nitrobenzene	EPA 8270E			X	X					
Nitrobenzene	EPA 8330			X	X					
Nitrobenzene	EPA 8330A			X	X					
Nitrobenzene	EPA 8330B			X	X					
Nitrocellulose	EPA 353.2 Modified			X	X					
Nitrocellulose	US Army #ADA067081			X	X					
Nitroglycerin	EPA 8330			X	X					
Nitroglycerin	EPA 8330A			X	X					
Nitroglycerin	EPA 8330B			X	X					
Nitroguanidine	EPA 8330			X	X					
Nitroguanidine	EPA 8330A			X	X					
Nitroguanidine	EPA 8330B			X	X					
n-Nitrosodiethylamine	EPA 625.1			X						
n-Nitrosodiethylamine	EPA 8270C			X	X					

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n-Nitrosodiethylamine	EPA 8270D			X	X					
n-Nitrosodiethylamine	EPA 8270E			X	X					
n-Nitrosodimethylamine	EPA 625.1			X						
n-Nitrosodimethylamine	EPA 625.1 SIM			X						
n-Nitrosodimethylamine	EPA 8270C			X	X					
n-Nitrosodimethylamine	EPA 8270C SIM			X	X					
n-Nitrosodimethylamine	EPA 8270D			X	X					
n-Nitrosodimethylamine	EPA 8270D SIM			X	X					
n-Nitrosodimethylamine	EPA 8270E			X	X					
n-Nitrosodimethylamine	EPA 8270E SIM				X					
n-Nitroso-di-n-butylamine	EPA 625.1			X						
n-Nitroso-di-n-butylamine	EPA 8260B			X						
n-Nitroso-di-n-butylamine	EPA 8260C			X						
n-Nitroso-di-n-butylamine	EPA 8260D			X						
n-Nitroso-di-n-butylamine	EPA 8270C			X	X					
n-Nitroso-di-n-butylamine	EPA 8270D			X	X					
n-Nitroso-di-n-butylamine	EPA 8270E			X	X					
n-Nitrosodi-n-propylamine	EPA 625.1			X						
n-Nitrosodi-n-propylamine	EPA 8270C			X	X					
n-Nitrosodi-n-propylamine	EPA 8270D			X	X					
n-Nitrosodi-n-propylamine	EPA 8270E			X	X					
n-Nitrosodiphenylamine	EPA 625.1			X						
n-Nitrosodiphenylamine	EPA 8270C			X	X					
n-Nitrosodiphenylamine	EPA 8270D			X	X					
n-Nitrosodiphenylamine	EPA 8270E			X	X					
n-Nitrosomethylethylamine	EPA 625.1			X						
n-Nitrosomethylethylamine	EPA 8270C			X	X					
n-Nitrosomethylethylamine	EPA 8270D			X	X					
n-Nitrosomethylethylamine	EPA 8270E			X	X					
n-Nitrosomorpholine	EPA 625.1			X						
n-Nitrosomorpholine	EPA 8270C			X	X					
n-Nitrosomorpholine	EPA 8270D			X	X					
n-Nitrosomorpholine	EPA 8270E			X	X					

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n-Nitrosopiperidine	EPA 625.1			X						
n-Nitrosopiperidine	EPA 8270C			X	X					
n-Nitrosopiperidine	EPA 8270D			X	X					
n-Nitrosopiperidine	EPA 8270E			X	X					
n-Nitrosopyrrolidine	EPA 625.1			X						
n-Nitrosopyrrolidine	EPA 8270C			X	X					
n-Nitrosopyrrolidine	EPA 8270D			X	X					
n-Nitrosopyrrolidine	EPA 8270E			X	X					
n-Nonane	EPA TO-15	X								
n-Octadecane	EPA 625.1			X						
n-Octadecane	EPA 8270C			X	X					
n-Octadecane	EPA 8270D			X	X					
n-Octadecane	EPA 8270E			X	X					
n-Octane	EPA 8260B			X	X					
n-Octane	EPA 8260C			X	X					
n-Octane	EPA 8260D			X	X					
n-Octane	SM 6200 B-2011			X						
NOEC (ON) Growth	EPA 1000.0 - Fathead minnow, 7-day			X						
NOEC Reproduction	EPA 1002.0 - Ceriodaphnia dubia,			X						
NOEC Survival	EPA 1000.0 - Fathead minnow, 7-day			X						
NOEC Survival	EPA 1002.0 - Ceriodaphnia dubia,			X						
NOEC Survival	EPA 2002 Ceriodaphnia dubia			X						
non-Polar Extractable Material (TPH)	EPA 1664A (HEM)			X						
n-Pentane	EPA TO-15	X								
n-Propane	EPA RSK-175 (GC/FID)			X						
n-Propylbenzene	EPA 524.2		X							
n-Propylbenzene	EPA 624 (extended)			X						
n-Propylbenzene	EPA 624.1			X						
n-Propylbenzene	EPA 8260B			X	X					
n-Propylbenzene	EPA 8260C			X	X					
n-Propylbenzene	EPA 8260D			X	X					
n-Propylbenzene	EPA TO-15	X								
n-Propylbenzene	SM 6200 B-2011			X						

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o,o,o-Triethyl phosphorothioate	EPA 625.1			X						
o,o,o-Triethyl phosphorothioate	EPA 8270C			X	X					
o,o,o-Triethyl phosphorothioate	EPA 8270D			X	X					
o,o,o-Triethyl phosphorothioate	EPA 8270E			X	X					
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330			X	X					
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330A			X	X					
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330B			X	X					
Odor	SM 2150 B		X	X						
Oil & Grease	EPA 1664A (HEM)			X	X					
Oil & Grease	EPA 1664B			X	X					
Oil & Grease	EPA 1664B (SGT-HEM)			X						
Oil & Grease	EPA 9070A			X						
Oil & Grease	EPA 9071B				X					
Oil-Range Organics (ORO)	EPA 8015B			X	X					
Oil-Range Organics (ORO)	EPA 8015C			X	X					
Oil-Range Organics (ORO)	EPA 8015D			X	X					
Organic nitrogen	EPA 350.1			X						
Organic nitrogen	EPA 351.1			X						
Organic nitrogen	EPA 351.2			X						
Organic nitrogen	EPA 351.2 minus EPA 350.1			X						
Organic nitrogen	EPA 351.3			X						
Organic nitrogen	EPA 351.4			X						
Organic nitrogen	SM 4500-Norg D-2011 minus SM 4500-			X						
Organic nitrogen	TKN minus AMMONIA			X						
Orthophosphate	EPA 9056A				X					
Orthophosphate as P	EPA 300.0				X					
Orthophosphate as P	EPA 365.2		X	X						
Orthophosphate as P	EPA 9056				X					
Orthophosphate as P	EPA 9056A				X					
Orthophosphate as P	SM 4500-P E-2011		X	X						
Oxidation Reduction Potential	SM 2580 B		X							
Oxygen	ASTM D1946-90	X								
Oxygen, dissolved	SM 4500-O C-2011			X						

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Oxygen, dissolved	SM 4500-O G-2011			X						
o-Xylene	EPA 602			X						
o-Xylene	EPA 624.1			X						
o-Xylene	EPA 8021B			X	X					
o-Xylene	EPA 8260B			X	X					
o-Xylene	EPA 8260C			X	X					
o-Xylene	EPA 8260D			X	X					
o-Xylene	EPA TO-15	X								
o-Xylene	IDNR OA-1				X					
o-Xylene	MADEP VPH			X	X					
o-Xylene	OK DEQ GRO				X					
o-Xylene	SM 6200 B-2011			X						
o-Xylene	EPA 524.2		X							
Parathion, ethyl	EPA 1657			X						
Parathion, ethyl	EPA 625.1			X						
Parathion, ethyl	EPA 8141A			X	X					
Parathion, ethyl	EPA 8141B			X	X					
Parathion, ethyl	EPA 8270C			X	X					
Parathion, ethyl	EPA 8270D			X	X					
Parathion, ethyl	EPA 8270E			X	X					
p-Dimethylaminoazobenzene	EPA 625.1			X						
p-Dimethylaminoazobenzene	EPA 8270C			X	X					
p-Dimethylaminoazobenzene	EPA 8270D			X	X					
p-Dimethylaminoazobenzene	EPA 8270E			X	X					
Pentachlorobenzene	EPA 625.1			X						
Pentachlorobenzene	EPA 8270C			X	X					
Pentachlorobenzene	EPA 8270D			X	X					
Pentachlorobenzene	EPA 8270E			X	X					
Pentachloroethane	EPA 624.1			X						
Pentachloroethane	EPA 625 (extended)			X						
Pentachloroethane	EPA 625.1			X						
Pentachloroethane	EPA 8260B			X	X					
Pentachloroethane	EPA 8260C			X	X					

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Pentachloroethane	EPA 8260D			X	X					
Pentachloroethane	EPA 8270C			X	X					
Pentachloroethane	EPA 8270D			X	X					
Pentachloroethane	EPA 8270E			X	X					
Pentachloroethane	SM 6200 B-2011			X						
Pentachloronitrobenzene	EPA 625.1			X						
Pentachloronitrobenzene	EPA 8270C			X	X					
Pentachloronitrobenzene	EPA 8270D			X	X					
Pentachloronitrobenzene	EPA 8270E			X	X					
Pentachlorophenol	EPA 625.1			X						
Pentachlorophenol	EPA 8151A			X	X					
Pentachlorophenol	EPA 8270C			X	X					
Pentachlorophenol	EPA 8270D			X	X					
Pentachlorophenol	EPA 8270E			X	X					
Pentaerythritoltetranitrate	EPA 8330			X	X					
Pentaerythritoltetranitrate	EPA 8330A			X	X					
Pentaerythritoltetranitrate	EPA 8330B			X	X					
Percent ash	ASTM D482				X					
Perchlorate	EPA 314.0		X	X	X					
Petroleum Organics	CT ETPH				X					
Petroleum Organics	FL PRO				X					
Petroleum Organics	LUFT GC				X					
Petroleum Organics	NWTPH-HCID			X	X					
Petroleum Organics	Texas 1006			X	X					
Petroleum Volatile Organic Compounds (PVOC)	WI(95) GRO			X	X					
pH	EPA 150.1		X	X						
pH	EPA 9040B			X	X					
pH	EPA 9040C			X	X					
pH	EPA 9045C			X	X					
pH	EPA 9045D			X	X					
pH	SM 4500-H+ B-2011		X	X						
Phenacetin	EPA 625.1			X						
Phenacetin	EPA 8270C			X	X					

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Phenacetin	EPA 8270D			X	X					
Phenacetin	EPA 8270E			X	X					
Phenanthrene	EPA 610 (HPLC)			X						
Phenanthrene	EPA 625.1			X						
Phenanthrene	EPA 625.1 SIM			X						
Phenanthrene	EPA 8270C			X	X					
Phenanthrene	EPA 8270C SIM			X	X					
Phenanthrene	EPA 8270D			X	X					
Phenanthrene	EPA 8270D SIM			X	X					
Phenanthrene	EPA 8270E			X	X					
Phenanthrene	EPA 8270E SIM			X	X					
Phenanthrene	EPA 8310			X	X					
Phenanthrene	MADEP EPH			X	X					
Phenol	EPA 420.4			X						
Phenol	EPA 625.1			X						
Phenol	EPA 8270C			X	X					
Phenol	EPA 8270D			X	X					
Phenol	EPA 8270E			X	X					
Phenols	EPA 420.1		X							
Phenols	EPA 420.4		X							
Phenols	SM 3500 D-2005		X							
Phorate	EPA 1657			X						
Phorate	EPA 625.1			X						
Phorate	EPA 8141A			X	X					
Phorate	EPA 8141B			X	X					
Phorate	EPA 8270C			X	X					
Phorate	EPA 8270D			X	X					
Phorate	EPA 8270E			X	X					
Phosmet (Imidan)	EPA 8141A			X						
Phosmet (Imidan)	EPA 8141B			X						
Phosphorus	EPA 200.7		X	X						
Phosphorus	EPA 6010B			X						
Phosphorus	EPA 6010C			X	X					

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Phosphorus	EPA 6010D			X						
Photon Emitters	DOE 4.5.2.3				X					
Photon Emitters	EPA 901.1			X						
Photon Emitters	HASL 300 Ga-01-R				X					
Phthalic anhydride	EPA 625.1			X						
Phthalic anhydride	EPA 8270C			X	X					
Phthalic anhydride	EPA 8270D			X	X					
Phthalic anhydride	EPA 8270E				X					
Pimephales promelas	EPA 1000			X						
Pimephales promelas	EPA 2000			X						
Plutonium-238	EPA 907 Modified (ENV-SOP-MTJL-	X		X	X		X			
Plutonium-239/240	EPA 907 Modified (ENV-SOP-MTJL-	X		X	X		X			
Plutonium-241	EPA 907 Modified (ENV-SOP-MTJL-	X		X	X		X			
Polonium-210	DOE EML Po-02-RC			X						
Polonium-210	HASL 300 Po-02-RC	X		X	X		X			
Potassium	EPA 200.7		X	X						
Potassium	EPA 200.8			X						
Potassium	EPA 6010B			X	X					
Potassium	EPA 6010C			X	X					
Potassium	EPA 6010D			X	X					
Potassium	EPA 6020			X	X					
Potassium	EPA 6020A			X	X					
Potassium	EPA 6020B			X	X					
Preparation/Extraction	EPA 200.2			X						
Pronamide (Kerb)	EPA 625.1			X						
Pronamide (Kerb)	EPA 8270C			X	X					
Pronamide (Kerb)	EPA 8270D			X	X					
Pronamide (Kerb)	EPA 8270E			X	X					
Propane	EPA RSK-175 (GC/FID)	X		X						
Propionitrile (Ethyl cyanide)	EPA 624.1			X						
Propionitrile (Ethyl cyanide)	EPA 8260B			X	X					
Propionitrile (Ethyl cyanide)	EPA 8260C			X	X					
Propionitrile (Ethyl cyanide)	EPA 8260D			X	X					

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Propionitrile (Ethyl cyanide)	SM 6200 B-2011			X						
Propylene	EPA TO-15	X								
Propylene Glycol	EPA 8015B			X	X					
Propylene Glycol	EPA 8015C			X						
Propylene Glycol	EPA 8015C (extended)			X	X					
Propylene Glycol	EPA 8015D			X	X					
Purge and trap for aqueous phase samples	EPA 5030			X						
Purge and trap for aqueous phase samples	EPA 5030A			X						
Purge and trap for aqueous phase samples	EPA 5030B			X						
Purge and trap for aqueous phase samples	EPA 5030C			X						
p-Xylene	EPA 624.1			X						
p-Xylene	EPA 8021B			X	X					
p-Xylene	EPA 8260B			X	X					
p-Xylene	EPA 8260C			X	X					
p-Xylene	EPA 8260D			X	X					
p-Xylene	EPA TO-15	X								
Pyrene	EPA 610 (HPLC)			X						
Pyrene	EPA 625.1			X						
Pyrene	EPA 625.1 SIM			X						
Pyrene	EPA 8270C			X	X					
Pyrene	EPA 8270C SIM			X	X					
Pyrene	EPA 8270D			X	X					
Pyrene	EPA 8270D SIM			X	X					
Pyrene	EPA 8270E			X	X					
Pyrene	EPA 8270E SIM			X	X					
Pyrene	EPA 8310			X	X					
Pyrene	MADEP EPH			X	X					
Pyridine	EPA 625.1			X						
Pyridine	EPA 8270C			X	X					
Pyridine	EPA 8270D			X	X					
Pyridine	EPA 8270E			X	X					
Quinoline	EPA 625.1			X						
Quinoline	EPA 8270C			X	X					

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Quinoline	EPA 8270D			X	X					
Quinoline	EPA 8270E			X	X					
Radium-226	EPA 903.0		X							
Radium-226	EPA 903.1			X	X					
Radium-226	EPA 9315			X						
Radium-226	HASL 300 Ra-04-RC				X					
Radium-226	SM 7500 Ra B Modified	X		X	X		X			
Radium-226	SM 7500-Ra B		X	X						
Radium-226	SM 7500-Ra B (GPC)			X	X					
Radium-228	EPA 904			X						
Radium-228	EPA 904.0		X	X	X					
Radium-228	EPA 9320			X	X					
Radon	SM 7500-Rn B		X	X						
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330			X	X					
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330A			X	X					
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330B			X	X					
Reactive Cyanide	EPA 9010C				X					
Reactive Cyanide	EPA 9014			X						
Reactive sulfide	EPA 9034			X	X					
Residue-filterable (TDS)	SM 2540 C-2011			X						
Residue-nonfilterable (TSS)	SM 2540 D-2011			X						
Residue-nonfilterable (TSS)	USGS I-3765-85			X						
Residue-settleable	SM 2540 F-2011			X						
Residue-total	SM 2540 B-2011			X						
Residue-volatile	EPA 160.4			X						
Residue-volatile	SM 2540 E-2011			X						
Ronnel	EPA 1657			X						
Ronnel	EPA 8141A			X	X					
Ronnel	EPA 8141B			X	X					
Safrole	EPA 625.1			X						
Safrole	EPA 8270C			X	X					
Safrole	EPA 8270D			X	X					
Safrole	EPA 8270E			X	X					

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Salinity	SM 2520 B-2011			X						
sec-Butylbenzene	EPA 524.2		X							
sec-Butylbenzene	EPA 624 (extended)			X						
sec-Butylbenzene	EPA 624.1			X						
sec-Butylbenzene	EPA 8260B			X	X					
sec-Butylbenzene	EPA 8260C			X	X					
sec-Butylbenzene	EPA 8260D			X	X					
sec-Butylbenzene	EPA TO-15	X								
sec-Butylbenzene	SM 6200 B-2011			X						
Selenium	EPA 200.7		X	X						
Selenium	EPA 200.8		X	X						
Selenium	EPA 6010B			X	X					
Selenium	EPA 6010C			X	X					
Selenium	EPA 6010D			X	X					
Selenium	EPA 6020			X	X					
Selenium	EPA 6020A			X	X					
Selenium	EPA 6020B			X	X					
Separatory Funnel Liquid-liquid extraction	EPA 3510C			X						
Silica as SiO2	EPA 200.7		X	X						
Silica as SiO2	EPA 6010B			X						
Silica as SiO2	EPA 6010C			X						
Silica as SiO2	EPA 6010D			X						
Silica Gel Clean-up	EPA 3630C			X	X					
Silica Gel Treated n-hexane Extractable Material (SGT-	EPA 1664A (HEM)			X	X					
Silica Gel Treated n-hexane Extractable Material (SGT-	EPA 1664B				X					
Silica Gel Treated n-hexane Extractable Material (SGT-	EPA 9071B				X					
Silica-dissolved	EPA 200.7			X						
Silicon	EPA 200.7			X						
Silicon	EPA 6010B			X						
Silicon	EPA 6010C			X						
Silicon	EPA 6010D			X						
Silver	EPA 200.7		X	X						
Silver	EPA 200.8		X	X						

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Silver	EPA 6010B			X	X					
Silver	EPA 6010C			X	X					
Silver	EPA 6010D			X	X					
Silver	EPA 6020			X	X					
Silver	EPA 6020A			X	X					
Silver	EPA 6020B			X	X					
Silvex (2,4,5-TP)	EPA 8151A			X	X					
Silvex (2,4,5-TP)	SM 6640 B-2001			X						
Silvex (2,4,5-TP)	SM 6640 B-2006			X						
Simazine	EPA 507		X	X						
Simazine	EPA 8141B			X						
Sodium	EPA 200.7		X	X						
Sodium	EPA 200.8			X						
Sodium	EPA 6010B			X	X					
Sodium	EPA 6010C			X	X					
Sodium	EPA 6010D			X	X					
Sodium	EPA 6020			X	X					
Sodium	EPA 6020A			X	X					
Sodium	EPA 6020B			X	X					
Solid-Phase Extraction (SPE)	EPA 3535A			X						
Soxhlet Extraction	EPA 3540C				X					
Specific Gravity (Relative Density)	SM 2710 F-2011			X						
Specific Gravity of Sludge	SM 2710 F-2011				X					
Stirophos	EPA 1657			X						
Stirophos	EPA 8141A			X	X					
Stirophos	EPA 8141B			X	X					
Strontium	EPA 200.7		X	X						
Strontium	EPA 200.8			X						
Strontium	EPA 6010B			X	X					
Strontium	EPA 6010C			X	X					
Strontium	EPA 6010D			X	X					
Strontium	EPA 6020			X	X					
Strontium	EPA 6020A			X	X					

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Strontium	EPA 6020B			X	X					
Strontium-89	DOE EML Sr-01-RC				X					
Strontium-89	EPA 905.0			X	X					
Strontium-89	HASL 300 Sr-01-RC (GPC)				X					
Strontium-89, 90	EPA 905		X	X						
Strontium-90	DOE EML Sr-02-RC				X					
Strontium-90	EPA 905		X	X						
Strontium-90	EPA 905.0			X	X					
Strontium-90	HASL 300 Sr-02-RC (GPC)				X					
Styrene	EPA 624.1			X						
Styrene	EPA 8260B			X	X					
Styrene	EPA 8260C			X	X					
Styrene	EPA 8260D			X	X					
Styrene	EPA TO-15	X								
Styrene	SM 6200 B-2011			X						
Styrene	EPA 524.2		X							
Sulfate	EPA 300.0		X	X	X					
Sulfate	EPA 9056			X	X					
Sulfate	EPA 9056A			X	X					
Sulfate	SM 4110 B-2011		X	X						
Sulfide	EPA 9030A				X					
Sulfide	EPA 9030B			X	X					
Sulfide	EPA 9034			X	X					
Sulfide	SM 4500-$S2^{-}$ D-2011			X						
Sulfite-SO3	SM 4500-$SO3^{-}$ B-2011			X						
Sulfotepp	EPA 1657			X						
Sulfotepp	EPA 625.1			X						
Sulfotepp	EPA 8141A			X	X					
Sulfotepp	EPA 8141B			X	X					
Sulfotepp	EPA 8270C			X	X					
Sulfotepp	EPA 8270D			X	X					
Sulfotepp	EPA 8270E			X	X					
Sulfur	EPA 6010B			X						

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Sulfur	EPA 6010C			X						
Sulfur	EPA 6010D			X						
Sulfur Clean-Up	EPA 3660B			X	X					
Sulfuric acid/permanganate clean-up	EPA 3665A			X	X					
Surfactants - MBAS	SM 5540 C-2011		X	X						
Synthetic Precipitation Leaching Procedure	EPA 1312			X	X					
T-amylmethylether (TAME)	EPA 624.1			X						
T-amylmethylether (TAME)	EPA 8260B			X	X					
T-amylmethylether (TAME)	EPA 8260C			X	X					
T-amylmethylether (TAME)	EPA 8260D			X	X					
T-amylmethylether (TAME)	SM 6200 B-2011			X						
Technetium-99	DOE EML Tc-02-RC	X		X	X		X			
Temperature, deg. C	SM 2550 B-2000		X	X						
Terbufos	EPA 8141A			X						
Terbufos	EPA 8141B			X	X					
tert-Amyl-ethyl ether (TAEE)	EPA 8260B (extended)			X	X					
tert-Amyl-ethyl ether (TAEE)	EPA 8260C			X	X					
tert-Amyl-ethyl ether (TAEE)	EPA 8260D				X					
tert-Amyl-ethyl ether (TAEE)	EPA TO-15	X								
tert-Amyl-ethyl ether (TAEE)	SM 6200 B-2011			X						
tert-Butyl alcohol	EPA 602			X						
tert-Butyl alcohol	EPA 624.1			X						
tert-Butyl alcohol	EPA 8260B			X	X					
tert-Butyl alcohol	EPA 8260C			X	X					
tert-Butyl alcohol	EPA 8260D			X	X					
tert-Butyl alcohol	EPA TO-15	X								
tert-Butyl alcohol	SM 6200 B-2011			X						
tert-Butyl formate	EPA 624.1			X						
tert-Butyl formate	EPA 8260B			X	X					
tert-Butyl formate	EPA 8260C			X	X					
tert-Butyl formate	EPA 8260D				X					
tert-Butyl formate	SM 6200 B-2011			X						
tert-Butylbenzene	EPA 524.2		X							

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tert-Butylbenzene	EPA 624 (extended)			X						
tert-Butylbenzene	EPA 624.1			X						
tert-Butylbenzene	EPA 8260B			X	X					
tert-Butylbenzene	EPA 8260C			X	X					
tert-Butylbenzene	EPA 8260D			X	X					
tert-Butylbenzene	EPA TO-15	X								
tert-Butylbenzene	SM 6200 B-2011			X						
Tetrachloroethene	EPA 524.2		X							
Tetrachloroethylene (Perchloroethylene)	EPA 624.1			X						
Tetrachloroethylene (Perchloroethylene)	EPA 8260B			X	X					
Tetrachloroethylene (Perchloroethylene)	EPA 8260C			X	X					
Tetrachloroethylene (Perchloroethylene)	EPA 8260D			X	X					
Tetrachloroethylene (Perchloroethylene)	EPA TO-15	X								
Tetrachloroethylene (Perchloroethylene)	EPA TO-15 GC/MS SIM	X								
Tetrachloroethylene (Perchloroethylene)	SM 6200 B-2011			X						
Tetrachlorovinphos	EPA 8141B			X						
Tetraethyl pyrophosphate (TEPP)	EPA 1657			X						
Tetraethyl pyrophosphate (TEPP)	EPA 8141A			X	X					
Tetraethyl pyrophosphate (TEPP)	EPA 8141B			X	X					
Tetrahydrofuran	EPA 524.2		X							
Tetrahydrofuran (THF)	EPA 624.1			X						
Tetrahydrofuran (THF)	EPA 8260B			X	X					
Tetrahydrofuran (THF)	EPA 8260C			X	X					
Tetrahydrofuran (THF)	EPA 8260D			X	X					
Tetrahydrofuran (THF)	EPA TO-15	X								
Tetrahydrofuran (THF)	SM 6200 B-2011			X						
Thallium	EPA 200.7		X	X						
Thallium	EPA 200.8		X	X						
Thallium	EPA 6010B			X	X					
Thallium	EPA 6010C			X	X					
Thallium	EPA 6010D			X	X					
Thallium	EPA 6020			X	X					
Thallium	EPA 6020A			X	X					

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Thallium	EPA 6020B			X	X					
Thionazin (Zinophos)	EPA 625.1			X						
Thionazin (Zinophos)	EPA 8270C			X	X					
Thionazin (Zinophos)	EPA 8270D			X	X					
Thionazin (Zinophos)	EPA 8270E			X	X					
Thorium	EPA 200.8			X						
Thorium	EPA 6020			X	X					
Thorium	EPA 6020A			X	X					
Thorium	EPA 6020B			X	X					
Thorium-228	LANL ER200 Modified	X		X	X		X			
Thorium-230	LANL ER200 Modified	X		X	X		X			
Thorium-232	LANL ER200 Modified	X		X	X		X			
Tin	EPA 200.7		X	X						
Tin	EPA 200.8		X	X						
Tin	EPA 6010B			X	X					
Tin	EPA 6010C			X	X					
Tin	EPA 6010D			X	X					
Tin	EPA 6020			X	X					
Tin	EPA 6020A			X	X					
Tin	EPA 6020B			X	X					
Titanium	EPA 200.7		X	X						
Titanium	EPA 200.8			X						
Titanium	EPA 6010B			X	X					
Titanium	EPA 6010C			X	X					
Titanium	EPA 6010D			X	X					
Titanium	EPA 6020			X	X					
Titanium	EPA 6020A			X	X					
Titanium	EPA 6020B			X	X					
Tokuthion (Prothiophos)	EPA 1657			X						
Tokuthion (Prothiophos)	EPA 8141A			X	X					
Tokuthion (Prothiophos)	EPA 8141B			X	X					
Toluene	EPA 602			X						
Toluene	EPA 624.1			X						

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Toluene	EPA 8021B			X	X					
Toluene	EPA 8260B			X	X					
Toluene	EPA 8260C			X	X					
Toluene	EPA 8260D			X	X					
Toluene	EPA TO-15	X								
Toluene	IDNR OA-1			X	X					
Toluene	LUFT GCMS			X	X					
Toluene	MADEP VPH			X	X					
Toluene	OK DEQ GRO			X	X					
Toluene	SM 6200 B-2011			X						
Toluene	EPA 524.2		X							
Total coliforms	SM 9223 B-2004		X	X						
Total Cyanide	EPA 335.4			X						
Total Cyanide	EPA 9010B			X						
Total Cyanide	EPA 9010C			X	X					
Total Cyanide	EPA 9012A			X	X					
Total Cyanide	EPA 9012B			X	X					
Total Cyanide	EPA 9014			X	X					
Total Cyanide	SM 4500-CN^- B-2011			X						
Total Cyanide	SM 4500-CN^- C-2011			X						
Total Cyanide	SM 4500-CN^- E-2011			X						
Total Dissolved Solids	SM 2540 C-2011		X							
Total Haloacetic Acids	EPA 552.2		X							
Total hardness as CaCO3	EPA 130.1			X						
Total hardness as CaCO3	EPA 200.7			X						
Total hardness as CaCO3	EPA 200.8			X						
Total hardness as CaCO3	EPA 6010B			X						
Total hardness as CaCO3	EPA 6010C			X	X					
Total hardness as CaCO3	EPA 6010D			X						
Total hardness as CaCO3	SM 2340 B-2011			X						
Total hardness as CaCO3	SM 2340 C-2011			X						
Total Nitrate+Nitrite	EPA 300.0			X						
Total Organic Carbon	ASTM F1647-02A				X					

