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April 9, 2025

Project 203723786.W06

Mr. Jason Cook
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Toxic Cleanup Program
P.O. Box 47600
Olympia, Washington 98504-7600

Reference: Compliance Monitoring Plan, ExxonMobil ADC, 2717/2731 Federal Avenue, Everett, Washington, Ecology Facility Site ID 2728

Mr. Cook,

At the request of ExxonMobil Environmental and Property Solutions, on behalf of ExxonMobil Oil Corporation (ExxonMobil) and American Distributing Company, Stantec Consulting Services Inc. (Stantec) conducts environmental activities at the ExxonMobil ADC site (Site). Stantec prepared the enclosed *Compliance Monitoring Plan*, dated April 9, 2025, at the request of the Washington State Department of Ecology (Ecology). The purpose of the Compliance Monitoring Plan is to describe soil and groundwater performance and confirmation monitoring following remedial action excavation completion at the Site.

Site Identification

Consent Decree No. 24-2-01561-31
Facility Site ID No. 2728
Cleanup Site ID No. 5182

Site Location

2717 and 2731 Federal Avenue
Everett, Washington 98201
Port Gardner / Possession Sound

Ecology Contacts

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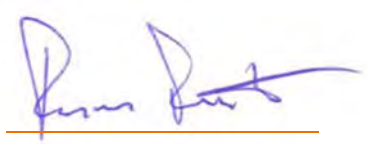
Regards,

Stantec Consulting Services Inc.



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Enclosure: Stantec's *Compliance Monitoring Plan*, dated April 9, 2025

c. Mr. Steve Miller, American Distributing Company
Mr. Jeff Johnson, ExxonMobil Environmental and Property Solutions Company

Compliance Monitoring Plan

ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

April 9, 2025

Prepared for:
ExxonMobil Environmental and Property Solutions Company and American Distributing Company

Prepared by:
Stantec Consulting Services Inc.

Project Number:
203723786.W06

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Signature

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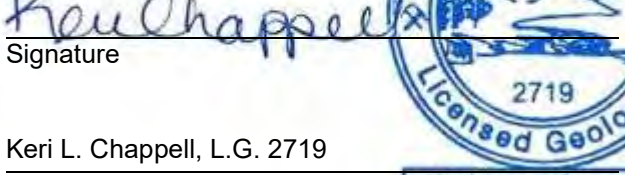

Signature

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Acronyms / Abbreviations

µg/L	Micrograms per liter
ADC	American Distributing Company
bgs	Below ground surface
BNSF	BNSF Railway Company
BTEX	Benzene, toluene, ethylbenzene, total xylenes
CAP	Cleanup Action Plan
COC	Contaminant of concern
Consent Decree	Consent Decree No. 24-2-01561-31
cPAHs	Carcinogenic polycyclic aromatic hydrocarbons
CPOC	Conditional point of compliance
DO	Dissolved oxygen
DTW	Depth to water
EPA	United States Environmental Protection Agency
ExxonMobil	ExxonMobil Oil Corporation
ISS	In-situ soil stabilization
L/min	Liter per minute
LNAPL	Light non-aqueous phase liquid
mg/L	Milligram per liter
MNA	Monitored natural attenuation
MS	Matrix spike
MSD	Matrix spike duplicate
MTCA	Model Toxics Control Act
NTU	Nephelometric turbidity units
NWTPH-Dx	Northwest TPH for Diesel and Oil Range Organics
NWTPH-Gx	Northwest TPH for Gasoline Range Organics
ORP	Oxidation reduction potential
PID	Photoionization detector
PLP	Potentially liable party
POC	Point of compliance
Port	Port of Everett
Property	ExxonMobil and ADC owned tax parcels: 00437161900101, 00437161900100, and 00437161901000
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality assurance/quality control
SC/FFS	WSP's Site Characterization/Focused Feasibility Study Report
SIM	Select Ion Monitoring
Site	ExxonMobil ADC Site
SOP	Standard operating procedure
Stantec	Stantec Consulting Services Inc.
TEE	Terrestrial ecological evaluation
TPH	Total petroleum hydrocarbons
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHo	Total petroleum hydrocarbons as oil
USCS	Unified Soil Classification System
USDOT	United States Department of Transportation
VOA	Volatile organic analysis

VOC	Volatile organic compound
WAC	Washington Administrative Code
WSP	WSP USA Environment & Infrastructure Inc.

1 Introduction

At the request of ExxonMobil Environmental and Property Solutions, on behalf of ExxonMobil Oil Corporation (ExxonMobil) and American Distributing Company (ADC), Stantec Consulting Services Inc. (Stantec) prepared this Compliance Monitoring Plan for the ExxonMobil ADC Site (Site) located at 2717/2731 Federal Avenue, Everett, Snohomish County, Washington. The location of the Site is shown on Plates 1 and 2. Compliance monitoring is required as part of the cleanup process under Washington Administrative Code (WAC) Chapter 173-340 – Model Toxics Control Act (MTCA) Cleanup Regulations (WAC, 2023).

Consent Decree No. 24-2-01561-31 (Consent Decree) prepared by Ecology, ExxonMobil, and ADC was entered by the State of Washington Snohomish County Superior Court on March 26, 2024.

1.1 Purpose

The purpose of the Compliance Monitoring Plan is to identify performance and confirmation monitoring actions to confirm the long-term effectiveness of the cleanup action in accordance with the Consent Decree.

The purpose of performance and confirmation monitoring is to attain cleanup standards in soil and groundwater at the applicable points of compliance (POCs) and conditional points of compliance (CPOCs) as identified in the *ExxonMobil/ADC Revised Draft Cleanup Action Plan* (CAP), dated October 2023 (Ecology, 2023) within a reasonable restoration timeframe and in accordance with the MTCA regulations. The Compliance Monitoring Plan includes the following elements:

- Placement of environmental covenants for restriction of groundwater use and maintenance of surface seal to limit human exposure to soil, particularly in the inaccessible areas.
- Installation of six groundwater monitoring wells in the inaccessible areas.
- Groundwater sampling at approximately 5-year intervals for the evaluation of natural attenuation in the inaccessible areas.
- Soil sampling at approximately 10-year intervals for the evaluation of progress toward soil cleanup standards.
- Groundwater confirmation sampling at the CPOCs until a period of eight consecutive quarterly sampling events confirming attainment of groundwater cleanup standards has been achieved.

In the final *Site Characterization/Focused Feasibility Study Report* (SC/FFS) prepared by WSP USA Environment & Infrastructure Inc. (WSP) on May 12, 2023, WSP used an estimated restoration time of 50 years for the purpose of remedial alternative development; this restoration time was requested by

Ecology (WSP, 2023). For the purposes of this compliance monitoring plan, a 50-year schedule has been established and is included as Table 1.

2 Site Description

The ExxonMobil ADC Site is comprised of portions or the entirety of the Parcels on the following table, as depicted on Plate 2.

Property Description	Property Owner	Location	Tax Parcel Description
ADC	ADC	Northern portion of Property	00437161900101 00437161900100
ExxonMobil	ExxonMobil	Southern portion of Property	00437161901000
City of Everett Right-of-Way	City of Everett	East and south of Property	Right-of-way
Former Everett Avenue	Port of Everett (Port)	North of Property	00597761803901
Federal Avenue	City of Everett	West of Property	Right-of-way
BNSF Railway Company (BNSF)	BNSF parcel	East of Property	00437161901702
BNSF Easement	City of Everett	East of Property	Right-of-way
Terminal Avenue Overpass	City of Everett	East and south of Property	00437161901801 00437161901400
Port properties	Port	West and north of Property	29051900301600 29051900302500 29051900302700 29051900302800 29051900302900

2.1 Site Identification

The lateral extent of the Site extends from the ExxonMobil- and ADC-owned parcels (Property) onto neighboring properties to the north, south, east, and west. To the west of the Property is Federal Avenue and Port property beyond. To the east of the Property is a City of Everett right-of-way and the BNSF parcel beyond. To the east and southeast is the Terminal Avenue Overpass. To the north is former Everett Avenue. The ExxonMobil ADC Property and surrounding parcels are shown on Plate 2. The following sections summarize the ExxonMobil ADC Property and surrounding properties (Snohomish County, 2023; WSP, 2023).

2.1.1 ExxonMobil ADC Property

Historical ExxonMobil and ADC operations were located at 2717/2731 Federal Avenue, Everett, Snohomish County, Washington, adjacent to Port Gardner Bay. The Property consists of three tax parcels: 00437161900101, 00437161900100, and 00437161901000. The northern parcels are owned by ADC, and the southern parcel is owned by ExxonMobil. The ExxonMobil ADC Property occupies 0.86 acre of land (Snohomish County, 2023). The northern ADC parcels at 2717 Federal Avenue occupy approximately two-thirds of the Property (0.65 acre). The southern ExxonMobil parcel at 2731 Federal Avenue occupies approximately one-third of the Property (0.21 acre). City of Everett rights-of-way are located immediately east, west, and south of the Property boundary.

The Property historically operated as a bulk petroleum storage, transfer, and distribution facility. Additional potential sources of contaminants of concern (COCs) include releases from the former rail loading racks located east of the Property, underneath the current Terminal Avenue Overpass (WSP, 2023). In the early 1900s, the historical shoreline was located approximately along present-day Federal Avenue. As development continued, the shoreline was extended westward until it reached its current extent in 1976 (WSP, 2023).

2.1.2 The Port of Everett

The properties beyond Federal Avenue to the west are owned by the Port and abut the Port Gardner Bay shoreline (Snohomish County, 2023). Various portions of the Port properties are leased to other businesses, including Dunlap Towing and Everett Ship Repair, and are paved with asphalt (WSP, 2023).

2.1.3 Former Everett Avenue

Former Everett Avenue was historically an east/west public road located north of the ExxonMobil ADC Property. The portion of former Everett Avenue located within in the Site boundary was formerly owned by Kimberly-Clark Corporation and is currently owned by the Port and is mostly paved with asphalt with some areas of gravel (Snohomish County, 2023). In 2011-2012, an interim action excavation was completed under Agreed Order No. DE 6184 on the former Everett Avenue parcel, as illustrated on Plate 3. Approximately 725 tons of soil were excavated to a total depth of 3 to 5 feet below ground surface (bgs) (WSP, 2023).

2.1.4 BNSF Parcel

An active BNSF rail line and adjacent BNSF parcel are located east and southeast of the Property (Google, 2022; Snohomish County, 2023). The BNSF railway corridor crosses underneath the Terminal Avenue Overpass. The adjacent BNSF parcel is paved with asphalt. In 2011-2012, an interim action excavation was completed on the BNSF parcel, as illustrated on Plate 3. Approximately 3,060 tons of soil were excavated to a total depth of approximately 8 to 10 feet bgs. A total of 1,489,246 gallons of petroleum-affected groundwater and approximately 2,530 gallons of light non-aqueous phase liquid (LNAPL) were removed from the BNSF parcel during excavation activities (WSP, 2023).

2.1.5 Federal Avenue

The City of Everett right-of-way Federal Avenue is located west of the Property (Snohomish County, 2023). Federal Avenue is a north to south trending public road and utility corridor that is currently paved with asphalt.

2.1.6 Terminal Avenue Overpass

The City of Everett right-of-way Terminal Avenue Overpass is located east and southeast of the Property (Google, 2022). Terminal Avenue is a northeast to southwest trending road that is currently paved with asphalt. The overpass crosses the BNSF railway corridor and then intersects at grade with Federal Avenue southwest of the Site. A portion of the right-of-way was previously part of the southern portion of the ExxonMobil parcel but was transferred to the City of Everett as part of the Terminal Avenue Overpass project (WSP, 2023).

3 Cleanup Actions

3.1 Completed

Cleanup actions as outlined in the CAP completed to date include the following:

- Excavation and in-situ soil stabilization (ISS) of soil containing LNAPL and soil exceeding the Site-specific residual saturation remediation levels in accessible areas on the Port, ExxonMobil, and ADC parcels.
- Installation of a barrier wall along the western edge of Federal Avenue.

3.2 Projected

Cleanup actions as outlined in the CAP that will be completed as part of work outlined in this Compliance Monitoring Plan include the following:

- Placement of institutional controls. The institutional controls will be committed to in environmental covenants recorded on the title for the restricted properties and remain in place until cleanup standards are met.
- Monitored natural attenuation (MNA) of COCs in soil in the inaccessible areas.
- MNA of COCs in groundwater in the inaccessible areas and downgradient of the inaccessible areas.
- Groundwater confirmation sampling at the CPOCs until a period of eight consecutive quarterly sampling events confirming attainment of groundwater cleanup standards has been achieved.

The areas of the Site defined as inaccessible areas are illustrated on Plate 3.

4 Cleanup Standards

This section summarizes the proposed cleanup standards for the selected cleanup action. The cleanup standards will be met at the Site POCs and CPOCs. These standards must be established for affected media and must be considered appropriate for projected land uses, groundwater uses, and relevant potential exposure pathways.

4.1 Cleanup Levels

Cleanup levels for soil and groundwater at the applicable POCs and CPOCs were established in the CAP (Ecology, 2023) and accepted by Ecology. They are included here for clarity and reference.

Concentrations of COCs in soil during compliance monitoring will be compared to the MTCA Method A Cleanup Levels presented in the following table.

Contaminants of Concern in Soil	MTCA Method A Cleanup Level in Soil (mg/kg)
TPHg	30/100[a]
TPHd	2,000
TPHo	2,000
Benzene	0.03
Ethylbenzene	6
Total Xylenes	9
Total cPAHs	0.1[b]
1-Methylnaphthalene	34[c]

a. TPHg cleanup level for soil is 30 mg/kg unless benzene is not detected in the sample, or if toluene, ethylbenzene, and total xylenes constitute less than 1% of the TPHg present in the sample. If these conditions are met, the cleanup level for TPHg may be elevated to 100 mg/kg.
b. The MTCA Method A Cleanup Level for cPAHs is based on benzo(a)pyrene and is the sum of concentrations calculated using the toxic equivalency factors.
c. The MTCA Method B Cleanup Level for 1-methylnaphthalene is used to demonstrate compliance.

Concentrations of COCs in groundwater during compliance monitoring will be compared to the MTCA Method A Cleanup Levels presented in the following table.

Contaminants of Concern in Groundwater	MTCA Method A Cleanup Level in Groundwater in Micrograms per Liter (µg/L)
TPHg	800/1,000[a]
TPHd	500
TPHo	500

Contaminants of Concern in Groundwater	MTCA Method A Cleanup Level in Groundwater in Micrograms per Liter (µg/L)
Benzene	5
Total Xylenes	1,000
Total cPAHs	0.1[b]
1-Methylnaphthalene	1.5[c]

a. TPHg cleanup level for groundwater is 800 µg/L if benzene is present; TPHg cleanup level is 1,000 µg/L if benzene is not present.
b. The MTCA Method A Cleanup Level for cPAHs is based on benzo(a)pyrene and is the sum of concentrations calculated using the toxic equivalency factors.
c. The MTCA Method B Cleanup Level for 1-methylnaphthalene is used to demonstrate compliance.

4.2 Points of Compliance

The standard POC for soil under the MTCA is generally considered to be all soils throughout the Site to uppermost groundwater and/or 15 feet bgs, depending on which exposure pathway is being protected (WAC 173-340-740[6][b-d]); however, because source material will be left in place at inaccessible locations across the Site (including surrounding properties and rights-of-way), WAC 173-340-740(6)(f)(i-vi) provides for the cleanup action to comply with cleanup standards if the remedy is permanent to the maximum extent practicable, protective of human health and of terrestrial ecological receptors, institutional controls are implemented, and compliance monitoring is completed (WAC, 2023).

The POCs for soil at this Site are based on the two complete pathways of exposure:

- Soil direct contact – The soil POC at the Site is any soil between surface and 15 feet bgs. Compliance is determined by direct sampling of soil.
- Soil leaching COCs to groundwater – This is a cross-media pathway that concerns all Site soil that is a potential source of COCs to groundwater. Compliance is demonstrated empirically by direct sampling of groundwater. If groundwater is less than the groundwater cleanup levels (MTCA Method A), this pathway will be empirically demonstrated to be in compliance.

The standard POC for groundwater under the MTCA is “throughout the site from the uppermost level of the saturated zone extending vertically to the lowest depth that could potentially be affected by the site” (WAC 173-340-720[8][b]; WAC, 2023); however, because source material will be left in place at inaccessible places within the Site, including surrounding properties and rights-of-way, a CPOC may be applied by Ecology under WAC173-340-720(8)(c). The CPOC for groundwater consists of two existing monitoring wells (MW-A4 and MW-A9), located on Port property west of the source area excavations as shown on Plate 4. Compliance is determined by direct sampling of groundwater and comparison to the MTCA Method A Cleanup Levels.

5 Institutional Controls

5.1 Purpose

The purpose of enacting institutional controls at the Site is to protect human and ecological receptors from coming into direct contact with soil and groundwater in inaccessible areas that may contain COCs exceeding cleanup standards. Additionally, the institutional controls will carry stipulations to protect potential future receptors from soil vapor that may contain COCs in the event of future building construction, and instructions for protecting worker health and safety in the event of future excavation activities.

5.2 Environmental Covenants

In accordance with the CAP, the potentially liable parties (PLPs) will record environmental covenants on their respective properties. The PLPs will also work with Ecology and negotiate with the City of Everett, Port, and BNSF property owners to draft and request permission to record environmental covenants on these other properties and rights-of-way located within the Site boundary (Plate 3). In accordance with the Consent Decree, the PLPs will provide Ecology with the original recorded environmental covenants within 30 days of the recording date.

ExxonMobil and ADC will prepare a sampling and analysis plan as an addendum to the environmental covenants for the City of Everett, Port, and BNSF property owners to address worker safety and management of LNAPL, affected soil, and/or affected groundwater resulting from potential future work within inaccessible areas on or near Federal Avenue, former Everett Avenue, the BNSF parcel, and/or the public rights-of-way including the Terminal Avenue Overpass. A contaminated media management plan (or similar document) will be included as an addendum to the environmental covenants.

The environmental covenants are expected to include the following measures:

- Limit the future use of the Property to commercial or industrial uses.
- Maintain the existing asphalt or gravel cap.
- Prohibit use of groundwater from the Site.
- Permanent buildings constructed within the boundaries of the areas exceeding cleanup levels and inaccessible areas will require the incorporation of vapor barriers to limit the potential migration of soil vapor into the buildings.

Additionally, the City of Everett will be consulted to confirm that zoning for the Site will remain commercial/industrial.

Locations of the parcels that may require an environmental covenant are summarized in the following table and shown on Plate 2.

Property Description	Property Owner	Location	Tax Parcel Description
ADC	ADC	Northern portion of Property	00437161900101 00437161900100
ExxonMobil	ExxonMobil	Southern portion of Property	00437161901000
City of Everett Right-of-Way	City of Everett	East and south of Property	Right-of-way
Former Everett Avenue	Port	North of Property	00597761803901
Federal Avenue	City of Everett	West of Property	Right-of-way
BNSF parcel	BNSF	East of Property	00437161901702
BNSF Easement	City of Everett	East of Property	Right-of-way
Terminal Avenue Overpass	City of Everett	East and south of Property	00437161901801 00437161901400
Port properties	Port	West and north of Property	29051900301600 29051900302500 29051900302700 29051900302800 29051900302900

5.3 Inspection and Verification

In accordance with the CAP, Site restoration following excavation included reinstallation of the asphalt cap on the Port, ExxonMobil, and ADC parcels. Additionally, all inaccessible areas on parcels owned by the City of Everett, Port, and BNSF subject to environmental covenants are paved with asphalt or capped with gravel. In accordance with the Consent Decree, the PLPs will periodically inspect the condition of the asphalt and gravel caps at the Site; the inspection date and details of deficiencies, if any, will be included in the subsequent progress report for the Site. Any deficiencies identified during inspections will be shared with applicable property owners and PLPs will work with the property owners to correct the deficiencies. Inspections will be completed every 5 years.

6 Groundwater Monitoring Well Installation

6.1 Purpose

Six groundwater monitoring wells are proposed for installation around the perimeter of the Site (Plate 4). The purpose of installing groundwater monitoring wells in these areas is to monitor natural attenuation of COCs in the inaccessible areas along Former Everett Avenue, Federal Avenue, and in the vicinity of the Terminal Avenue Overpass.

Soil samples collected during groundwater monitoring well installation will provide baseline conditions of COCs in soil in the inaccessible areas following completion of corrective action excavations. The initial four quarters of groundwater samples collected from these new wells will provide baseline conditions of COCs in groundwater in the inaccessible areas immediately following corrective action excavations. Additionally, MNA parameters will be analyzed and the results evaluated to determine whether conditions favorable to natural attenuation exist in the inaccessible areas.

6.2 Schedule

Groundwater monitoring well installation is proposed for Year 1 pending Ecology approval of this compliance monitoring plan.

7 Monitored Natural Attenuation Considerations

Natural attenuation comprises physical, chemical or biological processes that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of hazardous substances in soil and groundwater (WAC, 2023). A cleanup action that includes natural attenuation and conforms to the following conditions can be considered an active remedial measure (WAC, 2023):

- Source control (including removal and/or treatment of hazardous substances) has been conducted to the maximum extent practicable.
- Leaving contaminants on site during the restoration timeframe does not pose an unacceptable threat to human health or the environment.
- There is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site.
- Appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.

Soil containing concentrations of TPHg, TPHd, and TPHo exceeding residual saturation levels has been removed from the Site to the extent practicable in all accessible areas, in accordance with the *ExxonMobil ADC Cleanup Action Plan* (Stantec, 2024). Analysis of soil samples at the locations of the six proposed groundwater monitoring wells in Year 1 will provide a baseline assessment of current petroleum hydrocarbon concentrations in the inaccessible areas across the Site.

Petroleum hydrocarbon compounds in the subsurface degrade naturally over time through various physical, chemical, and biological processes; however, some portion of petroleum hydrocarbon compounds, particularly those categorized as semi- or non-volatile such as diesel- and oil-range hydrocarbons, will degrade so slowly as to be immeasurable or may never be observed to degrade by natural processes (recalcitrant). The relative abundance of these compounds can be measured by chemical fingerprinting of LNAPL or soil samples. The three historical chemical fingerprinting studies (2006, 2012, and 2014) at the Site identified primarily middle distillate fuel (diesel, or fuel oil #2) with

varying amounts (4-37 percent) of heavy residual range petroleum (lube/waste oil, or heavy fuel oil such as bunker C or fuel oil #6) (NewFields, 2014).

Additionally, the LNAPL in these chemical fingerprinting samples was already being described as moderately to severely biodegraded or weathered at the time of collection between 10 and 18 years ago (NewFields, 2014). Releases of petroleum hydrocarbons at the Site occurred at least 35 years ago and perhaps as many as 100 years ago based on the dates of operation of the bulk petroleum storage, transfer, and distribution facility (WSP, 2023). It is probable that a significant reduction in petroleum hydrocarbon concentrations due to natural attenuation has already occurred in the inaccessible areas and what remains in the subsurface may be recalcitrant.

Historical LNAPL recovery efforts at the Site indicate that the LNAPL was discontinuous and relatively immobile under static conditions, failing to flow freely to the recovery trench or be readily recovered from wells using traditional recovery techniques (WSP, 2023). Artificially induced changes to the groundwater level via dewatering for construction or excavation was shown to mobilize LNAPL from exposed/de-watered soils as observed during the 2011-2012 interim action excavations and the 2012 City of Everett force main project (WSP, 2023). As described in WSP's SC/FFS:

> *The LNAPL is highly weathered and has been generally depleted of the more soluble and mobile hydrocarbon components. Weathering of the releases has increased LNAPL viscosity and further decreased the mobility of the petroleum hydrocarbons remaining at the Site. The fine-grained sediments and organic matter identified beneath the Site (wood waste and peat) also limit migration and recovery of LNAPL, resulting in higher residual saturation concentrations for hydrocarbons in fine-grained soils and high levels of adsorption to organic materials. The limited downgradient extent of groundwater affected by dissolved COCs further demonstrates that migration of LNAPL constituents from the source areas is minimal.*

A variety of natural source zone attenuation technologies exist for the purpose of quantifying degradation of petroleum hydrocarbons in soil such as soil gas composition gradients, carbon dioxide flux, and biogenic heat monitoring. However, these technologies are limited in their usefulness when biodegradation has already acted upon the majority of available, non-recalcitrant petroleum hydrocarbon components. Chemical fingerprinting of soil to calculate the relative abundance of compounds over time can be cost-prohibitive when the volatile components have already been eliminated through natural processes.

Based on the age of the releases, the relative immobility of the LNAPL observed during historical soil and groundwater characterization and remedial activities at the Site, and degree of biodegradation of LNAPL samples in historical chemical fingerprinting studies, long-term monitoring at the Site will consist of periodic direct sampling of groundwater and soil to evaluate progression toward MTCA cleanup standards in the inaccessible areas.

8 Monitored Natural Attenuation Groundwater Sampling

8.1 Purpose

The purpose of MNA sampling of groundwater wells in the inaccessible areas is to evaluate whether geochemical conditions in the subsurface indicate that biodegradation is occurring and evaluate the groundwater quality in the inaccessible areas. This groundwater sampling is independent of the CPOC well groundwater sampling.

8.2 Schedule

The MNA groundwater sampling is proposed for initiation in Year 1 following well installation and continuing for four consecutive quarters to provide baseline conditions across all seasons. Following establishment of baseline conditions and Ecology approval (contingent on the sample results), MNA groundwater sampling will occur on a 5-year basis.

8.3 Evaluation

Geochemical indicators of naturally occurring biodegradation will be analyzed from groundwater samples to evaluate whether conditions favorable to aerobic or anaerobic degradation are present in the subsurface in accordance with Ecology guidance (Ecology, 2005). Common indicators used for evaluation include carbon dioxide, nitrate, manganese, ferrous iron, sulfate, methane, and alkalinity. Changes in the relative concentrations of these geochemical indicators, along with changes in the relative concentrations of petroleum hydrocarbons, will be evaluated to determine whether biodegradation is occurring and to estimate approximate rates of degradation and the length of time for COCs to become sufficiently degraded such that they meet cleanup levels.

Soil leaching COCs to groundwater is a cross-media pathway that concerns all Site soil that is a potential source of COCs to groundwater. Compliance is demonstrated empirically by direct sampling of groundwater. If groundwater is less than the groundwater cleanup levels (MTCA Method A), this pathway will be empirically demonstrated to be in compliance.

8.4 Modification or Discontinuation

Discontinuation of MNA groundwater sampling will be evaluated in each progress report based on attainment of cleanup standards. Individual groundwater monitoring well locations determined to be in compliance with cleanup standards during any groundwater sampling event may be considered for discontinuation in cooperation with Ecology.

9 Monitored Natural Attenuation Soil Sampling

9.1 Purpose

The purpose of MNA soil sampling in the inaccessible areas is to confirm that natural source zone attenuation via naturally-occurring, non-augmented biodegradation has occurred in the inaccessible areas to the extent that COCs in soil are less than cleanup levels.

9.2 Schedule

Soil samples collected during groundwater monitoring well installation will provide baseline conditions of COCs in soil in the inaccessible areas following completion of remedial action excavations. Following establishment of baseline conditions, soil sampling will occur on a 10-year basis via direct-push drilling methods at locations as close to the baseline locations (groundwater monitoring wells) as possible.

9.3 Evaluation

Changes in the relative concentrations of petroleum hydrocarbons will be evaluated to determine whether biodegradation is occurring and to estimate approximate rates of degradation and the length of time for COCs to become sufficiently degraded such that they meet cleanup standards.

The soil POC at the Site for direct contact is any soil between surface and 15 feet bgs. Compliance is determined by direct sampling of soil and comparison of COC concentrations against cleanup levels.

9.4 Discontinuation

Discontinuation of periodic soil sampling will be evaluated in each applicable progress report based on attainment of cleanup standards. Individual soil sample intervals or depths determined to be in compliance with cleanup standards during any soil sampling event may be considered for discontinuation in cooperation with Ecology.

10 Conditional Point of Compliance Confirmation Sampling

10.1 Purpose

The purpose of groundwater confirmation sampling is to demonstrate that cleanup standards are achieved at the Ecology-approved CPOCs for the Site. The groundwater cleanup standard for the Site will be eight consecutive quarterly monitoring events with concentrations less than the MTCA Method A Cleanup Levels at the CPOCs.

The Ecology-approved CPOCs for the Site are wells MW-A4 and MW-A9 (Plate 4).

10.2 Schedule

Groundwater confirmation sampling is proposed for Year 1 and Year 2, extending into Year 3, as needed, at the Ecology-approved CPOCs for the Site, to provide eight consecutive quarterly results with concentrations less than the MTCA Method A Cleanup Levels.

10.3 Discontinuation

After reporting eight consecutive quarterly results with concentrations less than the MTCA Method A Cleanup Levels at the Ecology-approved CPOCs for the Site, groundwater confirmation sampling at the Site will cease and Ecology will acknowledge attainment of cleanup standards for groundwater at the CPOCs.

11 Sampling and Analysis Plan for Proposed Fieldwork

11.1 Soil Borings and Soil Sample Collection

11.1.1 Pre-fieldwork Procedures

Fieldwork will be completed in accordance with Stantec's standard field protocols (Appendix A) and under the supervision of a State of Washington Licensed Geologist.

11.1.1.1 Notifications

The Ecology Project Manager will be notified at least seven days in advance of any sample collection or work activity at the Site, in accordance with the Consent Decree. Property owners will be notified in accordance with applicable access agreements.

11.1.1.2 Start Cards

Prior to conducting field activities, the drilling subcontractor will obtain Washington start cards from Ecology in accordance with WAC 173-160-151 (WAC, 2008). No other permits are anticipated for completion of the groundwater monitoring well installation. Notices of Intent for soil borings that will not be completed as groundwater monitoring wells (i.e., periodic or confirmation soil borings) will be provided to Ecology in accordance with WAC 173-160-420 (WAC, 2008).

11.1.1.3 Utility Clearance

Consultant personnel will visit the site to check for obstructions and mark the proposed soil boring locations. Underground Service Alert will be notified at least 48 hours prior to the onset of field activities. A private utility locating service will be contracted to locate utilities or other subsurface structures at the site. If subsurface utilities or structures are detected during the locate, the locations of the proposed soil borings may be revised based on the information collected in the field.

11.1.2 Soil Sample Collection

Soil samples will be collected for laboratory analysis to provide a baseline for current conditions at various depths, to confirm the baseline conditions during subsequent confirmation soil borings, and for geologic logging purposes. A maximum sample collection interval of every 2.5 feet to a maximum depth of 15 feet bgs is proposed for baseline soil sampling. Subsequent soil sampling events may utilize a less vigorous sample collection interval based on attainment of cleanup standards during baseline soil sampling and in cooperation with Ecology. Boring locations subsequent to the original groundwater monitoring well locations will be placed as close as possible to the original groundwater monitoring wells in order to maximize comparability of sample results.

11.1.2.1 Subsurface Clearance

The proposed soil borings will be cleared using a combination of hand tools and soft digging methods to depths of approximately 5 to 8 feet bgs, or to the bottom of any subsurface structure (whichever is deeper) to avoid damage to subsurface utilities. Soft digging methods may include the use of an air knife or water knife in coordination with vacuum extraction or advancement of a hand auger.

Soil samples collected during air or water knife clearance will be advanced by a hand auger from 18 inches above the desired sample depth to preserve the sample integrity. After retrieving the hand auger from the desired sample depth, the contents of the hand auger will be transferred directly into a zip top bag and sealed. This bag will be taken to the sampling table where field personnel will use the contents to fill the required sample containers.

An aliquot of soil will be transferred directly into a second zip top bag, sealed, and labeled with the location number, sample depth, date, and time; this soil will be set aside for field screening using a photoionization detector (PID) or similar field instrument for evaluation of the presence of volatile organic compounds (VOCs).

11.1.2.2 Drilling

The proposed soil borings will be advanced from their cleared depth to their total depths of 15 feet bgs using direct-push drilling methods.

With the direct-push drilling method, samples will be collected via a dual tube sampling technique to ensure that samples are representative of the intended depth and not subjected to material falling from a shallower depth. Dual tube sampling uses two sets of probe rods to collect continuous soil cores. One set

of rods is driven into the ground as an outer casing. These rods receive the driving force from the hammer and provide a sealed hole from which the smaller set of rods are placed to recover soil samples with reduced threat of cross contamination due to sloughing. Soil samples will be continuously collected from the cleared depth to the total depth via direct-push soil cores in acrylic sleeves inside the inner rod.

Field personnel will use an approved cutting tool with a recessed blade to open the acrylic sleeves one at a time. A soil sample from the desired depth, as estimated along the length of the sleeve, will be collected by hand using a disposable tool into a zip top bag and sealed. This bag will be taken to the sampling table where field personnel will use the contents to fill the required sample containers.

An aliquot of soil will be transferred directly into a second zip top bag, sealed, and labeled with the location number, sample depth, date, and time; this soil will be set aside for field screening.

11.1.2.3 Field Screening

The zip top bag designated for field screening will be placed away from direct sunlight for a period of time that allows volatilization of chemical constituents, after which the tip of a PID or similar device will be inserted through the plastic bag to measure organic vapor concentrations in the headspace. The PID measurement is recorded on the boring log. Instruments such as the PID, equipped with a 10.6 electron volt lamp, are useful for evaluating relative concentrations of volatilized hydrocarbons, but they do not measure the concentration of volatilized hydrocarbons in the soil matrix with the same precision as laboratory analysis. Samples will also be visually inspected for the presence of LNAPL or sheen. Following completion of PID measurements, water will be introduced into the zip top bag in sufficient quantity to submerge the soil sample. The soil will be broken apart and allowed to rest for a period of 10 minutes. After 10 minutes, the sample will be examined for sheen or presence of LNAPL. Results of the sheen test will be recorded on the boring log.

11.1.2.4 QA/QC Samples

The following quality assurance/quality control (QA/QC) samples will be collected during soil sampling activities:

- One equipment blank per day per type of sampling equipment.
- One field duplicate per 20 field samples.
- One sample collected for the purpose of matrix spike/matrix spike duplicate (MS/MSD) at the laboratory per 20 field samples.
- One trip blank will accompany all samples selected for VOC analysis.

11.1.2.5 Sample Collection, Preservation, and Handling

At the sample table, field personnel will prepare the required laboratory-supplied sample containers by inspecting them for the correct preservative, completing the labels, securing them in an upright position, and removing the caps. A single use, disposable Terra Core (or similar) sample plunger will be used to

transfer a 5-gram portion of sample soil from the zip top bag to each volatile organic analysis (VOA) sample container. The transfer will be repeated using the same plunger until all sample containers are filled as required for a given sample. A disposable tool (spoon or similar) will be used to fill 4-ounce jars for non-VOC analyses. After transfer is completed for a given sample, the plunger and disposable tool will be disposed.

A summary of sample containers, preservatives, and hold times is provided in Table 2 and in the Quality Assurance Project Plan (QAPP; Appendix B).

Field personnel will initiate chain-of-custody procedures in accordance with the QAPP. Samples will be promptly transported in iced storage in a thermally-insulated cooler, accompanied by the chain-of-custody, to the analytical laboratory. An example chain-of-custody is provided in Appendix C.

11.1.3 Lithologic Logging

A trained geologist, under the supervision of a State of Washington Licensed Geologist, will generate a lithologic log at each soil boring location. At a minimum, the geologist will describe the grain size, color, moisture, and estimated percentages of clay, silt, sand, and gravel in each soil sample examined. Additional characteristics that may be included in the lithologic description are angularity, grading, stratification, plasticity, and cementation. The geologist will note the depths and thicknesses of distinct soil layers and the depth at which groundwater is encountered. Soil layers will be named in general accordance with the Unified Soil Classification System (USCS).

The geologist will examine the soil contained within the zip top bag set aside for field screening (after field screening has been completed) for samples collected between surface and 8 feet bgs. The geologist will examine the full subsurface sample between 8 feet bgs and total depth retrieved by the direct-push core barrel.

The finished boring log will also include backfill materials used in borings and well construction materials (annular backfill, casing, surface vault) used to construct groundwater monitoring wells, if applicable. An example boring log is included in Appendix C.

11.2 Groundwater Monitoring Well Construction

11.2.1 Drilling

Following completion of direct-push borings for the collection of soil samples, borings for the construction of groundwater monitoring wells will either be advanced in the same location or immediately adjacent to the backfilled direct-push boring. Borings for the construction of groundwater monitoring wells will be advanced to 15 feet bgs using an 8-inch diameter hollow-stem auger drill rig to allow for construction of a standard 2-inch diameter well.

11.2.2 Construction Materials

Groundwater monitoring wells will be constructed with 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) casing. Slotted casing will be installed across the desired groundwater sampling depth; blank casing will be extended from the top of the slotted interval to approximately 0.25 foot below surface grade. Factory-sealed PVC casing will be used to reduce the probability of cross contamination and all casing joints will be flush threaded. The annulus of the well will be backfilled with an appropriately sized silica sand filter pack from the total depth of the slotted casing to approximately 2 feet above the top of the slotted casing. A bentonite seal will be placed on top of the sand filter pack. Grout may be placed on top of the bentonite seal to within 6 inches of surface grade. Materials in the annulus will be installed using a tremie pipe to avoid bridging conditions. Surface completion will consist of a traffic-rated flush mount well vault. A concrete well pad will be installed around the flush-mount well vault. A locking cap for the well casing will be installed to protect against surface water infiltration and unauthorized entry. No glues, chemical cements, or solvents will be used in well construction. A well identification tag with a unique identification number, supplied by Ecology, will be installed at the top of the well casing. All well installations will be completed in accordance with WAC Chapter 173-160 (WAC, 2008).

11.2.3 Screened Intervals

Groundwater is expected to be encountered between approximately the surface and 12 feet bgs and wells will be screened from approximately 5 to 15 feet bgs. The screened intervals may be modified depending on soil and groundwater conditions observed during drilling activities. Based on historical groundwater monitoring wells at the Site and expected lithologic conditions, a screened casing with 0.010-inch slots is proposed for installation.

11.2.4 Development

Development of a groundwater monitoring well can take place either before the seal is placed, or after the grout has been allowed to cure a minimum of 48 hours. Field personnel or a contracted driller will use a surge block and submersible pump to develop the newly-installed well. The well will be developed until turbidity is stabilized (±10 percent on three successive readings), turbidity is measured to be 10 nephelometric turbidity units (NTU) or less, or 10 casing volumes have been removed. The volume of groundwater extracted will be recorded on a log (example provided in Appendix C). Groundwater sampling will not commence until a minimum of 72 hours after development is completed.

11.2.5 Survey

The horizontal coordinates of newly-installed groundwater monitoring wells at the Site will be surveyed by a licensed land surveyor relative to a known datum, identified in their report. The survey subcontractor will provide the northing, easting, latitude, and longitude of all surveyed locations.

The ground surface elevation of newly-installed groundwater monitoring wells will be surveyed by a licensed land surveyor relative to a known datum, identified in their report. The survey contractor will provide the elevation of all surveyed locations relative to mean sea level to an accuracy of at least ± 0.01

foot. The groundwater monitoring well casings will be notched or marked on one side to identify a consistent surveying and measuring point.

11.3 Monitored Natural Attenuation Groundwater Sampling

11.3.1 Depth to Water and LNAPL Thickness Measurements

The static water level (depth to water [DTW]) will be measured with an interface probe to the nearest 0.01 foot. If LNAPL is present, the depth to LNAPL will be measured with an interface probe to the nearest 0.01 foot and the LNAPL thickness will be calculated. Measurements will be taken from the notched or marked location on the well casing. DTW measurements will be collected prior to purging and/or groundwater sample collection. DTW measurements will be used with surveyed top of well casing elevation data to determine groundwater elevations relative to mean sea level. The DTW and LNAPL thickness measurements will be recorded on the appropriate field form (example provided in Appendix C).

Groundwater samples will not be collected from groundwater monitoring wells containing measurable LNAPL. If measurable LNAPL is observed, Ecology will be notified in accordance with the Consent Decree.

11.3.2 Groundwater Sample Collection

11.3.2.1 Purging

Before groundwater samples are collected from the groundwater monitoring wells, the wells will be purged using a non-dedicated peristaltic pump at rates not exceeding 1 liter per minute (L/min) until stabilization of groundwater quality parameters is obtained. The pump tubing will be lowered into the water column to approximately the midpoint of the wetted screen.

Readings of the groundwater quality parameters will be recorded every three minutes while the water is purged to determine stabilization. DTW readings will be collected every three minutes to ensure drawdown in the well is less than 0.33 foot from the initial DTW measurement. If drawdown exceeds 0.33 foot, the pumping rate will be reduced.

The following groundwater quality parameters will be monitored for these stabilization criteria:

- Dissolved oxygen (DO) has a change of less than 10 percent for values greater than 0.5 milligram per liter (mg/L); if three DO values are less than 0.5 mg/L, the values are considered stabilized.
- Conductivity has a change of less than 3 percent.
- Temperature has a change of less than 3 percent.
- pH has a change of less than 0.1 unit.
- Oxidation reduction potential (ORP) has a change of less than 10 millivolts.

Purging will continue until three consecutive readings meet the stabilization criteria or three well casing volumes have been purged from the groundwater monitoring well. The groundwater quality parameters will be recorded on the appropriate field form (example provided in Appendix C).

11.3.2.2 Sample Collection, Preservation, and Handling

Once groundwater quality parameters have reached stabilization, the tubing is directed away from the water quality meter to the sample containers. Groundwater samples for volatile COCs will be collected in laboratory-supplied 40-milliliter glass vials preserved with hydrochloric acid. The vials will be filled to produce a positive meniscus. After filling, each vial will be sealed with a cap containing a Teflon septum, and subsequently examined for air bubbles to avoid headspace that would allow volatilization to occur. Additional samples for other contaminants of concern will be collected in the appropriate laboratory-supplied sample containers. A summary of sample containers, preservatives, and hold times is provided in Table 2 and in the QAPP (Appendix B). The samples will be promptly transported in iced storage in a thermally-insulated cooler, accompanied by chain-of-custody documentation, to the analytical laboratory.

11.3.2.3 QA/QC Samples

The following QA/QC samples will be collected during groundwater sampling activities:

- One equipment blank per day per type of sampling equipment.
- One field duplicate per 20 field samples.
- One sample collected for the purpose of MS/MSD at the laboratory per 20 field samples.
- One trip blank will accompany all samples selected for VOC analysis.

11.4 Decontamination Procedures

Field personnel will decontaminate non-dedicated soil or groundwater sampling equipment between each sample location with a non-phosphate solution (such as Liquinox), followed by a minimum of two tap water rinses. Distilled water may be used for the final rinse. Downhole drilling equipment is steam-cleaned prior to drilling the borehole and at completion of the borehole.

Between sample intervals when soil sampling, the soil sampling table is cleaned by spraying it with a non-phosphate solution and wiping with disposable paper towels.

Prior to well development, the submersible pump is decontaminated by allowing it to run and recirculate while immersed in a non-phosphate solution followed by successive immersions in potable water and distilled water baths.

Before starting groundwater monitoring and sampling activities, and between each well, the DTW probe and multi-parameter probe are decontaminated by rinsing twice with a non-phosphate solution. The probes are then rinsed with tap water followed by a rinse with distilled water. The sample table/workstation, exterior of pump housing, and scissors (used for cutting disposable tubing) are cleaned with commercially-available disinfectant wipes before starting groundwater sampling activities and between each well.

Decontamination procedures are included in the QAPP (Appendix B).

11.5 Equipment Calibration

Field equipment will be calibrated in accordance with manufacturer's specifications and noted on a calibration log (example provided in Appendix C). Field equipment calibration procedures are included in the QAPP (Appendix B).

12 Laboratory Analyses

12.1 Soil Samples

Soil samples collected from soil borings will be analyzed for the following constituents:

- TPHg by Northwest TPH (NWTPH) for Gasoline Range Organics (NWTPH-Gx).
- TPHd and TPHo by NWTPH for Diesel/Oil Range Organics (NWTPH-Dx).
- VOCs, including benzene, toluene, ethylbenzene, and total xylenes (BTEX), by United States Environmental Protection Agency (EPA) Method 8260.
- cPAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) and 1-methylnaphthalene by EPA Method 8270 with Select Ion Monitoring (SIM).

12.2 Groundwater Samples

Groundwater samples collected for MNA sampling and confirmation sampling purposes will be analyzed for the following constituents:

- TPHg by NWTPH-Gx.
- TPHd and TPHo by NWTPH-Dx.
- BTEX by EPA Method 8260.
- cPAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) and 1-methylnaphthalene by EPA Method 8270SIM.

Groundwater samples collected for MNA sampling purposes will also be analyzed for the following constituents:

- Total and dissolved iron and manganese by EPA Method 6010B.
- Ferrous iron by Standard Method 3500-FeB.

- Nitrate and sulfate by EPA Method 300.0.
- Alkalinity by EPA Method 2320B.
- Carbon dioxide by Standard Method 4500-CO2D.
- Methane by RSK Standard Operating Procedure (SOP) 175.

13 Waste Management

Soil cuttings generated from drilling or sampling will be temporarily stored on Site in labeled United States Department of Transportation (USDOT)-approved 55-gallon drums or other appropriate storage container. Decontamination fluids and purge water from well development and groundwater sampling activities will be temporarily stored on Site in labeled USDOT-approved 55-gallon drums.

The soil, decontamination fluids, and purge water will be characterized under existing profiles for the Site and transported under manifest to a client- and regulatory-approved facility for recycling, treatment, or disposal.

14 Progress Reports

In accordance with the Consent Decree and unless otherwise specified in writing by Ecology, progress reports will be sent by electronic mail to Ecology's Project Coordinator. For each year where work occurs at the Site, the progress report will be due on the 10th of January in the following year. For example, the progress report summarizing work completed during Year 5 will be due on January 10th of Year 6.

Progress reports shall include the following:

- A list of on-Site activities that have taken place during the designated period.
- Description of any sample results that deviate from the norm.
- Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests.
- Descriptions of all deviations from the scope of work and any planned deviations in the upcoming designated period.
- For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule.
- All raw data (including laboratory analyses) received during the previous designated period (if not previously submitted to Ecology), together with a detailed description of the underlying samples collected.
- A list of planned activities for the upcoming designated period.

For the purposes of this compliance monitoring plan, a 50-year schedule has been established and is included in the following table.

Progress Report Content

Time Period	MNA Groundwater Sampling	CPOCs Confirmation Sampling	Environmental Covenant Inspection	MNA Soil Sampling
Year 1	X (quarterly following well installation)	X (quarterly following well installation)	X	X
Year 2		X (quarterly)		
Year 5	X		X	
Year 10	X		X	X
Year 15	X		X	
Year 20	X		X	X
Year 25	X		X	
Year 30	X		X	X
Year 35	X		X	
Year 40	X		X	X
Year 45	X		X	
Year 50	X		X	X

If cleanup standards are met between Years 1 and 50, the PLPs will work with Ecology to cancel the remaining work outlined on this schedule and move the Site to closure activities, including dismissal of the Consent Decree. If cleanup standards are not met by year 50, PLPs will work with Ecology to extend the compliance monitoring schedule based on an evaluation of conditions observed in year 50.

15 References

Google Earth Pro (Google). September 1, 2022. 2717 Federal Avenue, Everett, Washington. 47°58’53.90” N, 122°12’59.83” W. Version 7.3.6.9796. Accessed September 25, 2024.

NewFields. March 7, 2014. *Chemical Fingerprinting of NAPL Samples from and near the Former Mobil Oil Terminal/ADC Property, Everett, Washington*.

Snohomish County Assessor (Snohomish County). 2023. Snohomish County Online Property Information Interactive Map. https://www.snohomishcountywa.gov/5414/Interactive-Map-SCOPI. Accessed March 27, 2023.

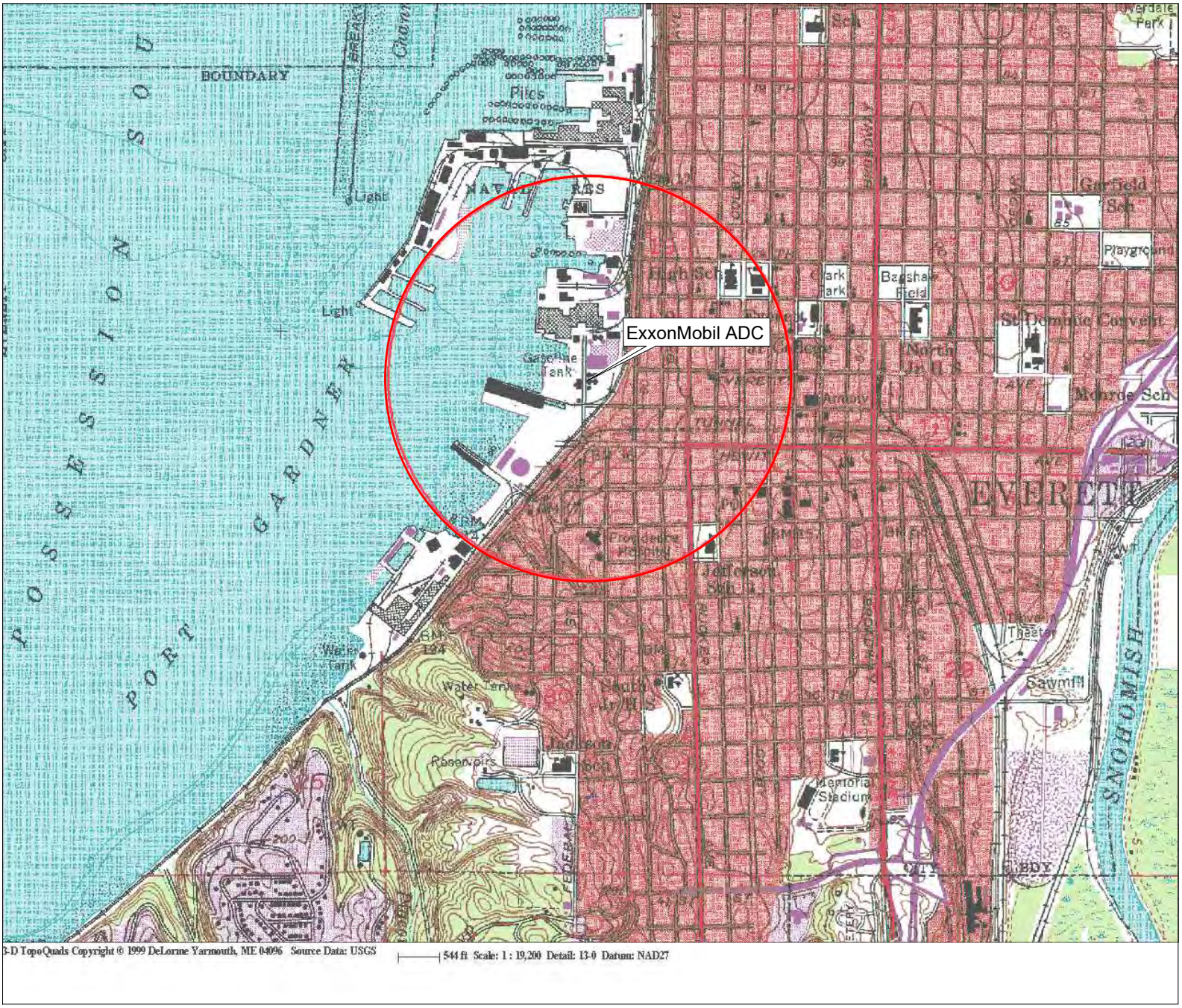
Washington Administrative Code (WAC). December 19, 2008. Chapter 173-160 Minimum Standards for Construction and Maintenance of Wells. URL: https://app.leg.wa.gov/wac/default.aspx?cite=173-160.

Washington Administrative Code (WAC). August 23, 2023. Chapter 173-340 Model Toxics Control Act – Cleanup. https://apps.leg.wa.gov/wac/default.aspx?cite=173-340.

Washington Department of Ecology (Ecology). July 2005. *Guidance on Remediation of Petroleum-Contaminated Ground Water by Natural Attenuation, Publication No. 05-09-091 (Version 1.0)*.

Washington Department of Ecology (Ecology). October 2023. *ExxonMobil ADC Revised Draft Cleanup Action Plan, ExxonMobil ADC, 2717/2731 Federal Avenue, Everett, Washington, Ecology Facility Site ID 2728.*

WSP USA Environment & Infrastructure Inc. (WSP). May 12, 2023. *Site Characterization/Focused Feasibility Study Report, ExxonMobil/ADC Property, Ecology Site ID 2728, Everett, Washington.*



FN 2037237860001

EXPLANATION

1/2-mile radius circle

N

APPROXIMATE SCALE

0 0.5 1 mile

Stantec

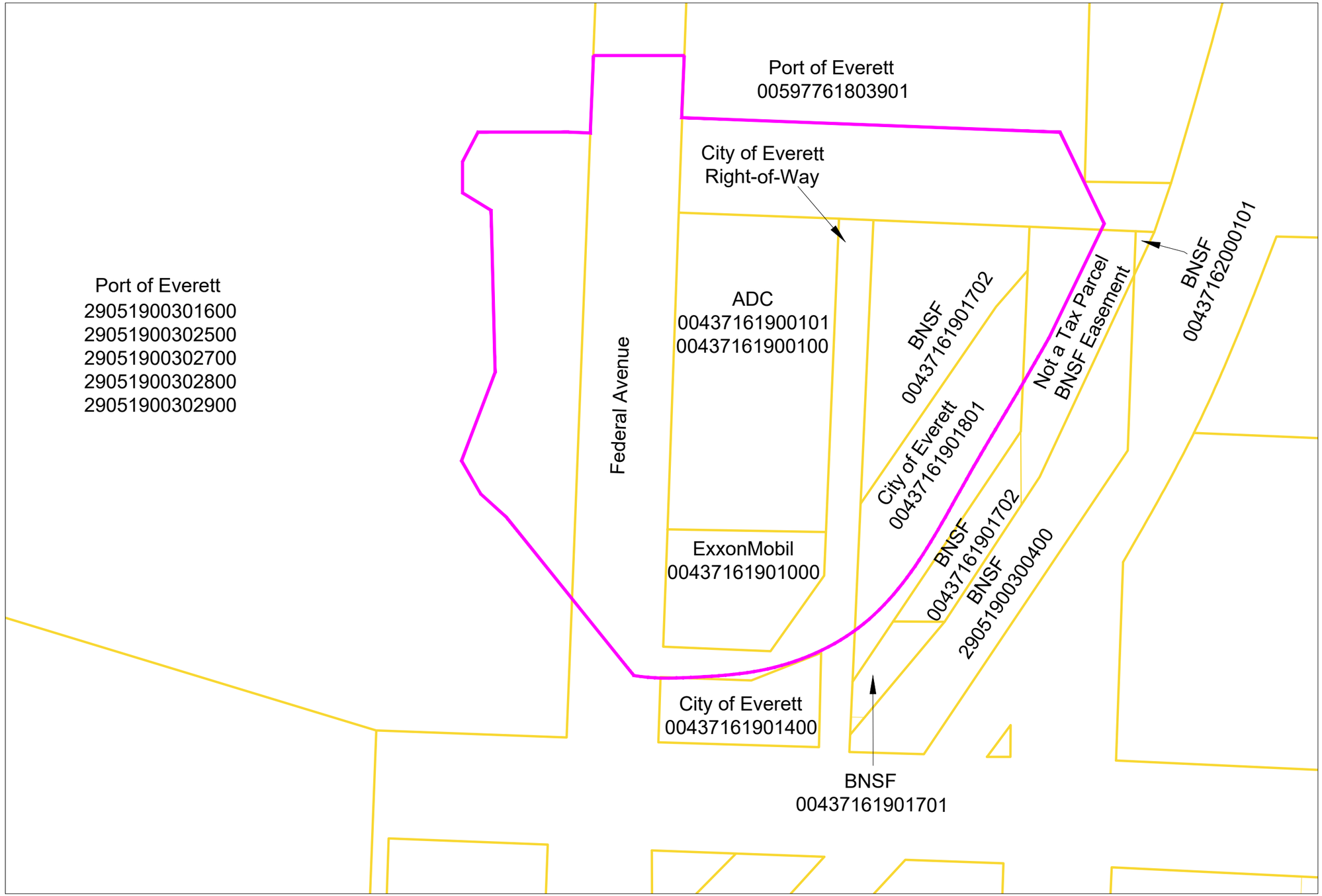
SITE LOCATION MAP

EXXONMOBIL ADC
2717/2731 Federal Avenue
Everett, Washington

PROJECT NO.
203723786

PLATE
1

LEC: 09/16/24



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EXPLANATION

MTCA Site Boundary

Tax Parcel Boundary

SOURCE: Modified from maps provided by the Snohomish County Assessor

APPROXIMATE SCALE

0 75 150 Feet

FN 2037237860002

Stantec

SITE BOUNDARY MAP

EXXONMOBIL ADC
2717/2731 Federal Avenue
Everett, Washington

PROJECT NO.
203723786

PLATE
2

LEC: 09/16/24

FN 2037237860002

N

EXPLANATION

- MTCA Site Boundary
- Tax Parcel Boundary
- Excavated Areas
- Inaccessible Areas

SOURCE: Modified from maps provided by the Snohomish County Assessor

APPROXIMATE SCALE

0 75 150 Feet

Stantec

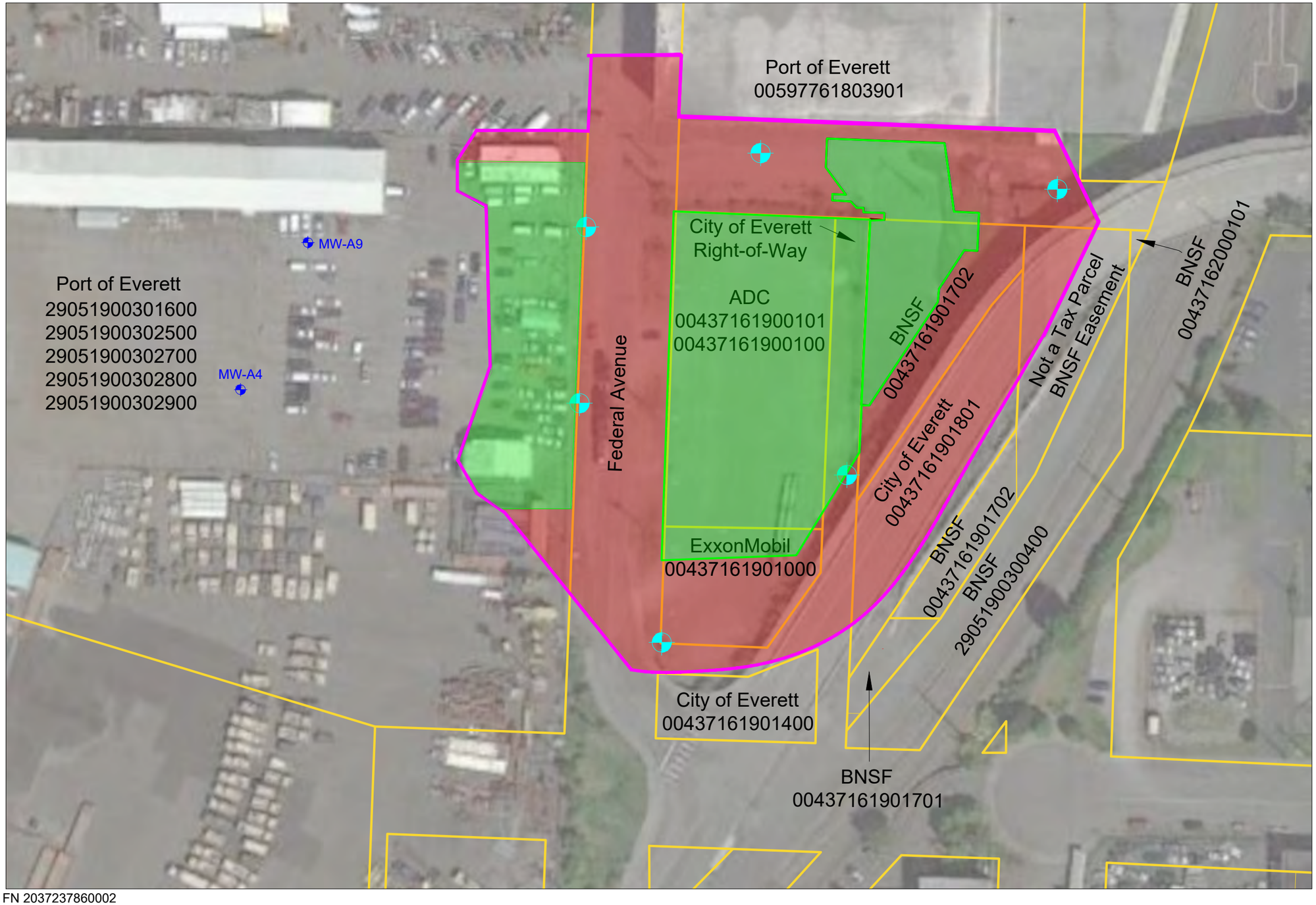
INACCESSIBLE AREAS MAP

EXXONMOBIL ADC
2717/2731 Federal Avenue
Everett, Washington

PROJECT NO.
203723786

PLATE
3

LEC: 09/16/24



FN 2037237860002

N

EXPLANATION

- MW-A9 — Conditional Point of Compliance Groundwater Monitoring Well
- Proposed Groundwater Groundwater Monitoring Well
- MTCA Site Boundary
- Tax Parcel Boundary
- Excavated Areas
- Inaccessible Areas

SOURCE: Modified from maps provided by the Snohomish County Assessor

APPROXIMATE SCALE

0 75 150 Feet

Stantec

PROPOSED GROUNDWATER MONITORING WELL LOCATION MAP

EXXONMOBIL ADC
2717/2731 Federal Avenue
Everett, Washington

PROJECT NO.
203723786

PLATE
4

RRT: 12/05/24

TABLE 1
COMPLIANCE MONITORING PLAN 50-YEAR SCHEDULE
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Progress Report Content				
Time Period	**Monitored Natural Attenuation Groundwater Sampling**	**Conditional Point of Compliance Confirmation Sampling**	**Environmental Covenant Inspection**	**Monitored Natural Attenuation Soil Sampling**
Year 1	X (quarterly following well installation)	X (quarterly following well installation)	X	X
Year 2		X (quarterly)		
Year 5	X		X	
Year 10	X		X	X
Year 15	X		X	
Year 20	X		X	X
Year 25	X		X	
Year 30	X		X	X
Year 35	X		X	
Year 40	X		X	X
Year 45	X		X	
Year 50	X		X	X

TABLE 2
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Matrix	Analysis	Analytical Method	Container	Preservation	Holding Time
Soil	TPHg	NWTPH-Gx	(1) 4 oz glass jar; (2) 40 mL glass VOA vial w/MeOH; (1) Field Preservation Kit	MeOH Cool to 4°C	14 days
	TPHd, TPHo	NWTPH-Dx	(1) 4 oz glass jar	Cool to 4°C	14 days for extraction; 40 days for analysis
	VOCs	EPA 8260	(1) 4 oz glass jar; (2) 40 mL glass VOA vial w/MeOH; (1) Field Preservation Kit	MeOH Cool to 4°C	14 days
	cPAHs	EPA 8270 SIM	(1) 4 oz glass jar	Cool to 4°C	14 days for extraction; 40 days for analysis
	Metals (waste soil only)	EPA 6020/7471A	(1) 4 oz glass jar	Cool to 4°C	180 days
Groundwater	TPHg	NWTPH-Gx	(3) 40 mL glass VOA vial w/HCl	HCl Cool to 4°C	14 days
	TPHd, TPHo	NWTPH-Dx	(1) 250 mL amber glass	Cool to 4°C	14 days for extraction; 40 days for analysis
	VOCs	EPA 8260	(3) 40 mL glass VOA vial w/HCl	HCl Cool to 4°C	14 days
	cPAHs	EPA 8270 SIM	(1) 1 L amber glass	Cool to 4°C	7 days for extraction; 40 days for analysis
	Total and dissolved iron and manganese	EPA 6010B	(1) 250 mL poly w/HNO_3; field-filtered	HNO_3 Cool to 4°C	15 minutes for filtration; 180 days for analysis
	Nitrate and Sulfate	EPA 300	(1) 250 mL poly	Cool to 4°C	48 hours
	Alkalinity	EPA 2320B	(1) 250 mL poly	Cool to 4°C	14 days
	Methane	RSK-175	(3) 40 mL VOA vial w/HCl	HCl Cool to 4°C	14 days
	Carbon dioxide	SM 4500-CO2_D	(1) 250 mL amber glass	Cool to 4°C	15 minutes (field test)

TABLE 2
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Notes:

The Field Preservation Kit for soil consists of (2) x 40-mL VOA vials preserved with MeOH and 5 grams of sample volume.

°C	=	Degrees Celsius
EPA	=	United States Environmental Protection Agency
HCl	=	Hydrochloric acid
MeOH	=	Methanol
mL	=	Milliliter
NWTPH-Dx	=	Northwest Total Petroleum Hydrocarbons for Diesel/Oil Range Organics
NWTPH-Gx	=	Northwest Total Petroleum Hydrocarbons for Gasoline Range Organics
oz	=	Ounce
cPAHs	=	Carcinogenic polycyclic aromatic hydrocarbons
SIM	=	Selective ion monitoring
TPH	=	Total petroleum hydrocarbons
TPHd	=	Total petroleum hydrocarbons as diesel
TPHg	=	Total petroleum hydrocarbons as gasoline
TPHo	=	Total petroleum hydrocarbons as oil
VOA	=	Volatile organic analysis
VOCs	=	Volatile organic compounds
w/	=	With

Appendix A

Field Protocols

Soil Boring and Well Installation Field Protocol

Preliminary Activities

Prior to the onset of field activities at the site, Stantec obtains the appropriate permit(s) from the governing agency(s). Advance notification is made as required by the agency(s) prior to the start of work. Stantec marks the borehole locations and contacts the local one call utility locating service at least 48 hours prior to the start of work to mark buried utilities. Borehole locations may also be checked for buried utilities by a private geophysical surveyor. Prior to drilling, the borehole location is cleared in accordance with the client's procedures. Fieldwork is conducted under the advisement of a registered professional geologist and in accordance with an updated site-specific safety plan prepared for the project, which is available at the job site during field activities.

Drilling and Soil Sampling Procedures

Stantec contracts a licensed driller to advance the boring and collect soil samples. The specific drilling method (e.g., hollow-stem auger, direct push method, or sonic drilling), sampling method [e.g., core barrel or California-modified split spoon sampler (CMSSS)] and sampling depths are documented on the boring log and may be specified in a work plan. Soil samples are typically collected at the capillary fringe and at 5-foot intervals to the total depth of the boring. To determine the depth of the capillary fringe prior to drilling, the static groundwater level is measured with a water level indicator in the closest monitoring well to the boring location, if available.

The borehole is advanced to just above the desired sampling depth. For CMSSSs, the sampler is placed inside the auger and driven to a depth of 18 inches past the bit of the auger. The sampler is driven into the soil with a standard 140-pound hammer repeatedly dropped from a height of 30 inches onto the sampler. The number of blows required to drive the sampler each 6-inch increment is recorded on the boring log. For core samplers (e.g., direct push), the core is driven 18 inches using the rig apparatus.

Soil samples are preserved in the metal or plastic sleeve used with the CMSSS or core sampler, in glass jars or other manner required by the local regulatory agency (e.g., Environmental Protection Agency Method 5035). Sleeves are removed from the sample barrel, and the lowermost sample sleeve is immediately sealed with Teflon™ tape, capped and labeled. Samples are placed in a cooler chilled to 4º Celsius and transported to a state-certified laboratory. The samples are transferred under chain-of-custody (COC) protocol.

Field Screening Procedures

Stantec places the soil from the middle of the sampling interval into a plastic re-sealable bag. The bag is placed away from direct sunlight for approximately 20 minutes, after which the tip of a photo-ionization detector (PID) or similar device is inserted through the plastic bag to measure organic vapor concentrations in the headspace. The PID measurement is recorded on the boring log. At a minimum, the PID or other device is calibrated on a daily basis in accordance with manufacturer's specifications using a hexane or isobutylene standard. The calibration gas and concentration are recorded on a calibration log. Instruments such as the PID are useful for evaluating relative concentrations of volatilized hydrocarbons, but they do not measure the concentration of petroleum hydrocarbons in the soil matrix with the same precision as laboratory analysis. Stantec trained personnel describe the soil in the bag according to the Unified Soil Classification System and record the description on the boring log, which is included in the final report.

Air Monitoring Procedures

Stantec performs a field evaluation for volatile hydrocarbon concentrations in the breathing zone using a calibrated photo-ionization detector or lower explosive level meter.

Groundwater Sampling

A groundwater sample, if desired, is collected from the boring by using Hydropunch™ sampling technology or installing a well in the borehole. In the case of using Hydropunch™ technology, after collecting the capillary fringe soil sample, the boring is advanced to the top of the soil/groundwater interface and a sampling probe is pushed to approximately 2 feet below the top of the static water level. The probe is opened by partially withdrawing it and thereby exposing the screen. A new or decontaminated bailer is used to collect a water sample from the probe. The water sample is then emptied into laboratory-supplied containers constructed of the correct material and with the correct volume and preservative to comply with the proposed laboratory test. The container is slowly filled with the retrieved water sample until no headspace remains and then promptly sealed with a Teflon-lined cap, checked for the presence of bubbles, labeled, entered onto a COC record and placed in chilled storage at 4° Celsius. Laboratory-supplied trip blanks accompany the water samples as a quality assurance/quality control procedure. Equipment blanks may be collected as required. The samples are kept in chilled storage and transported under COC protocol to a client-approved, state-certified laboratory for analysis.

Backfilling of Soil Boring

If a well is not installed, the boring is backfilled from total depth to approximately 5 feet below ground surface (bgs) with either neat cement or bentonite grout using a tremie pipe and either the boring is backfilled from 5 feet bgs to approximately 1 foot bgs with hydrated bentonite chips or backfill is continued to just below grade with neat cement grout. The borehole is completed to surface grade with material that best matches existing surface conditions and meets local agency requirements. Site-specific backfilling details are shown on the respective boring log.

Well Construction

A well (if constructed) is completed using materials documented on the boring log or specified in a work plan. The well is constructed with slotted casing across the desired groundwater sampling depth(s) and completed with blank casing to within 6 inches of surface grade. No further construction is conducted on temporary wells. For permanent wells, the annular space of the well is backfilled with Monterey sand from the total depth to approximately 2 feet above the top of the screened casing. A hydrated granular bentonite seal is placed on top of the sand filter pack. Grout may be placed on top of the bentonite seal to the desired depth using a tremie pipe. The well may be completed to surface grade with a 1-foot thick concrete pad. A traffic-rated well vault and locking cap for the well casing may be installed to protect against surface-water infiltration and unauthorized entry. Site-specific well construction details including type of well, well depth, casing diameter, slot size, length of screen interval and sand size are documented on the boring log or specified in the work plan.

Well Development and Sampling

If a permanent groundwater monitoring well is installed, the grout is allowed to cure a minimum of 48 hours before development. Stantec personnel or a contracted driller use a submersible pump or surge block to develop the newly installed well. Prior to development, the pump is decontaminated by allowing it to run and re-circulate while immersed in a non-phosphate solution followed by successive immersions in potable water and de-ionized water baths. The well is developed until sufficient well casing volumes are removed so that turbidity is within allowable limits and pH, conductivity and temperature levels stabilize in the purge water. The volume of groundwater extracted is recorded on a log.

Following development, groundwater within the well is allowed to recharge until at least 80% of the drawdown is recovered. A new or decontaminated bailer is slowly lowered past the air/water interface in the well, and a water sample is collected and checked for the presence of non-aqueous phase liquid, sheen, or emulsions. The water sample is then emptied into laboratory-supplied containers as discussed above.

Surveying

If required, wells are surveyed by a licensed land surveyor relative to an established benchmark of known elevation above mean sea level to an accuracy of +/- 0.01 foot. The casing is notched or marked on one side to identify a consistent surveying and measuring point.

Decontamination Procedures

Stantec or the contracted driller decontaminates soil and water sampling equipment between each sampling event with a non-phosphate solution, followed by a minimum of two tap water rinses. De-ionized water may be used for the final rinse. Downhole drilling equipment is steam-cleaned prior to drilling the borehole and at completion of the borehole.

Waste Treatment and Soil Disposal

Soil cuttings generated from the drilling or sampling are stored on site in labeled, Department of Transportation-approved, 55-gallon drums or other appropriate storage container. The soil is removed from the site and transported under manifest to a client- and regulatory-approved facility for recycling or disposal. Decontamination fluids and purge water from well development and sampling activities, if conducted, are stored on site in labeled, regulatory-approved storage containers. Fluids are subsequently transported under manifest to a client- and regulatory-approved facility for disposal or treated with a permitted mobile or fixed-base carbon treatment system.

Low-Flow Sampling Field Protocol

The static water level and non-aqueous phase liquid (NAPL) level, if present, in each groundwater monitoring well that contains water and/or NAPL are measured with an interface probe to the nearest 0.01 foot. To calculate groundwater elevations and evaluate groundwater gradient, depth to water (DTW) levels are subtracted from wellhead elevations.

Before water samples are collected from the groundwater monitoring wells, the wells are purged using a peristaltic or a submersible pump at rates not exceeding 1 liter per minute (L/min) until stabilization of the following groundwater quality parameters are obtained: dissolved oxygen (DO), specific conductance (conductivity), temperature, pH, and oxidation/reduction potential (ORP). Readings of these parameters are recorded every three minutes while the water is purged, and DTW readings are collected every three minutes to ensure drawdown in the well is less than 0.33 feet from the initial reading. If drawdown occurs too quickly, the pumping rate will be reduced.

Purging will continue until three consecutive readings meet the following stabilization criteria:

- DO has a change of less than ±10% for values greater than 0.5 milligram per liter (mg/L), if three DO values are less than 0.5 mg/L, the values are considered stabilized
- Conductivity has a change of less than 3%
- Temperature has a change of less than 3%
- pH has a change of less than ±0.1 unit
- ORP has a change of less than ±10 millivolts

Purging will continue until these stabilization criteria have been met, or three well casing volumes have been purged from the groundwater monitoring well. The groundwater quality parameters will be recorded on the appropriate field log form.

Once groundwater conditions have stabilized, groundwater samples for volatile contaminants of concern are collected in 40-milliliter glass vials, which are filled to produce a positive meniscus. Each vial is preserved with hydrochloric acid, sealed with a cap containing a Teflon® septum, and subsequently examined for air bubbles to avoid headspace, which would allow volatilization to occur. Additional samples for other contaminants of concern will be collected in the appropriate laboratory-supplied sampling containers. The samples are promptly transported in iced storage in a thermally insulated cooler, accompanied by chain-of-custody documentation, to a state-certified laboratory.

Appendix B

Quality Assurance Project Plan

Stantec Consulting Services Inc.
1687 114th Avenue Southeast, Suite 100
Bellevue WA 98004

January 15, 2025

Project 203723786.QAPP24

Mr. Jason Cook
Washington State Department of Ecology
Toxic Cleanup Program
P.O. Box 47600
Olympia, Washington 98504-7600

Jason Cook,

Reference: Quality Assurance Project Plan, ExxonMobil ADC, 2717/2731 Federal Avenue, Everett, Washington, Ecology Facility Site ID 2728

At the request of ExxonMobil Environmental and Property Solutions, on behalf of ExxonMobil Oil Corporation (ExxonMobil) and American Distributing Company (ADC), Stantec Consulting Services Inc. (Stantec) conducts environmental activities at the ExxonMobil ADC site (Site). Stantec prepared the enclosed *Quality Assurance Project Plan* (QAPP), dated January 15, 2025, at the request of the Washington State Department of Ecology (Ecology). The purpose of the QAPP is provide the guidance to be followed for collection and chemical analysis of soil, groundwater, and QA/QC samples so that the data are of sufficient quality to support the project data objectives and the data end uses at the Site.

Site Identification

Consent Decree No. 24-2-01561-31
Facility Site ID No. 2728
Cleanup Site ID No. 5182

Site Location

2717 and 2731 Federal Avenue
Everett, Washington 98201
Port Gardner / Possession Sound

Ecology Contacts

Washington State Department of Ecology
Toxic Cleanup Program – Headquarters
P.O. Box 47600
Olympia, Washington 98504-7600

Mr. Jason Cook
Site Manager
Phone: (260) 407-6834
Email: jason.cook@ecy.wa.gov

Please contact me using the contact information listed below.

Regards,

Stantec Consulting Services Inc.

Ryan Pozzuto
Project Manager
Phone: (206) 575-1527
ryan.pozzuto@stantec.com

Enclosure: Stantec's *Quality Assurance Project Plan*, dated January 15, 2025

c. Mr. Erik Gerking, Port of Everett
Mr. Steve Miller, American Distributing Company
Ms. Sandra Caldwell, Washington State Department of Ecology
Mr. Jeff Johnson, ExxonMobil Environmental and Property Solutions Company

Quality Assurance Project Plan

ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

January 15, 2025

Prepared for:
ExxonMobil Environmental and Property Solutions Company and American Distributing Company

Prepared by:
Stantec Consulting Services Inc.

Project Number:
203723786.QAPP24

The conclusions in the Report titled Quality Assurance Project Plan are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from ExxonMobil Environmental and Property Solutions Company and American Distributing Company (the "Clients") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Clients in accordance with Stantec's contract with the Clients. While the Report may be provided by the Clients to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Signature

Paul Prevou, Earth Scientist
Printed Name

Signature

Keri L. Chappell, L.G. 2719
Printed Name

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Acronyms / Abbreviations

ADC	American Distributing Company
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-custody
cPAHs	Carcinogenic polycyclic aromatic hydrocarbons
CPR	Cardiopulmonary resuscitation
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
EPA	United States Environmental Protection Agency
Eurofins	Eurofins Calscience LLC
ExxonMobil	ExxonMobil Oil Corporation
HASP	Site-Specific Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
MDL	Method detection limit
MS	Matrix spike
MSD	Matrix spike duplicate
MTCA	Model Toxics Control Act
NELAP	National Environmental Laboratory Accreditation Program
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons for Diesel/Oil Range Organics
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons for Gasoline Range Organics
OSHA	Occupational Safety and Health Administration
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PDF	Portable Document Format
PLP	Potentially liable person
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QA/QC	Quality assurance/quality control
RL	Reporting limit
RPD	Relative percent difference
SIM	Selective Ion Monitoring
Site	ExxonMobil ADC Site
SOP	Standard operating procedures
Stantec	Stantec Consulting Services Inc.
TPH	Total petroleum hydrocarbons
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHo	Total petroleum hydrocarbons as oil
USDOT	Appropriate United States Department of Transportation
VOC	Volatile organic compound
WAC	Washington Administrative Code

1 Introduction

This Quality Assurance Project Plan (QAPP) was prepared for the ExxonMobil ADC Site (Site) located at 2717/2731 Federal Avenue, Everett, Snohomish County, Washington. The location of the Site is shown on Plates 1 and 2. Environmental samples are being collected in support of compliance monitoring as required as part of the cleanup process under Washington Administrative Code (WAC) Chapter 173-340 – Model Toxics Control Act (MTCA) Cleanup Regulations (WAC, 2023b).

Consent Decree No. 24-2-01561-31 prepared by the Washington State Department of Ecology (Ecology), ExxonMobil Oil Corporation (ExxonMobil), and American Distributing Company (ADC) was entered by the State of Washington Snohomish County Superior Court on March 26, 2024.

The purpose of this document is to describe the personnel, procedures, and methods for ensuring the quality, accuracy, precision, and usability of data associated with compliance monitoring for the Site. This QAPP addresses quality assurance/quality control (QA/QC) associated with the field collection and laboratory analysis of environmental samples during compliance monitoring. Following the procedures outlined in this QAPP will ensure that the data collected and evaluated meet the project objectives.

This QAPP provides field and laboratory personnel with instructions regarding activities to be performed before, during, and after field investigations. These instructions will ensure data collected for use in project decisions will be of the type and quality required to meet the data use objectives for the project.

1.1 Objectives

The primary objective of this QAPP is to provide the guidance to be followed for collection and chemical analysis of soil, groundwater, and QA/QC samples so that the data are of sufficient quality to support the project data objectives and the data end uses. This QAPP also presents the overall project team organization and QA/QC procedures to be followed.

Consultant staff participating in the data collection work effort are required to be familiar with the requirements of the QAPP. The QAPP should be in the possession of the field team during sample collection and in possession of the analytical laboratory providing analytical services. The consultant and analytical laboratory personnel working on this project will be required to comply with the procedures documented in this QAPP to maintain comparability and representativeness of the resulting data.

2 Project Management

2.1 Project Organization and Responsibilities

Responsibilities of key project personnel are outlined in this section. The lines of communication, management activities, and technical direction within this project team will follow this organizational arrangement. Any directions or communications from Ecology will be given to the potentially liable

persons (PLPs) and Project Manager. The Project Manager and staff will communicate with the analytical laboratory and other subcontractors, as appropriate.

2.2 Regulatory Agency

Ecology is the lead agency and will oversee activities associated with compliance monitoring for the Site. Jason Cook with Ecology will provide regulatory leadership and be responsible for the review and approval of reports.

2.3 Potentially Liable Persons

ExxonMobil and ADC have been identified as PLPs under Ecology Consent Decree No. 24-2-01561-31 (Ecology, 2024).

2.4 Consultant

Together, the consultant management team will be responsible for the technical planning and implementation of the work. The QA/QC staff has responsibility for effective planning, verifying, and managing QA/QC activities associated with the assigned project. Below are descriptions of project responsibilities.

2.4.1 Project Manager

The Project Manager is responsible for the implementation of the field program and will provide management and tracking of the project schedule and budget. Other responsibilities include coordination and preparation of the required reports and assignment of technical responsibilities to appropriate personnel or subcontractors. The Project Manager will be responsible for coordinating all communications between the consultant, Ecology, and the PLPs.

2.4.2 Field QA Manager

The Field QA Manager will be responsible for the overall quality of field data and deliverables generated during the project. It is the responsibility of the Field QA Manager to ensure that required QA/QC protocols are met in the field.

2.4.3 Project Database Manager

The Project Database Manager will be responsible for management and maintenance of the project database and analytical data collected during field activities. The Project Database Manager oversees all database efforts that support the project, including screening sample analytical results against applicable screening levels.

2.4.4 QA Manager

The QA Manager will be responsible for reviewing the project QA program as it relates to the collection, completeness, and quality of data and deliverables generated during the project. The QA Manager will coordinate with the analytical laboratory to ensure readiness to implement project-specific requirements. The QA Manager is independent of the Project Manager and any data generation activities.

2.5 Analytical Laboratory

A state-certified laboratory will be contracted for laboratory analysis of environmental samples. For the purposes of this QAPP, Stantec solicited example documentation and materials from Eurofins Calscience LLC (Eurofins) in Garden Grove, California.

2.5.1 Laboratory Project Manager

The contract laboratory will provide laboratory analytical services in accordance with their laboratory Quality Assurance Manuals (QAMs), this QAPP, and other project-related communication. The Laboratory Project Manager will report to the QA Manager on aspects of the sample analysis and reporting. In addition, the Project Manager will be advised of any matters related to data quality.

2.5.2 Laboratory QA Manager

The Laboratory QA Manager is responsible for overseeing and implementing QA activities in the laboratory and ensuring the quality of the data for the project. The Laboratory QA Manager will coordinate with the Laboratory Project Manager on responses to any QC issues that affect the project.

3 Data Quality Objectives

3.1 PARCCS Overview

Criteria for measurements made during this project will be addressed in terms of Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity (PARCCS). The measurement criteria and numerical PARCCS parameters described in the following sections will require that the sampling be performed using standard methods with properly operated and calibrated equipment and conducted by trained personnel.

3.1.1 Precision

Precision is the degree of agreement among repeated measurements of the same parameter under the same or similar conditions. Precision is reported as either relative percent difference (RPD) or relative standard deviation, depending on the end use of the data.

3.1.1.1 Field Precision Objectives

Field precision will be assessed through the collection and analysis of field duplicate samples.

RPDs will be calculated for the detected analytes from investigative and field duplicate samples using the following equation:

$$\text{RPD} = \frac{|c_1 - c_2|}{\left(\frac{c_1 + c_2}{2}\right)} \times 100\ percent$$

Where:

- C_1 = Concentration of the compound or element in the sample.
- C_2 = Concentration of the compound or element in the duplicate/replicate.

Field duplicate samples will be collected for soil and groundwater samples. Duplicate RPDs of ±50 percent will be used as advisory limits for analytes detected in both investigative and field duplicate samples at concentrations greater than or equal to five times its reporting limit (RL). RPDs for samples with reported results that are less than five times its RL, non-detect, or estimated or rejected based on blank contamination, are considered non-representative and will not be calculated. The number of field duplicate samples recommended for each round of sampling is one for every 20 samples, per matrix.

3.1.1.2 Laboratory Precision Objectives

For the analytical laboratory to be used for this project, precision of laboratory analyses will be based upon laboratory matrix spike (MS), laboratory control sample (LCS), and laboratory duplicate analyses. Duplicate precision is reported as RPD, the equation to be used to determine precision is presented in Section 3.1.1.1. The LCS, MS, and laboratory duplicate analyses will be performed either at a rate of one per 20 samples per matrix received by the laboratory or in accordance with laboratory procedures.

3.1.2 Accuracy and Bias

Accuracy is the extent of agreement between an observed or measured value and the accepted reference, or true, value of the parameter being measured.

3.1.2.1 Field Accuracy Objectives

The objective for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Sampling accuracy will be assessed by evaluating the results of equipment and trip blank samples for contamination.

Equipment blanks will be collected only from decontaminated, reusable field equipment, such as split spoon samplers or hand augers. Equipment blanks will be collected by pouring laboratory-prepared water or distilled water over or through reusable field sampling equipment and collecting the rinsate in the

laboratory-supplied analytical containers. Equipment blanks should be collected following decontamination procedures and will not be collected for dedicated or disposable field equipment. Equipment blanks will be submitted to the laboratory with the associated investigative samples and will be analyzed for the same parameters as the investigative samples. The minimum required frequency is one equipment blank per day per type of sampling equipment. Where possible, the use of disposable, one-time use field equipment will be emphasized.