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Total Organic Carbon	EPA 9060			X						
Total Organic Carbon	EPA 9060A			X						
Total Organic Carbon	SM 5310 B-2011		X	X						
Total Organic Carbon	SM 5310 C-2011		X							
Total Organic Carbon	USDA LOI				X					
Total Organic Carbon	Walkley-Black Method				X					
Total Organic Halides (TOX)	EPA 9020B			X						
Total Organic Halides (TOX)	EPA 9076				X					
Total Organic Halides (TOX)	SM 5320 B-2010			X						
Total Petroleum Hydrocarbons (>C12-C28)	TNRCC 1005			X	X					
Total Petroleum Hydrocarbons (>C28-C35)	TNRCC 1005			X	X					
Total Petroleum Hydrocarbons (Aviation Gasoline Range)	EPA 8015B			X	X					
Total Petroleum Hydrocarbons (Aviation Gasoline Range)	EPA 8015C			X	X					
Total Petroleum Hydrocarbons (Aviation Gasoline Range)	EPA 8015D			X	X					
Total Petroleum Hydrocarbons (C6-C12)	TNRCC 1005			X	X					
Total Petroleum Hydrocarbons (C6-C35)	TNRCC 1005			X	X					
Total Petroleum Hydrocarbons (C8-C40)	EPA 8015B			X	X					
Total Petroleum Hydrocarbons (C8-C40)	EPA 8015C			X	X					
Total Petroleum Hydrocarbons (C8-C40)	EPA 8015D			X	X					
Total Petroleum Hydrocarbons (Gasoline Range)	TN GRO				X					
Total Petroleum Hydrocarbons (Jet Fuel Range)	EPA 8015B			X	X					
Total Petroleum Hydrocarbons (Jet Fuel Range)	EPA 8015C			X	X					
Total Petroleum Hydrocarbons (Jet Fuel Range)	EPA 8015D			X	X					
Total Petroleum Hydrocarbons (Oil Range)	EPA 8015B			X	X					
Total Petroleum Hydrocarbons (Oil Range)	EPA 8015C			X	X					
Total Petroleum Hydrocarbons (Oil Range)	EPA 8015D			X	X					
Total Petroleum Hydrocarbons (TPH)	EPA 8015B			X	X					
Total Petroleum Hydrocarbons (TPH)	EPA 8015C			X	X					
Total Petroleum Hydrocarbons (TPH)	EPA 8015D			X	X					
Total Petroleum Hydrocarbons (TPH)	FL PRO			X						
Total Petroleum Hydrocarbons (TPH)	TNRCC 1005			X	X					
Total Phenolics	EPA 420.1			X	X					
Total Phenolics	EPA 420.2				X					

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Total Phenolics	EPA 420.4			X						
Total Phenolics	EPA 9066			X	X					
Total Phenolics	SM 5530 D			X						
Total Phosphorus	EPA 365.1			X						
Total Phosphorus	EPA 365.4			X	X					
Total Phosphorus	EPA 6010B				X					
Total Phosphorus	EPA 6010C				X					
Total Phosphorus	EPA 6010D				X					
Total Phosphorus	SM 4500-P B 5-2011			X						
Total Phosphorus	SM 4500-P H-2011			X						
Total Purgeable Hydrocarbons (C5-C12)	MADEP VPH			X	X					
Total radium	EPA 903.0 (GPC)		X	X						
Total radium	EPA 9315			X	X					
Total radium	SM 7500-Ra B (GPC)			X						
Total radium	SM 7500-Ra B (GPC)-2001			X						
Total residual chlorine	SM 4500-Cl G-2011			X						
Total Suspended Solids	SM 2540 D-2011		X							
Total Trihalomethanes	EPA 524.2		X							
Total, Fixed, and Volatile Residue	SM 2540 G			X	X					
Total, Fixed, and Volatile Residue	SM 2540 G-2011			X						
Toxaphene (Chlorinated camphene)	EPA 608.3			X						
Toxaphene (Chlorinated camphene)	EPA 8081A			X	X					
Toxaphene (Chlorinated camphene)	EPA 8081B			X	X					
Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311			X	X					
trans-1,2-Dichloroethene	EPA 524.2		X							
trans-1,2-Dichloroethylene	EPA 624.1			X						
trans-1,2-Dichloroethylene	EPA 8260B			X	X					
trans-1,2-Dichloroethylene	EPA 8260C			X	X					
trans-1,2-Dichloroethylene	EPA 8260D			X	X					
trans-1,2-Dichloroethylene	EPA TO-15	X								
trans-1,2-Dichloroethylene	SM 6200 B-2011			X						
trans-1,3-Dichloropropene	EPA TO-15	X								
trans-1,3-Dichloropropene	EPA 524.2		X							

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trans-1,3-Dichloropropylene	EPA 624.1			X						
trans-1,3-Dichloropropylene	EPA 8260B			X	X					
trans-1,3-Dichloropropylene	EPA 8260C			X	X					
trans-1,3-Dichloropropylene	EPA 8260D			X	X					
trans-1,3-Dichloropropylene	EPA TO-15	X								
trans-1,3-Dichloropropylene	EPA TO-15 GC/MS SIM	X								
trans-1,3-Dichloropropylene	SM 6200 B-2011			X						
trans-1,4-Dichloro-2-butene	EPA 624.1			X						
trans-1,4-Dichloro-2-butene	EPA 8260B			X	X					
trans-1,4-Dichloro-2-butene	EPA 8260C			X	X					
trans-1,4-Dichloro-2-butene	EPA 8260D			X	X					
trans-1,4-Dichloro-2-butene	SM 6200 B-2011			X						
trans-Diallate	EPA 8270C			X						
trans-Isosafrole	EPA 8270C			X						
Trichloroacetic acid	EPA 552.2		X							
Trichloroethene	EPA 524.2		X							
Trichloroethene (Trichloroethylene)	EPA 624.1			X						
Trichloroethene (Trichloroethylene)	EPA 8260B			X	X					
Trichloroethene (Trichloroethylene)	EPA 8260C			X	X					
Trichloroethene (Trichloroethylene)	EPA 8260D			X	X					
Trichloroethene (Trichloroethylene)	EPA TO-15	X								
Trichloroethene (Trichloroethylene)	SM 6200 B-2011			X						
Trichlorofluoromethane	EPA 524.2		X							
Trichlorofluoromethane (Fluorotrichloromethane, Freon	EPA 624.1			X						
Trichlorofluoromethane (Fluorotrichloromethane, Freon	EPA 8260B			X	X					
Trichlorofluoromethane (Fluorotrichloromethane, Freon	EPA 8260C			X	X					
Trichlorofluoromethane (Fluorotrichloromethane, Freon	EPA 8260D			X	X					
Trichlorofluoromethane (Fluorotrichloromethane, Freon	EPA TO-15	X								
Trichlorofluoromethane (Fluorotrichloromethane, Freon	SM 6200 B-2011			X						
Trichloronate	EPA 1657			X						
Trichloronate	EPA 8141A			X	X					
Trichloronate	EPA 8141B			X	X					
Triclosan	EPA 8270C			X						

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Triclosan	EPA 8270D			X						
Triclosan	EPA 8270E			X						
tris-(2,3-Dibromopropyl) phosphate (tris-BP)	EPA 8270C			X	X					
tris-(2,3-Dibromopropyl) phosphate (tris-BP)	EPA 8270D			X	X					
tris-(2,3-Dibromopropyl) phosphate (tris-BP)	EPA 8270E				X					
Tritium	EPA 906		X	X						
Tritium	EPA 906 (Modified)				X					
Tritium	EPA 906.0			X						
Turbidity	EPA 180.1		X	X						
Turbidity	SM 2130 B-2011		X	X						
Ultrasonic Extraction	EPA 3550B				X					
Ultrasonic Extraction	EPA 3550C				X					
Uranium	ASTM D5174-02		X	X						
Uranium	ASTM D5174-07 Modified (ENV-SOP-	X			X		X			
Uranium	ASTM D5174-97		X	X						
Uranium	DOE EML U-02-RC				X					
Uranium	EPA 200.8		X	X						
Uranium	EPA 6020			X	X					
Uranium	EPA 6020A			X	X					
Uranium	EPA 6020B			X	X					
Uranium	HASL 300 U-02-RC				X					
Uranium-234	ASTM D3972-09 Modified (ENV-SOP-	X			X		X			
Uranium-234	DOE EML U-02-RC				X					
Uranium-234	HASL 300 U-02-RC				X					
Uranium-235	ASTM D3972-09 Modified (ENV-SOP-	X			X		X			
Uranium-235	DOE EML U-02-RC				X					
Uranium-235	HASL 300 U-02-RC				X					
Uranium-238	ASTM D3972-09 Modified (ENV-SOP-	X			X		X			
Uranium-238	DOE EML U-02-RC				X					
Uranium-238	HASL 300 U-02-RC				X					
UV254	SM 5910 B-2011		X							
Vanadium	EPA 200.7		X	X						
Vanadium	EPA 200.8		X	X						

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Vanadium	EPA 6010B			X	X					
Vanadium	EPA 6010C			X	X					
Vanadium	EPA 6010D			X	X					
Vanadium	EPA 6020			X	X					
Vanadium	EPA 6020A			X	X					
Vanadium	EPA 6020B			X	X					
Vinyl acetate	EPA 624.1			X						
Vinyl acetate	EPA 8260B			X	X					
Vinyl acetate	EPA 8260C			X	X					
Vinyl acetate	EPA 8260D			X	X					
Vinyl acetate	EPA TO-15	X								
Vinyl acetate	SM 6200 B-2011			X						
Vinyl bromide (Bromoethane)	EPA 624.1			X						
Vinyl bromide (Bromoethane)	EPA 8260			X						
Vinyl bromide (Bromoethane)	EPA 8260B			X	X					
Vinyl bromide (Bromoethane)	EPA 8260C			X	X					
Vinyl bromide (Bromoethane)	EPA 8260D			X	X					
Vinyl bromide (Bromoethane)	EPA TO-15	X								
Vinyl bromide (Bromoethane)	SM 6200 B-2011			X						
Vinyl chloride	EPA 624.1			X						
Vinyl chloride	EPA 8260B			X	X					
Vinyl chloride	EPA 8260C			X	X					
Vinyl chloride	EPA 8260D			X	X					
Vinyl chloride	EPA TO-15	X								
Vinyl chloride	EPA TO-15 GC/MS SIM	X								
Vinyl chloride	SM 6200 B-2011			X						
Vinyl chloride	EPA 524.2		X							
Volatile Petroleum Hydrocarbons (VPH)	MADEP VPH (modified)			X						
Volatile suspended solids	SM 2540 E-2011			X						
VPH Aliphatic >C6-C8	MADEP VPH			X	X					
VPH Aliphatic >C8-C10	MADEP VPH			X	X					
VPH Aliphatic C5-C8	MADEP VPH			X	X					
VPH Aliphatic C5-C8 Unadjusted	MADEP VPH			X	X					

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VPH Aliphatic C9-C12	MADEP VPH			X	X					
VPH Aliphatic C9-C12 Unadjusted	MADEP VPH			X	X					
VPH Aromatic >C8-C10	MADEP VPH			X	X					
VPH Aromatic C9-C10	MADEP EPH			X						
VPH Aromatic C9-C10	MADEP VPH			X	X					
Waste Dilution	EPA 3580A			X	X					
Waste Dilution	EPA 3585				X					
Weak Acid Dissociable Cyanide	SM 4500-CN I			X						
Xylene (mixed isomers, total)	EPA 524.2		X							
Xylene (total)	EPA 602			X						
Xylene (total)	EPA 624.1			X						
Xylene (total)	EPA 8021B			X	X					
Xylene (total)	EPA 8260B			X	X					
Xylene (total)	EPA 8260C			X	X					
Xylene (total)	EPA 8260D			X	X					
Xylene (total)	EPA TO-15	X								
Xylene (total)	IDNR OA-1			X	X					
Xylene (total)	LUFT GCMS			X	X					
Xylene (total)	MADEP VPH				X					
Xylene (total)	OK DEQ GRO			X	X					
Xylene (total)	SM 6200 B-2011			X						
Zinc	EPA 200.7		X	X						
Zinc	EPA 200.8		X	X						
Zinc	EPA 6010B			X	X					
Zinc	EPA 6010C			X	X					
Zinc	EPA 6010D			X	X					
Zinc	EPA 6020			X	X					
Zinc	EPA 6020A			X	X					
Zinc	EPA 6020B			X	X					
Zinc-65	DOE 4.5.2.3				X					
Zinc-65	EPA 901.1			X						
Zinc-65	HASL 300 Ga-01-R				X					

[1] = Laboratory does not hold TNI Accreditation for this test method.

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7.3 Appendix C: Glossary

This glossary provides common terms and definitions used in the laboratory. **It is not intended to be a complete list of all terms and definitions used.** The definitions have been compiled mostly from the TNI Standard and DoD QSM. Although this information has been reproduced with care, errors cannot be entirely excluded. Definitions for the same term also vary between sources. When the meaning of a term used in a laboratory document is different from this glossary or when the glossary does not include the term, the term and definition is included or defined in context in the laboratory document.

Term	Definition
3P Program	PAS-The continuous improvement program used by PAS that focuses on Process, Productivity, and Performance.
Acceptance Criteria	TNI- Specified limits placed on characteristics of an item, process, or service defined in requirement documents.
Accreditation	TNI- The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. DoD- Refers to accreditation in accordance with the DoD ELAP.
Accreditation Body (AB)	TNI- The organization having responsibility and accountability for environmental laboratory accreditation and which grants accreditation under this program. DoD- Entities recognized in accordance with the DoD-ELAP that are required to operate in accordance with ISO/IEC 17011, *Conformity assessment: General requirements for accreditation bodies accrediting conformity assessment bodies*. The AB must be a signatory, in good standing, to the International Laboratory Accreditation Cooperation (ILAC) mutual recognition arrangement (MRA) that verifies, by evaluation and peer assessment, that its signatory members are in full compliance with ISO/IEC 17011 and that its accredited laboratories comply with ISO/IEC 17025.
Accuracy	TNI- The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations; a data quality indicator.
Activity, Absolute	TNI- Rate of nuclear decay occurring in a body of material, equal to the number of nuclear disintegrations per unit time. NOTE: Activity (absolute) may be expressed in becquerels (Bq), curies (Ci), or disintegrations per minute (dpm), and multiples or submultiples of these units.
Activity, Areic	TNI- Quotient of the activity of a body of material and its associated area.
Activity, Massic	TNI- Quotient of the activity of a body of material and its mass; also called specific activity.
Activity, Volumic	TNI- Quotient of the activity of a body of material and its volume; also called activity concentration. NOTE: In this module [TNI Volume 1, Module 6], unless otherwise stated, references to activity shall include absolute activity, areic activity, massic activity, and volumic activity.
Activity Reference Date	TNI- The date (and time, as appropriate to the half-life of the radionuclide) to which a reported activity result is calculated. NOTE: The sample collection date is most frequently used as the Activity Reference Date for environmental measurements, but different programs may specify other points in time for correction of results for decay and ingrowth.
Aliquot	DoD- A discrete, measured, representative portion of a sample taken for analysis.
American Society for Testing and Materials (ASTM)	An international standards organization that develops and publishes voluntary consensus standards for a wide range of materials, products, systems and services.
Analysis	DoD- A combination of sample preparation and instrument determination.
Analysis Code (Acode)	All the set parameters of a test, such as Analytes, Method, Detection Limits and Price.
Analysis Sequence	A compilation of all samples, standards and quality control samples run during a specific amount of time on a particular instrument in the order they are analyzed.
Analyst	TNI- The designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.

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Analyte	TNI- A substance, organism, physical parameter, property, or chemical constituent(s) for which an environmental sample is being analyzed. DoD- The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family and are analyzed together.
Analytical Method	DoD- A formal process that identifies and quantifies the chemical components of interest (target analytes) in a sample.
Analytical Uncertainty	TNI- A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis.
Aliquot	DoD- A discrete, measured, representative portion of a sample taken for analysis.
Annual (or Annually)	Defined by PAS as every 12 months ± 30 days.
Assessment	TNI - The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its system to defined criteria (to the standards and requirements of laboratory accreditation). DoD- An all-inclusive term used to denote any of the following: audit, performance evaluation, peer review, inspection, or surveillance conducted on-site.
Atomic Absorption Spectrometer	Instrument used to measure concentration in metals samples.
Atomization	A process in which a sample is converted to free atoms.
Audit	TNI- A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives.
Batch	TNI- Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A **preparation batch** is composed of one to 20 environmental samples of the same quality systems matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours or the time-frame specified by the regulatory program. An **analytical batch** is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed 20 samples.
Batch, Radiation Measurements (RMB)	TNI- An RMB is composed of 1 to 20 environmental samples that are counted directly without preliminary physical or chemical processing that affects the outcome of the test (e.g., non-destructive gamma spectrometry, alpha/beta counting of air filters, or swipes on gas proportional detectors). The samples in an RMB share similar physical and chemical parameter, and analytical configurations (e.g., analytes, geometry, calibration, and background corrections). The maximum time between the start of processing of the first and last in an RMB is 14 calendar days.
Bias	TNI- The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).
Blank	TNI and DoD- A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results (See Method Blank). DoD- Blank samples are negative control samples, which typically include field blank samples (e.g., trip blank, equipment (rinsate) blank, and temperature blank) and laboratory blank samples (e.g., method blank, reagent blank, instrument blank, calibration blank, and storage blank).
Blind Sample	A sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.
BNA (Base Neutral Acid compounds)	A list of semi-volatile compounds typically analyzed by mass spectrometry methods. Named for the way they can be extracted out of environmental samples in an acidic, basic or neutral environment.
BOD (Biochemical Oxygen Demand)	Chemical procedure for determining how fast biological organisms use up oxygen in a body of water.

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Calibration	TNI- A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards. 1) In calibration of support equipment, the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI); 2) In calibration according to test methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications.
Calibration Curve	TNI- The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response.
Calibration Method	A defined technical procedure for performing a calibration.
Calibration Range	DoD- The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.
Calibration Standard	TNI- A substance or reference material used for calibration.
Certified Reference Material (CRM)	TNI- Reference material accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute.
Chain of Custody	An unbroken trail of accountability that verifies the physical security of samples, data, and records.
Chain of Custody Form (COC)	TNI- Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and type of containers; the mode of collection, the collector, time of collection; preservation; and requested analyses.
Chemical Oxygen Demand (COD)	A test commonly used to indirectly measure the amount of organic compounds in water.
Client (referred to by ISO as Customer)	Any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations.
Code of Federal Regulations (CFR)	A codification of the general and permanent rules published in the Federal Register by agencies of the federal government.
Comparability	An assessment of the confidence with which one data set can be compared to another. Comparable data are produced through the use of standardized procedures and techniques.
Completeness	The percent of valid data obtained from a measurement system compared to the amount of valid data expected under normal conditions. The equation for completeness is: % Completeness = (Valid Data Points/Expected Data Points)*100
Confirmation	TNI- Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: second-column confirmation; alternate wavelength; derivatization; mass spectral interpretation; alternative detectors; or additional cleanup procedures. DoD- Includes verification of the identity and quantity of the analyte being measured by another means (e.g., by another determinative method, technology, or column). Additional cleanup procedures alone are not considered confirmation techniques.
Conformance	An affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements.
Congener	A member of a class of related chemical compounds (e.g., PCBs, PCDDs).
Consensus Standard	DoD- A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof.
Continuing Calibration Blank (CCB)	A blank sample used to monitor the cleanliness of an analytical system at a frequency determined by the analytical method.
Continuing Calibration Check Compounds (CCC)	Compounds listed in mass spectrometry methods that are used to evaluate an instrument calibration from the standpoint of the integrity of the system. High variability would suggest leaks or active sites on the instrument column.
Continuing Calibration Verification	DoD- The verification of the initial calibration. Required prior to sample analysis and at periodic intervals. Continuing calibration verification applies to both external and internal standard calibration techniques, as well as to linear and non-linear calibration models.
Continuing Calibration Verification (CCV) Standard	Also referred to as a Calibration Verification Standard (CVS) in some methods, it is a standard used to verify the initial calibration of compounds in an analytical method. CCVs are analyzed at a frequency determined by the analytical method.

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Continuous Emission Monitor (CEM)	A flue gas analyzer designed for fixed use in checking for environmental pollutants.
Continuous Improvement Plan (CIP)	The delineation of tasks for a given laboratory department or committee to achieve the goals of that department.
Contract Laboratory Program (CLP)	A national network of EPA personnel, commercial labs, and support contractors whose fundamental mission is to provide data of known and documented quality.
Contract Required Detection Limit (CRDL)	Detection limit that is required for EPA Contract Laboratory Program (CLP) contracts.
Contract Required Quantitation Limit (CRQL)	Quantitation limit (reporting limit) that is required for EPA Contract Laboratory Program (CLP) contracts.
Control Chart	A graphic representation of a series of test results, together with limits within which results are expected when the system is in a state of statistical control (see definition for Control Limit)
Control Limit	A range within which specified measurement results must fall to verify that the analytical system is in control. Control limit exceedances may require corrective action or require investigation and flagging of non-conforming data.
Correction	DoD- Action taken to eliminate a detected non-conformity.
Corrective Action	DoD- The action taken to eliminate the causes of an existing non-conformity, defect, or other undesirable situation in order to prevent recurrence. A root cause analysis may not be necessary in all cases.
Corrective and Preventative Action (CAPA)	The primary management tools for bringing improvements to the quality system, to the management of the quality system's collective processes, and to the products or services delivered which are an output of established systems and processes.
Critical Value	TNI- Value to which a measurement result is compared to make a detection decision (also known as critical level or decision level). NOTE: The Critical Value is designed to give a specified low probability α of false detection in an analyte-free sample, which implies that a result that exceeds the Critical Value, gives high confidence $(1 - \alpha)$ that the radionuclide is actually present in the material analyzed. For radiometric methods, α is often set at 0.05.
Customer	DoD- Any individual or organization for which products or services are furnished or work performed in response to defined requirements and expectations.
Data Integrity	TNI- The condition that exists when data are sound, correct, and complete, and accurately reflect activities and requirements.
Data Quality Objective (DQO)	Systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use or end user.
Data Reduction	TNI- The process of transforming the number of data items by arithmetic or statistical calculation, standard curves, and concentration factors, and collating them into a more usable form.
Definitive Data	DoD- Analytical data of known quantity and quality. The levels of data quality on precision and bias meet the requirements for the decision to be made. Data that is suitable for final decision-making.
Demonstration of Capability (DOC)	TNI- A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. DoD- A procedure to establish the ability of the analyst to generate analytical results by a specific method that meet measurement quality objectives (e.g., for precision and bias).
Department of Defense (DoD)	An executive branch department of the federal government of the United States charged with coordinating and supervising all agencies and functions of the government concerned directly with national security.
Detection Limit (DL)	DoD- The smallest analyte concentration that can be demonstrated to be different than zero or a blank concentration with 99% confidence. At the DL, the false positive rate (Type 1 error) is 1%. A DL may be used as the lowest concentration for reliably reporting a detection of a specific analyte in a specific matrix with a specific method with 99% confidence.
Detection Limit (DL) for Safe Drinking Water Act (SDWA) Compliance	TNI- Laboratories that analyze drinking-water samples for SDWA compliance monitoring must use methods that provide sufficient detection capability to meet the detection limit requirements established in 40 CFR 141. The SDWA DL for radioactivity is defined in 40 CFR Part 141.25.c as the radionuclide concentration, which can be counted with a precision of plus or minus 100% at the 95% confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).
Deuterated Monitoring Compounds (DMCs)	DoD- SIM specific surrogates as specified for GC/MS SIM analysis.
Diesel Range Organics (DRO)	A range of compounds that denote all the characteristic compounds that make up diesel fuel (range can be state or program specific).

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Digestion	DoD- A process in which a sample is treated (usually in conjunction with heat and acid) to convert the target analytes in the sample to a more easily measured form.
Document Control	The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.
Documents	DoD- Written components of the laboratory management system (e.g., policies, procedures, and instructions).
Dry Weight	The weight after drying in an oven at a specified temperature.
Duplicate (also known as Replicate or Laboratory Duplicate)	The analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results of duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.
Electron Capture Detector (ECD)	Device used in GC methods to detect compounds that absorb electrons (e.g., PCB compounds).
Electronic Data Deliverable (EDD)	A summary of environmental data (usually in spreadsheet form) which clients request for ease of data review and comparison to historical results.
Eluent	A solvent used to carry the components of a mixture through a stationary phase.
Elute	To extract, specifically, to remove (absorbed material) from an absorbent by means of a solvent.
Elution	A process in which solutes are washed through a stationary phase by movement of a mobile phase.
Environmental Data	DoD- Any measurements or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology.
Environmental Monitoring	The process of measuring or collecting environmental data.
Environmental Protection Agency (EPA)	An agency of the federal government of the United States which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress.
Environmental Sample	A representative sample of any material (aqueous, non-aqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required. Environmental samples can generally be classified as follows: • Non Potable Water (Includes surface water, ground water, effluents, water treatment chemicals, and TCLP leachates or other extracts) • Drinking Water - Delivered (treated or untreated) water designated as potable water • Water/Wastewater - Raw source waters for public drinking water supplies, ground waters, municipal influents/effluents, and industrial influents/effluents • Sludge - Municipal sludges and industrial sludges. • Soil - Predominately inorganic matter ranging in classification from sands to clays. • Waste - Aqueous and non-aqueous liquid wastes, chemical solids, and industrial liquid and solid wastes
Equipment Blank	A sample of analyte-free media used to rinse common sampling equipment to check effectiveness of decontamination procedures.
Extracted Internal Standard Analyte	Isotopically labeled analogs of analytes of interest added to all standards, blanks and samples analyzed. Added to samples and batch QC samples prior to the first step of sample extraction and to standards and instrument blanks prior to analysis. Used for isotope dilution methods.
Facility	A distinct location within the company that has unique certifications, personnel and waste disposal identifications.
False Negative	DoD- A result that fails to identify (detect) an analyte or reporting an analyte to be present at or below a level of interest when the analyte is actually above the level of interest.
False Positive	DoD- A result that erroneously identifies (detects) an analyte or reporting an analyte to be present above a level of interest when the analyte is actually present at or below the level of interest.
Field Blank	A blank sample prepared in the field by filling a clean container with reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken.
Field Measurement	Determination of physical, biological, or radiological properties, or chemical constituents that are measured on-site, close in time and sPAS to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.
Field of Accreditation	TNI- Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation.

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Field of Proficiency Testing (FoPT)	TNI- Matrix, technology/method, analyte combinations for which the composition, spike concentration ranges and acceptance criteria have been established by the PTPEC.
Finding	TNI- An assessment conclusion referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. DoD- An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive, negative, or neutral and is normally accompanied by specific examples of the observed condition. The finding must be linked to a specific requirement (e.g., this standard, ISO requirements, analytical methods, contract specifications, or laboratory management systems requirements).
Flame Atomic Absorption Spectrometer (FAA)	Instrumentation used to measure the concentration of metals in an environmental sample based on the fact that ground state metals absorb light at different wavelengths. Metals in a solution are converted to the atomic state by use of a flame.
Flame Ionization Detector (FID)	A type of gas detector used in GC analysis where samples are passed through a flame which ionizes the sample so that various ions can be measured.
Gas Chromatography (GC)	Instrumentation which utilizes a mobile carrier gas to deliver an environmental sample across a stationary phase with the intent to separate compounds out and measure their retention times.
Gas Chromatograph/ Mass Spectrometry (GC/MS)	In conjunction with a GC, this instrumentation utilizes a mass spectrometer which measures fragments of compounds and determines their identity by their fragmentation patterns (mass spectra).
Gasoline Range Organics (GRO)	A range of compounds that denote all the characteristic compounds that make up gasoline (range can be state or program specific).
Graphite Furnace Atomic Absorption Spectrometry (GFAA)	Instrumentation used to measure the concentration of metals in an environmental sample based on the absorption of light at different wavelengths that are characteristic of different analytes.
High Pressure Liquid Chromatography (HPLC)	Instrumentation used to separate, identify and quantitate compounds based on retention times which are dependent on interactions between a mobile phase and a stationary phase.
Holding Time	TNI- The maximum time that can elapse between two specified activities. 40 CFR Part 136- The maximum time that samples may be held prior to preparation and/or analysis as defined by the method and still be considered valid or not compromised. For sample prep purposes, hold times are calculated using the time of the start of the preparation procedure. DoD- The maximum time that may elapse from the time of sampling to the time of preparation or analysis, or from preparation to analysis, as appropriate.
Homogeneity	The degree to which a property or substance is uniformly distributed throughout a sample.
Homologue	One in a series of organic compounds in which each successive member has one more chemical group in its molecule than the next preceding member. For instance, methanol, ethanol, propanol, butanol, etc., form a homologous series.
Improper Actions	DoD- Intentional or unintentional deviations from contract-specified or method-specified analytical practices that have not been authorized by the customer (e.g., DoD or DOE).
Incremental Sampling Method (ISM)	Soil preparation for large volume (1 kg or greater) samples.
In-Depth Data Monitoring	TNI- When used in the context of data integrity activities, a review and evaluation of documentation related to all aspects of the data generation process that includes items such as preparation, equipment, software, calculations, and quality controls. Such monitoring shall determine if the laboratory uses appropriate data handling, data use and data reduction activities to support the laboratory's data integrity policies and procedures.
Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)	Analytical technique used for the detection of trace metals which uses plasma to produce excited atoms that emit radiation of characteristic wavelengths.
Inductively Coupled Plasma- Mass Spectrometry (ICP/MS)	An ICP that is used in conjunction with a mass spectrometer so that the instrument is not only capable of detecting trace amounts of metals and non-metals but is also capable of monitoring isotopic speciation for the ions of choice.
Infrared Spectrometer (IR)	An instrument that uses infrared light to identify compounds of interest.