Trip blanks will be used when samples are collected for volatile organic compound (VOC) analysis. The laboratory-prepared organic-free sample taken from the laboratory to the sampling site and transported back to the laboratory without having been exposed to sampling procedures will be used to assess contamination during shipping and field handling procedures. One trip blank per cooler containing samples for VOC analysis will be used.

3.1.2.2 Laboratory Accuracy Objectives

Laboratory accuracy will be assessed by determining percent recoveries from the analysis of LCS and LCS duplicate (LCSD), MS and MS duplicate (MSD), or standard reference material samples. MS/MSD samples should be collected for organic and inorganic analyses at a minimum frequency of one per 20 or fewer samples for soil and groundwater.

The equation used to determine the analytical accuracy for this project is:

$$Accuracy = Percent\ Recovery = \frac{A_r - A_0}{A_f} \times 100\ percent$$

Where:

- A_r = Total amount detected in spiked sample.
- A_o = Amount detected in unspiked sample.
- A_f = Amount added to sample.

The accuracy of organics analyses will also be monitored through analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses.

In addition, example laboratory QA objectives can be referenced in the QAM presented in Appendix A.

3.1.3 Representativeness

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of the Site. It also reflects the ability of the sample team to collect samples and laboratory personnel to analyze those samples in such manners that the data accurately and precisely reflect the conditions at the Site.

3.1.3.1 Measures to Ensure Representativeness of Field Data

Representativeness will be achieved by ensuring that sampling locations are properly selected to characterize conditions at the Site. Representativeness is dependent upon the proper design of the sampling program and will be accomplished by ensuring that this QAPP, the project-specific Compliance Monitoring Plan, and standard procedures are followed. The QA goal will be to have all samples and measurements representative of the media sampled.

3.1.3.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness of laboratory data cannot be quantified; however, adherence to the prescribed analytical methods and procedures, including holding times, blanks, and duplicates, will ensure that the laboratory data are representative.

3.1.4 Completeness

Completeness is defined as the measure of the quantity of valid data obtained from a measurement system compared to the quantity that was expected under normal conditions. The equation used to determine completeness for this project is:

$$\%\ Completeness = \frac{Number\ of\ Valid\ (usable\ measurements)}{Number\ of\ Measurements\ Planned} \times 100$$

While a completeness goal of 100 percent is desirable, an overall completeness goal of 90 percent may be realistically achieved under normal field sampling and laboratory analysis conditions.

3.1.4.1 Field Completeness Objectives

The field sampling team will take measures to generate valid data in the field; however, some samples or sample containers may be lost or broken during handling and transit. Therefore, the field completeness goal for this project will be to have 90 percent of all samples be valid data. The equation for calculating completeness is presented in Section 3.1.4.

3.1.4.2 Laboratory Completeness Objectives

Laboratory completeness will be a measure of the quantity of valid data measurements and analyses obtained from all the measurements and analyses completed for the project. The laboratory completeness goal is for 90 percent of the samples analyzed to be valid data. The procedure for determining laboratory data validity is provided in Section 11.2. The equation for calculating completeness is presented in Section 3.1.4.

3.1.5 Comparability

The confidence with which one data set can be compared to another is a measure of comparability. The ability to compare data sets is particularly critical when a set of data for a specific parameter is compared to historical data for determining trends.

3.1.5.1 Measures to Ensure Comparability of Field Data

Ensuring that this QAPP and the Compliance Monitoring Plan are adhered to and that samples are properly handled and analyzed will satisfy the comparability of field data. Additionally, efforts will be made to have sampling completed in a consistent manner by the same sampling team using the same methodologies.

3.1.5.2 Measures to Ensure Comparability of Laboratory Data

Analytical data are comparable when the data are collected and preserved in the same manner followed by analysis with the same standard method and RLs. Data comparability is limited to data from the same environmental media. Analytical method quality specifications have been established to help ensure that the data will produce comparable results. Tables 1A and 1B summarize example laboratory RLs.

3.1.6 Sensitivity

Sensitivity is the ability of a method or instrument to detect a parameter to be measured at a level of interest. Analytical sensitivity is a measure of both the ability of the analytical method to detect the analyte and the concentration that can be reliably quantified. The minimum concentration of the analyte that can be detected is the method detection limit (MDL). The minimum concentration that can be reliably quantified is the RL. Laboratories use both MDLs and RLs for reporting analyte concentrations, and both values will be used as measures of sensitivity for each analysis.

The sensitivity requirements for laboratory analyses are to meet the screening levels established for the project and the MTCA standards, if applicable. Analytical results will be reported to the laboratory RL except for when the RL value exceeds applicable screening levels. For these cases, analytical results will be reported to the MDL.

Tables 1A and 1B summarize example laboratory RLs.

4 Specialized Training and Certification

Field technical staff working at locations where hazardous materials and/or other contaminants may be encountered will be trained as mandated by Occupational Safety and Health Administration (OSHA) regulations (29 Code of Federal Regulations [CFR] 1910.120) and WAC 296-843 (WAC, 2018). The consultant will also ensure that Site personnel complete either their initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training or their annual 8-Hour HAZWOPER refresher training

and maintain personnel training records. At least one field member at each field sampling station will have cardiopulmonary resuscitation (CPR) and first aid training. Additionally, field personnel will be trained in procedures for using field equipment or monitoring devices as well as in procedures for collecting, labeling, packaging, and shipping environmental samples.

Personnel engaged in field activities will have completed health and safety training that meets the requirements of the site-specific Health and Safety Plan (HASP) in accordance with WAC 173-340-810 (WAC, 2024). Documentation will be maintained to demonstrate that requirements of the HASP are followed. The Project Manager will be responsible for ensuring requirements for safety training set forth in the HASP are satisfied. Each day, prior to work commencing, the consultant field personnel will conduct a tailgate health and safety meeting with participation by the full contractor field team.

Subcontractors will be prequalified by the consultant to determine that their training and certification meet industry standards and are contractually aligned. The consultant will verify that all subcontractors are qualified to work on the project by conducting a thorough review of their safety programs, safety records, insurance requirements, licenses, and training and certifications specific to their task. Additional details pertaining to special training and required certification are described in detail in the HASP.

The laboratory performing sample analyses will be accredited by Ecology in accordance with WAC 173-50 Accreditation of Environmental Laboratories (WAC, 2023a) or the National Environmental Laboratory Accreditation Program (NELAP). The laboratory must be approved under Ecology for each analytical method or approved for each parameter of analysis under NELAP. Example laboratory certifications are provided in Appendix B.

5 Documentation and Records

Records to be used for project documentation include field forms and chain of custody (COC) forms. Example forms are included in the Compliance Monitoring Plan. Final copies of reports and spreadsheets will be saved in Portable Document Format (PDF). The consultant will retain these files for a period of at least 10 years following the date the Consent Decree is no longer in effect, in accordance with the Consent Decree.

Each product completed as part of the compliance monitoring will undergo a quality review by an experienced staff member and a final review by a senior reviewer prior to submittal to Ecology or discussion with outside parties. Corrective action will be implemented in response to deficiencies that are encountered during product or deliverable assessments. Any reviewer who detects a deficiency or non-conforming situation will be responsible for reporting the deficiency to the author/reviewer. A closed-loop corrective action system will be used to address these types of needed corrections.

6 Data Generation and Acquisition

This section addresses data generation and acquisition to ensure that appropriate methods for sampling measurement and analysis, data collection or generation, data handling, and QC activities are employed and documented.

6.1 Sample Design

The Compliance Monitoring Plan describes field activities, including the following elements:

- Project background.
- Sample matrices, numbers, locations, and depths.
- Sampling procedures.
- Number and type of QC samples to be collected and submitted for analysis.
- Field documentation and procedures.
- Requested analytical methods.
- Additional sampling, analytical, or QA/QC requirements that deviate from those established in this QAPP.

Sample containers, preservation, and holding times are summarized in Table 2. QA/QC samples will be collected in accordance with the QAPP protocols. Requirements for QA/QC samples are presented in Table 3.

6.2 Sample Methods

6.2.1 Sample Nomenclature Scheme

Each sample collected during compliance monitoring will be given a unique identification code. Each unique sample identification will consist of the following:

- *Sample Type.* Each sample will be identified by a sample type code as follows:

  S – soil sample.
  W – groundwater sample.

- *Depth interval.* Following the sample type, the depth, or depth interval, from which the sample was collected will be identified. For example:

  5 – sample collected at 5 feet below ground surface (bgs).

- *Station Number*. Following the sample type each sample will be identified by a station number as follows:

  B## – boring sample location.

MW## – monitoring well sample location.

- *QA Sample IDs.* Field, equipment, and duplicate samples will be identified using the project area code and the codes noted below. These codes will be followed by 01, 02, 03, etc. if more than one of the sample types are collected.

  TB – trip blank sample.
  EQB – equipment blank sample.
  DUP – field duplicate sample.

Examples:

S-5-B1 = Soil sample collected at 5 feet bgs from boring B1.
W-10-MW-A4 = Groundwater sample collected at 10 feet bgs from groundwater monitoring well MW-A4.
EQB01 = First equipment blank collected.
S-5-B1-DUP = Field duplicate soil sample collected at 5 feet bgs from boring B1.

Sample bottle labels appropriate for the size and type of sample containers shall be provided by each laboratory. Each label will be completed in waterproof ink and indicate at a minimum:

- Site name.
- Sample identification code.
- Date and time of sample collection.
- Sampler's initials.
- Requested analyses.
- Type of preservative.

6.2.2 Sample Collection

Table 2 lists the required sample containers, preservatives, and recommended maximum holding times for samples. Samples will be collected into containers provided by the laboratory. To maintain sample integrity and prevent cross contamination, samplers will follow field protocols (example field protocols are included in the Compliance Monitoring Plan).

6.3 Sampling Handling

6.3.1 Sample Custody

The possession and handling of samples will be documented from the time of collection until delivery to the laboratory. Field personnel are responsible for ensuring that COC procedures are followed. Field personnel will maintain custody of all samples until they are relinquished to another custodian, the laboratory, or the freight shipper.

A sample is considered "in custody" if it is:

- In a person's possession.

- In view of the person after being in their possession.
- Sealed in such a manner that it cannot be tampered with after having been in physical possession.
- In a secure area restricted to authorized personnel.

All samples must be catalogued on a COC form using sample identification codes. The date and time of collection will be recorded on the form, as well as the number of each type of bottle, the method of preservation, and the type of analysis.

6.3.2 Sample Packing and Shipping

Samplers will use an overnight delivery service to transport the samples to the laboratory. The laboratory will be contacted in advance to expect shipment so that sample holding times will be met. The COC forms will be sealed in a plastic bag and placed inside the sample cooler. Samples will be packed in the cooler using bubble-wrap packing materials and ice sealed in a zip top bag. Appropriate United States Department of Transportation (USDOT) regulations for packaging, marking/labeling, and shipping of hazardous materials and wastes will be followed.

The sample cooler will be taped closed and custody seals provided by the laboratory will be affixed to prevent tampering during transport and to facilitate the detection of possible tampering (if the seals are broken). Upon relinquishing the sample cooler to the shipper, field personnel will assign custody of the samples to the shipper by signing and dating the bottom of the COC form. One copy of the COC documentation will be retained by the QA Manager. The integrity of the custody seals shall be noted by the laboratory on the COC form upon arrival.

The project laboratory will perform laboratory custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data in accordance with their standard operating procedures (SOPs). The Laboratory Project Manager will be responsible for ensuring that laboratory custody protocol is maintained. The laboratory procedures related to sample custody are discussed in the laboratory's QAM (example QAM provided in Appendix A).

The consultant will be responsible for the custody of evidence files and will maintain and update contents of the files during the project term. The evidence files will include all records relevant to sampling and analysis activities such as field logbooks, photographs, subcontractor reports, laboratory data deliverables, COC forms, and data reviews. The consultant will retain this file for a period of at least 10 years following the date the Consent Decree is no longer in effect, in accordance with the Consent Decree.

6.4 Laboratory Procedures

6.4.1 Intra-Laboratory and Subcontracted Laboratory Sample Transfer

Transfer of samples, subsamples, digestates, or extracts to another party are subject to all of the requirements for legal COC for all samples associated with legal COC.

6.5 Analytical Methods

Analytical methods will be selected that will achieve project objectives. Samples will be prepared and analyzed in accordance with the analytical methods outlined in the laboratory's QAM (example QAM provided in Appendix A).

Samples will be submitted for analysis using one or more of the following methods:

- Total petroleum hydrocarbons (TPH) as gasoline (TPHg) by Ecology Method Northwest TPH (NWTPH) for Gasoline Range Organics (NWTPH-Gx).
- TPH as diesel (TPHd) and oil (TPHo) by Ecology Method NWTPH for Diesel/Oil Range Organics (NWTPH-Dx).
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency (EPA) Method 8260.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and 1-methylnaphthalene by EPA Method 8270 with Selective Ion Monitoring (SIM).
- Arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver by EPA Methods 200.8, 6020, 245.1, or 7471, as applicable.
- Total and dissolved iron and manganese by EPA Method 6010B.
- Ferrous iron by Standard Method 3500-FeB.
- Nitrate and sulfate by EPA Method 300.0.
- Alkalinity by Standard Method 2320B.
- Carbon dioxide by Standard Method 4500-CO2D.
- Methane by RSK SOP-175.

Analytical methods and example RLs for those methods are presented in Tables 1A and 1B.

After submittal of the samples to the laboratory for analysis, the analytical results are anticipated to be received on different turnaround times based on complexity of the analysis, method extraction, hold times, laboratory QA/QC validation times, and overall laboratory logistical and volume capabilities. It is anticipated that results will report on a two-week turnaround time.

7 Quality Control

QC requirements ensure that the environmental data collected are of the highest standard feasible, as appropriate for the intended application.

7.1 Field Quality Control

Where applicable, field QC checks will be conducted through replicate measurements, equipment calibration checks, and data verification by field personnel. Field sampling precision and data quality will be evaluated through use of sample duplicates, equipment blanks, and trip blanks. If there is any discrepancy in the sample data, field personnel will notify the Project Manager and discuss methods for resampling or otherwise addressing the discrepancy.

7.1.1 Field QA/QC Samples

The minimum required frequency for equipment blanks is one equipment blank per day per type of sampling equipment. The number of field duplicate samples recommended for each round of sampling is one for every 20 samples, per matrix. One sample collected for the purpose of MS/MSD at the laboratory will be collected for every 20 samples for soil and groundwater. One trip blank per cooler containing samples for VOC analysis will be used. Ecology shall be permitted to take split or duplicate samples of any environmental samples collected at the Site in accordance with the Consent Decree.

7.1.2 Field Instrument Calibration

Measuring and test equipment used in the field and laboratory will be subject to a formal calibration program. The program will require equipment of proper type, range, accuracy, and precision to provide data compatible with the specified requirements and the desired results. Calibration of measuring and test equipment may be performed internally using in-house reference standards, or externally by agencies or manufacturers. Field personnel are responsible for calibration of consultant field equipment and field equipment provided by vendors.

Calibrated equipment will be uniquely identified by the manufacturer's serial number, a consultant equipment identification number, or by other means. These identification numbers will be attached to the equipment, along with a label indicating when the next calibration is due (only for equipment that does not require daily calibration). If this is not possible, records traceable to the equipment will be readily available for reference. It will be the responsibility of all equipment operators to check the calibration status per the due date labels or records prior to using the equipment.

Measuring and testing equipment will be calibrated at prescribed intervals and/or as part of operational use. Frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values given in national standards, intended use, and experience. Whenever possible, equipment will be calibrated using reference standards associated with nationally recognized standards

or accepted values of physical constants. If national standards do not exist, the basis for calibration will be documented.

Physical and chemical reference standards will be used only for calibration. Equipment that fails calibration or becomes inoperable during use will be removed from service, segregated to prevent inadvertent use, and tagged to indicate the fault. Such equipment will be recalibrated and repaired to the satisfaction of the QA Manager or field personnel, as applicable. Equipment that cannot be repaired will be replaced.

Records will be prepared and maintained for each piece of calibrated measuring and test equipment to document that established calibration procedures have been followed. Records for consultant equipment, used only for this project, will be kept in the project files.

7.1.3 Field Instrument/Equipment Decontamination

Field personnel or the contracted driller will decontaminate non-dedicated sampling equipment between each sample location with a non-phosphate solution (such as Liquinox), followed by a minimum of two tap water rinses. Distilled water may be used for the final rinse. Downhole drilling equipment is steam-cleaned prior to drilling the borehole and at completion of the borehole.

Between sample intervals, the soil sampling table is cleaned by spraying it with a non-phosphate solution and wiping with disposable paper towels.

Prior to well development, the submersible pump is decontaminated by allowing it to run and recirculate while immersed in a non-phosphate solution followed by successive immersions in potable water and distilled water baths.

Before starting groundwater monitoring and sampling activities, and between each well, the depth to water probe and multi-parameter probe are decontaminated by rinsing twice with a non-phosphate solution. The probes are then rinsed with tap water followed by a rinse with distilled water. The sample table/workstation, exterior of pump housing, and scissors (used for cutting disposable tubing) are cleaned with commercially-available disinfectant wipes before starting groundwater sampling activities, and between each well.

7.1.4 Field Supplies and Consumables

Supplies and consumables including standard reference materials for field meter calibration, sampling equipment, cleaning supplies, distilled water for equipment decontamination, and personal protective equipment will be obtained from vendors to meet manufacturer operation/maintenance specifications and minimum safety requirements.

7.2 Laboratory Quality Control

The Laboratory QA Manager will be responsible for ensuring that each laboratory's data precision and accuracy are maintained in accordance with the laboratory QAM and this QAPP. Laboratory QA/QC

(initial and continuing calibration, frequency of blank analysis, etc.) will be determined in accordance with the analytical method requirements and internal laboratory SOPs.

The laboratory will qualify all results that are affected by QC exceptions or other events that affect the interpretation of the analytical results with a flag that is defined unambiguously in the analytical report.

7.2.1 Laboratory Instrument Calibration

The proper calibration of laboratory equipment is a key element to the quality of laboratory analysis. Each type of instrumentation and each Ecology- or EPA-approved method have specific calibration procedure requirements, depending on the analytes of interest and the sample medium.

Calibration procedures and frequencies of equipment used to perform analyses will be in accordance with requirements established by Ecology or EPA. The Laboratory QA Manager will be responsible for ensuring that laboratory instrumentation is maintained in accordance with specifications. Individual laboratory SOPs will be followed for corrective actions and preventative maintenance frequencies.

The laboratory will be responsible for the calibration of laboratory equipment and will maintain individual laboratory calibration records.

7.2.2 Laboratory Supplies and Consumables

The Laboratory QA Manager or designee will be responsible for ensuring the acceptability of supplies and consumables used in the collection, preservation, preparation, and analysis of samples

8 Non-Direct Measurements

Any non-direct measurements or data will be taken from industry recognized standard sources. These sources include the United States Geological Survey, as well as standard engineering, chemistry, and geological reference standards.

Available historical Site data from previous investigations are discussed in detail in the following documents:

- WSP USA Environment & Infrastructure Inc.'s May 12, 2023, *Site Characterization/Focused Feasibility Study*.
- Stantec Consulting Services Inc.'s March 26, 2024, *Site Characterization/Focused Feasibility Study Addendum.*

The historical data that met acceptance criteria were considered and used extensively to plan the investigation scope described in the Compliance Monitoring Plan.

9 Data Management

Field and electronic data will be managed to provide consistent, accurate, documentable, and defensible data quality. Field personnel will manage data during field activities. Field data such as sample location latitudes and longitudes collected in the field using a global positioning system unit, geologic profiles, and field measurements, will be recorded on the appropriate field forms or in field logbooks. Example field data sheets are provided for reference in the Compliance Monitoring Plan. The Project Database Manager will collect data gathered during assessment activities and save the data in the project file. Any errors or exceptions in field QA/QC observed by field staff will be brought to the attention of the Field QA Manager.

The Laboratory Project Manager will be responsible for laboratory data management. Procedures for data review and data reporting are discussed in the laboratory QAM and SOPs. Laboratory-generated analytical data reports will present all sample results, including all QA/QC samples.

The Project Database Manager will incorporate electronic data into Ecology's Environmental Information Management (EIM) database in accordance with Ecology's *Toxics Cleanup Program Policy 840: Data Submittal Requirements* (Ecology, 2005).

9.1 Standard Operating Procedures

Whenever field protocols are applicable and available, they will be incorporated into data collection activities. To ensure environmental sample collection efforts are comparable, procedures found in sampling field protocols will be followed. Example sampling field protocols are provided in the Compliance Monitoring Plan.

Data to be managed for this project include sample documentation, field forms and logbooks, field protocols, and analytical data deliverables.

9.2 Field Notes

Field notes detailing Site activities and observations will be kept (electronically or in a field logbook) so that an accurate and factual account of field procedures may be reconstructed. All field logbook entries will be signed by the individuals who are making them. Field notes should document the following:

- Site name and project number.
- Consultant name and address.
- Names of personnel on site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.

- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and COC information.
- Photographs taken.
- Site sketches.
- Relevant and appropriate information delineated in field data sheets and sample labels.

Real-time measurements and observations will be recorded in a logbook or field form. Field data records will be organized into standard formats whenever possible. Hard copies of field notes and laboratory data reports will be kept at least until data review, verification, validation, reconciliation with user requirements, and reporting is complete. Electronic copies of field notes and laboratory reports will be kept in the electronic project file.

9.3 Analytical Data Deliverable Requirements

Analytical data will contain the necessary sample results and QC data to evaluate the data use objectives defined for the project.

The laboratory will provide Level II data deliverables. Data shall be presented on numbered pages with an index or table of contents describing the contents. Analytical results should be reported as detected concentrations, estimated concentrations below the RL, or less than the quantitation limit. All quality control samples shall be clearly linked to the associated samples and the results summarized on EPA Contract Laboratory Program (CLP) or CLP-like forms. The following information shall be included in the data package:

- A case narrative shall be included in each data package. The case narrative shall identify all samples not meeting QC criteria and any other out-of-control condition. The narrative shall describe the corrective action taken. If matrix effects are invoked as a case for out-of-control recoveries, a subsection of the narrative shall present a detailed justification for this assertion and include a summary of all relevant quality control data.
- A copy of the original COC and a copy of the cooler receipt form.
- Sample collection, extraction, preparation, and analysis dates.
- Method of analysis (name and method number).
- QC sample identification (for project-specific QC samples).
- Dilution factors for all applicable samples.
- Detection limits (RLs and MDLs) and units of measure for all analyses.
- Field sample and laboratory sample identifications cross-reference.
- QC batch identifications.
- Laboratory data qualifiers.
- Surrogate recovery results with associated control limits (all organic analyses).
- LCS precision results with associated control limits. All samples must be clearly associated with each LCS/LCD sample pair analyses (where applicable).
- MS/MSD (as applicable) precision and accuracy results with associated control limits. All samples must be clearly associated with each MS/MSD sample pair analyses.

- Laboratory duplicate (as applicable) precision and accuracy results with associated control limits. All samples must be clearly associated with each laboratory duplicate sample pair analyses.
- Method blank analytical results will be reported for all target analytes for all required analyses. All samples must be clearly associated with each method blank sample analyses.
- Post digestion spike recovery values for metals analyses where MS/MSD or LCS samples were outside of acceptable ranges.

9.4 Electronic Data Deliverable

An Ecology EIM database formatted electronic data deliverable will be provided by the laboratory for loading the analytical results into the project database.

10 Data Quality Assessment

10.1 Assessments and Response Actions

10.1.1 Performance and System Audits

Performance and system audits may be completed to ensure that field sampling activities and laboratory analyses are performed in accordance with procedures established in this QAPP, including the Compliance Monitoring Plan and field protocols.

Generally, system audits are a qualitative measure of adherence to overall sampling QA measures, including sample collection and handling, decontamination procedures, COC use and completion, and recording requirements in the field, as well as sample receiving, log-in, and instrument operating records in the laboratory.

10.1.2 Field System Audits

Early in the project, the Field QA Manager may conduct a field audit to assess whether field activities are being conducted in accordance with this QAPP and the Compliance Monitoring Plan. If deviations are noted during the audit, the auditor will take immediate action to bring practices in line with this QAPP. The auditor will document any deficiencies encountered and corrections made. Results of the audit will be maintained in the project file.

The field audit will include the following:

- Review of field sampling records.
- Review of field measurement procedures.
- Comparison of sample identifications to the QAPP sample identification protocol.
- Review of field instrument calibration records and procedures.
- Recalibration of field instruments to verify calibration to the manufacturer’s specifications.

- Review of sample handling and packaging procedures.
- Review of COC procedures.

If deficiencies are observed during the audit, each deficiency shall be noted in writing and a follow-up audit may be completed if deemed necessary by the Field QA Manager. Corrective action procedures may need to be implemented due to the findings from the audit, following the procedures outlined in Section 10.2.2.

Upon completion of any audit, the auditor will submit to the Project Manager a report or memorandum describing any problems or deficiencies identified during the audit. It is the responsibility of the Project Manager to determine if the deviations will result in any adverse effect on the project conclusions. If it is determined that corrective action is necessary, procedures outlined in Section 10.2.2 will be followed.

10.1.3 Laboratory Audits

The laboratory will be responsible for ensuring that laboratory data precision and accuracy are maintained in accordance with specifications and laboratory SOPs.

10.1.4 Report Preparation QA/QC

All reports will undergo a quality review by an experienced staff member and a final review by a senior reviewer prior to submittal to Ecology. The report will be signed by a State of Washington professional geologist, hydrogeologist, or engineer in accordance with WAC 196-23 (WAC, 2022). Corrective action will be implemented in response to deficiencies that are encountered during product or deliverable assessments. Any reviewer who detects a deficiency or non-conforming situation will be responsible for reporting the deficiency to the author/reviewer and the Project Manager. A closed-loop corrective action system will be used to address these types of needed corrections.

10.2 Quality Assurance Reporting Procedures

10.2.1 Progress Reports

For the duration of the project, periodic progress reports will be prepared and submitted to the Ecology Project Manager in accordance with the Consent Decree. These reports will serve to inform Ecology of the project progress and any significant interim findings that have been identified, including those related to QA. This will streamline the process of addressing issues as they arise and adjusting the program to better achieve project objectives.

The progress reports shall include the following:

- A list of on-Site activities that have taken place during the designated period.
- Description of any sample results that deviate from the norm.

- Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests.
- Descriptions of all deviations from the scope of work and any planned deviations in the upcoming designated period.
- For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule.
- All raw data (including laboratory analyses) received during the previous designated period (if not previously submitted to Ecology), together with a detailed description of the underlying samples collected.
- A list of planned activities for the upcoming designated period.

Progress reports shall be submitted by the tenth day of the month in which they are due after the effective date of the Consent Decree.

10.2.2 Corrective Action

Corrective actions will be initiated whenever data quality indicators suggest that data usability objectives and/or measurement criteria 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 the problems and initiating corrective action lies with the analyst/field personnel. The second level of responsibility lies with any person reviewing the data. Corrective actions may include more intensive staff training, equipment repair followed by a more intensive preventive maintenance program, or removal of the source of systemic contamination. If data usability objectives are not met, the samples in question may require recollection and/or reanalysis using a properly functioning system.

The Project Manager is responsible for verifying and documenting completion of corrective actions.

11 Data Review and Verification

This section describes the QA activities that will be performed to verify that data collected and generated during the project are scientifically defensible, properly documented, of known quality, and meet project objectives. Data verification and usability assessment will be conducted to ensure that project data quality needs are met.

To perform the data evaluation steps in this section, reported data will be supported by complete data packages that include sample receipt and tracking information, COC records, tabulated data summary forms, QC checks, QC sample results, and other project-specific documents generated.

11.1 Data Verification Criteria and Methods

Data verification is a process of evaluating the completeness, correctness, and contractual compliance of a data set against the analytical method procedure, field protocols, or contract requirements. The goal of data verification is to assess whether the types and quantities of data specified in the QAPP and Compliance Monitoring Plan were collected.

Field and laboratory data will be verified by:

1. Identifying project requirements/specifications as documented in the laboratory QAM, QAPP, Compliance Monitoring Plan, field protocols, and analytical method procedures.

2. Reviewing project records such as field logbooks, COCs, sample receipts, laboratory preparation and analysis records to verify that collected data complies with procedures outlined in this QAPP.

The QA Manager will verify field data by periodically comparing field documentation including COCs, logbooks, and field forms to specifications in the QAPP and Compliance Monitoring Plan. Data to be verified will include sample collection and handling procedures, sample identification system, number and type (media) of samples collected, sample location and depth, field equipment calibration and use, units of measure, and analytical services requested on COCs.

The laboratory will verify analytical data by comparing procedures and requirements in the laboratory QAM, analytical method procedures, SOPs, and QAPP to records such as COCs, sample receipt forms, and sample preparation, handling, and analysis records. The QA Manager will review laboratory electronic data deliverables for compliance with contract and work order specifications.

If a significant problem that affects data usability is discovered, the QA Manager will contact the laboratory to initiate corrective action. If necessary, review of raw data associated with the identified problem will be performed. This further review will focus only on the identified problem and will not include analyses that did not exhibit serious data quality deficiencies for important target analytes.

11.2 Data Limitations and Actions

Sources of sampling and analytical error will be identified and corrected as early as possible. An ongoing data assessment process will be incorporated throughout the project, rather than as a final step, to facilitate early detection and correction of problems, ensuring that project quality objectives are met.

Data that do not meet the measurement performance criteria specified in this QAPP will be identified, and impact on project quality objectives will be assessed and discussed within the final report. Specific actions for data that do not meet measurement performance criteria will depend on the use of data and may require that additional samples be collected or use of the data be restricted.

12 Limitations

Select documents and materials provided in this QAPP such as the example RLs, precision, and accuracy values provided in Tables 1A and 1B; the example laboratory QAM provided in Appendix A; and the example laboratory certification provided in Appendix B may not be applicable to the consultant and analytical laboratory contracted for the compliance monitoring work outlined in the Consent Decree. An addendum to this QAPP may be necessary to provide updated documents and materials if they vary significantly from the examples provided herein.

13 References

Washington Administrative Code (WAC). November 6, 2018. Chapter 296-843 Hazardous Waste Operations. URL: https://app.leg.wa.gov/wac/default.aspx?cite=296-843.

Washington Administrative Code (WAC). April 27, 2022. Chapter 196-23 Stamping and Seals. URL: https://app.leg.wa.gov/wac/default.aspx?dispo=true&cite=196-23.

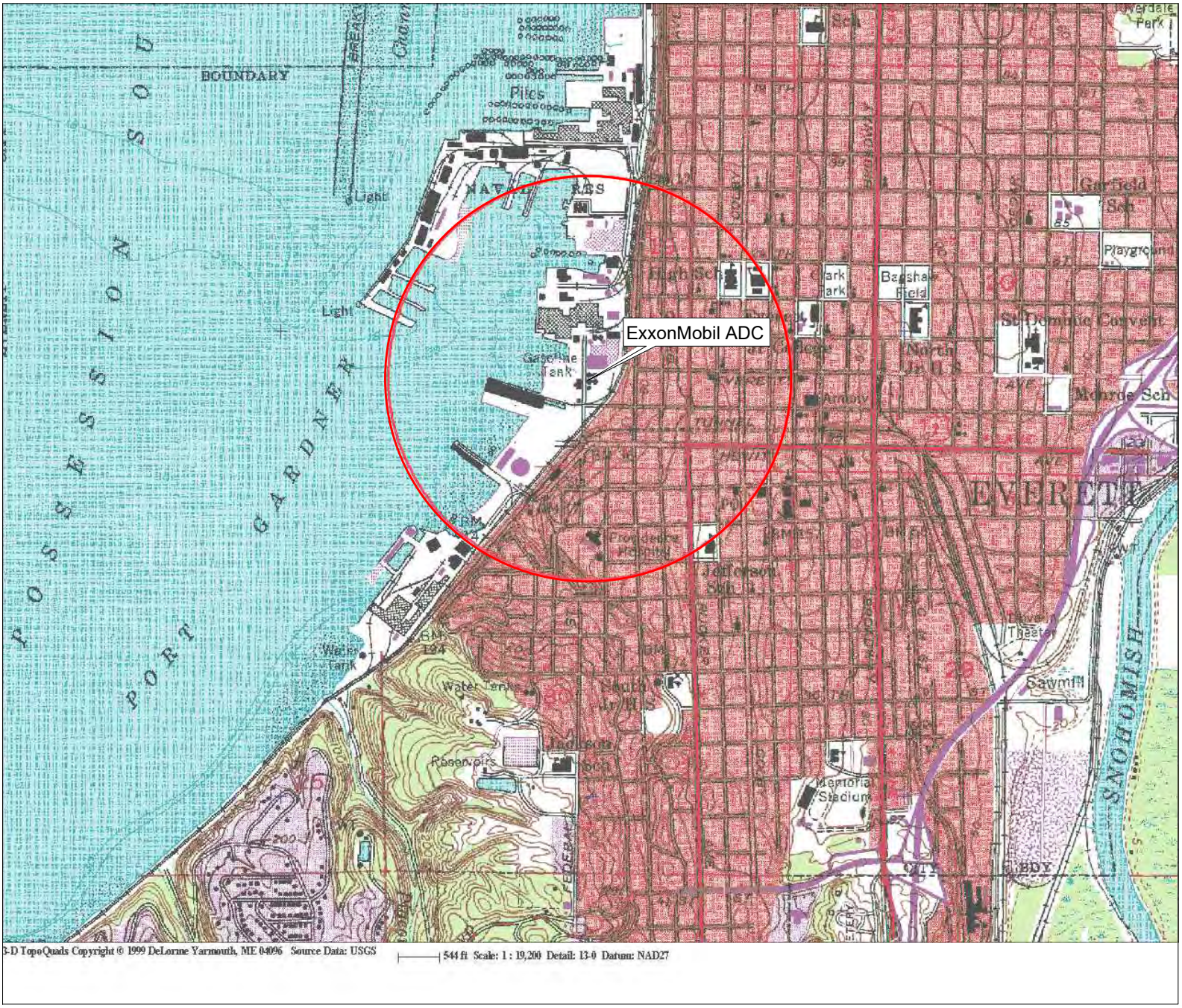
Washington Administrative Code (WAC). September 1, 2023a. Chapter 173-50 Accreditation of Environmental Laboratories. URL: https://app.leg.wa.gov/wac/default.aspx?cite=173-50.

Washington Administrative Code (WAC). October 12, 2023b. Chapter 173-340 Model Toxics Control Act – Cleanup. URL: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340.

Washington Administrative Code (WAC). January 1, 2024. Chapter 173-340-810 Worker Health and Safety. URL: https://app.leg.wa.gov/wac/default.aspx?cite=173-340-810.

Washington State Department of Ecology (Ecology). August 1, 2005. *Toxics Cleanup Program Policy 840: Data Submittal Requirements.* https://apps.ecology.wa.gov/publications/documents/1609050.pdf.

Washington State Department of Ecology (Ecology). March 26, 2024. Consent Decree No. 24 2 01561 31.



FN 2037237860001

EXPLANATION

1/2-mile radius circle

N

APPROXIMATE SCALE

0 0.5 1 mile

Stantec

SITE LOCATION MAP

EXXONMOBIL ADC
2717/2731 Federal Avenue
Everett, Washington

PROJECT NO.
203723786

PLATE
1

LEC: 09/16/24

TABLE 1A
ANALYTICAL PARAMETERS, REPORTING LIMITS, PRECISION, AND ACCURACY
EUROFINS CALSCIENCE LLC - SOLID SAMPLES

ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Analyte Group	Analyte	CAS No.	Analytical Method	MDL	MRL	MTCA Method A Cleanup Level	Units	LCS Criteria (% R)	LCS Duplicate RPDL (%)	MS Criteria (% R)	MS Duplicate RPDL (%)
TPH	TPHg	---	NWTPH-Gx	0.0556	0.250	30	mg/kg	77-128	16	48-114	23
	TPHd	---	NWTPH-Dx	3.55	5.00	2,000	mg/kg	76-126	20	37-175	20
	TPHo	---	NWTPH-Dx	3.80	5.00	2,000	mg/kg	71-139	20	71-174	20
VOCs	Benzene	71-43-2	SW8260	0.258	1.00	0.03	mg/kg	80-120	20	70-125	20
	Ethylbenzene	100-41-4	SW8260	0.206	1.00	6	mg/kg	80-120	20	64-125	22
	Toluene	108-88-3	SW8260	0.269	1.00	7	mg/kg	80-120	20	68-125	20
	m,p-Xylene	179601-23-1	SW8260	0.474	2.00	---	mg/kg	80-120	20	60-125	24
	o-Xylene	95-47-6	SW8260	0.255	1.00	---	mg/kg	80-120	20	59-128	24
	Total Xylenes	1330-20-7	SW8260	0.600	2.00	9	mg/kg	---	---	---	---
PAHs	Benzo(a)anthracene	56-55-3	SW8270	0.00802	0.0200	---	mg/kg	50-133	20	24-150	24
	Benzo(a)pyrene	50-32-8	SW8270	0.00816	0.0200	0.1	mg/kg	50-134	20	29-149	22
	Benzo(b)fluoranthene	205-99-2	SW8270	0.0149	0.0200	---	mg/kg	50-142	20	21-153	26
	Benzo(k)fluoranthene	207-08-9	SW8270	0.0172	0.0200	---	mg/kg	49-150	20	28-148	26
	Chrysene	218-01-9	SW8270	0.00650	0.0200	---	mg/kg	51-129	20	25-145	28
	Dibenz(a,h)anthracene	53-70-3	SW8270	0.0110	0.0200	---	mg/kg	50-133	20	20-132	26
	Indeno(1,2,3-cd)pyrene	193-39-5	SW8270	0.0121	0.0200	---	mg/kg	50-148	20	20-154	25
	1-Methylnaphthalene	90-12-0	SW8270	0.0109	0.0200	34*	mg/kg	54-132	20	34-136	29
	cPAHs (BaP eq)	---	---	---	---	0.1	---	---	---	---	---
Metals (waste soil only)	Arsenic	7440-38-2	SW6020	0.0914	0.500	20	mg/kg	80-120	20	75-125	20
	Barium	7440-39-3	SW6020	0.0957	0.500	16,000*	mg/kg	80-120	20	75-125	20
	Cadmium	7440-43-9	SW6020	0.0854	0.500	2.00	mg/kg	80-120	20	75-125	20
	Chromium	7440-47-3	SW6020	0.104	1.00	2,000	mg/kg	80-120	20	75-125	20
	Lead	7439-92-1	SW6020	0.0654	0.500	250	mg/kg	80-120	20	75-125	20
	Selenium	7782-49-2	SW6020	0.377	1.00	400*	mg/kg	80-120	20	75-125	20
	Silver	7440-22-4	SW6020	0.317	0.500	400*	mg/kg	80-120	20	75-125	20
	Mercury	7439-97-6	SW7471A	0.0220	0.0833	2.00	mg/kg	80-120	10	80-120	20

Notes:

Modifications may be made to laboratory analytical methods, as necessary and technically feasible, to improve MRLs to meet Preliminary Screening Levels

--- = Not applicable or not available
% = Percent
% R = Percent recovery
BaP eq = Benzo(a)pyrene equivalent
CAS = Chemical Abstracts Service
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
LCS = Laboratory control sample
MDL = Method detection limit
mg/kg = Milligrams per kilogram
MRL = Method reporting limit
MS = Matrix spike
MTCA = Model Toxics Control Act
PAHs = Polycyclic aromatic hydrocarbons
RPDL = Relative percent difference limit
TPH = Total petroleum hydrocarbons
TPHd = Total petroleum hydrocarbons as diesel
TPHg = Total petroleum hydrocarbons as gasoline
TPHo = Total petroleum hydrocarbons as oil
VOCs = Volatile organic compounds
* = MTCA Method B Cleanup Level

TABLE 1B
ANALYTICAL PARAMETERS, REPORTING LIMITS, PRECISION, AND ACCURACY
EUROFINS CALSCIENCE LLC - AQUEOUS SAMPLES

ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Analyte Group	Analyte	CAS No.	Analytical Method	MDL	MRL	MTCA Method A Cleanup Level	Units	LCS Criteria (% R)	LCS Duplicate RPDL (%)	MS Criteria (% R)	MS Duplicate RPDL (%)
TPH	TPHg	---	NWTPH-Gx	29.7	100	800	µg/L	76-128	10	69-132	15
	TPHd	---	NWTPH-Dx	36.0	100	500	µg/L	68-120	20	55-133	30
	TPHo	---	NWTPH-Dx	66.5	100	500	µg/L	71-129	20	55-133	30
VOCs	Benzene	71-43-2	SW8260	0.243	0.500	5	µg/L	80-121	20	75-125	20
	Ethylbenzene	100-41-4	SW8260	0.297	1.00	700	µg/L	80-121	20	75-127	20
	Toluene	108-88-3	SW8260	0.297	1.00	1,000	µg/L	80-120	20	75-128	20
	m,p-Xylene	179601-23-1	SW8260	0.492	2.00	---	µg/L	80-123	20	75-128	20
	o-Xylene	95-47-6	SW8260	0.267	1.00	---	µg/L	80-122	20	75-128	20
	Total Xylenes	1330-20-7	SW8260	0.492	2.00	1,000	µg/L	---	---	---	---
PAHs	Benzo(a)anthracene	56-55-3	SW8270	0.0856	0.200	---	µg/L	33-143	25	33-143	25
	Benzo(a)pyrene	50-32-8	SW8270	0.175	0.200	0.1	µg/L	17-163	25	17-163	25
	Benzo(b)fluoranthene	205-99-2	SW8270	0.175	0.200	---	µg/L	24-159	25	24-159	25
	Benzo(k)fluoranthene	207-08-9	SW8270	0.153	0.200	---	µg/L	24-159	25	24-159	25
	Chrysene	218-01-9	SW8270	0.0592	0.200	---	µg/L	17-168	25	17-168	25
	Dibenz(a,h)anthracene	53-70-3	SW8270	0.115	0.200	---	µg/L	25-175	25	10-219	25
	Indeno(1,2,3-cd)pyrene	193-39-5	SW8270	0.106	0.200	---	µg/L	25-175	25	10-171	25
	1-Methylnaphthalene	90-12-0	SW8270	0.0730	0.200	1.5*	µg/L	20-140	25	20-140	25
	cPAHs (BaP eq)	---	---	---	---	0.1	µg/L	---	---	---	---
MNA	Iron, total	7439-89-6	SW6010	0.0131	0.500	11,000*	mg/L	80-120	20	65-149	21
	Iron, dissolved	7439-89-6	SW6010	0.0131	0.500	---	mg/L	80-120	20	65-149	21
	Manganese, total	7439-96-5	SW6010	0.00134	0.0500	750*	mg/L	80-120	7	86-116	20
	Manganese, dissolved	7439-96-5	SW6010	0.00134	0.0500	---	mg/L	80-120	7	86-116	20
	Ferrous iron	15438-31-0	3500-FeB	0.0240	0.100	---	mg/L	90-114	10	55-144	10
	Nitrate	14797-55-8	SW300.0	0.0196	0.100	26,000*	mg/L	90-110	15	80-120	20
	Sulfate	14808-79-8	SW300.0	0.184	1.00	---	mg/L	90-110	15	80-120	20
	Alkalinity	---	2320B	2.18	5.00	---	mg/L	78-110	10	---	10
	Carbon dioxide	124-38-9	4500-CO2D	0.590	1.00	---	mg/L	---	---	---	---
	Methane	74-82-8	RSK SOP-175	0.109	1.00	---	µg/L	80-120	20	80-120	20

Notes:

Modifications may be made to laboratory analytical methods, as necessary and technically feasible, to improve MRLs to meet Preliminary Screening Levels

--- = Not applicable or not available
% = Percent
% R = Percent recovery
µg/L = Micrograms per liter
mg/L = Milligrams per liter
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PAHs = Polycyclic aromatic hydrocarbons
RPDL = Relative percent difference limit
TPH = Total petroleum hydrocarbons
TPHd = Total petroleum hydrocarbons as diesel
TPHg = Total petroleum hydrocarbons as gasoline
TPHo = Total petroleum hydrocarbons as oil
VOCs = Volatile organic compounds
* = MTCA Method B Cleanup Level

TABLE 2
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Matrix	Analysis	Analytical Method	Container	Preservation	Holding Time
Soil	TPHg	NWTPH-Gx	(1) 4 oz glass jar; (2) 40 mL glass VOA vial w/MeOH; (1) Field Preservation Kit	MeOH Cool to 4°C	14 days
	TPHd, TPHo	NWTPH-Dx	(1) 4 oz glass jar	Cool to 4°C	14 days for extraction; 40 days for analysis
	VOCs	EPA 8260	(1) 4 oz glass jar; (2) 40 mL glass VOA vial w/MeOH; (1) Field Preservation Kit	MeOH Cool to 4°C	14 days
	cPAHs	EPA 8270 SIM	(1) 4 oz glass jar	Cool to 4°C	14 days for extraction; 40 days for analysis
	Metals (waste soil only)	EPA 6020/7471A	(1) 4 oz glass jar	Cool to 4°C	180 days
Groundwater	TPHg	NWTPH-Gx	(3) 40 mL glass VOA vial w/HCl	HCl Cool to 4°C	14 days
	TPHd, TPHo	NWTPH-Dx	(1) 250 mL amber glass	Cool to 4°C	14 days for extraction; 40 days for analysis
	VOCs	EPA 8260	(3) 40 mL glass VOA vial w/HCl	HCl Cool to 4°C	14 days
	cPAHs	EPA 8270 SIM	(1) 1 L amber glass	Cool to 4°C	7 days for extraction; 40 days for analysis
	Total and dissolved iron and manganese	EPA 6010B	(1) 250 mL poly w/HNO_3; field-filtered	HNO_3 Cool to 4°C	15 minutes for filtration; 180 days for analysis
	Nitrate and Sulfate	EPA 300	(1) 250 mL poly	Cool to 4°C	48 hours
	Alkalinity	EPA 2320B	(1) 250 mL poly	Cool to 4°C	14 days
	Methane	RSK-175	(3) 40 mL VOA vial w/HCl	HCl Cool to 4°C	14 days
	Carbon dioxide	SM 4500-CO2_D	(1) 250 mL amber glass	Cool to 4°C	15 minutes (field test)

TABLE 2
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

Notes:

The Field Preservation Kit for soil consists of (2) x 40-mL VOA vials preserved with MeOH and 5 grams of sample volume.