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Initial Calibration (ICAL)	The process of analyzing standards, prepared at specified concentrations, to define the quantitative response relationship of the instrument to the analytes of interest. Initial calibration is performed whenever the results of a calibration verification standard do not conform to the requirements of the method in use or at a frequency specified in the method.
Initial Calibration Blank (ICB)	A blank sample used to monitor the cleanliness of an analytical system at a frequency determined by the analytical method. This blank is specifically run in conjunction with the Initial Calibration Verification (ICV) where applicable.
Initial Calibration Verification (ICV)	DoD- Verifies the initial calibration with a standard obtained or prepared from a source independent of the source of the initial calibration standards to avoid potential bias of the initial calibration.
Injection Internal Standard Analyte	Isotopically labeled analogs of analytes of interest (or similar in physiochemical properties to the target analytes but with a distinct response) to be quantitated. Added to all blanks, standards, samples and batch QC after extraction and prior to analysis.
Instrument Blank	A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination.
Instrument Detection Limits (IDLs)	Limits determined by analyzing a series of reagent blank analyses to obtain a calculated concentration. IDLs are determined by calculating the average of the standard deviations of three runs on three non-consecutive days from the analysis of a reagent blank solution with seven consecutive measurements per day.
Interference, spectral	Occurs when particulate matter from the atomization scatters incident radiation from the source or when the absorption or emission from an interfering species either overlaps or is so close to the analyte wavelength that resolution becomes impossible.
Interference, chemical	Results from the various chemical processes that occur during atomization and later the absorption characteristics of the analyte.
Internal Standard	TNI and DoD- A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method.
International Organization for Standardization (ISO)	An international standard-setting body composed of representatives from various national standards organizations.
Intermediate Standard Solution	Reference solutions prepared by dilution of the stock solutions with an appropriate solvent.
International System of Units (SI)	The coherent system of units adopted and recommended by the General Conference on Weights and Measures.
Ion Chromatography (IC)	Instrumentation or process that allows the separation of ions and molecules based on the charge properties of the molecules.
Isomer	One of two or more compounds, radicals, or ions that contain the same number of atoms of the same element but differ in structural arrangement and properties. For example, hexane (C6H14) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.
Laboratory	A body that calibrates and/or performs testing..
Laboratory Control Sample (LCS)	TNI- (also known as laboratory fortified blank (LFB), spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes and taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst-specific precision and bias or to evaluate the performance of all or a portion of the measurement system.
Laboratory Duplicate	Aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.
Laboratory Information Management System (LIMS)	DoD- The entirety of an electronic data system (including hardware and software) that collects, analyzes, stores, and archives electronic records and documents.
Learning Management System (LMS)	A web-based database used by the laboratories to track and document training activities. The system is administered by the corporate training department and each laboratory's learn centers are maintained by a local administrator.
Legal Chain-of-Custody Protocols	TNI- Procedures employed to record the possession of samples from the time of sampling through the retention time specified by the client or program. These procedures are performed at the special request of the client and include the use of a Chain-of-Custody (COC) Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory.

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Limit(s) of Detection (LOD)	TNI- The minimum result, which can be reliably discriminated from a blank with predetermined confidence level. DoD- The smallest concentration of a substance that must be present in a sample in order to be detected at the DL with 99% confidence. At the LOD, the false negative rate (Type II error) is 1%. A LOD may be used as the lowest concentration for reliably reporting a non-detect of a specific analyte in a specific matrix with a specific method at 99% confidence.
Limit(s) of Quantitation (LOQ)	TNI- The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. DoD- The smallest concentration that produces a quantitative result with known and recorded precision and bias. For DoD/DOE projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard and within the calibration range.
Linear Dynamic Range	DoD- Concentration range where the instrument provides a linear response.
Liquid chromatography/ tandem mass spectrometry (LC/MS/MS)	Instrumentation that combines the physical separation techniques of liquid chromatography with the mass analysis capabilities of mass spectrometry.
Lot	TNI- A definite amount of material produced during a single manufacturing cycle, and intended to have uniform character and quality.
Management	Those individuals directly responsible and accountable for planning, implementing, and assessing work.
Management System	System to establish policy and objectives and to achieve those objectives.
Manager (however named)	The individual designated as being responsible for the overall operation, all personnel, and the physical plant of the environmental laboratory. A supervisor may report to the manager. In some cases, the supervisor and the manager may be the same individual.
Matrix	TNI- The substrate of a test sample.
Matrix Duplicate	TNI- A replicate matrix prepared in the laboratory and analyzed to obtain a measure of precision.
Matrix Spike (MS) (spiked sample or fortified sample)	TNI- A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.
Matrix Spike Duplicate (MSD) (spiked sample or fortified sample duplicate)	TNI- A replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.
Measurement Performance Criteria (MPC)	DoD- Criteria that may be general (such as completion of all tests) or specific (such as QC method acceptance limits) that are used by a project to judge whether a laboratory can perform a specified activity to the defined criteria.
Measurement Quality Objective (MQO)	TNI- The analytical data requirements of the data quality objectives are project- or program-specific and can be quantitative or qualitative. MQOs are measurement performance criteria or objectives of the analytical process. Examples of quantitative MQOs include statements of required analyte detectability and the uncertainty of the analytical protocol at a specified radionuclide activity, such as the action level. Examples of qualitative MQOs include statements of the required specificity of the analytical protocol, e.g., the ability to analyze for the radionuclide of interest given the presence of interferences.
Measurement System	TNI- A method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s). DoD- A test method, as implemented at a particular laboratory, and which includes the equipment used to perform the sample preparation and test and the operator(s).
Measurement Uncertainty	DoD- An estimate of the error in a measurement often stated as a range of values that contain the true value within a certain confidence level. The uncertainty generally includes many components which may be evaluated from experimental standard deviations based on repeated observations or by standard deviations evaluated from assumed probability distributions based on experience or other information. For DoD/DOE, a laboratory's Analytical Uncertainty (such as use of LCS control limits) can be reported as the minimum uncertainty.
Method	TNI- A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed.
Method Blank	TNI- A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses.

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Method Detection Limit (MDL)	TNI- One way to establish a Detection Limit; defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
Method of Standard Additions	A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration.
Minimum Detectable Activity (MDA)	TNI- Estimate of the smallest true activity that ensures a specified high confidence, 1 – β, of detection above the Critical Value, and a low probability β of false negatives below the Critical Value. For radiometric methods, β is often set at 0.05. NOTE 1: The MDS is a measure of the detection capability of a measurement process and as such, it is an a priori concept. It may be used in the selection of methods to meet specified MQOs. Laboratories may also calculate a "sample specific" MDA, which indicates how well the measurement process is performing under varying real-world measurement conditions, when sample-specific characteristics (e.g., interferences) may affect the detection capability. However, the MDA must never be used instead of the Critical Value as a detection threshold. NOTE 2: For the purpose of this Standard, the terms MDA and minimum detectable concentration (MDC) are equivalent.
Minimum Reporting Limit (MRL)	the lowest concentration of standard used for calibration – Drinking Water Manual
MintMiner	Commercial software program used to scan large amounts of chromatographic data to monitor for errors or data integrity issues.
Mobile Laboratory	TNI- A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans, and skid-mounted structures configured to house testing equipment and personnel.
National Environmental Laboratory Accreditation Conference (NELAC)	See definition of The NELAC Institute (TNI).
National Institute of Occupational Safety and Health (NIOSH)	National institute charged with the provision of training, consultation and information in the area of occupational safety and health.
National Institute of Standards and Technology (NIST)	TNI- A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute (or NMI).
National Pollutant Discharge Elimination System (NPDES)	A permit program that controls water pollution by regulating point sources that discharge pollutants into U.S. waters.
Negative Control	Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.
Nitrogen Phosphorus Detector (NPD)	A detector used in GC analyses that utilizes thermal energy to ionize an analyte. With this detector, nitrogen and phosphorus can be selectively detected with a higher sensitivity than carbon.
Nonconformance	An indication or judgment that a product or service has not met the requirement of the relevant specifications, contract, or regulation; also the state of failing to meet the requirements.
Not Detected (ND)	The result reported for a compound when the detected amount of that compound is less than the method reporting limit.
Operator Aid	DoD- A technical posting (such as poster, operating manual, or notepad) that assists workers in performing routine tasks. All operator aids must be controlled documents (i.e., a part of the laboratory management system).
Performance Based Measurement System (PBMS)	An analytical system wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate test methods to meet those needs in a cost-effective manner.
Physical Parameter	TNI- A measurement of a physical characteristic or property of a sample as distinguished from the concentrations of chemical and biological components.
Photo-ionization Detector (PID)	An ion detector which uses high-energy photons, typically in the ultraviolet range, to break molecules into positively charged ions.
Polychlorinated Biphenyls (PCB)	A class of organic compounds that were used as coolants and insulating fluids for transformers and capacitors. The production of these compounds was banned in the 1970's due to their high toxicity.
Positive Control	Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

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Post-Digestion Spike	A sample prepared for metals analyses that has analytes spike added to determine if matrix effects may be a factor in the results.
Power of Hydrogen (pH)	The measure of acidity or alkalinity of a solution.
Practical Quantitation Limit (PQL)	Another term for a method reporting limit. The lowest reportable concentration of a compound based on parameters set up in an analytical method and the laboratory's ability to reproduce those conditions.
Precision	TNI- The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms.
Preservation	TNI and DoD- Any conditions under which a sample must be kept in order to maintain chemical, physical, and/or biological integrity prior to analysis.
Primary Accreditation Body (Primary AB)	TNI- The accreditation body responsible for assessing a laboratory's total quality system, on-site assessment, and PT performance tracking for fields of accreditation.
Procedure	TNI- A specified way to carry out an activity or process. Procedures can be documented or not.
Proficiency Testing (PT)	TNI- A means to evaluate a laboratory's performance under controlled conditions relative to a given set of criteria, through analysis of unknown samples provided by an external source.
Proficiency Testing Program (PT Program)	TNI- The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories.
Proficiency Testing Provider (PT Provider)	TNI- A person or organization accredited by a TNI-approved Proficiency Testing Provider Accreditor to operate a TNI-compliant PT Program.
Proficiency Testing Provider Accreditor (PTPA)	TNI- An organization that is approved by TNI to accredit and monitor the performance of proficiency testing providers.
Proficiency Testing Reporting Limit (PTRL)	TNI- A statistically derived value that represents the lowest acceptable concentration for an analyte in a PT sample, if the analyte is spiked into the PT sample. The PTRLs are specified in the TNI FoPT tables.
Proficiency Testing Sample (PT)	TNI- 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.
Proficiency Testing (PT) Study	TNI- a) Scheduled PT Study: A single complete sequence of circulation and scoring of PT samples to all participants in a PT program. The study must have the same pre-defined opening and closing dates for all participants; b) Supplemental PT Study: A PT sample that may be from a lot previously released by a PT Provider that meets the requirements for supplemental PT samples given in Volume 3 of this Standard [TNI] but that does not have a pre-determined opening date and closing date.
Proficiency Testing Study Closing Date	TNI- a) Scheduled PT Study: The calendar date by which all participating laboratories must submit analytical results for a PT sample to a PT Provider; b) Supplemental PT Study: The calendar date a laboratory submits the results for a PT sample to the PT Provider.
Proficiency Testing Study Opening Date	TNI- a) Scheduled PT Study: The calendar date that a PT sample is first made available to all participants of the study by a PT Provider; b) Supplemental PT Study: The calendar date the PT Provider ships the sample to a laboratory.
Protocol	TNI- A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) that must be strictly followed.
Qualitative Analysis	DoD- Analysis designed to identify the components of a substance or mixture.
Quality Assurance (QA)	TNI- An integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.
Quality Assurance Manual (QAM)	A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.
Quality Assurance Project Plan (QAPP)	A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.
Quality Control (QC)	TNI- The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring that the results are of acceptable quality.

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Quality Control Sample (QCS)	TNI- A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control.
Quality Manual	TNI- A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users.
Quality System	TNI and DoD- A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance and quality control activities.
Quality System Matrix	TNI and DoD- These matrix definitions shall be used for purposes of batch and quality control requirements and may be different from a field of accreditation matrix: • **Air and Emissions**: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device • **Aqueous**: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, groundwater effluents, and TCLP or other extracts. • **Biological Tissue**: Any sample of a biological origin such as fish tissue, shellfish or plant material. Such samples shall be grouped according to origin. • **Chemical Waste**: A product or by-product of an industrial process that results in a matrix not previously defined. • **Drinking Water**: Any aqueous sample that has been designated a potable or potentially potable water source. • **Non-aqueous liquid**: Any organic liquid with <15% settleable solids • **Saline/Estuarine**: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake. • **Solids**: Includes soils, sediments, sludges, and other matrices with >15% settleable solids.
Quantitation Range	DoD- The range of values (concentrations) in a calibration curve between the LOQ and the highest successively analyzed initial calibration standard used to relate instrument response to analyte concentration. The quantitation range (adjusted for initial sample volume/weight, concentration/dilution and final volume) lies within the calibration range.
Quantitative Analysis	DoD- Analysis designed to determine the amounts or proportions of the components of a substance.
Random Error	The EPA has established that there is a 5% probability that the results obtained for any one analyte will exceed the control limits established for the test due to random error. As the number of compounds measured increases in a given sample, the probability for statistical error also increases.
Raw Data	TNI- The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records.
Reagent Blank (method reagent blank)	A sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.
Reagent Grade	Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents that conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.
Records	DoD- The output of implementing and following management system documents (e.g., test data in electronic or hand-written forms, files, and logbooks).
Reference Material	TNI- Material or substance one or more of whose property values are sufficiently homogenized and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

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Reference Method	TNI- A published method issued by an organization generally recognized as competent to do so. (When the ISO language refers to a "standard method", that term is equivalent to "reference method"). When a laboratory is required to analyze by a specified method due to a regulatory requirement, the analyte/method combination is recognized as a reference method. If there is no regulatory requirement for the analyte/method combination, the analyte/method combination is recognized as a reference method if it can be analyzed by another reference method of the same matrix and technology.
Reference Standard	TNI- Standard used for the calibration of working measurement standards in a given organization or at a given location.
Relative Percent Difference (RPD)	A measure of precision defined as the difference between two measurements divided by the average concentration of the two measurements.
Reporting Limit (RL)	The level at which method, permit, regulatory and customer-specific objectives are met. The reporting limit may never be lower than the Limit of Detection (i.e., statistically determined MDL). Reporting limits are corrected for sample amounts, including the dry weight of solids, unless otherwise specified. There must be a sufficient buffer between the Reporting Limit and the MDL. DoD- A customer-specified lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
Reporting Limit Verification Standard (RLVS)	A standard analyzed at the reporting limit for an analysis to verify the laboratory's ability to report to that level.
Representativeness	A quality element related to the ability to collect a sample reflecting the characteristics of the part of the environment to be assessed. Sample representativeness is dependent on the sampling techniques specified in the project work plan.
Requirement	Denotes a mandatory specification; often designated by the term "shall".
Retention Time	The time between sample injection and the appearance of a solute peak at the detector.
Revocation	TNI- The total or partial withdrawal of a laboratory's accreditation by an accreditation body.
Sample	Portion of material collected for analysis, identified by a single, unique alphanumeric code. A sample may consist of portions in multiple containers, if a single sample is submitted for multiple or repetitive analysis.
Sample Condition Upon Receipt Form (SCURF)	Form used by sample receiving personnel to document the condition of sample containers upon receipt to the laboratory (used in conjunction with a COC).
Sample Delivery Group (SDG)	A unit within a single project that is used to identify a group of samples for delivery. An SDG is a group of 20 or fewer field samples within a project, received over a period of up to 14 calendar days. Data from all samples in an SDG are reported concurrently.
Sample Receipt Form (SRF)	Letter sent to the client upon login to show the tests requested and pricing.
Sample Tracking	Procedures employed to record the possession of the samples from the time of sampling until analysis, reporting and archiving. These procedures include the use of a chain-of-custody form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of the samples.
Sampling	TNI- Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure.
Selected Ion Monitoring (SIM)	A mode of analysis in mass spectrometry where the detector is set to scan over a very small mass range, typically one mass unit. The narrower the range, the more sensitive the detector. DoD- Using GC/MS, characteristic ions specific to target compounds are detected and used to quantify in applications where the normal full scan mass spectrometry results in excessive noise.
Selectivity	TNI- The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system.
Sensitivity	TNI- The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest.
Serial Dilution	The stepwise dilution of a substance in a solution.
Shall	Denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification as long as the requirement is fulfilled.
Should	Denotes a guideline or recommendation whenever noncompliance with the specification is permissible.

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Signal-to-Noise Ratio (S/N)	DoD- A measure of signal strength relative to background noise. The average strength of the noise of most measurements is constant and independent of the magnitude of the signal. Thus, as the quantity being measured (producing the signal) decreases in magnitude, S/N decreases and the effect of the noise on the relative error of a measurement increases.
Source Water	TNI- When sampled for drinking water compliance, untreated water from streams, rivers, lakes, or underground aquifers, which is used to supply private and public drinking water supplies.
Spike	A known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.
Standard (Document)	TNI- The document describing the elements of a laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies.
Standard (Chemical)	Standard samples are comprised of a known amount of standard reference material in the matrix undergoing analysis. A standard reference material is a certified reference material produced by US NIST and characterized for absolute content, independent of analytical test method.
Standard Blank (or Reagent Blank)	A calibration standard consisting of the same solvent/reagent matrix used to prepare the calibration standards without the analytes. It is used to construct the calibration curve by establishing instrument background.
Standard Method	A test method issued by an organization generally recognized as competent to do so.
Standard Operating Procedure (SOP)	TNI- A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or repetitive tasks.
Standard Reference Material (SRM)	A certified reference material produced by the US NIST or other equivalent organization and characterized for absolute content, independent of analytical method.
Statement of Qualifications (SOQ)	A document that lists information about a company, typically the qualifications of that company to compete on a bid for services.
Stock Standard	A concentrated reference solution containing one or more analytes prepared in the laboratory using an assayed reference compound or purchased from a reputable commercial source.
Storage Blank	DoD- A sample of analyte-free media prepared by the laboratory and retained in the sample storage area of the laboratory. A storage blank is used to record contamination attributable to sample storage at the laboratory.
Supervisor	The individual(s) designated as being responsible for a particular area or category of scientific analysis. This responsibility includes direct day-to-day supervision of technical employees, supply and instrument adequacy and upkeep, quality assurance/quality control duties and ascertaining that technical employees have the required balance of education, training and experience to perform the required analyses.
Surrogate	DoD- A substance with properties that mimic the analyte of interest. It is unlikely to be found in environmental samples and is added to them for quality control purposes.
Suspension	TNI- The temporary removal of a laboratory's accreditation for a defined period of time, which shall not exceed 6 months or the period of accreditation, whichever is longer, in order to allow the laboratory time to correct deficiencies or area of non-conformance with the Standard.
Systems Audit	An on-site inspection or assessment of a laboratory's quality system.
Target Analytes	DoD- Analytes or chemicals of primary concern identified by the customer on a project-specific basis.
Technical Director	Individual(s) who has overall responsibility for the technical operation of the environmental testing laboratory.
Technology	TNI- A specific arrangement of analytical instruments, detection systems, and/or preparation techniques.
Test	A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate.
Test Method	DoD- A definitive procedure that determines one or more characteristics of a given substance or product.
Test Methods for Evaluating Solid Waste, Physical/ Chemical (SW-846)	EPA Waste's official compendium of analytical and sampling methods that have been evaluated and approved for use in complying with RCRA regulations.
Test Source	TNI- A radioactive source that is tested, such as a sample, calibration standard, or performance check source. A Test Source may also be free of radioactivity, such as a Test Source counted to determine the subtraction background, or a short-term background check.

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The NELAC Institute (TNI)	A non-profit organization whose mission is to foster the generation of environmental data of known and documented quality through an open, inclusive, and transparent process that is responsive to the needs of the community. Previously known as NELAC (National Environmental Laboratory Accreditation Conference).
Total Petroleum Hydrocarbons (TPH)	A term used to denote a large family of several hundred chemical compounds that originate from crude oil. Compounds may include gasoline components, jet fuel, volatile organics, etc.
Toxicity Characteristic Leaching Procedure (TCLP)	A solid sample extraction method for chemical analysis employed as an analytical method to simulate leaching of compounds through a landfill.
Traceability	TNI- 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 conditions 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.
Training Document	A training resource that provides detailed instructions to execute a specific method or job function.
Trip Blank	This blank sample is used to detect sample contamination from the container and preservative during transport and storage of the sample. A cleaned sample container is filled with laboratory reagent water and the blank is stored, shipped, and analyzed with its associated samples.
Tuning	A check and/or adjustment of instrument performance for mass spectrometry as required by the method.
Ultraviolet Spectrophotometer (UV)	Instrument routinely used in quantitative determination of solutions of transition metal ions and highly conjugated organic compounds.
Uncertainty, Counting	TNI- The component of Measurement Uncertainty attributable to the random nature of radioactive decay and radiation counting (often estimated as the square root of observed counts (MARLAP). Older references sometimes refer to this parameter as Error, Counting Error or Count Error (c.f., Total Uncertainty).
Uncertainty, Expanded	TNI- The product of the Standard Uncertainty and a coverage factor, k, which is chosen to produce an interval about the result that has a high probability of containing the value of the measurand (c.f., Standard Uncertainty). NOTE: Radiochemical results are generally reported in association with the Total Uncertainty. Either if these estimates of uncertainty can be reported as the Standard Uncertainty (one-sigma) or as an Expanded Uncertainty (k-sigma, where $k > 1$).
Uncertainty, Measurement	TNI- Parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand.
Uncertainty, Standard	TNI- An estimate of the Measurement Uncertainty expressed as a standard deviation (c.f., Expanded Uncertainty).
Uncertainty, Total	TNI- An estimate of the Measurement Uncertainty that accounts for contributions from all significant sources of uncertainty associated with the analytical preparation and measurement of a sample. Such estimates are also commonly referred to as Combined Standard Uncertainty or Total Propagated Uncertainty, and in some older references as the Total Propagated Error, among other similar items (c.f., Counting Uncertainty).
Unethical actions	DoD- Deliberate falsification of analytical or quality control results where failed method or contractual requirements are made to appear acceptable.
United States Department of Agriculture (USDA)	A department of the federal government that provides leadership on food, agriculture, natural resources, rural development, nutrition and related issues based on public policy, the best available science, and effective management.
United States Geological Survey (USGS)	Program of the federal government that develops new methods and tools to supply timely, relevant, and useful information about the Earth and its processes.
Unregulated Contaminant Monitoring Rule (UCMR)	EPA program to monitor unregulated contaminants in drinking water.
Validation	DoD- The confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.
Verification	TNI- Confirmation by examination and objective evidence that specified requirements have been met. In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.

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Voluntary Action Program (VAP)	A program of the Ohio EPA that gives individuals a way to investigate possible environmental contamination, clean it up if necessary and receive a promise from the State of Ohio that no more cleanup is needed.
Whole Effluent Toxicity (WET)	The aggregate toxic effect to aquatic organisms from all pollutants contained in a facility's wastewater (effluent).

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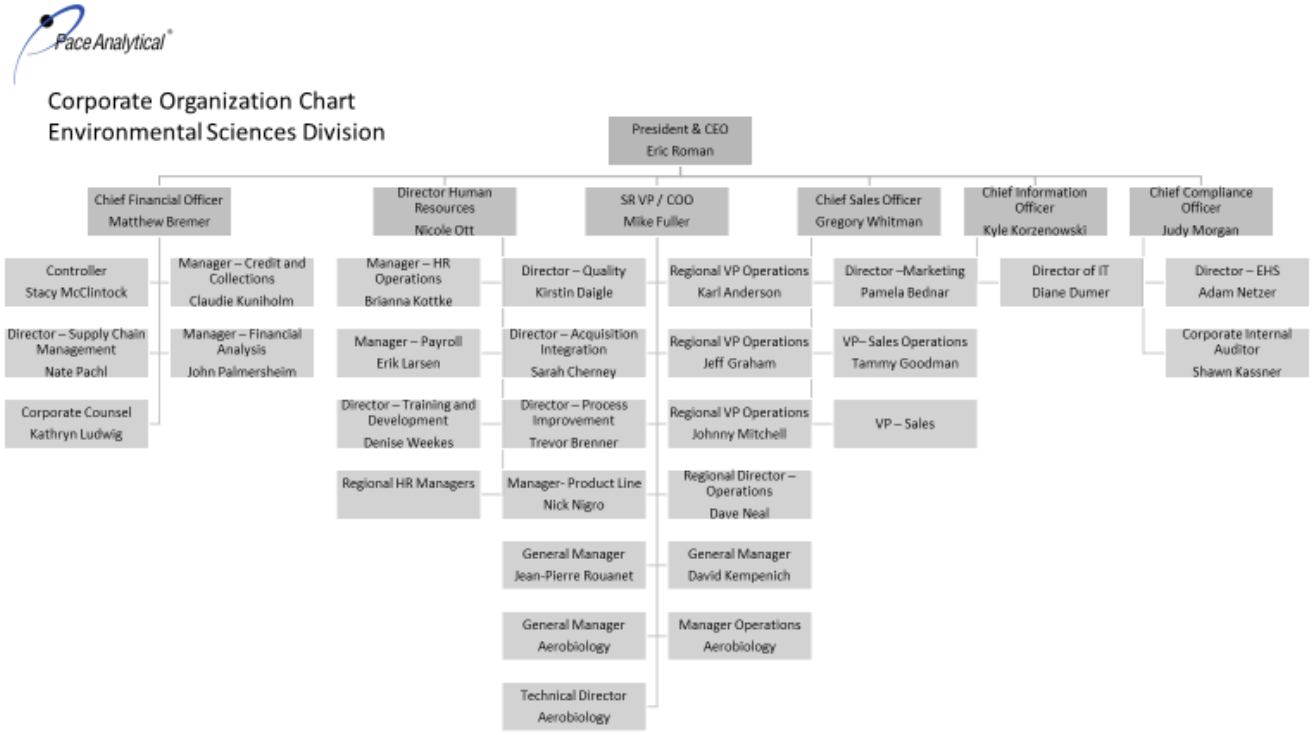
7.4 Appendix D: Organization Chart(s)

7.4.1 Corporate Organization Chart

Disclaimer: The following organization chart shows the structure of the and the relationships and relative ranks of its parts and positions/jobs in place on the date this version of this manual was published. This information is subject to change; contact the Quality Manager for the most current version.



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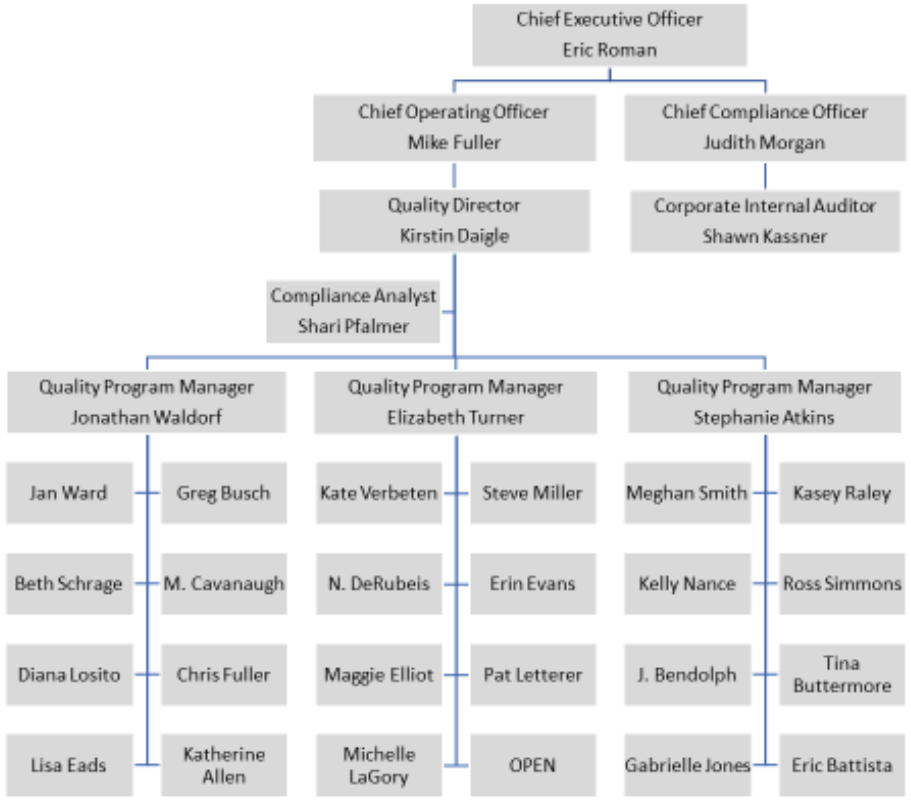
7.4.2 Quality Systems Management

Disclaimer: The following organization chart shows the structure of the and the relationships and relative ranks of its parts and positions/jobs in place on the date this version of this manual was published. This information is subject to change; contact the Quality Manager for the most current version.

Quality Systems Management
Environmental Sciences Division



Local Quality Managers

Each QM has a direct reporting relationship to a Quality Program Manager and an indirect reporting relationship to the General Manager of each location for which the QM is assigned.

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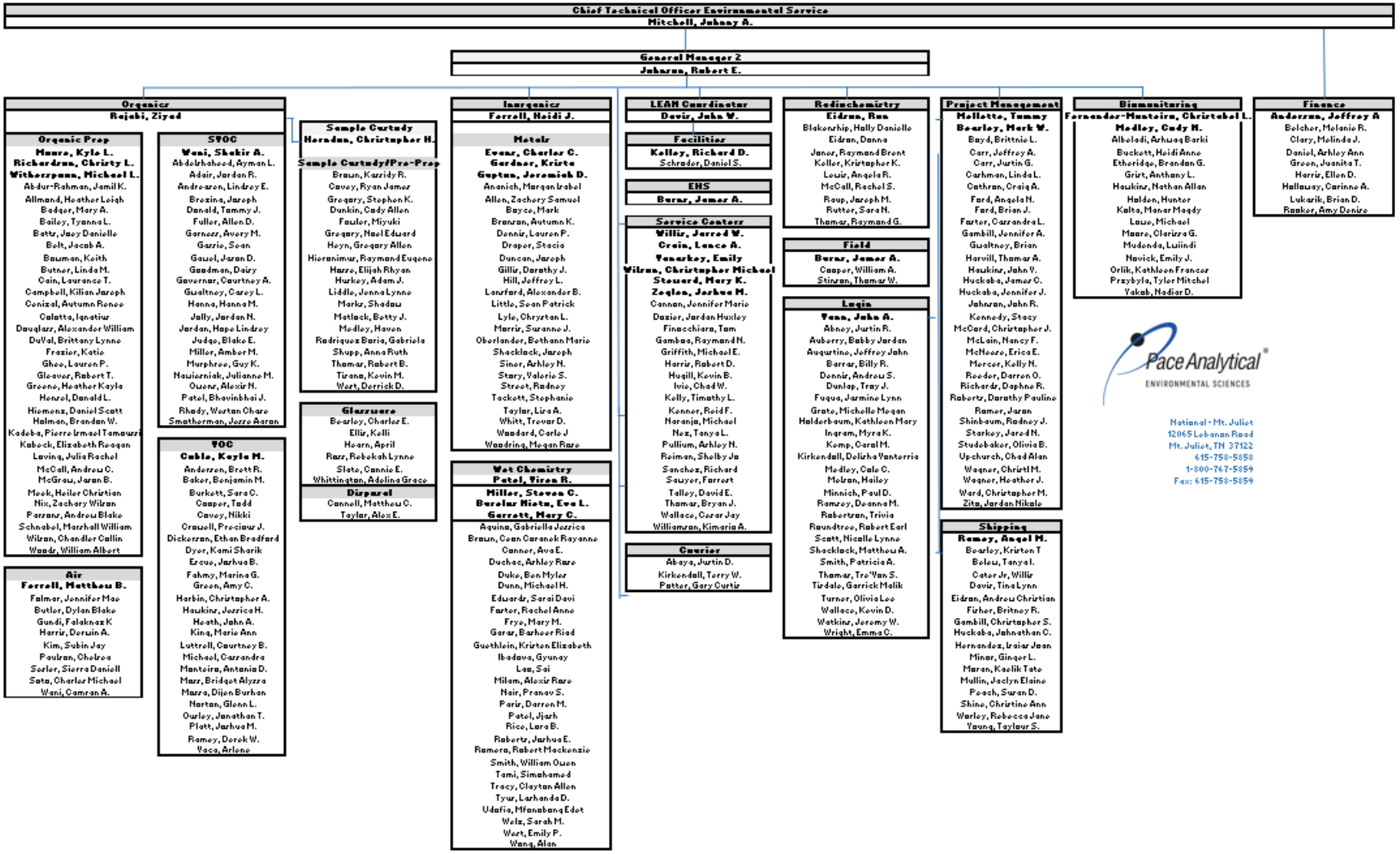
7.4.3 Mt. Juliet – Organization Chart



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7.5 Appendix E: Equipment Listing

The equipment listed represents equipment were held by each location on the effective date of this manual. This information is subject to change without notice. External parties should contact the location for the most current information.

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7.5.1 PAS-Mt. Juliet

EQUIPMENT LIST

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
GC/FID	Agilent	6890N	US10137006	As Needed	Used	Air Lab	AIRGC2	Online
Gas Chromatograph	HP	6890N TCD	US10726007	As Needed	Used	Air Lab	AIRGC3	Online
GC/FID	Agilent	7890B	CN14513033	As Needed	Used	Air Lab	AIRGC4	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890A/5975	CN13231014 US50680012	As Needed	Used	Air Lab	AIRMS1	Online
Preconcentrator	Entech	7200	1683	As Needed	Used	Air Lab	AIRMS1	Online
Canister Autosampler	Entech	7016D	1708	As Needed	Used	Air Lab	AIRMS1	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890N/5975	CN10551083 US61332744	As Needed	Used	Air Lab	AIRMS2	Online
Preconcentrator	Entech	7200	1005	As Needed	Used	Air Lab	AIRMS2	Online
Tedlar Autosampler	Entech	7032A	1017	As Needed	Used	Air Lab	AIRMS2	Online
Canister Autosampler	Entech	7016D	1871	As Needed	Used	Air Lab	AIRMS2	Online
Gas Chromatograph	Agilent	6890	US000011333	As Needed	Used	Air Lab	AIRMS3	Online
Injector	Agilent	G2614A	CN40327743	As Needed	Used	Air Lab	AIRMS3	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890/5973	US00024695 US82311265	As Needed	Used	Air Lab	AIRMS4	Online
Preconcentrator	Entech	7200	1174	As Needed	USED	Air Lab	AIRMS4	Online
Canister Autosampler	Entech	7016D	1870	As Needed	Used	Air Lab	AIRMS4	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890/5973	GCUS00039611 MSUS0340681	As Needed	Used	Air Lab	AIRMS5	Online
Preconcentrator	Entech	7200	1162	As Needed	Used	Air Lab	AIRMS5	Online
Canister Autosampler	Entech	7016D	1741	As Needed	Used	Air Lab	AIRMS5	Online
Tedlar Autosampler	Entech	7032AB	1044	As Needed	Used	Air Lab	AIRMS5	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890A/5975C	GCUS10831022 MSU91732329	As Needed	Used	Air Lab	AIRMS6	Online
Canister Autosampler	Entech	7016D	1505	As Needed	Used	Air Lab	AIRMS6	Online
Preconcentrator	Entech	7200	1322	As Needed	Used	Air Lab	AIRMS6	Online
Tedlar Autosampler	Entech	7032A	1049	As Needed	Used	Air Lab	AIRMS6	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890/5975C	US00024616 US71236615	As Needed	Used	Air Lab	AIRMS7	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Preconcentrator	Entech	7200	1720	As Needed	Used	Air Lab	AIRMS7	Online
Canister Autosampler	Entech	7016D	1828	As Needed	Used	Air Lab	AIRMS7	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890/5977B	US2008A003 US2007M007	As Needed	Used	Air Lab	AIRMS8	Online
Preconcentrator	Entech	7200A	00118	As Needed	Used	Air Lab	AIRMS8	Online
Canister Autosampler	Entech	7016D	1869	As Needed	Used	Air Lab	AIRMS8	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890/5977B	US2007A038 US2006M061	As Needed	Used	Air Lab	AIRMS9	Online
Preconcentrator	Entech	7200A	00117	As Needed	Used	Air Lab	AIRMS9	Online
Canister Autosampler	Entech	7016D	1872	As Needed	Used	Air Lab	AIRMS9	Online
Precision Diluter	Entech	4700	0371	As Needed	Used	Air Lab		Online
Dynamic Diluter	Entech	Model 4600A	1086	As Needed	Used	Air Lab		Online
TO Canister	Restek/Entech	TO-CAN/SiloniteCan	N/A	As Needed	Used	Air Lab	2839 cans owned	Online
Passive Sampling Kit	Restek/Entech		N/A	As Needed	Used	Air Lab	2123 owned	Online
Field hand held PID	RAE Systems	MiniRAE3000	592-929317	As Needed	Used	Air Lab		Online
Canister Cleaner	Entech	3100A	1178	As Needed	Used	Air Lab	Oven 1	Online
Oven	Entech	3513ENT	1482050570384	As Needed	Used	Air Lab	Oven 1	Online
Oven	Entech	3513ENT	1482060344515	As Needed	Used	Air Lab	Oven 1	Online
Canister Cleaner	Entech	3100A	1473	As Needed	Used	Air Lab	Oven 2	Online
Oven	Entech	3513ENT	1482060344518	As Needed	Used	Air Lab	Oven 2	Online
Oven	Entech	31-350ER	B33ER-01180	As Needed	Used	Air Lab	Oven 2	Online
Canister Cleaner	Entech	3100A	1448	As Needed	Used	Air Lab	Oven 3	Online
Oven	Entech	31-350	B33-02663	As Needed	Used	Air Lab	Oven 3	Online
Oven	Entech	31-350ER	B33ER-01142	As Needed	Used	Air Lab	Oven 3	Online
Canister Cleaner	Entech	3100D	1741	As Needed	Used	Air Lab	Oven 4	Online
Oven	Entech	31-350ER	B33ER-01654	As Needed	Used	Air Lab	Oven 4	Online
Oven	Entech	31-350ER	B33ER-01652	As Needed	Used	Air Lab	Oven 4	Online
Canister Cleaner	Entech	3100D	2214	As Needed	Used	Air Lab	Oven 5	Online
Oven	Entech	09-OV6L8	0134	As Needed	Used	Air Lab	Oven 5	Online
Oven	Entech	09-OV6L8	0135	As Needed	Used	Air Lab	Oven 5	Online
Canister Cleaner	Entech	3100A	1154	As Needed	Used	Air Lab	Oven 6	Online
Oven	Entech	3513ENT	1482060344516	As Needed	Used	Air Lab	Oven 6	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Oven	Entech	3513ENT	1003-4123	As Needed	Used	Air Lab	Oven 6	Online

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph 2	HP 6890	HP 6890	US00004397	As needed	Used	SVOC	svcompa	Online
Gas Chromatograph 3	Agilent 6890	Agilent 6890	US00002051	As needed	Used	SVOC	svcompo	Online
Gas Chromatograph 7	Agilent 6890	Agilent 6890	US10350064	As needed	Used	SVOC	Svcompe	Online
Gas Chromatograph 8	Agilent 6890	Agilent 6890	DE00022534	As needed	Used	SVOC	svcompp	Online
Gas Chromatograph 9	HP 6890	HP 6890	US00029095	As needed	Used	SVOC	Svcompj	Online
Gas Chromatograph 10	Agilent 6890	Agilent 6890	US00039655	As needed	Used	SVOC	Scvompk	Online
Gas Chromatograph 11	Agilent 6890	Agilent 6890	US00040550	As needed	Used	SVOC	Svcompn	Online
Gas Chromatograph 12	Agilent 6890	Agilent 6890	US00034155	As needed	Used	SVOC	Svcompaf	Online
Gas Chromatograph 13	HP 6890	HP 6890	US00010364	As needed	Used	SVOC	Svcomps	Online
Gas Chromatograph 14	HP 6890	HP 6890	US00020581	As needed	Used	SVOC	svcompt	Online
Gas Chromatograph 16	Agilent 6890	Agilent 6890	US10212071	As needed	Used	SVOC	Svcompv	Online
Gas Chromatograph 17	Agilent 6890	Agilent 6890	US10344078	As needed	Used	SVOC	Svcompw	Online
Gas Chromatograph 18	Agilent 6890	Agilent 6890	US10351038	As needed	Used	SVOC	Svcompd	Online
Gas Chromatograph 19	Agilent 6890	Agilent 6890	CN10516070	As needed	Used	SVOC	Svompaa	Online
Gas Chromatograph 20	Agilent 6890	Agilent 6890	CN10543031	As needed	Used	SVOC	Svcompa b	Online
Gas Chromatograph 21	Agilent 7890	Agilent 7890	CN10730070	As needed	Used	SVOC	Svcompa e	Online
Gas Chromatograph 22	Agilent 7890	Agilent 7890	CN10730081	As needed	Used	SVOC	svcompa d	Online
Gas Chromatograph 23	Agilent 6890	Agilent 6890	CN92174366	As needed	Used	SVOC	Svcompa g	Online
Gas Chromatograph 24	Agilent 6890	Agilent 6890	CN92174369	As needed	Used	SVOC	Svcompa h	Online
Gas Chromatograph 25	Agilent 7890	Agilent 7890	CN10091009	As needed	Used	SVOC	Svcompaj	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph 26	Agilent 7890	Agilent 7890	CN11501138	As needed	Used	SVOC	Svcompar	Online
Gas Chromatograph 27	Agilent 7890	Agilent 7890	CN11501139	As needed	Used	SVOC	Svcompas	Online
Gas Chromatograph 28	Agilent 7890	Agilent 7890	US11521018	As needed	Used	SVOC	Svcompat	Online
Gas Chromatograph 29	Agilent 7890	Agilent 7890	CN11521077	As needed	Used	SVOC	Svcompa u	Online
Gas Chromatograph 30	Agilent 7890	Agilent 7890	US11521020	As needed	Used	SVOC	Svcompa v	Online
Gas Chromatograph 31	Agilent 7890	Agilent 7890	CN13503096	As needed	Used	SVOC	Svcompb a	Online
Gas Chromatograph 32	Agilent 7890	Agilent 7890	CN14423060	As needed	Used	SVOC	Svcompb c	Online
Gas Chromatograph 33	Agilent 7890	Agilent 7890	CN15033026	As needed	Used	SVOC	Svcompb d	Online
Gas Chromatograph 34	Agilent 7890	Agilent 7890	CN15033027	As needed	Used	SVOC	svcompb e	Online
Gas Chromatograph 35	Agilent 7890	Agilent 7890	US10838014	As needed	Used	SVOC	svcompb h	Online
Gas Chromatograph 36	Agilent 7890	Agilent 7890	US10205134	As needed	Used	SVOC	svcompbi	Online
Gas Chromatograph 38	Agilent 7890	Agilent 7890	US10142052	As needed	Used	SVOC	svcompb k	Online
Gas Chromatograph 41	Agilent 7890	Agilent 7890	CN16123059	As needed	Used	SVOC	svcompb m	Online
Gas Chromatograph 42	Agilent 7890	Agilent 7890	US1952A007	As needed	Used	SVOC	svcompb p	Online
Gas Chromatograph 43	Agilent 7890	Agilent 7890	US1951A023	As needed	Used	SVOC	svcompb q	Online
Gas Chromatograph 45	Agilent 8890	Agilent 8890	US2016A022	As needed	Used	SVOC	svcompb x	Online
Gas Chromatograph 46	Agilent 7890	Agilent 7890	CN13443001	As needed	Used	SVOC	svcompb y	Online
Gas Chromatograph 47	Agilent 7890	Agilent 7890	CN10301152	As needed	Used	SVOC	svcompb z	Online
Gas Chromatograph 48	Agilent 6890	Agilent 6890	CN10344042	As needed	Used	SVOC	svcompca	Online
Gas Chromatograph 49	Agilent 7890	Agilent 7890	CN10814061	As needed	Used	SVOC	svcompc b	Online
Gas Chromatograph 50	Agilent 8890	Agilent 8890	US2119A057	As needed	Used	SVOC	svcompcc	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph Detectors 2	FID Detector	FID Detector	N/A	As needed	Used	SVOC	scvompa	Online
Gas Chromatograph Detectors 3	NPD/NPD Detectors	NPD/NPD Detectors	N/A	As needed	Used	SVOC	Svcompo	Online
Gas Chromatograph Detectors 7	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompe	Online
Gas Chromatograph Detectors 8	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompp	Online
Gas Chromatograph Detectors 9	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompj	Online
Gas Chromatograph Detectors 10	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompk	Online
Gas Chromatograph Detectors 11	ECD/ECD Detectors	ECD/ECD Detectors	F) U11750 B) U12481	As needed	Used	SVOC	svcompn	Online
Gas Chromatograph Detectors 12	FPD/FPD Detectors	FPD/FPD Detectors	N/A	As needed	Used	SVOC	Svcompaf	Online
Gas Chromatograph Detectors 13	Detectors	Detectors	N/A	As needed	Used	SVOC	Svcomps	Online
Gas Chromatograph Detectors 14	ECD/ECD Detectors	ECD/ECD Detectors	F) U3113 B) U2620	As needed	Used	SVOC	Svcompt	Online
Gas Chromatograph Detectors 16	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompv	Online
Gas Chromatograph Detectors 17	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompw	Online
Gas Chromatograph Detectors 18	ECD/ECD Detectors	ECD/ECD Detectors	F) U11613 B) U13988	As needed	Used	SVOC	Svcompd	Online
Gas Chromatograph Detectors 19	ECD/ECD Detectors	ECD/ECD Detectors	F) U6632 B) U8422	As needed	Used	SVOC	Svcompa a	Online
Gas Chromatograph Detectors 20	ECD/ECD Detectors	ECD/ECD Detectors	F) U13989 B) U0418	As needed	Used	SVOC	Svcompa b	Online
Gas Chromatograph Detectors 21	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompa e	Online
Gas Chromatograph Detectors 22	ECD/ECD Detectors	ECD/ECD Detectors	F) U12039 B) 12038	As needed	Used	SVOC	Svcompa d	Online
Gas Chromatograph Detectors 23	ECD/ECD Detectors	ECD/ECD Detectors	F) U2621 B) U8104	As needed	Used	SVOC	Svcompa g	Online
Gas Chromatograph Detectors 24	ECD/ECD Detectors	ECD/ECD Detectors	F) U8423 B) U12482	As needed	Used	SVOC	Svcompa h	Online
Gas Chromatograph Detectors 25	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompaj	Online
Gas Chromatograph Detectors 26	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompar	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph Detectors 27	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompas	Online
Gas Chromatograph Detectors 28	ECD/ECD Detectors	ECD/ECD Detectors	F) U26768 B) U26237	As needed	Used	SVOC	Svcompat	Online
Gas Chromatograph Detectors 29au	ECD/ECD Detectors	ECD/ECD Detectors	F) U20277 B) U20299	As needed	Used	SVOC	Svcompa u	Online
Gas Chromatograph Detectors 30	ECD/ECD Detectors	ECD/ECD Detectors	F) U20425 B) U20424	As needed	Used	SVOC	Svcompa v	Online
Gas Chromatograph Detectors 31	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb a	Online
Gas Chromatograph Detectors 32	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb c	Online
Gas Chromatograph Detectors 33	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb d	Online
Gas Chromatograph Detectors 34	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb e	Online
Gas Chromatograph Detectors 35	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb h	Online
Gas Chromatograph Detectors 36	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompbi	Online
Gas Chromatograph Detectors 38	ECD/ECD Detectors	ECD/ECD Detectors	F) U14736 B) U16284	As needed	Used	SVOC	Svcompb k	Online
Gas Chromatograph Detectors 41	NPD/NPD Detectors	NPD/NPD Detectors	N/A	As needed	Used	SVOC	Svcompb p	Online
Gas Chromatograph Detectors 42	ECD/ECD Detectors	ECD/ECD Detectors	F) U37659 B) U37661	As needed	Used	SVOC	Svcompb p	Online
Gas Chromatograph Detectors 43	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb q	Online
Gas Chromatograph Detectors 45	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb x	Online
Gas Chromatograph Detectors 46	ECD/ECD Detectors	ECD/ECD Detectors	F) U39219 B) U39356	As needed	Used	SVOC	Svcompb y	Online
Gas Chromatograph Detectors 47	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompb z	Online
Gas Chromatograph Detectors 48	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompc a	Online
Gas Chromatograph Detectors 49	FPD/FPD Detectors	FPD/FPD Detectors	N/A	As needed	Used	SVOC	Svcompc b	Online
Gas Chromatograph Detectors 50	FID Detector	FID Detector	N/A	As needed	Used	SVOC	Svcompc c	Online
Gas Chromatograph/ Mass Spectrometer 1	Agilent 6890GC 5973 MSD	Agilent 6890GC 5973 MSD	GC CN10335001 MS US33220022	As needed	Used	SVOC	Svcompf	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph/ Mass Spectrometer 2	Agilent 6890GC 5973 MSD	Agilent 6890GC 5973 MSD	GC US10409048 MS US35120400	As needed	Used	SVOC	Svcompc	Online
Gas Chromatograph/ Mass Spectrometer 4	Agilent 6890GC 5973 MSD	Agilent 6890GC 5973 MSD	GC CN10403067 MS US35120308	As needed	Used	SVOC	Svcomph	Online
Gas Chromatograph/ Mass Spectrometer 7	Agilent 6890GC 5973 MSD	Agilent 6890GC 5973 MSD	GC US00023180 MS US03940745	As needed	Used	SVOC	svcompm	Online
~~Gas Chromatograph/ Mass Spectrometer 9~~	Agilent 6890GC ~~5973 MSD~~	Agilent 6890GC ~~5973 MSD~~	GC CN10344042 ~~MS US33220158~~	As needed	Used	SVOC	~~Svcompx~~	Decommissioned and repurposed as SVGC48
Gas Chromatograph/ Mass Spectrometer 10	Agilent 6890GC 5973 MSD	Agilent 6890GC 5973 MSD	GC CN10340045 MS US33220183	As needed	Used	SVOC	Svcompy	Online
Gas Chromatograph/ Mass Spectrometer 11	Agilent 6890GC 5975 MSD	Agilent 6890GC 5975 MSD	GC CN10509031 MS US60532657	As needed	Used	SVOC	Svcompac	Online
Gas Chromatograph/ Mass Spectrometer 12	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN10728074 MS 12-0706-1325	As needed	Used	SVOC	Svcompai	Online
Gas Chromatograph/ Mass Spectrometer 13	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN10301081 MS US10313621	As needed	Used	SVOC	Svcompak	Online
Gas Chromatograph/ Mass Spectrometer 14	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN11031022 MS US11093726	As needed	Used	SVOC	Svcompal	Online
Gas Chromatograph/ Mass Spectrometer 15	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN10301081 MS US10313621	As needed	Used	SVOC	Svcompam	Online
~~Gas Chromatograph/ Mass Spectrometer 16~~	Agilent 7890GC ~~5975 MSD~~	Agilent 7890GC ~~5975 MSD~~	GC CN10301152 ~~MS US10313616~~	As needed	Used	SVOC	~~Svcompan~~	Decommissioned and repurposed as SVGC47
Gas Chromatograph/ Mass Spectrometer 17	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN11191064 MS US11363807	As needed	Used	SVOC	Svcompao	Online
Gas Chromatograph/ Mass Spectrometer 18	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN11401093 MS US11403903	As needed	Used	SVOC	Svcompap	Online
Gas Chromatograph/ Mass Spectrometer 19	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN 11391051 MS US11383838	As needed	Used	SVOC	Svcompaq	Online
Gas Chromatograph/ Mass Spectrometer 20	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN12031161 MS US11503941	As needed	Used	SVOC	Svcompaw	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph/ Mass Spectrometer 21	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN12031160 MS US11513903	As needed	Used	SVOC	Svcompax	Online
Gas Chromatograph/ Mass Spectrometer 22	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN11521157 MS US12023909	As needed	Used	SVOC	Svcompay	Online
Gas Chromatograph/ Mass Spectrometer 23	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN12031114 MS US11433926	As needed	Used	SVOC	Svcompaz	Online
Gas Chromatograph/ Mass Spectrometer 24	Agilent 7890GC 5977 MSD	Agilent 7890GC 5977 MSD	GC CN14163165 MS US92043581	As needed	Used	SVOC	Svcompbb	Online
Gas Chromatograph/ Mass Spectrometer 25	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN10906031 MS US11343905	As needed	Used	SVOC	Svcompbf	Online
Gas Chromatograph/ Mass Spectrometer 26	Agilent 7890GC 5975 MSD	Agilent 7890GC 5975 MSD	GC CN10021075 MS US10143111	As needed	Used	SVOC	Svcompbl	Online
Gas Chromatograph/ Mass Spectrometer 28	Agilent 7890GC 5977 MSD	Agilent 7890GC 5977 MSD	GC CN13483185 MS US1349M227	As needed	Used	SVOC	Svcompbo	Online
Gas Chromatograph/ Mass Spectrometer 29	Agilent 8890GC 5977 MSD	Agilent 8890GC 5977 MSD	GC US1951A019 MS US1952M030	As needed	Used	SVOC	Svcompbr	Online
Gas Chromatograph/ Mass Spectrometer 30	Agilent 8890GC 5977 MSD	Agilent 8890GC 5977 MSD	GC US1947A006 MS US2040M022	As needed	Used	SVOC	Svcompbs	Online
Gas Chromatograph/ Mass Spectrometer 31	Agilent 8890GC 5977 MSD	Agilent 8890GC 5977 MSD	GC US2014A033 MS US2041M031	As needed	Used	SVOC	Svcompbu	Online
Gas Chromatograph/ Mass Spectrometer 32	Agilent 8890GC 5977 MSD	Agilent 8890GC 5977 MSD	GC US2016A007 MS US2041M015	As needed	Used	SVOC	Svcompbv	Online
Gas Chromatograph/ Mass Spectrometer 33	Agilent 8890GC 5977 MSD	Agilent 8890GC 5977 MSD	GC US2014A035 MS US2040M015	As needed	Used	SVOC	Svcompbw	Online
Liquid Chromatograph/ Mass Spectrometer (QQQ) LCMSMS1	Agilent 1290/1290/ 1290LC 6470 MSD (QQQ)	Agilent 1290LC 6470 MSD (QQQ)	Multisampler DEBAS01954 MS/MS SG1846G104 Pump DEBA202992 MCT DEBA404366	As needed	Used	SVOC	LCMSMS 1	Online
Liquid Chromatograph/ Mass Spectrometer (QQQ) LCMSMS2	Agilent 1260/1200/ 1200LC 6460 MSD (QQQ)	Agilent 1260/1200/ 1200LC 6460 MSD (QQQ)	Multisampler DEAAC40230 MS/MS SG11477210 Pump DEAB715448 TCC DEACN42876	As needed	Used	SVOC	LCMSMS 2	In develop ment

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
High Performance Liquid Chromatography (HPLC1)	Agilent 1100 Series DAD/FLD	Agilent 1100 Series DAD/FLD	DAD de01608402 FLD de23904489	As needed	Used	SVOC	Hplc1	Online
High Performance Liquid Chromatography (HPLC2)	Agilent 1100 Series DAD/FLD	Agilent 1100 Series DAD/FLD	DAD de30518420 FLD de92001880	As needed	Used	SVOC	Hplc2	Online
High Performance Liquid Chromatography	Agilent 1100 Series DAD	Agilent 1100 Series DAD	DAD us64400711	As needed	Used	SVOC	Hplc3	Online
High Performance Liquid Chromatography	Agilent 1100 Series DAD	Agilent 1100 Series DAD	DAD de43623013	As needed	Used	SVOC	Hplc4	Online
Analytical Balance	Mettler-Toledo XS204		1122411619	As needed	Used	Ext. Lab		Book shelf
Automated Soxhlet	Gerhardt Soxtherm		2951	As needed	Used	Ext. Lab	#1	In lab on shelf next to instrument
Automated Soxhlet	Gerhardt Soxtherm		2952	As needed	Used	Ext. Lab	#2	In lab on shelf next to instrument
Automated Soxhlet	Gerhardt Soxtherm		2953	As needed	Used	Ext. Lab	#3	In lab on shelf next to instrument
Automated Soxhlet	Gerhardt Soxtherm		2954	As needed	Used	Ext. Lab	#4	In lab on shelf next to instrument
Centrifuge	Sorvall ST-41		2225	As needed	Used	Ext. Lab		Book shelf in lab
Centrifuge	Sorvall ST-41		2227	As needed	Used	Ext. Lab		Book shelf in lab
Microwave	CEM MARS 6		MJ2518	As needed	Used	Ext. Lab	#3	Book shelf in lab
Microwave	CEM MARS 6		MJ6367	As needed	Used	Ext. Lab	#4	Book shelf in lab
Microwave	CEM MARS 6		MJZ868	As needed	Used	Ext. Lab	#2	Book shelf in lab
Microwave	CEM MARS 6	MARS 6	MY2163	As needed	New	Ext. Lab	#5	Book shelf in lab
Microwave	CEM MARS 6	MARS 6	MY2132	As needed	New	Ext. Lab	#6	Book shelf in lab
O&G Solvent Evaporator	Horizon Speed-Vap III		04-2020	As needed	Used	Ext. Lab	#1	Book shelf in lab