°C	=	Degrees Celsius
EPA	=	United States Environmental Protection Agency
HCl	=	Hydrochloric acid
MeOH	=	Methanol
mL	=	Milliliter
NWTPH-Dx	=	Northwest Total Petroleum Hydrocarbons for Diesel/Oil Range Organics
NWTPH-Gx	=	Northwest Total Petroleum Hydrocarbons for Gasoline Range Organics
oz	=	Ounce
cPAHs	=	Carcinogenic polycyclic aromatic hydrocarbons
SIM	=	Selective ion monitoring
TPH	=	Total petroleum hydrocarbons
TPHd	=	Total petroleum hydrocarbons as diesel
TPHg	=	Total petroleum hydrocarbons as gasoline
TPHo	=	Total petroleum hydrocarbons as oil
VOA	=	Volatile organic analysis
VOCs	=	Volatile organic compounds
w/	=	With

TABLE 3
FIELD AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL SAMPLE REQUIREMENTS
ExxonMobil ADC
2717/2731 Federal Avenue
Everett, Washington

	QC Sample Type	Frequency of Sample/Analysis	Details
Field Samples	Duplicate Samples	1 duplicate per 20 samples per matrix	Duplicate sample to be collected using the same methods and at the same time (within reason) as the parent sample; used to verify sample and analytical reproducibility
	Matrix Spike/ Matrix Spike Duplicate	1 MS/MSD per 20 samples per matrix	Samples spiked by the laboratory with a known concentration of analytes of interest prior to sample preparation and analysis; used to assess the accuracy and precision of the method for that sample
	Equipment Blanks	1 equipment blank per day per sample matrix when non-dedicated/reusable sampling equipment is used	Distilled water poured over decontaminated field sampling equipment into laboratory containers (rinsate/equipment blanks); used to assess quality of data from field sampling and decontamination procedures
	Trip Blanks	1 trip blank per cooler containing samples for VOC analysis	Laboratory-prepared organic-free sample taken from the laboratory to the sampling site and transported back to the laboratory without having been exposed to sampling procedures; used to assess contamination during shipping and field handling procedures
Laboratory Samples	Method Blanks	1 method blank per batch of samples in accordance with laboratory SOP	A blank prepared to represent the matrix as closely as possible; used to assess contamination introduced during sample preparation by the laboratory
	Instrument Blanks	Defined by the analytical method or at the analyst's discretion	A blank analyzed with field samples; used to assess the presence or absence of instrument contamination
	Laboratory Control Samples and Sample Duplicates	Analyzed as per method requirements and laboratory SOPs	Samples prepared that contain analytes that are representative of the analytes of interest at known concentrations in distilled water or sand and process in the same manner as the field samples; used to demonstrate the laboratory has control over sample preparation and analysis of specific tests and to demonstrate reproducibility

Notes:
MS/MSD = Matrix spike/matrix spike duplicate
QC = Quality control
SOP = Standard operating procedure
VOC = Volatile organic compound

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Quality Assurance Manual for Environmental Analytical Services

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The NELAC Institute (TNI)
Management and Technical Requirements for Laboratories Performing Environmental Analysis
TNI Standard (EL-V1-2016-Rev 2.1) Effective December 6, 2016

1) INTRODUCTION, SCOPE, AND APPLICABILITY

1.1) Introduction and Compliance References

A. Eurofins Calscience Quality Assurance Manual (QAM) is a document prepared to define the overall policies, organization objectives and functional responsibilities for maintaining the laboratory's QA Program. Governing SOPs are in place within the organization to ensure the proper execution of this QA Manual. This manual is required reading for all personnel. Supporting SOPs are assigned reading for relevant personnel.

B. The laboratory is a team of people who work together to serve the health and environmental needs of society through science and technology. We offer comprehensive expertise in environmental laboratory applications and client relations with a focus on quality.

C. As such, this QAM has been prepared to assure compliance with the applicable versions of The NELAC Institute (TNI) Standard; ISO/IEC Guide 17025; and the Department of Defense (DoD)/Department of Energy (DOE) Quality Systems Manual (QSM). Policies and procedures referenced within this manual are compliant with the Eurofins Environment Testing (EET) National Business Line Service Center (NBLSC) procedures; Eurofins Calscience; and the associated accreditation and certification programs held by the laboratory to support environmental work.

1.2) Terms and Definitions

A. A Quality Management Program is a system designed to ensure that data produced by the laboratory conforms to the standards set by state and/or federal regulations. The program functions at the local management level through company goals, from guidance at the executive management level, and at the analytical level through Standard Operating Procedures (SOPs) and quality control. Our program is designed to minimize systematic error, encourage constructive, documented problem solving, and provide a framework for continuous improvement within the organization to better serve our clients.

B. Specific terms and acronyms used in the laboratory are defined in the corresponding procedures, identified in the analysis reports, and/or addressed in the referenced regulatory/method documents. Definitions are referenced in Calscience QAM *Appendix 1 -- Definitions*.

1.3) Scope / Fields of Testing

A. The laboratory analyzes a broad range of environmental and industrial samples. Sample matrices include, but are not limited to air, effluent water, groundwater, hazardous waste, sludge and soils. The QA Program contains specific procedures and methods to test samples of differing matrices for chemical and physical parameters. The Program also contains guidelines on maintaining documentation of analytical processes, reviewing results, servicing clients and tracking samples through the laboratory. The technical and service requirements of all analytical requests are thoroughly evaluated before commitments are made to accept the work. Measurements are made using published reference methods or methods developed and validated by the laboratory.

B. The methods covered by this manual include the most frequently requested methodologies needed to provide analytical services in the United States and its territories; and Canada. The specific list of test methods used by the laboratory can be found in TALS. Our areas of expertise include:

Standard Services	Specialty Services
A. Volatiles B. Semivolatiles C. Metals D. Pesticides/PCBs/Herbicides	A. Perchlorate B. 1,4-Dioxane C. PCB Congeners D. Explosives

E. Petroleum Hydrocarbons F. Waste Characterization G. Non-Potable Water Testing H. Soil and Surface Water Testing I. Vapor and Air Analysis J. Sediment and Tissue Testing K. Other	E. Alkyl PAHs, Alkanes, Biomarkers F. Organic Acids G. Aldehydes H. Other

C. **Note:** All current certificates and scopes of accreditation are available on the Eurofins' website at https://www.eurofinsus.com/environment-testing/resources/certifications/.

D. The approach of this manual is to define the minimum level of quality assurance and quality control necessary to meet these requirements. All methods performed by the laboratory shall meet these criteria as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs) or local regulations may require criteria other than those contained in this manual. In these cases, the laboratory will abide by the requested criteria following review and acceptance of the requirements by the Business Unit Manager (BUMA) and the Quality Assurance (QA) Manager. In some cases, QAPPs and DQOs may specify less stringent requirements. The Laboratory BUMA and the QA Manager must determine if it is in the lab's best interest to follow the less stringent requirements.

1.4) Quality Manual Review Process

A. The template on which this manual is based is reviewed annually by the NBLSC Quality Assurance leadership team. NBLSC QA will assure that the template complies with Section 1.1.

B. This manual itself is reviewed annually by senior laboratory management to assure that it reflects current practices and meets the requirements of the laboratory's clients and regulators. Occasionally, the manual may need to be revised in order to meet new or changing regulations and operations. The QA Manager (or designee) will review the changes in the normal course of business and incorporate changes into revised sections of the document. All updates will be reviewed by the designated senior laboratory management staff. The laboratory updates and approves such changes in accordance with our *Document Control* processes.

2) MANAGEMENT REQUIREMENTS

2.1) Overview

A. The laboratory is an independent business unit within the Eurofins Environment Testing group of companies. The laboratory's operational and support staff have the day-to-day independent operational authority under the direction of the Business Unit Manager (BUMA). The laboratory's quality system is managed under the oversight of the QA Manager with the BUMA. The laboratory management staff includes the operations manager, department managers and group leaders. The organizational chart of the management staff is included as Appendix 3. Individual department staff lists are maintained in the laboratory's internal records.

2.2) Roles and Responsibilities

A. **Business Unit Manager**

1. The BUMA is responsible for the overall quality, safety, financial, technical, human resource and service performance of the BU and reports to their Business Unit or Scope President. The BUMA is also responsible for any service centers connected with their BU that perform analytical tests, such as short holding time analyses. The BUMA provides the resources necessary to implement and maintain an effective and comprehensive Quality Assurance and Data Integrity Program.

2. Specific responsibilities include, but are not limited to:

a. Designates one or more technical managers for the appropriate fields of testing. If the Technical Manager is unavailable for a period of time exceeding 15 consecutive calendar days, the BUMA must designate another staff member meeting the qualifications of the Technical Manager to temporarily perform this function. If the absence exceeds 35 calendar days, the primary accrediting body must be notified in writing.

b. Ensures that all analysts and supervisors have the appropriate education and training to properly carry out the duties assigned to them and ensures that this training has been documented. Works with Eurofins Environment Testing Human Resources for hiring of new personnel.

c. Ensures that personnel are free from any commercial, financial and other undue pressures which might adversely affect the quality of their work.

d. Ensures Eurofins human resource policies are adhered to and maintained.

e. Ensures that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory. Assesses laboratory capacity and workload.

f. Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the QA Manual or laboratory SOPs may be temporarily suspended by the BUMA.

g. Reviews and approves, or delegates the responsibility for review and approval, for all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.

h. Pursues and maintains appropriate laboratory certification and contract approvals. Supports ISO 17025 requirements.

i. Ensures client specific reporting and quality control requirements are met.

j. Contributes to the continuous improvement of the laboratory operations.

k. Maintains an awareness of technical developments and regulatory requirements.

l. Leads the management team, consisting of the QA Manager, the Technical Manager(s), and the Operations Manager as direct reports.

B. **Quality Assurance Manager**

1. The QA Manager has responsibility and authority to ensure the continuous implementation of the quality system for the BU. The QA Manager is also responsible for any service centers connected with their BU that perform analytical tests, such as short holding time analyses.

2. The QA Manager reports directly to the BUMA. This position is able to evaluate data objectively and perform assessments without outside (e.g., managerial) influence. The National Business Line Service Center (NBLSC) QA team and procedures may be used as a resource in dealing with regulatory requirements, certifications and other quality assurance related items.

3. The QA Manager directs the activities of the QA staff to accomplish specific responsibilities, which include, but are not limited to:

   a. Serves as the focal point for QA/QC in the laboratory.

   b. Have functions independent from laboratory operations for which he/she has quality assurance oversight.

   c. Have documented training and/or experience in QA/QC procedures and the laboratory’s Quality System.

d. Have a general knowledge of the analytical test methods for which data audit/review is performed (and/or having the means of getting this information when needed).

e. Arrange for or conducting internal audits on quality systems and the technical operation Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QA Manual or laboratory SOPs shall be investigated following procedures outlined in Section 12 and if deemed necessary may be temporarily suspended during the investigation.

f. Maintaining and updating the QA Manual.

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

h. Monitoring and communicating regulatory changes that may affect the laboratory to management.

i. Training and advising the laboratory staff on quality assurance/quality control procedures that are pertinent to their daily activities.

j. The laboratory QA Manager will maintain records of all ethics-related training, including the type and proof of attendance.

k. Maintain, improve, and evaluate the corrective action database and the corrective and preventive action systems.

l. Objectively monitor standards of performance in quality control and quality assurance without outside (e.g., managerial) influence.

m. Coordinating of document control of SOPs, MDLs, control limits, and miscellaneous forms and information.

n. Performing technical data audits and method audits to ensure consistency and compliance with regulatory requirements.

o. Review of external audit reports and data validation requests.

p. Follow-up with audits to ensure client QAPP requirements are met.

q. Establishment of reporting schedule and preparation of various quality system reports for the BUMA, clients and/or NBLSC QA.

r. Development of suggestions and recommendations to improve quality systems.

s. Research of current state and federal requirements and guidelines.

t. Participate in the vendor and supplier approval process, including subcontractors.

u. Leads the QA team to enable communication and distribution of duties and responsibilities.

v. Communication with the relevant regulatory bodies when there are management or facility changes that impact the laboratory.

w. Ensuring communication & monitoring standards of performance to ensure that systems are in place to produce the level of quality as defined in this document.

x. Evaluation of the thoroughness and effectiveness of training.

y. Compliance with ISO 17025.

z. Compliance with the DoD/DOE QSM (where applicable).

C. **Department Managers**

1. The Department Manager(s) report(s) directly to the BUMA. He/she is accountable for all analyses and analysts under their experienced supervision and for compliance with the ISO 17025:2017 and TNI Standard. The scope of responsibility ranges from the new-hire process and existing technology through the ongoing training and development programs for existing analysts and new instrumentation.

2. Specific responsibilities include, but are not limited to:

    a. Exercises day-to-day supervision of laboratory operations for the appropriate field of accreditation and reporting of results. Coordinating, writing, and reviewing preparation of all test methods, i. e., SOPs, with regard to quality, integrity, regulatory and optimum and efficient production techniques, and subsequent analyst training and interpretation of the SOPs for implementation and unusual project samples. He/she insures that the SOPs are properly managed and adhered to at the bench. He/she develops standard costing of SOPs to include supplies, labor, overhead, and capacity (design vs. demonstrated versus first-run yield) utilization.

    b. Reviewing and approving client project proposals, with input from the QA Manager and in accordance with an established procedure for the review of requests and contracts. This procedure addresses the adequate definition of methods to be used for analysis and any limitations, the laboratory's capability and resources, the client's expectations. Differences are resolved before the contract is signed and work begins. A system documenting any significant changes is maintained, as well as pertinent discussions with the client regarding their requirements or the results of the analyses during the performance of the contract. All work subcontracted by the laboratory must be approved by the client. Any deviations from the contract must be disclosed to the client. Once the work has begun, any amendments to the contract must be discussed with the client and so documented.

    c. Monitoring the validity of the analyses performed and data generated in the laboratory. This activity begins with reviewing and supporting all new business contracts, insuring data quality, analyzing internal and external nonconformances to identify root cause issues and implementing the resulting corrective and preventive actions, facilitating the data review process (training, development, and accountability at the bench), and providing technical and troubleshooting expertise on routine and unusual or complex problems.

    d. Providing training and development programs to applicable laboratory staff as new hires and, subsequently, on a scheduled basis. Training includes instruction on calculations, instrumentation management to include troubleshooting and preventive maintenance.

    e. Enhancing efficiency and improving quality through technical advances and improved LIMS utilization. Capital forecasting and instrument life cycle planning for second generation methods and instruments as well as asset inventory management.

    f. Coordinating sample management from "cradle to grave," insuring that no time is lost in locating samples.

    g. Scheduling all QA/QC-related requirements for compliance, e.g., MDLs, etc.

    h. Captains department personnel to communicate quality, technical, personnel, and instrumental issues for a consistent team approach.

    i. Coordinates audit responses with the QA Manager.

    j. Compliance with ISO 17025.

    k. Compliance with the DoD/DOE QSM (where applicable).

D. **Operations Manager**

1. The Operations Manager manages and directs the analytical production sections of the laboratory. He/She reports directly to the BUMA. He/She assists the Technical Manager in determining the most

efficient instrument utilization.

2. More specifically, he/she:

   a. Evaluates the level of internal/external nonconformances for all departments.

   b. Continuously evaluates production capacity and improves capacity utilization.

   c. Continuously evaluates turnaround time and addresses any problems that may hinder meeting the required and committed turnaround time from the various departments.

   d. Develops and improves the training of all analysts in cooperation with the Technical Manager and QA Manager and in compliance with regulatory requirements.

   e. Works with the technical department management and staff to ensure that scheduled instrument maintenance is completed.

   f. Is responsible for efficient utilization of supplies.

   g. Constantly monitors and modifies the processing of samples through the departments.

   h. Fully supports the quality system and, if called upon in the absence of the QA Manager, serves as his/her substitute in the interim.

E. **Project Manager (PM)**

1. The members of the laboratory Client Services/Project Management Group are responsible for organizing and managing client projects. Clients are assigned a project manager who serves as their primary contact at the laboratory. It is the PM's responsibility to act as the client advocate by communicating client requirements to laboratory personnel and ensuring that clients provide complete information needed by the laboratory to meet those requirements – including all verbal communications.

2. With the overall goal of total client satisfaction, the functions of this position are outlined below:

   a. Scheduling sample submissions, sample container orders and sample pick-up via the laboratory courier service.

   b. Confirming certification status.

   c. Coordinating and communicating turnaround time (TAT) requirements for high priority samples/projects.

   d. Answering common technical questions, facilitating problem resolution and coordinating technical details with the laboratory staff.

   e. Ensuring that client specifications, when known, are met by communicating project and quality assurance requirements to the laboratory.

   f. Coordinating subcontract laboratory services and logistics when needed.

   g. Notifying the supervisors of incoming projects and sample delivery schedules.

   h. Accountable to clients for communicating sample status reports or results prior to receipt of the final report.

   i. Monitor the status of all data package projects in-house to ensure timely and accurate delivery of reports.

   j. Inform clients of data package-related problems and resolve service issues.

F. **Group Leaders**

1. Group Leaders report to the Operations Manager. Each one is responsible to:

   a. Ensure that staff in their department adheres to applicable SOPs and the QA Manual. They perform scheduled SOP and QA Manual review to determine if staff and processes are in compliance and if new, modified, and optimized measures are feasible and should be added to these documents.

   b. With regard to staff, participates in the selection, training (as documented in Section 3.3), development of performance objectives and standards of performance, appraisal (measurement of objectives), scheduling, counseling, discipline, and motivation of the staff and documents these activities in accordance with systems developed by the QA and Personnel Departments. They evaluate staffing sufficiency and overtime needs. Training consists of familiarization with SOP, QC, Safety, and computer systems.

   c. Encourage the development of staff to become cross-trained in various methods, processes, and/or operate multiple instruments efficiently while performing maintenance and documentation, self-supervise, and function as a department team.

   d. In conjunction with the Technical Manager, Operations Manager, and/or QA Manager, provide guidance to staff in resolving problems encountered during performance of their duties. Each is responsible for ensuring 100% of the data review and documentation, nonconformance issues, the timely and accurate completion of performance testing (PT) samples and MDLs, for the department.

   e. Ensure all logbooks are maintained, current, and properly labeled or archived.

   f. Ensure that preventive maintenance is performed on instrumentation as detailed in the QA Manual or SOPs and is responsible for developing and implementing a system for preventive maintenance, troubleshooting, and repairing or arranging for repair of instruments.

   g. Maintain adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.

   h. Achieve optimum turnaround time on analyses and compliance with holding times.

   i. Conduct efficiency and cost control evaluations on an ongoing basis to determine optimization of labor, supplies, overtime, first-run yield, capacity (designed vs. demonstrated), second- and third-generation production techniques/instruments, and long-term needs for budgetary planning.

   j. Develop, implement, and enhance calibration programs.

   k. Provide written responses to external and internal audit issues.

G. **Laboratory Analysts / Technicians**

1. Laboratory analysts/technicians are responsible for conducting analyses and performing all tasks assigned to them by the group leader or supervisor.

2. The responsibilities of the analysts are listed below:

   a. Perform analyses by adhering to analytical and quality control protocols prescribed by current SOPs, this QA Manual, and project-specific plans honestly, accurately, timely, safely, and in the most cost-effective manner.

   b. As applicable to their assigned tasks, document standard, reagent, and sample preparation, instrument calibration and maintenance, data calculations, sample matrix effects, and any observed nonconformance on worklists, benchsheets, lab notebooks and/or the LIMS.

c. Report all nonconformance situations, instrument problems, matrix problems and QC failures, which might affect the reliability of the data, to their supervisor or member of QA staff.

d. Perform 100% review of the data generated prior to submitting for secondary level review.

e. Suggest method improvements to their supervisor or member of QA staff. These improvements, if method compliant and approved, will be incorporated. Ideas for the optimum performance of their assigned area are encouraged.

f. Work cohesively as a team in their department to achieve the goals of accurate results, data quality, optimum turnaround time, cost effectiveness, cleanliness, complete documentation, and personal knowledge of environmental analysis.

2.3) Business Continuity and Contingency Plans

A. Various policies and practices are in place to address continuity of business and contingency plans to ensure continued operations or minimal disruption in operations should unplanned events (natural disasters, unexpected management changes, etc.) occur. Deputies are identified for all key management personnel. Deputies would temporarily fill a role if the primary is unavailable for more than 15 consecutive calendar days. The deputies must meet the same qualifications as the primary person should they be required to take on the responsibilities. The QA Manager communicates to the relevant regulatory authorities when there are management or facility changes that impact the laboratory. Changes in the technical director must be communicated within a period of time and in the manner dictated by each regulatory authority.

B. The following table defines who assumes the responsibilities of key personnel in their absence:

Key Personnel	Deputy
Michael DeCavallas Business Unit Manager	Elizabeth Winger President/Scope Leader
Terri Garcia Quality Assurance Manager	Jose Estrada Tiempos Quality Assurance Specialist
Ryan Parish Operations Manager	Michael DeCavallas Business Unit Manager
Terri Garcia Technical Manager	Ryan Perish Operations Manager
Jeanie Kang SVOC Department Manager	Ryan Parish Operations Manager
Sylvie Doan VOC Department Manager	Ryan Parish Operations Manager
Stephen Nowak EHS Manager	Roger Hoover EHS Coordinator
William Mitzel Sales Director	Sean Leffler Business Development Manager
Virendra Patel Customer Service Manager - Operations	Lori Thompson Customer Service Manager
Lori Thompson Customer Service Manager	Virendra Patel Customer Service Manager - Operations
Cynthia Jih Office Manager	Ashlie Soto Administrative Specialist

3) PERSONNEL

3.1) Overview

A. The laboratory’s management believes that its highly qualified and professional staff is the single most important aspect in assuring a high level of data quality and service and achieves the goals of competence, impartiality and consistent operation of the laboratory. The staff consists of professionals

and support personnel. The laboratory employs sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned responsibilities.

B. All personnel must demonstrate competence in the areas where they have responsibility. Any staff that is undergoing training shall have appropriate supervision until they have demonstrated their ability to independently perform their job functions. Staff shall be qualified for their tasks based on appropriate education, training, experience and/or demonstrated skills as required.

C. All personnel are responsible for complying with all QA/QC requirements that pertain to the laboratory and their area of responsibility. Each staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular area of responsibility. Technical staff must also have a general knowledge of lab operations, test methods, QA/QC procedures and records management.

D. Laboratory management is responsible for formulating goals for staff with respect to education, training, and skills and for ensuring that the laboratory has a policy and procedures for identifying training needs and providing training of personnel. The training shall be relevant to the present and anticipated responsibilities of the laboratory staff.

E. The laboratory only uses personnel that are employed by or under contract to, the laboratory. Contracted personnel, when used, must meet competency standards of the laboratory and work in accordance to the laboratory's quality system.

3.2) Education and Experience Requirements for Technical Personnel

A. The laboratory makes every effort to hire analytical staff that possesses a college degree (AA, BA, BS) in an applied science with some chemistry in the curriculum. Selection of qualified candidates for laboratory employment begins with documentation of the minimum levels of education, training, and experience needed to perform the prescribed tasks.

3.3) Training

A. The laboratory is committed to furthering the professional and technical development of employees at all levels. Orientation to the laboratory's policies and procedures, in-house method training, and employee attendance at outside training courses and conferences all contribute toward employee proficiency.

B. Eurofins trainings are achieved through a combination of in-person presentations, recorded/electronic presentations/courses managed through the Eurofins Learning Centre (ELC) platform, supervised on the job training, and SOP reading. All training is documented with employee acknowledgement of completion.

C. New hire orientation and training begins the first week of employment. These initial sessions include overviews of the business, quality system policies and procedures, ethics and data integrity, resources, health and safety, and introduction of their job specific tasks.

D. Comprehensive Environmental Health and Safety training and review of the *EHS Manual* must be completed prior to performance of work in the laboratories.

E. Formal *Ethics and Data Integrity* and, where applicable, *Manual Integration* trainings are completed within the first 60 days of employment and include reading the associated policies and completing the assigned courses and presentations, in person and/or on-line.

F. Initial Demonstration of Capability (IDOC) must be completed and approved prior to independent performance of analytical method testing. See Section 3.3.1.

G. The following occur annually:

1. *Ethics and Data Integrity Refresher* training - all employees.

2. *Manual Integration Training* - applicable employees.

3. Ongoing Demonstration of Capability (ODOC) - technical staff - see Section 3.3.2

H. The laboratory maintains records of relevant authorization/competence, education, professional qualifications, training, skills and experience of technical personnel, as well as the date that approval/authorization was given. These records are kept on file at the laboratory.

I. The training of technical staff is kept up to date by:

1. Each employee must have documentation in their training file that they have read, understood and agreed to follow the most recent version of the laboratory QA Manual and SOPs in their area of responsibility. This documentation is updated as SOPs are updated.

2. Documentation from any training courses or workshops on specific equipment, analytical techniques or other relevant topics.

3. Documentation of proficiency.

4. An Ethics Agreement signed by each staff member (renewed each year) and evidence of annual ethics training.

5. A Confidentiality Agreement signed by each staff member signed at the time of employment.

6. Human Resources maintains documentation and attestation forms on employment status and records; benefit programs; timekeeping/payroll; and employee conduct (e.g., ethics violations). This information is maintained in the employee's secured personnel file.

3.3.1) Initial Demonstration of Capability (IDOC)

A. An individual must successfully perform an IDOC prior to independently analyzing and reporting client samples, and any time there is a change in instrument type, method, or any time that a method has not been performed by the analyst in a twelve (12) month period.

B. If the method or regulation does not specify an IDOC, it is the responsibility of the laboratory to document in their SOP what other approaches to the IDOC can be used.

C. The laboratory SOP No. *27925* details the following:

1. The preparation and analysis of 4 laboratory control samples (LCS), prepared at 1 to 4 times the limit of quantitation (LOQ).

2. The evaluation criteria.

3. Actions to be taken for IDOC failure.

3.3.2) Continuing Demonstration of Capability (CDOC)

A. The CDOC procedure is detailed in the laboratory SOP. This process must be completed annually for each employee for the tests that they are performing. If the method has not been performed by the analyst in a twelve (12) month period, an IDOC shall be performed.

B. This on-going demonstration may be one of the following:

1. Acceptable performance of a blind sample (single blind to the analyst) or successful analysis of a blind performance sample on a similar method using the same technology (e.g., GC/MS volatiles by purge and trap for Methods 524.2, 624 or 5030/8260).

2. Another IDOC

3. At least four (4) consecutive laboratory control samples with acceptable levels of precision and accuracy.

4. For methods that do not lend themselves to spiking - documented process of observing the analyst performing the process and/or comparison of results between two analysts with documented

evaluation of the precision.

3.4) Ethics and Data Integrity Training

A. The laboratory's Ethics and Data Integrity Program is discussed in Section 5.2. Employees are trained as to the legal and environmental repercussions that result from data misrepresentation. Key topics covered in the presentation include:

1. Organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting and business practices.
2. *Ethics and Data Integrity Policy* and the Eurofins Ethics Statement.
3. Consequences for infractions including potential for immediate termination, debarment, or criminal prosecution.
4. How and when to report ethical/data integrity issues.
5. Confidential reporting.
6. Record keeping.
7. Discussion regarding data integrity procedures.
8. Specific examples of breaches of ethical behavior (e.g. peak shaving, altering data or computer clocks, improper macros, etc., accepting/offering kickbacks, illegal accounting practices, unfair competition/collusion).
9. Internal monitoring, investigations, and data recalls.
10. Importance of proper written narration / data qualification by the analyst and project manager with respect to those cases where the data may still be of use to the client but have some method or project deficiencies.

B. Additionally, an anonymous third party run hotline is available to all employees as a means of reporting ethics and/or data integrity issues or concerns.

1. Lighthouse Services hotline at www.lighthouse-services.com/eurofinsus.
2. Via e-mail reports@lighthouse-services.com (include company name).
3. Or call 855-910-0005 (Spanish speaking 800-216-1288).

4) ACCOMODATIONS AND ENVIRONMENTAL CONDITIONS

4.1) Overview

A. The laboratory is a secure laboratory facility with controlled access and designed to accommodate an efficient workflow and to provide a safe and comfortable work environment for employees. All visitors sign in and are escorted by laboratory personnel. Access is controlled by various measures.

B. The laboratory is equipped with structural safety features. Each employee is familiar with the location, use, and capabilities of general and specialized safety features associated with their workplace. The laboratory provides and requires the use of protective equipment including safety glasses, protective clothing, gloves, etc., OSHA and other regulatory agency guidelines regarding required amounts of bench and fume hood space, lighting, ventilation (temperature and humidity controlled), access, and safety equipment are met or exceeded.

C. Traffic flow through sample preparation and analysis areas is minimized to reduce the likelihood of contamination. Adequate floor space and bench top area is provided to allow unencumbered sample preparation and analysis space. Sufficient space is also provided for storage of reagents and media,

glassware, and portable equipment. Ample space is also provided for refrigerated sample storage before analysis and archival storage of samples after analysis. Laboratory HVAC and deionized water systems are designed to minimize potential trace contaminants.

D. The laboratory is separated into specific areas for sample receiving, sample preparation, volatile organic sample analysis, non-volatile organic sample analysis, inorganic sample analysis, and administrative functions.

4.2) Environment

A. Laboratory accommodation, test areas, energy sources, and lighting are adequate to facilitate proper performance of tests. The facility is equipped with heating, ventilation, and air conditioning (HVAC) systems appropriate to the needs of environmental testing performed at this laboratory.

B. The environment in which these activities are undertaken does not invalidate the results or adversely affect the required accuracy of any measurements.

C. The laboratory provides for the effective monitoring, control and recording of environmental conditions that may affect the results of environmental tests as required by the relevant specifications, methods, and procedures. Such environmental conditions include temperature. When temperature changes to a point where it may adversely affect test results, analytical testing will be discontinued until the temperature is returned to the required level.

D. Environmental conditions of the facility housing the computer network and LIMS are regulated to protect against raw data loss.

E. When the laboratory performs laboratory activities at sites or facilities outside its permanent control, it shall ensure that the requirements related to facilities and environmental conditions of this document are met.

F. Specific requirements for facility and environmental conditions, as well as periodic monitoring of conditions, are given in the NDLSC Document *NDSC-US-EHS-QP46060 Environmental Health & Safety Manual* plus each laboratory's Facility Addendum.

4.3) Work Areas

A. There is effective separation between neighboring areas when the activities therein are incompatible with each other. For example, volatile organic chemical handling areas, including sample preparation and waste disposal, and volatile organic chemical analysis area.

B. Access to and use of all areas affecting the quality of analytical testing is defined and controlled by secure access to the laboratory building as described in the Building Security section of this manual.

C. Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality. These measures include regular cleaning to control dirt and dust within the laboratory. Work areas are available to ensure an unencumbered work area. Work areas include:

1. Access and entryways to the laboratory
2. Sample receipt areas
3. Sample storage areas
4. Chemical and waste storage areas
5. Data handling and storage areas
6. Sample processing areas
7. Sample analysis areas

4.4) Responding to Emergencies

A. Employees are trained in the procedures to respond to all emergencies that might occur in the workplace. Employees have been trained in the location and proper operation of all emergency equipment, evacuation routes and designated assembly areas for all areas where they work.

B. Refer to the *NDSC-US-EHS-QP46060 EH&S Manual* and the laboratory's local EH&S addendum for complete details. The document provides direction for situations where normal operations of the laboratory are not possible (e.g., electrical failures, heating/air conditioning failures, fire/building evacuation, computer failures, hazardous material spills, injury to employees, pandemic flu, disruption of phone service, etc.).

C. In the event that the building or information technology (IT) systems would be severely challenged, a designated disaster recovery team, which includes Facility Management, Safety, Executive Management, IT, QA and other applicable personnel, depending on the scope of the disaster, would assemble at a designated area to assess the situation and formulate a plan.

4.5) Building Security

A. The laboratory is considered a secure facility. All outside doors, except the main lobby entrance and sample receiving area, are locked during normal business hours to prevent unauthorized entry. Employees are issued a building access key card to access the facility.

B. All visitors to the facility must sign in and out in a visitor's logbook that is located in the lobby. A visitor is defined as any person who visits the laboratory who is not an employee of the laboratory. Both visitors and vendors must review and sign specific EH&S forms; and are escorted by laboratory personnel at all times, or the location of the visitor is noted in the visitor's logbook.

5) QUALITY SYSTEM

5.1) Quality Policy Statement

A. The Quality Policy statement gives employees clear requirements for the production of analytical data. As an organization, all personnel are committed to high quality professional practice, testing and data, and service to our clients.

1. Calscience is committed to providing its customers with environmental data that is reliable, defensible, and of known and documented quality. We continually strive to meet our customers' requirements and exceed their expectations.

2. This Quality Assurance Manual and related documentation describes the policies and procedures used to meet that commitment. The Manual is designed to meet the standards used in the NELAP, the State of California SWRCB ELAP, and other government and customer requirements. Laboratory management is committed to the quality improvement processes described in these standards and to providing the resources to ensure laboratory personnel can honor that commitment.

3. Laboratory personnel whose responsibilities include any aspect of testing activities are required to familiarize themselves with all of the quality documentation associated with their job function and to implement the policies and procedures described in that documentation into all of their work in the laboratory. Laboratory personnel acknowledge this responsibility on annual review of the Quality Assurance Manual by acknowledging they have read, understood and agree to act accordingly.

4. Management reviews this Quality Policy and the objectives listed below during the annual Management Review. The signatures of management personnel on this Quality Assurance Manual indicate their concurrence and support of this Policy.

5.2) Ethics and Data Integrity

A. The Eurofins Environment Testing group of companies is committed to ensuring the integrity of its data and meeting the quality needs of its clients. The laboratory operates our Ethics and Data Integrity program under the guidance of Eurofins Key Guidance Documents (KGD) and the Eurofins *NBLSC Ethics and Data Integrity Policy.*

B. The elements of the Ethics and Data Integrity Program include:

1. *Ethics and Data Integrity Policy* and Eurofins Ethics and Quality Policy Statements.
2. A Training Program.
3. Self-governance through disciplinary action for violations.
4. A confidential mechanism for anonymously reporting alleged misconduct (see Section 4.2 of this manual) and a process for conducting internal investigations of all alleged misconduct.
5. Procedures and guidance for recalling data if necessary.
6. Effective external and internal monitoring system that includes procedures for internal audits (SOP No. *18249*).
7. Produce results, which are accurate and include QA/QC information that is method compliant and/or meets client pre-defined Data Quality Objectives (DQOs).
8. Present services in a confidential, honest and forthright manner.
9. Provide employees with guidelines and an understanding of the Ethical and Quality Standards of our Industry.
10. Provide procedures and guidance to ensure the impartiality and confidentiality of all data and customer information.
11. Operate our facilities in a manner that protects the environment and the health and safety of employees and the public.
12. Obey all pertinent federal, state and local laws and regulations and encourage other members of our industry to do the same.
13. Educate clients as to the extent and kinds of services available.
14. Assert competency only for work for which adequate personnel and equipment are available and for which adequate preparation has been made.
15. Promote the status of environmental laboratories, their employees, and the value of services rendered by them.

5.3) Quality System Documentation

A. The BU's quality system is defined and communicated through a variety of documents. There is a hierarchy of documents within Eurofins and for the local BU.

B. The top EET level documents are the NBLSC policies and procedures. These are written, approved, and released by the NBLSC QA team with input from NBLSC IT and EHS staff, where applicable. These documents provide procedures that can be used as guidance or a template for establishing local procedures or may be used directly as the local BU SOP by assigning the local staff to train on the NBLSC document. This level of document is written to address Environment US regulatory processes and requirements (i.e. ISO17025, TNI, DOE/DoD). Any individual state agency requirements are addressed locally.

C. The local BU defines its quality system through its own policies and procedures which must at a minimum meet the guidance set forth in the NBLSC SOPs. The BU documents are established using the following structure/hierarchy:

1. Quality Manual
2. Laboratory Operational SOPs and policies.
    a. Those that apply to the BU as a whole.

b. Those that apply to specific areas of the BU.

3. Laboratory Analytical SOPs - define method specific processes to be followed in the laboratory tests.

4. Forms and Instruction Sheets - e.g., checklists, preformatted bench sheets, job aids

D. All of the documents described here are controlled with defined versioning, review, and approval processes. The BU management and QA staff have the responsibility and authority to operate in compliance with regulatory requirements of the jurisdiction in which the work is performed.

5.4) Quality Control (QC) Objectives for the Measurement of Data

A. Quality Assurance (QA) is responsible for developing planned activities whose purpose is to provide assurance to all levels of management that a quality program is in place within the laboratory, and that it is functioning in an effective manner that is consistent with the requirements of NELAP, ISO 17025, DoD, and any other regulatory agencies (i.e., states) in which the laboratory maintains accreditation.

B. Quality Control (QC) is generally understood to be limited to the analyses of samples and to be synonymous with the term "analytical quality control". QC refers to the routine application of statistically based procedures to evaluate and control the accuracy of results from analytical measurements. The QC program includes procedures for estimating and controlling precision and bias and for determining reporting limits.

C. Request for Proposals (RFPs) and Quality Assurance Project Plans (QAPP) provide a mechanism for the client and the laboratory to discuss the data quality objectives in order to ensure that analytical services closely correspond to client needs. In order to ensure the ability of the laboratory to meet the Data Quality Objectives (DQOs) specified in the QAPP, clients are advised to allow time for the laboratory to review the QAPP before being finalized. The client is responsible for developing the QAPP; however, the laboratory will provide support to the client for developing the sections of the QAPP that concern laboratory activities.

5.5) Criteria for Quality Indicators

A. The laboratory maintains tables, housed in LIMS, that summarize the precision and accuracy acceptability limits for performed analyses. This summary includes an effective date, is updated each time new limits are generated, and are managed by the laboratory's QA department. Unless otherwise noted, limits within these tables are laboratory generated. Some acceptability limits are derived from US EPA methods or other referenced methods. Where US EPA method limits are not prescriptive, the laboratory has developed limits from evaluation of data from similar matrices. Criteria for development of control limits is contained in *Internal Quality Control Checks* (SOP No. *33613*).

5.6) Statistical Quality Control

A. Statistically-derived precision and accuracy limits are required by selected methods (such as SW-846) and programs. The laboratory routinely utilizes statistically-derived limits to evaluate method performance and determine when corrective action is appropriate. The analysts use the current limits entered into LIMS. If a method defines the QC limits, the method limits are used.

B. If a method requires the generation of historical limits, the lab develops such limits from recent data in the QC database of the LIMS following the guidelines described in Section 22. All calculations and limits are documented and dated when approved and effective. On occasion, a client requests contract-specified limits for a specific project.

C. Current QC limits are entered and maintained in the LIMS analyte database. As sample results and the related QC are entered into LIMS, the sample QC values are compared with the limits in LIMS to determine if they are within the acceptable range. The analyst then evaluates if the sample needs to be reanalyzed or re-extracted/reanalyzed or if a comment should be added to the report explaining the reason for the QC outlier.

5.6.1) Quality Control Charts

A. QC Charting is available in LIMS for evaluation at any point by technical and/or QA staff. A LIMS program, QC Trending, applies a modified version of the "Western Electric Company Rules for Control Charts (WECO)" in an automatic scan of entered analytical data for Method Blanks, Laboratory Control

Sample and Matrix Spike Recoveries, and Continuing Calibration Verifications. The system allows daily monitoring of trending to allow quick intervention by the chemist or group leader prior to an analytical process becoming out of control. Notification emails are sent each morning.

5.7) Quality System Metrics

A. In addition to the QC parameters discussed above, the entire Quality System is evaluated on a monthly basis through the use of specific metrics (refer to Section 16). These metrics are used to assess risk and to drive continuous improvement in the laboratory's Quality System. The metrics are reviewed by the BUMA and the QA Manager and shared with other management staff.

5.8) Management of Change

A. The Management of Change process is designed to manage significant events and changes that occur within the laboratory. Through these procedures, the potential risks inherent with a new event or change are identified and evaluated. The risks are minimized or eliminated through pre-planning and the development of preventive measures.