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
O&G Solvent Evaporator	Horizon Speed-Vap III		03-1001	As needed	Used	Ext. Lab	#3	Book shelf in lab
O&G Solvent Evaporator	Horizon Speed-Vap IV		15-0055	As needed	Used	Ext. Lab	#4	Book shelf in lab
O&G Solvent Evaporator	Horizon Speed-Vap IV		15-0056	As needed	Used	Ext. Lab	#2	Book shelf in lab
O&G SPE Extractor	Horizon SPE-DEX 3100		15-0113	As needed	Used	Ext. Lab		Disk in lab
O&G SPE Extractor	Horizon SPE-DEX 3100		15-0116	As needed	Used	Ext. Lab		Disk in lab
O&G SPE Extractor	Horizon SPE-DEX 3100		15-0117	As needed	Used	Ext. Lab		Disk in lab
O&G SPE Extractor	Horizon SPE-DEX 3100		15-0118	As needed	Used	Ext. Lab		Disk in lab
Oven	Fisher		00700127	As needed	Used	Ext. Lab		Bookshelf in lab
Oven	Fisher		~~1000594~~ F210266022FD	As needed	Used	Ext. Lab		Bookshelf in lab
Ring & Puck Mill	SPEX ShatterBOX 8530		10191	As needed	Used	Ext. Lab		Bookshelf in lab
Sonicator	Qsonica Q700		92183M-16-16	As needed	Used	Ext. Lab		Bookshelf in lab
Sonicator	Qsonica Q700		92186M-10-16	As needed	Used	Ext. Lab		Bookshelf in lab
Sonicator	Qsonica Q700		92189M-10-16	As needed	Used	Ext. Lab		Bookshelf in lab
Sonicator	Qsonica Q700		9219M-10-16	As needed	Used	Ext. Lab		Bookshelf in lab
Sonicator	Qsonica Q700	Q700	120131U-05-21	As needed	New	Ext. Lab	#5	Bookshelf in lab
Sonicator	Qsonica Q700	Q700	120137U-05-21	As needed	New	Ext. Lab	#6	Bookshelf in lab
Water Bath	ThermoScientific		2033602-102	As needed	Used	Ext. Lab		Bookshelf in lab
Water Bath	Gant		VH1535002	As needed	Used	EXT. Lab		Bookshelf
~~Microwave~~	~~CEM MARS Xpress~~		~~MD2861~~	~~As needed~~	~~New~~	~~EXT. Lab~~	~~#1~~	Decommissioned
Centrifuge	Sorvall ST-41		42498357	As needed	Used	EXT. Lab		Bookshelf
Concentrator	Buchi	Buchi Syncore Plus	1100082324	As needed	New	EXT. Lab	#1	Bookshelf
Concentrator	Buchi	Buchi Syncore Plus	1100082473	As needed	New	EXT. Lab	#2	Bookshelf
Concentrator	Buchi	Buchi Syncore Plus	1100084062	As needed	New	EXT. Lab	#3	Bookshelf
Concentrator	Buchi	Buchi Syncore Plus	1100084063	As needed	New	EXT. Lab	#4	Bookshelf
Concentrator	XcelVap	Horizon Technologies	17-5548	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	19-5688	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	17-5564	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	17-5686	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	19-5687	As needed	Used	EXT. Lab		On Disc in Lab

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Concentrator	XcelVap	Horizon Technologies	17-5549	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	17-5541	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	17-5545	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	17-5547	As needed	Used	EXT. Lab		On Disc in Lab
Concentrator	XcelVap	Horizon Technologies	18-5619	As needed	Used	EXT. Lab		On Disc in Lab
O/G SPE Extractor		Horizon Technologies	15-0104	As needed	Used	EXT. Lab		On Disc in Lab
O/G SPE Extractor		Horizon Technologies	16-0169	As needed	Used	EXT. Lab		On Disc in Lab
O&G Solvent Evaporator	Horizon Speed-Vap IV	Horizon Speed-Vap IV	10-0778	As needed	Used	EXT. Lab		Bookshelf in Lab
O&G Solvent Evaporator	Horizon Speed-Vap IV	Horizon Speed-Vap IV	04-2020	As needed	Used	EXT. Lab		Bookshelf in Lab
Analytical Balance	Rad Wag		552935	As needed	Used	EXT. Lab	EXTBAL #4	Bookshelf in Lab
Analytical Balance	Rad Wag		537906	As needed	Used	EXT. Lab	EXTBAL #3	Bookshelf in Lab
Analytical Balance	Rad Wag		552941	As needed	Used	EXT. Lab	EXTBAL #5	Bookshelf in Lab
Analytical Balance	Rad Wag		545380	As needed	Used	EXT. Lab	EXTBAL #7	Bookshelf in Lab
Analytical Balance	Rad Wag		537906	As needed	Used	EXT. Lab	EXTBAL #9	Bookshelf in Lab

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph	Hewlett Packard	5890 Series II	3336A60095	As Needed	Used	Volatiles	VOCGC1 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Agilent	6890	CN10609095	As Needed	Used	Volatiles	VOCGC2 FID1A= FID ELC2B= PID	Online
Gas Chromatograph	Hewlett Packard	5890 Series II	3336A50614	As Needed	Used	Volatiles	VOCGC4 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Hewlett Packard	5890 Series II	3027A29678	As Needed	Used	Volatiles	VOCGC5 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Hewlett Packard	5890 Series II	2950A27895	As Needed	Used	Volatiles	VOCGC6 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Hewlett Packard	5890 Series II	3336A55283	As Needed	Used	Volatiles	VOCGC7 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Agilent	6890	US00022519	As Needed	Used	Volatiles	VOCGC10 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Agilent	6890	US00040221	As Needed	Used	Volatiles	VOCGC12 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Hewlett Packard	5890 Series II	2921A23548	As Needed	Used	Volatiles	VOCGC13 FID1A= FID FID2B= PID	Online
Gas Chromatograph	Agilent	6890	CN10406054	As Needed	Used	Volatiles	VOCGC14 FID1A= FID ELC2B= PID	Online
Gas Chromatograph	Agilent	6890	US10232130	As Needed	Used	Volatiles	VOCGC15 ELC1A= FID ELC2B= PID	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph	Agilent	8890 GC	GC US2120A021	As Needed	Used	Volatiles	VOCGC16 FID1A=FID FID2B=PID	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5975 MSD	GC CN10517046 MS US63234371	As Needed	Used	Volatiles	VOCMS2	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC US00023465 MS US82311257	As Needed	Used	Volatiles	VOCMS4	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC CN10343037 MS US44647141	As Needed	Used	Volatiles	VOCMS6	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC US00038168 MS US92530547	As Needed	Used	Volatiles	VOCMS7	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC CN10339006 MS US33220045	As Needed	Used	Volatiles	VOCMS13	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC US00006479 MS US82321899	As Needed	Used	Volatiles	VOCMS16	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5975 MSD	GC CN621A4367 MS US469A4832	As Needed	Used	Volatiles	VOCMS20	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5975 MSD	GC CN621A4368 MS US469A4833	As Needed	Used	Volatiles	VOCMS21	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN99205324 MS US54441572	As Needed	Used	Volatiles	VOCMS22	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN10728068 MS US71236616	As Needed	Used	Volatiles	VOCMS23	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5975 MSD	GC CN10728074 MS US98003634	As Needed	Used	Volatiles	VOCMS25	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5975 MSD	GC CN11381060 MS US11383834	As Needed	Used	Volatiles	VOCMS26	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN10301155 MS US10313619	As Needed	Used	Volatiles	VOCMS27	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC US10208101 MS US10442380	As Needed	Used	Volatiles	VOCMS28	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	6890 GC 5973 MSD	GC US000034135 MS US94240103	As Needed	Used	Volatiles	VOCMS30	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN13113015 MS US92013978	As Needed	Used	Volatiles	VOCMS32	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN11351165 MS US63810153	As Needed	Used	Volatiles	VOCMS33	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN10849077 MS US83131017	As Needed	Used	Volatiles	VOCMS35	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN13153007 MS US83141150	As Needed	Used	Volatiles	VOCMS36	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5977 MSD	GC CN15333012 MS US1534M407	As Needed	Used	Volatiles	VOCMS37	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890 GC 5975 MSD	GC CN11281031 MS US1713D003	As Needed	Used	Volatiles	VOCMS38	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890A GC 5977A MS	GC CN10151020 MS US1417L240	As Needed	Used	Volatiles	VOCMS39	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890B GC 5977A MSD	GC CN15133171 MS US1542L427	As Needed	Used	Volatiles	VOCMS40	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890B GC 5977B MS	GC CN10940090 MS US1705M027	As Needed	Used	Volatiles	VOCMS41	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890B GC 5977B MS	GC CN17010001 MS US1706M049	As Needed	Used	Volatiles	VOCMS42	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	Intuvo 9000 GC 5977HES MS	GC CN17040005 MS US1714D003	As Needed	Used	Volatiles	VOCMS44	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	7890B GC 5973 MSD	GC US14453011 MS US1451L418	As Needed	Used	Volatiles	VOCMS52	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890B GC 5977B MS	GC US1946A049 MS US1945M023	As Needed	New	Volatiles	VOCMS53	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890B GC 5977B MS	GC US1946A050 MS US1946M007	As Needed	New	Volatiles	VOCMS54	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890B GC 5977B MS	GC US1946A054 MS US1946M008	As Needed	New	Volatiles	VOCMS55	Online
Gas Chromatograph/ Mass Spectrometer	Agilent	8890B GC 5977B MS	GC US1946A056 MS US1945M026	As Needed	New	Volatiles	VOCMS56	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
as Chromatograph/ Mass Spectrometer	Agilent	8890 GC 5977B MS	GC US1947A068 MS US2040M031	As Needed	New	Volatiles	VOCMS57	Online
as Chromatograph/ Mass Spectrometer	Agilent	8890 GC 5977B MS	GC US2014A037 MS US2041M011	As Needed	New	Volatiles	VOCMS58	Online
as Chromatograph/ Mass Spectrometer	Agilent	8890 GC 5977B MS	GC US2014A036 MS US2040M033	As Needed	New	Volatiles	VOCMS59	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS385091214	As Needed	Used	Volatiles	VOCGC2	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS368051214	As Needed	Used	Volatiles	VOCMS6	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS317080513	As Needed	Used	Volatiles	VOCMS7	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS500041117	As Needed	Used	Volatiles	VOCMS13	Online
Centurion Autosampler	PTS/EST	Centurion	CENTW801062121	As Needed	Used	Volatiles	VOCMS16	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS396112014	As Needed	Used	Volatiles	VOCMS21	Online
Centurion Autosampler	PTS/EST	Centurion	CENTW803062121	As Needed	Used	Volatiles	VOCMS22	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS386091214	As Needed	Used	Volatiles	VOCMS23	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS165061710	As Needed	Used	Volatiles	VOCMS25	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS170072010	As Needed	Used	Volatiles	VOCMS26	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS375071714	As Needed	Used	Volatiles	VOCMS30	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS163052610	As Needed	Used	Volatiles	VOCMS33	Online
Centurion Autosampler	PTS/EST	Centurion	CENTW802062121	As Needed	Used	Volatiles	VOCMS36	Online
Centurion Autosampler	PTS/EST	Centurion	CENTW804062121	As Needed	Used	Volatiles	VOCMS37	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS171072010	As Needed	Used	Volatiles	VOCMS39	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS338112213	As Needed	Used	Volatiles	VOCMS40	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS395112014	As Needed	Used	Volatiles	VOCMS42	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS499041117	As Needed	Used	Volatiles	VOCMS44	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS667111119	As Needed	Used	Volatiles	VOCMS53	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS664110519	As Needed	Used	Volatiles	VOCMS54	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS673120319	As Needed	Used	Volatiles	VOCMS55	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS674120319	As Needed	Used	Volatiles	VOCMS56	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS756102820	As Needed	Used	Volatiles	VOCMS57	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS755102820	As Needed	Used	Volatiles	VOCMS58	Online
Centurion Autosampler	PTS/EST	Centurion	CENTS800062121	As Needed	Used	Volatiles	VOCMS59	Online
Autosampler	Varian	Archon	13809	As Needed	Used	Volatiles	VOCGC1	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Autosampler	Varian	Archon	13999	As Needed	Used	Volatiles	VOCGC4	Online
Autosampler	Varian	Archon	13454	As Needed	Used	Volatiles	VOCGC5	Online
Autosampler	Varian	Archon	14157	As Needed	Used	Volatiles	VOCGC6	Online
Autosampler	Varian	Archon	14599	As Needed	Used	Volatiles	VOCGC7	Online
Autosampler	Varian	Archon	13391	As Needed	Used	Volatiles	VOCGC10	Online
Autosampler	Varian	Archon	VOLARCHON1	As Needed	Used	Volatiles	VOCGC12	Online
Autosampler	Varian	Archon	13827	As Needed	Used	Volatiles	VOCGC14	Online
Autosampler	Varian	Archon	13810	As Needed	Used	Volatiles	VOCGC15	Online
Autosampler	Varian	Archon	15261	As Needed	Used	Volatiles	VOCGC16	Online
Autosampler	Varian	Archon	14143	As Needed	Used	Volatiles	VOCMS2	Online
Autosampler	Varian	Archon	14605	As Needed	Used	Volatiles	VOCMS27	Online
Autosampler	Varian	Archon	14395	As Needed	Used	Volatiles	VOCMS28	Online
Autosampler	Teledyne	Atomx	US10123007	As Needed	Used	Volatiles	VOCMS4	Online
Autosampler	Teledyne	Atomx	US14330003	As Needed	Used	Volatiles	VOCMS52	Online
Autosampler	OI Analytical	4100	D645410849	As Needed	Used	Volatiles	VOCMS20	Online
Autosampler	OI Analytical	4100	D627410770	As Needed	Used	Volatiles	VOCMS32	Online
Autosampler	OI Analytical	4100	D645410848	As Needed	Used	Volatiles	VOCMS35	Online
Autosampler	OI Analytical	4100	D619410106	As Needed	Used	Volatiles	VOCMS38	Online
Autosampler	OI Analytical	4100	D705410973	As Needed	Used	Volatiles	VOCMS41	Online
Purge and Trap	OI Analytical	Eclipse 4660	D833466009P	As Needed	Used	Volatiles	VOCGC6	Online
Purge and Trap	OI Analytical	Eclipse 4660	F023466618P	As Needed	Used	Volatiles	VOCGC16	Online
Purge and Trap	OI Analytical	Eclipse 4660	D726466961P	As Needed	Used	Volatiles	VOCMS2	Online
Purge and Trap	OI Analytical	Eclipse 4660	D742466578P	As Needed	Used	Volatiles	VOCMS16	Online
Purge and Trap	OI Analytical	Eclipse 4660	F026466142P	As Needed	Used	Volatiles	VOCMS26	Online
Purge and Trap	OI Analytical	Eclipse 4660	F024466460P	As Needed	Used	Volatiles	VOCMS27	Online
Purge and Trap	OI Analytical	Eclipse 4660	F026466139P	As Needed	Used	Volatiles	VOCMS28	Online
Purge and Trap	OI Analytical	Eclipse 4660	D719466252P	As Needed	Used	Volatiles	VOCMS32	Online
Purge and Trap	OI Analytical	Eclipse 4660	D736466413P	As Needed	Used	Volatiles	VOCMS33	Online
Purge and Trap	OI Analytical	Eclipse 4660	D713466087P	As Needed	Used	Volatiles	VOCMS35	Online
Purge and Trap	OI Analytical	Eclipse 4660	E851466095P	As Needed	Used	Volatiles	VOCMS39	Online
Purge and Trap	OI Analytical	Eclipse 4760	21J102729	As Needed	Used	Volatiles	VOCMS20	Online
Purge and Trap	OI Analytical	Eclipse 4760	21J102730	As Needed	Used	Volatiles	VOCMS25	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Purge and Trap	OI Analytical	Eclipse 4760	A627447776	As Needed	Used	Volatiles	VOCMS37	Online
Purge and Trap	OI Analytical	Eclipse 4760	A626447111	As Needed	Used	Volatiles	VOCMS38	Online
Purge and Trap	OI Analytical	Eclipse 4760	A620447864	As Needed	Used	Volatiles	VOCMS40	Online
Purge and Trap	OI Analytical	Eclipse 4760	A703447933	As Needed	Used	Volatiles	VOCMS41	Online
Purge and Trap	OI Analytical	Eclipse 4760	A707447491	As Needed	Used	Volatiles	VOCMS42	Online
Purge and Trap	OI Analytical	Eclipse 4760	A942447703	As Needed	Used	Volatiles	VOCMS53	Online
Purge and Trap	OI Analytical	Eclipse 4760	A031447210	As Needed	Used	Volatiles	VOCMS54	Online
Purge and Trap	OI Analytical	Eclipse 4760	A946447334	As Needed	Used	Volatiles	VOCMS55	Online
Purge and Trap	OI Analytical	Eclipse 4760	A946447333	As Needed	Used	Volatiles	VOCMS56	Online
Purge and Trap	OI Analytical	Eclipse 4760	A039447237	As Needed	Used	Volatiles	VOCMS57	Online
Purge and Trap	OI Analytical	Eclipse 4760	A041447860	As Needed	Used	Volatiles	VOCMS58	Online
Purge and Trap	OI Analytical	Eclipse 4760	A946447335	As Needed	Used	Volatiles	VOCMS59	Online
Purge and Trap	PTS/EST	Encon	301082903P	As Needed	Used	Volatiles	VOCGC1	Online
Purge and Trap	PTS/EST	Encon	269050803P	As Needed	Used	Volatiles	VOCGC2	Online
Purge and Trap	PTS/EST	Encon	273052803P	As Needed	Used	Volatiles	VOCGC4	Online
Purge and Trap	PTS/EST	Encon	188040502	As Needed	Used	Volatiles	VOCGC5	Online
Purge and Trap	PTS/EST	Encon	F26466143P	As Needed	Used	Volatiles	VOCGC7	Online
Purge and Trap	PTS/EST	Encon	271051903P	As Needed	Used	Volatiles	VOCGC10	Online
Purge and Trap	PTS/EST	Encon	485031406P	As Needed	Used	Volatiles	VOCGC12	Online
Purge and Trap	PTS/EST	Encon	210073108P	As Needed	Used	Volatiles	VOCGC14	Online
Purge and Trap	PTS/EST	Encon	280062503P	As Needed	Used	Volatiles	VOCGC15	Online
Purge and Trap	PTS/EST	Evolution	EV577051214	As Needed	Used	Volatiles	VOCMS6	Online
Purge and Trap	PTS/EST	Evolution	EV504082713	As Needed	Used	Volatiles	VOCMS7	Online
Purge and Trap	PTS/EST	Evolution	EV831041117	As Needed	Used	Volatiles	VOCMS13	Online
Purge and Trap	PTS/EST	Evolution	EV642112014	As Needed	Used	Volatiles	VOCMS21	Online
Purge and Trap	PTS/EST	Evolution	EV643112014	As Needed	Used	Volatiles	VOCMS22	Online
Purge and Trap	PTS/EST	Evolution	EV618091214	As Needed	Used	Volatiles	VOCMS23	Online
Purge and Trap	PTS/EST	Evolution	EV594071714	As Needed	Used	Volatiles	VOCMS30	Online
Purge and Trap	PTS/EST	Evolution	EV832041117	As Needed	Used	Volatiles	VOCMS44	Online
Purge and Trap	PTS/EST	Evolution II	EV20174062121	As Needed	Used	Volatiles	VOCMS36	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Analytical Balance	Mettler	XSE 105 Dual Range	B634906554	Annual	New	Aquatic Tox Lab	002929	Biomon
Class "I" weights (2)	Troemner	SN #67812	67812	Annual	New	Aquatic Tox Lab	000565	UKN
Dissolved Oxygen Meter	YSI	Model 5000	01L0435 AE	Annual	New	Aquatic Tox Lab	N/A	Biomon
Stereoscope	Olympus	SZX-ILLK100 (ESC1709)	7D48897	Annual	New	Aquatic Tox Lab	N/A	Biomon
Oven (1)	Fisher	655F	30400142	Annual	New	Aquatic Tox Lab	304	UKN
Cold Room	Thermo-Kool	Walk-In Refrigerator	49409	Annual	New	Aquatic Tox Lab	1800	UKN
pH meter	Beckman	SN 2192	2192	Annual	New	Aquatic Tox Lab	N/A	Biomon
Incubator-19	Thermo Scientific Precision	3759	WB14651419	Annual	New	Aquatic Tox Lab	2355	Biomon
Incubator-14	Thermo Scientific Precision	3759	WB40472036	Annual	New	Aquatic Tox Lab	2593	Biomon
Stereoscope	Olympus	SZX2-ILLD (ESCP0004)	7B03145	Annual	New	Aquatic Tox Lab	P0004	Biomon
pH meter	Orion	VersaStar	V02105	Annual	New	Aquatic Tox Lab	2424	Biomon
Waterbath	Lindberg/Blue	WB1130A	X05R-220204-XE	Annual	UKN	Aquatic Tox Lab	000601	N/A
Stereoscope	Olympus	SZH-ILLD (ESC125)	TB49859	Annual	New	Aquatic Tox Lab	N/A	Biomon
Stereoscope	Olympus	SZH-ILLD	9B49874	Annual	New	Aquatic Tox Lab	P0128	Biomon
Waterbath	Lindberg Blue M	MW-1110A-1	501M-580360-SM	Annual	Used	Aquatic Tox Lab	2009	UKN
Refrigerator	True	T-49	AK9434A	Annual	UKN	Aquatic Tox Lab	243	UKN
Water Purifier	ELGA Pure Lab	4LXXXSCM2	4LT00002887	N/A	New	Aquatic Tox Lab	2628	Biomon
Mini fridge	Haier	HC27SG42RG	BS0882E1G00B KFCH0426	Annual	New	Aquatic Tox Lab	n/A	N/A
pH/Conductivity Benchtop meter	Thermo Scientific Orion	VSTAR 52	V02105	Annual	New	Aquatic Tox Lab	2424	Biomon
RDO Probe	Thermo Scientific Orion	VSTAR-RD	3477 232	Daily	New	Aquatic Tox Lab	N/A	Biomon
Oven (2)	Thermoscientific	Heratherm OGS400	41831936	Annual	New	Aquatic Tox Lab	2809	Biomon
Freezer	Kenmore	198.8130582	P20949206	Annual	Used	Aquatic Tox Lab	N/A	UKN
Incubator	Crown Tonka	Walk-In	260333-01 J01	Annual	New	Aquatic Tox Lab	N/A	Biomon

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Analytical Balance	Mettler Toledo	XSE1050DU	B634906554	Annual	New	Microbiology Lab	002929	Biomon
Class "I" weights	(1 set) Troemner	000565		Annual	New	Microbiology Lab	N/A	UKN
Autoclave	Barstead	Harvey	1277061222472	Annual	New	Microbiology Lab	1708	Biomon
Water Bath	Lindberg Blue	WB1130 A	X05E-2205204-XE	Annual	New	Microbiology Lab	000601	Biomon
Water Bath	Blue M	MW-1110A-1	501M-580390-SM	Annual	Used	Microbiology Lab	2009	UKN

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Oven	Fisher	655F	30400142	Annual	New	Microbiology Lab	304	UKN
Quantitray Sealer	IDEXX	2X	QTP13172302569	Monthly	New	Microbiology Lab	2803	Biomon
Incubator	Thermo Scientific Precision	PR505755L	300303584	Annual	New	Microbiology Lab	30T8	Biomon
Colony Counter	Quebecor	3325	222649	N/A		Microbiology Lab		
pH meter	Beckman	pH/Temp/mV/ISE	2192	Annual	New	Microbiology Lab	N/A	Biomon
Refrigerator	True	T-49	AK9434A	Annual	UKN	Microbiology Lab	243	UKN
Stereoscope (2)	Olympus	SZH-ILLD	9B49974	Annual	New	Microbiology Lab	P0128	Biomon
UV light; short and long wave	Entela	UVP-56	1010.1-92	Quarterly	New	Microbiology Lab	N/A	Biomon
Autoclave	SterileMax	Harvey	1277061222472	Annual	New	Microbiology Lab	1708	Biomon
Water Purifier	ELGA Pure La	4LXXXSCM2	ULT00002887	N/A	New	Microbiology Lab	2628	Biomon
pH meter/ Conductivity meter/LDO	Thermo Scientific Orion	VStar 02105	V02105	Annual	New	Aquatic Tox Lab	2424	Biomon
Incubator	Thermo Scintific	Heartherm	42408345	Annual	New	Aquatic Tox Lab	P0141	Biomon
Incubator	Thermo Scintific	Heartherm	42408348	Annual	New	Aquatic Tox Lab	P0182	Biomon

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Analytical Balance	Mettler	PL602-S	1125081657	Annual	Unk	Bacteriology Lab	N/A	Mold Lab cabinet
Autoclave	Tuttnauer	2540EK	2906170	Annual	New	Bacteriology Lab	N/A	Mold Lab cabinet
Biolog MicroStation	Biolog, Inc.	Microlog 3	203222	Annual	New	Bacteriology Lab	1676	Mold Lab cabinet
BOD SP Robotic Analyzer	Skalar	SP50	8123	Annual	New	BOD	1931	Mold Lab cabinet
BOD SP Robotic Analyzer	Skalar	SP50	8124	Annual	New	BOD	1932	Mold Lab cabinet
Class I BSC	AirFiltronix	AirFiltronix HS 4500	41031	Annual	New	Mold Lab	1505	Mold Lab cabinet
Class II BSC	Labconco	Labconco 36209	30706555	Annual	USed	Bacteriology Lab	1374	Mold Lab cabinet
Class II BSC	Labconco	Labconco 36213	60554894	Annual	USed	Mold Lab	N/A	Mold Lab cabinet
COD Reactor	HACH	45600	900903221	N/A	New	BOD	N/A	Mold Lab cabinet
DO meter	YSI	5000	081K101451	N/A	New	BOD	N/A	Mold Lab cabinet
DO meter	YSI	5000	081K101450	N/A	New	BOD	N/A	Mold Lab cabinet
DO meter	YSI	5000	08K101452	N/A	New	BOD	N/A	Mold Lab cabinet
DO meter	YSI	5000	08J101358	N/A	New	BOD	N/A	Mold Lab cabinet
Fisher Scientific Vortex(q?)	Fisher Scientific		80109016	N/A	New	Mold	N/A	No
Incubator	Precision Scientific	30M	309100	N/A	New	Bacteriology Lab	1826	Mold lab cabinet
Incubator	Precision Scientific	ER505755R	300245487	N/A	New	BOD	P0127	Mold lab cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Incubator	Thermo Scientific Precision	3721	233089-3323	N/A	New	BOD	2617	Mold Lab cabinet
Incubator	SHEL-LAB	SR120P	09000719	N/A	New	BOD	3079	BOD lab
Incubator	SHEL-LAB	SR120P	09000819	N/A	New	BOD	3079	BOD Lab
Incubator	SHEL-LAB	SR120P	11003819	N/A	New	BOD	N/A	BOD Lab
Incubator	VWR	2030	1000499	N/A	New	BOD	0902	Mold Lab cabinet
Incubator	Quincy Lab	10-100	I11-2454	N/A	New	Mold Lab	N/A	Mold lab cabinet
Incubator	Thermo Precision	PR505755R	300207736	N/A	New	Mold Lab	P0092	Mold lab cabinet
Microscope	NIKON	LABOPHOT	230064	Annual	Used	Mold Lab	N/A	UKN
Microscope	NIKON	LABOPHOT	235267	Annual	Used	Mold Lab	N/A	UKN
Microscope	Olympus	CH2	9G0216	Annual	Used	Mold Lab	N/a	UKN
Microscope	Olympus	BH-2	200733	Annual	Used	Mold Lab	1597	UKN
Microscope	Leitz	Laborlux	512663	Annual	Used	Mold Lab	N/A	UKN
pH meter	Thermo Scientific	Orion Star A211	X38960	N/A	New	BOD	N/A	BOD lab
Refrigerator	Frigidaire	FRT17G4BW9	BA703033306	N/A	NEW	Mold Lab	N/A	UKN
Refrigerator	Whirlpool	EL88TRRWS03	442001106	N/A	New	Mold Lab	N/A	UKN
Refrigerator	Whirlpool	EL7ATRRMQ07	EWR4973976	N/A	New	Mold Lab	N/A	UKN
Refrigerator	Whirlpool	EL05PPXMQ	EEP3524864	N/A	NEW	Bacteriology Lab	N/A	UKN
Spectrophotometer	Hach	DR900	192180001065	N/A	New	BOD	N/A	BOD
Stereoscope	VWR Scientific	VWRS1	V168430	Annual	Used	Mold Lab	N/A	Mold lab cabinet
Stir Plate	VWR	DYLA-DUAL	120202001	N/A	New	Bacteriology Lab	N/A	UKN
Stir Plate	IKA	Big Squid	102	N/A	New	Bacteriology Lab	N/A	UKN
Stir Plate	VWR	7x7 AL4 HOT/STIR	180605003	N/A	New	BOD	N/A	UKN
Stir Plate	VWR	205	7852	N/A	New	BOD	N/A	UKN
Turbidimeter	Biolog, Inc.	21907	06093898	Annual	New	Bacteriology Lab	N/A	Mold lab cabinet
Vortex Genie2 Mixer	VWR	G-560	2-223236	N/A	New	Bacteriology Lab	N/A	UKN
Waterbath	Blue M-MagniWhirlpool	MW-1110A-1	14991	N/A	New	Bacteriology Lab	N/A	Mold lab cabinet
Waterbath	Precision	Circulating 260	21-AJ11	N/A	New	BOD	N/A	Mold lab cabinet

Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Flow control valve	Plast-o-matic	FC050B	SA55CXFJN352	Semi-annual	New	Protozoan Lab	N/A	UKN
Centrifugal pump	Jabsco	18610-0271	0562309-MA	Semi-annual	Unk	Protozoan Lab	N/A	Crypto Lab
Graduated container	Nalgene	20 Liter Carboy	N/A	Semi-annual	New	Protozoan Lab	N/A	UKN
Laboratory shaker	Lab-Line	3587-4	0105-2679	Annual	New	Protozoan Lab	N/A	Crypto Lab
Laboratory shaker side arms	Lab-Line	3589	0105-2679	Annual	New	Protozoan Lab	N/A	Crypto Lab
1500 XG swinging bucket centrifuge	Damon/IEC Division	CRU-5000	23453388	Annual	Unk	Protozoan Lab	1863	Crypto Lab

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
1500 XG swinging bucket centrifuge	Damon/IEC Division	CRU-5000	23453744	Annual	Unk	Protozoan Lab	1863	Crypto Lab
1500 XG swinging bucket centrifuge	Damon/IEC Division	CRU-5000	2345497	annual	unk	Protozoan Lab	1863	Crypto Lab
Sample mixer/rotator	DYNAL	Car#: 947.01	1004-3765	Annual	Unk	Protozoan Lab	RT1	UKN
Magnetic Particle Concentrator	DYNAL	MPC-1	N/A	N/A		Protozoan Lab	N/A	UKN
Magnetic Particle Concentrator	DYNAL	MPC-S	N/A	N/A		Protozoan Lab	N/A	UKN
Magnetic Particle Concentrator	DYNAL	MPC-6	N/A	N/A		Protozoan Lab	N/A	UKN
Flat-sided sample tubes	DYNAL	Cat#: 740.03	74003	N/A	New	Protozoan Lab	N/A	UKN
Epifluorescence /differential interference contract microscope	Olympus	BX-40	9E09944	Annual		Protozoan Lab	1554	Crypto Lab
Excitation/ band pass microscope for fluorescein isothiocyanate (FTIC)	C-squared	UN3100	023355	Annual		Protozoan Lab	1924	Crypto Lab
Excitation/ band pass filters for 4'6-diamidino-2-phenylindole (DAPI)	C-squared	UN41001	8H2122	Annual		Protozoan Lab	N/A	Crypto Lab
Masterflex pump	Cole Parmer	7553-50				Protozoan Lab		Crypto Lab
Balance	Denver Instrument	MXX-412	19053216	Annual		Protozoan Lab		Crypto Lab
Biosafety Cabinet	Labconco	Cat#: 36208043726	050J372	Annual		Protozoan Lab	1557	Crypto Lab
Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Balance - Top Loading	Mettler Toledo	PB3002-S	1119070828	See KanbanFlow	Used	Metals Prep	METBAL2	Cabinet
Balance - Top Loading	Torbal	AGN100	701001026	See KanbanFlow	Used	Metals Prep	METBAL5	Cabinet
Balance - Top Loading	Mettler Toledo	PB3002-S	1128150150	See KanbanFlow	Used	TCLP	METBAL1	Cabinet
Balance - Top Loading	Mettler Toledo	MS3002S	B246522879	See KanbanFlow	Used	TCLP	TCLPBAL1	Cabinet
Balance - Top Loading	Mettler Toledo	MS603S 103	B712847753	See KanbanFlow	Used	TCLP	METBAL4	Cabinet
Balance - Top Loading	Mettler Toledo	XS40025	B410367932	See KanbanFlow	Used	Mercury	HGBAL1	Cabinet
Hotblock	Environmental Express	SC154	9062CECW3953	See KanbanFlow	Used	Metals Prep	MPE	Cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Hotblock	Environmental Express	SC154	2015CECW4278	See KanbanFlow	Used	Metals Prep	MPF	Cabinet
Hotblock	Environmental Express	SC154	2015CECW4338	See KanbanFlow	Used	Metals Prep	MPG	Cabinet
Hotblock	Environmental Express	SC154	2018CECW4965	See KanbanFlow	Used	Metals Prep	MPO	Cabinet
Hotblock	Environmental Express	SC154	9062CECW3954	See KanbanFlow	Used	Mercury	HG1	Cabinet
Hotblock	Environmental Express	SC154	9062CECW3956	See KanbanFlow	Used	Mercury	HG2	Cabinet
Hotblock	Environmental Express	SC154	3994CEC1880	See KanbanFlow	Used	Mercury	MPC	Cabinet
Hotblock	Environmental Express	SC154	missing	See KanbanFlow	Used	Mercury	MPD	Cabinet
Hotblock	Environmental Express	SC154	2018CECW4945	See Kanban Flow	Used	Mercury	MPN	Cabinet
AutoBlock	Thomas Cain/Seal	Deena II	20050	See KanbanFlow	Used	Metals Prep	Deena 1	Cabinet
AutoBlock	Thomas Cain/Seal	Deena II	20093	See KanbanFlow	Used	Metals Prep	Deena 2	Cabinet
Microwave	CEM	Mars 5 Xpress	MD7441	See KanbanFlow	Used	Metals Prep	MD7441	Cabinet
Microwave	CEM	Mars 5 Xpress	MD4692	See KanbanFlow	Used	Metals Prep	MD4692	Cabinet
Microwave	CEM	Mars 6	MJ2771	See KanbanFlow	Used	Metals Prep	MJ2771	Cabinet
Microwave	CEM	Mars 6	MJ9747	See KanbanFlow	Used	Metals Prep	MJ9747	Cabinet
Microwave	CEM	Mars 6	MJ9726	See KanbanFlow	Used	Metals Prep	MJ9726	Cabinet
Centrifuge	Thermo Fisher	Sorvall ST 40	42496720	See KanbanFlow	Used	Metals Prep	N/A	Cabinet
Turbidimeter	Hach	TL2300	2019060C0080	See KanbanFlow	Used	Metals Prep	Turb 2	Cabinet
Turbidimeter	HACH	TL2300	2020060C0093	See KanbanFlow	Used	Metals Prep	Turb 1	Cabinet
Water Purifier	ELGA	Purelab Ultra	ULT00002665	See KanbanFlow	Used	Metals Prep	N/A	Cabinet
Mercury Analyzer	Leeman	Hydra II AA	4049	See KanbanFlow	Used	Mercury	CVAA 5	Cabinet
Mercury Analyzer	Teledyne	QuickTrace 7600	US17016008	See KanbanFlow	Used	Mercury	CVAA 6	Cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Mercury Analyzer	PerkinElmer	FIMS 100	101S18111401	See KanbanFlow	Used	Mercury	CVAA 7	Cabinet
ICP OES	Thermo	ICAP 7400 Duo	IC74DC141801	See KanbanFlow	Used	ICP	ICP 12	Cabinet
ICP OES	Thermo	ICAP 7400 Duo	IC74DC143804	See KanbanFlow	Used	ICP	ICP 13	Cabinet
ICP OES	Thermo	ICAP 7400 Duo	IC74DC151103	See KanbanFlow	Used	ICP	ICP 14	Cabinet
ICP OES	Thermo	ICAP 6500 DUO	ICP-20074614		Used	Metals Lab		Cabinet
ICPMS	Agilent	(1) 7900 G8403A	JP16281469	See KanbanFlow	Used	ICPMS	ICPMS 8	Cabinet
ICPMS	Agilent	7900 G8403A	JP14400452	See KanbanFlow	Used	ICPMS	ICPMS 9	Cabinet
ICPMS	Agilent	7900 G8403A	JP14080164	See KanbanFlow	Used	ICPMS	ICPMS 10	Cabinet
ICPMS	Agilent	7900 G8403A	JP17472096	See KanbanFlow	Used	ICPMS	ICPMS 11	Cabinet
Refrigerator	Maxx Cold	MXM2-48RBHC	36031		Used	TCLP	P0136	Cabinet
TCLP Freezer	Danby Designer	DUFM043A1WDD	431509341953	See KanbanFlow	Used	TCLP	TCLP F2	Cabinet
TCLP Freezer	Danby Designer	DUFM043A1WDD	431510424708	See KanbanFlow	Used	TCLP LAB	TCLP-1	Cabinet
Stirrer/Hot Plate	Thermo	Cinarec+	C301001311514115	See KanbanFlow	Used	TCLP	1	Cabinet
Stirrer/Hot Plate	IKA	RT15	3.492224	See KanbanFlow	Used	TCLP	2	Cabinet
Stirrer/Hot Plate	IKA	RT15	3.503438	See KanbanFlow	Used	TCLP	3	Cabinet
Stirrer/Hot Plate	IKA	RT15	3.527248	See KanbanFlow	Used	TCLP	4	Cabinet
Stirrer/Hot Plate	IKA	RT15	3.527246	See KanbanFlow	Used	TCLP	5	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	A	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	E	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	I	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	L	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	O	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	S	Cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	1	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	2	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	G	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	H	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	R	Cabinet
Tumbler	Environmental Express	12 Position	N/A	See KanbanFlow	Used	TCLP	B	Cabinet
pH Meter	Thermo	OrionVerastar	V04967	See KanbanFlow	Used	TCLP	V04967	Cabinet
pH Meter	Thermo	OrionVerastarPro	V11227	See KanbanFlow	Used	TCLP	V11227	Cabinet
pH meter	Thermo	Orion VersastarPro	V13429	See KanbanFlow	Used	TCLP	V13429	Cabinet
Balance – Top Loading	RADWAG Balances and Scales	WTC600	603642	See KanbanFlow	Used	Metals Prep	MTLPREPBAL1	Cabinet
Balance – Top Loading	Mettler Toledo	MS3002S/03	B246522879	See KanbanFlow	Used	TCLP	TCLPBAL1	Cabinet
Hotblock	Environmental Express	SC154	2018CECW5060	See KanbanFlow	Used	Metals Prep	MPK	Cabinet
Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Analytical Balance	Mettler	XP205	1129420141			Wet Lab	Balance 3	Cabinet
Analytical Balance	Mettler Toledo	AG204	1120381348			Wet Lab	WetBal 1	Cabinet
Analytical Balance	VWR	403B	5262015128			Wet Lab	WetBa8	Cabinet
Analytical Balance	VWR	403B	5262015102			Wet Lab	WetBa7	Cabinet
Balance	RADWAG	WTC600	603664	2019	New	Wet Lab	WetBal 13	Cabinet
Balance	Scout Pro		B513752877			Wet Lab	WetBal 9	Cabinet
Analytical Balance	Mettler Toledo	MS204TS/00	B820869344			Wet Lab	WetBal 10	Cabinet
Autoanalyzer	OI Analytical	FS 3100	301831056 (NH3) 251833391 (CN)			Wet Lab	FS 3100-1	Cabinet
Autoanalyzer	OI Analytical	FS 3100	407831164 (NO2NO3) 403833925 (PHT)			Wet Lab	FS 3100-3	Cabinet
Autoanalyzer	Lachat	Quikchem 8000	A83000-1027			Wet Lab	Lachat 2	Cabinet
Autoanalyzer	Lachat	Quikchem 8000	A83000-1638			Wet Lab	Lachat 3	Cabinet
Autoanalyzer	Lachat	Quikchem 8500	60900000341			Wet Lab	Lachat 4	Cabinet
Autoanalyzer	Lachat	Quikchem 8500	60900000342			Wet Lab	Lachat 5	Cabinet
Autoanalyzer	Lachat	Quikchem 8500	70500000452			Wet Lab	Lachat 6	Cabinet
Autoanalyzer-digestor	Lachat	BD-46	100700000-982			Wet Lab	DIG1	Cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Autoanalyzer-digestor	Lachat	BD-46	1800-871			Wet Lab	DIG1	Cabinet
Autoanalyzer-digestor	Lachat	BD-46	1000700000-982			Wet Lab	DIG2	Cabinet
Autoanalyzer-digestor	Lachat	BD-46	1800-872			Wet Lab	DIG2	Cabinet
Autoanalyzer-digestor	Lachat	BD-40	HTLC1018420580			Wet Lab	DIG3	Cabinet
Automated Titrator	Metrohm	855 titrosampler	3256			Wet Lab	Titrando	Cabinet
Balance	RADWAG	WTC600	603642	2019	New	Wet Lab	WetBal 11	Cabinet
Balance	RADWAG	WTC600	603657	2019	New	Wet Lab	WetBal 12	Cabinet
Balance	RADWAG	WTC600	603639	2019	New	Wet Lab	WetBal 14	Cabinet
Bomb Calorimeter	Parr	1108 Oxygen Bomb	5424			Wet Lab	Parr Bomb	Cabinet
Centrifuge	Thermo	ST40	41179863			Wet Lab	Centrifuge	Cabinet
Centrifuge	Damon	HNSII	23557225			We Lab	Centrifuge	Cabinet
Class "I" weights	Troemner	Serial # 7944	4057			Wet Lab		Cabinet
COD Reactor	Environmental Express	B3000	2016CODW101			Wet Lab	COD Reactor	Cabinet
Conductivity Meter	ORION	Model 170	32470051			Wet Lab	ATI Orion	Cabinet
Conductivity Meter	Thermo Fisher	Orion VersaStar	V02971			Wet Lab	Orion VS-2	Cabinet
Discrete Analyzer	Seal	AQ400	141032	2017	New	Wet Lab	Seal 1	Cabinet
DI Water	Dionex	IC Pure	42034291			Wet Lab	Nanopure	Cabinet
Distillation Unit-Cyanide	Environmental Express	Distillation 1	2270			Wet Lab	LMD1920-106	Cabinet
Distillation Unit-Cyanide	Environmental Express	Distillation 2	2271			Wet Lab	LMD1920-106	Cabinet
Distillation Unit-Cyanide	Environmental Express	Distillation 3	2272			Wet Lab	LMD1920-106	Cabinet
Distillation Unit-Phenol	Westco Scientific	Model EASY-DIST	1062			Wet Lab	Dist 1	Cabinet
Distillation Unit-Phenol	Westco Scientific	Model EASY-DIST	1198			Wet Lab	Dist 2	Cabinet
Drying Oven	VWR	1390 FM	501202			Wet Lab	103-105	Cabinet
Drying Oven	Shel Lab	FX28-2	12006713			Wet Lab	178-182	Cabinet
Drying Oven	Shel Lab	SM028-2	8041917			Wet Lab	178-182	Cabinet
Flash Point Tester	Koehler	Pensky-Martens K16200	R07002693B			Wet Lab	Manual	Cabinet
Flash Point Tester	Koehler	Pensky-Martens K16204	R070022328D			Wet Lab	Manual	Cabinet
Automated Flash Point Ignitability Tester	Tanaka	APM-8FC	34352	2019	New	Wet Lab	Automated	Cabinet
Hot Block TDS	Environmental Express	TDS024	2017TDSW101	2018	New	Wet Lab	TDS Hot Block	Cabinet
Hot Plate	Cole Parmer	HS19 C-P	50000073			Wet Lab	Hot Plate	Unknown
Hot Plate	Thermo Fisher	Type 2200	C1707140516473			Wet Lab	Hot Plate	Unknown
Hot Plate	Cole Parmer	HS19 CP	50002676			Wet Lab	Hot Plate	Unknown

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Hot Plate	Cole Parmer	HS19 CP	50002447			Wet Lab	Hot Plate	Unknown
Hot Plate	Cole Parmer	HS19 CP	50002557			Wet Lab	Hot Plate	Unknown
Ion Chromatograph	Dionex	ICS-2000	6050731			Wet Lab	IC5	Cabinet
Ion Chromatograph	Dionex	ICS 1500	8100010			Wet Lab	IC6	Cabinet
Ion Chromatograph	Dionex	ICS 2000	8090820			Wet Lab	IC8	Cabinet
Ion Chromatograph	Dionex	ICS 2100	10060822			Wet Lab	IC9	Cabinet
Ion Chromatograph	Dionex	ICS 2100	10091285			Wet Lab	IC10	Cabinet
Ion Chromatograph	Dionex	ICS 2100	11012204			Wet Lab	IC11	Cabinet
Ion Chromatograph	Dionex	ICS 2100	12020460			Wet Lab	IC12	Cabinet
Ion Chromatograph	Thermo Fisher	ICS 1600	13031204			Wet Lab	IC13	Cabinet
Ion Chromatograph	Thermo Fisher	ICS-2100	15030082			Wet Lab	IC14	Cabinet
Ion Chromatograph	Thermo Fisher	ICS-2100	15071973			Wet Lab	IC15	Cabinet
Ion Chromatograph	Thermo Fisher	ICS-2100	15071973			Wet Lab	IC16	Cabinet
Ion Chromatograph	Thermo Fisher	ICS-1600	15110462			Wet Lab	IC17	Cabinet
Ion Chromatograph	Thermo Fisher	ICS-2100	15120139			Wet Lab	IC18	Cabinet
Ion Chromatograph	Thermo Fisher	Integrion	16070510			Wet Lab	IC19	Cabinet
Ion Chromatograph	Thermo Fisher	Integrion	16090734			Wet Lab	IC20	Cabinet
Ion Chromato Ion	Thermo Fisher	Integrion	19050436	2019	New	Wet Lab	IC21	Cabinet
Ion Chromatograph	Thermo Fisher	Integrion	19040421	2019	New	Wet Lab	IC22	Cabinet
Ion Chromatograph	Thermo Fisher	Integrion	19050752	2019	New	Wet Lab	IC23	Cabinet
Ion Chromatograph	Thermo Fisher	Integrion	19050751	2019	New	Wet Lab	IC24	Cabinet
Muffle Furnace	Thermolyne	(1) 30400	23231			Wet Lab	FURNACE	Cabinet
Muffle Furnance	Cole Parmer		CE3749			Wet Lab	FURNACE	Cabinet
ORP Meter	YSI	ORP15	JC000114			Wet Lab	ORP	Cabinet
pH Meter	Fisher	AB15	AB92329028			Wet Lab	AB 15+	Cabinet
pH Meter	Orion	410A	58074			Wet Lab	Orion	Cabinet
pH Meter	Thermo Fisher	Orion VersaStar	V00659			Wet Lab	Orion VS-1	Cabinet
pH Meter	Thermo Fisher	Orion Starfall 1	J13992			Wet Lab	PH1	Cabinet
pH Meter	Thermo Fisher	Orion Star A222	K12005	2018	New	Wet Lab	PH	Cabinet
pH Meter	Thermo Fisher	Orion Star A111	J21101			Wet Lab	PH	Cabinet
pH Meter	Thermo Fisher	Orion Star A111	J21983	2019	New	Wet Lab	pH	Cabinet
Refrigerated Recirculator	Polyscience	Recirculator	1282			Wet Lab	Recirculator 1	Cabinet
Refrigerated Recirculator	Polyscience	Recirculator	1608			Wet Lab	Recirculator 2	Cabinet
Shaker	GlasCol	099A LC1012	11325052			Wet Lab	Shaker	Cabinet

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
SimpleDist	Env. Express	SC154	8940CECW3871			Wet Lab	SimpDist1	Cabinet
SimpleDist	Env. Express	SC155	9062CECW3952			Wet Lab	SimpDist2	Cabinet
SimpleDist	Env. Express	SC156	9062CECW3955			Wet Lab	SimpDist3	Cabinet
SimpleDist	Env Express	MDI	2019MDISW159	2019	New	Wet Lab	SimpD4	Cabinet
SimpleDist	Env Express	MDI	2019MDISW162	2019	New	Wet Lab	SimpD 5	Cabinet
Spectrophotometer	Hach	DR6000	1646676			Wet Lab	DR6000-1	Cabinet
Spectrophotometer	Hach	DR6000	1646781			Wet Lab	DR6000-2	Cabinet
Spectrophotometer	Hach	DR6000	1894098	2019	New	Wet Lab	DR6000-3	Cabinet
Stir Base	Env. Express	STIR	2019 STIR132	2019	New	Wet Lab	STIR	Cabinet
TOC Analyzer	Shimadzu	Model TOC-VWS	39830572			Wet Lab	TOC2	Cabinet
TOC Analyzer	Shimadzu	TOC-VCPH	H51304435			Wet Lab	TOC3	Cabinet
TOC Analyzer	Shimadzu	TOC-L	H54335232035			Wet Lab	TOC5	Cabinet
TOC Analyzer	Shimadzu	TOC	H51725600306			Wet Lab	TOC6	Cabinet
TOC Analyzer	EST	TE Xplorer	2019.154	2019	New	Wet Lab	TOC8	Cabinet
TOX Analyzer	EST	TE Xplorer	2017.287	2017	New	Wet Lab	TOX5	Cabinet
TOX Analyzer	EST	TE Xplorer	2017.286	2017	New	Wet Lab	TOX6	Cabinet
TOX Analyzer	EST	TE Xplorer	2015-184	2015	New	Wet Lab	TOX3	Cabinet
TOX Analyzer	EST	TE Xplorer	2016202	2016	New	Wet Lab	TOX4	Cabinet
Turbidimeter	Hach	TL2300	2017070C0008	2018	New	Wet Lab	TURB1	Cabinet
Chemchek KPA-11 Kinetic Phosphorescence Analyzer w/ Gilson Sample Changer and Gilson Dilutor 401 Syringe Pump	Chemchek	KPA-11	1418986; 649025031; 91-5050024	As Needed	Used	Rad Lab		At the Instrument
Canberra 2404 Alpha/Beta Counter	Canberra	2404	1090352; 988600/ 787196; 488584	As Needed	Used	Rad Lab		At the Instrument
Packard Tri-Carb 2200CA Liquid Scintillation Counter	Packard	2200CA	102180	As Needed	Used	Rad Lab		At the Instrument
Canberra LB4100 Alpha/Beta Counter	Canberra	LB4100U2	1300001; 1300002; 1300000; 117	As Needed	Used	Rad Lab		At the Instrument
Canberra Genie 2000 Alpha Spectrometer System	Canberra	Genie 2000	See Description	As Needed	Used	Rad Lab		At the Instrument
Canberra Genie 2000 Gamma Spectrometer System	Canberra	Genie 2000	See Description	Clean Chambers monthly, Vacuum pump-6 months. As needed.	Used	Rad Lab		At the Instrument
LSC 8000 Liquid Scintillation Counter	Hitachi	LSC-8000	GR30025119	As Needed	New	Rad Lab		At the Instrument
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G18	Online
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G39	Online
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G40	Online
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G42	Online

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G46	Online
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G47	Online
Hot Plate	Mainstays	MS-GRD20	NA	As Needed	Used	Rad Lab	G48	Online
Furnace	Fisher Scientific	550-126	902NOO12	As Needed	Used	Rad Lab	M1	Online
Furnace	Barnstead	FB1415M	7.46951E+11	As Needed	Used	Rad Lab	M2	Online
Centrifuge	Beckman	TJ-06	9A010	As Needed	Used	Rad Lab	C2	Rad Lab
Centrifuge	Beckman	TJ-06	8953	As Needed	Used	Rad Lab	C3	Rad Lab
Centrifuge	Fisher Scientific	ST-40	42502680	As Needed	Used	Rad Lab	C4	Rad Lab
Centrifuge	Fisher Scientific	ST-4 Plus	42814561	As Needed	Used	Rad Lab	C5	Rad Lab
Hot Water Bath	Mainstays	NA	NA	As Needed	Used	Rad Lab	HB2	Online
Hot Water Bath	Mainstays	NA	NA	As Needed	Used	Rad Lab	HB4	Online
Hot Water Bath	Aroma	ART-7125B	DM6200798	As Needed	Used	Rad Lab	HB6	Online
Sonicator	CD FCC RoHS	PS-30A	20150720	As Needed	Used	Rad Lab	So1	Online
Hot Plate	Fisher Brand	HP88850200	C102003108201072 4	As Needed	Used	Rad Lab	HP1	Online
Hot Plate	Fisher Brand	HP88850200	C102003108201072 4	As Needed	Used	Rad Lab	HP2	Online
Hot Plate	Fisher Brand	HP88850200	M10200270621043 38	As Needed	Used	Rad Lab	HP3	Online
Shaker	Eserbach	NA	NA	As Needed	Used	Rad Lab	Sh1	Online
Shaker	NA	6000	NA	As Needed	Used	Rad Lab	Sh2	Online
Hot Plate/Stirrer	NA	NA	NA	As Needed	Used	Rad Lab	St5	Online
Hot Plate/Stirrer	NA	NA	NA	As Needed	Used	Rad Lab	St7	Online
Hot Plate/Stirrer	NA	NA	NA	As Needed	Used	Rad Lab	St8	Online
Hot Plate/Stirrer	NA	NA	NA	As Needed	Used	Rad Lab	St9	Online
Hot Plate/Stirrer	SYMA	HJ6A	NA	As Needed	New	Rad Lab	St19	Online
Hot Plate/Stirrer	SYMA	HJ6A	NA	As Needed	New	Rad Lab	St20	Online
Hot Plate/Stirrer	SYMA	HJ6A	NA	As Needed	New	Rad Lab	St21	Online
Hot Plate/Stirrer	LabLine	978930	6000212	As Needed	Used	Rad Lab	St23	Online
Hot Plate/Stirrer	LabLine	1455	9970196	As Needed	Used	Rad Lab	St25	Online
Hot Plate/Stirrer	Silent Shake	MS-15HA	3620002	As Needed	Used	Rad Lab	St29	Online
Hot Plate/Stirrer	Silent Shake	MS-15HA	4016010	As Needed	Used	Rad Lab	St32	Online
Hot Plate/Stirrer	Silent Shake	MS-15HA	4016006	As Needed	Used	Rad Lab	St33	Online
Oven	Binder	NA	NA	As Needed	Used	Rad Lab	O1	Online
Oven	Shel Lab	1326	5057405	As Needed	Used	Rad Lab	O2	Online
Sealer	Automatic Canning	NA	3108	As Needed	Used	Rad Lab	S1	Rad Lab
Grinder	Straus Co.	4E	NA	As Needed	Used	Rad Lab	GR1	Rad Lab
Grinder	Arthur H. Thomas Co.	NA	4352	As Needed	Used	Rad Lab	GR2	Rad Lab
Tumbler	US Stoneware	NA	CN12005	As Needed	Used	Rad Lab	T1	Rad Lab
Tumbler	US Stoneware	NA	CN32108	As Needed	Used	Rad Lab	T2	Rad Lab
Balance	RADWAG	PS360R2	530077	As Needed	Used	Rad Lab	RADBAL1	Rad Lab
Balance	RADWAG	PS4500R2	544404	As Needed	Used	Rad Lab	RADBAL2	Rad Lab

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Balance	RADWAG	AS60/220R2	415543	As Needed	Used	Rad Lab	RADBAL3	Rad Lab
Balance	RADWAG	PS4500R2	544401	As Needed	Used	Rad Lab	RADBAL4	Rad Lab
Pipettor/Repeater	RAININ	EDP3-PLUS	C040040E	Quarterly	Used	Rad Lab	E-31	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	K0203177E	Quarterly	Used	Rad Lab	E-44	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3	J0400734E	Quarterly	Used	Rad Lab	E-33	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	H0300753E	Quarterly	Used	Rad Lab	E-63	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	A00978	Quarterly	Used	Rad Lab	E-41	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	J0400699E	Quarterly	Used	Rad Lab	E-43	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	J0300147E	Quarterly	Used	Rad Lab	E-54	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	G0200223E	Quarterly	Used	Rad Lab	E-32	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	H0000585E	Quarterly	Used	Rad Lab	E-53	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	B0200477E	Quarterly	Used	Rad Lab	E-42	Rad Lab/Online
Pipettor/Repeater	OXFORD	MACRO SET	NA	Quarterly	Used	Rad Lab	102	Rad Lab/Online
Pipettor/Repeater	OXFORD		NA	Quarterly	Used	Rad Lab	130	Rad Lab/Online
Pipettor/Repeater	Ward Science	2.5-30	NA	Quarterly	Used	Rad Lab	RP-1	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	F200510E	Quarterly	Used	Rad Lab	E-34	Rad Lab/Online
Pipettor/Repeater	RAININ	EDP3-PLUS	D1100091E	Quarterly	Used	Rad Lab	E-64	Rad Lab/Online
Survey Meter	Ludlum	9	79445	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	156503	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	12	88002	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3-98	71211	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3-98	455984	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	292175	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	292202	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	177	287820	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	2221	172021	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	19	156438	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	9	74528	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	156232	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	156193	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	56439	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	12	63765	Annually	Used	Rad Lab		Rad Lab

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Description	Manufacturer	Model	Serial Number	Service Date	Condition	Location	Internal ID	Manual Location
Survey Meter	Ludlum	177	96337	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	12	47797	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	12	87918	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	2221	154201	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	19	499190	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	19	156468	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3-98	155387	Annually	Used	Rad Lab		Rad Lab
Survey Meter	Ludlum	3	156193	Annually	Used	Rad Lab		Rad Lab

Gas Chromatograph/ Mass Spectrometer (QQQ) 27	Agilent 7890GC 7010 MSD (QQQ)	Agilent 7890GC 7010 MSD (QQQ)	GC US18373018 MS US1730V003	As needed	Used	IDEA Lab	Svcompbn	Transferred to IDEA Lab.