B. The types of changes covered under this system include (but is not limited to): Laboratory Relocation, Facility Changes, Major Accreditation Changes, Implementation of Method Updates or Program Changes (e.g., MUR, client QAPPs, Regulatory Updates), Addition or Deletion to Laboratory Capabilities or Instrumentation, Key Personnel Changes, Laboratory Information Management System (LIMS) changes.

6) DOCUMENT CONTROL

6.1) Overview

A. The QA Department is responsible for the control of documents used in the laboratory to ensure that the approved current document revision is in circulation and obsolete documents are archived (original signed copy) and any obsolete hardcopies (other than the signed original) are destroyed. The laboratory's document control procedure is defined in SOP No. *18405*.

B. The following documents, at a minimum, must be controlled:

1. Laboratory Quality Assurance (QA) Manual
2. Laboratory Policies
3. Laboratory Standard Operating Procedures (SOP)
4. Work Instructions, Forms, Tables, and Matrices
5. NBLSC Documents

C. The NBLSC documents are considered "controlled" when they are accessed as the electronic file on the documents site. Printed copies are considered uncontrolled unless the laboratory physically distributes them as controlled documents.

D. The laboratory QA Department also maintains a listing of various references and document sources integral to the operation of the laboratory. This includes reference methods and regulations. Instrument manuals (hard or electronic copies) are also maintained by the laboratory.

E. The laboratory maintains control of records for raw analytical data and supporting records such as audit reports and responses, logbooks, standard logs, training files, MDL studies, Proficiency Testing (PT) studies, certifications and related correspondence, and corrective action reports. Raw analytical data consists of bound logbooks, instrument printouts, any other notes, magnetic media, electronic data, and final reports.

6.2) Document Approval and Issuance

A. The pertinent elements of the document control system includes a unique document number, title, pagination, the total number of pages of the item or an 'end of document' indicator, the effective date,

expiration date, and revision number. The QA personnel are responsible for the maintenance of this system.

B. Controlled documents are authorized by the QA Department. In order to develop a new document, a responsible manager submits a draft to the QA Department for suggestions and approval before use. Upon approval, QA personnel add the identifying version information to the document and retains that document as the official document on file. That document is then provided to all applicable operational units. Controlled documents are identified as such and records of their distribution are kept by the QA Department. Document control may be achieved by either electronic or hardcopy distribution.

C. The QA Department maintains a list of the official versions of controlled documents.

D. Quality System Policies and Procedures will be reviewed at a minimum of every two years and revised as appropriate. Changes to documents occur when a procedural change warrants.

6.3) Procedures for Document Control

A. For creation of or changes to SOPs and the QA manual, refer to laboratory SOP No. *18076*, *Document Preparation, Review, and Revision*.

B. Uncontrolled copies must not be used within the laboratory. Controlled documents are marked as such, and posted to D4. Controlled distribution is achieved electronically. Controlled hardcopies must be obtained through the QA Department. Previous revisions and back-up data are stored on D4 by the QA department. Details of the numbering system, required format, and controlled distribution of documents are described in laboratory SOP No. *18405*. Editable copies are stored on a restricted access drive or accessed by designated personnel in D4.

C. Forms, worksheets, work instructions, and information are organized by department by QA. Controlled electronic versions are distributed through the intranet or on D4 and hard copies can be printed out as needed. Editable copies are accessed by designated personnel in D4. All forms used in the laboratory are tracked in the controlled documents database which can be accessed by the QA department and the IT group. The procedure for the care of these documents is in laboratory SOP No. *18405*.

6.4) Obsolete Documents

A. All invalid or obsolete documents are removed, or otherwise prevented from unintended use. The laboratory has specific procedures as described above to accomplish this. In general, obsolete documents are collected from employees according to distribution lists and are marked obsolete on the cover or destroyed. At least one copy of the obsolete document is archived according to SOP No. *18405*.

B. All documents reside with the D4 document management system. Only the current version of a document is accessible by the general user. Once a revision is made to a document, the prior version is automatically marked as "Invalid" and redirects the user to the current version.

C. If a document is no longer needed at all and is made "Obsolete" it is "deleted" from the current documents but archived within the system and automatically marked as such.

D. All "obsolete" and prior versions of documents can be accessed by designated personnel under the advanced search function within the program.

7) SERVICE TO THE CLIENT

7.1) Overview

A. The laboratory has established procedures for the review of work requests and contracts, oral or written. The procedures include evaluation of the laboratory’s capability and resources to meet the contract’s requirements within the requested time period. All requirements, including the methods to be used, must be adequately defined, documented and understood. For many environmental sampling and analysis programs, testing design is site or program specific and does not necessarily fit into a standard laboratory service or product. It is the laboratory’s intent to provide both standard and customized environmental laboratory services to our clients.

B. A thorough review of technical and QC requirements contained in contracts is performed to ensure project success. The appropriateness of requested methods, and the laboratory's capability to perform them must be established. Projects, proposals, and contracts are reviewed for adequately defined requirements and the laboratory's capability to meet those requirements. Alternate test methods that are capable of meeting the clients' requirements may be proposed by the laboratory. A review of the laboratory's capability to analyze non-routine analytes is also part of this review process.

C. All projects, proposals and contracts are reviewed for the client's requirements in terms of analyte lists, test methodology requested, sensitivity (detection and reporting levels), accuracy, and precision requirements (% Recovery and RPD). The reviewer ensures that the laboratory's test methods are suitable to achieve these requirements and that the laboratory holds the appropriate certifications and approvals to perform the work. The laboratory and any potential subcontract laboratories must be certified, as required, for all proposed tests.

D. Electronic or hard copy deliverable requirements are evaluated against the laboratory's capacity for production of the documentation.

E. If the laboratory cannot provide all services but intends to subcontract such services, whether to another Eurofins business unit operating on the same LIMS or to an outside firm, this will be documented and discussed with the client prior to contract approval. (Refer to Section 8 for Subcontracting Procedures.)

F. The laboratory informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the laboratory to complete the work satisfactorily. Any discrepancy between the client's requirements and the laboratory's capability to meet those requirements is resolved in writing before acceptance of the contract. It is necessary that the contract be acceptable to both the laboratory and the client. Amendments initiated by the client and/or Eurofins Calscience are documented in writing.

G. All contracts, QAPPs, Sampling and Analysis Plans (SAPs), contract amendments, and documented communications become part of the project record.

H. The same review process used for the initial review of the project documents is repeated when there are amendments to the original document(s) by the client, and the participating personnel are informed of the changes.

7.2) Project Review

A. Appropriate personnel will review the work request at each stage of evaluation.

B. For routine projects and other simple tasks, a review by the Project Manager (PM) is considered adequate. The PM confirms that the laboratory has any required certifications, that it can meet the clients' data quality and reporting requirements and that the lab has the capacity to meet the clients turn around needs. It is recommended that, where there is a sales person assigned to the account, an attempt should be made to contact that sales person to inform them of the incoming samples.

C. For new, complex or large projects, the proposed contract is given to the Client Relationship Manager or Proposal Team, who will decide which lab will receive the work based on the scope of work and other requirements, including certification, testing methodology, and available capacity to perform the work. The contract review process is outlined below and supplemented by the *Contract Questionnaire Form 45183*.

D. This review encompasses all facets of the operation. The scope of work is distributed to the appropriate personnel, as needed based on scope of contract, to evaluate all of the requirements shown above (not necessarily in the order below):

1. Contract Administrator

2. Laboratory Project Manager (Pm)

3. BUMA

4. Laboratory Directors and/or Department Managers

5. Account Executive

6. QA Manager

7. Laboratory Environmental Health and Safety Manager

E. The QA Manager performs an overall review to identify any quality systems concerns. Department Managers review the sections of the documents applicable to their assigned areas of the laboratory to identify any project specific requirements to be communicated to their staff and or any concerns with meeting the project requirements. Project specific requirements may be added as notes in the LIMS as part of the project set up. This is managed by the PM with input from the reviews.

F. The BUMA/Laboratory Director reviews the formal laboratory quote and makes the final acceptance for their facility. The Sales Director, Contract Administrator, Account Executive or Proposal Coordinator then submits the final proposal to the client.

G. In the event that one of the above personnel is not available to review the contract, his or her back-up will fulfill the review requirements.

7.2.1) Project Specific Quality Planning

A. Communication of contract specific technical and QC criteria is an essential activity in ensuring the success of site specific testing programs. To achieve this goal, a PM is assigned to each client. It is the PM's responsibility to ensure that project-specific technical and QC requirements are effectively evaluated and communicated to the laboratory personnel before and during the project. QA department involvement may be needed to assist in the evaluation of custom QC requirements.

B. PMs are the primary client contact and they ensure resources are available to meet project requirements, they coordinate opportunities and work with laboratory management and supervisory staff to ensure available resources are sufficient to perform work for the client's project.

C. Prior to work on a new project, the dissemination of project information and/or project opening meetings may occur to discuss schedules and unique aspects of the project. Items to be discussed may include the project technical profile, turnaround times, holding times, methods, analyte lists, reporting limits, deliverables, sample hazards, or other special requirements. The PM introduces new project information to maximize production and client satisfaction, while maintaining quality. Project notes may be associated with each sample batch as requirements notifications upon sample receipt and during analytical processing.

D. Any change that may occur within an active project is agreed upon between the client/regulatory agency and the PM/laboratory. These changes (e.g., use of a non-standard method or modification of a method) and approvals must be documented prior to implementation. Documentation pertains to any document (e.g., letter, e-mail, variance, contract addendum), which has been signed by both parties.

E. Such changes are also communicated to the laboratory through method comments in TALS. The laboratory staff is then introduced to the modified requirements via the PM or the QA Specialist. After the modification is implemented into the laboratory process, documentation of the modification is made in the case narrative of the data report(s).

7.3) Balancing Laboratory Capacity and Workload

A. Evaluating laboratory capacity to perform specific projects is the responsibility of the BUMA, Laboratory Directors and Department Managers, and the Client Services manager. Many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in case of malfunctions. This minimizes the need to evaluate small and medium size projects against capacity available to complete them. Large and complex projects are reviewed against capacity estimates before bids are submitted to ensure that the client's analysis schedule can be met. Regularly scheduled meetings are held between laboratory management, PMs, Client Services and QA personnel to review progress with current projects, as well as special requirements of new work scheduled for the laboratory. Laboratory capacity and backlog is tracked on a continuous basis using information from the Laboratory Information Management System (LIMS) including turnaround time, and work in-house.

7.4) Project Contracts / Records

A. The Administration Department maintains copies of all locally signed contracts. National Sales Teams is responsible for those large corporately agreements.

B. Appropriate records are maintained for every contract or work request. All stages of the contract review process are documented and include records of any significant changes.

C. The contract will be distributed to and maintained by the appropriate sales/marketing personnel and the Account Executive. Records are maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract.

7.5) Special Services

A. The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. It is the laboratory's goal to meet all client requirements in addition to statutory and regulatory requirements. The laboratory has procedures to ensure confidentiality to clients.

B. The laboratory's standard procedures for reporting data are described in Section 23. Special services are also available and provided upon request. These services include:

1. Reasonable access for our clients or their representatives to the relevant areas of the laboratory for the witnessing of tests performed for the client.

2. Assisting client-specified third party data validators as specified in the client's contract.

3. Supplemental information pertaining to the analysis of their samples. Note: An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

7.6) Client Communication

A. PMs are the primary communication link with the clients. They shall inform their clients of any delays in project completion as well as any nonconformances in either sample receipt or sample analysis. Project management will maintain ongoing client communication throughout the entire client project.

B. QA is available to discuss any technical questions or concerns the client may have.

7.7) Reporting

A. The laboratory works with our clients to produce any special communication reports required by the contract.

7.8) Client Feedback and Surveys

A. The laboratory assesses both positive and negative client feedback and tracks the business's Net Promoter Score (NPS). The results are used to improve overall laboratory quality and client service. The NPS measures the customer experience from a specific business unit on a scale of 0 - 10. The results of that range are put into three categories: detractors (0-6), passives (7, 8) and promoters (9, 10). To calculate the Net Promoter Score, the # of detractors is subtracted from the # of promoters to get the score which will be on a scale of -100 to 100.

B. Surveys are sent, using an electronic interface, every 2 weeks to only those that received a report in the 2 weeks prior. This allows us to gather more real-time data. Responses by the laboratory management and/or PM to detractors is required. It is also required to be tracked within the system.

C. When a compliant is received, we determine, to the best of our ability, the extent of the issue and what data is in question. The person receiving the complaint documents this information and promptly forwards it to the appropriate management personnel where the work in question was performed. If a data reporting error is discovered, the final report and/or data must be regenerated with the correct value(s).

D. The QA Manager is responsible for entering client concerns into D4. While an individual issue may not warrant a formal investigation, QA monitors these concerns for potential trends and will initiate an Investigation when a trend is evident. In other cases, based on the severity of the issue or upon client request, a formal Investigation is initiated for a single concern. Formal Investigation is used to document the situation and determine root cause(s) and corrective action(s).

7.9) Client Confidentiality

A. The laboratory ensures the highest standards of quality and integrity of the data and services provided to our clients.

B. The laboratory is responsible for maintaining in confidence all client information obtained or created. In situations involving the transmission of environmental test results by telephone, facsimile or other electronic means, client confidentiality must be maintained.

C. The laboratory will not intentionally divulge to any person (other than the client or any other person designated by the client in writing) any information regarding the services provided by the laboratory or any information disclosed to the laboratory by the client. Furthermore, information known to be potentially endangering to national security or an entity's proprietary rights will not be released.

D. Information about the client obtained from sources other than the client (e.g., complainant, regulator) shall be confidential between client and the laboratory. The source of this information shall be confidential to the laboratory and shall not be shared with the client, unless agreed by the source.

E. **Note:** This shall not apply to the extent that the information is required to be disclosed by the laboratory under the compulsion of legal process. The laboratory will, to the extent feasible, provide reasonable notice to the client before disclosing the information.

F. **Note:** Authorized representatives of an accrediting authority are permitted to make copies of any analyses or records relevant to the accreditation process, and copies may be removed from the laboratory for purposes of assessment.

8) SUBCONTRACTING

8.1) Overview

A. The laboratory may subcontract tests to other laboratories outside of Eurofins if the requested testing is not routinely performed in our laboratory. To a lesser extent, samples may need to be subcontracted to an overflow laboratory to ensure hold times and/or turn-around-times (TAT) are met.

B. Testing is only subcontracted with the client’s knowledge and approval. Calscience must notify the client in writing when any of their requested analyses will be subcontracted to another lab. Client approval must be obtained in writing before samples are shipped.

C. Subcontract laboratories are selected based on their qualifications and accreditations. Only an appropriately accredited laboratory will be used. The client may also have a list of laboratories to be used for subcontracting. In these cases, the evaluation of the subcontract laboratory is made by the client.

D. Data obtained from subcontract laboratories is clearly marked as such when reported by the laboratory. The data from non-Eurofins laboratories or from Eurofins laboratories not using the “TALS LIMS” are submitted to the client in the format obtained from the subcontractor.

E. For the purpose of this quality manual, the phrase subcontract laboratory refers to a laboratory external to the Eurofins Environment Testing laboratories. The phrase “work share” refers to internal transfers of samples between the Eurofins Environment Testing laboratories.

F. When contracting with our clients, the laboratory makes commitments regarding the services to be performed and the data quality for the results to be generated. When the need arises to outsource testing for our clients because project scope, changes in laboratory capabilities, capacity, or unforeseen circumstances, we must be assured that the subcontractors or work sharing laboratories understand the

requirements and will meet the same commitments we have made to the client. Refer to the NBLSC Subcontracting SOP No. *NDSC-US-SUB-SOP44936*.

G. When outsourcing analytical services, the laboratory will assure, to the extent necessary, that the subcontract or work sharing laboratory maintains a program consistent with the requirements of this document, the requirements specified in TNI/ISO 17025 and/or the client's Quality Assurance Project Plan (QAPP). All QC guidelines specific to the client's analytical program are transmitted to the subcontractor and agreed upon before sending the samples to the subcontract facility. Additionally, work requiring accreditation will be placed with an appropriately accredited laboratory. The laboratory performing the subcontracted work will be identified in the final report, as will non-TNI accredited work where required.

H. PMs or other responsible Client Service members, for the Export Lab (i.e., Eurofins Calscience, that transfers samples to another laboratory) are responsible for obtaining client approval prior to subcontracting any samples. The laboratory will advise the client of a subcontract arrangement in writing and when possible, approval from the client shall be obtained and retained in the project folder. Standard Eurofins Calscience Terms & Conditions include the flexibility to subcontract samples within the Eurofins Environment Testing Laboratories. Therefore, additional advance notification to clients for intra-laboratory subcontracting is not necessary unless specifically required by a client contract.

I. **Note:** In addition to the client, some regulating agencies (e.g., USDA) or contracts (e.g., DoD and DOE projects) require notification prior to placing such work.

8.2) Qualifying and Monitoring Subcontractors

A. Whenever a PM or Account Executive (AE) becomes aware of a client requirement or laboratory need where samples must be outsourced to another laboratory, the other laboratory(s) shall be selected based on the following:

1. Subcontractors specified by the client:

    a. In these circumstances, the client assumes responsibility for the quality of the data generated from the use of a subcontractor.

2. Subcontractors reviewed by Eurofins Calscience:

    1. Firms which have been reviewed by the company and are known to meet standards for accreditations (e.g., State, TNI and DoD/DOE).

    2. Technical specifications.

    3. Legal and financial information.

B. A listing of subcontractors is available in D4 *PM-LI70655*.

C. All Eurofins Environment Testing America laboratories are pre-qualified for work sharing provided they hold the appropriate accreditations and can adhere to the project/program requirements. Client approval is not necessary unless specifically required by the contract. In these cases, the client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented). The originating laboratory is responsible for communicating all technical, quality, and deliverable requirements as well as other contract needs.

1. When the potential subcontract laboratory has not been previously approved, Account Executives or PMs may nominate a laboratory as a subcontractor based on need. The decision to nominate a laboratory must be approved by the Sales Director or BUMA and requests that the QA Manager or PM begin the process of approving the subcontract laboratory. Refer to the D4 NBLSC document Subcontracting SOP No. *NDSC-US-SUB-SOP44936* for process details.

2. Once the appropriate accreditation and legal information is received by the laboratory, it is evaluated for acceptability and forwarded to the NBLSC Quality Information Manager (QIM) for review. After the NBLSC QIM reviews the documents for completeness, the subcontract agreement is forwarded to the

BU's Scope President for formal signature and contracting with the laboratory. The approved company will be added to the approved subcontractor list on the intranet site, and the finance group is concurrently notified. A copy of the signed subcontract agreement is forwarded to the subcontractor.

3. The client will assume responsibility for the quality of the data generated from the use of a subcontractor they have requested the lab to use. The qualified subcontractors on the intranet site are known to meet minimal standards. Eurofins Calscience does not certify laboratories. Eurofins list of subcontractors can only be recommended to the extent that we would use them.

8.3) Oversight and Reporting

A. The status and performance of qualified subcontractors will be monitored by local BUs and includes an annual evaluation survey conducted by the NBLSC-QIM. Any problems identified will be brought to the attention of local BU management, the legal department and the finance department.

1. Complaints shall be investigated. Documentation of the complaint, investigation, and corrective action will be maintained in the subcontractor's file on the intranet site. Complaints are posted using the corrective action mechanism employed at each laboratory.

2. Information shall be updated on the intranet when new information is received from the subcontracted laboratories.

3. Subcontractors in good standing will be retained on the intranet listing. Client Service personnel will notify all Eurofins Environmental Testing laboratories, NBLSC-QA, the legal department and finance department if any laboratory requires removal from the intranet site. This notification will be posted on the intranet site and e-mailed to all Client Service Personnel, Laboratory Directors, QA Managers, and Sales Personnel.

B. Prior to initially sending samples to the subcontracted laboratory, the PM confirms their certification status to determine if it's current and scope inclusive. The information is documented within the project records.

C. The laboratory's certifications can be viewed on the company's website at https://www.eurofinsus.com/environment-testing/resources/certifications/.

1. All subcontracted samples must be accompanied by a Eurofins Calscience Chain of Custody (COC). A copy of the original COC sent by the client must be available in LIMS for all samples work shared within Eurofins Calscience. Client COCs are only forwarded to external subcontractors when samples are shipped directly from the project site to the subcontractor lab. Under routine circumstances, to maintain client confidentiality, original client COCs are not provided to external subcontractors.

2. Through communication with the subcontracted laboratory, the PM monitors the status of the subcontracted analyses, facilitates successful execution of the work, and ensures the timeliness and completeness of the analytical report.

3. All accredited and non-accredited work must be identified in the subcontractor's report.

4. Reports submitted from subcontractor laboratories are not altered and are included in their original form in the final project report. This clearly identifies the data as being produced by a subcontractor facility. If subcontract laboratory data is incorporated into the laboratory's EDD (i.e., imported), the report must explicitly indicate which lab produced the data for which methods and samples.

5. **Note:** The results submitted by a Eurofins Calscience work sharing laboratory may be transferred electronically and the results reported by the Eurofins Calscience work sharing lab are identified on the final report. The report must explicitly indicate which lab produced the data for which methods and samples. The final report must include a copy of the completed COC for all work sharing reports.

8.4) Contingency Planning

A. The full qualification of a subcontractor may be waived to meet emergency needs. This decision and justification must be documented in the project files, and the 'Purchase Order Terms And Conditions For

Subcontracted Laboratory Services' must be sent with the samples and COC.

B. In the event this provision is utilized, the laboratory (e.g., PM) will be required to verify and document the applicable accreditations of the subcontractor. All other quality and accreditation requirements will still be applicable, but the subcontractor need not have signed a subcontract agreement with Eurofins Calscience at this time.

C. The use of any emergency subcontractor will require the PM to complete a New Supplier Information Request Form in order to process payment to the subcontractor and add them to LIMS. This form requires the user to define the subcontractor's category/s of testing and the reason for testing.

9) PURCHASING SERVICES AND SUPPLIES

9.1) Overview

A. Supplier Evaluation

1. Procedures are in place to evaluate vendors who supply us with: new equipment, instrumentation, computerized systems and computer software; commercially purchased glassware, including sample bottleware, reagents, chemicals, solvents, gases, media, and standards; and contracted and subcontracted services.

2. The laboratory strives to ensure that our suppliers continually improve their quality systems and we reserve the right to purchase from suppliers of our choice in order to best fulfill the needs of our clients and our business. When directed by a client to purchase from a specific supplier, we will do so. In this instance it is the client's responsibility to "qualify" the specified supplier. We attempt to purchase from businesses that we have an established purchase history or have previously acquired information regarding the supplier's quality programs.

3. An approved vendor list is maintained by the laboratory for critical consumables (reagents and standards), and PT services.

4. Evaluations are not required for computer operating systems, utilities, toolsets, or systems software. They also are not required for any off-the-shelf configurable software package that has an extensive market performance history (e.g., Microsoft Word, Excel, Access).

B. Procurement

1. It is the responsibility of management personnel within each department to ensure that the appropriate supplies are available and/or ordered with sufficient lead-time to perform analytical testing or to provide support to the testing areas. The individual technical departments have trained personnel who enter the supply order into the company's purchasing system. The selection of these products is based on technical input at the analyst level and authorized by technical departmental management. The Purchasing Department maintains an ordering system in which purchase requisitions are managed. Common laboratory items (e.g., beakers, flasks, reagents) are ordered directly through the purchasing system. Purchase orders over a specified dollar amount require approval from the appropriate member(s) of the Executive Management Group before an order can be placed.

2. Upon receipt of an order, the recipient checks the order to ensure that all items were received as specified. Products that have specific storage requirements are taken to the technical area upon receipt. It is the technical area's responsibility to ensure that the product is stored in the appropriate manner. Any checks on the quality of the materials received for use in a specific test are the responsibility of the laboratory using them. This is based upon the experience of the laboratory with the usability of the product. Generally, each test has controls in place to ensure that test results are not adversely affected by the materials.

9.2) Glassware

A. Glassware used for volumetric measurements must be Class A or verified for accuracy according to laboratory procedure. Pyrex (or equivalent) glass should be used where possible.

9.3) Purchasing

A. Chemical reagents, solvents, glassware, and general supplies are ordered as needed to maintain sufficient quantities on hand. Materials used in the analytical process must be of a known quality. The wide variety of materials and reagents available makes it advisable to specify recommendations for the name, brand, and grade of materials to be used in any determination. This information is contained in the analytical method SOP.

9.3.1) Receiving

A. It is the responsibility of the purchasing manager to receive the shipment. It is the responsibility of the analyst who ordered the materials to document the date materials were received. Once the ordered reagents or materials are received, the analyst compares the information on the label or packaging to the original order to ensure that the purchase meets the quality level specified. This is documented through the addition of the received date and initials to the information present on the daily order log.

B. The purchasing manager verifies the lot numbers as received solvents and acids against the pre-approval lists. If a received material is listed as unapproved, or is not listed, it is sequestered and returned to the vendor. Alternatively, the laboratory may test the material for the intended use.

C. Materials may not be released for use in the laboratory until they have been inspected, verified as suitable for use, and the inspection/verification has been documented.

D. Safety Data Sheets (SDSs) are available online through a link on the Eurofins EET-Net Sharepoint site at: https://testamerica365.sharepoint.com/sites/EETAIntranet/SitePages/Environment,-Health-and-Safety.aspx

E. Anyone may review these for relevant information on the safe handling and emergency precautions of on-site chemicals.

9.3.2) Specifications

A. Methods used in the laboratory specify the grade of reagent that must be used in the procedure. If the quality of the reagent is not specified, analytical reagent grade will be used. It is the responsibility of the analyst to check the procedure carefully for the suitability of grade of reagent.

B. Chemicals are assigned expiration from the manufacturer's expiration date and must not be used past any expiration period noted in a method SOP. If expiration dates are not provided, the laboratory may contact the manufacturer to determine an expiration date. The laboratory assumes a five year expiration date on inorganic dry chemicals and solvents unless noted otherwise by the manufacturer or by the reference source method.

C. Chemicals/solvents should not be used past the manufacturer's or SOP expiration date unless verified as outlined below.

1. An expiration date cannot be extended if the dry chemical/solvent is discolored or appears otherwise physically degraded. In this case, the dry chemical/solvent must be discarded.

2. Expiration dates can be extended if the dry chemical/solvent is found to be satisfactory based on acceptable performance of quality control samples (Continuing Calibration Verification (CCV), Blanks, Laboratory Control Sample (LCS), etc.).

3. If the dry chemical/solvent is used for the preparation of standards, the expiration dates can be extended 6 months if the dry chemical/solvent is compared to an unexpired independent source in performing the method and the performance of the dry chemical/solvent is found to be satisfactory. The comparison must show that the dry chemical/solvent meets CCV limits. The comparison studies are maintained on-file and available for review.

D. Wherever possible, standards must be traceable to national or international standards of measurement or to national or international reference materials. Records to that effect are available to the user.

E. Compressed gases in use are checked for pressure and secure positioning daily. To prevent a tank from going to dryness, or introducing potential impurities, the pressure should be closely watched as it decreases to approximately 15% of the original reading, at which point it should be replaced. The quality of the gases must meet method or manufacturer specification or be of a grade that does not cause any analytical interference.

F. Water used in the preparation of samples, standards or reagents must have a specific conductivity of less than 1-µmho/cm (or specific resistivity of greater than 1.0 megohm-cm) at 25°C. The specific conductivity is checked and recorded daily. If the water's specific conductivity is greater than the specified limit, the Facility Manager and appropriate Technical Managers must be notified immediately in order to notify all departments, decide on cessation (based on intended use) of activities, and make arrangements for correction.

G. Purchased bottleware used for sampling must be certified clean and the certificates must be maintained.

9.3.3) Storage

A. Reagent and chemical storage is important from the aspects of both integrity and safety. Light-sensitive reagents may be stored in brown glass containers. Storage conditions are per the NBLSC Environmental Health & Safety Manual, Document No. *NDSC-US-EHS-QP46060*, the local laboratory EH&S manual addendum and method SOPs or manufacturer instructions.

9.4) Purchase of Equipment / Instruments / Software

A. When a new piece of equipment is needed, either for additional capacity or for replacing inoperable equipment, the analyst or supervisor makes a supply request to the Operations Manager or BUMA. A decision is made as to which piece of equipment can best satisfy the requirements. The appropriate written requests are completed.

B. Upon receipt of a new or used piece of equipment, an identification name is assigned and added to the equipment list. IT must also be notified so that they can synchronize the instrument for back-ups. Its capability is assessed to determine if it is adequate or not for the specific application. For instruments, a calibration curve is generated, followed by MDLs, Demonstration of Capabilities (DOCs), and other relevant criteria (refer to Section 18). For software, its operation must be deemed reliable and evidence of instrument verification must be retained by the IT Department or QA Department. Software certificates supplied by the vendors are filed with the LIMS Administrator. The manufacturer's operation manual is retained by local IT.

9.5) Service

A. Service to analytical instruments (except analytical balances) is performed on an as needed basis. Routine preventative maintenance is discussed in Section 18.2. The need for service is determined by analysts and/or Technical Managers. The service providers that perform the services are approved by the Technical Manager.

B. Analytical balances are serviced and calibrated annually. The calibration and maintenance services are performed on-site, and the balances are returned to use immediately following successful calibration. Calibration certificates are filed for reference. If the calibration was unsuccessful, the balance is immediately removed from service and segregated pending either further maintenance or disposal.

C. Calibration services for support equipment such as the balances, thermometers, weight sets, autopipettors, etc., are obtained from vendors with current and valid ISO 17025 accreditation for calibration of the specific piece of equipment. Prior to utilizing the vendor's services, the vendor's accreditation status is verified. Once the equipment has been calibrated, the calibration certificates are reviewed by the QA department, and documentation of the review is filed with the calibration certificates. The equipment is then returned to service in the laboratory.

9.6) Suppliers

A. Eurofins adds vendors as options for use in the Purchasing program through a competitive proposal / bid process, strategic business alliances or negotiated vendor partnerships (contracts).

B. The level of control used in the selection process is dependent on the anticipated spending amount and the potential impact on the laboratory's business. Vendors that provide test and measuring equipment,

solvents, standards, certified containers, instrument related service contracts or subcontract laboratory services shall be subject to more rigorous controls than vendors that provide off-the-shelf items of defined quality that meet the end use requirements.

C. Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality. Calscience has an in house purchasing agent who evaluates our supply room inventory to ensure it remains stocked, places orders, and follows receipt of orders to ensure shipments are received and are accurate.

D. Proficiency testing providers and suppliers of certified reference materials must have appropriate ISO accreditation.

10) COMPLAINTS

10.1) Overview

A. The laboratory considers an effective client complaint handling process to be of significant business and strategic value. Listening to and documenting client concerns captures client knowledge that enables our operations to continually improve processes and client satisfaction. An effective client complaint handling process also provides assurance to the data user that the laboratory will stand behind its data, service obligations, and products.

B. A client complaint is any expression of dissatisfaction with any aspect of our business services (e.g., communications, responsiveness, data, reports, invoicing and other functions) expressed by any party, whether received verbally or in written form. Client inquiries, complaints, or noted discrepancies are documented, communicated to management, and addressed promptly and thoroughly. These must also be communicated to QA for trending and/or formal investigation.

C. The laboratory has procedures for addressing complaints with the goal of providing satisfactory resolution in a timely and professional manner.

D. The nature of the complaint is identified, documented and investigated, and an appropriate action is determined and taken. In cases where a client complaint indicates that an established policy or procedure was not followed, the QA Department must evaluate whether a special audit must be conducted to assist in resolving the issue. A written confirmation or letter to the client, outlining the issue and response taken is recommended as part of the overall action taken. This may be handled by the PM following-up with the client on the resolution. If a client requires a letter detailing the investigation and actions, the letter is written by QA.

E. The process of complaint resolution and documentation utilizes the procedures outlined in Section 12, Corrective Actions.

10.2) Complaint Processing

A. An employee that receives a complaint initiates the complaint resolution process by first documenting the complaint in an Internal Nonconformance Memo (NCM) in TALS as outlined in Section 12.

B. Complaints fall into two categories: correctable and non-correctable. An example of a correctable complaint would be one where a report re-issue would resolve the complaint. An example of a non-correctable complaint would be one where a client complains that their data was repeatedly late. Non-correctable complaints should be reviewed for preventive action measures to reduce the likelihood of future occurrence and mitigation of client impact.

C. The general steps in the complaint handling process are:

1. Receiving and documenting complaints.

2. Acknowledging receipt of complaint, whenever possible.

3. Complaint investigation and service recovery.

4. Process improvement.

D. Complaints need to be communicated to QA to allow for initiation of investigations and for trending purposes. Full root cause investigation with corrective actions are required when requested by the client, for issues that involve a change to a reported analytical result, and where an adverse trend in the type of issue has been seen. These investigations must be documented in the corrective action database.

E. The laboratory shall inform the initiator of the complaint of the results of the investigation and the corrective action(s) taken, if any.

11) CONTROL AND NONCONFORMING WORK

11.1) Overview

A. When data discrepancies are discovered or deviations and departures from laboratory SOPs, policies and/or client requests have occurred, corrective action is taken immediately. First, the laboratory evaluates the significance of the nonconforming work. Then, a corrective action plan is initiated based on the outcome of the evaluation. If it is determined that the nonconforming work is an isolated incident, the plan could be as simple as adding a qualifier to the final results and/or making a notation in the case narrative. If it is determined that the nonconforming work is a systematic or improper practices issue, the corrective action plan could include a more in depth investigation and a possible suspension of an analytical method. In all cases, the actions taken are documented using the laboratory's corrective action system (refer to Section 12).

B. Due to the frequently unique nature of environmental samples, sometimes departures from documented policies and procedures are needed. These situations are documented in the corrective action database as Planned Deviations. When an analyst encounters such a situation, the problem is presented to the supervisor for resolution. The supervisor may elect to discuss it with the Technical Manager or have a representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst documents it using the laboratory's corrective action system described in Section 12. This information can then be supplied to the client in the form of a case narrative with the report.

C. Project Management may encounter situations where a client may request that a special procedure be applied to a sample that is not standard laboratory practice. Based on a technical evaluation, the laboratory may accept or opt to reject the request based on technical or ethical merit. An example might be the request to filter a sample before analysis of a test where filtering is not part of the method preparation. The laboratory would not have validated the method with this step as part of the sample preparation. Such a request would need to be approved by the Technical Manager and QA Manager, documented and included in the project folder. Deviations must also be noted on the final report with a narrative that the filtering of the sample during preparation is not in compliance with the analytical method requirements and the reason.

11.2) Responsibilities and Authorities

A. Under certain circumstances, the BUMA, Department Manager, or a member of the QA team may authorize departures from documented procedures or policies. The departures may be a result of procedural changes due to the nature of the sample; a one-time procedure for a client; QC failures with insufficient sample to reanalyze, etc. In most cases, the client will be informed of the departure prior to the reporting of the data. Any departures must be well documented using the laboratory's corrective action procedures. This information may also be documented in logbooks and/or data review checklists as appropriate. Any associated data must be referenced in a case narrative and/or flagged with an appropriate data qualifier.

B. Any misrepresentation or possible misrepresentation of analytical data discovered by any laboratory staff member must be reported to the laboratory Senior Management within 24-hours. The Senior Management staff is comprised of the BUMA, the QA Manager, the Department Managers, and the Operations Manager. The reporting of issues involving alleged violations of the company's *Ethics and Data Integrity Policy* or *Manual Integration* procedures must be conveyed to an ECO (e.g., the VP-QA/EHS) and the laboratory's Quality Director within 24 hours of discovery.

C. Whether an inaccurate analytical result was reported due to calculation or quantitation errors, data entry errors, improper practices, or failure to follow SOPs, the data must be evaluated to determine the

possible effect and include full root cause investigation and corrective action(s).

D. All laboratory personnel are responsible for taking appropriate action when nonconforming work is identified. BUMA, QA Manager, ECOs, VP-QA/EHS, and the Quality Directors have the authority and responsibility to halt work, withhold final reports, or suspend an analysis for due cause as well as authorize the resumption of work once the investigation has been completed, root cause(s) determined and corrective action(s) implemented.

11.3) Evaluation of Significance and Actions Taken

A. For each nonconforming issue reported, an evaluation of its significance and the level of management involvement needed is made. This includes reviewing its effect on the final data, whether or not it is an isolated or a systematic issue, potential for recurrence and actions for prevention, and how it relates to any special client or program requirements.

B. The laboratory has a policy and procedures that must be implemented when any aspect of its testing work, or the results of this work do not confirm to its own procedures or the agreed requirements of the customer. The policy of the laboratory is that nonconforming work must be addressed as defined below so that the needs of the customer are met. Examples of places non-confirming work could occur include customer complaints, quality control, instrument calibration, checking of consumable materials, staff observations or supervision, test report checking, management reviews, and internal or external audits.

C. The responsibilities and for the management of nonconforming work include all laboratory personnel responsible for taking appropriate action when nonconforming work is identified, including notification of the BUMA if needed. All personnel may stop work when nonconforming work is identified, but the Group Leader, Operations Manager, BUMA, QA Representative, or QA Manager must be notified of a stoppage as soon as is feasible. The BUMA, QA Manager, Operations Manager are authorized to recall work or withhold analytical reports if necessary.

D. An evaluation of the significance of the nonconforming work is made. Exceptions are first evaluated by the analyst or other personnel performing the work and their Group Leader. Correction is taken immediately, together with any decision about the acceptability of the nonconforming work. "Corrections" are things done to continue working, report the data, and fix the immediate problem. Note that this is different than corrective action, which is described in Section 12.

E. Where necessary, the customer is notified and work is recalled. The responsibility for authorizing the resumption of work is given by the BUMA in consultation with the QA manager following the review of root cause(s) and corrective action.

F. Where the evaluation indicates that the nonconforming work could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures, the corrective action procedures given in Section 12.3 shall be promptly followed.

11.4) Method Suspension / Restriction (Stop Work Procedures)

A. In some cases, it may be necessary to suspend/restrict the use of a method or target analyte which constitutes significant risk and/or liability to the laboratory. Suspension/restriction procedures can be initiated by designated persons as noted in Section 11.2.

B. Prior to suspension/restriction, confidentiality will be respected, and the problem with the required corrective and preventative action(s) will be stated in writing and presented to the BUMA.

C. The BUMA shall arrange for the appropriate personnel to meet with the QA Manager as needed. This meeting shall be held to confirm that there is a problem, that suspension/restriction of the method is required and will be concluded with a discussion of the steps necessary to bring the method/target or test fully back on line. In some cases, that may not be necessary if all appropriate personnel have already agreed there is a problem and there is agreement on the steps needed to bring the method, target or test fully back on line. The QA Manager will initiate a corrective action report as described in Section 12 if one has not already been started. A copy of any meeting notes and agreed upon steps should be e-mailed by the laboratory to their Business Unit President and the VP-QA/EHS. This e-mail serves as notification of the incident.

D. After suspension/restriction, the laboratory will hold all reports to clients pending review. No faxing, mailing, or distributing through electronic means may occur. The report must not be posted for viewing on the internet. It is the responsibility of the BUMA to hold all reporting and to notify all relevant laboratory personnel regarding the suspension/restriction (e.g., Project Management, Log-in, etc.). Clients, generally, will NOT be notified at this time. Analysis may proceed in some instances depending on the nonconformance issue.

E. Within 72 hours, the QA Manager will determine if the issue has been addressed and compliance is now met and reports can be released, OR determine the plan of action with timeline to bring work into compliance, and release work. A team, with all principals involved (e.g., BUMA, QA Manager) can devise a start-up plan to cover all steps from client notification through compliance and release of reports. Project Management, Client Services Managers, and Sales and must be notified if clients must be notified or if the suspension/restriction affects the laboratory's ability to accept work.

F. The QA Manager must approve resumption of work or elimination of any restrictions after the investigation is complete with root cause(s) determined and corrective action(s) implemented.

12) CORRECTIVE ACTION

12.1) Overview

A. A major component of the laboratory's QA Program is the problem investigation and feedback mechanism designed to keep the laboratory staff informed on quality related issues and to provide insight to problem resolution. When nonconforming work or departures from policies and procedures in the quality system or technical operations are identified, the corrective action procedure provides a systematic approach to assess the issues, restore the laboratory's system integrity, and prevent reoccurrence.

B. The laboratory employs two systems to manage nonconformances. Issues suspected of being systematic in nature and for which full investigation with root cause analysis and a formal Corrective Action Report (CAR) required are documented in the laboratory's CAR database. Routine batch nonconformances, events that are understood to be isolated in nature, are documented using the LIMS nonconformance memo (NCM) system.

12.2) General Processes

A. Problems within the quality system or within analytical operations may be discovered in a variety of ways, such as QC sample failures, internal or external audits, proficiency testing (PT) performance, client complaints, staff observation, etc.

B. The purpose of a corrective action system is to:

1. Identify nonconformance events and assign responsibility for investigating.
2. Resolve nonconformance events and assign responsibility for any required corrective action.
3. Identify systematic problems before they become serious.
4. Identify and track client complaints and provide resolution.

C. Nonconformance Memos (NCMs) are used to document the following types of corrections / corrective actions:

1. Deviations from an established procedure or SOP.
2. QC outside of limits.
3. Isolated reporting / calculation errors.
4. Client complaints (minor, isolated issues).

5. Discrepancies in materials / goods received vs manufacturer packing slips (documentation other than NCMs in LIMS are also acceptable).

D. Investigations and Corrective Actions Documented in the CAR Database

1. Internal and external audit findings.
2. Failed or unacceptable PT results.
3. Identified poor process or method performance trends.
4. Systematic reporting / calculation errors.
5. Analytical Result Changes.
6. Data recall investigations.
7. Questionable trends that are found in the review of NCMs.
8. Client complaints (major issues; client requested full investigation).
9. Excessive revised reports.

E. The CAR database is used to document background information, assigned tasks with the responsible staff, timelines, results of corrective action investigations and root cause analysis, details of the planned corrective action(s), and follow-up.

12.3) Corrective Action Process Steps

A. Any employee in the company can initiate a corrective action. There are four main components to a corrective action process once an issue has been identified: Cause Analysis, Selection and Implementation of Corrective Actions (both short and long term), Monitoring of the Corrective Actions, and Follow-up.

B. Cause Analysis

1. Upon discovery of a nonconformance event, the event must be defined and documented. An entry into the CAR system must be initiated, someone is assigned to investigate the issue and the event is investigated for cause.
2. The cause analysis step is the key to the process as a long term corrective action cannot be determined until the cause is determined.
3. If the cause is not readily obvious, the BUMA, Department Manager, Operations Manager, QA Manager, or QA Specialist is consulted.

C. Selection and Implementation of Corrective Actions

1. Where corrective action is needed, the laboratory shall identify potential corrective actions. The action(s), most likely to eliminate the problem and prevent recurrence, are selected and implemented. Responsibility for implementation is assigned.
2. Corrective actions shall be to a degree appropriate to the magnitude of the problem identified through the cause analysis.
3. Whatever corrective action is determined to be appropriate, the laboratory shall document and assign the appropriate laboratory personnel to implement the changes. The CAR record is used for this documentation.

D. Root Cause Analysis

1. Root Cause Analysis is a class of problem solving (investigative) methods aimed at identifying the basic or causal factor(s) that underlie variation in performance or the occurrence of a significant failure. The root cause may be buried under seemingly innocuous events, many steps preceding the perceived failure. At first glance, the immediate response is typically directed at a symptom and not the cause. Typically, root cause analysis would be best with three or more incidents to triangulate a weakness.

2. Systematically analyze and document the root causes of the more significant problems that are reported. Identify, track, and implement the corrective actions required to reduce the likelihood of recurrence of significant incidents. Trend the root cause data from these incidents to identify root causes that, when corrected, can lead to dramatic improvements in performance by eliminating entire classes of problems.

3. Identify the one event associated with problem and ask why this event occurred. Brainstorm the root causes of failures; for example, by asking why events occurred or conditions existed; and then why the cause occurred consecutive times until you get to the root cause. For each of these sub events or causes, ask why it occurred. Repeat the process for the other events associated with the incident.

4. Root cause analysis does not mean the investigation is over. Look at technique or other systems outside the normal indicators. Often creative thinking will find root causes that ordinarily would be missed and continue to plague the laboratory or operation.

E. Monitoring of the Corrective Actions

1. The Department Manager and QA are responsible to ensure that the corrective action taken was effective.

2. Ineffective actions are documented and re-evaluated by QA until acceptable resolution is achieved. Department Managers or Group Leaders are accountable to QA to ensure final acceptable resolution is achieved and documented appropriately.

3. The QA Manager and Specialists review monthly NCM and CAR records for trends. Highlights are included in the monthly quality metrics report (refer to Section 16). If a significant trend develops that adversely affects quality, an audit of the area is performed and corrective action implemented.

4. Any out-of-control situations that are not addressed acceptably at the laboratory level may be reported to the NBLSC Quality Director by the QA Manager, indicating the nature of the out-of-control situation and problems encountered in solving the situation.

F. Follow-up Audits

1. Follow-up audits may be initiated by the QA Manager and shall be performed as soon as possible when the identification of a nonconformance casts doubt on the laboratory’s compliance with its own policies and procedures, or on its compliance with state or federal requirements.

2. These audits often follow the implementation of the corrective actions to verify effectiveness. An additional audit would only be necessary when a critical issue or risk to business is discovered.

12.4) Technical Data Corrective Actions

A. In addition to providing acceptance criteria and specific protocols for technical corrective actions in the method SOPs, the laboratory has general procedures to be followed to determine when departures from the documented policies, procedures, and quality control have occurred (refer to Section 11). The documentation of these procedures is through the use of an NCM or record in the CAR system.

B. For specific criteria and corrective actions, refer to the analytical methods or specific method SOPs. The laboratory may also maintain controlled Work Instructions or Forms detailing these items. These procedures also detail the actions to be taken and by whom, for method and/or QC departures and nonconformances.

C. To the extent possible, samples shall be reported only if all quality control measures are acceptable. If the deficiency does not impair the method or program (e.g., drinking water) compliance of the results,

data will be reported with an appropriate data qualifier and/or the deficiency will be noted in the case narrative. Where sample results may be impaired, the PM is notified by an NCM and appropriate corrective action (e.g., reanalysis, resampling) is taken and documented.

12.5) Corrections to Data / Records

A. When mistakes occur in records, each mistake shall be crossed-out with a single line, [not obliterated (e.g. no white-out, erasure, write-overs, scribble out)], and the correct value entered alongside. All such corrections shall be initialed (or signed) and dated by the person making the correction.

B. This same process applies to adding additional information to a record. All additions made later than the initial must also be initialed (or signed) and dated. When corrections are due to reasons other than obvious transcription errors, the reason for the corrections (or additions) shall also be documented. In the case of records stored electronically, the original uncorrected file must be maintained intact and a second corrected file is created.

13) PREVENTIVE ACTION / IMPROVEMENT

A. The laboratory's preventive action programs minimize or eliminate potential causes of nonconformance to the quality system. This preventive action process is a proactive and continuous process of improvement that can be initiated through feedback from clients, employees, business providers, and affiliates. The QA Department has the overall responsibility to ensure that the preventive action process is in place and that relevant information on actions is submitted for management review.

B. Dedicating resources to an effective preventive action system emphasizes the laboratory's commitment to its Quality Systems. It is beneficial to identify and address negative trends before they develop into complaints, problems and corrective actions. Additionally, the laboratory continually strives to improve customer service and client satisfaction through continuous improvements to laboratory systems.

C. Opportunities for improvement may be discovered through any or all of the following:

1. Review of the monthly Quality Metrics Report.
2. Trending NCMs.
3. Review of control charts and QC results.
4. Trending proficiency testing (PT) results.
5. Performance of management system reviews.
6. Trending client complaints.
7. Review of processing operations.
8. Staff observations.

D. The Monthly QA Metrics Report shows performance indicators in all areas of the laboratory and quality system. These areas include revised reports, corrective actions, audit findings, internal auditing and data authenticity audits, client complaints, PT samples, holding time violations, SOPs, ethics training, etc. The metrics report is reviewed monthly by the laboratory management, NBLSC QA Team, Local and NBLSC Management. These metrics are used in evaluating the management and quality system performance on an ongoing basis and provide a tool for identifying risk and areas for improvement.

E. Items identified as continuous improvement opportunities to the management system may be issued as goals from the annual management systems review, recommendations from internal audits, Lessons Learned, or as management or NBLSC level initiatives.

F. The laboratory's corrective action process is integral to implementation of preventive actions. A critical piece of the corrective action process is the implementation of actions to prevent further occurrence of a noncompliance event. Historical review of corrective action and nonconformances provides a valuable mechanism for identifying preventive action opportunities.

G. The following elements are part of a preventative action/process improvement system:

1. Identification of an opportunity for preventive action or process improvement.
2. Process for the preventive action or improvement.
3. Define the measurements of the effectiveness of the process once undertaken.
4. Execution of the preventive action or improvement.
5. Evaluation of the plan using the defined measurements.
6. Verification of the effectiveness of the preventive action or improvement.
7. Close-Out by documenting any permanent changes to the Quality System as a result of the Preventive Action or Process Improvement.

H. Documentation of Preventive Action/Process Improvement is incorporated into the monthly QA reports, corrective action process, and management review.

I. Any preventive actions/process improvement undertaken or attempted shall be taken into account during the Annual *Management Systems Review* (Section 16). A highly detailed report is not required; however, a summary of successes and failures within the preventive action program is sufficient to provide management with a measurement for evaluation.

14) CONTROL OF RECORDS

A. The laboratory maintains a records management system appropriate to its needs and that complies with applicable standards or regulations as required. The system produces unequivocal, accurate records that document all laboratory activities. The laboratory retains all original observations, calculations and derived data, calibration records and a copy of the analytical report for a minimum of five years after it has been issued. Exceptions for programs with longer retention requirements are discussed in Section 14.2.

14.1) Overview

A. The laboratory has established procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. Quality records are maintained by the QA department in a database, D4, which is backed up as part of the regular laboratory backup. Records are of two types; either electronic or hard copy paper formats depending on whether the record is computer or hand generated (some records may be in both formats).

B. All records are stored and retained in such a way that they are secure and readily retrievable at the laboratory facility or at an offsite storage location that provides a suitable environment to prevent damage or deterioration and to prevent loss at the laboratory. All records shall be protected against fire, theft, loss, environmental deterioration, and vermin. In the case of electronic records, electronic or magnetic sources, storage media are protected from deterioration caused by magnetic fields and/or electronic deterioration.

C. Access to the data is limited to laboratory and company employees and is documented with an access log. Records are archived off-site, stored in a secure location where a record is maintained of any entry into the storage facility. Retention of records are maintained on-site at the laboratory for at least 1 year. It is kept on a secondary server until disk space is needing to be freed up, which usually takes two or three years before we need to do a purge. That same data on the local lab server is backed up nightly by our backup system at the Datacenter. Records are maintained for a minimum of five years unless otherwise specified by a client or regulatory requirement.

D. For raw data and project records, record retention shall be calculated from the date the project report is issued. For other records, such as NBLSC Documents, QA, or Administrative Records, the retention time is calculated from the date the record is formally retired.

E. The laboratory has procedures to protect and back-up records stored electronically and to prevent unauthorized access to or amendment of these records. All analytical data is maintained in secure

electronic format and, in limited cases, hard copy bound logbooks.

F. The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data, as well as rapid recovery of historical data. (Records stored off site are, for the most part, immediately accessible. If requested in a queried format, within 2 days of a request for such records). The history of the sample from when the laboratory took possession of the samples must be readily understood through the documentation. This shall include inter-laboratory transfers of samples and/or extracts.

1. The records include the identity of personnel involved in sampling, sample receipt, preparation, or testing. All analytical work contains the initials (at least) of the personnel involved. The laboratory's copy of the COC is stored by Sample Control after scanning. The chain of custody would indicate the name of the sampler and any sampling provided with the work order.

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

3. The record keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes (e.g., set format for naming electronic files, set format for what is included with a given analytical data set. Instrument data is stored sequentially by instrument. A given day's analyses are maintained in the order of the analysis. Run logs are maintained for each instrument or method; a copy of each day's run log or instrument sequence is stored with the data to aid in re-constructing an analytical sequence. Where an analysis is performed without an instrument, bound logbooks or bench sheets are used to record and file data. Standard and reagent information is recorded into LIMS for each method as required.

4. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

5. The reason for a signature or initials on a document is clearly indicated in the records such as "sampled by," "prepared by", "reviewed by", or "analyzed by".

6. All generated data except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent dark ink.

7. Hard copy data may be scanned into PDF format for record storage as long as the scanning process can be verified in order to ensure that no data is lost and the data files and storage media must be tested to verify the laboratory's ability to retrieve the information prior to the destruction of the hard copy that was scanned.

14.2) Technical and Analytical Records

A. The laboratory retains records of original observations, derived data and sufficient information to establish an audit trail, calibration records, staff records and a copy of each analytical report issued, for a minimum of five years unless otherwise specified by a client or regulatory requirement. The records for each analysis shall contain sufficient information to enable the analysis to be repeated under conditions as close as possible to the original. The records shall include the identity of laboratory personnel responsible for the sampling, performance of each analysis and reviewing results.

B. Observations, data and calculations are recorded real-time and are identifiable to the specific task. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

C. The essential information to be associated with analysis, such as instrument printouts, computer data files, analytical notebooks, and run logs, include:

1. Laboratory sample ID code

2. Date of analysis, time of analysis is also required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., drying times, incubations, etc.), instrumental analyses have the date and time of analysis recorded as part of their general operations.

3. Instrumentation identification and instrument operating conditions/parameters - operating conditions/parameters are typically recorded in instrument maintenance logs where available.
4. Analysis type
5. Analyst's or operator's initials/signature
6. Sample preparation including cleanup, separation protocols, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents
7. Test results
8. Standard and reagent origin, receipt, preparation, and use
9. Calibration criteria, frequency and acceptance criteria
10. Data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions
11. Quality control protocols and assessment
12. Electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries.
13. Method performance criteria including expected quality control requirements. These are indicated both in LIMS and on specific analytical report formats.

D. All logbooks used during receipt, preparation, storage, analysis, and reporting of samples or monitoring of support equipment shall undergo a periodic, documented supervisory or peer review.

14.3) Laboratory Support Activities

A. In addition to documenting all the above-mentioned activities, the following are retained QA records and project records (previous discussions in this section relate where and how these data are stored):

1. All original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts’ work sheets and data output records (chromatograms and other instrument response readout records).
2. Copies of final reports.
3. Archives SOPs.
4. Correspondence relating to laboratory activities for a specific project.
5. All corrective action reports, audits and audit responses.
6. Proficiency test results and raw data.
7. Results of data review, verification, and data checking procedures.

B. Records of all procedures to which a sample is subjected while in the possession of the laboratory are maintained. These include, but are not limited to, records pertaining to:

1. Sample preservation including appropriateness of sample container and compliance with holding time requirement.
2. Sample identification, receipt, acceptance, or rejection and login.
3. Sample storage and tracking including shipping receipts, sample transmittal / COC forms.

4. Procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples.

14.4) Records Management, Storage and Disposal

A. All records (including those pertaining to test equipment), certificates and reports are safely stored, held secure and in confidence to the client. Certification related records are available upon request.

B. All information necessary for the historical reconstruction of data is maintained by the laboratory. Records that are stored only on electronic media must be supported by the hardware and software necessary for their retrieval. Records that are generated by personal computers are operated only on the company VPN and records are stored and backed up on the same system as though they were on-site.

C. The laboratory has a record management system (a.k.a., *document control*) for control of instrument logbooks. Standards are maintained in LIMS and/or TALS – no logbooks are used to record that data. Records are considered archived when noted as such in the records management system (a.k.a., *document control*).

1. Transfer of Ownership - In the event that the laboratory transfers ownership or goes out of business, the laboratory shall ensure that the records are maintained or transferred according to client's instructions. Upon ownership transfer, record retention requirements shall be addressed in the ownership transfer agreement and the responsibility for maintaining archives is clearly established. In addition, in cases of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed. In the event of the closure of the laboratory, all records will revert to the control of NBLSC. Should the entire company cease to exist, as much notice as possible will be given to clients and the accrediting bodies who have worked with the laboratory during the previous 5 years of such action.

2. Records Disposal - Records are removed from the archive and destroyed after 5 years unless otherwise specified by a client or regulatory requirement. On a project specific or program basis, clients may need to be notified prior to record destruction. Records are destroyed in a manner that ensures their confidentiality such as shredding, mutilation or incineration. Electronic copies of records are destroyed by erasure so no records can be read.

15) AUDITS

15.1) Internal Audits

A. *Internal audits* are performed to verify that laboratory operations comply with the requirements of the laboratory's quality system and with the external quality programs under which the laboratory operates. Audits are planned and organized by the QA staff. Personnel conducting the audits should be independent of the area being evaluated. Auditors will have sufficient authority, access to work areas, and organizational freedom necessary to observe all activities affecting quality and to report the assessments to laboratory management and, when requested, to NBLSC Management.

B. Audits are conducted and documented as described in the:

1. *Annual Management Systems Internal Audit* - An annual management systems audit is required to ensure compliance to relevant items from a checklist that incorporates items from the TNI Standard that include the management system, quality systems, and quality assurance requirements.

2. *Test Method Internal Audits* - These audits assess the methods performed. Reported results are compared to raw data to verify the authenticity of results. The validity of calibrations, QC results, run logs, records of manual integrations, and calculations are checked. Where possible, electronic audit miner programs are used to identify unusual manipulations of the data deserving closer scrutiny. The analyst's technique is reviewed as well as their ability to follow the SOP as written.

3. *Operational System Audits* - These audits apply to areas of the laboratory that are not necessarily test methods such as Sample Receiving, Sample Splitting, LIMS, etc.

4. Special Audit - Focused audits conducted on an as needed basis, generally as a follow up to specific issues such as client complaints, corrective actions, PT results, data audits, system audits, method

validation audits, regulatory audits or suspected ethical improprieties. Special audits are focused on a specific issue.

5. Performance Testing - The laboratory participates semi-annually in performance audits conducted through the analysis of PT samples provided by a third party. Some non-TNI labs do not require semi-annual PTs including Arizona and California. The laboratory participates in the following types of PT studies: Nonpotable Water, Soil, and Air. It is policy that PT samples be treated as typical samples in the production process. Full root cause investigations for unacceptable PT results are required. Any PT that receives an Unacceptable result must be reported to CA ELAP and two out of three Unacceptable results in immediate loss of accreditation. A seven-day waiting period followed by an Acceptable score and an Amendment application to restore accreditation.

15.2) External Audits

A. External audits are performed when certifying agencies or clients conduct inspections (either on-site or remote) or submit performance testing samples to the laboratory for analysis. It is Eurofins policy to cooperate fully with regulatory authorities and clients. The laboratory makes every effort to provide the auditors with access to personnel, documentation, and assistance. Laboratory supervisors are responsible for providing corrective actions to the QA Manager who coordinates the response. Audit responses are due in the time allotted by the client or agency performing the audit.

B. The laboratory cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. The client may only view data and systems related directly to the client's work. All efforts are made to keep other client information confidential.

C. During audits, auditors may come into possession of information claimed as Confidential Business Information (CBI). A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information. Additional information regarding CBI can be found in the TNI Standard.

15.3) Audit Findings

A. Audit findings, deviations, or however named are documented using the corrective action process and database (see Section 12). The laboratory's corrective action documentation must include the investigation, root cause(s), actions(s) with timelines and supporting documentation of proof of completion. The responses to the agency or client may include action plans that could not be completed prior to the response due date. In these instances, a targeted completion date must be set and agreed to by operations management and the QA Manager.

B. Developing and implementing corrective actions to findings is the responsibility of the department manager where the finding originated. Findings that are not corrected by specified due dates are reported monthly to management in the monthly quality metrics report.

C. If any audit finding casts doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's test results, the laboratory shall take timely corrective action, and shall notify clients in writing if the investigations show that the laboratory results have been affected. Once corrective action is implemented, a follow-up evaluation is scheduled to ensure that the problem has been corrected.

D. Clients must be notified promptly in writing of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any test report or amendment to a test report. The investigation must begin within 24 hours of confirmation of the problem and all efforts are made to notify the client within two weeks after the completion of the investigation.

16) Management Reviews

16.1) Quality Metrics Report

A. The QA Department is responsible for preparing a comprehensive monthly quality metrics report to Management to keep them apprised of current quality system related issues. This report fosters communication, review, and refinement of the quality system to evaluate the suitability of policies and procedures to meet both regulatory and laboratory quality objectives.

B. The NBLSC QA team compiles information from all of the Eurofins Environment Testing laboratories monthly quality metrics reports for the Executive Management team. This report includes, but is not limited to, notable information and concerns regarding the laboratory's quality system programs, overall concerns across the laboratories, information regarding new regulations that may affect the Eurofins businesses.

16.2) Annual Management Review

A. The BU management team (BUMA, Scope Leader, Department Managers, Sales Direct, QA Manager) conducts a review annually of its quality and management systems to ensure its continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. It will also provide a platform for defining goals, objectives and action items that feed into the laboratory planning system.

B. Details on the review process and agenda topics to be addressed are covered in SOP No. *39508*. The review uses information generated during the preceding year.

C. Significant issues from the following documentation are compiled by the QA Manager and reviewed with the BUMA prior to the review meeting:

1. Matters arising from the previous annual review
2. Prior Monthly QA Reports issues
3. Laboratory QA Metrics
4. Review of report reissue requests
5. Review of client feedback and complaints
6. Issues arising from any prior management or staff meetings
7. Minutes from prior senior lab management meetings. Issues that may be raised from these meetings include:
    a. Adequacy of staff, equipment and facility resources
    b. Adequacy of policies and procedures
    c. Future plans for resources and testing capability and capacity
8. The annual internal double blind PT program sample performance (if performed)
9. Compliance to the *Ethics and Data Integrity Policy*. Including any evidence/incidents of inappropriate actions or vulnerabilities related to Data Integrity.
10. Evaluation of overall risk, including risks to impartiality, confidentiality, reporting statements of conformity and nonconforming work.

D. The meeting is held. A report is generated by the QA Manager and management. The report is distributed to the President of the Business Unit, Business Unit Manager, and other management attendees. The report includes, but is not limited to:

1. The date of the review and the names and titles of participants.

2. A reference to the existing data quality related documents and topics that were reviewed.

3. Quality system or operational changes or improvements that will be made as a result of the review [e.g., an implementation schedule including assigned responsibilities for the changes (Action Table)]

17) TEST METHODS AND METHOD VALIDATION

17.1) Overview

A. The laboratory uses methods that are appropriate to meet our clients' requirements and that are within the scope of the laboratory's capabilities. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement of uncertainty as well as statistical techniques for analysis of environmental data.

B. Instructions are available in the laboratory for the operation of equipment as well as for the handling and preparation of samples. All instructions, Standard Operating Procedures (SOPs), reference methods and manuals relevant to the working of the laboratory are readily available to all staff. Deviations from published methods are documented (with justification) in the laboratory's approved SOPs. SOPs are submitted to clients for review at their request. Significant deviations from published methods require client approval and regulatory approval where applicable.

17.2) Standard Operating Procedures (SOPs)

A. The laboratory maintains SOPs that accurately reflect all laboratory activities. The method SOPs are derived from the most recently promulgated/approved, published methods and are specifically adapted to the laboratory facility. Modifications or clarifications to published methods are clearly noted in the SOPs. All SOPs are controlled in the laboratory.

1. All SOPs contain a revision number, effective date, and appropriate approval signatures. Controlled copies are available to all staff.

2. Procedures for writing an SOP are addressed in SOP No. *18076*.

3. SOPs are reviewed at a minimum of every 2 years and where necessary, revised to ensure continuing suitability and compliance with applicable requirements.

17.3) Laboratory Methods

A. For each test method, the laboratory shall have available the published referenced method as well as the laboratory developed SOP.

B. Technical SOPs are maintained to described a specific test method. Non-technical SOPs are maintained to describe functions and processes not related to a specific test method.

17.4) Selection of Methods

A. Since numerous methods and analytical techniques are available, continued communication between the client and laboratory is imperative to assure the correct methods are utilized. Once client methodology requirements are established, this and other pertinent information is summarized by the PM or Business Development Manager. These mechanisms ensure that the proper analytical methods are applied when the samples arrive for log-in. For non-routine analytical services (e.g., special matrices, non-routine compound lists), the method of choice is selected based on client needs and available technology. The methods selected should be capable of measuring the specific parameter of interest, in the concentration range of interest, and with the required precision and accuracy.

17.4.1) Sources of Methods

A. Routine analytical services are performed using standard EPA-approved methodology. In some cases, modification of standard approved methods may be necessary to provide accurate analyses of particularly complex matrices. When the use of specific methods for sample analysis is mandated through project or regulatory requirements, only those methods shall be used.

B. When clients do not specify the method to be used or methods are not required, the methods used will be clearly validated and documented in an SOP and available to clients and/or the end user of the data.

C. The laboratory reviews updated versions to all the aforementioned references for adaptation based upon capabilities, instrumentation, etc., and implements them as appropriate. As such, the laboratory strives to perform only the latest versions of each approved method as regulations allow or require.

D. Other reference procedures for non-routine analyses may include methods established by specific states (e.g., Underground Storage Tank methods), ASTM or equipment manufacturers. Sample type, source, and the governing regulatory agency requiring the analysis will determine the method utilized.

E. Other reference procedures for non-routine analyses may include methods established by specific states (e.g., Underground Storage Tank methods), ASTM or equipment manufacturers. Sample type, source, and the governing regulatory agency requiring the analysis will determine the method utilized.

F. The laboratory shall inform the client when a method proposed by the client may be inappropriate or out of date. After the client has been informed, and they wish to proceed contrary to the laboratory's recommendation, it will be documented.

G. Client Supplied, Laboratory Developed, and/or Non-Standard Methods

1. Most client-supplied method requirements involve achieving specific quality control criteria, limits of quantitation (LOQ), and/or method detection limits (MDL) using standard EPA methods. These requirements are communicated to the appropriate technical groups prior to the project start up. Each technical group evaluates the scope of work and the requirements to ensure the criteria can be met using the standard EPA method. The data is monitored to ensure the criteria are met throughout the project. The PM notifies the client if there is a more appropriate method available or if the client's criteria cannot be achieved on a certain sample matrix (i.e., due to matrix or dilutions).

H. Procedural Deviations

1. Analysts are required to follow a documented method for all tests performed; and any deviations from analytical methods must be documented, approved, and justified in an appropriate and consistent manner. We classify method deviations as either being a planned deviation or an unplanned deviation. In general, the following information is captured to document both types of situations:

   a. Description of the situation

   b. Reason or justification for the deviation

   c. Relevance the deviation has on the testing

   d. Signature/date of analyst performing the test

   e. Signature/date of QA and laboratory management approving the deviation

   f. Signature/date of client approval, if necessary

2. Deviations to written procedures are documented in raw data records and the corrective action system. Both types of documentation require management and QA review and approval.

17.4.2) Demonstration of Capability

A. Before the laboratory may institute a new method and begin reporting results, the laboratory shall confirm that it can properly perform the method. In general, this demonstration does not test the performance of the method in real world samples, but in an applicable and available clean matrix sample. If the method is for the testing of analytes that are not conducive to spiking, demonstration of capability may be performed on quality control samples.

B. A demonstration of capability (DOC) SOP No. *27925* is performed whenever there is a change in instrument type (e.g., new instrumentation), matrix, method or personnel (e.g., analyst has not

performed the test within the last 12 months).

C. **Note:** The laboratory shall have a DOC for all analytes included in the methods that the laboratory performs, and proficiency DOCs for each analyst shall include all analytes that the laboratory routinely performs. Addition of non-routine analytes does not require new DOCs for all analysts if those analysts are already qualified for routine analytes tested using identical chemistry and instrument conditions.

D. The initial demonstration of capability must be thoroughly documented and approved by the Department Manager or Group Leader and QA Manager prior to independently analyzing client samples. All associated documentation must be retained in accordance with the laboratory's archiving procedures.

E. The laboratory must have an approved SOP, demonstrate satisfactory performance, and conduct an MDL study (when applicable). There may be other requirements as stated within the published method or regulations (e.g., retention time window study).

17.4.3) Initial Demonstration of Capability (IDOC) Procedure

A. The analyte(s) shall be diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified by a method or the laboratory SOP.

1. At least four aliquots shall be prepared (including any applicable clean-up procedures) and analyzed according to the test method (either concurrently or over a period of days).

2. Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations for each parameter of interest.

3. When it is not possible to determine the mean and standard deviations, such as for presence, absence and logarithmic values, the laboratory will assess performance against criteria described in the Method SOP.

4. Compare the information obtained above to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory generated acceptance criteria (LCS or interim criteria) if there is no mandatory criteria established. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter. For Arizona IDOCs, all four iterations must pass the acceptance criteria.

5. When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst must proceed according to either option listed below:

   a. Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with step 3 above.

   b. Beginning with step 3 above, repeat the test for all parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with step 1 above.

B. **Note:** Results of successive LCS analyses can be used to fulfill the DOC requirement.

C. Methods on line prior to the effective date of this Section shall be updated to the procedures outlined above as new analysts perform their demonstrations of capability. A copy of the new record will replace that which was used for documentation in the past. At a minimum, the precision and accuracy of four mid-level laboratory control samples must have been compared to the laboratory's quality control acceptance limits.

17.5) Method Detection Limit (MDL) / Limits of Detection (LOD)

A. Details of the laboratory's procedure for conducting MDL studies are given in SOP No. *33615*.

B. The MDL is the minimum measured quantity of a substance that can be reported with 99% confidence that the concentration is distinguishable from method blank results, consistent with 40CFR Part 136 Appendix B, August, 2017. The MDL is equivalent to the TNI LOD or DL, and is also equivalent to the

DoD/DOE Quality Systems Manual (QSM) DL. The working or final MDL is the higher of the MDL value determined from spikes (MDLs) and the MDL value determined from blanks (MDLb).

C. An initial MDL study shall be performed during the method validation process and when the method is altered in a way that can reasonably be expected to change its sensitivity. Ongoing data are collected during each quarter in which samples are being analyzed. If it is found during the reevaluation of detection limit results that more than 5% of the spiked samples do not return positive numeric results that meet all method qualitative identification criteria, then then spiking level shall be increased and the initial MDL study will be repeated at the new spiking concentration.

D. At least once every 13 months the MDLs and MDLb are recalculated and reevaluated using data collected during the preceding period.

17.6) Limit of Quantitation

A. The LOQ shall be at a concentration equivalent to the lowest calibration standard concentration, with the exception of methods using a single-point calibration, and shall be greater than the MDL. The LOQ is verified by preparing and analyzing spikes at concentrations 1-2 times the selected LOQ, employing the complete analytical process.

B. When the laboratory establishes a quantitation limit, it must be initially verified by the analysis of a low level standard or QC sample at 1-2 times the reporting limit or by a DL check samples at or below the LOQ. The LOQ is verified annually thereafter. The annual requirement is waived for methods that have an annually verified MDL. The laboratory will comply with any regulatory requirements.

C. DoD Requirements for LOQ are described in Section 10 of SOP No. *33615*.

17.7) Retention Time Windows

A. Most organic analyses and some inorganic analyses use chromatography techniques for qualitative and quantitative determinations. For every chromatography analysis or as specified in the reference method, each analyte will have a specific time of elution from the column to the detector. This is known as the analyte's retention time. The variance in the expected time of elution is defined as the retention time window. As the key to analyte identification in chromatography, retention time windows must be established on every column for every analyte used for that method. These records are kept on-file and available for review at the instrument.

17.8) Evaluation of Selectivity

A. The laboratory evaluates selectivity by following the checks within the applicable analytical methods, which include mass spectral tuning, second column confirmation, ICP interelement interference checks, chromatography retention time windows, sample blanks, spectrochemical, atomic absorption or fluorescence profiles, co-precipitation evaluations, specific electrode response factors, etc.

17.9) Estimation of Uncertainty of Measurement

A. Uncertainty is "a parameter associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand" (as defined by the International Vocabulary of Basic and General Terms in Metrology, ISO Geneva, 1993, ISBN 92-67-10175-1). Knowledge of the uncertainty of a measurement provides additional confidence in a result's validity. Its value accounts for all the factors which could possibly affect the result, such as adequacy of analyte definition, sampling, matrix effects and interferences, climatic conditions, variances in weights, volumes, and standards, analytical procedure, and random variation. Some national accreditation organizations require the use of an "expanded uncertainty" defined as the range within which the value of the measurand is believed to lie within at least a 95% confidence level with the coverage factor k=2.

1. Uncertainty is not error. Error is a single value (i.e., the difference between the true result and the measured result). On environmental samples, the true result is never known. The measurement is the sum of the unknown true value and the unknown error. Unknown error is a combination of systematic error, or bias, and random error. Bias varies predictably, constantly, and independently from the number of measurements. Random error is unpredictable, assumed to be Gaussian in distribution, and reducible by increasing the number of measurements.

2. The minimum uncertainty associated with results generated by the laboratory can be determined by using the Laboratory Control Sample (LCS) accuracy range for a given analyte. The LCS limits are

used to assess the performance of the measurement system since they take into consideration all of the laboratory variables associated with a given test over time (except for variability associated with the sampling and the variability due to matrix effects). The percent recovery of the LCS is compared either to the method-required LCS accuracy limits or to the statistical, historical, in-house LCS accuracy limits.

3. To calculate the uncertainty for the specific result reported, multiply the result by the decimal of the lower end of the LCS range percent value for the lower end of the uncertainty range, and multiply the result by the decimal of the upper end of the LCS range percent value for the upper end of the uncertainty range. These calculated values represent uncertainties at approximately the 99% confidence level with a coverage factor of k = 3. As an example, for a reported result of 1.0 mg/L with an LCS recovery range of 50 to 150%, the estimated uncertainty in the result would be 1.0 +/- 0.5 mg/L.

17.10) Sample Reanalysis Guidelines

A. Because there is a certain level of uncertainty with any analytical measurement, a sample reanalysis may result in either a higher or lower value from an initial sample analysis. There are also variables that may be present (e.g., sample homogeneity, analyte precipitation over time, etc.) that may affect the results of a reanalysis. Based on the above comments, the laboratory will reanalyze samples at a client's request with the caveats listed below. Client specific Contractual Terms & Conditions for reanalysis protocols may supersede the following items.

B. Homogenous samples: If a reanalysis agrees with the original result to within the RPD limits for MS/MSD or Duplicate analyses, or within +/- 1 reporting limit for samples

1. If the reanalysis does not agree (as defined above) with the original result, then the laboratory will investigate the discrepancy and reanalyze the sample a third time for confirmation, if sufficient sample is available.

2. Any potential charges related to reanalysis are discussed in the contract terms and conditions or discussed at the time of the request. The client will typically be charged for reanalysis unless it is determined that the laboratory was in error.

3. Due to the potential for increased variability, reanalysis may not be applicable to Non-homogenous, Encore, and Sodium Bisulfate preserved samples. See the Area Supervisor or Laboratory Director if unsure.

17.11) Control of Data

A. The laboratory has policies and procedures in place to ensure the authenticity, integrity, and accuracy of the analytical data generated by the laboratory.

17.11.1) Computer and Electronic Data Related Requirements

A. The three basic objectives of our computer security procedures and policies are shown below. The laboratory is currently using the Eurofins Laboratory Information Management System (LIMS), which has been highly customized to meet the needs of the laboratory.

1. Maintain the Database Integrity - Assurance that data is reliable and accurate from acquisition through data verification (review) procedures, password-protecting access, anti-virus protection, data change requirements, as well as an internal LIMS permissions procedure.

   a. LIMS Database Integrity is achieved through data input validation, internal user controls, documentation of system failures and corrective actions taken, and data change requirements.

   b. Spreadsheets and other software developed in-house must be verified with documentation through hand calculations prior to use. Cells containing calculations must be lock-protected and controlled.

   c. Instrument hardware and software adjustments are safeguarded through maintenance logs, audit trails, and controlled access.

2. Ensure Information Availability - Protection against loss of information or service is ensured through scheduled back-ups, stable file server network architecture, secure storage of media, line filter, Uninterruptible Power Supply (UPS), and maintaining older versions of software as revisions are implemented.

3. Maintain Confidentiality - Ensure data confidentiality through physical access controls such as password protection or website access approval when electronically transmitting data.

17.11.2) Data Reduction

A. The complexity of the data reduction depends on the analytical method and the number of discrete operations involved (e.g., extractions, dilutions, instrument readings and concentrations). The analyst calculates the final results from the raw data or uses appropriate computer programs to assist in the calculation of final reportable values.

B. For manual data entry of laboratory-produced data, e.g., Wet Chemistry, the data is reduced by the analyst and then verified by the secondary reviewer in LIMS. The batch data are signed by both the analyst and secondary reviewer to confirm the accuracy of the manual entry(s). For manual data entry of sample collection data, the data is reduced by the sample collected, entered by a secondary staff member and then verified by the reviewer in LIMS. The batch data are signed by both the secondary staff member and reviewer to confirm the accuracy of the manual entry(s).

C. Manual integration of peaks will be documented and reviewed and the raw data will be flagged by the instrument software.

D. Analytical results are reduced to appropriate concentration units specified by the analytical method, taking into account factors such as dilution, sample weight or volume, etc. Blank correction will be applied only when required by the method or per manufacturer's indication; otherwise, it should not be performed. Calculations are independently verified by appropriate laboratory staff. Calculations and data reduction steps for various methods are summarized in the respective analytical SOPs or program requirements.

1. In general, concentration results are reported in milligrams per liter (mg/L) or micrograms per liter (µg/L) for liquids and milligrams per kilogram (mg/kg) or micrograms per kilogram (µg/kg) for solids. For values greater than 10,000 mg/L, results can be reported in percent, i.e., 10,000 mg/L = 1%. Units are defined in each laboratory SOP.

2. For those methods that do not have an instrument printout or an instrumental output compatible with the LIMS, the raw results and dilution factors are entered directly into LIMS by the analyst or secondary staff member for field parameters, and the software calculates the final result for the analytical report. LIMS has a formatter for significant figure criterion for each analyte.

3. All raw data must be retained in the worklist folder, computer file, and/or runlog. All criteria pertinent to the method must be recorded. The documentation is recorded at the time observations or calculations are made and must be signed or initialed/dated (month/day/year). It must be easily identifiable who performed which tasks if multiple people were involved.

4. In reporting, the analyst or the instrument output records the raw data result using values of known certainty plus one uncertain digit. If final calculations are performed external to LIMS, the results should be entered in LIMS with at least three significant figures. In general, results are reported to 2 significant figures on the final report.

5. The laboratory strives to import data directly from instruments or calculation spreadsheets to ensure that the reported data are free from transcription and calculation errors. For those analyses with an instrumental output compatible with the LIMS, the raw results and dilution factors are transferred into LIMS, electronically after reviewing the quantitation report, and removing unrequested or poor spectrally-matched compounds. The analyst prints a copy of what has been entered to check for errors. This printout and the instrument's printout of calibrations, concentrations, retention times, chromatograms, and mass spectra, if applicable, are retained with the data file. The data file is stored in a folder on the instrument computer and the file is backed up to the server that evening.

17.11.3) Logbook / Worksheet Use Guidelines

A. Logbooks and worksheets are filled out in 'real time' and have enough information on them to trace the events of the applicable analysis/task.

1. Corrections are made following the procedures outlined in Section 12.

2. Logbooks are controlled by the QA department. A record is maintained of all logbooks in the lab.

3. Unused portions of pages must be "Z"d out, signed, and dated.

4. Worksheets are created with the approval of QA. QA controls all worksheets following the laboratory's document control procedures.

17.11.4) Review / Verification Procedures

A. Review of data is performed by primarily by analysts that perform the process step or analytical activity or designated data reviewers such as Group Leaders, senior analysts, local data package staff, and off-site data reviewers. This process ensures that reported data are free from calculation and transcription errors and that QC parameters have been reviewed and evaluated before data is reported. The laboratory also has an SOP discussing manual integrations to ensure the authenticity of the data *NCSC-ETHC-TRN-FRM56342* and there are group-directed trainings in Eurofins Learning Centre that are required. The general review concepts are discussed below.

1. Log-In Review - The data review process starts at the sample receipt stage. Sample control personnel review chain-of-custody forms and project instructions from the project management group. This is the basis of the sample information and analytical instructions entered into the LIMS. The log-in instructions are reviewed by the personnel entering the information, and a second level review is conducted by the project management staff.

2. First Level Data Review - The next level of data review occurs with the analysts. As data are generated, analysts review their work to ensure that the results meet project and SOP requirements. First level reviews include inspection of all raw data (e.g., instrument output for continuous analyzers, chromatograms, spectra, and manual integrations), evaluation of calibration/calibration verification data in the day's analytical run, evaluation of QC data, and reliability of sample results. The analyst transfers data into LIMS, data qualifiers are added as needed. A Data Review Checker (DRC) is utilized as a tool to automate review of select method requirements. All first level reviews are documented.

3. Second Level Data Review - All analytical data are subject to review by a second qualified analyst or supervisor. Second level reviews include inspection of all raw data (e.g., instrument output, chromatograms, and spectra) including 100% of data associated with any changes made by the primary analyst, such as manual integrations or reassignment of peaks to different analytes, or elimination of false negative analytes. The second review also includes evaluation of initial calibration/calibration verification data in the analytical run, evaluation of QC data, reliability of sample results, qualifiers and NCM narratives. Manual calculations are checked in second level review. A Data Review Checker (DRC) is utilized as a tool to automate review of select method requirements. All second level reviews are documented.

4. Issues that deem further review include the following:

   a. QC data that are outside the specified control limits for accuracy and precision.

   b. Reviewed sample that data does not match with reported results.

   c. Unusual detection limit changes.

   d. Samples with unusually high results.

   e. Samples exceeding a known regulatory limit.

   f. Raw data indicating some type of contamination or poor technique.

g. Inconsistent peak integration

h. Transcription errors.

i. Results outside of calibration range.

5. Unacceptable analytical results may require reanalysis of the samples.

6. The results are then entered or directly transferred into LIMS and a pdf is generated for the client.

7. As a final review prior to the release, some reports may undergo review by the Project Manager for appropriateness and completeness. Other reports continue onto auto reporting.

8. Projects that require a data package may be subject to a tertiary data review for transcription errors and acceptable quality control requirements.

17.11.5) Manual Integrations

A. Computerized data systems provide the analyst with the ability to reintegrate raw instrument data in order to optimize the interpretation of the data. Though manual integration of data is an invaluable tool for resolving variations in instrument performance and some sample matrix problems, when used improperly, this technique would make unacceptable data appear to meet quality control acceptance limits. Improper reintegration may lead to legally indefensible data, a poor reputation, or possible laboratory decertification. Because guidelines for reintegration of data are not provided in the methods and most methods were written prior to widespread implementation of computerized data systems, the laboratory trains all analytical staff on proper manual integration techniques in accordance with NBLSC Document No. *NDSC-ETHC-SOP43862 - Manual Integrations*.

18) INSTRUMENTS, EQUIPMENT, AND CALIBRATION

18.1) Overview

A. Instrumentation is purchased on the basis of accuracy, dependability, efficiency and sensitivity. Each laboratory is furnished with all items of sampling, preparation, analytical testing and measurement equipment necessary to correctly perform the tests for which the laboratory has capabilities. Each piece of equipment is capable of achieving the required accuracy and complies with specifications relevant to the method being performed. Before being placed into use, the equipment (including sampling equipment) is calibrated and checked to establish that it meets its intended specification. The calibration routines for analytical instruments establish the range of quantitation. Calibration procedures are specified in laboratory SOPs. Equipment is only operated by authorized and trained personnel. Manufacturer’s instructions for equipment use hard copies and electronic copies are archived by the local IT group. Electronic copies are readily accessible to all appropriate laboratory personnel as well as the Operations Manager.

18.2) Instrument / Equipment Maintenance

A. The laboratory follows a well-defined maintenance program to ensure proper equipment operation and to prevent the failure of laboratory equipment or instrumentation during use. This program of preventive maintenance helps to avoid delays due to instrument failure.

B. Routine preventive maintenance procedures and frequency, such as cleaning and replacements, should be performed according to the procedures outlined in the manufacturer's manual. Qualified personnel must also perform maintenance when there is evidence of degradation of peak resolution, a shift in the calibration curve, loss of sensitivity, or failure to continually meet one of the quality control criteria.

C. Scheduled routine maintenance is defined in each method SOP. It is the responsibility of each department manager or Group Leader to ensure that instrument maintenance logs are kept for all equipment in his/her department. Preventative maintenance procedures are recorded in instrument maintenance logbooks.

D. Instrument maintenance logbooks are controlled and are used to document instrument problems, instrument repair and maintenance activities. Maintenance logbooks shall be kept for all major pieces of equipment. Instrument maintenance logbooks may also be used to specify instrument parameters.

1. Documentation must include all major maintenance activities such as contracted preventive maintenance and service, and in-house activities such as the replacement of electrical components, lamps, tubing, valves, columns, detectors, cleaning and adjustments.

2. Each entry in the instrument logbook includes the analyst's initials, the date, a detailed description of the problem (or maintenance needed/scheduled), a detailed explanation of the solution or maintenance performed, and a verification that the equipment is functioning properly (state what was used to determine a return to control. e.g. CCV run on 'date' was acceptable, or instrument recalibrated on 'date' with acceptable verification, etc.) must also be documented in the instrument records.

3. When maintenance or repair is performed by an outside agency, service receipts detailing the service performed must be kept on file.

E. If an instrument requires repair, gives suspect results, or otherwise is shown to be defective or outside of specified limits it shall be taken out of operation and tagged as out-of-service or otherwise isolated until such a time as the repairs have been made and the instrument can be demonstrated as operational by calibration and/or verification or other test to demonstrate acceptable performance. The laboratory shall examine the effect of this defect on previous analyses.

F. At a minimum, if an instrument is sent out for service or transferred to another facility, it must be recalibrated and the laboratory MDL verified (using and MDLv) prior to returning to lab operations.

18.3) Support Equipment

A. SOP No. *33458* and SOP No. *17517* apply to all devices that may not be the actual test instrument, but are necessary to support laboratory operations. These include but are not limited to: balances, ovens, refrigerators, freezers, field sampling devices, temperature measuring devices, thermal/pressure sample preparation devices and volumetric dispensing devices if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume. All raw data records associated with the support equipment are retained to document instrument performance.