8.0 ADDENDUM: PROGRAM REQUIREMENTS

Program specific information provided in this addendum supplements the main body of this manual. Each subsection is stand-alone, meaning the requirements for the quality management system in each subsection only apply to the program referenced. Additionally, only program requirements for the quality management system that are more stringent than the content of the main body of the manual are included.

8.1 DoD/DOE

Pace National-Mt. Juliet maintains accreditation for DoD/DoE Environmental Laboratory Approval Program (ELAP)

This addendum outlines additional policies and processes established by this laboratory to maintain compliance with DoD/DOE program specific requirements as outlined in the DoD/DOE Consolidated Quality Systems Manual (QSM) for Environmental Laboratories. The QSM incorporates ISO/IEC 17025 and the TNI Standard and includes additional program-specific requirements for laboratories that perform analytical testing services for DoD and DoE and which must be followed for DoD / DoE projects.

Section 4.2.5: Supporting Documents

Technical SOPs used for DoD/DoE testing must also include instructions for equipment and instrument maintenance, computer software/hardware, and troubleshooting.

The review frequency for technical SOPs used for DoD/DoE testing is annual, instead of every 2 years.

Section 4.4: Review of Analytical Service Requests

If the DoD/DoE customer requests a statement of conformity, the standard used for the decision rule must be communicated to and agreed on with the customer and identified in the final test report.

Laboratory requests to deviate from the requirements specified in the DoD/DoE QSM must be requested on a project-basis and include technical justifications for the deviation. These requests are submitted to and approved by the DoD/DoE project chemist or contractor, however name, in addition to the PAS client.

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For DoD / DoE projects, will also seek clarification from the customer when the customer has requested an incorrect, obsolete or improper method for the intended use of data; the laboratory needs to depart from its test method SOP in order to meet project-specific data quality objectives; information in project planning documents is missing or is unclear,

Section 4.5: Subcontracting

In addition to written client approval of any subcontractor for testing, the customer is notified of the laboratory's intent to use a subcontractor for any management system element (such as data review, data processing, project management or IT support) and consent for subcontracting is obtained approved in writing by the DoD/DoE customer and record of consent kept in the project record.

Section 4.6: Purchasing and Supplies

The laboratory procedure for records of receipt of materials and supplies used in testing also include a specification to record the date opened (DoE only).

Section 4.9.3: Nonconforming Work

The laboratory's procedure for client notification includes the 15-business day DoD /DOE timeframe for notification of the problem and the 30-business day timeframe for submission of the corrective action plan or corrective actions taken. This procedure also includes the DoD/DoE requirement for AB notification of discovery.

Section 4.13: Control of Records

Technical Records: The laboratory's procedure for logbooks includes measures to prevent the removal of or addition of pages to the logbook (applies to both hardcopy and electronic). Hardcopy logbooks are version controlled, pre-numbered and bound. Initials and entries and are signed or initialed and dated by the person making the entry and the entry is made at the time the activity is performed and in chronological order. Each page of the logbook must be closed by the last person making the entry on the page. Closure is recorded by the initial and date of the person making the last entry.

Section 5.4.5.3.3: Limit of Detection

For DoD/DOE the LOD is an estimate of the minimum amount of an analyte that can be reliably detected by an analytical process. For clarification, the LOD is the analyte concentration necessary to distinguish its presence from its absence. The LOD may be used as the lowest concentration for reliably reporting a non-detect (ND). The LOD is specific to each suite of analyte, matrix, and method including sample preparation.

After each DL determination, the laboratory establishes the LOD by spiking a quality system matrix at a concentration of least 2X but no greater than 4X the DL (i.e. 2X DL ≤ LOD Spike ≤ 4X DL). The spike concentration establishes the LOD and the concentration at which the LOD is verified.

The LOD is established during method validation and after major changes to the analytical system or procedure that affects sensitivity of analysis or how the procedure is performed.

An LOD study is not required for any component for which spiking solutions or quality control samples are not available. Additionally, an LOD study is not required if the laboratory does not report data below the LOQ.

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The LOD must be verified on a quarterly basis. Each preparation method listed on the scope of accreditation must have quarterly LOD verifications; however, verification of all possible combinations of preparation and clean-up techniques is not required. Where LOD verifications are not performed on all combinations, the LOD verification is based on the worst-case combination (preparation method with all applicable cleanup steps).

The laboratory's procedure for LOD determination and verification is detailed in laboratory SOP ENV-SOP-MTJL-0016, *Method Detection Limits (MDL), Limits of Detection (LOD) and Limits of Quantitation (LOQ).*

Section 5.4.5.3.4: Limit of Quantitation

For DoD/DOE, the LOQ is established for each analyte-matrix-method combination, including surrogates. When an LOD is determined or verified by the laboratory, the LOQ must be above the LOD [DL<LOD<LOQ].

At a minimum, the LOQ must be verified quarterly; however, verification of all possible combinations of preparation and clean-up techniques is not required. Where LOQ verifications are not performed on all combinations, the LOQ verification on the worst-case combination (preparation method with all applicable cleanup steps).

The laboratory's procedure for LOQ determination and verification is detailed in laboratory SOP ENV-SOP-MTJL-0016, *Method Detection Limits (MDL), Limits of Detection (LOD) and Limits of Quantitation (LOQ).*

Section 5.4.7: Control of Data

The laboratory will assure LIMS passwords are changed at least once per year.

An audit of the LIMS will be incorporated into the laboratory's annual internal audit schedule.

The laboratory will have procedures in place to notify DoD/DoE customers of changes to LIMS software or hardware configurations that may impact the customer's integrity of electronic data

Section 5.9.1: Quality Control

For DoD/DOE, storage blanks are essential QC to monitor the storage of samples for volatile organic analysis (VOA). The laboratory's SOP for storage of VOA samples must include a contamination monitoring program based on the performance of storage blanks. (See QSM 5.3.3)

Section 5.8.5: Sample Disposal

For DoE projects, the record of disposal must also include how the sample was disposed and the name of the person that performed the task.

Appendix E: Support Equipment Calibration

Mechanical Volumetric Pipette: In addition to the quarterly verification check, pipettes used for DoD/DoE projects are checked daily before use using the same procedure and criteria specified for the quarterly check.

Water Purification System: The performance of the water purification system is checked daily prior to use in accordance with laboratory SOP ENV-SOP-MTJL-0366, *Reagent Water Quality*.

Radiological Survey Equipment: The performance of the radiological survey equipment is checked daily prior to use in accordance with laboratory SOP ENV-SOP-MTJL-0344 *Radiation and Contamination Surveys.*

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Additional: (DoE): Section 6.0 of the QSM outlines additional management system requirements for the management of hazardous and radioactive materials management and health and safety practices. The laboratory, if approved for DoE, will work with the PAS Health and Safety Director to establish plans, policies and procedures that conform to these comprehensive specifications and incorporate these documents into the quality management system.

8.2 ADDENDUM: AIHA-LAP, LLC

Section 4.1.5.4: Confidentiality

While the laboratory does not typically make client information public, the customer will be informed in advance if the laboratory intends to place any client-identifying information in the public domain.

Information about the customer obtained from sources other than the customer (e.g., complainant, regulators) will remain confidential between the customer and the laboratory. The source of the information will remain confidential to the laboratory and will not be shared with the customer, unless agreed by the source.

Personnel, including any committee members, contractors, personnel of external bodies, or individuals acting on the laboratory's behalf, shall keep confidential all information obtained or created during the performance of laboratory activities, except as required by law.

All personnel of the laboratory, either internal or external, that could influence the laboratory activities shall act impartially, be competent and work in accordance with the laboratory's management system.

Section 4.2.1.2: Risk and Opportunity Assessment

Actions taken to address risks and opportunities shall be proportional to the potential impact on the validity of laboratory results.

Section 4.3.1: Document Control - General

All documentation, processes, systems, records, related to the fulfilment of the requirements of ISO/IEC 17025 are included in, referenced from, or linked to the management system. All personnel involved in laboratory activities have access to the parts of the management system documentation and related information that are applicable to their responsibilities.

Section 4.4: Analytical Service Request, Tender, and Contract Review

If a contract is amended after the work has commenced, the contract review shall be repeated and any amendments shall be communicated to all affected personnel.

Section 4.13.2.3: Error Correction

Amendments to technical records can be tracked to previous versions or to original observations. Both the original and amended data and files are retained as applicable, including the date of alteration, an indication of the altered aspects and the personnel responsible for the alterations.

Section 4.14.1: Internal Audit

- Quality System Audits: A review of all management system requirements of ISO/IEC 17025 and any other regulatory or applicable policy document (e.g., AIHA-LAP, LLC). These audits are also performed annually per a pre-determined schedule.

Section 5.5.2: Calibration

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Laboratory staff performing in-house calibrations and verifications shall have received documented training.

Section 5.5.7: Calibration Status

Measuring equipment shall be calibrated when:

- The measurement accuracy or measurement uncertainty affects the validity of the reported results, and/or
- Calibration of the equipment is required to establish the metrological traceability of the reported results

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8.3 ADDENDUM: QUALITY CONTROL CALCULATIONS

PERCENT RECOVERY (%REC)

$$\%REC = \frac{(MSConc - SampleConc)}{TrueValue} * 100$$

NOTE: The SampleConc is zero (0) for the LCS and Surrogate Calculations

PERCENT DIFFERENCE (%D)

$$\%D = \frac{MeasuredValue - TrueValue}{TrueValue} * 100$$

where:
TrueValue = Amount spiked (can also be the $\overline{CF}$ or $\overline{RF}$ of the ICAL Standards)
Measured Value = Amount measured (can also be the CF or RF of the CCV)

PERCENT DRIFT

$$\boldsymbol{\%Drift = \frac{CalculatedConcentration - TheoreticalConcentration}{TheoreticalConcentrtion} * 100}$$

RELATIVE PERCENT DIFFERENCE (RPD)

$$RPD = \frac{|(R1 - R2)|}{(R1 + R2)/2} * 100$$

where:
R1 = Result Sample 1
R2 = Result Sample 2

CORRELATION COEFFICIENT (R)

$$CorrCoeff = \frac{\sum_{i=1}^{N} W_i * (X_i - \overline{X}) * (Y_i - \overline{Y})}{\sqrt{\left(\sum_{i=1}^{N} W_i * (X_i - \overline{X})^2\right) * \left(\sum_{i=1}^{N} W_i * (Y_i - \overline{Y})^2\right)}}$$

With:	N	Number of standard samples involved in the calibration
	i	Index for standard samples
	Wi	Weight factor of the standard sample no. i
	Xi	X-value of the standard sample no. i
	X(bar)	Average value of all x-values
	Yi	Y-value of the standard sample no. i
	Y(bar)	Average value of all y-values

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CALIBRATION FACTOR (CF)

$$CF = \frac{A_s}{C_s}$$

where:
A_s = Average Peak Area over the number of peaks used for quantitation
C_s = Concentration of the analyte in the standard

RESPONSE FACTOR (RF)

$$RF = \frac{(Conc_{.ISTd})(Area_{Analyte})}{(Conc_{.analyte})(Area_{ISTd})}$$

where:
A_s = Response for analyte to be measured
A_{is} = Response for the internal standard
C_{is} = Concentration of the internal standard
C_s = Concentration of the analyte to be measured

LINEAR CALIBRATION MODEL

$$y = mx + b$$

where:
m = Slope of the line
b = The y intercept

QUADRATIC CALIBRATION MODEL

$$y = ax^2 + bx + c$$

where:
c = The y intercept

STANDARD DEVIATION (S)

$$S = \sqrt{\sum_{i=1}^{n} \frac{(X_i - \overline{X})^2}{(n-1)}}$$

where:
n = number of data points
X_i = individual data point
$\overline{X}$ = average of all data points

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AVERAGE (X)

$$\overline{X} = \frac{\sum_{n=1}^{i} X_i}{n}$$

where:
n = number of data points
X_i = individual data point

RELATIVE STANDARD DEVIATION (RSD)

$$RSD = \frac{S}{\overline{X}} * 100$$

where:
S = Standard Deviation of the data points
$\overline{X}$ = average of all data points

PERCENT ERROR

$$\%Error = \frac{x_i - x'_i}{x_i} * 100$$

where:
x'_i = Measured amount of analyte at calibration level i
x_i = True amount of analyte at calibration level i

RELATIVE STANDARD ERROR (RSE)

$$RSE = 100 \times \sqrt{\sum_{i=1}^{n} \left[\frac{x'_i - x_i}{x_i}\right]^2 \Big/ (n-p)}$$

where:
x_i = True amount of analyte at calibration level i
x'_i = Measured amount of analyte at calibration level i
p = Number of terms in fitting equation (Average = 1, Linear = 2, Quadratic = 3)
n = Number of calibration points

AVERAGE RESPONSE 1/X FOR MASS HUNTER INSTRUMENTS

$$RF\frac{1}{x} = \sum_{s=1}^{n} \frac{1}{C_s} \Big/ \sum_{s=1}^{n} \left(\frac{(A_s * C_{is})}{A_{is} * C_s}\right)$$

where:
A_s = Response for analyte to be measured
A_{is} = Response for the internal standard
C_{is} = Concentration of the internal standard
C_s = Concentration of the analyte to be measured

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MINIMUM DETECTABLE ACTIVITY (MDA)

The MDA is used for radiochemical analysis and is calculated with the following equations:

MDA with Blank Population

$$\frac{3.29 * S_b}{KT_s} + \frac{3}{KT_S}$$

MDA =

Where:
K = E × V × R × Y × F × 2.22
E = efficiency
V = sample volume
R = tracer recovery
Y = gravimetric carrier recovery
F = ingrowth or decay factor
2.22 = conversion from dpm to pCi
T_s = count time of sample in minutes
S_b = standard deviation of the blank population

MDA without Blank Population

$$\frac{3.29 * \sqrt{\frac{b}{T_s} + \frac{b}{T_b}}}{K} + \frac{3}{KT_s}$$

MDA =

Where:
b = background count rate in cpm
T_b = Count time of background in minutes

Relative Error Ratio (RER)/Normalized Absolute Difference (NAD)/Duplicate Error Ratio (DER)

RER, NAD, and DER are used for radiochemical analysis and are calculated by the following:

$$RER/NAD/DER = \frac{|S - R|}{\sqrt{U_S^2 + U_R^2}}$$

Where:
S = Sample Value
U_S = Sample Uncertainty (at 2 sigma)
R = Replicate Value
U_R = Replicate Uncertainty (at 2 sigma)

ATTACHMENT C

Arizona Data Qualifiers

Arizona Data Qualifiers
Revision 4.0
9/5/12

ADEQ Arizona Department of Environmental Quality **Memorandum**

Date: October 10, 2012
To: Prabha Acharya – Manager, Technical Resources – ADHS Lab Licensure
From: Julie Hoskin – QA/QC and Laboratory Services Manager (acting)- ADEQ
Subject: Arizona Data Qualifiers Revision 4.0

Arizona Department of Environmental Quality concurs with Revision 4.0 Arizona Data Qualifiers as amended by subcommittee of Environmental Laboratory Advisory Committee (ELAC).

Any qualified data submitted to ADEQ after January 1, 2001 must be designated using the Arizona Data Qualifiers as developed by the ELAC technical subcommittee. Because the data qualifiers are specific, there may be multiple qualifiers assigned to each analytical result. Any events that cannot be described by the data qualifiers must be documented in a case narrative which must be included with the final report. Using the Arizona Data Qualifiers does not automatically qualify the data as acceptable to the Agency.

Arizona Data Qualifiers Revision 4.0 will be placed on both ADHS Lab Licensure and ADEQ's websites.

Arizona Data Qualifiers
Revision 4.0
9/5/12

Developed by the Sub-committee of the Arizona Environmental Laboratory Advisory Committee
This is an updated list of the Rev. 3.0 Arizona Data Qualifiers dated 9/20/2007, with some new qualifiers added, some obsolete ones deleted and some modified. The new qualifiers are designated in red font. If there was a minor modification to the existing qualifier, it has been highlighted in blue.

Using the following Arizona Data Qualifiers does not automatically denote acceptability to the Regulatory Agency. Arizona Department of Environmental Quality expects that data reported utilizing the following qualifiers, unless stated otherwise, is useable, scientifically valid and defensible. In the laboratory's judgment if the data should not be used for compliance, the T6 qualifier must be used. Other general guidelines for use and application of the following data qualifiers can be found as an attachment to this document (ATTACHMENT A).

Note: Please note that as of 10/28/08, AZ Drinking Water Data Qualifiers have been discontinued, please use Arizona Data Qualifiers Revision 4.0 dated 9/5/12.

Microbiology:

A1 = Too numerous to count.
A2 = Sample incubation period exceeded method requirement.
A3 = Sample incubation period was shorter than method requirement.
A4 = Target organism detected in associated method blank.
A5 = Incubator/water bath temperature was outside method requirements.
A6 = Target organism not detected in associated positive control.
A7 = Micro sample received without adequate headspace.
A8 = Plate count was outside the method's reporting range. Reported value is estimated.

Method/calibration/Trip blank:

B1 = Target analyte detected in method blank at or above the method reporting limit.
B2 = Non-target analyte detected in method blank and sample, producing interference.
B3 = Target analyte detected in calibration blank at or above the method reporting limit.
B4 = Target analyte detected in blank at or above method acceptance criteria.
B5 = Target analyte detected in method blank at or above the method reporting limit, but below trigger level or MCL.
B6 = Target analyte detected in calibration blank at or above the method reporting limit, but below trigger level or MCL.
B7 = Target analyte detected in method blank at or above method reporting limit.

Concentration found in the sample was 10 times above the concentration found in the method blank.
B8 = Analyte found in both the travel blank and sample.

Confirmation:

C1 = Confirmatory analysis not performed as required by the method.
C2 = deleted
C3 = Qualitative confirmation performed.
C4 = Confirmatory analysis was past holding time.
C5 = Confirmatory analysis was past holding time. Original result not confirmed.
C6 = deleted
C7 = deleted
C8 = Sample RPD between the primary and confirmatory analysis exceeded 40%. Per EPA Method 8000C, the lower value was reported as there was no evidence of chromatographic problems.

Dilution:

D1 = Sample required dilution due to matrix.
D2 = Sample required dilution due to high concentration of target analyte.
D3 = deleted.
D4 = Minimum Reporting Limit (MRL) adjusted to reflect sample amount received and analyzed.
D5 = Minimum Reporting Limit (MRL) adjusted due to sample dilution; analyte was nondetect in the sample.
D6 = Minimum Reporting Limit (MRL) adjusted due to an automatic 10X dilution performed on this sample for the purpose of reporting traditional drinking water analytes for wastewater requirements.
D7= Minimum Reporting Limit adjusted to reflect sample dilution.

Estimated concentration:

E1 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not possible due to insufficient sample.
E2 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to sample matrix.
E3 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to holding time requirements.
E4 = Concentration estimated. Analyte was detected below laboratory minimum reporting limit (MRL) but above MDL.
E5 = Concentration estimated. Analyte was detected below laboratory minimum reporting limit (MRL), but not confirmed by alternate analysis.
E6 = Concentration estimated. Internal standard recoveries did not meet method acceptance criteria.

E7 = Concentration estimated. Internal standard recoveries did not meet laboratory acceptance criteria.
E8 = Analyte reported to MDL per project specification. Target analyte was not detected in the sample.

Hold time:

H1 = Sample analysis performed past holding time.
H2 = Initial analysis within holding time. Reanalysis for the required dilution was past holding time.
H3 = Sample was received and/ or analysis requested past holding time.
H4 = Sample was extracted past required extraction holding time, but analyzed within analysis holding time.
H5 = This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
H6 = The filtration was not done within the required 15 minutes of sampling, the sample was filtered in the laboratory.

BOD/CBOD:

K1 = The sample dilutions set-up for the BOD/CBOD analysis did not meet the oxygen depletion criteria of at least 2 mg/L. Any reported result is an estimated value.
K2 = The sample dilutions set up for the BOD/CBOD analysis did not meet the criteria of a residual dissolved oxygen of at least 1 mg/L. Any reported result is an estimated value.
K3 = deleted.
K4 = deleted.
K5 = The dilution water D.O. depletion was > 0.2 mg/L.
K6 = Glucose/glutamic acid BOD/CBOD was below method acceptance criteria.
K7 = A discrepancy between the BOD and COD results has been verified by reanalysis of the sample for COD.
K8 = Glucose/glutamic acid BOD/CBOD was above method acceptance levels.
K9=Test replicates show more than 30% difference between high and low values.
K10=Seed control samples do not deplete at least 2.0 mg/L, with a retention of at least 1.0 mg/L DO criteria in all samples.
K11=Minimum DO is less than 1.0 mg/L in all dilutions.

Laboratory fortified blank/blank spike:

L1 = The associated blank spike recovery was above laboratory acceptance limits
L2 = The associated blank spike recovery was below laboratory acceptance limits.
L3 = The associated blank spike recovery was above method acceptance limits.
L4 = The associated blank spike recovery was below method acceptance limits.
L5 = The associated blank spike recovery was above laboratory/method acceptance limits. This analyte was not detected in the sample.

Matrix spike:

M1 = Matrix spike recovery was high; the associated blank spike recovery was acceptable.
M2 = Matrix spike recovery was low; the associated blank spike recovery was acceptable.
M3 = The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike recovery was acceptable.
M4 = The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The associated blank spike recovery was acceptable.
M5 = Analyte concentration was determined by the method of standard addition (MSA).
M6 = Matrix spike recovery was high. Data reported per ADEQ policy 0154.000. Matrix Interference was confirmed.
M7 = Matrix spike recovery was low. Data reported per ADEQ policy 0154.000. Matrix Interference was confirmed.

General:

N1 = See case narrative.
N2 = See corrective action report.
N3 = deleted.
N4 = The Minimum Reporting Limit (MRL) verification check did not meet the laboratory acceptance limit.
N5 = The Minimum Reporting Limit (MRL) verification check did not meet the method acceptance limit.
N6 = Data suspect due to quality control failure, reported per data user's request.
N7= Additional analysis was not performed based on the "Total" result which was below the requested analyte's MCL/Action level/Trigger level.

Sample quality:

Q1 = Sample integrity was not maintained. See case narrative.
Q2 = Sample received with head space.
Q3 = Sample received with improper chemical preservation.
Q4 = Sample received and analyzed without chemical preservation.
Q5 = Sample received with inadequate chemical preservation, but preserved by the laboratory.
Q6 = Sample was received above recommended temperature.
Q7 = Sample inadequately dechlorinated.
Q8 = Insufficient sample received to meet method QC requirements. Batch QC requirements satisfy ADEQ policy 0154.000.
Q9 = Insufficient sample received to meet method QC requirements.
Q10 = Sample received in inappropriate sample container.
Q11 = Sample is heterogeneous. Sample homogeneity could not be readily achieved using routine laboratory practices.

Duplicates:

R1 = RPD/RSD exceeded the method acceptance limit. See case narrative.
R2 = RPD/RSD exceeded the laboratory acceptance limit. See case narrative.
R3 = deleted.
R4 = MS/MSD RPD exceeded the method acceptance limit. Recovery met acceptance criteria.
R5 = MS/MSD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
R6 = LFB/LFBD RPD exceeded the method acceptance limit. Recovery met acceptance criteria.
R7 = LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
R8 = Sample RPD exceeded the method acceptance limit.
R9 = Sample RPD exceeded the laboratory acceptance limit.
R10 = deleted.
R11 = The RPD calculation for MS/MSD does not provide useful information due to the varying sample weights when Encore samplers/methanol field preserved samples are used.
R12 - RPD/RSD exceeded the method acceptance limit. Result less than 5 times the PQL.
R13 = MS/MSD RPD exceeded method acceptance limit. Matrix spike recovery was outside acceptance criteria. Batch precision and accuracy were demonstrated.

Surrogate:

S1 = Surrogate recovery was above laboratory acceptance limits, but within method acceptance limits.
S2 = deleted.
S3 = Surrogate recovery was above laboratory acceptance limits, but within method acceptance limits. No target analytes were detected in the sample.
S4 = Surrogate recovery was above laboratory and method acceptance limits. No target analytes were detected in the sample.
S5 = Surrogate recovery was below laboratory acceptance limits, but within method acceptance limits.
S6 = Surrogate recovery was below laboratory and method acceptance limits. Reextraction and/or reanalysis confirms low recovery caused by matrix effect.
S7 = Surrogate recovery was below laboratory and method acceptance limits. Unable to confirm matrix effect.
S8 = The analysis of the sample required a dilution such that the surrogate recovery calculation does not provide useful information. The associated blank spike recovery was acceptable.
S9 = deleted.
S10 = Surrogate recovery was above laboratory and method acceptance limits. See case narrative.
S11 = Surrogate recovery was high. Data reported per ADEQ policy 0154.000.
S12 = Surrogate recovery was low. Data reported per ADEQ policy 0154.000.

Method/analyte discrepancies:

T1 = Method approved by EPA, but not yet licensed by ADHS.
T2 = Cited ADHS licensed method does not contain this analyte as part of method compound list.
T3 = Method not promulgated either by EPA or ADHS.
T4 = Tentatively identified compound. Concentration is estimated and based on the closest internal standard.
T5 = Laboratory not licensed for this parameter.
T6 = The reported result cannot be used for compliance purposes.
T7 = Incubator/Oven temperatures were not monitored as required during all days of use.
T8= Method used not listed in 40 CFR 136; alternate method chosen as acceptable per permit.
T9 = Less than the prescribed sample amount was available to perform the leachate extraction. The volume of extraction fluid was adjusted proportionately based on the method prescribed ratio of extraction fluid to sample weight.

Calibration verification:

V1 = CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.
V2 = CCV recovery was above method acceptance limits. This target analyte was detected in the sample. The sample could not be reanalyzed due to insufficient sample.
V3 = CCV recovery was above method acceptance limits. This target analyte was detected in the sample, but the sample was not reanalyzed. See case narrative.
V4 = deleted.
V5 = CCV recovery after a group of samples was above acceptance limits. This target analyte was not detected in the sample; acceptable per EPA Method 8000C.
V6 = Data reported from one-point calibration criteria.
V7 = deleted.
V8 = deleted.
V9 = CCV recovery was below method acceptance limits.

Calibration:

W1= deleted.
W2= deleted.

ATTACHMENT A
"Guidance on the Usage of Data Qualifiers"

These standardized data qualifiers are for use in qualifying analytical results for compliance samples in Arizona to represent events that occurred during analysis.
The technical subcommittee has endeavored to develop qualifiers that are succinct and narrow in scope to eliminate broad or multiple interpretations when assessing the impact on data. It must also be noted that due to the specialized nature of the individual qualifiers, it is likely that more than one qualifier may be needed in order to accurately represent the data.

Note: 1. Using the Arizona Data Qualifiers does not automatically denote acceptability to the Regulatory Agency.
2. As specified in the Arizona Adopted Rules, R9-14-615.C.9, *for each parameter tested at the laboratory for which quality control acceptance criteria are not specified in the approved method or by EPA or ADEQ,:*
a. Use default limits provided in Exhibit II; or
b. Statistically develop limits from historical data

The laboratory has an option of using ADHS Default Limits which can be accessed at http://www.azdhs.gov/lab/license/tech/altdefaultlimit.pdf

Microbiology:

None.

Method/calibration blank:

Apply appropriate qualifier to affected analyte in the blank if target analyte is not detected at $\geq$ RL in the samples. If analytes are detected, then all corresponding analytes for the associated samples should also be qualified.

Confirmation:

For methods that require qualitative confirmation. C3 applies to methods that require quantitative confirmation.

Dilution:

If all analytes are reported from the diluted sample, apply qualifier to the entire sample. Otherwise apply qualifier to each analyte that required dilution.

Estimated concentration:

Appropriate qualifier must be used for any analyte result reported outside the calibration range. Affects data reported outside the calibration range or down to the MDL. E8 is only required if additional clarification is necessary.

Hold time:

Qualify samples appropriately when method extraction and/ or analysis holding time have been exceeded.

BOD/CBOD:

Qualifiers K5, K6, & K8 indicate situations that may impact all results in an analytical run and should be used to qualify all affected samples as well as any affected quality control samples when reported. K3 was deleted because if the seed depletion was out, then the situation must be explained in the case narrative. Criteria for qualifiers K9, K10, K11 taken from Standard Methods 5210 B, 2001 Revision.

Laboratory fortified blank/blank spike:

Appropriate qualifier must be applied to the affected analytes in the Laboratory fortified blank/blank spike and to all corresponding analytes in the associated samples.

Matrix spike:

Appropriate qualifier must be applied to the affected analytes in the matrix spike and should also be added to all corresponding analytes in the associated spiked sample. If a batch spike recovery is outside of the acceptable range, it is permissible to only flag the sample that was spiked and not the other samples in the batch. As required in the Arizona Adopted Rules A.A.C. R9-14-617.8.d, clients must always be informed if the batch QC result is unacceptable whether one of their samples was spiked or not. The laboratory can choose how the unacceptable QC is reported to the client (e.g., cover letter or flag).

The ADEQ policy 0154.000 can be accessed at
http://www.azdeq.gov/function/programs/download/spike8.pdf

General:

For example, qualifier N7 refers to total cyanide vs. free or amendable cyanide, total nitrate/nitrite vs. nitrite, total metals vs. TCLP metals, total PCB's vs. individual aroclors, and total chromium vs. hexavalent chromium.

Sample quality:

Flag samples with appropriate qualifier when sample quality may be potentially impacted or when method requirements were not met.
The ADEQ policy 0154.000 can be accessed at
http://www.azdeq.gov/function/programs/download/spike8.pdf

Duplicates:

For use with sample, matrix spike, LFB and LFB/blank spike duplicates. Qualify all affected analytes. For MS/MSD or sample duplicates qualify only the original source sample.

Surrogate:

Qualify surrogates appropriately when they do not meet criteria. Surrogate failures in quality control samples will most likely require additional narration. S11 & S12 are used to qualify sample surrogates and only in cases where the Laboratory Fortified Blank/ blank spike has acceptable surrogate recoveries.

Method/analyte discrepancies:

For use with methods or analytes that are not currently approved under the Environmental Laboratory Licensure Rules or for which the lab is not licensed.

Calibration verification:

Appropriate qualifier must be applied to all affected analytes in any samples associated with the calibration verification.

Calibration:

None.

ATTACHMENT B

VOLUNTARY REMEDIATION PROGRAM WORK PLAN CHECKLIST

Voluntary Remediation Program Work Plan Checklist

Complete Shaded Areas and Submit with Work Plan

Site Name:	I-10 Avra Valley Mining & Development Site	VRP Site Code:	514142-00
Volunteer/Applicant Name:	I-10 Avra Valley Mining & Development, LLC/ Thomas Parsons		
Volunteer/Applicant Email Address and Phone:	Tparsons@stubbsschubart.com		
Authorized Agent (AA)/Consulting Company:	Annie McCawley/ Terracon Consultants, Inc		
AA/Consultant Email Address and Phone:	annie.mccawley@terracon.com / (520) 798-4823		

Reference	Summary of Statutory Requirement (please review all statutes in their entirety to ensure compliance)	Page(s) Where Addressed in Work Plan (write N/A if not applicable)	VRP Use Only
§49-175A.1	Summary of existing site characterization and assessment information; information regarding any remediation previously conducted; copies of referenced reports not previously submitted;	Pages 5-9	☐
§49-175A.2	If the site has not been characterized, a plan to conduct site characterization and a schedule for completion.	N/A	☐
§49-175A.3.a	If site characterization is completed, a description of how the remediation will comply with §49-175B ("Work Plans") and how the completion of remediation will be verified. A schedule for completion must be included.	Pages 16-28 Table 6	☐
§49-175A.3.b	If site characterization is completed, the work plan may provide for the remediation to be conducted in phases or tasks. A schedule for completion must be included.	Table 6	☐
§49-175A.4	Schedule for submission of progress reports.	Table 6	☐
§49-175A.5	A proposal for community involvement as prescribed by §49-176 ("Community Involvement Requirements")	Page 33	☐
§49-175A.6	If known, a list of institutional or engineering controls necessary during remediation and after completion of the proposed remediation to control exposure to contaminants.	N/A	☐
§49-175A.7	A proposal for monitoring during remediation and after the remediation if necessary to verify whether the approved remediation levels or controls have been attained and will be maintained.	Pages 16-28	☐
§49-175A.8	A list of any permits or legal requirements known to apply to the work or already performed by the applicant.	Pages 12-15	☐
§49-175A.9	If requested by the department, information regarding the financial capability of the applicant to conduct the work identified in the application. *(IF APPLICABLE)*	N/A	☐

Voluntary Remediation Program Work Plan Checklist

Complete Shaded Areas and Submit with Work Plan

Site Name: I-10 Avra Valley Mining & Development Site VRP Site Code: 514142-00

Reference	Summary of Statutory Requirement (please review all statutes in their entirety to ensure compliance)	Page(s) Where Addressed in Work Plan (write N/A if not applicable)	VRP Use Only
§49-175B	Remediation levels or controls for remediation conducted pursuant to this article shall be established in accordance with rules adopted pursuant to §49-282.06 unless one or more of the following applies: see §49-175B.1 through §49-175B.4, below.	Pages 1-3	☐
§49-175B.1	The applicant demonstrates that remediation levels, institutional controls, or engineering controls for remediation of contaminated soil comply with §49-152 and the rules adopted.	Pages 1-3	☐
§49-175B.2	The applicant demonstrates that remediation levels, institutional controls, or engineering controls for remediation of landfills or other facilities that contain materials that are not subject to §49-152 (i.e.: asbestos) do not exceed a cumulative excess lifetime cancer risk between $1X10^{-4}$ to $1X10^{-6}$, and a hazard index of no greater than 1.	Pages 1-3	☐
§49-175B.3	The applicant demonstrates that on achieving remediation levels or controls for a source or potential source of contamination to a navigable water, the source of contamination will not cause or contribute to an exceedance of surface water quality standards, or if a permit is required pursuant to 33 United States Code §1342 for any discharge from the source, that any discharges from the source will comply with the permit.	N/A	☐
§49-175B.4	The applicant demonstrates that, on achieving remediation levels or controls for a source of contamination to an aquifer, the source will not cause or contribute to an exceedance of aquifer water quality standards (AWQS) beyond the boundary of the facility where the source is located.	Pages 1-3	☐
§49-175C	The VRP may waive any work plan requirement under this section that it determines to be unnecessary to make any of the determinations required under §49-177. *If any waivers are requested in the Work Plan or have been previously requested and approved by the VRP, cite them in the Work Plan, including a citation of the statute for which the waiver applies.*	N/A	☐

Voluntary Remediation Program Work Plan Checklist

Complete Shaded Areas and Submit with Work Plan

Site Name: I-10 Avra Valley Mining & Development Site VRP Site Code: 514142-00

To support the prerequisites established by A.R.S. §49-177 and §49-180, the VRP expects certain documentation to accompany a Work Plan. The following provides a list of attachments/exhibits which are recommended for submittal with a Work Plan to provide the information required by the statutes.

Work Plan Information	Title of Figure/Table/Attachment/Exhibit Where Requested Information is Cited (write N/A if not applicable)	Figure/Table/ Attachment or Report Page Number (write N/A if not applicable)	VRP Use Only
Site Location Map *(topographic or aerial)*	Topographic Map	Exhibit 1	☐
Site Map *(to scale)*	Site Diagram with Site Features	Exhibit 2	☐
Historical Sampling Data Table	See attached	Tables 2 through 5	☐
Historical Sample Location Map (to scale)	Soil Sample Locations and Site Boundary	Exhibit 3	☐
Proposed Sample Location Map (to scale)	Decision Units and Assumed Soil Excavation Depths	Exhibit 4, 5A, and 5B	☐
Sampling and Analysis Plan (includes Field Sampling Plan & Quality Assurance Plan)	Sample and Analysis Plan	Attachment A	☐
Proposed Remediation System Location Map	N/A	N/A	☐
Proposed Remediation System Layout (Design Drawings)	N/A	N/A	☐
Schedule for Implementation of Project Activities* (Gantt Style Chart)	Project Milestone Schedule	Table 6	☐
*Project Activities are defined in A.R.S. §§49-175A.2 through 49-175A.4, and 49-176A.2 (Community Involvement).			
Proposed Language for Public Notification of Remediation (i.e.: example signage)	Sample Community Notification Sign	Attachment G	☐
Plan for Investigative Derived Waste (IDW)	Disposal of Residual Materials	Page 29 - Work Plan	☐
Evaluation of Remedial Alternatives (i.e: for Feasibility Study Work Plan)	N/A	N/A	☐

DOES THE WORK PLAN PROPOSE IMPLEMENTING SITE-SPECIFIC REMEDIATION LEVELS?

Yes	No
☐	☑

DOES THE WORK PLAN PROPOSE EVALUATION OF BACKGROUND LEVELS?

Yes	No
☐	☑

NOTE: When reports are submitted which document any type of sampling activity, the submittal of Electronic Data per ADEQ's *Groundwater Data Submittal Guidance (V3.4)* is strongly recommended.

ATTACHMENT C

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY ACCEPTANCE OF VOLUNTARY REMEDIATION PROGRAM APPLICATION

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

Katie Hobbs
Governor

Karen Peters
Cabinet Executive Officer
Executive Deputy Director

Sent via Email

October 25, 2023
VRP 24-045

1-10 Avra Valley Mining & Development, LLC
Mr. Thomas Parsons
5210 East Williams Circle, Suite 720
Tucson, AZ 85711

Re: Acceptance of Voluntary Remediation Program Application
1-10 Avra Valley Mining & Development
7755 and 7851 West Avra Valley Road
Marana, Arizona 85653
Site Code: 514142-00

Dear Mr. Parsons:

The Arizona Department of Environmental Quality (ADEQ), Voluntary Remediation Program (VRP) has reviewed your October 5, 2023, application request for the above-referenced site. Based on the VRP's review of the application, 1-10 Avra Valley Mining & Development, located at 7755 and 7851 West Avra Valley Road, Marana, is hereby accepted into the VRP. The site was used for the transfer of copper ore from trucks to railcars, and the repairs of railcars. More recently the site was used for refueling trucks, and is currently operating as a decorative rock business. The formal date of acceptance into the VRP is October 25, 2023. Jennifer Widlowski will be the Project/Technical Manager for this site and will be reviewing the documents relating to your project.

Information about the VRP

Please ensure that you and/or your representatives review and comply with the requirements of Arizona Revised Statutes (A.R.S.) § 49-171 through 188 and the VRP Fee Rule in Arizona Administrative Code (A.A.C.) R18-7-501 through 507. All work performed within the VRP shall: comply with any and all applicable corrective or remedial action requirements of any applicable permit required under A.R.S. Title 49; be consistent with Title 45, Chapter 2; and comply with any and all otherwise applicable laws and rules.

Failure to comply with the appropriate requirements may result in termination from the VRP and/or denial of a No Further Action (NFA) or Conditional NFA determination. If applicable, any unresolved environmental issues will be referred to the appropriate ADEQ program for further investigation and action.

Acceptance of 1-10 Avra Valley Mining & Development, into the VRP does not constitute any statement, assurance, or representation by ADEQ that the site is exempt from regulation or enforcement under any ADEQ enforcement program. Rather, acceptance into the VRP indicates only that ADEQ will not compel a Volunteer to take remedial or corrective action under another program while 1-10 Avra Valley Mining & Development, is the subject of the approved VRP application so long as that approval is not withdrawn or terminated. See A.R.S. Section 49-184(B).

The VRP will issue an NFA determination (A.R.S. § 49-181) for sites that meet all applicable remediation levels (soil remediation levels, aquifer or surface water quality standards, or groundwater protection levels). If the site is restricted to non-residential use or an engineering control is used to meet the remediation levels, a Declaration of Environmental Use Restriction (DEUR) must be approved by ADEQ and recorded at the applicable County Recorder's Office before the NFA can be granted.

VRP Account

In accordance with the VRP Fee Rule A.A.C. R18-7-503, a request for the initial $4,000.00 deposit is enclosed with this letter. Please reference your site's assigned VRP site code #514142-00 and Account #B2083546 on all future payments to ensure payments are accurately credited to your account. Please send payments to the attention of ADEQ's Accounts Receivable.

Additional Information

The VRP requests one electronic copy of all documents submitted for review. No hard copies are required. The VRP site name **I-10 Avra Valley Mining & Development**, and site code #514142-00 should be used consistently on all correspondence and reports relating to this site to ensure accuracy of file identification.

If applicable to your site conditions, ADEQ requests well water level and groundwater quality data be provided in electronic format. ADEQ has developed a guidance document to assist you with this request, which can be found at: http://www.azdeq.gov/node/1196. Please contact the Data Coordinator at gwqd@azdeq.gov for more information or assistance.

Information pertaining to the VRP can be obtained by accessing ADEQ's web page at azdeq.gov/vrp, or by visiting ADEQ's office at 1110 W. Washington Street, Phoenix, Arizona. Information pertaining to Arizona Revised Statutes Title 49 can be obtained by accessing the Arizona State Legislature web page at azleg.gov. Information pertaining to VRP Arizona Administrative Code rule citations may be found at azsos.gov.

You may contact the ADEQ Records Management Center staff about reviewing or copying file information at 602-771-4380.

Jennifer Widlowski will contact you to set-up an orientation meeting and to discuss the site. Thank you for your participation in the VRP and if you have any questions or comments, please feel free to contact me at 602-771-1612, toll-free at 1-800-234-5677, or green.scott@azdeq.gov.

Sincerely,

Scott Green, Manager
Voluntary Remediation & Brownfields Programs

Enclosure: Deposit Request

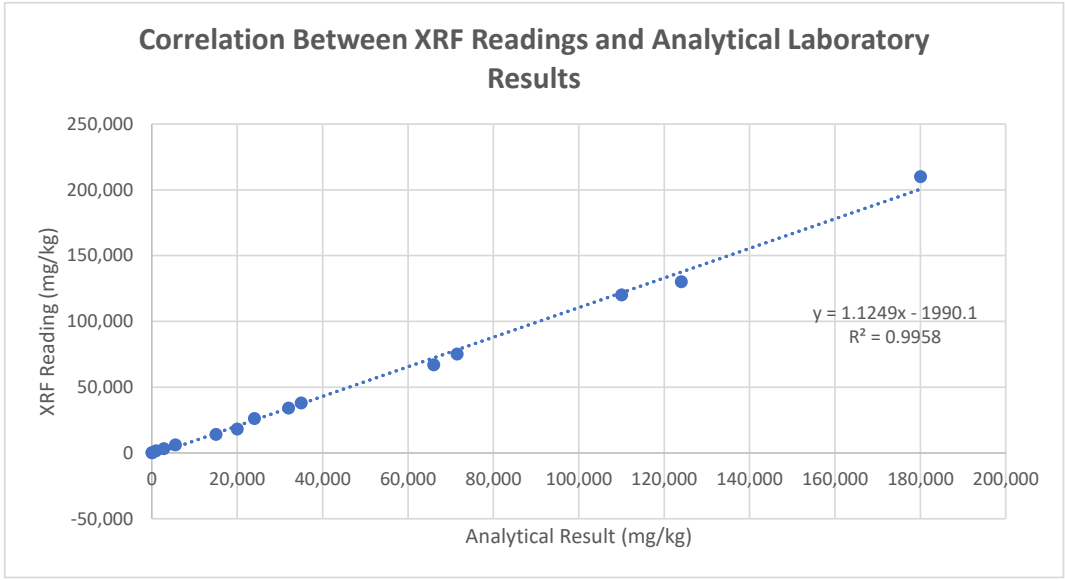
cc: Derek Sizemore, Terracon Consultants Inc., - via email

ATTACHMENT D

EXAMPLE USE OF LINEAR REGRESSION FOR LIMITS OF EXCAVATIONS

Attachment D
Example Use of Linear Regression
for Limits of Excavation

Sample Number	XRF Reading (mg/kg)	Analytical Result (mg/kg)
1	110,000	120,000
2	35,000	38,000
3	20,000	18,000
4	58	60
5	20	25
6	5,500	6,000
7	71,500	75,000
8	124,000	130,000
9	15,000	14,000
10	66,000	67,000
11	180,000	210,000
12	1,000	1,600
13	32,000	34,000
14	24,000	26,000
15	2,800	3,100



ATTACHMENT E

CALCULATION OF REQUIRED NUMBER OF SOIL STOCKPILE SAMPLES FOR HAZARDOUS WASTE DETERMINATION

ATTACHMENT E
CALCULATION OF REQUIRED NUMBER OF SOIL STOCKPILE SAMPLES FOR HAZARDOUS WASTE DETERMINATION

The number of samples required to be collected and analyzed is calculated using Equation 8 of the United States Environmental Protection Agency document entitled *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846), Chapter 9*

$$n_r = \frac{(t^2_{0.20})(s^2)}{\Delta^2}$$

where: n_r = number of samples required for hazardous waste determination
$t^2_{0.20}$ = Student's t value for a probability of 0.20 and based on the appropriate degrees of freedom (DF) for n_c
n_c = number of historical samples collected
s^2 = sample variance
Δ = RT - $\overline{x}$
RT = Regulatory level for toxic characteristic
$\overline{x}$ = mean concentration of analyte concentration

The standard deviation (s^2) for simple random sampling is calculated using Equation 3a of SW-846:

$$s^2 = \frac{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n_c}}{n_c - 1}$$

where: x_i = individual analytical result
n_c = number of historical samples collected

Historical analytical results from the WTI Phase II Site Characterization were used to calculate the number of samples required to obtain a representative sample using the following assumptions:

- Samples must have been analyzed for 8 RCRA metals
- Samples must have been collected within the Site boundaries
- Sample results with RDLs greater than the SRLs were not used
- The RDL was used for sample results reported at less than the RDL

Illustration of Calculation of n_r for Soil Stockpile Generated from Excavation (Selenium)

n_c = samples collected from S3, B1S, B16, AV-10, AV-20, SV-30,AV-35, AV-40= 8

DF = 1 – n_c = 8 - 1 = 7

$t_{0.2}$ (DF=7) = 1.415 (Table 9.2, SW-846)

$\sum_{i=1}^{n} x_i^2$ = $(14)^2 + (0.5)^2 + (3.9)^2 + (5)^2 + (5)^2 + (5)^2 + (50)^2 + (5)^2$ = 2,811 (values from Table G-2)

$\left(\sum_{i=1}^{n} x_i\right)^2$ = $(14 + 0.5 + 3.9 + 5 + 5 + 5 + 50 + 5)^2$ = 5,535 (values from Table G-1)

$\frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n_c} = \frac{5{,}535}{8}$ = 692

$s^2 = \frac{2{,}811-692}{8-1}$ = 303

$\bar{x}$ = (14 + 0.5 + 3.9 + 5 + 5 + 5 + 50 + 5)/8 = 9 mg/kg

RT (selenium) = (20)(Toxicity characteristic regulatory limit) = (20)(1) (Table G- 2)

Δ = 20 – 9 = 11

$n_r = \frac{(1.415^2)(303)}{11^2}$ = 5.01

Round up to 6 samples required

TABLE F-1
PARAMETERS USED TO CALCULATE NUMBER OF SAMPLES REQUIRED

Sample Number	Contaminant of Concern							
	Arsenic	**Barium**	**Cadmium**	**Chromium**	**Lead**	**Selenium**	**Silver**	**Mercury**
S3	0.035	2.4	56	0.47	7.1	14	5	0.13
B1S	11	140	7	16	140	0.5	3	0.1
B16	4.6	110	1.6	11	31	3.9	0.35	0.22
AV-10	0.3	140	0.3	6.3	12	5	1.3	0.05
AV-20	2.5	110	0.3	6	12	5	1.3	0.05
AV-30	2.5	120	0.3	6	12	5	1.3	0.05
AV-35	2.5	150	7.7	10	25	50	13	0.05
AV-40	2.5	100	0.25	5.6	12	5	1.3	0.05
n_c	8	8	8	8	8	8	8	8
Mean	3	109	2	8	31	9	3	0
s^2	12	2,242	458	23	2,053	303	22	0
TC level (mg/L)	5	100	1	5	5	1	5	0.2
20x limit (mg/kg)	100	2000	20	100	100	20	100	4
Δ	97	1,891	18	92	70	11	97	4
$t_{0.80}$	1.415	1.415	1.415	1.415	1.415	1.415	1.415	1.415
n_r	1	1	3	1	1	6	1	1

Key:
mg/L – milligrams per liter
mg/kg – milligrams per kilogram

ATTACHMENT F

VOLUNTARY REMEDIATION PROGRAM REMEDIATION REPORT FORM

Voluntary Remediation Program

Remediation Data Reporting Form

Complete shaded areas and submit with Site Characterization/Remedial Report, Remedial Progress Report, or any other report containing remediation data. Please contact your VRP Project Manager with any questions.

SITE INFORMATION	
Site Name	
VRP Site Code	
Volunteer	
Person Completing Form	**Volunteer** **Consultant** **Authorized Agent** **Other** _____
Reporting Period	
Remediation Status ☐ In Progress ☐ Completed	

REMEDIAL DATA (provide data from reporting period)	
Tons of Soil Removed	
Number of Soil Samples Collected	
Number of Soil Vapor Samples Collected	
Number of Groundwater Wells Installed	
Number of Groundwater Samples Collected	
Gallons of Groundwater Treated	
Number of SVE System Samples Collected	
Pounds Removed – Volatile Organic Compounds	
Pounds Removed – Metals	
Pounds Removed – Other (please specify)	

Remediation Data Reporting Form

REMEDIATED CONTAMINANTS (use only when remediation is completed)

Constituent	Media	Highest Concentration Left in Place	Units			Depth of Highest Concentration Left in Place
			soil	water	indoor air	
			mg/kg	µg/L	µg/m³	
EXAMPLE: Benzene	Soil	0.10	☑	☐	☐	22 feet bgs
	Select One		☐	☐	☐	
	Select One		☐	☐	☐	
	Select One		☐	☐	☐	
	Select One		☐	☐	☐	
	Select One		☐	☐	☐	
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	Select One		☐	☐	☐	
	Select One		☐	☐	☐	

Last Update: 3/9/17

ATTACHMENT G

COMMUNITY NOTIFICATION SIGN

ENVIRONMENTAL RECLAMATION NOTICE
Voluntary Remediation Program Site

SITE CODE: 514142-00

Project Start Date: April 1, 2024

I-10 Avra Valley Mining & Development, LLC, through Terracon, is conducting soil remediation.

This work is performed under the Arizona Department of Environmental Quality Voluntary Remediation Program.

For more information please contact:
Site Contact:
Thomas Parsons, 520-623-5466

ADEQ Contact:
Jennifer Widlowski, 602-771-2256

Terracon Contact:
Annie McCawley, 520-798-4823

ENVIRONMENTAL RECLAMATION NOTICE
Voluntary Remediation Program Site

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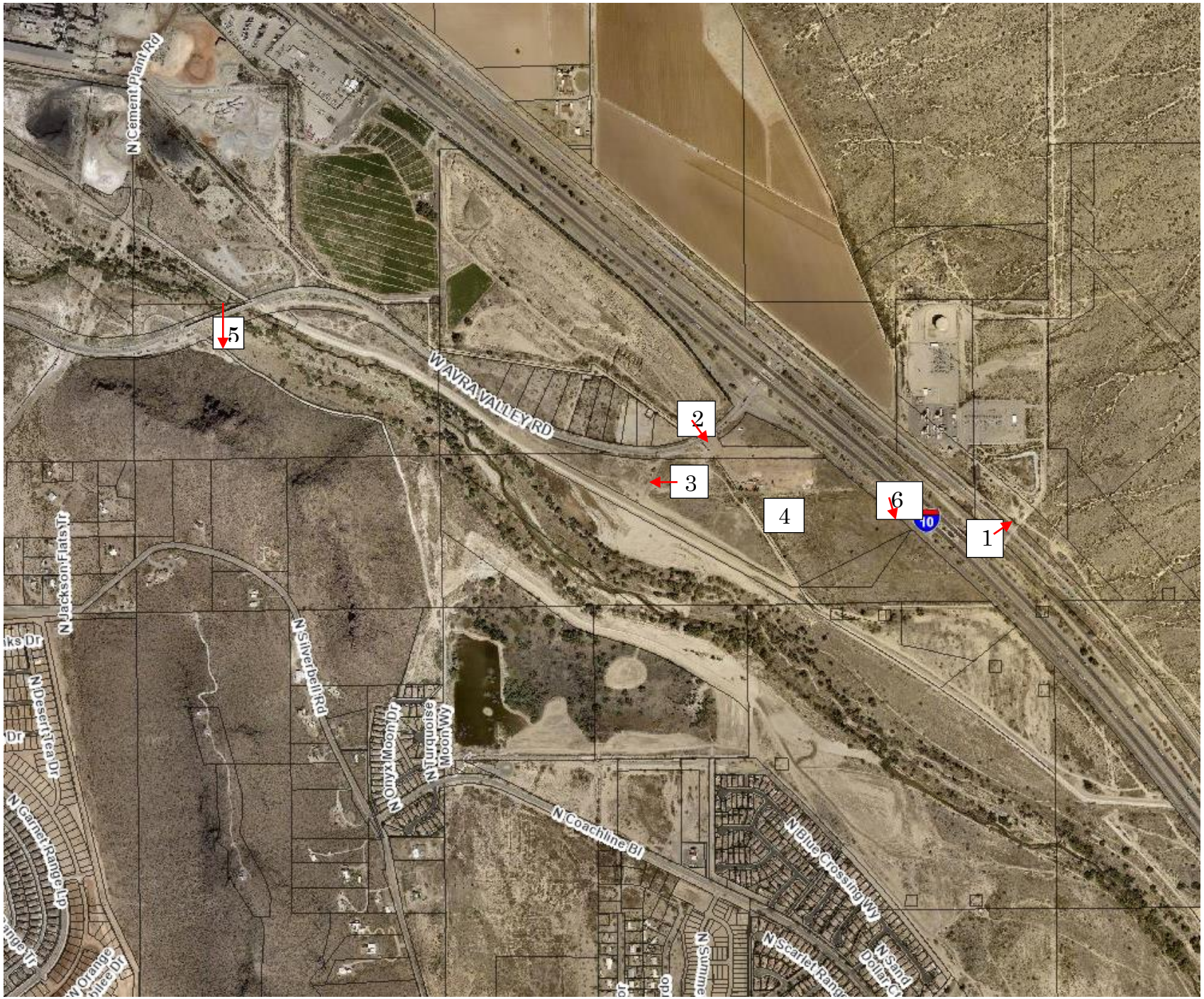
I-10 Avra Valley Mining & Development, LLC
Stapled Laminate Notices
Site Code: 514142-00



I-10 Avra Valley Mining & Development, LLC
Stapled Laminate Notices
Site Code: 514142-00

1) Frontage Road – Railroad Crossing

2) Avra Valley Road – Entrance to Kalamazoo

3) Avra Valley Road – Mini Barn Sales (Davis Operations) (Door Hanger)

4) Center of Remediation Site – open to public

5) Avra Valley Road, Public Entrance to Huckelberry Loop Bike Trail

6) I-10 Frontage Road

APPENDIX 1

1-Frontage Rd - RR Crossing


PRIVATE
R R
CROSSING
NO TRESPASSING

APPENDIX 2

2-Avra Valley Rd - Entrance to Kalamazoo


FORZA


ENVIRONMENTAL RECLAMATION NOTICE
Voluntary Remediation Program Site
SITE CODE: 514142-00
Project Start Date: April 1, 2024
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This work is performed under the Arizona Department of Environmental Quality Voluntary Remediation Program.
For more information please contact:
Site Contact: Thomas Parsons, 520-623-5466
ADEQ Contact: Jennifer Widlowski, 602-771-2256
Terracon Contact: Tod Whitwer or Derek Sinclair, 520-770-1789

APPENDIX 3

3-Avra Valley Rd - Mini Barn Sales


IF NO ONE IS HERE TO ASSIST YOU
CALL OR TEXT 520-308-7812
FOR EVEN FASTER SERVICE
TAKE A PICTURE OF THE BUILDING
YOUR INTERESTED IN
CALL OR TEXT THE NUMBER ABOVE
WE WILL CALL YOU BACK SAME DAY
EASY ONLINE ORDERING AVAILABLE
FROM THE CONVENIENCE OF YOUR HOME
LOCATIONS AT
7755 W. AVRA VALLEY RD IN MARANA
3162 W. MEADOWLARK LANE IN BENSON
PREMIER
PORTABLE BUILDINGS
WWW.PREMIERBUILDINGS.US
RENT TO OWN
NO CREDIT CHECK
FREE DELIVERY WITHIN 50 MILES

APPENDIX 4

4-Center of Remediation Site


ENVIRONMENTAL RECLAMATION NOTICE
Voluntary Remediation Program Site
SITE CODE: 8141-GLPP
Project Start Date: April 1, 2025

APPENDIX 5

5-Avra Valley Rd-Huckelberry Loop

APPENDIX 6

6-I-10 Frontage Road


ENVIRONMENTAL RECLAMATION NOTICE
Voluntary Remediation Program Site
SITE CODE: 514142-00
Project Start Date: April 1, 2024
I-10 Avra Valley Mining & Development, LLC, through Terracon, is conducting soil remediation.
This work is performed under the Arizona Department of Environmental Quality Voluntary Remediation Program.
For more information please contact:
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