18.3.1) Weights and Balances

A. The accuracy of the balances used in the laboratory is checked every working day, before use. All balances are placed on stable counter tops.

B. Each balance is checked prior to initial serviceable use with at least two certified ASTM type 1 weights spanning its range of use (weights that have been calibrated to ASTM type 1 weights may also be used for daily verification). ASTM type 1 weights used only for calibration of other weights (and no other purpose) are inspected for corrosion, damage or nicks at least annually and if no damage is observed, they are calibrated at least every 5 years by an outside calibration laboratory. Any weights (including ASTM Type 1) used for daily balance checks or other purposes are recalibrated/recertified annually to NIST standards (this may be done internally if laboratory maintains "calibration only" ASTM type 1 weights).

C. All balances are serviced annually by a qualified service representative, who supplies the laboratory with a certificate that identifies traceability of the calibration to the NIST standards.

D. All of this information is recorded in logs, and the recalibration/recertification certificates are kept on file.

18.3.2) pH, Conductivity, and Turbidity Meters

A. The pH meters used in the laboratory are accurate to + 0.1 pH units, and have a scale readability of at least 0.05 pH units. The meters automatically compensate for the temperature, and are calibrated with at least two working range buffer solutions on working day prior to use.

B. Conductivity meters used in the laboratory are capable for measuring conductivity with an error not exceeding 1% or one umhos/cm, whichever is greater. The meters are also calibrated on working day prior to use with a known standard.

C. Turbidity meters are also calibrated on each working day prior to use.

D. All of this information is documented in logs.

E. Consult *pH*, *Conductivity*, and *Turbidity* SOPs for further information.

18.3.3) Temperature Measuring Devices

A. All liquid in glass thermometers are calibrated on an annual basis with a NIST-traceable reference thermometer.

1. If the temperature measuring device is used over a range of 10°C or less, then a single point verification within the range of use is acceptable.

2. If the temperature measuring device is used over a range of greater than 10°C, then the verification must bracket the range of use.

B. IR thermometers, digital probes and thermocouples are calibrated quarterly. IR Thermometers should be calibrated over the full range of use, including ambient, iced (4°C) and frozen (0°C to -5°C), per the Drinking Water Manual.

C. The NIST thermometer is recalibrated every five years by an approved outside service and the provided certificate of traceability is kept on file. The NIST thermometer has increments of 1 degree and has ranges applicable to method and certification requirements. The NIST traceable thermometer is used for no other purpose than to calibrate other thermometers.

D. All of this information is documented in logbooks. Monitoring method-specific temperatures, including incubators, heating blocks, water baths, and ovens, is documented in method-specific logbooks. More information on this subject can be found in the SOP No. *17517*.

18.3.4) Refrigerators, Freezer, Water Baths, Ovens, and Incubators

A. The temperatures of all refrigerators and freezers used for sample and standard storage are monitored 7 days a week. Ovens and water baths are monitored on days of use. All of this equipment has a unique identification number, and is assigned a thermometer for monitoring.

B. Sample storage refrigerator temperatures are kept between > 0ºC and < 6 ºC. Specific temperature settings/ranges for other refrigerators, ovens and water baths can be found in method specific SOPs.

C. All of this information is documented in Daily Temperature Logbooks and method-specific logbooks and discussed in SOP No. *17517*.

18.3.5) Autopipettors, Dilutors, and Syringes

A. Mechanical volumetric dispensing devices are given unique identification numbers and the delivery volumes are verified gravimetrically, at a minimum, on a quarterly basis.

B. For those dispensers that are not used for critical volume measurements, a label shall be applied to the device stating that it is not calibrated. Any device not regularly verified cannot be used for any quantitative measurements.

18.4) Instrument Calibration

A. Calibration of analytical instrumentation is essential to the production of quality data. Strict calibration procedures are followed for each method. These procedures are designed to determine and document the method detection limits, the working range of the analytical instrumentation and any fluctuations that may occur from day today.

B. Sufficient raw data records are retained to allow an outside party to reconstruct all facets of the initial calibration. Records contain, but are not limited to, the following: calibration date, method, instrument, analyst(s) initials or signatures, analysis date, analytes, concentration, response, and type of calibration (Avg RF, curve, or other calculations that may be used to reduce instrument responses to concentration.)

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

D. If the initial calibration results are outside of the acceptance criteria, corrective action is performed and any affected samples are reanalyzed if possible. If the reanalysis is not possible, any data associated with an unacceptable initial calibration will be reported with appropriate data qualifiers. Recalibration is performed as needed, per method, or at least annually.

18.4.1) Calibration Standards

A. Calibration standards are prepared using the procedures indicated in the Reagents and Standards section of the determinative method SOP.

B. Standards for instrument calibration are obtained from a variety of sources. All standards are traceable to national or international standards of measurement, or to national or international standard reference materials.

C. The lowest concentration calibration standard that is analyzed during an initial calibration must be at or below the stated reporting limit for the method based on the final volume of extract (or sample).

D. The other concentrations define the working range of the instrument/method or correspond to the expected range of concentrations found in actual samples that are also within the working range of the instrument/method. Results of samples not bracketed by initial instrument calibration standards (within calibration range to at least the same number of significant figures used to report the data) must be reported as having less certainty, e.g., defined qualifiers or flags (additional information may be included in the case narrative). The exceptions to these rules; ICP and ICPMS methods, which define the working range with periodic linear dynamic range studies, rather than through the range of concentrations of daily calibration standards.

E. All initial calibrations are verified with a standard obtained from a second source and traceable to a national standard, when available (or vendor certified different lot if a second source is not available). For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst at a different time or a different preparation would be considered a second source. This verification occurs immediately after the calibration curve has been analyzed, and before the analysis of any samples.

18.4.2) Calibration Verification

A. The calibration relationship established during the initial calibration must be verified initially and at least daily as specified in the laboratory method SOPs in accordance with the referenced analytical methods and in the TNI Standard. The process of calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models. Initial calibration verification (ICV) is with a standard source secondary (second source standard) to the calibration standards, but continuing calibration verifications (CCV) may use the same source standards as the calibration curve.

1. **Note:** The process of calibration verification referred to here is fundamentally different from the approach called "calibration" in some methods. As described in those methods, the calibration factors or response factors calculated during calibration are used to update the calibration factors or response factors used for sample quantitation. This approach, while employed in other EPA programs, amounts to a daily single-point calibration.

B. All target analytes and surrogates, including those reported as non-detects, must be included in periodic calibration verifications for purposes of retention time confirmation and to demonstrate that calibration verification criteria are being met.

C. All samples must be bracketed by periodic analyses of standards that meet the QC acceptance criteria (e.g., calibration and retention time). The frequency is found in the determinative methods or SOPs.

1. **Note:** If an internal standard calibration is being used then bracketing calibration verification standards may not be required, only daily verifications are needed. The results from these verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

D. Generally, the calibrations must be verified by an ICV analyzed immediately following initial calibration and before sample analysis. The ICV may be used as the first bracketing CCV, if criteria for both are

met.

E. A continuing instrument calibration verification (CCV) is generally analyzed at the beginning of each 12-hour analytical shift during which samples are analyzed. The 12-hour analytical shift begins with the injection of the calibration verification standard (or the MS tuning standard in MS methods). The shift ends after the completion of the analysis of the last sample, QC, or standard that can be injected within 12-hours of the beginning of the shift. For methods that have quantitation by external calibration models, a CCV is analyzed at the end of each analytical sequence. Some methods have more frequent CCV requirements. Most inorganic methods require the CCV to be analyzed after every 10 samples or injections, including matrix or batch QC samples.

F. If the results of a CCV are outside the established acceptance criteria and analysis of a second consecutive (and immediate) CCV fails to produce results within acceptance criteria, corrective action shall be performed. Once corrective actions have been completed and documented, the laboratory shall demonstrate acceptable instrument / method performance by analyzing two consecutive CCVs, or a new initial instrument calibration shall be performed.

G. Calibration verification for calibrations involves the calculation of the percent drift or the percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard. (These calculations are available in the laboratory method SOPs.) Verification standards are evaluated based on the % Difference from the average CF or RF of the initial calibration or based on % Drift or % Recovery if a linear or quadratic curve is used.

H. Regardless of whether a linear or non-linear calibration model is used, if initial verification criterion is not met, then no sample analyses may take place until the calibration has been verified or a new initial calibration is performed that meets the specifications listed in the method SOPs. If the calibration cannot be verified after the analysis of a single verification standard, then adjust the instrument operating conditions and/or perform instrument maintenance, and analyze another aliquot of the verification standard. If the calibration cannot be verified with the second standard, then a new initial calibration is performed.

I. Sample analyses and reporting of data may not occur or continue until the analytical system is calibrated or calibration verified. However, data associated with an unacceptable calibration verification may be fully useable reported based upon discussion and approval of the client under the following special conditions:

   1. When the acceptance criteria for the CCV are exceeded high (i.e., high bias) and the associated samples within the batch are non-detects, then those non-detects may be reported with case narrative comment explaining the high bias. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted.

   2. When the acceptance criteria for the CCV are exceeded low (i.e., low bias), those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable CCV shall be re-analyzed after a new calibration curve has been established, evaluated and accepted. Alternatively, a reporting limit standard may be analyzed to demonstrate that the laboratory can still support non-detects at their reporting limit.

J. Samples reported by the 2 conditions identified above will be appropriately flagged.

19) MEASUREMENT TRACEABILITY

19.1) Overview

A. Traceability of measurements shall be assured using a system of documentation, calibration, and analysis of reference standards. Laboratory equipment that are peripheral to analysis and whose calibration is not necessarily documented in a test method analysis or by analysis of a reference standard shall be subject to ongoing certifications of accuracy. At a minimum, these must include procedures for checking specifications of ancillary equipment. Wherever possible, subsidiary or peripheral equipment is checked against standard equipment or standards that are traceable to national or international standards.

B. With the exception of Class A Glassware, quarterly accuracy checks are performed for mechanical volumetric devices used to measure critical volumes. Calscience also checks glass microliter syringes for accuracy on a semiannual basis. Class A Glassware should be routinely inspected for chips and acid etching. If the Class A glassware is suspect, the accuracy of the glassware will be assessed prior to use.

19.2) Reference Weights and Thermometers

A. Reference standards of measurement shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated.

B. For reference weights and thermometers, the laboratory requires that all calibrations be conducted by a calibration laboratory accredited under ISO/IEC 17025. A calibration certificate for these reference weights and thermometers is kept on file at the laboratory.

19.3) Reference Standards, Materials, and Reagents

A. Reference standards/materials/reagents, where commercially available, are traceable to certified reference materials. Commercially prepared reference standards, to the extent available, are purchased from vendors that are accredited under ISO 17034. All reference standards from commercial vendors shall be accompanied with a certificate that includes at least the following information:

1. Manufacturer
2. Analytes or parameters calibrated
3. Identification or lot number
4. Concentration with associated uncertainties
5. Purity

B. If a standard cannot be purchased from a vendor that supplies a Certificate of Analysis, the purity of the standard is documented by analysis. The receipt of all reference standards must be documented. Reference standards are labeled with a unique identification number and expiration date. All documentation received with the reference standard is retained as a QC record and references the identification number.

C. All reference, primary and working standards/materials, whether commercially purchased or laboratory prepared, must be checked regularly to ensure that the variability of the standard or material from the true value does not exceed method requirements. The accuracy of calibration standards is checked by comparison with a standard from a second source. In cases where a second standard manufacturer is not available, a vendor certified different lot is acceptable for use as a second source. For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source. The appropriate Quality Control (QC) criteria for specific standards are defined in laboratory SOPs.

D. All standards and materials must be stored and handled according to method or manufacturer’s requirements in order to prevent contamination or deterioration.

E. Standards and reference materials shall not be used after their expiration dates unless their reliability is verified by the laboratory and their continued use through the extended expiration period is approved by the QA Manager.

F. Records are maintained electronically for standard and reference material preparation. These records show the traceability to purchased stocks or neat compounds. These records also include method of preparation, date of preparation, expiration date and preparer’s name or PUID. Preparation procedures are provided in the Method SOPs.

G. All standards, reagents, and reference materials must be clearly labeled with a minimum of the following information:

1. Expiration Date (include prep date for reagents)

2. Identification number

3. Date opened

H. Label with the following when container size allows, if not, ensure the information is in the associated LIMS/logbook record:

1. Description (if different from manufacturer's label or if it was prepared in the laboratory)

2. Storage Conditions

3. Concentration (if applicable)

4. Preparer name/ID

I. Special Health/Safety warnings must also be available to the analyst. This information is found in the associated SDS.

20) SAMPLING

20.1) Overview

A. The laboratory provides sampling services. Sampling procedures are described in SOP No. *46239*, Wastewater Sampling.

20.2) Sampling Containers

A. The laboratory offers clean sampling containers for use by clients. These containers are obtained from ESS, a reputable container manufacturer that meets EPA specifications as required. Certificates of cleanliness for bottles and preservatives are maintained by the supplier and available to the laboratory on-line or by request.

B. Preservatives are provided to the client in pre-cleaned sampling containers. In some cases, containers may be prepared by the laboratory. At a minimum, the preservatives are:

1. Hydrochloric Acid: Instra-Analyzed or equivalent

2. Methanol: Purge and Trap grade

3. Nitric Acid: ACS grade or equivalent.

4. Sodium Bisulfate: ACS grade or equivalent.

5. Sodium Hydroxide: ACS grade or equivalent.

6. Sulfuric Acid: Instra-Analyzed or equivalent.

21) SAMPLE HANDLING

21.1) Chain of Custody (COC)

A. The COC form is the documented history of any sample and is initiated when bottles are sent to the field, or at the time of sampling. This form is completed by the sampling personnel and accompanies the samples to the laboratory where it is received and stored under the laboratory’s custody. The purpose of the COC form is to provide a legal record of the handling of samples from the time of collection until they are received at the laboratory. It also serves as the primary documented request for analyses from the client to the laboratory. The COC form may serve as the purchase order specifying the requested analytical services when no other contractual agreement is in effect.

B. Field COC Documentation

1. The information the sampler needs to provide at the time of sampling on the container label includes:
    a. Sample identification
    b. Date and time of collection
    c. Preservative (laboratory-provided containers will have this information)
2. During the sampling process, the COC form is completed and must be legible. This form includes information such as:
    a. Client name, address, phone number, and fax number (if available)
    b. Project name, and/or number
    c. The sample identification
    d. Date, time, and location of sampling
    e. Sample collector's name
    f. The matrix description
    g. The container description
    h. The total number of each type of container
    i. Preservatives used
    j. Analysis requested
    k. Requested turnaround time (TAT)
    l. Any special instructions
    m. Purchase Order number or billing information (e.g. quote number) if available
    n. The date and time that each person received or relinquished the sample(s), including their signed name.
3. The client relinquishes the samples in writing on the COC form, or through the Eurofins eCOC electronic transfer program, to the sample control personnel at the laboratory or to a laboratory courier. The laboratory personnel document the receipt date and time on the COC.
4. When clients send the samples through a common carrier (e.g., Fed-Ex, UPS), the COC relinquished date/time is completed by the client. Samples are documented as received by the laboratory with the date and time of receipt of the shipment from the common carrier.
5. **Note:** Independent couriers are not required to sign the COC form.

C. Legal / Evidentiary COC

1. If samples are identified for legal/evidentiary purposes on the COC, login will complete the custody seal, retain the shipping record with the COC, and initiate an internal COC for laboratory use by analysts and a sample disposal record.

21.2) Sampling Containers, Preservation Requirements, Holding Times

A. The sampling container type, preservation, and holding time criteria specified in the laboratory SOPs are derived from the source documents for the methods. If method required holding times or preservation requirements are not met, the reports will be qualified using a flag, footnote and/or case narrative comment.

B. The date and time of sampling documented on the COC form establishes the day and time zero. As a general rule, when the maximum allowable holding time is expressed in days (e.g., 14 days, 28 days), the holding time is based on calendar day measured. Holding times expressed in hours (e.g., 6 hours, 24 hours, etc.) are measured from date and time zero. Holding times for analysis include any necessary reanalysis.

C. Tests designated in the method or regulation as to be performed "As soon as possible" or "ASAP" is indicative of a parameter that should be analyzed within 15 minutes of collection. Therefore, these are typically tests that are performed in the field. When the analysis is performed in the laboratory, the data will be qualified as outside the holding time.

21.3) Sample Receipt

A. Samples are received at the laboratory by designated sample receiving personnel and a unique laboratory job identification number is assigned. Each sample container shall be assigned a unique sample identification number that is cross-referenced to the client identification number such that traceability of test samples is unambiguous and documented. Each sample container is affixed with a durable sample identification label. Sample acceptance, receipt, tracking and storage procedures are detailed in the laboratory's *SC-SOP39452 Sample Receipt and Login Procedures*.

B. When samples arrive at the laboratory, sample receiving personnel inspect the coolers and samples. The integrity of each sample must be determined by comparing sample labels with the COC and by visual checks of the container for possible damage. Any nonconformance, irregularity, or compromised sample receipt must be documented on the receipt checklist and brought to the immediate attention of the client. The COC, shipping documents, documentation of any nonconformance, irregularity, or compromised sample receipt, record of client contact, and resulting instructions become part of the project record.

C. Sample Receiving personnel document preservation of non-volatile liquid samples after the samples have been entered into the LIMS and before they are released to the laboratory for testing or placed into storage.

21.4) Sample Acceptance Policy

A. The laboratory has a written sample acceptance policy that clearly outlines the circumstances under which samples shall be accepted or rejected. This policy is outlined in the SOP noted above in Section 21.2.

B. After inspecting the samples, the sample receiving personnel sign and date the COC form, make any necessary notes of the samples' conditions and store them in appropriate refrigerators or storage locations.

C. Any deviations from these checks that question the suitability of the sample for analysis, or incomplete documentation as to the tests required will be resolved by consultation with the client. If the sample acceptance policy criteria are not met, the laboratory shall either:

1. Retain all correspondence and/or records of communications with the client regarding the disposition of rejected samples, or

2. Fully document any decision to proceed with sample analysis that does not meet sample acceptance criteria.

D. Once sample acceptance is verified, the samples are logged into LIMS.

21.5) Sample Storage

A. In order to avoid deterioration, contamination or damage to a sample during storage and handling, from the time of receipt until all analyses are complete, samples are stored in refrigerators, freezers or protected locations suitable for the sample matrix. In addition, samples to be analyzed for volatile

organic parameters are stored in separate refrigerators designated for volatile organic parameters only. Samples are never to be stored with reagents, standards or materials that may create contamination.

B. To ensure the integrity of the samples during storage, refrigerator blanks are maintained in the volatile sample refrigerators and analyzed every two weeks.

C. Access to the laboratory is controlled such that sample storage need not be locked at all times unless a project specifically requires it. Samples are accessibly to laboratory personnel only. Visitors to the laboratory are prohibited from entering the storage and laboratory areas unless accompanies by an employee of Eurofins Calscience.

21.6) Hazardous Samples and Foreign Soils

A. All samples should be treated as hazardous until clearly noted otherwise. To minimize exposure to personnel and to avoid potential accidents, foreign soil samples are stored in a designated area and have a Foreign Soil sticker attached as described in SOP No. *17778*, *Handling and Disposal of Foreign Soil Samples*. Hazardous samples are designated for hazardous waste only. For any sample that is known to be hazardous at the time of receipt, or if after completion of analysis the result exceeds the acceptable regulatory levels, a Hazardous Sample Notice must be completed by the analyst. This form may be completed by Sample Control, Project Managers, or analysts and must be attached to the report.

B. The sample itself is clearly marked with a red stamp, stamped on the sample label reading "HAZARDOUS" and placed in a colored and/or marked bag to easily identify the sample. The date, log number, lab sample number, and the result or brief description of the hazard are all written on the Hazardous Sample Notice. A copy of the form must be included with the original COC and Work Order and the original must be given to the Sample Control Custodian.

C. Analysts will notify Sample Control of any sample determined to be hazardous after completion of analysis by completing a Hazardous Sample Notice. All hazardous samples are either returned to the client or disposed of appropriately through a hazardous waste disposal firm that lab-packs all hazardous samples and removed them from the laboratory. Foreign soil samples are sent out for incineration by Veolia.

21.7) Sample Shipping

A. Reference SOP No. *39452*, Section 11, Inter-Laboratory Sampling

1. In the event that the laboratory needs to ship samples, the samples are placed in a cooler with enough ice to ensure the samples remain just above freezing and at or below 6°C during transit. The samples are carefully surrounded by packing material to avoid breakage (yet maintain appropriate temperature). A trip blank is enclosed for those samples requiring water/solid volatile organic analyses and a temperature blank. The chain-of-custody form is signed by the sample control technician and attached to the shipping paperwork. A custody seal is placed is required.

2. Samples are generally shipped overnight express. All personnel involved with shipping and receiving samples must be trained to maintain the proper chain-of-custody documentation and to keep the samples intact and on ice. The laboratory's Environmental, Health and Safety Manual contains additional shipping requirements.

3. **Note:** If the sample will be sent outside of California, refer to the Shipping Requirements section of the SOP No. *17778*, *Handling and Disposal of Foreign Soil Samples*, for further requirements.

21.8) Sample Disposal

A. Samples should be retained for a minimum of 30 days after the project report is sent, however, provisions may be made for earlier disposal of samples once the holding time is exceeded. Some samples are required to be help for longer periods based on regulatory or client requirements. The laboratory must follow the longer sample retention requirements where required by regulation or client agreement.

B. Several possibilities for sample disposal exist: the sample may be consumed completely during analysis, the sample may be returned to the customer or location of sampling for disposal, or the sample may be

disposed of in accordance with the laboratory's waste disposal procedures SOP No. *38183*, *Disposal of Laboratory Wastes and Samples*. All procedures in the laboratory's *Environmental Health and Safety Manual* are followed during disposal. Unused portions of samples found or suspected to be hazardous according to state or federal guidelines may be returned to the client upon completion of the analytical work or disposed of in the relevant hazardous waste stream.

C. If a sample is part of a known litigation, the affected legal authority, sample data user, and/or submitter of the sample must participate in the decision about the sample's disposal.

D. All documentation and correspondence concerning the disposal decision process must be kept on file. Pertinent information includes the date of disposal, nature of disposal (such as sample depletion, hazardous waste facility disposal, return to client), names of individuals who conducted the arrangements and physically completed the task. The laboratory will remove or deface sample labels prior to disposal unless this is accomplished through the disposal method (e.g., samples are incinerated).

22) ASSURING THE QUALITY OF TEST RESULTS

22.1) Overview

A. In order to assure our clients of the validity of their data, the laboratory continuously evaluates the quality of the analytical process. The analytical process is controlled not only by instrument calibration, but also by routine process quality control requirements. These quality control checks are performed as required by the method and/or regulations to assess precision and accuracy. Quality control samples are to be treated in the exact same manner as the associated field samples being tested (e.g. filtering of samples requires the QC to also be filtered). In addition to the routine process quality control samples, Proficiency Testing (PT) Samples are analyzed to help ensure laboratory performance.

22.2) Controls

A. Samples are arranged into discreet manageable groups referred to as batches. Typically a batch consists of a maximum 20 field samples and the associated preparation and/or analytical quality control (QC) samples. Control samples are added to each batch to monitor method performance and are processed through the entire procedure with field samples.

22.3) Negative Controls

Control Type	Details
Method Blank (MB)	To assess preparation and analysis for possible contamination during the preparation and processing steps.
	The specific frequency of use for method blanks during the analytical sequence is defined in the specific standard operating procedure for each analysis. Generally it is 1 for each batch of samples; not to exceed 20 environmental samples.
	The method blank is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (e.g., Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples.
	The method blank goes through all of the steps of the process (including as necessary: filtration, clean-ups, etc.).
	Reanalyze or qualify associated sample results when the concentration of a targeted analyte in the blank is at or above the reporting limit as established by the method or by regulation, AND is greater than 1/10 of the amount measured in the sample.
Calibration Blanks	Prepared and analyzed along with calibration standards where applicable. They are prepared using the same reagents that are used to prepare the standards. In some analyses the calibration blank may be included in the calibration curve.
Instrument Blanks	Blank reagents or reagent water that may be processed during an analytical sequence in order to assess contamination in the analytical system. In general, instrument blanks are used to differentiate between contamination caused by the analytical system and that caused by the sample handling or sample prep process. Instrument blanks may also be

	inserted throughout the analytical sequence to minimize the effect of carryover from samples with high analyte content.
Trip Blank (TB)[1]	TBs are required to be submitted by the client with each shipment of samples requiring aqueous and solid volatiles analyses (or as specified in the client's project plan). Additionally, trip blanks may be prepared and analyzed for volatile analysis of air samples, when required by the client. A trip blank may be purchased (certified clean) or is prepared by the laboratory by filling a clean container with pure deionized water that has been purged to remove any volatile compounds. Appropriate preservatives are also added to the container. The trip blank is sent with the bottle order and is intended to reflect the environment that the containers are subjected to throughout shipping and handling and help identify possible sources if contamination is found. The field sampler returns the trip blank in the cooler with the field samples.
Field Blanks (FB)[1]	FBs are sometimes used for specific projects by the field samplers. A field blank prepared in the field by filling a clean container with pure reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)
Equipment Blanks (EB)[1]	EBs are also sometimes created in the field for specific projects. An equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (TNI)
Holding Blanks	Also referred to as refrigerator, storage, or freezer blanks, are used to monitor the sample storage units for volatile organic compounds during the storage of VOA samples in the laboratory.

[1] - When known, these field QC samples should not be selected for matrix QC as it does not provide information on the behavior of the target compounds in the field samples. Usually, the client sample ID will provide information to identify the field blanks with labels such as "FB", "EB", or "TB."

22.4) Positive Controls

A. Control samples are analyzed with each batch of samples to evaluate data based upon:

1. Method Performance - Laboratory Control Sample (LCS) or Laboratory Fortified Blank (LFB) - which includes both the preparation and analysis steps. The LCS measures the accuracy of the method in a blank matrix and assesses method performance independent of potential field sample matrix effects in a laboratory batch.

2. Matrix Effects - Matrix Spike (MS) or Sample Duplicate (MSD, DUP) - which includes both the preparation and analysis steps. The matrix QC evaluates field sampling accuracy, precision, representativeness, interferences, and the effect of the matrix on the method performed.

B. Each regulatory program and each method within those programs specify the control samples that are prepared and/or analyzed with a specific batch.

C. Complete details on additional method control samples are listed in each analytical SOP.

22.5) Acceptance Criteria (Quality Control Limits)

As mandated by the test method and/or regulation, each individual analyte in the QC is evaluated against the control limits published in the test method. Where there are no established acceptance criteria, the laboratory calculates in-house control limits with the use of control charts or, in some cases, utilizes client project specific control limits. When this occurs, the regulatory or project limits will supersede the laboratory's in-house limits.

A. **Note:** For methods, analytes and matrices with very limited data (e.g., unusual matrices not analyzed often), interim limits are established using available data or by analogy to similar methods or matrices.

B. Once control limits have been established, they are verified, reviewed, and updated if necessary on an annual basis unless the method requires more frequent updating. Control limits are established per method regardless of the number of instruments utilized.

C. SOP No. *33613*, *Internal Quality Control Checks*

1. Laboratory generated % Recovery acceptance (control) limits are generally established by taking ± 3 Standard Deviations (99% confidence level) from the average recovery of a minimum of 20-30 data

points (more points are preferred).

2. Regardless of the calculated limit, the limit should be no tighter than the Calibration Verification (ICV/CCV). (Unless the analytical method specifies a tighter limit).

3. In-house limits cannot be any wider than those mandated in a regulated analytical method. Client or contract required control limits are evaluated against the laboratory's statistically derived control limits to determine if the data quality objectives (DQOs) can be achieved. If laboratory control limits are not consistent with DQOs, then alternatives must be considered, such as method improvements or use of an alternate analytical method.

4. The lowest acceptable recovery limit will be 10% (the analyte must be detectable and identifiable).

5. See SOP No. *33613* for other acceptable ranges.

D. A **LCS** that is within the acceptance criteria establishes that the analytical system is in control and is used to validate the process. Samples that are analyzed with an LCS with recoveries outside of the acceptance limits may be determined as out of control and should be reanalyzed if possible. If reanalysis is not possible, then the results for all affected analytes for samples within the same batch must be qualified when reported. The internal corrective action process (see Section 10) is also initiated if an LCS exceeds the acceptance limits. Sample results may be qualified and reported without reanalysis if:

1. The analyte results are below the reporting limit and the LCS is above the upper control limit.

2. If the analytical results are above the relevant regulatory limit and the LCS is below the lower control limit.

E. If the **MS/MSDs** do not meet acceptance limits, the MS/MSD and the associated spiked sample is reported with a qualifier for those analytes that do not meet limits. If obvious preparation errors are suspected, or if requested by the client, unacceptable MS/MSDs are reprocessed and reanalyzed to prove matrix interference.

F. If a **surrogate** standard falls outside the acceptance limits, and if there is not obvious chromatographic matrix interference, reanalyze the sample to confirm a possible matrix effect. If the recoveries confirm or there was obvious chromatographic interference, results are reported from the original analysis and a qualifier is added. If the reanalysis meets surrogate recovery criteria, the second run is reported (or both are reported if requested by the client).

22.5) Marginal Exceedance

A. Marginal exceedances (ME) are recovery values between 3 SD and 4 SD from the mean recovery limit.

B. Marginal exceedances must be random. If the same analyte exceeds the LCS control limit repeatedly, it is an indication of a systematic problem. The source of the error must be located and corrective action taken. Though marginal exceedance may be allowed, the data must still be qualified to indicate it is outside of the normal limits.

C. For TNI and DoD/DOE work, there are an allowable number of Marginal Exceedances.

1. **Note:** Some methods/regulations may not allow the use of ME.

Number of Analytes	Number of Marginal Exceedances Allowed
< 11 analytes	0 marginal exceedances are allowed.
11-30 analytes	1 marginal exceedance is allowed.
31-50 analytes	2 marginal exceedances are allowed.
51-70 analytes	3 marginal exceedances are allowed.
71-90 analytes	4 marginal exceedances are allowed.
> 90 analytes	5 marginal exceedances are allowed.

D. See SOP No. *33613*, *Internal Quality Control Checks*, Section 12.1.

23) REPORTING RESULTS

23.1) Overview

A. The results of each test are reported accurately, clearly, unambiguously, and objectively in accordance with State and Federal regulations as well as client requirements. Analytical results are issued in a format that is intended to satisfy customer and laboratory accreditation requirements as well as provide the end user with the information needed to properly evaluate the results. Where there is conflict between client requests and laboratory ethics or regulatory requirements, the laboratory's ethical and legal requirements are paramount, and the laboratory will work with the client during project set up to develop an acceptable solution.

B. A variety of report formats are available to meet specific needs.

23.2) Test Reports

A. At a minimum, the standard laboratory report shall contain the following information:

1. A report title (e.g., Analytical Report).
2. The cover page shall include the laboratory name, address and telephone number.
3. A unique identification of the report (e.g., Eurofins Calscience Job ID #) and on each page an identification in order to ensure the page is recognized as part of the report and a clear identification of the end.
    a. **Note:** Page numbers of report are represented as page # of ##. Where the first number is the page number and the second is the total number of pages.
4. A copy of the chain of custody (COC), including Subcontract and/or Workshare COCs.
5. The name and address of client and a project name/number, if applicable.
6. Client project manager or other contact.
7. Description and unambiguous identification of the tested sample(s) including the client identification code.
8. Date of receipt of sample, date and time of collection, date(s) of test preparation and performance, and time of preparation or analysis if the required holding time for either activity is less than or equal to 72 hours.
9. Release Date, or date of revision (when applicable).
10. Method used (EPA ###, Standard Methods ####, etc.).
11. Reporting limit.
12. Method detection limits (if requested)
13. Definition of Data qualifiers and reporting acronyms.
14. Sample results.
15. Batch QC data.
16. Condition of samples at receipt including temperature.
17. A statement to the effect that the results relate only to the items tested and the sample as received by the laboratory, except when information is provided by the client. When data is provided by the

client there shall be a clear identification of it, and a disclaimer shall be put in the report when the client supplied data can affect the validity of the test.

18. A statement that the report shall not be reproduced except in full, without prior express written approval by the laboratory.

19. A signature and title of the person(s) accepting responsibility for the content of the report and date of release. Authorized signatories are designated Project Managers.

20. A narrative to the report that explains any noncompliant data and (where applicable) action(s) taken (e.g. repreparation, reanalysis).

21. When soil samples are analyzed, a specific identification as to whether soils are reported on a "wet weight" or "dry weight" basis.

22. Laboratory certification number for the state of origin of the sample, if applicable.

23. If only part of the report is provided to the client (client requests some results before all of it is complete), it must be clearly indicated on the report (e.g., partial report). A complete report must be sent once all of the work has been completed.

24. Any subcontracted analysis results are provided as an attachment of the subcontract laboratory's report. All subcontract or workshare testing is clearly identified on the report as to which laboratory performed which analysis.

25. A Certification Summary Report, where required, will document that, unless otherwise noted, all analytes tested and reported by the laboratory were covered by the noted certifications.

23.3) Reporting Level or Report Type

A. The type and format of the Analysis report is designed to accommodate each type of environmental test carried out and to minimize the possibility of misunderstanding or misuse of the data. The laboratory offers four levels of quality control reporting. Each level, in addition to its own specific requirements, contains all the information provided in the preceding level.

B. The packages provide the following information:

1. Level 2 is a basic sample results report noting any data qualification and QC summary information.

2. Level 3 contains all the information supplied in Level 2, but presented on the CLP-like summary forms, and relevant calibration information. No raw data is provided.

3. Level 4 is the same as Level 3 with the addition of all raw supporting data.

C. Various formatter options are available with the report types. These are designed to meet program and/or client specific requirements. The formatters define such parameters as reporting to the MDL/DL vs LOQ/RL, flags and qualifier types (e.g., DoD, state specific). The laboratory also offers reports in an electronic data deliverable (EDD) formats.

23.4) Electronic Data Deliverable (EDD)

A. A variety of EDDs are available. EDD formats include, but are not limited to, Environmental Restoration Information Management Systems (ERPIMS), Staged Electronic Data Deliverable (SEDD), Environmental Quality Information System (EQuIS), Electronic Deliverable Format (EDF), Excel and custom files, etc.

23.5) Amendments to Test Reports

A. Corrections, additions, or deletions to final issued reports are only made when justification arises through supplemental documentation. Investigation into any laboratory caused data change is documented using the laboratory's corrective action system.

B. Copies of all Final versions of a report are maintained in LIMS. Any revisions are identified with a revision # in the file name and on the report cover page. The date that the version was generated is also identified on the cover page.

C. Further detail on the revision is provided in the report narrative. This detail includes the date of the original report and the reason for the revision. Example explanatory text is, *"The report being provided is a revision of the original report sent on 5/4/2022. The report (revision 1) is being revised due to correction to QC data for method ####."*

23.5.1) Policy on Data Omissions or Reporting Limit Increases

A. Eurofins policy is simply to not omit previously reported results (including data qualifiers) or to not raise reporting limits and report sample results as ND.

B. This policy has the following exceptions:

1. Laboratory error.
2. Sample identification is unclear (discrepancy between COC and sample labels).
3. An incorrect analysis (not analyte) was requested (e.g., COC lists 8315 but client wanted 8310); documented request for the change is required.
4. Incorrect limits reported based on regulatory requirements.
5. The requested change has absolutely *no possible* impact on the interpretation of the analytical results and there is *no possibility* of the chage being interpreted as misrepresentation by anyone inside or outside of our company.

23.5.2) Multiple Reports

A. The laboratory does not issue multiple reports for the sample work order where there is different information on each report.

24) APPENDICES

24.1) References

A. The QAM has been prepared to be consistent with the requirements of the following documents:

1. ANSI/ASQC, E4-1994, "Specifications and Guidelines for Quality Management Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995, or most recent version).
2. "EPA Requirements for Quality Management Programs" (QA/R-2) (EPA/240/B-01/002, May 31, 2006).
3. EPA 600/4-88/039, *Methods for the Determination of Organic Compounds in Drinking Water*, EPA, Revised July 1991.
4. EPA 600/R-95/131, *Methods for the Determination of Organic Compounds in Drinking Water*, Supplement III, EPA, August 1995.
5. EPA 600/4-79-019, *Handbook for Analytical Quality Control in Water and Wastewater Laboratories*, EPA, March 1979.
6. *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)*, current editions.
7. *U.S. Department of Defense (DoD)/Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories*, current version.
8. Federal Register, 40 CFR Parts 136, 141, 172, 173, 178, 179 and 261.

9. *Statement of Work for Inorganics & Organics Analysis, SOM and ISM*, current versions, USEPA Contract Laboratory Program Multi-media, Multi-concentration.

10. APHA, *Standard Methods for the Examination of Water and Wastewater*, current edition.

11. Toxic Substances Control Act (TSCA).

End of document

Version	Approval	Revision information
10	22.FEB.2022	Add Business Unit Manager and Laboratory Director as document approvers.
10.1	24.AUG.2023	Change section 5.6 to refer to the Reagents and Standards SOP.
11	04.SEP.2024	Entire document change to NBLSC template to include DoD requirements.

The State of Washington Department of Ecology

Eurofins Calscience
Tustin, CA

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective October 12, 2023 and shall expire October 11, 2024.

Witnessed under my hand on November 15, 2023

Rebecca Wood
Lab Accreditation Unit Supervisor

Laboratory ID
C916

WASHINGTON STATE DEPARTMENT OF ECOLOGY

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

SCOPE OF ACCREDITATION

Eurofins Calscience

Tustin, CA

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. EPA is the U.S. Environmental Protection Agency. SM is "Standard Methods for the Examination of Water and Wastewater." SM refers to EPA approved method versions. ASTM is the American Society for Testing and Materials. USGS is the U.S. Geological Survey. AOAC is the Association of Official Analytical Chemists. Other references are described in notes.

Matrix/Analyte	Method	Notes
Air		
Carbon dioxide	ASTM D1946	1
Carbon monoxide	ASTM D1946	1
Helium	ASTM D1946	1
Hydrogen	ASTM D1946	1
Methane	ASTM D1946	1
Nitrogen	ASTM D1946	1
Oxygen	ASTM D1946	1
Ethane	EPA TO-3	1
Ethene	EPA TO-3	1
Gasoline range organics (GRO)	EPA TO-3	1
Methane	EPA TO-3	1
n-Butane	EPA TO-3	1
n-Hexane	EPA TO-3	1
n-Pentane	EPA TO-3	1
n-Propane	EPA TO-3	1
1,1,1-Trichloroethane	EPA TO-14A Rev. 2 (1999)	1
1,1,2,2-Tetrachloroethane	EPA TO-14A Rev. 2 (1999)	1
1,1,2-Trichloroethane	EPA TO-14A Rev. 2 (1999)	1
1,1-Dichloroethane	EPA TO-14A Rev. 2 (1999)	1
1,1-Dichloroethylene	EPA TO-14A Rev. 2 (1999)	1
1,2,4-Trichlorobenzene	EPA TO-14A Rev. 2 (1999)	1
1,2,4-Trimethylbenzene	EPA TO-14A Rev. 2 (1999)	1
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-14A Rev. 2 (1999)	1
1,2-Dichlorobenzene	EPA TO-14A Rev. 2 (1999)	1
1,2-Dichloroethane (Ethylene dichloride)	EPA TO-14A Rev. 2 (1999)	1
1,2-Dichloropropane	EPA TO-14A Rev. 2 (1999)	1

Matrix/Analyte	Method	Notes
Air		
1,3,5-Trimethylbenzene	EPA TO-14A Rev. 2 (1999)	1
1,3-Dichlorobenzene	EPA TO-14A Rev. 2 (1999)	1
1,4-Dichlorobenzene	EPA TO-14A Rev. 2 (1999)	1
Benzene	EPA TO-14A Rev. 2 (1999)	1
Benzyl chloride	EPA TO-14A Rev. 2 (1999)	1
Carbon tetrachloride	EPA TO-14A Rev. 2 (1999)	1
Chlorobenzene	EPA TO-14A Rev. 2 (1999)	1
Chloroform	EPA TO-14A Rev. 2 (1999)	1
cis-1,2-Dichloroethylene	EPA TO-14A Rev. 2 (1999)	1
Dichlorodifluoromethane (Freon-12)	EPA TO-14A Rev. 2 (1999)	1
Ethyl chloride	EPA TO-14A Rev. 2 (1999)	1
Ethylbenzene	EPA TO-14A Rev. 2 (1999)	1
Hexachlorobutadiene	EPA TO-14A Rev. 2 (1999)	1
Methyl bromide (Bromomethane)	EPA TO-14A Rev. 2 (1999)	1
Methylene chloride (Dichloromethane)	EPA TO-14A Rev. 2 (1999)	1
Styrene	EPA TO-14A Rev. 2 (1999)	1
Tetrachloroethylene (Perchloroethylene)	EPA TO-14A Rev. 2 (1999)	1
Toluene	EPA TO-14A Rev. 2 (1999)	1
trans-1,2-Dichloroethylene	EPA TO-14A Rev. 2 (1999)	1
trans-1,3-Dichloropropylene	EPA TO-14A Rev. 2 (1999)	1
Trichloroethene (Trichloroethylene)	EPA TO-14A Rev. 2 (1999)	1
Trichlorofluoromethane (Freon 11)	EPA TO-14A Rev. 2 (1999)	1
Vinyl chloride	EPA TO-14A Rev. 2 (1999)	1
Xylene (total)	EPA TO-14A Rev. 2 (1999)	1
1,1,1-Trichloroethane	EPA TO-15 Rev. 2 (1999)	1
1,1,2,2-Tetrachloroethane	EPA TO-15 Rev. 2 (1999)	1
1,1,2-Trichloroethane	EPA TO-15 Rev. 2 (1999)	1
1,1-Dichloroethane	EPA TO-15 Rev. 2 (1999)	1
1,1-Dichloroethylene	EPA TO-15 Rev. 2 (1999)	1
1,2,4-Trichlorobenzene	EPA TO-15 Rev. 2 (1999)	1
1,2,4-Trimethylbenzene	EPA TO-15 Rev. 2 (1999)	1
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA TO-15 Rev. 2 (1999)	1
1,2-Dichlorobenzene	EPA TO-15 Rev. 2 (1999)	1
1,2-Dichloroethane (Ethylene dichloride)	EPA TO-15 Rev. 2 (1999)	1
1,2-Dichloropropane	EPA TO-15 Rev. 2 (1999)	1
1,3,5-Trimethylbenzene	EPA TO-15 Rev. 2 (1999)	1
1,3-Butadiene	EPA TO-15 Rev. 2 (1999)	1

Matrix/Analyte	Method	Notes
Air		
1,3-Dichlorobenzene	EPA TO-15 Rev. 2 (1999)	1
1,4-Dichlorobenzene	EPA TO-15 Rev. 2 (1999)	1
1,4-Dioxane (1,4- Diethyleneoxide)	EPA TO-15 Rev. 2 (1999)	1
2-Butanone (Methyl ethyl ketone, MEK)	EPA TO-15 Rev. 2 (1999)	1
4-Methyl-2-pentanone (MIBK)	EPA TO-15 Rev. 2 (1999)	1
Acetone	EPA TO-15 Rev. 2 (1999)	1
Benzene	EPA TO-15 Rev. 2 (1999)	1
Benzyl chloride	EPA TO-15 Rev. 2 (1999)	1
Bromodichloromethane	EPA TO-15 Rev. 2 (1999)	1
Bromoform	EPA TO-15 Rev. 2 (1999)	1
Carbon disulfide	EPA TO-15 Rev. 2 (1999)	1
Carbon tetrachloride	EPA TO-15 Rev. 2 (1999)	1
Chlorobenzene	EPA TO-15 Rev. 2 (1999)	1
Chloroform	EPA TO-15 Rev. 2 (1999)	1
cis-1,2-Dichloroethylene	EPA TO-15 Rev. 2 (1999)	1
cis-1,3-Dichloropropene	EPA TO-15 Rev. 2 (1999)	1
Dichlorodifluoromethane (Freon-12)	EPA TO-15 Rev. 2 (1999)	1
Ethyl chloride	EPA TO-15 Rev. 2 (1999)	1
Ethylbenzene	EPA TO-15 Rev. 2 (1999)	1
Hexachlorobutadiene	EPA TO-15 Rev. 2 (1999)	1
Hexane	EPA TO-15 Rev. 2 (1999)	1
Methyl bromide (Bromomethane)	EPA TO-15 Rev. 2 (1999)	1
Methyl chloride (Chloromethane)	EPA TO-15 Rev. 2 (1999)	1
Methyl tert-butyl ether (MTBE)	EPA TO-15 Rev. 2 (1999)	1
Methylene chloride (Dichloromethane)	EPA TO-15 Rev. 2 (1999)	1
Styrene	EPA TO-15 Rev. 2 (1999)	1
Tetrachloroethylene (Perchloroethylene)	EPA TO-15 Rev. 2 (1999)	1
Toluene	EPA TO-15 Rev. 2 (1999)	1
trans-1,2-Dichloroethylene	EPA TO-15 Rev. 2 (1999)	1
trans-1,3-Dichloropropylene	EPA TO-15 Rev. 2 (1999)	1
Trichloroethene (Trichloroethylene)	EPA TO-15 Rev. 2 (1999)	1
Trichlorofluoromethane (Freon 11)	EPA TO-15 Rev. 2 (1999)	1
Vinyl acetate	EPA TO-15 Rev. 2 (1999)	1
Vinyl chloride	EPA TO-15 Rev. 2 (1999)	1
Xylene (total)	EPA TO-15 Rev. 2 (1999)	1
Non-Potable Water		
Suspended Sediment Conc	ASTM D3977 B	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
n-Hexane Extractable Material (O&G)	EPA 1664A_1_1999	1
Bromide	EPA 300.0_2.1_1993	1, 5
Chloride	EPA 300.0_2.1_1993	1
Fluoride	EPA 300.0_2.1_1993	1
Nitrate	EPA 300.0_2.1_1993	1
Nitrate + Nitrite	EPA 300.0_2.1_1993	1
Nitrite	EPA 300.0_2.1_1993	1
Orthophosphate	EPA 300.0_2.1_1993	1
Sulfate	EPA 300.0_2.1_1993	1
Perchlorate	EPA 314_1_1999	1
Nitrogen, Total Kjeldahl	EPA 351.2_2_1993	1
Alkalinity	SM 2320 B-2011	1
Hardness (calc.)	SM 2340 B-2011	1
Specific Conductance	SM 2510 B-2011	1
Solids, Total	SM 2540 B-2015	1
Solids, Total Dissolved	SM 2540 C-2015	1
Solids, Total Suspended	SM 2540 D-2015	1
Iron, Ferrous	SM 3500-Fe B-2011	1,5
Cyanide, Total	SM 4500-CN^- E-2016	1
pH	SM 4500-H+ B-2011	1
Ammonia	SM 4500-NH3 C-2011	1
Ammonia	SM 4500-NH3 D-2011	1
Sulfide	SM 4500-$S2^-$ D-2011	1
Biochemical Oxygen Demand (BOD)	SM 5210 B-2011	1
Total Organic Carbon	SM 5310 D-2011	1
Anionic Surfactants (MBAS)	SM 5540 C-2011	1
Aluminum	EPA 200.7_4.4_1994	1
Antimony	EPA 200.7_4.4_1994	1
Arsenic	EPA 200.7_4.4_1994	1
Barium	EPA 200.7_4.4_1994	1
Beryllium	EPA 200.7_4.4_1994	1
Boron	EPA 200.7_4.4_1994	1
Cadmium	EPA 200.7_4.4_1994	1
Calcium	EPA 200.7_4.4_1994	1
Chromium	EPA 200.7_4.4_1994	1
Cobalt	EPA 200.7_4.4_1994	1
Copper	EPA 200.7_4.4_1994	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
Iron	EPA 200.7_4.4_1994	1
Lead	EPA 200.7_4.4_1994	1
Magnesium	EPA 200.7_4.4_1994	1
Manganese	EPA 200.7_4.4_1994	1
Molybdenum	EPA 200.7_4.4_1994	1
Nickel	EPA 200.7_4.4_1994	1
Potassium	EPA 200.7_4.4_1994	1
Selenium	EPA 200.7_4.4_1994	1
Silica	EPA 200.7_4.4_1994	1
Silver	EPA 200.7_4.4_1994	1
Sodium	EPA 200.7_4.4_1994	1
Thallium	EPA 200.7_4.4_1994	1
Tin	EPA 200.7_4.4_1994	1
Titanium	EPA 200.7_4.4_1994	1
Vanadium	EPA 200.7_4.4_1994	1
Zinc	EPA 200.7_4.4_1994	1
Aluminum	EPA 200.8_5.4_1994	1
Antimony	EPA 200.8_5.4_1994	1
Arsenic	EPA 200.8_5.4_1994	1
Barium	EPA 200.8_5.4_1994	1
Beryllium	EPA 200.8_5.4_1994	1
Cadmium	EPA 200.8_5.4_1994	1
Chromium	EPA 200.8_5.4_1994	1
Cobalt	EPA 200.8_5.4_1994	1
Copper	EPA 200.8_5.4_1994	1
Lead	EPA 200.8_5.4_1994	1
Manganese	EPA 200.8_5.4_1994	1
Molybdenum	EPA 200.8_5.4_1994	1
Nickel	EPA 200.8_5.4_1994	1
Selenium	EPA 200.8_5.4_1994	1
Silver	EPA 200.8_5.4_1994	1
Thallium	EPA 200.8_5.4_1994	1
Tin	EPA 200.8_5.4_1994	1
Titanium	EPA 200.8_5.4_1994	1
Vanadium	EPA 200.8_5.4_1994	1
Zinc	EPA 200.8_5.4_1994	1
4,4'-DDD	EPA 608.3	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
4,4'-DDE	EPA 608.3	1
4,4'-DDT	EPA 608.3	1
Aldrin	EPA 608.3	1
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608.3	1
Aroclor-1016 (PCB-1016)	EPA 608.3	1
Aroclor-1221 (PCB-1221)	EPA 608.3	1
Aroclor-1232 (PCB-1232)	EPA 608.3	1
Aroclor-1242 (PCB-1242)	EPA 608.3	1
Aroclor-1248 (PCB-1248)	EPA 608.3	1
Aroclor-1254 (PCB-1254)	EPA 608.3	1
Aroclor-1260 (PCB-1260)	EPA 608.3	1
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608.3	1
delta-BHC	EPA 608.3	1
Dieldrin	EPA 608.3	1
Endosulfan I	EPA 608.3	1
Endosulfan II	EPA 608.3	1
Endosulfan sulfate	EPA 608.3	1
Endrin	EPA 608.3	1
Endrin aldehyde	EPA 608.3	1
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 608.3	1
Heptachlor	EPA 608.3	1
Heptachlor epoxide	EPA 608.3	1
Toxaphene (Chlorinated camphene)	EPA 608.3	1
Ethane	EPA RSK-175	1
Ethene	EPA RSK-175	1
Methane	EPA RSK-175	1
1,1,1,2-Tetrachloroethane	EPA 624.1	1
1,1,1-Trichloroethane	EPA 624.1	1
1,1,2,2-Tetrachloroethane	EPA 624.1	1
1,1,2-Trichloroethane	EPA 624.1	1
1,1-Dichloroethane	EPA 624.1	1
1,1-Dichloroethylene	EPA 624.1	1
1,2,3-Trichloropropane	EPA 624.1	1
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 624.1	1
1,2-Dichlorobenzene	EPA 624.1	1
1,2-Dichloroethane (Ethylene dichloride)	EPA 624.1	1
1,2-Dichloropropane	EPA 624.1	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
1,3-Dichlorobenzene	EPA 624.1	1
1,4-Dichlorobenzene	EPA 624.1	1
2-Butanone (Methyl ethyl ketone, MEK)	EPA 624.1	1
2-Chloroethyl vinyl ether	EPA 624.1	1
2-Hexanone	EPA 624.1	1
4-Methyl-2-pentanone (MIBK)	EPA 624.1	1
Acetone	EPA 624.1	1
Acetonitrile	EPA 624.1	1
Acrolein (Propenal)	EPA 624.1	1
Acrylonitrile	EPA 624.1	1
Benzene	EPA 624.1	1
Bromodichloromethane	EPA 624.1	1
Bromoform	EPA 624.1	1
Carbon disulfide	EPA 624.1	1
Carbon tetrachloride	EPA 624.1	1
Chlorobenzene	EPA 624.1	1
Chlorodibromomethane	EPA 624.1	1
Chloroethane (Ethyl chloride)	EPA 624.1	1
Chloroform	EPA 624.1	1
cis-1,2-Dichloroethylene	EPA 624.1	1
cis-1,3-Dichloropropene	EPA 624.1	1
Dibromomethane	EPA 624.1	1
Di-isopropylether (DIPE)	EPA 624.1	1
Ethanol	EPA 624.1	1
Ethylbenzene	EPA 624.1	1
Ethyl-t-butylether (ETBE)	EPA 624.1	1
m+p-xylene	EPA 624.1	1
Methyl bromide (Bromomethane)	EPA 624.1	1
Methyl chloride (Chloromethane)	EPA 624.1	1
Methyl tert-butyl ether (MTBE)	EPA 624.1	1
Methylene chloride (Dichloromethane)	EPA 624.1	1
o-Xylene	EPA 624.1	1
Styrene	EPA 624.1	1
tert-amylmethylether (TAME)	EPA 624.1	1
tert-Butyl alcohol	EPA 624.1	1
Tetrachloroethylene (Perchloroethylene)	EPA 624.1	1
Toluene	EPA 624.1	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
trans-1,2-Dichloroethylene	EPA 624.1	1
trans-1,3-Dichloropropylene	EPA 624.1	1
Trichloroethene (Trichloroethylene)	EPA 624.1	1
Trichlorofluoromethane (Freon 11)	EPA 624.1	1
Vinyl acetate	EPA 624.1	1
Vinyl chloride	EPA 624.1	1
Xylene (total)	EPA 624.1	1
1,2,4-Trichlorobenzene	EPA 625.1	1
1,2-Diphenylhydrazine	EPA 625.1	1
1-Methylnaphthalene	EPA 625.1	1
2,2'-Oxybis(1-chloropropane)	EPA 625.1	1
2,4,5-Trichlorophenol	EPA 625.1	1
2,4,6-Trichlorophenol	EPA 625.1	1
2,4-Dichlorophenol	EPA 625.1	1
2,4-Dimethylphenol	EPA 625.1	1
2,4-Dinitrophenol	EPA 625.1	1
2,4-Dinitrotoluene (2,4-DNT)	EPA 625.1	1
2,6-Dinitrotoluene (2,6-DNT)	EPA 625.1	1
2-Chloronaphthalene	EPA 625.1	1
2-Chlorophenol	EPA 625.1	1
2-Methylphenol (o-Cresol)	EPA 625.1	1
2-Nitrophenol	EPA 625.1	1
3,3'-Dichlorobenzidine	EPA 625.1	1
3-Nitroaniline	EPA 625.1	1
4,6-Dinitro-2-methylphenol	EPA 625.1	1
4-Bromophenyl phenyl ether	EPA 625.1	1
4-Chloro-3-methylphenol	EPA 625.1	1
4-Chloroaniline	EPA 625.1	1
4-Chlorophenyl phenylether	EPA 625.1	1
4-Nitroaniline	EPA 625.1	1
4-Nitrophenol	EPA 625.1	1
Acenaphthene	EPA 625.1	1
Acenaphthylene	EPA 625.1	1
Anthracene	EPA 625.1	1
Benzidine	EPA 625.1	1
Benzo(a)anthracene	EPA 625.1	1
Benzo(a)pyrene	EPA 625.1	1

Matrix/Analyte	Method	Notes
Non-Potable Water		
Benzo(g,h,i)perylene	EPA 625.1	1
Benzo(k)fluoranthene	EPA 625.1	1
Benzo[b]fluoranthene	EPA 625.1	1
Benzoic acid	EPA 625.1	1
Benzyl alcohol	EPA 625.1	1
bis(2-Chloroethoxy)methane	EPA 625.1	1
bis(2-Chloroethyl) ether	EPA 625.1	1
bis(2-Chloroisopropyl) ether	EPA 625.1	1
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625.1	1
Butyl benzyl phthalate	EPA 625.1	1
Carbazole	EPA 625.1	1
Chrysene	EPA 625.1	1
Dibenz(a,h) anthracene	EPA 625.1	1
Diethyl phthalate	EPA 625.1	1
Dimethyl phthalate	EPA 625.1	1
Di-n-butyl phthalate	EPA 625.1	1
Di-n-octyl phthalate	EPA 625.1	1
Fluoranthene	EPA 625.1	1
Fluorene	EPA 625.1	1
Hexachlorobenzene	EPA 625.1	1
Hexachlorobutadiene	EPA 625.1	1
Hexachlorocyclopentadiene	EPA 625.1	1
Hexachloroethane	EPA 625.1	1
Indeno(1,2,3-cd) pyrene	EPA 625.1	1
Isophorone	EPA 625.1	1
m+p Cresol	EPA 625.1	1
Naphthalene	EPA 625.1	1
Nitrobenzene	EPA 625.1	1
N-Nitrosodimethylamine	EPA 625.1	1
N-Nitroso-di-n-propylamine	EPA 625.1	1
N-Nitrosodiphenylamine	EPA 625.1	1
Pentachlorophenol	EPA 625.1	1
Phenanthrene	EPA 625.1	1
Phenol	EPA 625.1	1
Pyrene	EPA 625.1	1
Pyridine	EPA 625.1	1
Dibutyltin	Krone 1988	1,2

Matrix/Analyte	Method	Notes
Non-Potable Water		
Monobutyltin	Krone 1988	1,2
Tetrabutyltin	Krone 1988	1,2
Tributyltin	Krone 1988	1,2
Solid and Chemical Materials		
Sulfide	EPA 376.2_1978	1
Chromium, Hexavalent	EPA 7199_0_(12/96)	1,3
Cyanide, Total	EPA 9014_ (7/14)	1
Orthophosphate	SM 4500-P E-2011	1
Phosphorus, Total	SM 4500-P E-2011	1
Aluminum	EPA 6010D_2018	1
Antimony	EPA 6010D_2018	1
Arsenic	EPA 6010D_2018	1
Barium	EPA 6010D_2018	1
Beryllium	EPA 6010D_2018	1
Boron	EPA 6010D_2018	1
Cadmium	EPA 6010D_2018	1
Chromium	EPA 6010D_2018	1
Cobalt	EPA 6010D_2018	1
Copper	EPA 6010D_2018	1
Iron	EPA 6010D_2018	1
Lead	EPA 6010D_2018	1
Lithium	EPA 6010D_2018	1
Magnesium	EPA 6010D_2018	1
Manganese	EPA 6010D_2018	1
Molybdenum	EPA 6010D_2018	1
Nickel	EPA 6010D_2018	1
Phosphorus, Total	EPA 6010D_2018	1
Potassium	EPA 6010D_2018	1
Selenium	EPA 6010D_2018	1
Silica	EPA 6010D_2018	1,3
Silicon	EPA 6010D_2018	1
Silver	EPA 6010D_2018	1
Sodium	EPA 6010D_2018	1
Sulfur	EPA 6010D_2018	1
Thallium	EPA 6010D_2018	1
Tin	EPA 6010D_2018	1
Titanium	EPA 6010D_2018	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Vanadium	EPA 6010D_2018	1
Zinc	EPA 6010D_2018	1
Antimony	EPA 6020B_(7/14)	1
Arsenic	EPA 6020B_(7/14)	1
Barium	EPA 6020B_(7/14)	1
Beryllium	EPA 6020B_(7/14)	1
Cadmium	EPA 6020B_(7/14)	1
Chromium	EPA 6020B_(7/14)	1
Cobalt	EPA 6020B_(7/14)	1
Copper	EPA 6020B_(7/14)	1
Lead	EPA 6020B_(7/14)	1
Molybdenum	EPA 6020B_(7/14)	1
Nickel	EPA 6020B_(7/14)	1
Selenium	EPA 6020B_(7/14)	1
Silver	EPA 6020B_(7/14)	1
Thallium	EPA 6020B_(7/14)	1
Tin	EPA 6020B_(7/14)	1
Vanadium	EPA 6020B_(7/14)	1
Zinc	EPA 6020B_(7/14)	1
Mercury, Liquid Waste	EPA 7470A_1_1994	1
Mercury, Solid Waste	EPA 7471B_(2/07)	1
Diesel range organics (DRO)	EPA 8015C_(11/00)	1
Gasoline range organics (GRO)	EPA 8015C_(11/00)	1
Motor Oil	EPA 8015C_(11/00)	1
Benzene	EPA 8021B_2_(12/96)	1
Ethylbenzene	EPA 8021B_2_(12/96)	1
Toluene	EPA 8021B_2_(12/96)	1
Xylene (total)	EPA 8021B_2_(12/96)	1
4,4'-DDD	EPA 8081B_(2/07)	1
4,4'-DDE	EPA 8081B_(2/07)	1
4,4'-DDT	EPA 8081B_(2/07)	1
Aldrin	EPA 8081B_(2/07)	1
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081B_(2/07)	1
alpha-Chlordane	EPA 8081B_(2/07)	1
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081B_(2/07)	1
Chlordane (tech.)	EPA 8081B_(2/07)	1
Chlorobenzilate	EPA 8081B_(2/07)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
delta-BHC	EPA 8081B_(2/07)	1
Diallate	EPA 8081B_(2/07)	1
Dieldrin	EPA 8081B_(2/07)	1
Endosulfan I	EPA 8081B_(2/07)	1
Endosulfan II	EPA 8081B_(2/07)	1
Endosulfan sulfate	EPA 8081B_(2/07)	1
Endrin	EPA 8081B_(2/07)	1
Endrin aldehyde	EPA 8081B_(2/07)	1
Endrin ketone	EPA 8081B_(2/07)	1
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B_(2/07)	1
gamma-Chlordane	EPA 8081B_(2/07)	1
Heptachlor	EPA 8081B_(2/07)	1
Heptachlor epoxide	EPA 8081B_(2/07)	1
Hexachlorobenzene	EPA 8081B_(2/07)	1
Hexachlorocyclopentadiene	EPA 8081B_(2/07)	1
Methoxychlor	EPA 8081B_(2/07)	1
Mirex	EPA 8081B_(2/07)	1
Toxaphene (Chlorinated camphene)	EPA 8081B_(2/07)	1
trans-Nonachlor	EPA 8081B_(2/07)	1
Aroclor-1016 (PCB-1016)	EPA 8082A_(2/07)	1
Aroclor-1221 (PCB-1221)	EPA 8082A_(2/07)	1
Aroclor-1232 (PCB-1232)	EPA 8082A_(2/07)	1
Aroclor-1242 (PCB-1242)	EPA 8082A_(2/07)	1
Aroclor-1248 (PCB-1248)	EPA 8082A_(2/07)	1
Aroclor-1254 (PCB-1254)	EPA 8082A_(2/07)	1
Aroclor-1260 (PCB-1260)	EPA 8082A_(2/07)	1
Atrazine	EPA 8141B_2_(2/07)	1
Azinphos-methyl (Guthion)	EPA 8141B_2_(2/07)	1
Bolstar (Sulprofos)	EPA 8141B_2_(2/07)	1
Chlorpyrifos	EPA 8141B_2_(2/07)	1
Coumaphos	EPA 8141B_2_(2/07)	1
Demeton	EPA 8141B_2_(2/07)	1
Diazinon	EPA 8141B_2_(2/07)	1
Dichlorovos (DDVP, Dichlorvos)	EPA 8141B_2_(2/07)	1
Dimethoate	EPA 8141B_2_(2/07)	1,3,6
Disulfoton	EPA 8141B_2_(2/07)	1
EPN	EPA 8141B_2_(2/07)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Ethion	EPA 8141B_2_(2/07)	1,3
Ethoprop	EPA 8141B_2_(2/07)	1,3
Famphur	EPA 8141B_2_(2/07)	1,3,5
Fensulfothion	EPA 8141B_2_(2/07)	1
Fenthion	EPA 8141B_2_(2/07)	1
Malathion	EPA 8141B_2_(2/07)	1
Merphos	EPA 8141B_2_(2/07)	1
Methyl parathion (Parathion, methyl)	EPA 8141B_2_(2/07)	1
Mevinphos	EPA 8141B_2_(2/07)	1
Naled	EPA 8141B_2_(2/07)	1
Parathion, ethyl	EPA 8141B_2_(2/07)	1
Phorate	EPA 8141B_2_(2/07)	1
Ronnel	EPA 8141B_2_(2/07)	1
Simazine	EPA 8141B_2_(2/07)	1
Sulfotepp	EPA 8141B_2_(2/07)	1
Tetrachlorvinphos (Stirophos, Gardona)	EPA 8141B_2_(2/07)	1
Thionazin (Zinophos)	EPA 8141B_2_(2/07)	1
Tokuthion (Prothiophos)	EPA 8141B_2_(2/07)	1
Trichloronate	EPA 8141B_2_(2/07)	1
2,4,5-T	EPA 8151A_(1/98)	1
2,4-D	EPA 8151A_(1/98)	1
2,4-DB	EPA 8151A_(1/98)	1
Dalapon	EPA 8151A_(1/98)	1
Dicamba	EPA 8151A_(1/98)	1
Dichloroprop (Dichlorprop)	EPA 8151A_(1/98)	1
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151A_(1/98)	1
MCPA	EPA 8151A_(1/98)	1
MCPP	EPA 8151A_(1/98)	1
Silvex (2,4,5-TP)	EPA 8151A_(1/98)	1
Acenaphthene	EPA 8310_0_1986	1
Acenaphthylene	EPA 8310_0_1986	1
Anthracene	EPA 8310_0_1986	1
Benzo(a)anthracene	EPA 8310_0_1986	1
Benzo(a)pyrene	EPA 8310_0_1986	1
Benzo(g,h,i)perylene	EPA 8310_0_1986	1
Benzo(k)fluoranthene	EPA 8310_0_1986	1
Benzo[b]fluoranthene	EPA 8310_0_1986	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Chrysene	EPA 8310_0_1986	1
Dibenz(a,h) anthracene	EPA 8310_0_1986	1
Fluoranthene	EPA 8310_0_1986	1
Fluorene	EPA 8310_0_1986	1
Indeno(1,2,3-cd) pyrene	EPA 8310_0_1986	1
Naphthalene	EPA 8310_0_1986	1
Phenanthrene	EPA 8310_0_1986	1
Pyrene	EPA 8310_0_1986	1
Diesel range organics (DRO)	WDOE NWTPH-Dx_(1997)	1
Motor Oil	WDOE NWTPH-Dx_(1997)	1
Gasoline range organics (GRO)	WDOE NWTPH-Gx_(1997)	1,4
1,1,1,2-Tetrachloroethane	EPA 8260D_4_(6/18)	1
1,1,1-Trichloroethane	EPA 8260D_4_(6/18)	1
1,1,2,2-Tetrachloroethane	EPA 8260D_4_(6/18)	1
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260D_4_(6/18)	1
1,1,2-Trichloroethane	EPA 8260D_4_(6/18)	1
1,1-Dichloroethane	EPA 8260D_4_(6/18)	1
1,1-Dichloroethylene	EPA 8260D_4_(6/18)	1
1,1-Dichloropropene	EPA 8260D_4_(6/18)	1
1,2,3-Trichlorobenzene	EPA 8260D_4_(6/18)	1,3
1,2,3-Trichloropropane	EPA 8260D_4_(6/18)	1
1,2,4-Trichlorobenzene	EPA 8260D_4_(6/18)	1
1,2,4-Trimethylbenzene	EPA 8260D_4_(6/18)	1
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260D_4_(6/18)	1
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260D_4_(6/18)	1
1,2-Dichloro-1,1,2-trifluoroethane	EPA 8260D_4_(6/18)	1
1,2-Dichlorobenzene	EPA 8260D_4_(6/18)	1
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260D_4_(6/18)	1
1,2-Dichloropropane	EPA 8260D_4_(6/18)	1
1,3,5-Trimethylbenzene	EPA 8260D_4_(6/18)	1
1,3-Dichlorobenzene	EPA 8260D_4_(6/18)	1
1,3-Dichloropropane	EPA 8260D_4_(6/18)	1
1,3-Dichloropropene	EPA 8260D_4_(6/18)	1,3
1,4-Dichlorobenzene	EPA 8260D_4_(6/18)	1
1,4-Dioxane (1,4- Diethyleneoxide)	EPA 8260D_4_(6/18)	1
2,2,4-Trimethylpentane	EPA 8260D_4_(6/18)	1
2,2-Dichloro-1,1,1-trifluoroethane (Freon 123)	EPA 8260D_4_(6/18)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,2-Dichloropropane	EPA 8260D_4_(6/18)	1
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260D_4_(6/18)	1
2-Chloroethyl vinyl ether	EPA 8260D_4_(6/18)	1
2-Chlorotoluene	EPA 8260D_4_(6/18)	1
2-Hexanone	EPA 8260D_4_(6/18)	1
4-Chlorotoluene	EPA 8260D_4_(6/18)	1
4-Methyl-2-pentanone (MIBK)	EPA 8260D_4_(6/18)	1
Acetone	EPA 8260D_4_(6/18)	1
Acetonitrile	EPA 8260D_4_(6/18)	1
Acrolein (Propenal)	EPA 8260D_4_(6/18)	1
Acrylonitrile	EPA 8260D_4_(6/18)	1
Allyl chloride (3-Chloropropene)	EPA 8260D_4_(6/18)	1
Benzene	EPA 8260D_4_(6/18)	1
Bromobenzene	EPA 8260D_4_(6/18)	1
Bromochloromethane	EPA 8260D_4_(6/18)	1
Bromodichloromethane	EPA 8260D_4_(6/18)	1
Bromoform	EPA 8260D_4_(6/18)	1
Carbon disulfide	EPA 8260D_4_(6/18)	1
Carbon tetrachloride	EPA 8260D_4_(6/18)	1
Chlorobenzene	EPA 8260D_4_(6/18)	1
Chlorodibromomethane	EPA 8260D_4_(6/18)	1
Chloroethane (Ethyl chloride)	EPA 8260D_4_(6/18)	1
Chloroform	EPA 8260D_4_(6/18)	1
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260D_4_(6/18)	1
cis & trans-1,2-Dichloroethene	EPA 8260D_4_(6/18)	1
cis-1,2-Dichloroethylene	EPA 8260D_4_(6/18)	1
cis-1,3-Dichloropropene	EPA 8260D_4_(6/18)	1
Cyclohexane	EPA 8260D_4_(6/18)	1
Cyclohexanone	EPA 8260D_4_(6/18)	1
Dibromomethane	EPA 8260D_4_(6/18)	1
Dichlorodifluoromethane (Freon-12)	EPA 8260D_4_(6/18)	1
Diethyl ether	EPA 8260D_4_(6/18)	1
Di-isopropylether (DIPE)	EPA 8260D_4_(6/18)	1
Ethanol	EPA 8260D_4_(6/18)	1
Ethyl methacrylate	EPA 8260D_4_(6/18)	1
Ethylbenzene	EPA 8260D_4_(6/18)	1
Ethyl-t-butylether (ETBE)	EPA 8260D_4_(6/18)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Hexachlorobutadiene	EPA 8260D_4_(6/18)	1
Iodomethane (Methyl iodide)	EPA 8260D_4_(6/18)	1
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260D_4_(6/18)	1
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260D_4_(6/18)	1
Isopropylbenzene	EPA 8260D_4_(6/18)	1
m+p-xylene	EPA 8260D_4_(6/18)	1
Methacrylonitrile	EPA 8260D_4_(6/18)	1
Methyl bromide (Bromomethane)	EPA 8260D_4_(6/18)	1
Methyl chloride (Chloromethane)	EPA 8260D_4_(6/18)	1
Methyl methacrylate	EPA 8260D_4_(6/18)	1
Methyl tert-butyl ether (MTBE)	EPA 8260D_4_(6/18)	1
Methylene chloride (Dichloromethane)	EPA 8260D_4_(6/18)	1
Naphthalene	EPA 8260D_4_(6/18)	1
n-Butylbenzene	EPA 8260D_4_(6/18)	1
n-Hexane	EPA 8260D_4_(6/18)	1
n-Propylbenzene	EPA 8260D_4_(6/18)	1
o-Xylene	EPA 8260D_4_(6/18)	1
Propionitrile (Ethyl cyanide)	EPA 8260D_4_(6/18)	1
sec-Butylbenzene	EPA 8260D_4_(6/18)	1
Styrene	EPA 8260D_4_(6/18)	1
tert-amylmethylether (TAME)	EPA 8260D_4_(6/18)	1
tert-Butyl alcohol	EPA 8260D_4_(6/18)	1
tert-Butylbenzene	EPA 8260D_4_(6/18)	1
Tetrachloroethylene (Perchloroethylene)	EPA 8260D_4_(6/18)	1
Tetrahydrofuran (THF)	EPA 8260D_4_(6/18)	1
Toluene	EPA 8260D_4_(6/18)	1
trans-1,2-Dichloroethylene	EPA 8260D_4_(6/18)	1
trans-1,3-Dichloropropylene	EPA 8260D_4_(6/18)	1
trans-1,4-Dichloro-2-butene	EPA 8260D_4_(6/18)	1,3
Trichloroethene (Trichloroethylene)	EPA 8260D_4_(6/18)	1
Trichlorofluoromethane (Freon 11)	EPA 8260D_4_(6/18)	1
Vinyl acetate	EPA 8260D_4_(6/18)	1
Vinyl chloride	EPA 8260D_4_(6/18)	1
Xylene (total)	EPA 8260D_4_(6/18)	1
1,2,4-Trichlorobenzene	EPA 8270E_6_(6/18)	1
1,2-Dichlorobenzene	EPA 8270E_6_(6/18)	1,3
1,2-Diphenylhydrazine	EPA 8270E_6_(6/18)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
1,3-Dichlorobenzene	EPA 8270E_6_(6/18)	1
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270E_6_(6/18)	1
1,4-Dichlorobenzene	EPA 8270E_6_(6/18)	1
1,4-Naphthoquinone	EPA 8270E_6_(6/18)	1
1,4-Phenylenediamine	EPA 8270E_6_(6/18)	1
1-Methylnaphthalene	EPA 8270E_6_(6/18)	1
1-Naphthylamine	EPA 8270E_6_(6/18)	1
2,4,5-Trichlorophenol	EPA 8270E_6_(6/18)	1
2,4,6-Trichlorophenol	EPA 8270E_6_(6/18)	1
2,4-Dichlorophenol	EPA 8270E_6_(6/18)	1
2,4-Dimethylphenol	EPA 8270E_6_(6/18)	1
2,4-Dinitrophenol	EPA 8270E_6_(6/18)	1
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270E_6_(6/18)	1
2,6-Dichlorophenol	EPA 8270E_6_(6/18)	1
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270E_6_(6/18)	1
2-Acetylaminofluorene	EPA 8270E_6_(6/18)	1
2-Chloronaphthalene	EPA 8270E_6_(6/18)	1
2-Chlorophenol	EPA 8270E_6_(6/18)	1
2-Methylaniline (o-Toluidine)	EPA 8270E_6_(6/18)	1
2-Methylnaphthalene	EPA 8270E_6_(6/18)	1
2-Methylphenol (o-Cresol)	EPA 8270E_6_(6/18)	1
2-Naphthylamine	EPA 8270E_6_(6/18)	1
2-Nitroaniline	EPA 8270E_6_(6/18)	1
2-Nitrophenol	EPA 8270E_6_(6/18)	1
2-Picoline (2-Methylpyridine)	EPA 8270E_6_(6/18)	1
3,3'-Dichlorobenzidine	EPA 8270E_6_(6/18)	1
3,3'-Dimethoxybenzidine	EPA 8270E_6_(6/18)	1
3,3'-Dimethylbenzidine	EPA 8270E_6_(6/18)	1
3-Methylcholanthrene	EPA 8270E_6_(6/18)	1
3-Methylphenol (m-Cresol)	EPA 8270E_6_(6/18)	1
3-Nitroaniline	EPA 8270E_6_(6/18)	1
4,6-Dinitro-2-methylphenol	EPA 8270E_6_(6/18)	1
4-Aminobiphenyl	EPA 8270E_6_(6/18)	1
4-Bromophenyl phenyl ether (BDE-3)	EPA 8270E_6_(6/18)	1
4-Chloro-3-methylphenol	EPA 8270E_6_(6/18)	1
4-Chloroaniline	EPA 8270E_6_(6/18)	1
4-Chlorophenyl phenylether	EPA 8270E_6_(6/18)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
4-Dimethyl aminoazobenzene	EPA 8270E_6_(6/18)	1
4-Methylphenol (p-Cresol)	EPA 8270E_6_(6/18)	1
4-Nitroaniline	EPA 8270E_6_(6/18)	1
4-Nitrophenol	EPA 8270E_6_(6/18)	1
5-Nitro-o-toluidine	EPA 8270E_6_(6/18)	1
7,12-Dimethylbenz(a) anthracene	EPA 8270E_6_(6/18)	1
a,a-Dimethylphenethylamine	EPA 8270E_6_(6/18)	1
Acenaphthene	EPA 8270E_6_(6/18)	1
Acenaphthylene	EPA 8270E_6_(6/18)	1
Aniline	EPA 8270E_6_(6/18)	1
Anthracene	EPA 8270E_6_(6/18)	1
Aramite	EPA 8270E_6_(6/18)	1
Benzidine	EPA 8270E_6_(6/18)	1
Benzo(a)anthracene	EPA 8270E_6_(6/18)	1
Benzo(a)pyrene	EPA 8270E_6_(6/18)	1
Benzo(g,h,i)perylene	EPA 8270E_6_(6/18)	1
Benzo(k)fluoranthene	EPA 8270E_6_(6/18)	1
Benzo[b]fluoranthene	EPA 8270E_6_(6/18)	1
Benzoic acid	EPA 8270E_6_(6/18)	1
Benzyl alcohol	EPA 8270E_6_(6/18)	1
bis(2-Chloroethoxy)methane	EPA 8270E_6_(6/18)	1
bis(2-Chloroethyl) ether	EPA 8270E_6_(6/18)	1
bis(2-Chloroisopropyl) ether	EPA 8270E_6_(6/18)	1
Butyl benzyl phthalate	EPA 8270E_6_(6/18)	1
Chrysene	EPA 8270E_6_(6/18)	1
Di(2-ethylhexyl)phthalate	EPA 8270E_6_(6/18)	1
Dibenz(a,h) anthracene	EPA 8270E_6_(6/18)	1
Dibenzofuran	EPA 8270E_6_(6/18)	1
Diethyl phthalate	EPA 8270E_6_(6/18)	1
Dimethyl phthalate	EPA 8270E_6_(6/18)	1
Di-n-butyl phthalate	EPA 8270E_6_(6/18)	1
Di-n-octyl phthalate	EPA 8270E_6_(6/18)	1
Diphenylamine	EPA 8270E_6_(6/18)	1
Ethyl methanesulfonate	EPA 8270E_6_(6/18)	1
Fluoranthene	EPA 8270E_6_(6/18)	1
Fluorene	EPA 8270E_6_(6/18)	1
Hexachlorobenzene	EPA 8270E_6_(6/18)	1

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Hexachlorobutadiene	EPA 8270E_6_(6/18)	1
Hexachlorocyclopentadiene	EPA 8270E_6_(6/18)	1
Hexachloroethane	EPA 8270E_6_(6/18)	1
Hexachlorophene	EPA 8270E_6_(6/18)	1,3
Hexachloropropene	EPA 8270E_6_(6/18)	1
Indeno(1,2,3-cd) pyrene	EPA 8270E_6_(6/18)	1
Isophorone	EPA 8270E_6_(6/18)	1
Isosafrole	EPA 8270E_6_(6/18)	1
Methyl methanesulfonate	EPA 8270E_6_(6/18)	1
Naphthalene	EPA 8270E_6_(6/18)	1
Nitrobenzene	EPA 8270E_6_(6/18)	1
n-Nitrosodimethylamine	EPA 8270E_6_(6/18)	1
n-Nitroso-di-n-butylamine	EPA 8270E_6_(6/18)	1
N-Nitroso-di-n-propylamine	EPA 8270E_6_(6/18)	1
n-Nitrosodiphenylamine	EPA 8270E_6_(6/18)	1
N-Nitrosomethylethylamine	EPA 8270E_6_(6/18)	1
n-Nitrosomorpholine	EPA 8270E_6_(6/18)	1
n-Nitrosopiperidine	EPA 8270E_6_(6/18)	1
n-Nitrosopyrrolidine	EPA 8270E_6_(6/18)	1
Pentachloronitrobenzene	EPA 8270E_6_(6/18)	1,3
Pentachlorophenol	EPA 8270E_6_(6/18)	1
Phenacetin	EPA 8270E_6_(6/18)	1
Phenanthrene	EPA 8270E_6_(6/18)	1
Phenol	EPA 8270E_6_(6/18)	1
Pronamide (Kerb)	EPA 8270E_6_(6/18)	1
Pyrene	EPA 8270E_6_(6/18)	1
Pyridine	EPA 8270E_6_(6/18)	1
Safrole	EPA 8270E_6_(6/18)	1
Dibutyltin	Krone 1988	1,2
Monobutyltin	Krone 1988	1,2
Tetrabutyltin	Krone 1988	1,2
Tributyltin	Krone 1988	1,2
Ignitability	EPA 1010	1
Corrosivity	EPA 9045C_3_1995	1
Paint Filter Liquids	EPA 9095 B-04	1

Matrix/Analyte	Method	Notes

Accredited Parameter Note Detail

(1) Accreditation based in part on recognition of Oregon NELAP accreditation. (2) Listed in ORELAP Scope as EC SOP-M422. SOP Title ORGANOTINS by KRONE et al., (1989) via GC/MS and Selected Ion Monitoring (SIM). (3) Accreditation is limited to liquid matrices only. (4) GC-FID (5) Provisional accreditation pending submittal of acceptable corrective action report and Proficiency Testing (PT) results (WAC 173-50-110).(6) Provisional accreditation pending submittal of acceptable PT corrective action report.

11/15/2023

Authentication Signature
Rebecca Wood, Lab Accreditation Unit Supervisor

Date

Appendix C

Example Field Forms

Daily Field Report

Stantec

Project #:		**Stantec #:**
Activity:		**Date:**
Equipment Used:		**Sheet:** **of**
Name(s):		
Arrived On Site:	**Departed Site:**	**Total Travel:**

1687 114th Avenue Souteast, Suite 100, Bellevue, WA 98004 *Office: (800) 499-8950*

Project #:	Sheet: of

CALIBRATION LOG

Stantec

Equipment: ____

Date	Time	Calibrated By	Standard	Standard Concentration	Comments

Stantec

SITE ID: _____ BORING: _____ PLATE: _____
STANTEC #: _____ DATE: _____
DRILL CONTRACTOR: _____
SAMPLE METHOD: _____ GEOLOGIST: _____
DRILL RIG: _____ SIGNATURE: _____
BOREHOLE DIAMETER: _____ WELL TAG #: _____
LOCATION: _____ LOGGED BY: _____

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN

GROUT:
SAND SIZE:
SLOT SIZE:
CASING DIAMETER:

FIELD LOG
WELL DEVELOPMENT FIELD PARAMETERS

SITE: **STANTEC#:**
LOCATION:
FIELD CREW: **DATE:**

WELL ID:

PURGE START hr:min	PURGE STOP hr:min	INITIAL DTW ft bgs	FINAL DTW ft bgs	PUMP RATE gal/min	PURGE VOLUME gal	TIME hr:min	TURBIDITY NTU

TOTAL PURGE VOLUME: 0.0 gal

COMMENTS:

WELL CONSTRUCTION:	Flush	WELL DIAMETER:	2-inch	TOTAL DEPTH (ft bgs):	15	SCREEN INTERVAL (ft bgs):	5-15

EXPLANATION:
-- = Not measured
DTW = Depth to water in feet below top of casing
ft bgs = Feet below ground surface
gal = Gallon
gal/min = Gallon per minute
hr:min = Hour:Minute time format
NTU = Nephelometric turbidity unit

FIELD LOG
DEPTH TO WATER RECORD

CLIENT NAME: **STANTEC#**:
SITE LOCATION:
FIELD CREW: **DATE**:

Well #	Time	DTNAPL (ft)	DTW (ft)	NAPL Thickness	Comments/Repairs

Comments:

FIELD LOG
PURGING & SAMPLING RECORD AND WELL EQUIPMENT STATUS

SITE: **STANTEC#**:
LOCATION:
FIELD CREW: **DATE**: Low-Flow Sampling

WELL #

TIME	DTW	PURGE VOLUME	PUMP RATE (Q)	TEMP	COND	pH	ORP	DO
hr:min	ft	mL	mL/min	deg C	mS/cm	unit	mV vs NHE	mg/L
				±3%	±3%	±0.1	±10	±10% / 0.5*
Comments:								
SW		1 gal = 3.79 L						
Total Purge Volume		0 mL		0.00 gal				

WELL #

TIME	DTW	PURGE VOLUME	PUMP RATE (Q)	TEMP	COND	pH	ORP	DO
hr:min	ft	mL	mL/min	deg C	mS/cm	unit	mV vs NHE	mg/L
				±3%	±3%	±0.1	±10mV	±10% / 0.5*
Comments:								
SW		1 gal = 3.79 L						
Total Purge Volume		0 mL		0.00 gal				

*10% for values >0.5 mg/L, if three DO values are <0.5 mg/L, values are considered stabilized.

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For courier service / sample drop off information, contact us26_sales@eurofinsus.com or call us.

FRM51408 Rev. 1.2

CHAIN-OF-CUSTODY RECORD

DATE: _____

PAGE: _____ **OF** _____

LABORATORY CLIENT:		CLIENT PROJECT NAME / NO.:	P.O. NO.:
ADDRESS:		PROJECT CONTACT:	LAB CONTACT OR QUOTE NO.:
CITY:	STATE: ZIP:		
TEL:	E-MAIL:	GLOBAL ID: / LOG CODE:	SAMPLER(S): (PRINT)

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ STANDARD

EDD:

☐ COELT EDF ☐ OTHER

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH _____	BTEX / MTBE ☐ 8260 ☐ _____	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6				

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature/Affiliation)	Date: / Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature/Affiliation)	Date: / Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature/Affiliation)	Date: / Time: