



**FINAL
QUANTITATIVE ASSESSMENT REPORT
FOR
MUNITIONS CONSTITUENT MIGRATION ON
AIR NATIONAL GUARD OPERATIONAL RANGES
PORTLAND AIR NATIONAL GUARD BASE, OREGON**

Prepared for

HQ ANG (on behalf of AFCEC/CZTQ)
NGB/A7AN
Joint Base Andrews, Maryland 20762

Prepared by

Weston Solutions, Inc.
5599 San Felipe, Suite 700
Houston, Texas 77056

Contract No. FA8903-08-D-8784
Task Order No. 0077

May 2014

TABLE OF CONTENTS (CONTINUED)

Section	Page
EXECUTIVE SUMMARY	ES-1
1. INTRODUCTION	1-1
1.1 PURPOSE OF THE OPERATIONAL RANGE ASSESSMENT PROGRAM	1-1
1.2 PROJECT SCOPE/OBJECTIVES.....	1-2
1.3 PROJECT PERSONNEL.....	1-4
1.4 REPORT ORGANIZATION.....	1-4
2. INSTALLATION INFORMATION.....	2-1
2.1 LOCATION/SETTING	2-1
2.1.1 Surrounding Land Use/Anticipated Changes in Use	2-1
2.1.2 Surrounding Water Use/Anticipated Changes in Use.....	2-2
2.2 MISSION/OPERATIONAL HISTORY	2-4
2.3 OPERATIONAL RANGES/TRAINING AREAS	2-4
2.3.1 ORAP-Eligible Ranges/Areas.....	2-4
2.3.2 ORAP Non-Eligible Areas.....	2-5
2.4 PREVIOUS OPERATIONAL RANGE ASSESSMENTS	2-6
2.5 OTHER ENVIRONMENTAL ASSESSMENTS.....	2-6
3. ENVIRONMENTAL/PHYSICAL CHARACTERISTICS.....	3-1
3.1 VEGETATION AND SOIL TYPE	3-1
3.2 TOPOGRAPHY AND HYDROLOGY	3-1
3.3 GEOLOGY AND HYDROGEOLOGY	3-2
3.4 CLIMATE/METEOROLOGY	3-6
3.5 NATURAL/CULTURAL RESOURCES	3-6
3.5.1 Natural Resources	3-6
3.5.1.1 Sensitive Habitats.....	3-6
3.5.1.2 Species of Concern	3-6
3.5.2 Cultural Resources	3-6
4. SUMMARY OF PROJECT ACTIVITIES.....	4-1
4.1 SAMPLING METHODOLOGY	4-1
4.1.1 Data Quality Objectives.....	4-1
4.1.2 Design and Approach.....	4-1
5. OPERATIONAL RANGE/AREA INFORMATION.....	5-1
5.1 SUMMARY OF RANGES.....	5-1
5.2 SAR CHARACTERISTICS	5-1
5.2.1 Site Description Summary	5-1
5.2.2 Conceptual Site Model Overview	5-2

TABLE OF CONTENTS (CONTINUED)

Section	Page
5.2.3 MC of Potential Concern	5-3
5.2.4 Sample Approach/Location	5-3
5.2.4.1 Media Sampling	5-4
5.2.4.2 Analytical Methods	5-4
5.2.5 Sampling Results Summary	5-4
5.3 EOD RANGE CHARACTERISTICS	5-5
5.3.1 Site Description Summary	5-5
5.3.2 Conceptual Site Model Overview	5-6
5.3.3 MC of Potential Concern	5-6
5.3.4 Sample Approach/Location	5-7
5.3.4.1 Media Sampling	5-7
5.3.4.2 Analytical Methods	5-7
5.3.5 Sampling Results Summary	5-7
6. MC AVAILABILITY AND TRANSPORT	6-1
6.1 MC OF CONCERN DETERMINATION	6-1
6.2 MEDIA MIGRATION CONCLUSIONS	6-1
6.3 MC OFF-RANGE RELEASE EVALUATION	6-1
7. CSM REVISION	7-1
7.1 SOURCE AREA	7-1
7.2 RECEPTORS	7-1
7.2.1 Off-Range Humans	7-1
7.2.1.1 Air	7-2
7.2.1.2 Surface and Subsurface Soil	7-2
7.2.1.3 Surface Water/Sediment	7-2
7.2.1.4 Groundwater	7-2
7.2.2 Off-Range Ecological	7-3
7.3 SOURCE-RECEPTOR INTERACTION	7-4
7.3.1 Exposure Media	7-4
7.3.2 Exposure Routes	7-4
7.4 EXPOSURE PATHWAY ANALYSIS	7-5
7.4.1 Air	7-5
7.4.2 Surface and Subsurface Soil	7-5
7.4.3 Surface Water/Sediment	7-5
7.4.4 Groundwater	7-6
7.5 HUMAN/ECOLOGICAL RISK ANALYSIS	7-6
8. CONCLUSIONS AND RECOMMENDATIONS	8-1
8.1 MC AVAILABILITY AND TRANSPORT	8-1
8.2 MC EXPOSURE PATHWAYS	8-1

TABLE OF CONTENTS (CONTINUED)

Section	Page
8.2.1 Human Health Risks	8-1
8.2.2 Environmental Risks	8-1
8.3 RECOMMENDATIONS	8-2
9. REFERENCES	9-1
APPENDIX A RANGE MAP	
APPENDIX B SOIL BORING LOGS	
APPENDIX C GEOLOGIC CROSS-SECTIONS OF PORTLAND ANGB	
APPENDIX D POTENTIOMETRIC MAPS	
APPENDIX E INTERVIEW RECORDS	
APPENDIX F PHOTOGRAPHIC LOG	
APPENDIX G ANALYTICAL SAMPLING DATA	
APPENDIX H THREATENED AND ENDANGERED SPECIES LISTS	

LIST OF TABLES

Table 2-1	Groundwater Well and Surface Water Intake Data.....	2-11
Table 2-2	USGS and Receptor Survey Groundwater Well Data.....	2-14
Table 2-3	Historical SAR and EOD Groundwater Analytical Data.....	2-15
Table 5-1	2013 Operational Range Assessment - SAR Analytical Results.....	5-10
Table 5-2	2012 EOD Range Usage Data.....	5-11
Table 5-3	2013 Operational Range Assessment - EOD Results Analytical Results.....	5-13

LIST OF FIGURES

Figure 2-1	Area Location Map	2-8
Figure 2-2	Installation Boundary Map	2-9
Figure 2-3	Potential Receptor Well Map.....	2-10
Figure 3-1	Topographic Map....	3-8
Figure 3-2	Surface Water Map	3-9
Figure 5-1	Site Layout Map.....	5-9
Figure 7-1	Conceptual Site Model – Small Arms Range.....	7-7
Figure 7-2	Conceptual Site Model – EOD Range.....	7-8

LIST OF ACRONYMS

A7AN	Office of the Civil Engineer, Asset Management and Operations Division, Environmental Branch
AFB	Air Force Base
AFCEC	Air Force Civil Engineering Center
ANG	Air National Guard
ANGB	Air National Guard Base
bgs	below ground surface
BMP	Best Management Practice
C4	Composition 4
CPC	Climate Prediction Center
CRSA	Columbia River Sand Aquifer
CSM	Conceptual Site Model
CSSWF	Columbia South Shore Well Field
DoD	Department of Defense
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ERPIMS	Environmental Resources Program Information Management System
FG	Fighter Group
ft/day	feet per day
FUDS	Formerly Used Defense Sites
FW	Fighter Wing
HQ	Headquarters
MC	Munitions Constituents
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
msl	mean sea level
NCDC	National Climatic Data Center
ORA	Operational Range Assessment
ORANG	Oregon Air National Guard
ORAP	Operational Range Assessment Program
OWRD	Oregon Water Resources Department

LIST OF ACRONYMS (CONTINUED)

PETN	pentaerythritol tetranitrate
PIA	Portland International Airport
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RMUS	Range and Munitions Use Subcommittee
RSP	Range Sustainment Program
SAP	Sample and Analysis Plan
SAR	Small Arms Range
SI/RI	Site Inspection/Remedial Investigation
TWC	The Weather Channel
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
WESTON®	Weston Solutions, Inc.

EXECUTIVE SUMMARY

An Operational Range Assessment (ORA) was conducted in 2013 by Weston Solutions, Inc. (WESTON®) to evaluate the potential or existing off-site migration of munitions constituents (MC) from the Small Arms Range (SAR) and Explosive Ordnance Disposal (EOD) Range that are located within the boundaries of Portland Air National Guard Base (ANGB). The ORA is the first 5-year assessment update for the Portland ANGB (the third assessment overall). The assessment updates the Conceptual Site Model (CSM) that was previously developed for the ranges to evaluate potential sources of MC, migration pathways and links to possible off-range receptors, and whether a source-receptor interaction exists or has the potential to exist that requires further study/action. A Qualitative Assessment was conducted in 2009 by WESTON that concluded that potential sources of MC were present at both ranges, potential human receptors were present within prescribed distances from the ranges, and migration pathways between the potential sources of MC and receptors were present (WESTON, 2009). The 2009 Qualitative Assessment recommended that a Quantitative Assessment be conducted to fill the identified data gaps in the CSM.

A Quantitative Assessment was conducted in 2011 by the Air National Guard under the Operational Range Assessment Program Version 2.0 to determine if MC was migrating from the suspected source areas (BEM Systems, 2011). This 2013 ORA was conducted under the guidelines established in the Operational Range Assessment Program (ORAP), Version 3.0. The CSM update also includes a revised qualitative evaluation to determine if the possibility of source-receptor interactions has changed since the 2009 Qualitative Assessment. Potential sources include MC released into the environment at the SAR soil berm and at the EOD Range that lie within the boundaries of the Portland ANGB. Potential receptors include off-range humans and ecological organisms that could interact with MC-affected media for significant durations of time; thereby classifying as a long-term exposure. The CSM, based on updated qualitative and new quantitative evaluations to assess the possibility of source-receptor interactions, can be summarized by the following:

- The identified sources of MC as defined by the ORAP (USAF, 2011) include spent munitions and MC generated from weapons training at the SAR and EOD Range. The SAR and EOD Range are co-located together with the EOD range being built into the northern SAR berm. The SAR has been inactive since 2008 due to the baffle system

allowing rounds to migrate from the range. The EOD Range is used approximately once per month. A limit of 1.25 pounds of Composition 4 (C4) explosives can be used per detonation at the EOD Range.

- The predominant wind direction at the installation is from the northwest; however, winds also originate from the east-southeast and the south. Potential human air receptors are located within the 4-mile ORAP distance threshold criteria from the SAR and EOD Range, as the installation is located in an urban setting. However, no significant source of MC was identified that could pose a threat to an off-range receptor through the air pathway. The SAR earthen berms are covered in vegetation that do not readily support a vigorous soil transport mechanism through wind entrainment. Due to the earthen berms acting as a partial wind barrier, MC that is exposed on the surface of the SAR floor are protected from high winds and are unlikely to become entrained in the wind. Additionally, the limited use of the EOD Range does not support a significant source of MC capable of migrating from the range. Therefore, the air exposure pathway is incomplete and no complete source-receptor interactions were identified for human or ecological receptors.
- No receptors were identified within the 200-foot distance threshold for the soil pathway (distance criteria established in the ORAP) from the SAR and EOD Range. The surface soil pathway is incomplete by stormwater erosion and air transport, based on the well-established vegetative cover. The potential for transport of subsurface soil was evaluated through assessment of the groundwater pathway.
- Stormwater water runoff from the SAR is channeled into a drain beneath the SAR floor that is directed to the sanitary sewer. Stormwater water runoff from the EOD Range area flows north toward Portland ANGB retention ponds #1 and #2. Water from these ponds is discharged to the off-site Port of Portland Retention Pond, prior to discharge to the Columbia Slough. The Columbia Slough flows west and joins the Willamette River approximately 1 mile from the Willamette River's confluence with the Columbia River. Although surface water may be capable of transporting MC off-range, no receptors were identified within the 15-mile downstream distance threshold established in the ORAP of the SAR and EOD Range that use surface water as a drinking water supply. Therefore, no complete source-receptor interactions were identified for the surface water/sediment pathway.
- The groundwater gradient for the shallowest water bearing unit (Upper Zone) beneath the SAR and EOD Range is believed to be directed to the north, based on existing Environmental Restoration Program site evaluation data from the Portland ANGB. However, significant changes in flow direction in both the Upper Zone, and the next water bearing units, the Shallow Zone, the Deep Zone, and the Columbia River Sand Aquifer, appear to correlate with seasonal fluctuations in the Columbia River stage. These groundwater bearing units are hydraulically connected and vertical migration of potentially impacted groundwater is likely based on the absence of significant aquitards between groundwater bearing units. Due to seasonal fluctuations in groundwater flow direction, it is not possible to predict a single groundwater gradient. Based on the presence of private water wells within 4 miles of the SAR and EOD Range, receptors do exist. However, the 2011 Quantitative Assessment results suggest that groundwater in

the area of the SAR and EOD Range are not impacted by MC. Therefore, a source-receptor interaction does not appear to exist for the groundwater pathway.

- A review of the US Fish & Wildlife Service list of threatened and endangered species in Multnomah County lists a total of eight threatened or endangered species as possibly occurring in the county (USFWS, 2013). None of the eight listed species has the potential of occurring on the installation due to the SAR and the EOD Range, and surrounding areas not possessing the necessary habitat needed by these listed species.
- Three soil borings were advanced at the SAR, and multiple samples were collected from each boring. Copper, iron, lead, tungsten, and zinc were reported above detection limits in soil samples collected at the SAR. None of the reported detections of copper, lead, or zinc exceed the screening levels provided in the ORAP (no screening level is provided for tungsten). Iron was reported above the screening level for the protection of groundwater (640 milligrams per kilogram [mg/kg]); however, this screening level is unrealistic based on the general content of iron in the soil. Detections of naturally occurring iron ranged from 12,000 mg/kg to 46,000 mg/kg, respectively. Therefore, any MC impacted soil at the SAR is not apparent.
- One soil sample was collected at the EOD Range. Perchlorate was reported at an estimated concentration of 0.00075 mg/kg. Nitrocellulose was reported at an estimated concentration of 0.79 mg/kg. Chromium was reported at a concentration of 14 mg/kg, and lead was reported at a concentration of 8.8 mg/kg. None of these values exceed the screening levels listed in the ORAP Version 3.0. No other compounds were reported above detection limits from the sample collected at the EOD Range. Therefore, any MC impacted soil at the EOD Range is not apparent.

Based on the quantitative analysis of the conditions present at the Portland ANGB SAR and EOD Range, MC migration toward off-range areas does not appear to be occurring. Additionally, no additional data gaps were identified; therefore, no further action or assessment is warranted at this time. If any significant operational changes occur, or if additional information regarding a more viable transport mechanism is discovered, reevaluation of the potential for a complete pathway should be performed. The SAR and EOD Range should be reevaluated at a minimum of every 5 years as recommended in the ORAP, regardless of a change in conditions.

1. INTRODUCTION

Weston Solutions, Inc. (WESTON®) was contracted by the Air Force Civil Engineer Center (AFCEC) on behalf of Headquarters Air National Guard to conduct munitions constituents (MC) migration assessments on Air National Guard (ANG) operational ranges as part of the United States Air Force (USAF) Range Sustainment Program (RSP). The RSP sets forth a framework for addressing and integrating mission, operational, and training requirements with environmental, safety, and facility infrastructure needs to maintain accessibility, enhance capabilities, minimize restrictions, and ensure long-term availability of operational range resources. The Operational Range Environmental Program focuses on the environmental responsibilities portion of the USAF range sustainability framework that addresses natural resource infrastructure. The goal of the program is to sustain, restore, optimize, and modernize natural infrastructure assets in order to mitigate environmental encroachment and balance environmental stewardship with operational requirements. One aspect of this program is environmental resource management that consists of operational range assessments (ORAs). The knowledge obtained through ORAs, in conjunction with infrastructure assessments, compliance assessments, and management programs will allow for informed decision making regarding environmental resource management and comprehensive planning in support of range sustainability and mission readiness.

1.1 PURPOSE OF THE OPERATIONAL RANGE ASSESSMENT PROGRAM

The Operational Range Assessment Program (ORAP) was developed by Headquarters USAF, Office of the Civil Engineer, Asset Management and Operations Division, Environmental Branch (USAF/A7AN) in order to comply with Department of Defense (DoD) policy to assess the environmental impacts of munitions use on operational ranges. DoD Directive 4715.11 requires DoD components to respond to an off-range release of MC. MC are any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. DoD Instruction 4715.14 establishes and implements procedures for conducting assessments of ranges for the potential of a release of MC from the ranges (USAF, 2011).

The ORAP outlines USAF procedures and provides range, installation, and Major Command personnel involved in supporting the initiative to evaluate potential MC migration beyond the operational range boundary with guidance on implementing ORAs in a consistent and defensible manner. To accomplish an assessment of potential MC migration, the USAF will:

- Determine whether there has been a release or a substantial threat of release of MC of concern from an operational range or range complex to off-range areas; and
- Determine whether the release or substantial threat of a release of MC of concern from an operational range or range complex to an off-range area creates an unacceptable risk to human health or the environment.

Based on assessment findings, the USAF will perform an appropriate response and prepare a report in accordance with applicable statutes, regulations, and policy if there has been a release or substantial threat of release of MC of concern from an operational range or range complex to an off-range area (USAF, 2011).

1.2 PROJECT SCOPE/OBJECTIVES

The ORA will collect, leverage, and integrate accurate data in order to provide installation managers with information to make informed planning and management decisions on ranges having the potential to release MC beyond the range boundary so that current use may be preserved. The Small Arms Range (SAR) and Explosive Ordnance Disposal (EOD) Range at the Portland Air National Guard Base (ANGB) were previously assessed under the ORAP in 2009 (WESTON, 2009). A Quantitative Assessment was performed by the ANG in 2011 under the ORAP Version 2.0 (BEM Systems, 2011). The current Quantitative Assessment is performed under the guidance of the ORAP Version 3.0. The ORA, including both qualitative and quantitative activities, is being conducted as part of the 5-year mandatory review/update requirement in the ORAP.

The ORAP has prioritized range assessments into three tiers based on mission criticality, munitions expenditures, and the presence of management controls to prevent MC migration. According to the ORAP, Tier 1 ranges as “air-to-ground ranges within the United States and all types of ranges within the boundaries of Tier 1 ranges.” Tier 2 ranges are “ranges involving munitions greater than .50 caliber; maneuver and training areas that use smoke, pyrotechnics, and/or simulators; and overseas air-to-ground ranges (e.g., explosive ordnance disposal ranges,

demolition ranges, mortar ranges, and grenade ranges that are not co-located on ranges included in Tier 1).” Tier 3 ranges are described as “all ranges and training areas used exclusively for firing small arms ammunition (.50 caliber and below) to include blanks and dye-marking rounds” (USAF, 2011). The Portland ANGB has one operational Tier 2 range (an EOD Range) and one Tier 3 range (a SAR). The 2009 Qualitative Assessment recommended that a Quantitative Assessment (i.e., environmental sampling) be conducted to fill data gaps. The Quantitative Assessment conducted in 2011 by BEM Systems under an ANG contract included installation of monitoring wells and collection of soil and groundwater samples (BEM Systems, 2011). Neither range has been addressed by any other program; therefore, the SAR and EOD Range will continue to be addressed under the ORAP.

The objectives of the 2013 ORA Assessment conducted for the Portland ANGB SAR and EOD Range will attempt to:

- Identify potential data gaps that were not recognized by the previous Qualitative Assessment conducted in 2009;
- Confirm if previously identified data gaps with regard to potential MC migration have been addressed;
- Verify whether or not a Best Management Practice (BMP) has been implemented at the SAR and/or EOD Range;
- Verify if any major changes to the SAR and EOD Range infrastructure or areas surrounding the SAR and EOD Range have occurred through records review, interview with installation personnel, and conduct a range survey;
- Assess whether or not MC is escaping the SAR and EOD Range areas or has the potential to escape the area by collecting environmental samples;
- Assess risk to off-range human and ecological receptors;
- Update the Conceptual Site Model (CSM) produced during the 2009 Phase 1 Qualitative Assessment;
- Compare analytical results collected during the 2013 Quantitative Assessment with results from the 2011 BEM Systems Quantitative Assessment; and
- Complete the required 5-year assessment update based on the guidelines presented in the ORAP Version 3.0.

These tasks were completed through a review of existing records and reports on environmental investigations, site reconnaissance, environmental media sampling, and recent interviews of facility personnel.

1.3 PROJECT PERSONNEL

This assessment was conducted under contract with AFCEC under supervision of the ANG. The Portland ANGB SAR and EOD range are managed by 142nd Fighter Wing (FW) of the Oregon ANG (ORANG). Additional essential project personnel are listed in the approved Work Plan (WESTON, 2012).

1.4 REPORT ORGANIZATION

The remainder of the ORA Report includes the following discussion areas:

- Section 2 – Installation Information
- Section 3 – Environmental/Physical Characteristics
- Section 4 – Summary of Project Activities
- Section 5 – Operational Range/Area Information
- Section 6 – MC Availability and Transport
- Section 7 – CSM Revision
- Section 8 – Conclusions and Recommendations
- Section 9 – References

Reference material is also included with this ORA Report and includes the following:

- Appendix A – Range Map
- Appendix B – Soil Borings
- Appendix C – Geologic Cross-Sections of Portland ANGB
- Appendix D – Potentiometric Maps
- Appendix E – Interview Records
- Appendix F – Photographic Log
- Appendix G – Analytical Sampling Data
- Appendix H – Threatened and Endangered Species Lists

2. INSTALLATION INFORMATION

The current and historical uses of Portland ANGB and the SAR and EOD Range are described in the following subsections. The Portland ANGB is located adjacent to and south of the Portland International Airport (PIA).

2.1 LOCATION/SETTING

The PIA is located approximately 6 miles northeast of downtown Portland, Oregon, along the Columbia River. The airport is owned and operated by the Port of Portland and occupies approximately 3,200 acres of land (PIA, 2000). In addition to hosting commercial airline passenger travel, the airport is currently home to the 142nd FW of the ORANG that is located at the Portland ANGB. The installation (Portland ANGB) occupies approximately 249 acres of land leased from the Port of Portland. Portland ANGB is currently under negotiations regarding returning several parcels of land to the Port of Portland over the next few decades.

2.1.1 Surrounding Land Use/Anticipated Changes in Use

Portland ANGB is bordered on the east by the Riverside Country Club Golf Course and the Peninsula Drainage Canal. PIA is located north of the installation. The areas south and west of the installation are zoned for residential, commercial, and industrial use. A City of Portland municipal well field, known as the Columbia South Shore Well Field (CSSWF), is located east of the installation. The western boundary of the well field is approximately 1 mile east of the installation (ERM, 2001a).

Communities in Oregon within 15 miles of the Portland ANGB (with their respective 2011 population estimates) include: Portland (593,820), Aloha (49,425), Cedar Mill (12,597), Gresham (107,439), Gladstone (11,626), Oak Grove, (16,629), Oatfield (13,415), Milwaukie (20,518), Lake Oswego (37,046), Tigard (49,011), Troutdale (16,244), Beaverton (91,625), and West Lynn (25,392). Communities in Washington (north of the Columbia River) within 15 miles of the Portland ANGB (with their respective populations) include: Vancouver (164,759), Orchards (19,556), Camas (19,712), Five Corners (12,207), and Salmon Creek (16,767) (U.S. Census Bureau, 2013). These communities are shown on **Figure 2-1**.

The SAR and EOD Range are located on the western portion of the Portland ANGB. The land to the immediate north, east, and south is maintained grassland. To the immediate west of the SAR and EOD Range is a firearm storage/maintenance facility and associated parking lot. The installation boundary and an installation layout map are shown **Figure 2-2**.

The land around the airport is generally developed; therefore, encroachment by outside development is not expected in the near future on the east and west sides of the airport property. A golf course borders the eastern Portland ANGB boundary, and a majority of the southern property boundary contains commercial/industrial facilities along a heavily developed highway corridor.

2.1.2 Surrounding Water Use/Anticipated Changes in Use

Public water supply in the Portland area is managed by the Portland Water Bureau. The majority of the area's potable water is supplied by the Bull Run Watershed that is located within the Mount Hood National Forest approximately 26 miles east of Portland. The 102-square-mile watershed is primarily located in federally managed, old-growth forest and captures runoff from snow melt of the Hood Mountain area. The Bull Run Watershed has the capacity to supply the Portland area for the majority of the year. During the summer months, stream flow is low and results in water of poor quality (high turbidity). For this reason, the Portland Water Bureau installed a well field along the Columbia River to supplement the Bull Run Watershed during times of low flow, as well as to serve as a backup water supply.

The Portland well field (also referred to as the CSSWF) is located approximately 0.5 miles east of the installation and runs along the Columbia River shore for approximately 10 miles (**Figure 2-3**). The CSSWF has the capacity to pump over 100 million gallons per day into the supply system but is typically only used once or twice a year, generally during the summertime. However, the CSSWF was last used twice in January and February 2012, due to high turbidity in the Bull Run Watershed water (Portland Water Bureau, 2013). The CSSWF has supply wells screened in the Blue Lake Aquifer, the Troutdale Gravel Aquifer, the Troutdale Sandstone Aquifer, and the Sand and Gravel Aquifer. The wells are typically screened at least 300 feet below ground surface (bgs), with the exception of wells screened in the Troutdale Gravel

Aquifer at depths of approximately 100 to 200 feet bgs. No wells are screened in the Columbia River Sand Aquifer (CRSA).

The Portland Water Bureau supplies water to the airport and the Portland ANGB, as well as the area surrounding the airport. A private well survey conducted by the Portland ANGB in 2004 located eight private wells within approximately 1 mile of the installation boundary that are used for either domestic or irrigation purposes. The locations of these wells are shown on the Potential Receptor Well Map, **Figure 2-3**. Six of the wells are located along Columbia Boulevard that runs east/west near the southern boundary of the Portland ANGB, one well is located along Cornfoot Road, and the eighth well is located off of Marine Drive along the southern bank of the Columbia River. All of the wells located along Columbia Boulevard are less than 100 feet in depth. The well located along Cornfoot Road is 50 feet in depth. The well located along Marine Drive is 129 feet in depth. Three of the wells are utilized for domestic purposes including a drinking water source, while the remaining five wells were strictly used for irrigation (OWRD, 2008). Additional private water wells were located using the online Oregon Water Resources Department (OWRD) database service during the 2009 Qualitative Assessment. The database is no longer assessable via the internet; therefore the survey was not updated for this assessment. **Figure 2-3** presents the locations of the wells identified from this search (identified as groundwater wells), and **Table 2-1** and **Table 2-2** present well information including depths and usage, if known.

The OWRD database also lists surface water intakes. All identified surface water downstream intakes shown on **Figure 2-3** are used for non-potable purposes. One surface water intake (52534) is located approximately 2 miles east of the SAR and EOD Range; however, this intake is located upstream of the ranges. The U.S. Environmental Protection Agency (EPA) Safe Drinking Water Information System indicates the nearest downstream surface water intake for municipal water treatment and distribution or for private use is located in Scappoose, Oregon. The intake is located approximately 20 miles downstream of the Portland ANGB along the Columbia River (OWRD, 2008; EPA, 2008).

2.2 MISSION/OPERATIONAL HISTORY

Development of the area, including the PIA and Portland ANGB, began in 1936 with the placement of dredge materials as fill on various portions of the land. Military operations at the Portland ANGB began in 1941 at the present location of the installation, which functioned as an Army Air Base until 1945. The installation was converted into a Tactical Air Command facility in 1947 under the name of Portland Air Force Base (AFB). In 1951, the 142nd Fighter Group (FG) was activated. In 1952, jurisdiction of Portland AFB was transferred to Air Defense Command. In 1992, the 142nd FG was converted to the 142nd FW and the installation jurisdiction was transferred to the ANG. Over the course of its history, the wing has flown the O-47, BC-1A, F-5, F-51, B-25J, F-86, F-94, F-89, F-102, F101, F-4C, T-33, F-15A/B, and F-15C/D. The 142nd FW patrols the Pacific Northwest skies on 24-hour alert, from northern California to the Canadian border, as part of the North American Defense System (ERM, 2001a; ORANG, 2005). In addition to serving as the host facility to the 142nd FW, the Portland ANGB is also home to the 125th Special Tactics Squadron, the 366th OL-A Communications Squadron, the 123rd Weather Flight of the ANG, and the Air Force Reserve 304th Rescue Squadron.

2.3 OPERATIONAL RANGES/TRAINING AREAS

Two ranges at Portland ANGB are currently considered operational, the SAR and the EOD Range. Several historical ranges were also identified.

2.3.1 ORAP-Eligible Ranges/Areas

HQ USAF/A7CAN classifies eligible, non-overseas ranges as “those ranges under the jurisdiction, custody, or control of the DoD” (USAF, 2011). Both the SAR and the EOD range located at the Portland ANGB are considered eligible ranges. ORAP-eligible ranges/areas are summarized in the below table.

Name	Munitions Types and Activities	Approximate Dates of Operations	Status	ORAP Eligible
SAR	Small arms; small arms range	1993 - present	Inactive	Yes
EOD Range	Explosive ordnance disposal training	1999-present	Active	Yes

2.3.2 ORAP Non-Eligible Areas

A total of eleven ORAP non-eligible areas exist at the Portland ANGB, as described in the table below (Baywest, 2012).

Name	Munitions Types and Activities	Approximate Dates of Operations	Status	ORAP Eligible
Target Butt	Small arms; small arms training; testing of firing weapons from fighter aircraft	1940s	Closed	No (FUDS*)
Alert Pad	.50-caliber munitions training	1950s	Closed	No (FUDS*)
Shoot-in Butt	Small arms; small arms training; testing of firing weapons from fighter aircraft	1940s	Closed	No (FUDS*)
Skeet Range	Skeet shooting	1946-	Closed	No
Indoor Rifle Range	.22-rifle range	1940s-1950s	Closed	No
Ordnance Area 1	Munitions storage	1940s-1960s	Closed	No
Ordnance Area 2	Munitions storage	1940s	Closed	No
Munitions Storage Compound	Munitions storage	unknown-current	Active	No
Burial Area	.50-caliber munitions burial	1945-1946	Closed	No (FUDS*)
Chemical Warfare Training	Chemical weapons training; munitions storage	1940s	Closed	No
Burn Area	0.50-caliber munitions disposal	1950s-1960s	Closed	No

*Managed under the Formerly Used Defense Site (FUDS) program

The locations of the ORAP-eligible and ORAP non-eligible areas are shown in **Appendix A**.

2.4 PREVIOUS OPERATIONAL RANGE ASSESSMENTS

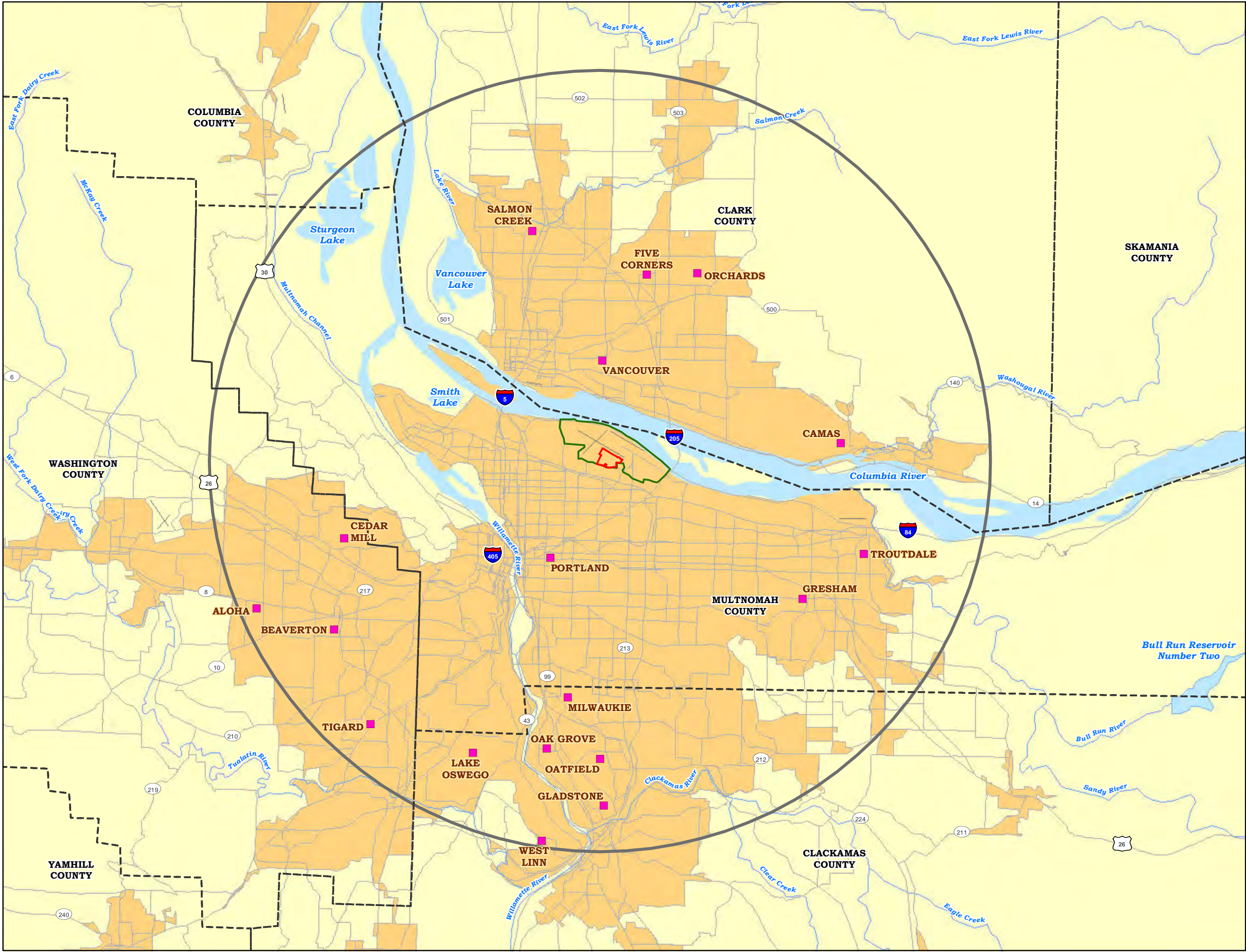
A Qualitative Assessment was conducted by WESTON in 2009 to evaluate the potential for MC to migrate off-range toward human receptors. This included a site visit to the Portland ANGB to gather information about the SAR and EOD Range, their history, and environmental setting. Additionally, site reconnaissance was performed to identify any potential human receptors within the prescribed distances outlined in the ORAP Version 2.0. This information was used to construct a CSM to evaluate the potential for MC migration from both facilities toward off-range receptors.

Sources of MC identified included spent munitions at the SAR and explosives constituents used in historical munitions disposal and current munitions disposal training activities at the EOD Range. This includes copper, iron, lead, tungsten, and zinc for the SAR, and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), pentaerythritol tetranitrate (PETN), and lead for the EOD Range. Potential pathways of migration include air, surface and subsurface soil, surface water, and groundwater; however, the groundwater pathway was determined to be the only potentially complete pathway based on the potential for off-range receptors. Potential receptors included residents north, east, south, and west of the Portland ANGB who utilize private groundwater wells for potable water supplies. Groundwater modeling indicates that the CSSWF is not affected by contaminant migration, and therefore is not considered a receptor. The closest identified receptor wells are located approximately 0.5 mile south of the SAR and EOD Range. Due to the fluctuations in groundwater gradient directions and the shallow depth to groundwater at the Portland ANGB, a potential source-receptor interaction was determined to be possible in all directions for the groundwater pathway (WESTON, 2009).

2.5 OTHER ENVIRONMENTAL ASSESSMENTS

A follow-up to the 2009 Qualitative Assessment was performed by BEM Systems in 2011 at the SAR and EOD range under an ANG contract (BEM, 2011). Four groundwater monitoring wells were installed at the SAR and four groundwater monitoring wells were installed at the EOD Range. Each well was sampled for the MC identified in the 2009 Qualitative Assessment. No MC were reported above the ORAP Version 2.0 screening levels in any of the groundwater samples. Groundwater data provided in the 2011 Quantitative Assessment Report is shown on

Table 2-3. Soil samples were collected, but were not analyzed due to the lack of screening level exceedances in the groundwater samples. Based on the groundwater data resulting from the Quantitative Assessment, it was concluded that MC were not leaching into groundwater from the SAR soil berm or EOD Range.



- LEGEND**
- Cities
 - Hydrology
 - County Boundary
 - Urban Areas
 - Portland International Airport
 - Portland ANGB Installation Boundary
 - 15 Mile Radius

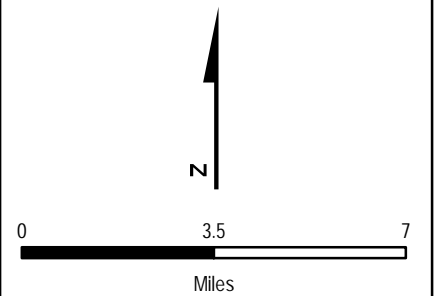


Image Source:
(c) 2009 Microsoft Corporation and its data suppliers, 2011



FIGURE 2-1
AREA LOCATION MAP
PORTLAND ANGB
SMALL ARMS RANGE
MULTNOMAH COUNTY, OREGON
2-8



- LEGEND
- Portland ANGB Installation Boundary
 - Small Arms Range
 - EOD Range
 - Buildings

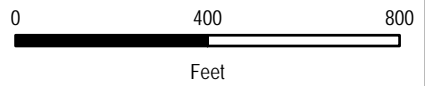


Image Source:
(c) 2009 Microsoft Corporation and its data suppliers, 2011



FIGURE 2-2
INSTALLATION BOUNDARY
PORTLAND ANGB
SMALL ARMS RANGE
MULTNOMAH COUNTY, OREGON
2-9

Table 2-1
Groundwater Well and Surface Water Intake Data
Portland ANGB
Portland, Oregon

Well ID	Water Type	Permit Number	Certificate Number	Usage	Water Source
Oregon Water Resources Department Surface Water Rights					
233076	SW	NA	NA	IR	A WELL
243524	SW	14393	NA	IR	COLUMBIA SLOUGH
243599	SW	NA	80434	IR	COLUMBIA SLOUGH
243602	SW	NA	80434	IR	COLUMBIA SLOUGH
243603	SW	NA	80434	IR	COLUMBIA SLOUGH
243604	SW	NA	80434	IR	COLUMBIA SLOUGH
243605	SW	NA	80434	IR	COLUMBIA SLOUGH
243606	SW	NA	80434	IR	COLUMBIA SLOUGH
243607	SW	NA	80434	IR	COLUMBIA SLOUGH
243608	SW	NA	80434	IR	COLUMBIA SLOUGH
243609	SW	NA	80434	IR	COLUMBIA SLOUGH
243610	SW	NA	80434	IR	COLUMBIA SLOUGH
243611	SW	NA	80434	IR	COLUMBIA SLOUGH
243612	SW	NA	80434	IR	COLUMBIA SLOUGH
243613	SW	NA	80434	IR	COLUMBIA SLOUGH
243614	SW	NA	80434	IR	COLUMBIA SLOUGH
243615	SW	NA	80434	IR	COLUMBIA SLOUGH
243616	SW	NA	80434	IR	COLUMBIA SLOUGH
243617	SW	NA	80434	IR	COLUMBIA SLOUGH
243618	SW	NA	80434	IR	COLUMBIA SLOUGH
243619	SW	NA	80434	IR	COLUMBIA SLOUGH
243620	SW	NA	80434	IR	COLUMBIA SLOUGH
243621	SW	NA	80434	IR	COLUMBIA SLOUGH
243622	SW	NA	80434	IR	COLUMBIA SLOUGH
243623	SW	NA	80434	IR	COLUMBIA SLOUGH
243624	SW	NA	80434	IR	COLUMBIA SLOUGH
243625	SW	NA	80434	IR	COLUMBIA SLOUGH
243626	SW	NA	80434	IR	COLUMBIA SLOUGH
243627	SW	NA	80434	IR	COLUMBIA SLOUGH
243628	SW	NA	80434	IR	COLUMBIA SLOUGH
243629	SW	NA	80434	IR	COLUMBIA SLOUGH
243630	SW	NA	80434	IR	COLUMBIA SLOUGH
243631	SW	NA	80434	IR	COLUMBIA SLOUGH
243632	SW	NA	80434	IR	COLUMBIA SLOUGH
243633	SW	NA	80434	IR	COLUMBIA SLOUGH
243634	SW	NA	80434	IR	COLUMBIA SLOUGH
243635	SW	NA	80434	IR	COLUMBIA SLOUGH
243636	SW	NA	80434	IR	COLUMBIA SLOUGH
243637	SW	NA	80434	IR	COLUMBIA SLOUGH
243638	SW	NA	80434	IR	COLUMBIA SLOUGH

Table 2-1
Groundwater Well and Surface Water Intake Data
Portland ANGB
Portland, Oregon

Well ID	Water Type	Permit Number	Certificate Number	Usage	Water Source
243639	SW	NA	80434	IR	COLUMBIA SLOUGH
243640	SW	NA	80434	IR	COLUMBIA SLOUGH
243641	SW	NA	80434	IR	COLUMBIA SLOUGH
243642	SW	NA	80434	IR	COLUMBIA SLOUGH
243643	SW	NA	80434	IR	COLUMBIA SLOUGH
243644	SW	NA	80434	IR	COLUMBIA SLOUGH
51495	SW	50680	NA	IR	COLUMBIA RIVER
52534	SW	51547	NA	MU	COLUMBIA RIVER1
52535	SW	51547	NA	WI	COLUMBIA RIVER1
120823	SW	38868	46613	IR	COLUMBIA SLOUGH
147966	SW	50240	66547	IM	A SPRING
Oregon Water Resources Department Groundwater Rights					
274280	GW	15655	NA	IR	A WELL
274281	GW	15655	NA	IR	A WELL
336541	GW	10597	82820	IM	A WELL
23625	GW	2093	NA	MU	WELL 2
24804	GW	8755	NA	MU	WELL #1
24805	GW	8755	NA	MU	WELL #2
24806	GW	8755	NA	MU	WELL #3
24807	GW	8755	NA	MU	WELL #4
24808	GW	8755	NA	MU	WELL #5
24809	GW	8755	NA	MU	WELL #6
24810	GW	8755	NA	MU	WELL #7
24811	GW	8755	NA	MU	WELL #8
24812	GW	8755	NA	MU	WELL #9
24813	GW	8755	NA	MU	WELL #10
24814	GW	8755	NA	MU	WELL #11
24815	GW	8755	NA	MU	WELL #12
24816	GW	8755	NA	MU	WELL #13
24817	GW	8755	NA	MU	WELL #14
26387	GW	10479	NA	MU	WELL 34
26871	GW	10967	NA	IR	A WELL
31139	GW	13387	NA	MU	A WELL
32693	GW	15067	NA	AG	A WELL
32694	GW	15067	NA	IR	A WELL
32695	GW	15067	NA	TC	A WELL
36833	GW	NA	NA	IR	A WELL
36982	GW	NA	NA	IR	A WELL
93608	GW	921	27572	IR	A WELL
95411	GW	409	28937	IM	A WELL
99729	GW	1450	32131	IR	A WELL

Table 2-1
Groundwater Well and Surface Water Intake Data
Portland ANGB
Portland, Oregon

Well ID	Water Type	Permit Number	Certificate Number	Usage	Water Source
99731	GW	2114	32133	AH	A WELL
107719	GW	4192	37763	AH	A WELL
113397	GW	2018	41716	IR	A WELL
113406	GW	3235	41721	AH	WELL #1
113407	GW	3235	41721	AH	WELL #2
117516	GW	4639	44422	IR	A WELL

Data provided by Oregon Water Resources Department Online Database.

SW = surface water

AG = Agriculture

GW = groundwater

WI = Wildlife

TC = Temperature Control

AH = Air Conditioning and Heating

IR = Irrigation

MI = Mining

MU = Municipal

IM = Manufacturing

NA - Not Applicable

Table 2-2
USGS and Receptor Survey Groundwater Well Data
Portland ANGB
Portland, Oregon

Well ID	Water Usage	Well Location		Well Depth (feet)
		Easting	Northing	
USGS Water Well Data				
MULT 1135	community	790599.5614	1398676.83	270
MULT 1132	community	786400.827	1398680.495	460
MULT 1134	community	790523.4706	1398477.21	448
MULT 1148	not listed	779989.499	1398436.572	80
MULT 1152	domestic	776997.2279	1398309.709	70
MULT 1161	community	790992.0402	1394412.435	65
MULT 1164	community	791271.6931	1394201.933	63
MULT 1155	industrial	778870.7761	1396282.191	84
MULT 1144	irrigation	786260.6303	1401162.345	634
MULT 1113	irrigation	780816.1824	1403107.863	155
MULT 72091	irrigation	778046.2956	1399844.144	95.5
MULT 72093	irrigation	778064.8125	1399828.505	95.5
MULT 72092	irrigation	778066.9826	1399848.036	95.5
Portland ANGB Water Well Receptor Search - 2004				
1	Irrigation	5135 NE Columbia Blvd		Ponds/Columbia Slough
2	Irrigation	6849 NE Columbia Blvd		84
3	Domestic	6849 NE Columbia Blvd		72
4	Domestic	6900 NE Cornfoot Road		50
5	Irrigation	7313 NE Columbia Blvd		95
6	Irrigation	7313 NE Columbia Blvd		95
7	Irrigation	7313 NE Columbia Blvd		95
8	Domestic	7101 NE Marine Drive		129

2004 Receptor Survey performed by Portland ANGB staff in 2004, by knocking on doors of properties surrounding Base.

Table 2-3
Historical SAR and EOD Groundwater Analytical Data
Portland ANGB
Portland, Oregon

USAF & RMUS Identified Screening Levels	METALS					EXPLOSIVES	
	Copper	Iron	Lead	Tungsten	Zinc	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	Pentaerythritol tetranitrate (PETN)
CAS#	7440-50-8	7439-89-6	7439-92-1	7440-33-7	7440-66-6	121-82-4	78-11-5
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(Ug/L)
Human Drinking Water Screening Levels ^a	1,500	26,000	15	NL	11,000	0.6	NA
SAR-MW01	0.00094	2.9	0.000073	0.00017	0.0227	NS	NS
SAR-MW05 (DUP of SAR-MW01)	0.0017	3.06	0.000086	0.00016	0.0214	NS	NS
SAR-MW02	0.0026	0.365	0.00018	0.0043	0.0194	NS	NS
SAR-MW03	0.0011	14.4	0.00018	0.00026	0.0025	NS	NS
SAR-MW04	0.0438	38.6	0.0063	0.00069	0.261	NS	NS
EOD-MW01	NS	NS	0.000092	NS	NS	0.0024 U	0.0005 U
EOD-MW02	NS	NS	0.00019	NS	NS	0.0024 U	0.0005 U
EOD-MW03	NS	NS	0.00015	NS	NS	0.0024 U	0.0005 U
EOD-MW04	NS	NS	0.000071	NS	NS	0.0024 U	0.0005 U

NOTES:

a EPA Regional Screening Level (RSL) Table, April 2009 (Update of the EPA Region 3 RBC Table, Region 6 HHMSSL Table and the Region 9 PRG Table)

b More protective of Risk-Based or MCL-Based Soil Screening Level

NS - Not Sampled

Bold numbers indicate that the analyte occurred above the Method Detection Limit.

Highlighted values indicated that the sample result exceeds one or more USAF & RMUS Identified Screening Levels

All results are from the 2011 FINAL Portland ORAP Phase II conducted by BEM Systems.

3. ENVIRONMENTAL/PHYSICAL CHARACTERISTICS

The physical characteristics of the Portland ANGB and surrounding areas are described in the following subsections. The Portland ANGB is operated by the 142nd FW of the ORANG and is located south of the PIA. The installation and airport are located approximately 6 miles northeast of downtown Portland, Oregon. An area location map was provided as **Figure 2-1**.

3.1 VEGETATION AND SOIL TYPE

Vegetation at the Portland ANGB is limited to maintained grasslands and landscaped areas. No critical habitats (unique or unusual natural settings that are necessary for the continuing propagation of key species in an ecosystem) or wilderness areas are located in the vicinity of the base. A wetlands survey conducted in 1996 identified six wetland areas, ranging in size from 0.0008 to 0.95 acres, with a total area of 1.8 acres located within the Portland ANGB boundaries. No publicly owned natural preserves, wilderness areas, or wildlife sanctuaries are present within a 3-mile radius of the installation (MWH, 2003).

Most of the original surface soils at the Portland ANGB have been altered by re-grading or construction activities, or have been covered by fill. Original native soils in the area include Pilchuck and Sauvie-Rafton soils. Pilchuck soils, consisting of dark, grayish-brown to dark brown soil with high permeability, underlie most of the installation. Sauvie-Rafton soils, consisting of poorly drained, silty loam soil, are present in the southeast corner of the installation. The surficial soil at Portland ANGB is approximately 15 inches thick and is underlain by a dark brown, silty loam to a depth of about 60 inches (ERM, 2001a). Borings performed during the March 2013 Quantitative site visit revealed that soils beneath the SAR and EOD range are consistent with the description of the Pilchuck soils. Boring logs collected during the 2011 Quantitative Phase 2 investigation are presented as **Appendix B**.

3.2 TOPOGRAPHY AND HYDROLOGY

The Portland ANGB is situated on the Columbia River Floodplain. The ground surface across the installation is relatively flat and varies in elevation from approximately 10 to 20 feet above mean sea level (msl). A majority of the installation includes disturbed and re-graded land and

includes dredged material from the Willamette River, or imported fill used to construct the land underlying the PIA, the installation, and surrounding areas. The 100-year floodplain elevation for the area surrounding the installation is 14 feet above msl (ERM, 2001a). A local topographic map is provided as **Figure 3-1**.

The Portland ANGB lies between the Columbia River to the north and the Columbia Slough to the south (both flow toward the west). The Willamette River lies approximately 4 miles west of the ANGB and flows toward the north. Portions of the installation are beneath the 100-year floodplain elevation of 14 feet above msl.

Prior to significant development in the area of the Portland ANGB, the area was often flooded during high stages of the Columbia River because it was not protected by dikes and engineered drainage. Presently, surface runoff from the installation enters storm drains and a drainage ditch system, both of which eventually discharge to the Columbia Slough via pumping from the retention ponds near the western Portland ANGB boundary (ERM, 2001b). **Figure 3-1** presents the locations of the main surface water features on the installation, including the retention ponds and main outfall location. **Figure 3-2** presents the regional surface water features.

3.3 GEOLOGY AND HYDROGEOLOGY

The northeastern Portland area is underlain by Tertiary and Quaternary sedimentary and volcanic deposits. The Portland ANGB is located within the central portion of the Portland Basin, a northwest-southeast trending structural depression that was formed in the early Tertiary and filled with approximately 1,800 feet of late Tertiary and Quaternary sediments. In ascending order, the basin deposits in the vicinity of the installation include Eocene and Miocene rocks, the Sandy River Mudstone, the Troutdale Formation, the Parkrose Formation, the Troutdale Gravel, the Columbia River Sand, and Pleistocene to Recent Alluvium (ERM, 2001a).

The Sandy River Mudstone is the oldest sedimentary unit of the Portland Basin and consists of silt and fine- to medium-grained sand with some gravel lenses. Plant fossils and wood fragments are present in the silty layers. Clay-rich and ash units are predominant in the upper portion of the formation and are interbedded with the Troutdale Formation (ERM, 2001a).

The Troutdale Formation consists of fluvial conglomerates of quartzite and granite as well as vitric-lithic sand and conglomerates. To the east of the Portland ANGB, the unit becomes predominantly sand and gravel, and to the west it grades laterally into the Sandy River Mudstone (ERM, 2001a).

The Parkrose Formation overlies the Troutdale Formation in the vicinity of the installation. The Parkrose Formation is approximately 50 to 100 feet in thickness in the area and consists of siltstones, sandstones, and claystones deposited in a lacustrine environment (ERM, 2001a).

The Troutdale Gravel consists of gravel and sand deposited in the channel of the ancestral Columbia River. The Columbia River Sand was deposited in the Portland Basin area in a channel cut into the top of the Troutdale Gravel. The Columbia River Sand consists predominantly of sand with a small amount of silt and gravel (ERM, 2001a).

The Pleistocene and Recent Alluvium sediments in the east Portland area include terrace deposits, catastrophic flood deposits, and recent river alluvium composed of fluvial and local lacustrine sediments. The recent alluvium deposits of the Columbia River are made up of interbedded silt and sand (ERM, 2001a).

The Columbia River has been isolated from the floodplain areas near the Portland vicinity by a series of artificial dikes that were completed prior to the 1940s. The floodplain surface is relatively flat. At the Portland ANGB, the natural land surface has been modified by using imported and local fill material to elevate portions of the installation (ERM, 2001b) (ERM, 2001a).

The floodplain deposits at the Portland ANGB extend from the ground surface to depths ranging from approximately 48 to 60 feet bgs. Water-bearing zones within these Floodplain Deposits consist of, in descending order, the Upper Zone, the Shallow Zone, the Deep Zone, and the CRSA (ERM, 2001a).

The Upper Zone is a discontinuous, unconfined to semi-confined water-bearing zone that is present at scattered locations in the northern, eastern, and southwestern portions of the Portland ANGB. It consists of a brown, well-sorted, fine sand in the eastern portion of the installation and silty to fine sand in the southwestern and northern portions of the installation. The Upper Zone

was encountered in several borings at Environmental Restoration Program (ERP) Sites 1, 7, 9, and 11 at depths ranging from 5.5 to 9.0 feet bgs and in thickness ranging from approximately 1 to 18 feet. (Note: ERP sites were formerly referred to as Installation Restoration Program sites). The Upper Zone is separated from the Shallow Zone by a silty low-permeability zone up to 6 feet in thickness and in some areas transitions directly into the Shallow Zone. Hydraulic conductivity values are not available for the Upper Zone; however, hydraulic conductivities from 0.54 to 15 feet per day (ft/day) are estimated based on the similar grain-size distribution of the Upper Zone and Shallow Zone. **Appendix C** provides geologic cross sections depicting the hydrogeology discussed above, including a map of the ERP Site locations (ERM, 2001a).

The Shallow Zone is the shallowest extensive and laterally continuous water-bearing zone at the Portland ANGB. It is a semi-confined aquifer consisting of a dark gray, well-sorted, fine sand with occasional silt and scattered silty layers. The Shallow Zone was encountered in all but the southern-most borings drilled during the base-wide ERP Site Inspection and Remedial Investigation (SI/RI) (ERM, 2004). The top of the Shallow Zone was encountered at depths of 7.5 to 21 feet bgs. Where observed, the Shallow Zone generally ranges in thickness from approximately 3 to 19 feet and is thickest through the central portion of the installation (ERM, 2001a).

The hydraulic conductivity of the Shallow Zone ranges from 0.54 to 15 ft/day based on aquifer pumping and slug tests completed during the SI/RI. Groundwater flow in the Shallow Zone is not static throughout the year but is generally directed to the north. As indicated from years of groundwater monitoring from ERP sites, some seasonal fluctuations in gradient occur (especially in summer months during peaks in the Columbia River stage). A silty, low-permeability zone ranging from 2 to 14 feet in thickness separates the Shallow Zone from the Deep Zone. Impacted groundwater at the installation primarily occurs within the Shallow Zone unit. The presence of the silty soils between the Shallow Zone and the Deep Zone has limited the downward migration of contaminants from the Shallow Zone, although impacts to the Deep Zone have been confirmed (ERM, 2001a).

The Deep Zone is an extensive, laterally continuous, and semi-confined water-bearing zone that is typically encountered below depths of 28 to 41 feet bgs and consists of a gray fine sand with

occasional silt and interbedded silty layers. The Deep Zone was encountered in every deep boring across the ERP study area, with the exception of one near the eastern installation boundary. Where observed, the Deep Zone ranges in thickness from approximately 2 to 19 feet. Similar to the Shallow Zone, the Deep Zone typically has a northern gradient; however, some seasonal fluctuations occur based on Columbia River stages. Potentiometric maps from an October 1999 Groundwater Transport Report are included in **Appendix D** (ERM, 2001a).

The hydraulic conductivity of the Deep Zone ranges from 0.46 to 68 feet/day based on aquifer pumping and slug tests completed during the SI/RI. In most areas of the Portland ANGB, the Deep Zone is separated from the underlying CRSA by an intervening low-permeability zone of gray clayey silt that ranges in thickness from less than 1 foot to 12 feet. In one location in the south central portion of the installation (MW9-2), the Deep Zone was observed to be in contact with the CRSA. In general, the aquitard between the Deep Zone and the CRSA is thickest in the northern and northeastern portions of the ERP study area and thinnest in the central and southwestern portions, which is in the vicinity of the SAR and EOD Range (ERM, 2001a).

At the Portland ANGB, the CRSA is a semi-confined aquifer consisting of a gray, fine-to-medium, micaceous, dense sand. The top of the CRSA was encountered at depths ranging from approximately 48 to 60 feet bgs. Logs of borings that penetrate the CRSA at the PIA report the bottom of the unit at approximately 280 feet bgs. The hydraulic conductivity of the CRSA ranges from 16 to 190 feet/day based on aquifer pumping and slug tests completed during the SI/RI. Groundwater in the CRSA typically flows to the northeast during much of the year. A potentiometric map of the CRSA is included in **Appendix D** (ERM, 2001a).

Groundwater elevations are affected by precipitation events and by changes in the Columbia River stage. The groundwater elevation in the Shallow Zone appears to correlate more closely with individual precipitation events, whereas groundwater elevations in the Deep Zone and the CRSA correlate more closely with the Columbia River stage. Geologic cross sections that show the depths and distribution of the geologic formations discussed above are provided in **Appendix C** (ERM, 2001a).

3.4 CLIMATE/METEOROLOGY

Average monthly high temperatures for Portland, Oregon range from 45°F in December to 80°F in July and August. Average monthly low temperatures range from 36°F in December to 58°F in August. The record high and low temperatures are 106°F in August 1981 and 8°F in February 1989, respectively. Portland receives an average of 43.16 inches of precipitation a year, with an average monthly maximum of 6.94 inches in December. The average evaporation for 1971-2000 was approximately 17.6 inches annually. The area receives an average of 6.5 inches of snow annually (CPC, 2013; NCDC, 2013; TWC, 2013).

3.5 NATURAL/CULTURAL RESOURCES

The natural and cultural resources in the area of the Portland ANGB are described in the following subsections.

3.5.1 Natural Resources

Natural resources include potentially sensitive habitats and species of concern.

3.5.1.1 Sensitive Habitats

No sensitive habitats were discovered in the area of the ranges during this assessment.

3.5.1.2 Species of Concern

No species of concern were determined to reside in the vicinity of the Portland ANGB.

3.5.2 Cultural Resources

An inventory of buildings was completed at the Portland ANGB in 2005. The Regimental Chapel (Building 495) and a former Barrack (Building 494) are two historical buildings located on the Portland ANGB that were considered eligible for the National Register of Historic Places. The locations of these buildings are shown on **Figure 2-2** (ORANG, 2005).

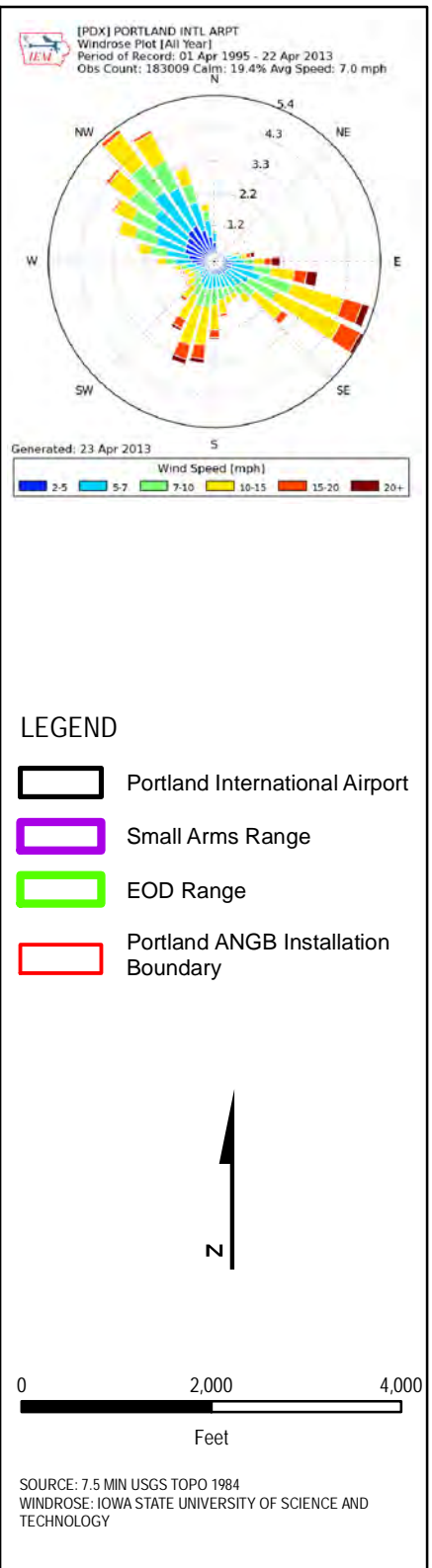
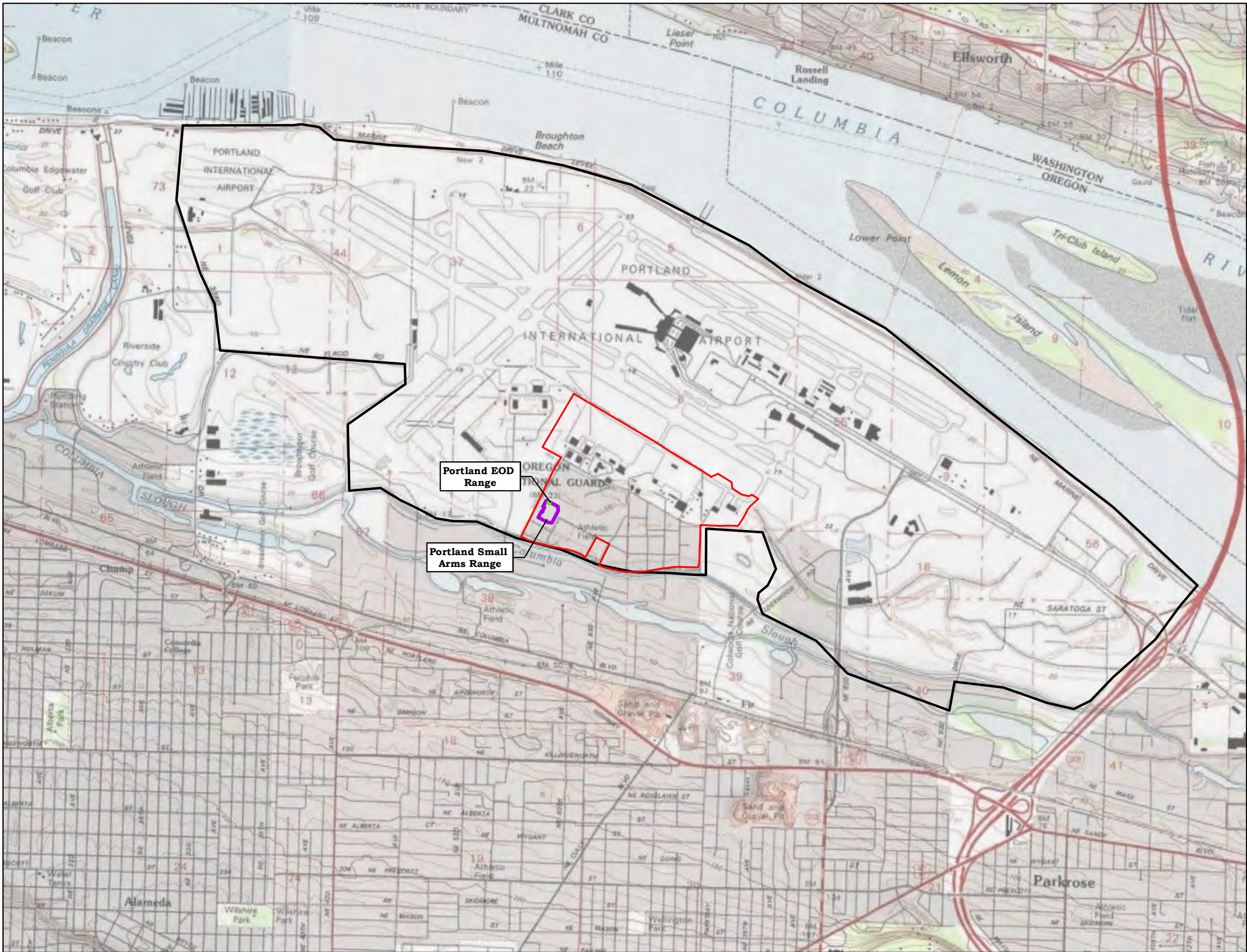


FIGURE 3-1
TOPOGRAPHIC MAP
PORTLAND ANGB
SMALL ARMS RANGE
MULTNOMAH COUNTY, OREGON
3-7



- LEGEND
- Drainage Ditch
 - Surface Water Flow Direction
 - Stormwater Flow
 - Portland ANGB Installation Boundary
 - Small Arms Range
 - Hydrology



0 750 1,500
Feet

Image Source:
(c) 2009 Microsoft Corporation and its data suppliers, 2011



FIGURE 3-2
SURFACE WATER MAP
PORTLAND ANGB
SMALL ARMS RANGE
MULTNOMAH COUNTY, OREGON
3-8

4. SUMMARY OF PROJECT ACTIVITIES

The project activities conducted during the 2013 ORA at the Portland ANGB are described in the following subsections.

4.1 SAMPLING METHODOLOGY

As outlined in the approved Sampling and Analysis Plan (SAP), soil samples were collected outside the SAR and EOD Range soil berm (WESTON, 2012). The primary purpose of sampling was to determine if MC were present along migration routes and to assess the threat or possible threat of an off-range release.

4.1.1 Data Quality Objectives

The data obtained during this ORA will be incorporated into existing data obtained during the 2009 Qualitative Assessment and the 2011 ANG Quantitative Assessment. The data from the ORA will be updated, as appropriate, to reflect the current conditions at the installation. Data obtained during previous Assessments and this ORA will comply with the respective standards. Specifically, mapping elements will comply with Spatial Data Standards for Facilities, Infrastructure, and the Environment, and analytical data shall meet requirements of the Environmental Resources Program Information Management System (ERPIMS). In either of these cases, other USAF-designed standards and formats or systems may be used (USAF, 2011).

4.1.2 Design and Approach

As outlined in the SAP, soil samples were collected outside of the SAR and EOD Range soil berm to determine if MC were leaching through the berm through surface water infiltration into groundwater (WESTON, 2012). Due to installation requirements, a geophysical survey was conducted beneath the proposed sample locations prior to mobilization.

5. OPERATIONAL RANGE/AREA INFORMATION

Two ranges at Portland ANGB are currently considered operational, the SAR and the EOD Range. No other range was discovered during this assessment that is eligible for assessment with the ORAP. Interview records compiled during the site visit are included in **Appendix E**.

5.1 SUMMARY OF RANGES

The SAR is located near the western installation boundary. The EOD Range is located within the north SAR berm. A BMP is not in place at either range.

5.2 SAR CHARACTERISTICS

The usage, infrastructure, and sampling associated with the SAR are described in the following subsections.

5.2.1 Site Description Summary

The SAR is located near the western boundary of the Portland ANGB. The land to the immediate north, east, and south of the SAR is maintained grassland. To the immediate west of the SAR is a firearm storage/maintenance facility and associated parking lot. A Site Layout Map is provided as **Figure 5-1**.

The range consists of 21 covered firing positions, targets, and an earthen berm. The SAR is situated so that firing positions are aligned toward the eastern berm, located approximately 130 feet down-range. The U-shaped earthen berm is approximately 25 feet high, extends along the north, south, and east sides of the SAR, and is constructed of local soils. Vertical baffles are aligned along the top of the SAR to help contain ricocheting bullets. The flooring of the SAR is comprised of shredded tires, another measure installed to help protect against ricocheting bullets.

The SAR was constructed in 1993 and has been inactive since 2008. During typical months, the SAR was used by approximately 42 ANG personnel one weekend a month. Daily use in the summer months increased to an average of five ANG personnel a day for three months. Additional units, including the Port of Portland Police Department, the Portland Police Department, the U.S. Coast Guard, the USAF Reserve Forces, and Portland ANGB Security

Forces have also historically used the SAR on occasion; however, the installation commander has not allowed outside agencies to use the SAR since approximately 2006.

Typical munitions permitted for use at the SAR include 5.56, 7.62, and 9 millimeter ball ammunition. Additional munitions less frequently used include shotgun rounds and tracer rounds. Frangible munitions were used briefly by USAF Reserve Forces, although the majority of expended rounds were lead. The SAR was constructed with measures to prevent rounds from exiting the range (overhead baffles, shredded tires, etc.); however, it has been reported that bullets were bouncing over the earthen berm and falling outside of the surface danger zone. Due to this condition, the SAR has been inactive since 19 September 2008 (although still considered operational). The range will remain closed until this problem has been resolved. Resolution will likely require construction of a new facility or substantial upgrades to the current facility. Usage data for the SAR is not presented because the SAR has not been used since 2008. Range personnel currently train at other military ranges in the area, including the Yakima Training Center in Washington State.

During construction of the SAR in 1993, a plastic liner was installed beneath the backstop berm to help prevent percolation of water through potentially impacted soils. Water accumulation within the SAR is collected within a central sump that is connected to the sanitary sewer system. The sanitary sewer system is sampled and analyzed annually to comply with City of Portland requirements. The 2011-2013 total lead results have ranged from 0.005 milligrams per liter (mg/L) to 0.007 mg/L. Prior to the connection to the sanitary sewer made in January 2002, stormwater runoff from the SAR was collected and discharged to the stormwater system and retention ponds. The combination of liner and water collection system within the SAR berms helped prevent water infiltration that could contribute to vertical migration of potentially impacted soils and groundwater. However, due to the age of the liner, seepage into groundwater may be occurring.

5.2.2 Conceptual Site Model Overview

During the 2009 Qualitative Assessment of the Portland ANGB that was performed under the ORAP Version 2.0, a CSM was created to identify sources of MC, pathways of migration or exposure, human receptors, and source-receptor interactions. These elements of the CSM were

used to analyze source-receptor interactions and determine whether a complete pathway constitutes interaction of MC with a human receptor. Air, surface and subsurface soil, surface water/sediment, and groundwater pathways were analyzed.

The Qualitative Assessment concluded that a complete source-receptor interaction was possible for the groundwater pathway. However, when the Qualitative Assessment was finalized, the data was not sufficient to define whether an interaction that posed a threat of a release existed, as no soil or groundwater data collected at the range was available. No receptors were identified that could interact with potential MC through the air, surface and subsurface soil, and surface water/sediment pathways.

5.2.3 MC of Potential Concern

Based on the historical munitions expenditures at the Portland ANGB SAR, the most prevalent MC found in the inventory for the Portland ANGB SAR are copper, iron, lead, tungsten, and zinc. Limited use of tracer rounds has been documented at the SAR; however the expenditure of these rounds is not frequent enough to warrant placement on the MC list. Similarly, primers and propellants were not included in the MC list. The primer and propellant are consumed upon ignition; residual materials would likely be contained in the cartridge casings, which are collected for recycling. Residual primer and propellant that may escape the casing is far less than the weight of the projectile.

The DoD Range and Munitions Use Subcommittee (RMUS) developed a list of screening levels to which all Military Services are required to compare surface water, groundwater, and sediment sampling data. The RMUS evaluated screening levels for each MC selected. In the case that more than one screening level was available, the RMUS selected the most conservative value (USAF, 2011). The MC list and associated ORAP used in the assessment of the SAR are presented in **Table 5-1** (Screening Levels for Ranges Using Munitions .50 Caliber and Below).

5.2.4 Sample Approach/Location

As recommended in the 2009 Qualitative Assessment Report, soil samples were collected from outside the SAR soil berm. Two soil borings (PO03 and PO04) were advanced outside the eastern berm and one boring (PO02) was advanced outside the northern berm. The surface soil samples were collected in 1-foot intervals to a depth of 5 feet bgs, or until refusal. The locations

of the soil borings are presented in **Figure 5-1**. A photographic log showing the soil sampling activities being performed and the site conditions at the SAR is presented as **Appendix F**.

5.2.4.1 Media Sampling

Soil samples were collected using a hand auger. The soil from each interval was placed in a plastic bag and homogenized prior to placing the soil in sample containers. Vegetation and miscellaneous debris were excluded from the sample. Remaining soil was returned to the borehole at the sample collection location.

5.2.4.2 Analytical Methods

The following analytical methods were used to analyze samples collected at the SAR:

- Metals by SW 846 Method 6020C

The samples were submitted to Test America in Denver, Colorado for analysis.

5.2.5 Sampling Results Summary

Soil samples from the SAR were collected on 19 March 2013. Samples were collected from 0-1 feet bgs, 1-2 feet bgs, 2-3 feet bgs, 3-4 feet bgs, and 4-5 feet bgs at two locations. Refusal was encountered at approximately 2 feet bgs at the third soil sample location (the southern boring on the eastern SAR berm). The boring was attempted to be resampled four times within the area cleared by the geophysical survey; however, no boring was able to be advanced farther than 2 feet bgs. This indicates that a subsurface obstruction was present that was not detected during the geophysical survey. Based on the scraping felt with the hand auger, this obstruction appeared to be a concrete slab. Only samples collected at this location from 0-1 feet bgs and 1-2 feet bgs were submitted for laboratory analysis.

Copper, iron, lead, and zinc were reported in each of the samples submitted for analysis. All reported detections were below the DoD RMUS Soil Screening Level listed in the ORAP Version 3.0 except for iron. Iron was reported at concentrations that exceed the DoD RMUS identified Soil Screening Level for the Protection of Groundwater of 640 milligrams per kilogram (mg/kg); however, this screening level is unrealistic based on the general content of iron in the soil. Reported concentrations of naturally occurring iron ranged from 12,000 mg/kg to 46,000 mg/kg. Samples from three locations were also analyzed for tungsten, which was

detected in two samples from two different sample locations. The detections ranged from 1.0 mg/kg to 1.1 mg/kg; however, there is not a DoD RMUS identified Soil Screening Level for tungsten listed in the ORAP Version 3.0. Sample results from the March 2013 ORA are presented in **Table 5-1**. Analytical data reports and a data validation summary are provided in **Appendix G**.

5.3 EOD RANGE CHARACTERISTICS

The usage, infrastructure, and sampling associated with the EOD Range, which is located within the northern SAR berm, are detailed in the following subsections.

5.3.1 Site Description Summary

The EOD Range is located near the western boundary of the Portland ANGB within the northern berm of the SAR. The land to the immediate north, east, and south is maintained grassland. A Site Layout Map is provided as **Figure 5-1**.

The EOD Range consists of a 2-foot-thick, concrete-walled structure, approximately 20 feet by 20 feet in area. Two entrances are located along the west and east walls. The floor of the EOD range consists of sand.

The EOD Range was permitted in 1999, first used in 2000, and is managed by the 142nd EOD Flight. The range is only used a couple of times per year by the 142nd EOD Flight. The 142nd EOD Flight is required to exercise monthly; however, due to restrictions on what can be deployed at the EOD Range, a significant portion of training conducted by 142nd FW is accomplished elsewhere. The majority of the 142nd EOD Flight training is conducted at the Army Yakima Firing Range in Washington State. The most frequent user of the EOD Range is the 125th Special Tactics Squadron, which uses the range for similar training applications approximately once per month. Additional “emergency detonations” were previously performed when munitions components were discovered in civilian possession and required expert disposal. However, these disposals are no longer conducted at the EOD Range, and no records of historical detonations of this type are maintained.

Munitions used at the EOD range include Composition 4 blocks as well as detonation cord and blasting caps. MC in these munitions include lead, RDX, and PETN. The range is permitted to use 1.25 pounds of Hazard Division 1.1, non-fragment producing explosives at a time. The cumulative munitions used by both the 142nd FW and the 125th Special Tactics Squadron during 2012 at the EOD Range are presented in **Table 5-2**.

5.3.2 Conceptual Site Model Overview

During the Qualitative Assessment of the Portland ANGB that was performed under the ORAP Version 2.0, a CSM was created to identify sources of MC, pathways of migration or exposure, human receptors, and source-receptor interactions. These elements of the CSM were used to analyze source-receptor interactions and determine whether a complete pathway constitutes interaction of MC with a human receptor. Air, surface and subsurface soil, surface water/sediment, and groundwater pathways were analyzed.

The 2009 Qualitative Assessment concluded that a complete source-receptor interaction was possible for the groundwater pathway. However, when the Qualitative Assessment was finalized, the data was not sufficient to define whether an interaction that posed a threat of a release existed, as no soil or groundwater data collected at the range was available. No receptors were identified that could interact with potential MC through the air, surface and subsurface soil, and surface water/sediment pathways.

5.3.3 MC of Potential Concern

The EOD Range is dedicated for proficiency training. Exceptional circumstances have led to the detonation of relic munitions on an emergency disposal status in the past; however, this action is no longer permitted at the EOD Range.

The DoD RMUS developed a list of screening levels to which all Military Services are required to compare surface water, groundwater, and sediment sampling data. The RMUS evaluated screening levels for each MC selected. In the cases where more than one screening level was found, the RMUS selected the most conservative values (USAF, 2011). The MC list and associated ORAP screening levels used in the assessment of the EOD Range are presented in **Table 5-3** (Screening Levels for Ranges Using Munitions Greater Than .50 Caliber).

5.3.4 Sample Approach/Location

As recommended in the 2009 Qualitative Assessment Report, one soil sample (PO01) was collected from a location outside the EOD Range. The soil sample was collected at 0-1 foot bgs. The location of the soil boring is presented in **Figure 5-1**. A photographic log showing the soil sampling activities being performed and the site conditions at the EOD Range is presented as **Appendix F**.

5.3.4.1 Media Sampling

The soil sample was collected using a hand auger. The soil was placed in a plastic bag and homogenized prior to placing the soil in the sample containers. Vegetation and miscellaneous debris were excluded from the sample. Remaining soil was returned to the borehole at the sample collection location.

5.3.4.2 Analytical Methods

The following analytical methods were used to analyze the sample collected outside the EOD Range:

- Explosives by SW 846 Method 8330A
- Metals by SW 846 Method 6020C
- Perchlorate by SW 846 Method 6860
- Nitrocellulose by SW 846 Method 353.2
- White phosphorus by SW 846 Method 7580

The sample was submitted to Test America in Denver, Colorado and ALS in Salt Lake City, Utah for analysis. Only white phosphorus was analyzed by ALS; all other analyses were conducted by Test America.

5.3.5 Sampling Results Summary

One soil sample from the EOD Range was collected on 19 March 2013. Perchlorate was reported at an estimated concentration of 0.00075 mg/kg. Nitrocellulose was reported at an estimated concentration of 0.79 mg/kg. Chromium was reported at a concentration of 14 mg/kg and lead was reported at a concentration of 8.8 mg/kg. None of these values exceed the DoD RMUS identified Screening Levels listed in the ORAP Version 3.0. No other compounds were reported above detection limits from the sample collected at the EOD Range. Sample results

from the March 2013 ORA are presented in **Table 5-2**. A data validation summary is provided in **Appendix G**.



LEGEND

- Sample Locations
- Small Arms Range
- EOD Range
- Portland ANGB Installation Boundary



0 80 160
Feet

Image Source:
(c) 2009 Microsoft Corporation and its data suppliers, 2011



FIGURE 5-1
SITE LAYOUT MAP
PORTLAND ANGB
SMALL ARMS RANGE
MULTNOMAH COUNTY, OREGON
5-9

Table 5-1
2013 Operational Range Assessment - SAR Analytical Results
Portland ANGB
Portland, Oregon

USAF & RMUS Identified Screening Levels	METALS				
	Copper	Iron	Lead	Tungsten	Zinc
CAS#	7440-50-8	7439-89-6	7439-92-1	7440-33-7	7440-66-6
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Residential Soil ^a	3,100	55,000	400	NL	23,000
Industrial Soil ^a	41,000	720,000	800	NL	310,000
Protection of Groundwater ^{a, b}	46	640	NA	NL	680
PO02-31-(0-1)-20130319	18	19,000	14	1.0 J	58
PO02-32-(0-1)-20130319	17	18,000	17	0.57 U	55
PO02-31-(1-2)-20130319	15	17,000	11	0.58 U	53
PO02-31-(2-3)-20130319	13	16,000	12	0.58 U	64
PO02-31-(3-4)-20130319	26	23,000	20	0.61 U	71
PO02-31-(4-5)-20130319	9.6	12,000	6.6	0.55 U	52
PO03-31-(0-1)-20130319	17	20,000	9.7	0.58 U	59
PO03-31-(1-2)-20130319	21	22,000	8.5	0.64 U	56
PO03-31-(2-3)-20130319	12	15,000	20	0.60 U	63
PO03-31-(3-4)-20130319	28	44,000	24	0.66 U	85
PO03-31-(4-5)-20130319	34	46,000	29	0.70 U	96
PO04-31-(0-1)-20130319	18	18,000	16	1.1 J	59

NOTES:

^a EPA Regional Screening Level (RSL) Table, April 2009 (Update of the EPA Region 3 RBC Table, Region 6 HHMSSL Table and the Region 9 PRG Table)

^b More protective of Risk-Based or MCL-Based Soil Screening Level

NS - Not Sampled

Bold numbers indicate that the analyte occurred above the Method Detection Limit.

Highlighted values indicated that the sample result exceeds one or more USAF & RMUS Identified Screening Levels

Table 5-2
2013 Operational Range Assessment - EOD Results Analytical Results
Portland ANGB
Portland, Oregon

USAF & RMUS Identified Screening Levels	METALS		EXPLOSIVES										
	Chromium (Total)	Lead	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	2,4,6-Trinitrotoluene (TNT)	1,3,5-Trinitrobenzene (TNB)	1,3-Dinitrobenzene (1,3-DNB)	Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	Nitrobenzene (NB)	2-Amino-4,6-dinitrotoluene	4-Amino-2,6-dinitrotoluene	DNT-mixture 2,4/2,6	2,6-Dinitrotoluene (2,6-DNT)
CAS#	7440-47-3	7439-92-1	2691-41-0	121-82-4	118-96-7	99-35-4	99-65-0	479-45-8	98-95-3	35572-78-2	1946-51-0	25321-14-6	606-20-2
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Residential Soil ^a	280	400	3,800	5.5	19	2,200	6.1	240	4.4	150.0	150.0	0.7	61.0
Industrial Soil ^a	1400	800	49,000	24	79	27,000	62	2,500	22	2000	1900	2.5	620
Protection of Groundwater ^{a, b}	180000	NA	7.1	0.00036	0.0087	2.6	0.0023	0.65	0.000071	0.029	0.029	0.000093	0.034
PO01-31-(0-1)-20130319	14	8.8	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	0.089 U	NS	0.089 U
PO01-32-(0-1)-20130319	14	9.4	0.086 U	0.086 U	0.086 U	0.086 U	0.086 U	0.086 U	0.086 U	0.086 U	0.086 U	NS	0.086 U

NOTES:

^a EPA Regional Screening Level (RSL) Table, April 2009 (Update of the EPA Region 3 RBC Table, Region 6 HHMSSL Table and the Region 9 PRG Table)

^b More protective of Risk-Based or MCL-Based Soil Screening Level

NS - Not Sampled

Bold numbers indicate that the analyte occurred above the Method Detection Limit.

Highlighted values indicated that the sample result exceeds one or more USAF & RMUS Identified Screening Levels

Table 5-2
2013 Operational Range Assessment - EOD Results Analytical Results
Portland ANGB
Portland, Oregon

USAF & RMUS Identified Screening Levels	EXPLOSIVES											
	2,4-Dinitrotoluene (2,4-DNT)	2-Nitrotoluene (o-Nitrotoluene)	3-Nitrotoluene (m-Nitrotoluene)	4-Nitrotoluene (p-Nitrotoluene)	Nitroglycerin (NG)	Pentaerythritol tetranitrate (PETN)	2,6-Diamino-4-nitrotoluene	2,4-Diamino-6-nitrotoluene	Nitrocellulose (NC)	Nitroguanidine (NQ)	White Phosphorus	Perchlorate
CAS#	121-14-2	88-72-2	99-08-1	99-99-0	55-63-0	78-11-5	59229-75-3	6629-29-4	9004-70-0	556-88-7	7723-14-0	14797-73-0
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Residential Soil ^a	1.6	2.9	1200.0	30.0	6.1	NA	NA	NA	NA	6100.0	1.6	55.0
Industrial Soil ^a	5.5	13	12000	110	62	NA	NA	NA	NA	62000	20	720
Protection of Groundwater ^{a, b}	0.0002	0.00025	0.6	0.0034	0.0017	NA	NA	NA	NA	0.92	0.0027	NA
PO01-31-(0-1)-20130319	0.089 U	0.089 U	0.089 U	0.18 U	0.99 U	0.89 U	1.5 U	1.5 U	0.79 J	0.039 U	ND	0.00075 J
PO01-32-(0-1)-20130319	0.086 U	0.086 U	0.086 U	0.17 U	0.96 U	0.86 U	1.4 U	1.4 U	1.8 U	0.039 U	ND	0.00023 J

NOTES:

^a EPA Regional Screening Level (RSL) Table, April 2009 (Update of the EPA Region 3 RBC Table, Region 6 HHMSSL Table and the Region 9 PRG Table)

^b More protective of Risk-Based or MCL-Based Soil Screening Level

NS - Not Sampled

Bold numbers indicate that the analyte occurred above the Method Detection Limit.

Highlighted values indicated that the sample result exceeds one or more USAF & RMUS Identified Screening Levels

Table 5-3
2012 EOD Range Usage Data
Portland ANGB
Portland, Oregon

Description	DODIC	Munitions Constituents ¹	Quantity Used	Unit
Charge	M023	Composition 4 - Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	5	pounds
Time Fuse	M670	Black Powder	435	feet
Ground Burst Simulator	L594	Photoflash Powder, Perchlorate	30	each
M7 Blasting Cap	M131	RDX, Lead Azide, Lead Styphnate, Aluminum Alloy	20	each

¹ Source: Technical Manual, Army Ammunition Data Sheets for Demolition Materials, July 1994

DODIC - Department of Defense Identification Code

6. MC AVAILABILITY AND TRANSPORT

Determination of MC of concern for the Portland ANGB, along with conclusions for off-site media migration and an evaluation of MC off-range releases are discussed in the following subsections.

6.1 MC OF CONCERN DETERMINATION

Based on sampling results from the March 2013 ORA Site Visit, there are no MC of concern at the Portland ANGB. Although several MC were reported above detection limits, with the exception of iron, all MC detected occurred at levels that were below DoD RMUS identified Screening Levels. Iron exceeded the DoD RMUS-identified Soil Screening Level for the Protection of Groundwater of 640 mg/kg in every sample. However, this screening level is not reasonable considering the high levels of iron that have been reported in soil at the site. In addition, groundwater samples from have not been reported with elevated iron. Therefore, there are no MC of concern associated with the SAR or EOD Range at the Portland ANGB.

6.2 MEDIA MIGRATION CONCLUSIONS

Based on the CSM developed in the 2009 Qualitative Assessment, the only identified media at the SAR and EOD Range capable of off-site migration were surface water and groundwater.

6.3 MC OFF-RANGE RELEASE EVALUATION

Although both surface water and groundwater were determined to be capable of migrating from the SAR and EOD Range, based on the analytical results from samples collected during the March 2013 ORA, there does not appear to be a threat of release of MC to off-range areas from the Portland ANGB SAR or EOD Range.

7. CSM REVISION

The current ORA updates the CSM developed under ORAP Version 2.0 so that it reflects the requirements of ORAP Version 3.0 and the conditions observed at the SAR and EOD Range during the March 2013 Assessment.

7.1 SOURCE AREA

The primary source area is the remnant MC in the soil berms at the SAR and in the floor of the EOD Range. No other primary or secondary sources of MC exist at the Portland ANGB SAR or EOD Range.

7.2 RECEPTORS

According to the ORAP Version 3.0, off-range humans and ecological organisms are considered receptors (USAF, 2011).

7.2.1 Off-Range Humans

Potential receptors are listed in the ORAP (USAF, 2011) and are susceptible to qualifying criteria such as distances to sources and duration of exposure. Current and future receptors are considered off-range and off-installation humans who may come into contact with MC on a regular frequency. USAF military, civilian, and contractor personnel, community and industry workers, construction workers, and nearby residents are examples of potential off-range receptors. Activities causing only intermittent and short-term exposures, including most recreational uses and casual trespassing, will not generally be evaluated in the ORAP. Furthermore, the ORAP excludes on-range workers from consideration on the basis that occupational health concerns associated with range users/workers are covered by other programs.

The SAR and EOD Range are co-located within the fenced boundary of the Portland ANGB. Installation security is tightly controlled and provided by armed security forces. The SAR is a locked and fenced facility with access limited to approved personnel who are escorted by the Range Manager (the EOD Range is located within the SAR northern berm). Because access to both ranges and the installation is strictly controlled by fencing and security forces, unwanted access by trespassers is highly improbable.

7.2.1.1 Air

The prevailing wind direction is from the northwest; however, winds also originate from the east-southeast and the south. Potential air receptors are located within the 4-mile ORAP distance threshold criteria for the SAR and EOD Range, as the installation is located in the northern portion of the Portland, Oregon. Many residents live north, east, and south of the installation; therefore, potential receptors exist for the air pathway as defined by the ORAP.

7.2.1.2 Surface and Subsurface Soil

No human receptors are located within 200 feet of the SAR or EOD Range.

7.2.1.3 Surface Water/Sediment

No surface water intakes for water treatment and distribution of potable water are located within 15 downstream miles of the SAR or EOD Range. One intake is located approximately 2 miles east of the SAR and EOD Range; however, this intake is located upstream of the ranges. The nearest downgradient surface water intake for water treatment and distribution that was located during this assessment is in Scappoose, Oregon, approximately 20 miles downstream of the installation along the Columbia River (OWRD, 2008; EPA, 2008). This is greater than the 15-mile distance threshold for potential source-receptor interactions identified in the ORAP; therefore, no receptors exist for the surface water/sediment pathway.

7.2.1.4 Groundwater

The majority of local residents are supplied with water from the Portland Water Bureau. For the majority of the year, this water is supplied from the Bull Run watershed, located approximately 26 miles east of Portland. During the summer months, the Bull Run watershed is occasionally supplemented by the CSSWF, whose nearest well is located approximately 1 mile east of the installation boundary. The CSSWF was last used in January and February 2012, due to high turbidity in the Bull Run Watershed water (Portland Water Bureau, 2013).

Private groundwater wells are located north, west, south, and east of the installation. The closest private well used for consumption is located approximately 0.5 miles east-southeast of the SAR and EOD Range (Well 4 on **Figure 2-3**, while Well 8 is the closest private well in the northern direction).

A hydrogeologic study was performed by ERM in 2001 in order to evaluate the transport and flow to estimate the potential for contaminants to migrate from existing ERP sites with known contamination on Portland ANGB toward sensitive receptors such as the Columbia River and the CSSWF. Simulations from the model indicated that some movement toward the well field would occur under the worst-case pumping scenario (3 years of continuous pumping from 6 wells). However, conclusions of the study reported that the well field pumping would not cause groundwater to migrate beyond the installation boundaries, and northern groundwater migration would resume when pumping was discontinued (ERM, 2001b).

The ERP sites used for modeling purposes were located east and closer to the CSSWF than the SAR and EOD Range. Also, the model used volatile organic compounds as a migration species. Therefore, while the migration and contaminant properties are different for metals and explosives constituents, the groundwater gradient characteristics would likely be the same. Based on the flow and transport modeling, it is unlikely that potentially MC-impacted groundwater for the Shallow Zone, Deep Zone, and CRSA in the areas of the SAR and EOD Range would reach the Portland well field due to pumping from the municipal supply wells in that area.

7.2.2 Off-Range Ecological

Potential off-range ecological receptors include listed, candidate, or proposed threatened, endangered, rare, or special consideration species; species with a religious, cultural, or economic value; and environmental areas that provide critical or distinct habitat that are within 1 mile of a source area (USAF, 2011). Current and future ecological receptors are considered off-range and off-installation wildlife that may come into contact with MC on a regular frequency. Activities causing only intermittent and short-term exposures are not generally evaluated in the ORAP.

A review of the U.S. Fish & Wildlife Service list of threatened and endangered species in Multnomah County indicates a total of eight threatened or endangered species as possibly occurring in the county (USFWS, 2013). None of the eight listed species has the potential of occurring on the installation because the SAR, EOD Range, and surrounding areas do not have the necessary habitat needed by these listed species. The Oregon Department of Fish and Wildlife maintains a list of statewide threatened and endangered species; however, a separate list

for Multnomah County is not available (ODFWS, 2013). The federal list of the threatened and endangered species for Multnomah County and the Oregon statewide lists are provided in **Appendix H**.

7.3 SOURCE-RECEPTOR INTERACTION

Interaction describes all possible ways a potential receptor may come into contact with contamination at a source area and/or other areas where source contamination has migrated. Source-receptor interaction requires two closely connected elements: access and activity as defined below:

- Access is the ability of a receptor to enter the area and/or media in which MCs are present and come into contact with MCs (exposure media).
- Activity is any action by a receptor that may result in contact (ingestion, inhalation, or dermal absorption) with the media containing MCs (exposure route).

Based on the identified sources and receptors (human and ecological), potential source-receptor interactions are discussed in the following subsections. A revised CSM for the SAR and EOD Range is provided as **Figure 7-1** and **Figure 7-2**, respectively.

7.3.1 Exposure Media

Exposure media at the SAR are the MC-impacted soils located in the earthen berms and range floor. Exposure media at the EOD Range includes MC-impacted soils located in the floor of the EOD Range.

7.3.2 Exposure Routes

Exposure routes include ingestion, inhalation, and dermal absorption of MC-impacted media. Range users and personnel are unlikely to be exposed to impacted media through typical firearm training activities. Through good personal hygiene, such as hand washing, the chances of ingesting or absorbing MC are minimized. Meanwhile, the inhalation exposure route is minimized due to the open-air construction of the SAR, which generally allows adequate airflow to minimize residual exhaust resulting from firing activities at the firing line, allowing the exhaust from firing activities to be deposited on the SAR floor. Dermal absorption of lead and other metal MC is not expected to be a significant exposure route, as these constituents do not readily absorb into the body under normal conditions.

Off-range human receptors are not likely to come into contact with MC-impacted media found at the SAR or EOD Range. There are no qualified identified ecological receptors associated with the Portland ANGB SAR and EOD Range.

7.4 EXPOSURE PATHWAY ANALYSIS

Potential source-receptor interactions are discussed in the following subsections. CSMs for the SAR and EOD Range are provided as **Figure 7-1** and **Figure 7-2**, respectively.

7.4.1 Air

Although potential receptors for the air pathway were identified, no significant source of MC was identified that could pose a threat to an off-range receptor through the air pathway. The Portland ANGB SAR earthen berms are covered in vegetation and do not readily support a vigorous soil transport mechanism through wind entrainment. Due to the earthen berms acting as a partial wind barrier, MC that is exposed on the surface of the SAR floor are protected from high winds and are unlikely to become entrained in the wind. The limited use of the EOD Range does not produce a significant quantity of MC to be considered a source capable of migration through the air pathway. Therefore, the air exposure pathway is incomplete and no complete source-receptor interactions were identified for human or ecological receptors.

7.4.2 Surface and Subsurface Soil

Surface soils have the potential to migrate via stormwater runoff. This was examined with the surface water/sediment exposure pathway. No receptors were identified that could potentially interact with MC-affected subsurface soil, except in the limited case of groundwater transport of affected soils. This scenario is examined with the groundwater pathway. No direct surface/subsurface soil source-receptor interactions for human or ecological receptors are known to exist.

7.4.3 Surface Water/Sediment

Precipitation falling at the SAR infiltrates the SAR floor where it encounters the liner that rests beneath the SAR. This water then flows toward a sump and onto the sanitary sewer as described in Section 5.2.1. However, due to the age of the liner, some infiltration into groundwater may occur. Stormwater falling at the EOD Range flows north toward the ponds. Although

stormwater has the capability to transport MC off-range, no surface water intakes for water treatment/distribution were identified within 15 miles downstream of the Portland ANGB. Therefore, no complete surface water/sediment exposure pathway exists for either human or ecological receptors.

7.4.4 Groundwater

Groundwater beneath the SAR and EOD Range provides a pathway for potential MC migration toward off-site receptors. Private drinking water wells have been identified through water well database searches and a door-to-door, private water well survey conducted by Portland ANGB staff in 2004. Private water wells that are used for domestic purposes exist to the north, south, east, and west. These wells are relatively shallow, with some less than 100 feet in depth. While the groundwater gradient is likely in the northerly direction during most of the year, as indicated from years of groundwater gradient monitoring from ERP site investigations, some seasonal fluctuations in the gradient occur (especially in summer months during high water levels in the Columbia River stages). Therefore, wells located north, east, south, and west of the source area are considered potential receptors. The hydrogeology of the Portland ANGB, including shallow sands, shallow depth-to-groundwater, and interconnectivity of the first few water-bearing units, lends to the potential for MC migration. In addition, the significant precipitation in the area, permeable soils, and geology of the area increases the potential for MC migration to occur through groundwater.

While the potential for a source-receptor interaction exists for the groundwater pathway, the analytical results from the 2011 and 2013 (quantitative) Assessments indicate that MC is not leaching toward groundwater and is not migrating beyond the boundaries of the SAR or EOD Range.

7.5 HUMAN/ECOLOGICAL RISK ANALYSIS

Based on historical data and the sampling results from the 2011 Quantitative Assessment and the March 2013 ORA conducted at the Portland ANGB, there are no human or ecological risks associated with the Portland ANGB SAR or EOD Range.

Figure 7-1
Conceptual Site Model - SAR
Portland ANGB
Portland, Oregon

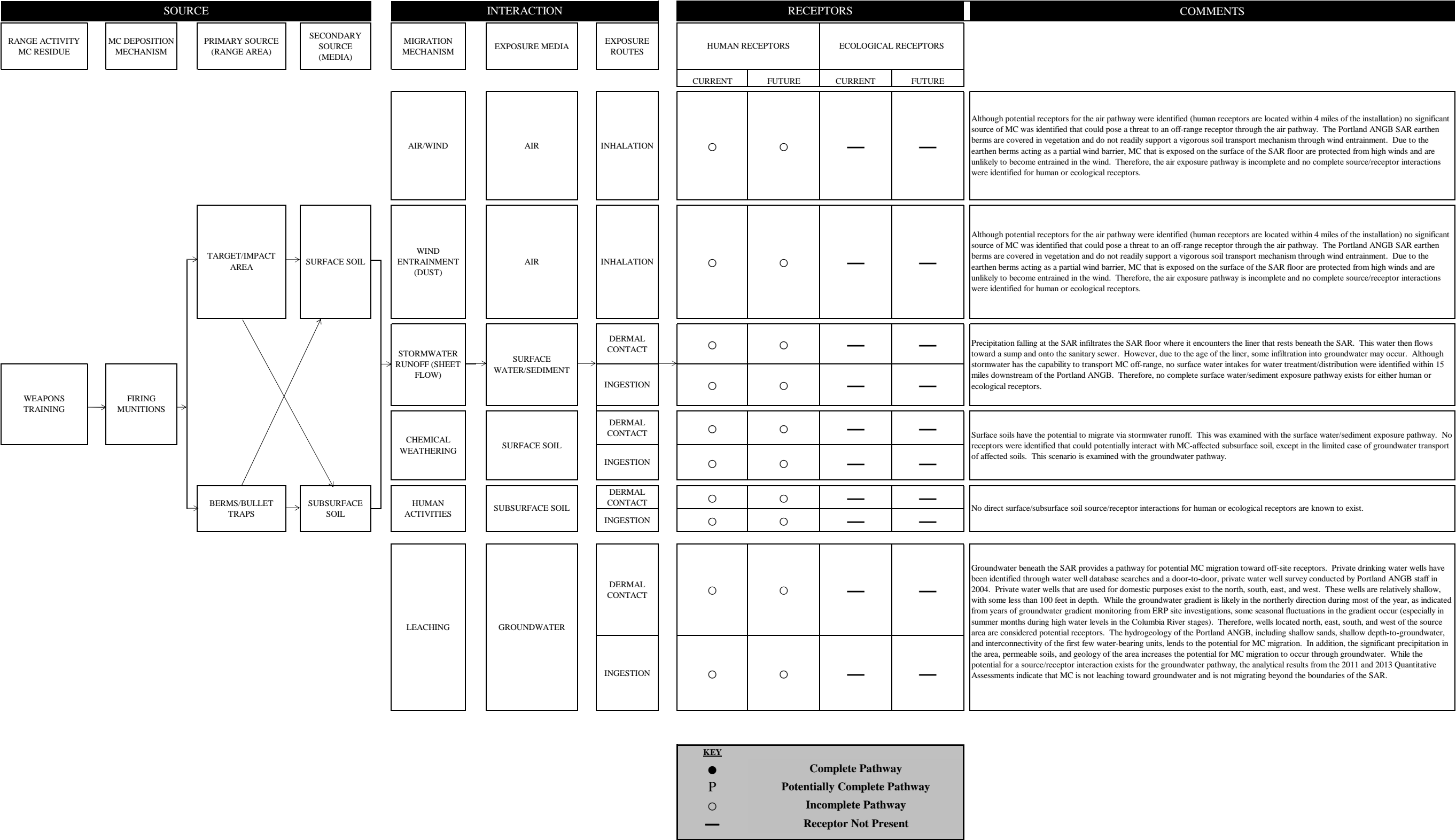
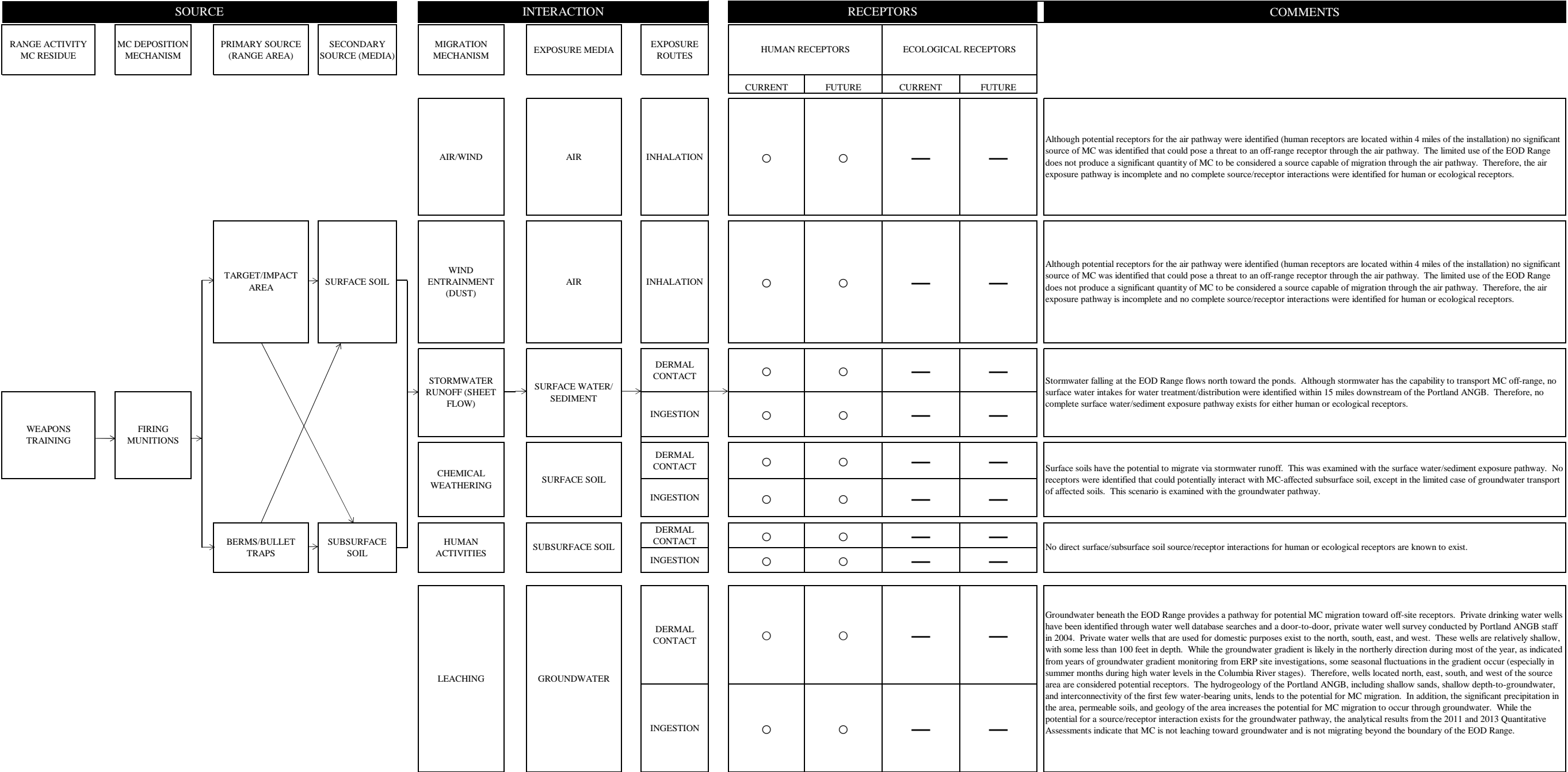


Figure 7-2
Conceptual Site Model - EOD Range
Portland ANGB
Portland, Oregon



KEY

●

Complete Pathway

P

Potentially Complete Pathway

○

Incomplete Pathway

—

Receptor Not Present

Figure 7-2
Conceptual Site Model-EOD Range
Portland ANGB, Oregon

8. CONCLUSIONS AND RECOMMENDATIONS

The findings of the 2013 ORA completed for the Portland ANGB SAR and EOD Range and recommendations to complete the CSM are summarized in the following subsections.

8.1 MC AVAILABILITY AND TRANSPORT

MC are present at the SAR due to bullets that remain in the SAR backstop berm, and MC may be present along the floor and side berms. MC may be present in the soil floor of the EOD Range, although this is presumed to be limited due to the infrequent use of the range. Dissolved MC has the ability to be transported off-range by stormwater and groundwater. However, the only identified potentially complete source-receptor pathway was through groundwater transport of dissolved MC. However, based on the analytical data collected during the 2011 and 2013 sampling activities, MC do not appear to be migrating through the soil berm into groundwater.

8.2 MC EXPOSURE PATHWAYS

Although the groundwater transport pathway was considered to be potentially complete based on the fluctuating groundwater gradient and location of off-site receptor wells, MC do not appear to be migrating from the SAR or EOD Range through groundwater. Therefore, the groundwater exposure pathway is considered incomplete. The air, soil, and surface water/sediment transport pathways are not considered complete; therefore, no MC exposure pathways are considered to be complete.

8.2.1 Human Health Risks

No MC exposure pathway was considered complete; therefore, no human health risks were identified from potential MC migration from the SAR or EOD Range.

8.2.2 Environmental Risks

No MC exposure pathway was considered complete; therefore, no environmental risks were identified from potential MC migration from the SAR or EOD Range.

8.3 RECOMMENDATIONS

Based on this 2013 ORA of the conditions present at the Portland ANGB SAR and EOD Range, MC migration toward off-range areas does not appear to be occurring. Additionally, no additional data gaps were identified; therefore, no further action or assessment is warranted at this time. If any significant operational changes occur, or if additional information regarding a more viable transport mechanism is discovered, reevaluation of the potential for a complete pathway should be performed. The SAR and EOD Range should be reevaluated at a minimum of every 5 years as recommended in the ORAP, regardless of a change in conditions.

9. REFERENCES

Baywest, January 2012. *Comprehensive Site Evaluation Phase I Report*. Portland International Airport Air National Guard, Oregon.

BEM Systems, January 2011. *Final Phase II Operational Range Assessment Plan*. ANG Portland SAR and EOD Range.

Climate Prediction Center (CPC), Accessed March 2013. *Calculated Evaporation Climatology (1971-2000)*. Website. <http://www.cpc.ncep.noaa.gov/soilmst/eclim_frame.html> (Last Modified February 22, 2005).

Environmental Protection Agency (EPA), 2008. *Envirofacts Warehouse*. Website: <http://www.epa.gov/enviro/html/sdwis/sdwis_query.html#geography>

Environmental Resources Management (ERM), July 2001a. *Installation Restoration Program, Final Feasibility Study, 142nd Fighter Wing*.

ERM, July 2001b. *Installation Restoration Program, Final Groundwater Flow and Solute Transport Modeling Report, 142nd Fighter Wing*.

ERM, January 2004. *Environmental Restoration Program Final Record of Decision*. 142nd Fighter Wing, Portland Air National Guard Station.

MWH Americas, Inc. (MWH), May 2003. *Final Management Action Plan, 142nd Fighter Wing*.

National Climatic Data Center (NCDC), Accessed March 2013. *Snowfall – Average Total in Inches*. Website. <<http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/snowfall.html>> (Last updated August 20, 2008)

Oregon Air National Guard (ORANG), January 2005. *Integrated Cultural Resources Management Plan and Environmental Assessment Implementing the ICRMP*.

Oregon Department of Fish and Wildlife (ODFW), May 2013. *Threatened and Endangered Species*

Oregon Water Resources Department (OWRD), 2008. *Well Log Query*. Website. <http://apps2.wrd.state.or.us/apps/gw/well_log/Default.aspx>

Portland International Airport (PIA), September 2000. *Portland International Airport Master Plan*.

Portland Water Bureau, 2013. *Development and Use of Groundwater*. Website. <<http://www.portlandoregon.gov/water/article/344756>>

U.S. Air Force (USAF), December 2011. *Operational Range Assessment Program*. Version 3.0.

U.S. Census Bureau, 2013. *United States Census (2011 Estimates)*. Website: <http://quickfacts.census.gov/qfd/states/41000.html>.

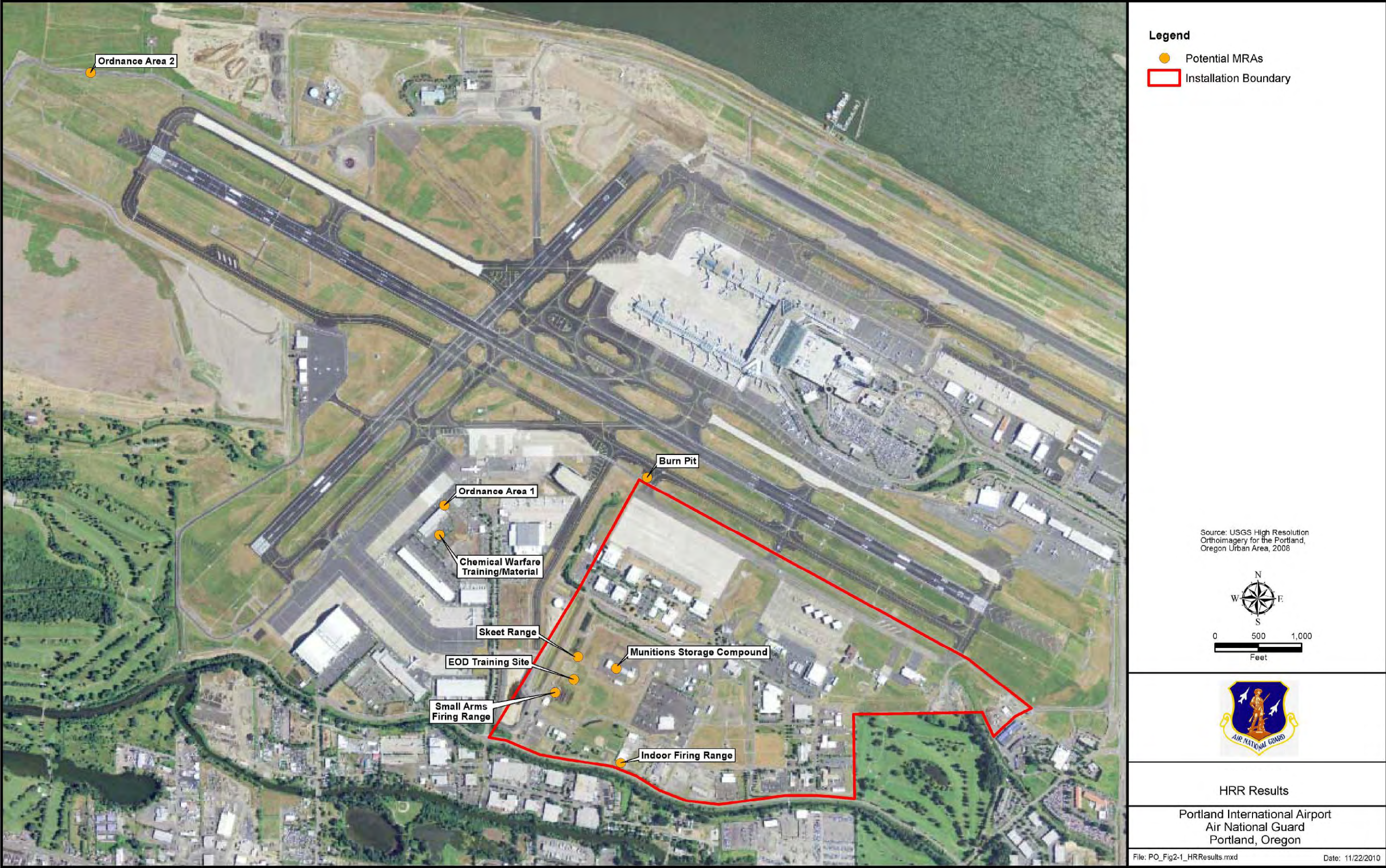
U.S. Fish and Wildlife Service (USFWS), 2013. *Federally Listed, Proposed, Candidate Species, and Species of Concern Under the Jurisdiction of the Fish and Wildlife Service Which May Occur Within Multnomah County, Oregon*.

The Weather Channel (TWC), Accessed March 2013. *Average maximum and minimum temperatures and average precipitation rates for Portland, Oregon*. Website: [<http://www.weather.com>](http://www.weather.com)

WESTON, May 2009. *Final Qualitative Assessment Report*. Portland Air National Guard Base, Oregon.

WESTON, December 2012. *Work Plan, Operational Range Assessments for Multiple Operational Ranges, Headquarters Air National Guard Command*.

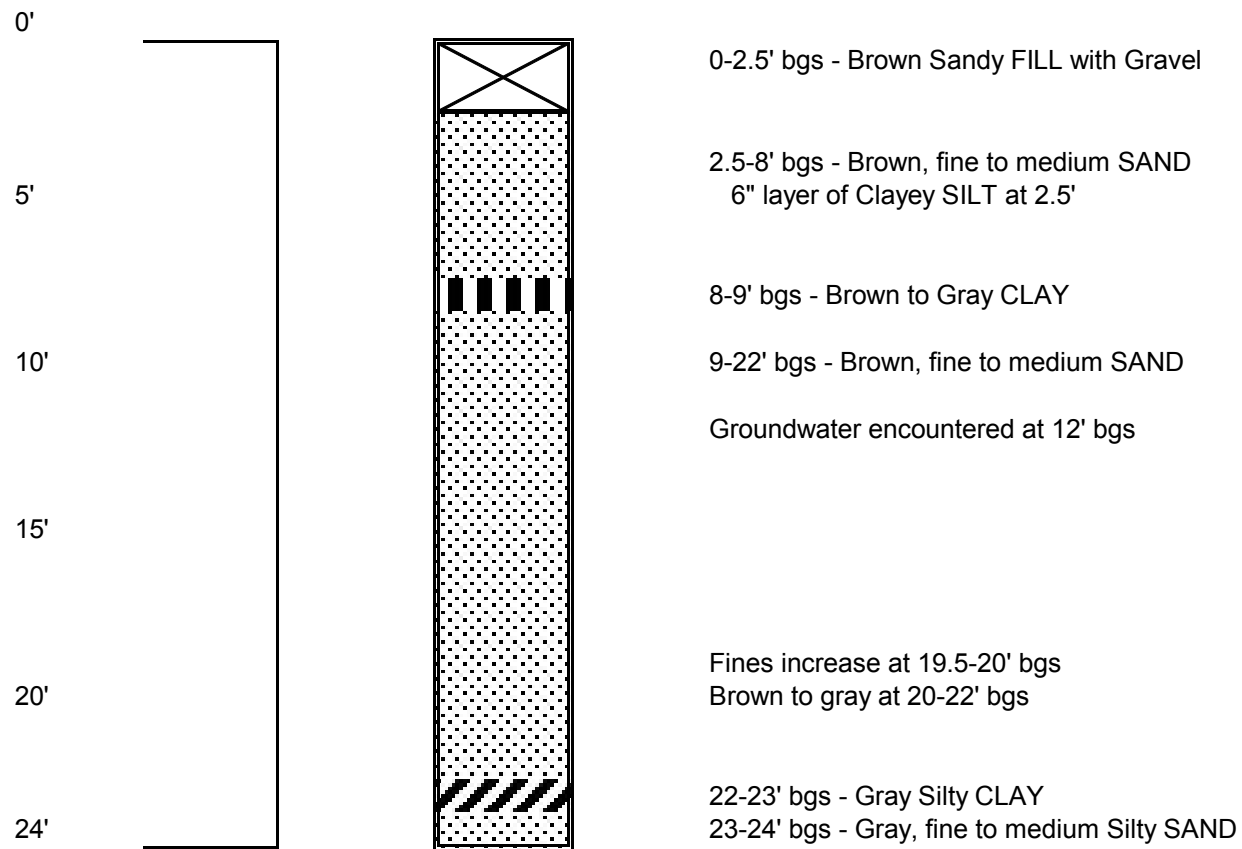
APPENDIX A RANGE MAP



APPENDIX B
SOIL BORING LOGS

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Small Arms Range
Portland, OR

Soil Profile for Lithologic Soil Boring SAR-MW01



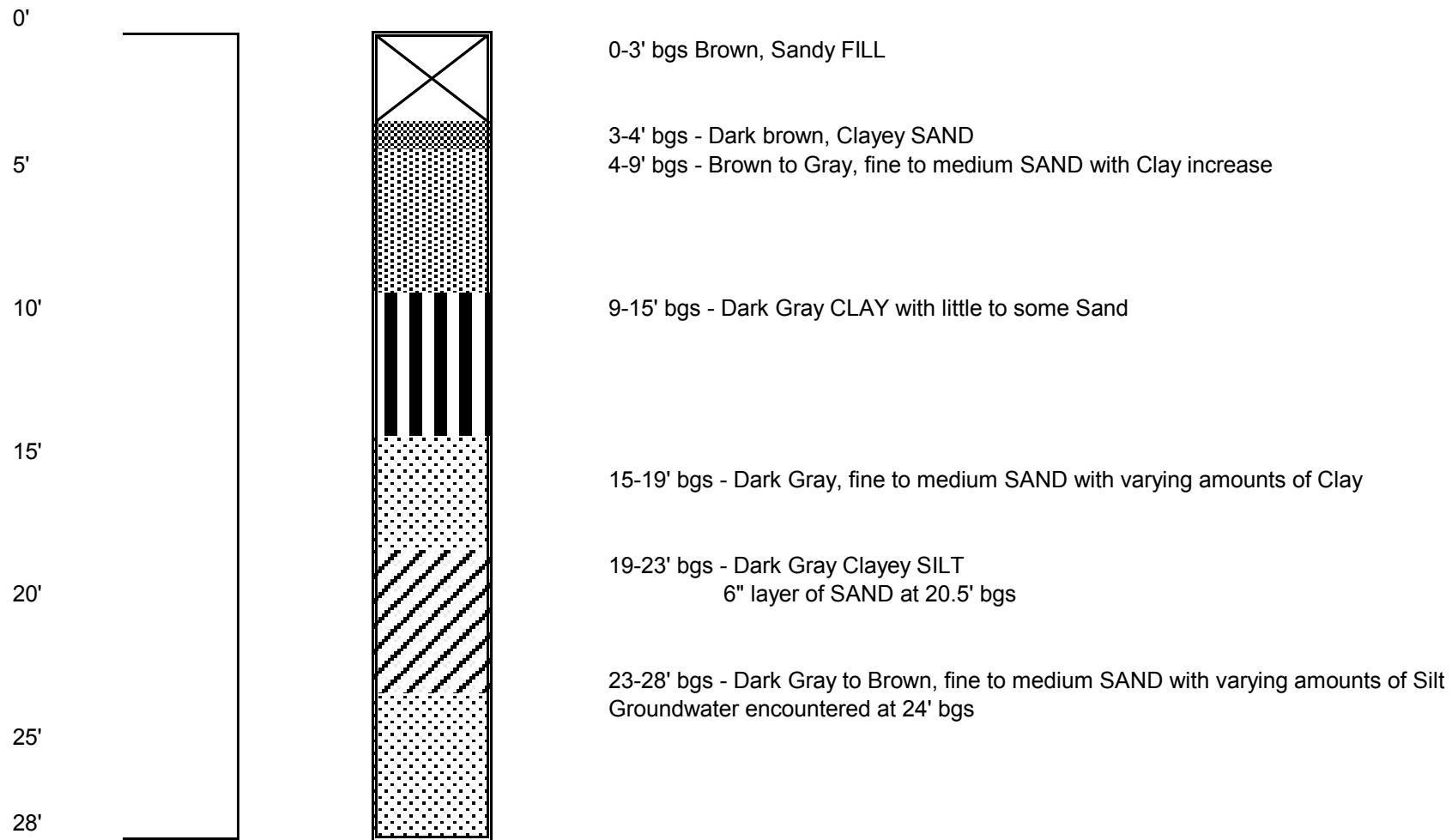
Notes:

bgs = Below Ground Surface

Date Started:	8/30/2010	Drilling Contractor:	ESN Northwest
Date Completed:	8/30/2010	Drillers:	Don Harnden/Chris Ross
Total Depth:	24'	Drilling Equipment:	Power Pro 9500 PTO
Water Table Depth:	12'	Geologist:	Chris Pissari/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Small Arms Range
Portland, OR

Soil Profile for Lithologic Soil Boring SAR-MW02



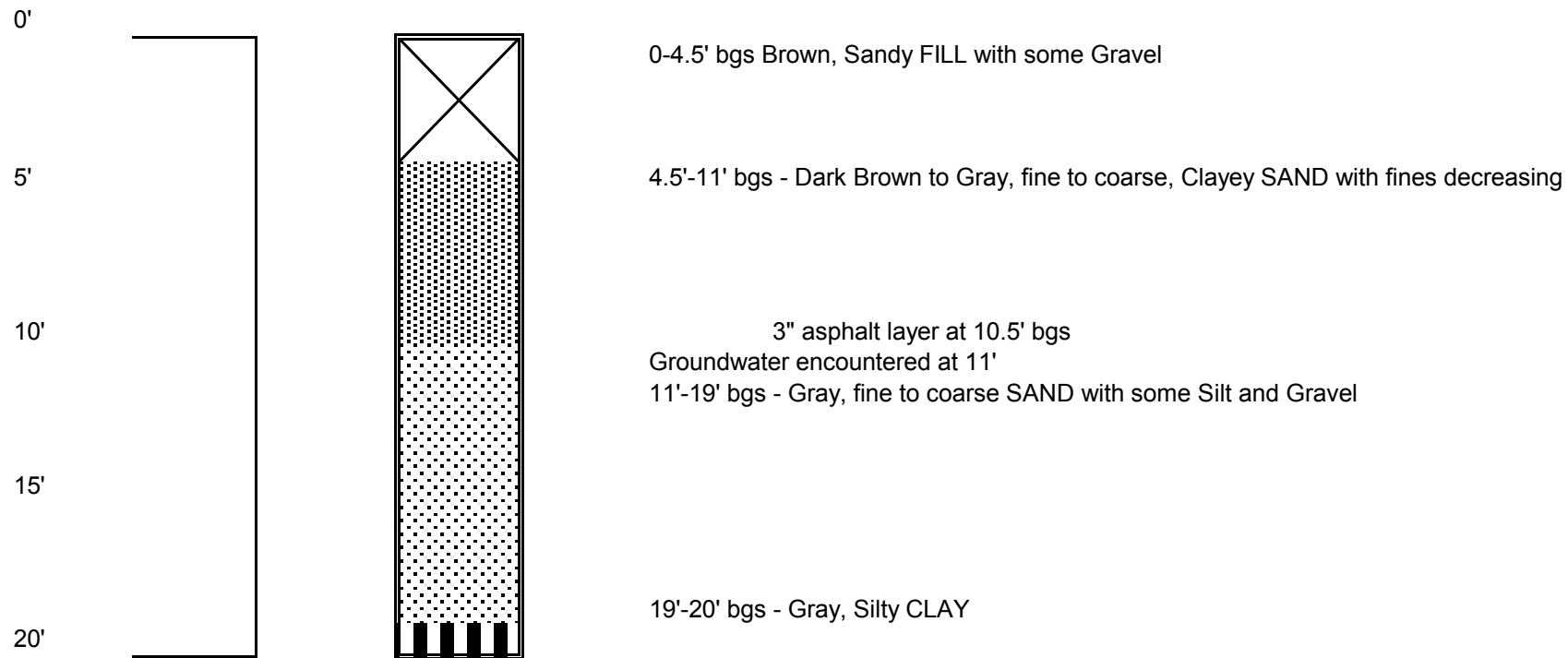
Notes:

bgs = Below Ground Surface

Date Started:	8/30/2010	Drilling Contractor:	ESN Northwest
Date Completed:	8/30/2010	Drillers:	Don Harnden/Chris Ross
Total Depth:	28'	Drilling Equipment:	Power Pro 9500 PTO
Water Table Depth:	24'	Geologist:	Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Small Arms Range
Portland, OR

Soil Profile for Lithologic Soil Boring SAR-MW03



Notes:

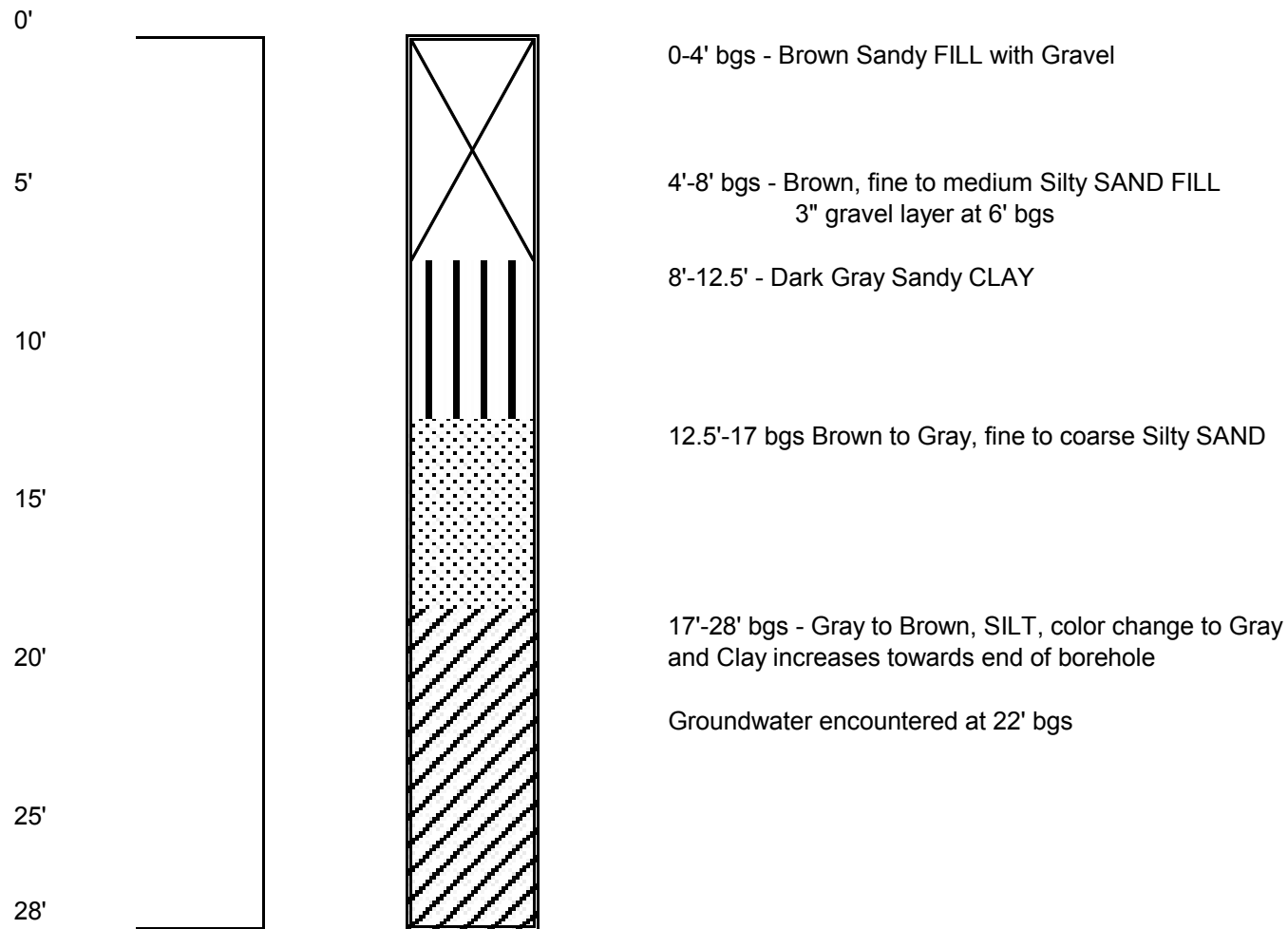
bgs = Below Ground Surface

Date Started: 8/31/2010
Date Completed: 8/31/2010
Total Depth: 20'
Water Table Depth: 11'

Drilling Contractor: ESN Northwest
Drillers: Don Harnden/Chris Ross
Drilling Equipment: Power Pro 9500 PTO
Geologist: Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Small Arms Range
Portland, OR

Soil Profile for Lithologic Soil Boring SAR-MW04



Notes:

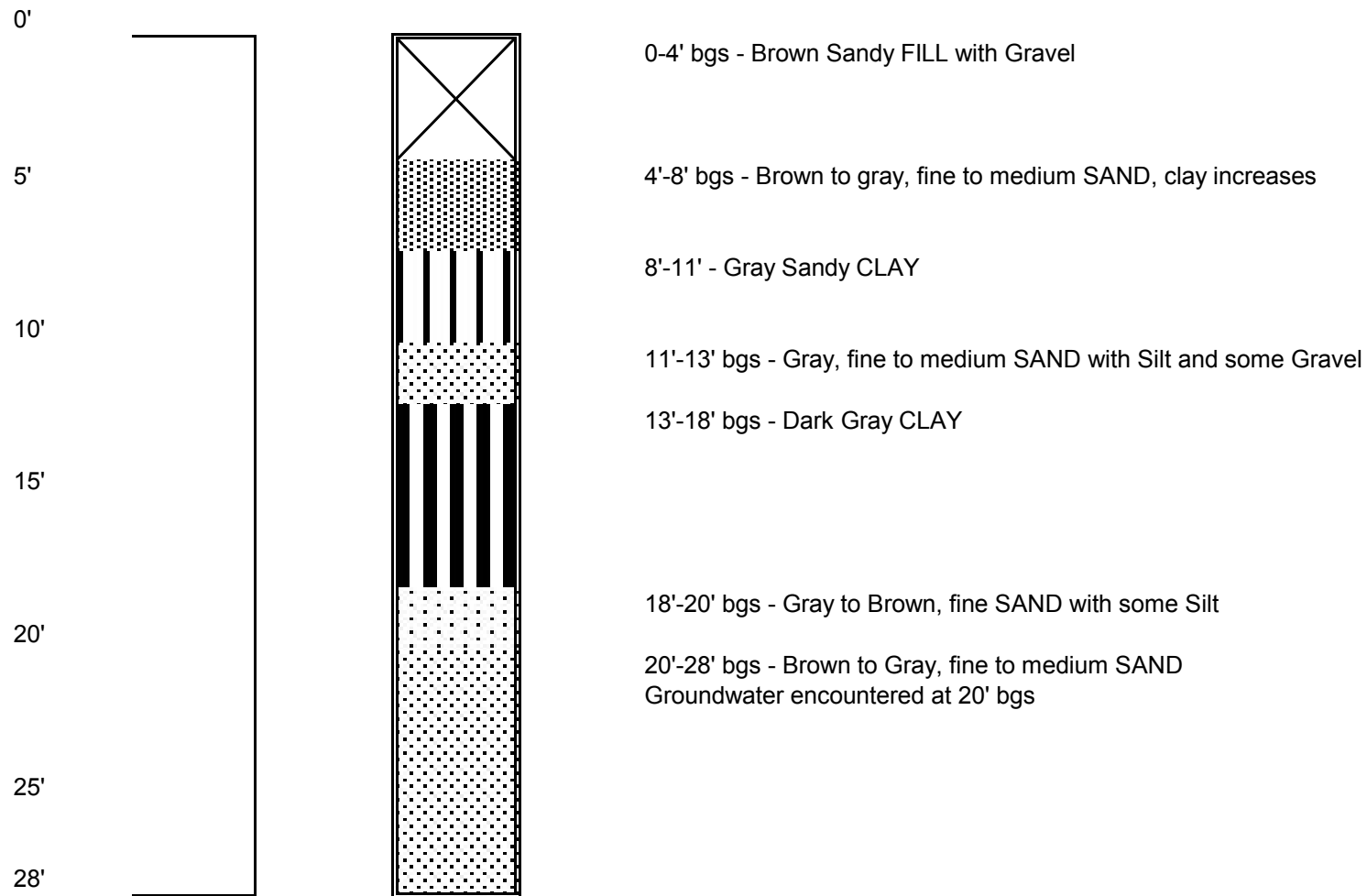
bgs = Below Ground Surface

Date Started: 8/31/2010
Date Completed: 8/31/2010
Total Depth: 28'
Water Table Depth: 22'

Drilling Contractor: ESN Northwest
Drillers: Don Harnden/Chris Ross
Drilling Equipment: Power Pro 9500 PTO
Geologist: Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Explosive Ordnance Disposal Range
Portland, OR

Soil Profile for Lithologic Soil Boring EOD-MW01



Notes:

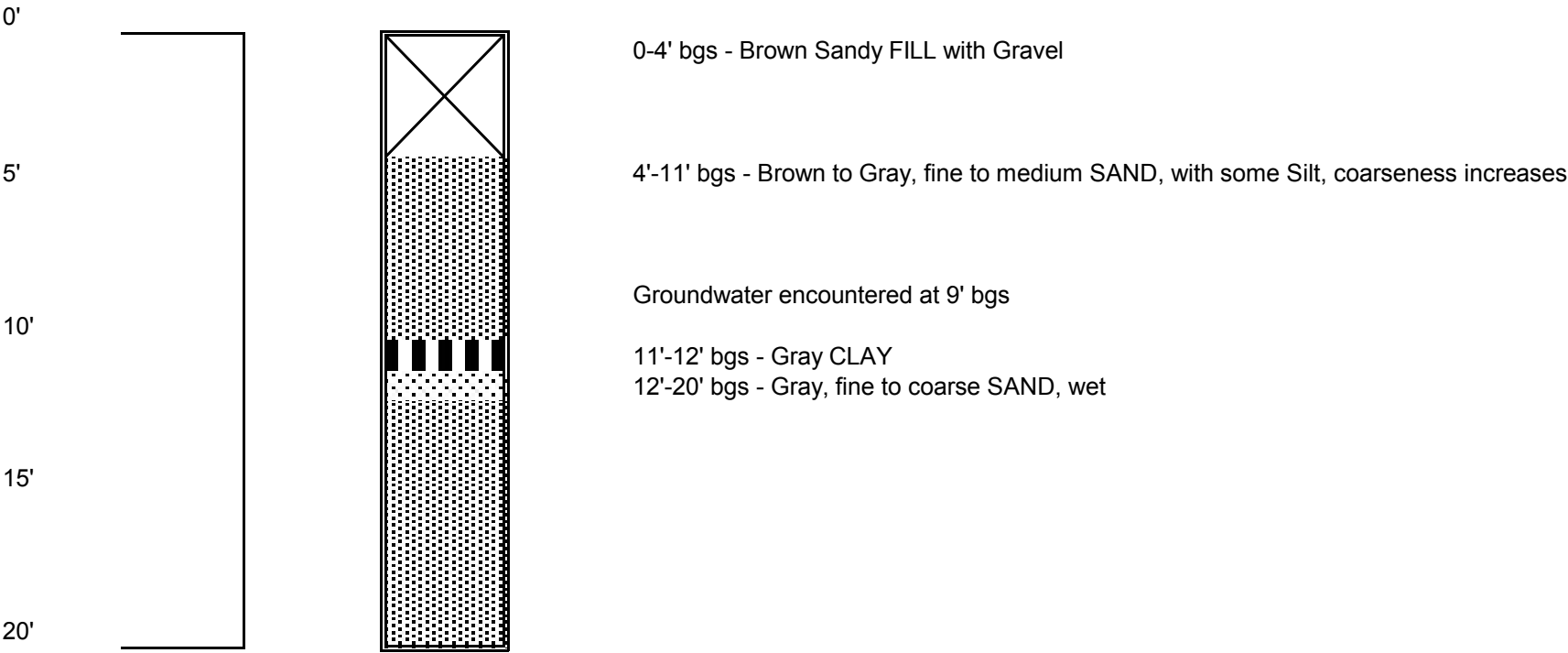
bgs = Below Ground Surface

Date Started: 8/31/2010
Date Completed: 8/31/2010
Total Depth: 28'
Water Table Depth: 20'

Drilling Contractor: ESN Northwest
Drillers: Don Harnden/Chris Ross
Drilling Equipment: Power Pro 9500 PTO
Geologist: Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Explosive Ordnance Disposal Range
Portland, OR

Soil Profile for Lithologic Soil Boring EOD-MW02

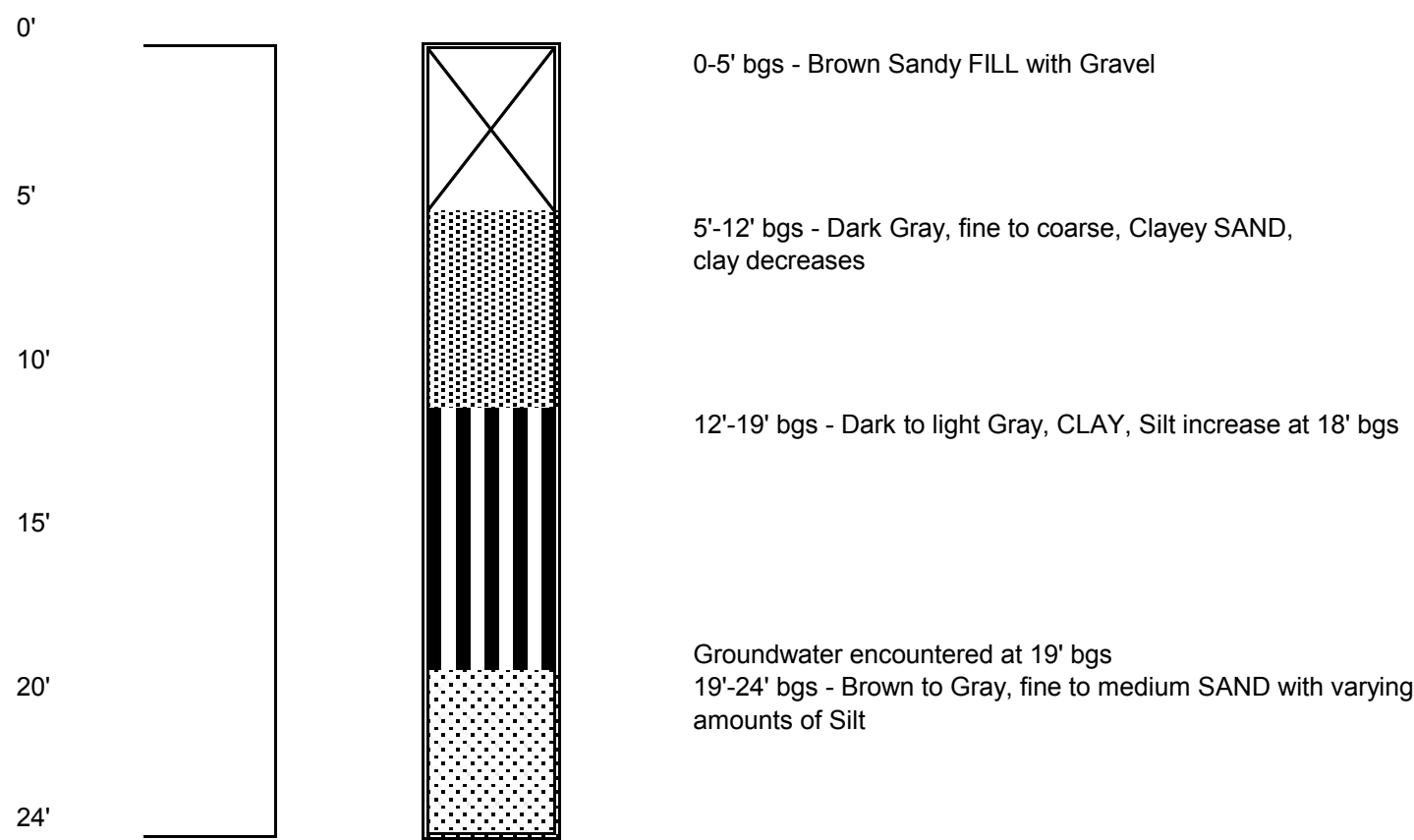


Notes:
bgs = Below Ground Surface

Date Started:	8/31/2010	Drilling Contractor:	ESN Northwest
Date Completed:	8/31/2010	Drillers:	Don Harnden/Chris Ross
Total Depth:	20'	Drilling Equipment:	Power Pro 9500 PTO
Water Table Depth:	9'	Geologist:	Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Explosive Ordnance Disposal Range
Portland, OR

Soil Profile for Lithologic Soil Boring EOD-MW03

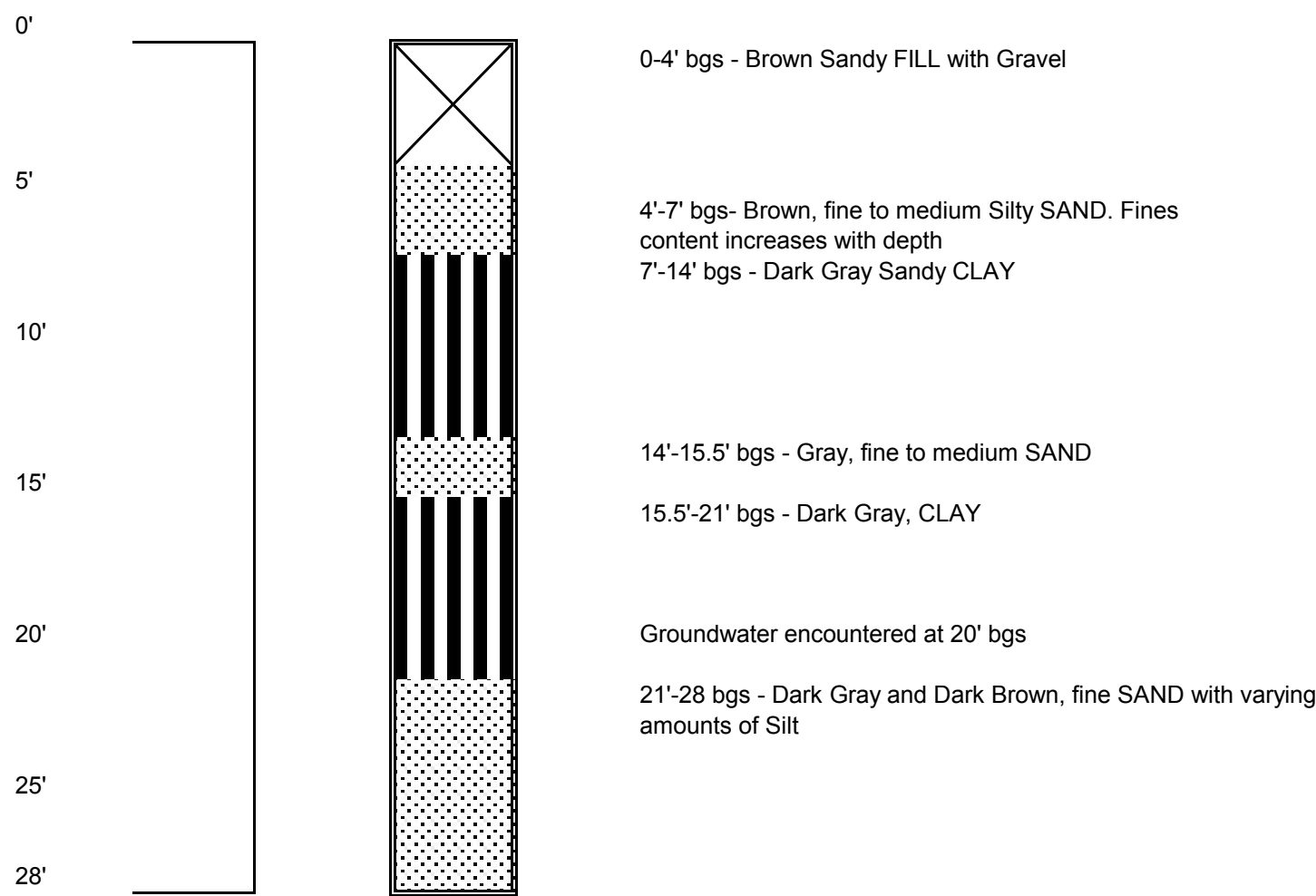


Notes:
bgs = Below Ground Surface

Date Started:	8/31/2010	Drilling Contractor:	ESN Northwest
Date Completed:	8/31/2010	Drillers:	Don Harnden/Chris Ross
Total Depth:	24'	Drilling Equipment:	Power Pro 9500 PTO
Water Table Depth:	19'	Geologist:	Chris Pisarri/Sandy Peterson

Appendix B - Lithologic Soil Boring Profile
Phase II Quantitative Assessment
Portland Air National Guard Base - Explosive Ordnance Disposal Range
Portland, OR

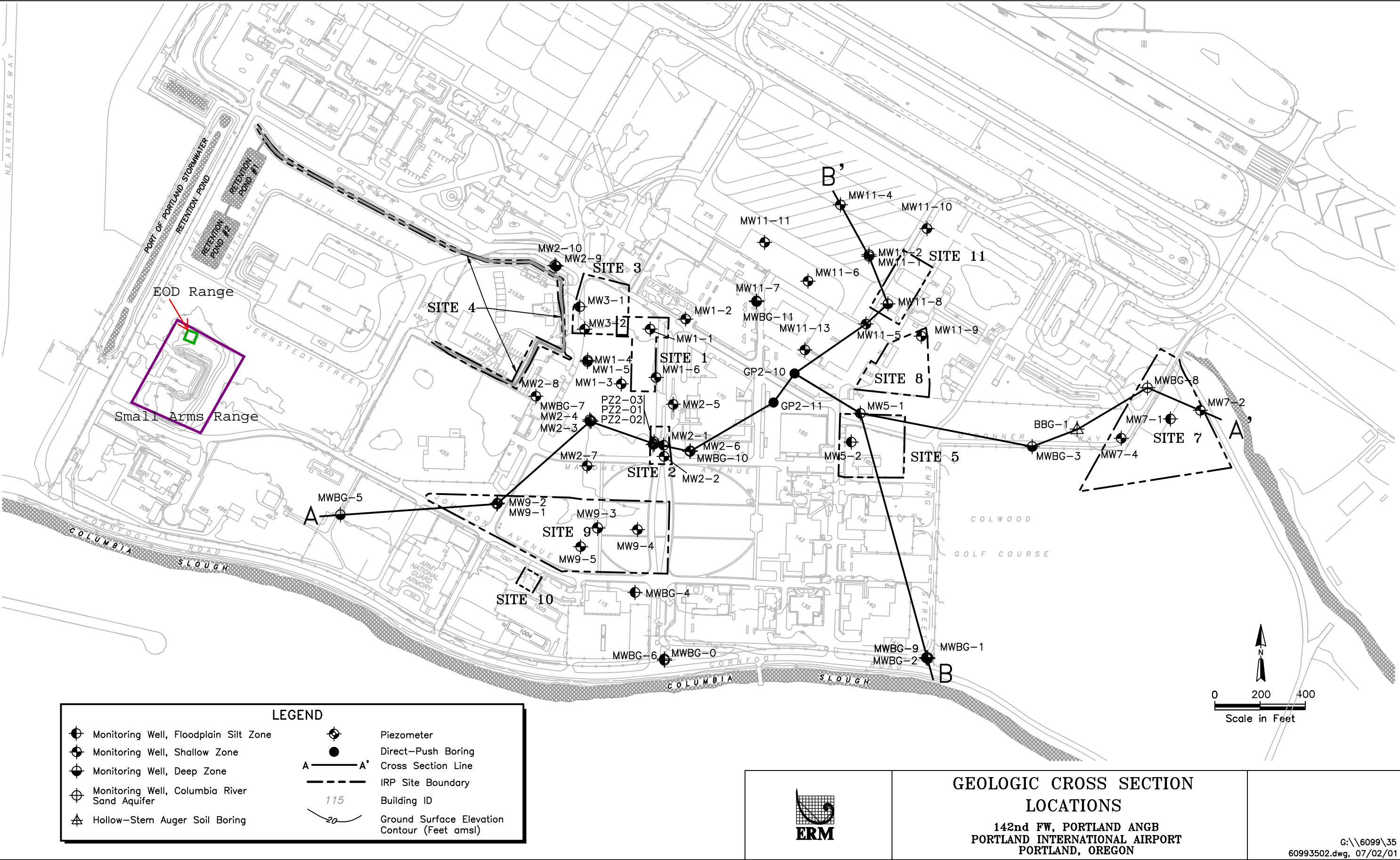
Soil Profile for Lithologic Soil Boring EOD-MW04



Notes:
bgs = Below Ground Surface

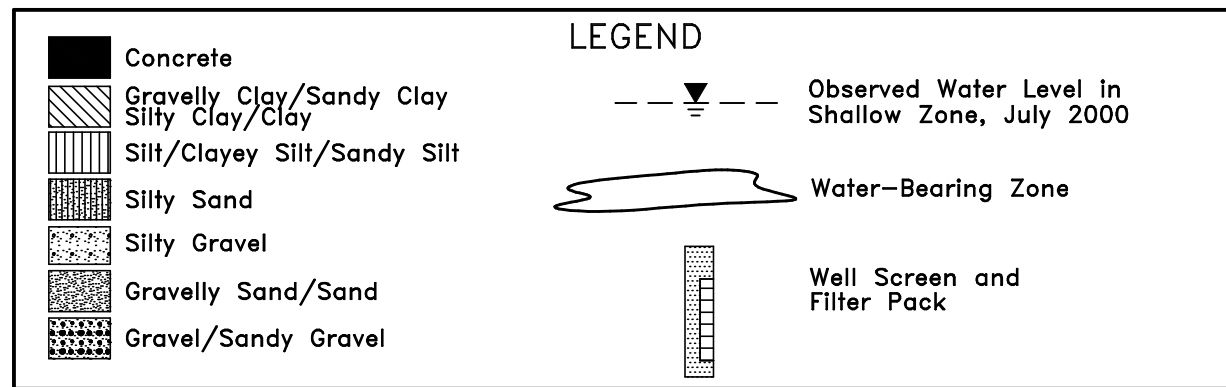
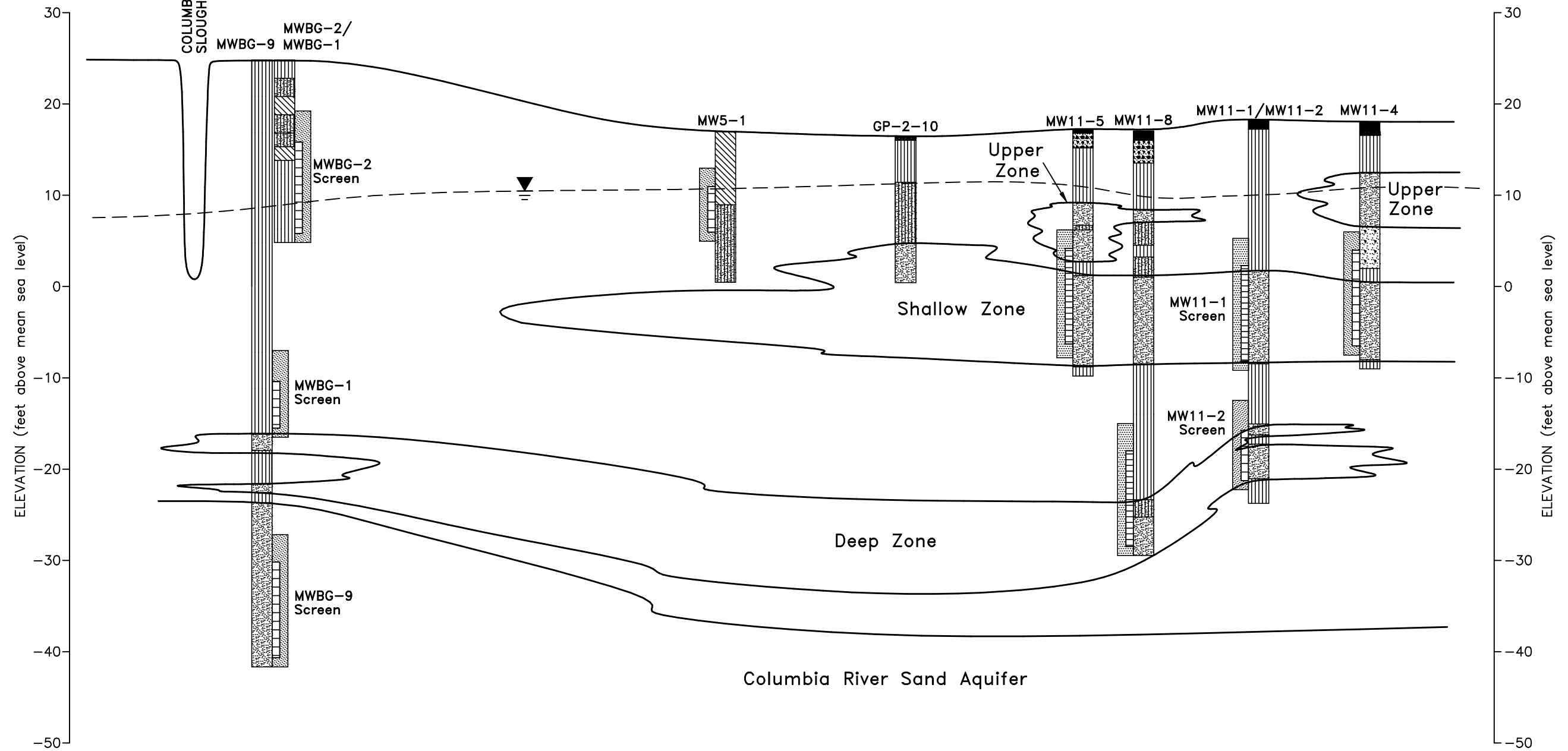
Date Started:	8/31/2010	Drilling Contractor:	ESN Northwest
Date Completed:	8/31/2010	Drillers:	Don Harnden/Chris Ross
Total Depth:	28'	Drilling Equipment:	Power Pro 9500 PTO
Water Table Depth:	20'	Geologist:	Chris Pisarri/Sandy Peterson

APPENDIX C
GEOLOGIC CROSS SECTION OF PORTLAND ANGB



B (South)

B' (North)



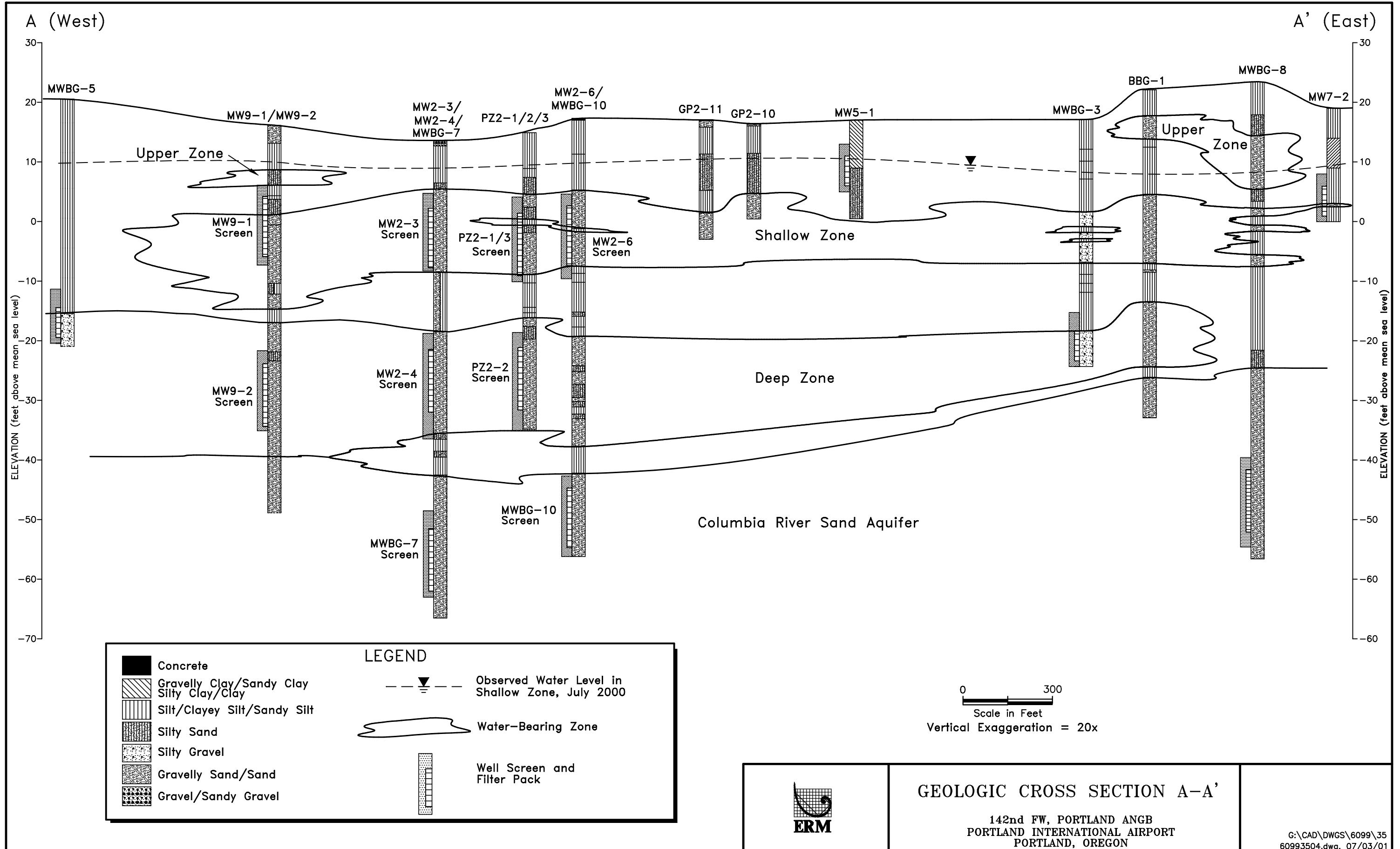
0 250
Scale in Feet
Vertical Exaggeration = 20x



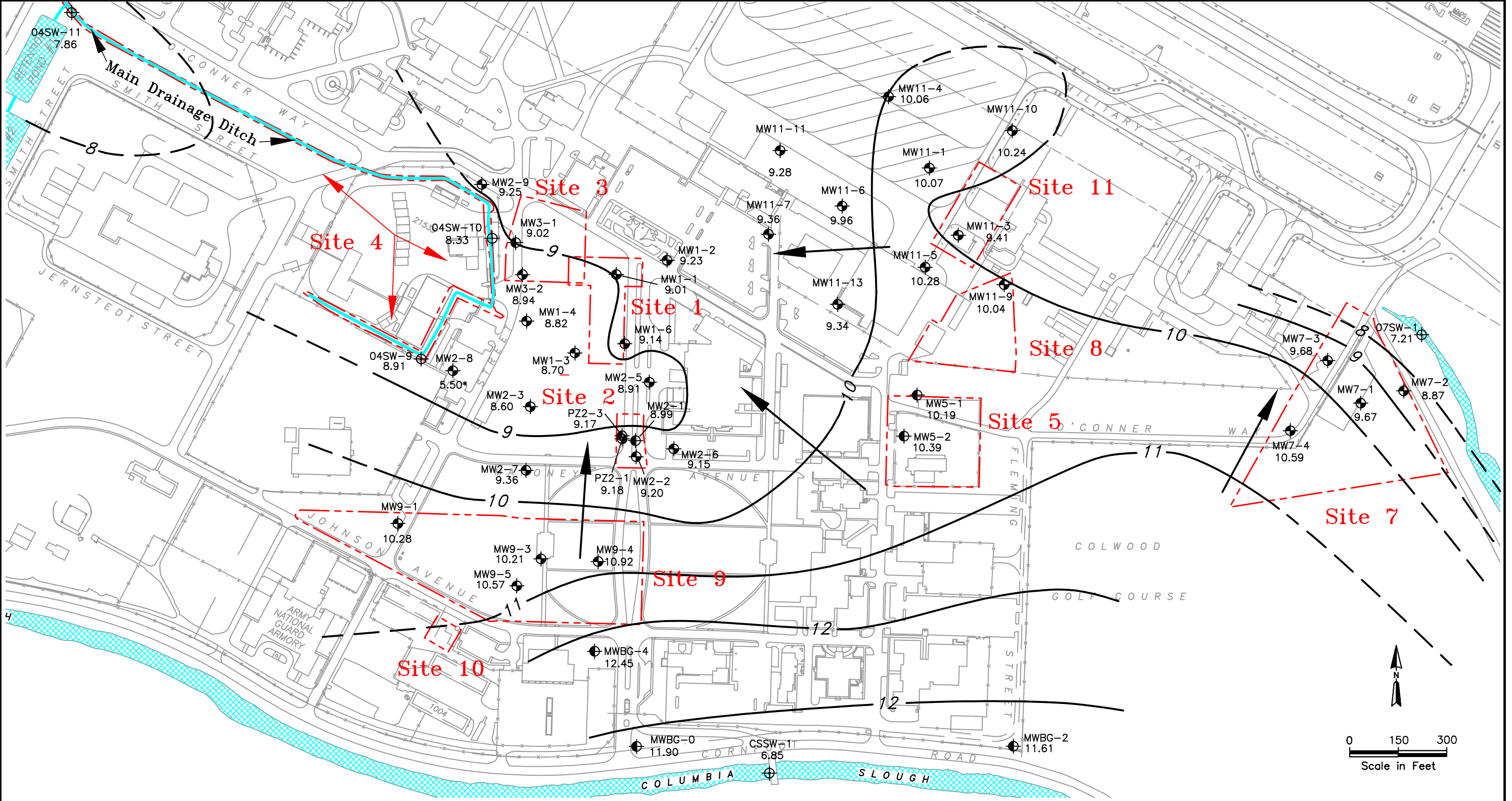
GEOLOGIC CROSS SECTION B-B'

142nd FW, PORTLAND ANGB
PORTLAND INTERNATIONAL AIRPORT
PORTLAND, OREGON

G:\CAD\DWGS\6099\35
60993505.dwg, 07/03/01



APPENDIX D
POTENTIOMETRIC MAPS



MWBC-4 Monitoring Well, Floodplain Silt

MW7-3 Monitoring Well, Shallow Zone

04SW-11 Surface Water Sampling Location

13.26 Groundwater Elevation Based on 12 October 1999 Data (ft amsl)

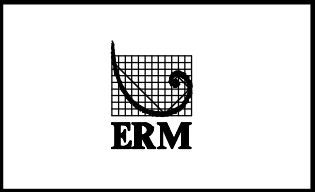
LEGEND

* Water Level Affected by Slow Post-Development Recovery; Not Used For Contouring

11 Contour of Approximate Potentiometric Surface Elevation; Dashed Where Inferred (ft amsl)

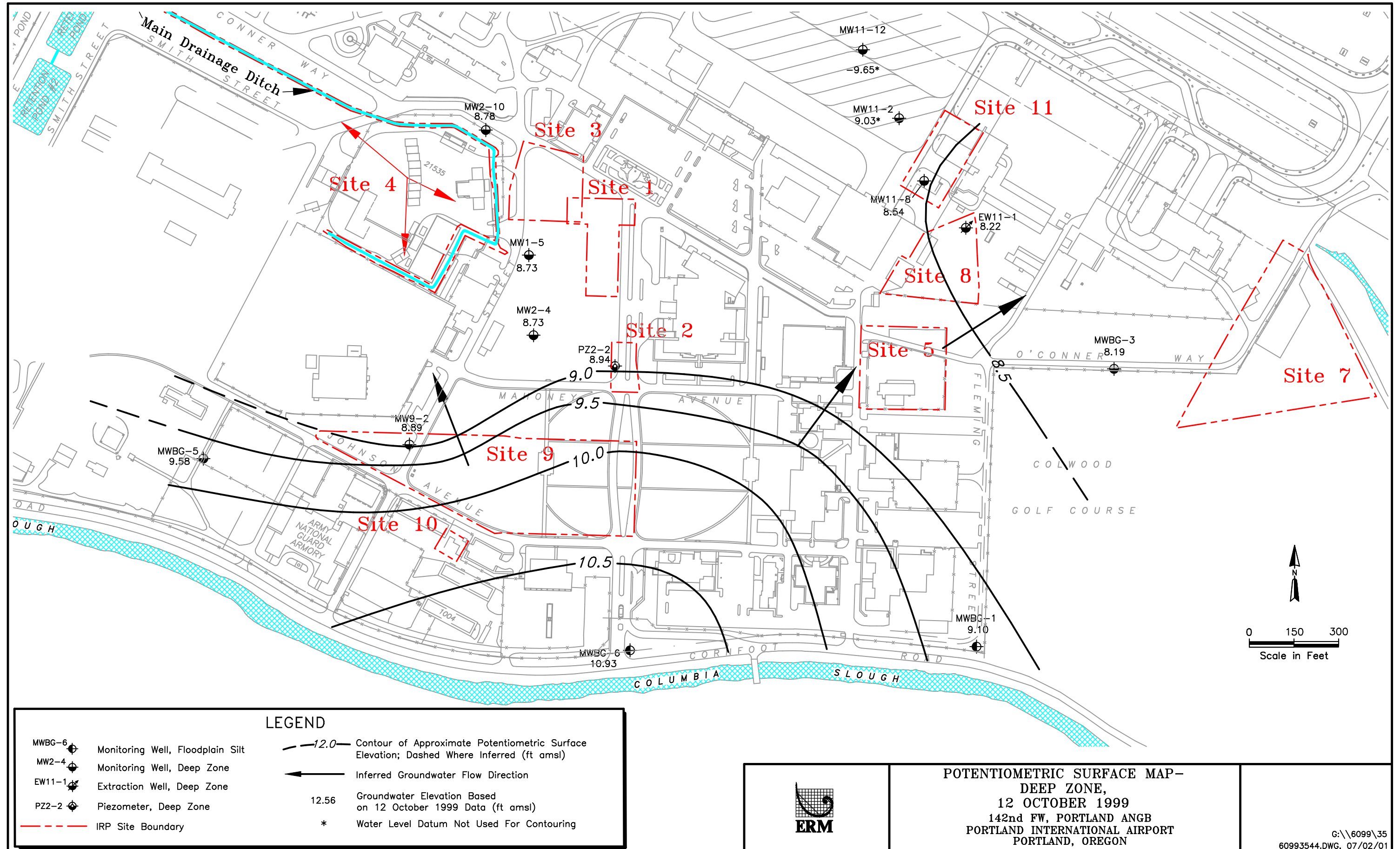
← Inferred Groundwater Flow Direction

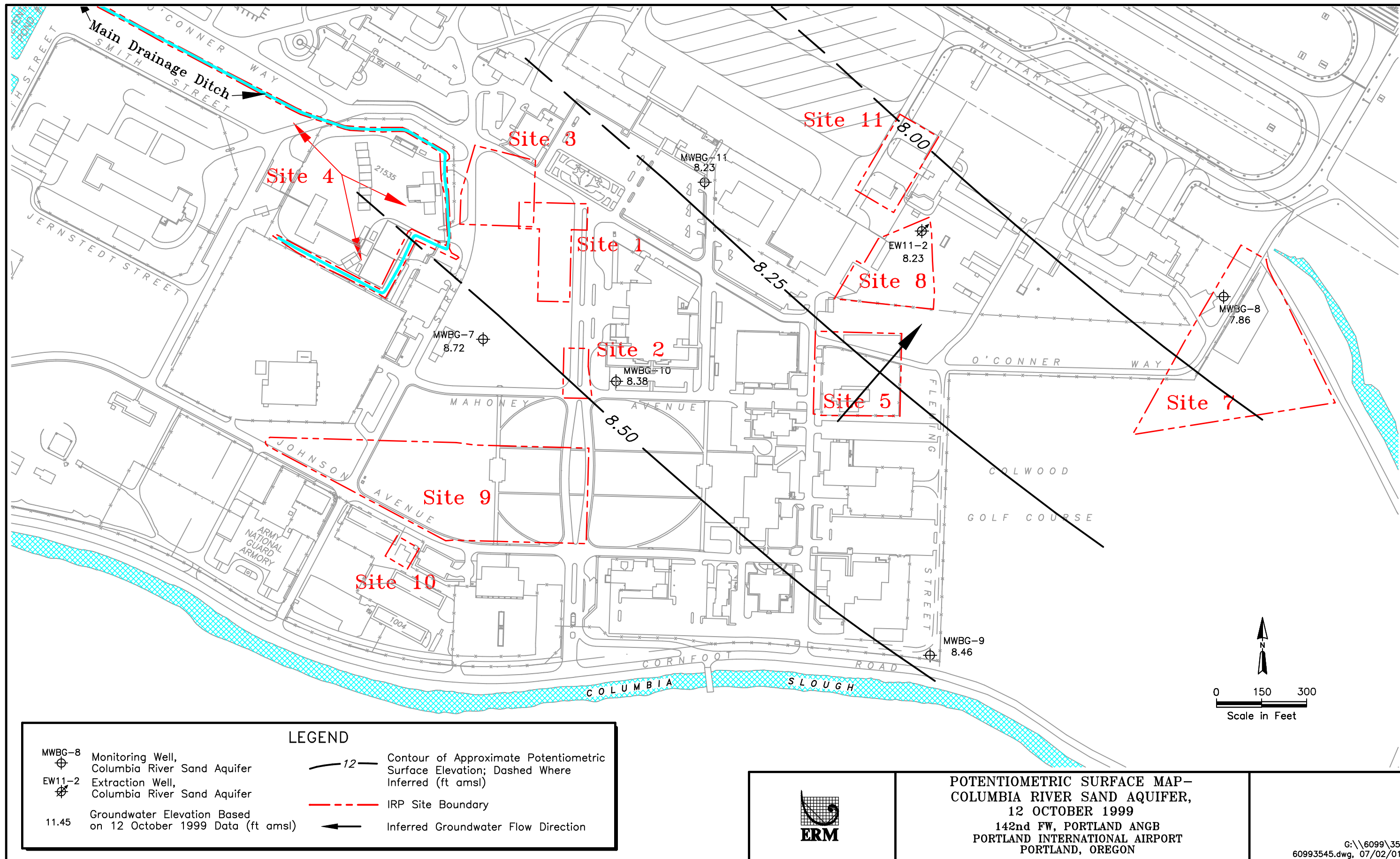
--- IRP Site Boundary



POTENTIOMETRIC SURFACE MAP-
SHALLOW ZONE,
12 OCTOBER 1999
142nd FW, PORTLAND ANGB
PORTLAND INTERNATIONAL AIRPORT
PORTLAND, OREGON

G:\6099\35
60993543.DWG, 07/02/01





APPENDIX E
INTERVIEW RECORDS

Appendix E
Interview Record

AIR FORCE OPERATIONAL RANGE ASSESSMENT PROGRAM
CONTACT/INTERVIEW REPORT

Date: 19 March 2013 Originator: Patrick Warnick (Weston Solutions, Inc.)

Contact by: Telephone Meeting X Other

Site: Portland ANGB, OR

Name, Title and Organization:
Sgt Mendell Holley, 142 EOD

Address and Telephone Number:
142 MSG
6801 Cornfoot Road
Portland, Oregon 97218-2797
(503) 335-4212

Summary:

Records are kept for EOD usage as part of the greenhouse gas emissions.

The EOD range is allowed to use up to 1.25 pounds (lbs) of C4 explosive.

The EOD range is used more by the STS – strictly non-electric. Tend to use 1 block of C4 cut into thirds.

The EOD unit is required to do monthly training.

Unrelated: EOD is going out to assess 700 acres of former army training area that has UXO on it: M47 bombs

Responds to two counties: Clark and Cowlitz and Skamania

No other units other than EOD and STS use the EOD range.

All debris from explosions is turned into MSA and HAZ waste. Roger Rein should have these records. Roger Rein also has the records for EOD range use.

Appendix E
Interview Record

AIR FORCE OPERATIONAL RANGE ASSESSMENT PROGRAM
CONTACT/INTERVIEW REPORT

Date: 19 March 2013 Originator: Patrick Warnick (Weston Solutions, Inc.)

Contact by: Telephone Meeting X Other

Site: Portland ANGB, OR

Name, Title and Organization:

Mr. Mark Johnson, 142 Bioenvironmental Manager

Address and Telephone Number:

142 MSG
6801 Cornfoot Road
Portland, Oregon 97218-2797
(503) 335-4212

Summary:

Mr. Mark Johnson has been working in the bioenvironmental section of the installation since October 1996 and joined the Air National Guard in 2006.

According to Mr. Johnson, the closest groundwater well is at the wrecker service on the South side of the slough.

Air sampling for lead was performed, "many years ago" with no detections of lead. He does not know where the data from this sampling is and feels that may have been lost.

The nearest outfall to the SAR is monitored for lead; however, the sump pump pipe at the SAR was redirected from the stormwater drain to the sanitary sewer several years ago, so no lead should show up in samples collected at the outfall.

Water from EOD range infiltrates the ground surface. They don't believe that the EOD range has a liner

There have never been any complaints from the surrounding community with regard to noise created from explosions at the SAR.

Appendix E
Interview Record

AIR FORCE OPERATIONAL RANGE ASSESSMENT PROGRAM
CONTACT/INTERVIEW REPORT

Date: 19 March 2013 Originator: Patrick Warnick (Weston Solutions, Inc.)

Contact by: Telephone Meeting X Other

Site: Portland ANGB, OR

Name, Title and Organization:

Mr. Mike Godsey, 142 Civil Engineering Squadron Real Property Officer

Address and Telephone Number:

142 MSG
6801 Cornfoot Road
Portland, Oregon 97218-2797
(503) 335-4212

Summary:

According to Mr. Godsey, the front edge of property near the west end of the SAR will go back to the Port of Portland. This should happen within 2 years of the signing of the lease. Lease was signed in 2013 so transfer will occur sometime in 2015.

A second land give back will likely occur in 2030. If the land give back occurs in 2030, the SAR could be torn down as it would be part of the parcel that is given back to the Port of Portland. If the port does not have a plan for these parcels (Parcel D-1 and D-2 on the map) then the lease would be extended for an additional 5 years with a new review every 5 years after that.

Old boundaries shown on 2009 ORAP appear to be wrong.

The installation does not have a full time GIS analyst.

Appendix E
Interview Record

AIR FORCE OPERATIONAL RANGE ASSESSMENT PROGRAM
CONTACT/INTERVIEW REPORT

Date: 19 March 2013 Originator: Patrick Warnick (Weston Solutions, Inc.)

Contact by: Telephone Meeting X Other

Site: Portland ANGB, OR

Name, Title and Organization:

Mr. Roger Rein, Environmental Manager, 142 MSG

Address and Telephone Number:

142 MSG
6801 Cornfoot Road
Portland, Oregon 97218-2797
(503) 335-4462

Summary:

According to Mr. Roger Rein, there are no federal or State/County listed endangered species of concern in the area.

There is a munitions storage area on the installation. This area could be in danger when the lease transfer occurs in 2015 due to the storage area requiring a 1200 feet buffer area and the lease turnover would impede on the required 1200 feet buffer area.

There are some cultural areas on the southern and eastern borders of the installation; however, they are not impacted by the SAR or EOD range.

The SAR is currently not used and has not been used since 2008 due to the baffling system not preventing rounds from escaping the range during firing activities.

Appendix E
Interview Record

AIR FORCE OPERATIONAL RANGE ASSESSMENT PROGRAM
CONTACT/INTERVIEW REPORT

Date: 19 March 2013 Originator: Patrick Warnick (Weston Solutions, Inc.)

Contact by: Telephone Meeting X Other

Site: Portland ANGB, OR

Name, Title and Organization:

MSgt David Brunstad, Non-Commissioned Officer In Charge (NCOIC) Combat Arms Training and Maintenance (CATM), 142 Security Forces Squadron (SFS)
MSgt Jason Schroeder, 142 SFS Unit Training Manager

Address and Telephone Number:

142 MSG
6801 Cornfoot Road
Portland, Oregon 97218-2797
(503) 335-4212

Summary:

According to MSgt David Brunstad, ANG property is owned by the Port of Portland.

Both MSgts agree that the SAR has not been used since 2008. The CATM building is attached to the property and is used to give training classes.

Baffle system doesn't work and allows ricochets to leave the SAR beyond the SDZ (the SDZ stops at the fenced boundary of the SAR). The installation invited Action Target from Utah to evaluate the range and find out the cost associated in making the SAR into a fully contained range. The upgraded range would also have firing lanes that are 5 feet wide versus the current 3 feet wide lanes.

Current shooting activities are done at a range in Clark County and Yakima. MSgt Brunstad agrees to send the number of rounds fired for the past year a little later today. EOD, and STS, and 304th Para Rescue also shoot off installation.

MSgt Schroeder says that the grassy open field just outside the fenced boundary of the SAR is occasionally used to shoot blank rounds.

All chemical weapons training is done off installation.

Checklist Preparer: Roger Rein, Environmental Manager

Name

142 MSG/EM

Company

19 March 2013

Date

Site Location: Small Arms Range, EOD Range

Complex, Range, Training Area Name

Portland ANG Base, Oregon

Installation/MAJCOM

Location if not on the Installation

Complete the following checklist. As appropriate, please explain responses under "Comments" or separate page.		Yes	No	N/A	Comment
ORAP Inventory					
POC: <i>Roger Rein</i>					
1.	Is the range/area sited in the ORAP Inventory?	X			
2.	Is the range/area not listed in the ORAP Inventory but eligible for assessment under the ORAP?		X		
3.	Was any operational range/training area identified that is not eligible for assessment under the ORAP?		X		
Air Quality					
POC: <i>Roger Rein</i>					
4.	Is the range/area in a National Ambient Air Quality Standards (NAAQS) non-attainment area?		X		
5.	Does the National Emission Standards for Hazardous Air Pollutants (NESHAPs) apply at the range/area?		X		
6.	Does the range/area have an air permit OR does the installation have an air permit which includes the range/area?		X		
7.	Has management activities (e.g., dust control, etc.) been implemented or altered (e.g., controlled burns, etc.) due to air quality requirements?		X		
a.	Are air quality management activities documented (e.g., operating standards, best management practices, plans, etc.)?		X		
8.	Has any air quality concerns (e.g., regional haze, conformity, etc.) negatively impacted the mission?		X		
Cultural Resources					
POC: <i>Roger Rein</i>					
9.	Is the range/area covered in the Integrated Cultural Resource Management Plan (ICRMP)?	X			
10.	Has a cultural resource survey been conducted to include the range/area?	X			
a.	Are there any known or suspected cultural sites on the range/area?		X		
11.	Has any management activities been implemented or altered due to cultural resources?		X		
a.	Are processes for managing cultural resource documented (e.g., operating standards, best management practices plans, etc.)?		X		
12.	Has any cultural resource concerns negatively impacted the mission?		X		
Natural Resources					
POC: <i>Roger Rein</i>					
13.	Is the range/area covered in the Integrated Natural Resource Management Plan (INRMP)?	X			
14.	Has a natural resource survey been conducted to include the range/area?	X			
a.	Are there any known or suspected listed species, critical habitat, and/or species of concern on the range/area?		X		
15.	Are there other pertinent natural resources (e.g., wetlands, floodplains, etc.) on the range/area?		X		
16.	Has management activities been implements (e.g., species or habitat protection, etc.) or altered (i.e., hunting/fishing, controlled burns, etc.) due to identified species or designated habitat?		X		
a.	Are processes for managing natural resource documented (e.g., operating standards, best management practices, plans, etc.)?		X		
17.	Has any natural resource concerns negatively impacted the mission?		X		

Complete the following checklist. As appropriate, please explain responses under "Comments" or separate page.		Yes	No	N/A	Comment
Environmental Planning					
POC: Roger Rein					
18.	Has any National Environmental Policy Act (NEPA) studies (i.e., Environmental Assessment [EA] or Environmental Impact Statement [EIS]) been conducted to assess impacts from operations at the range/area?	X			
19.	5. Has an Air Installations Compatible Use Zones (AICUZ) or Range Air Installations Compatible Use Zones (RAICUZ) study been performed at the range/area?	X			
20.	Has information on the range boundary and associated safety zone been provided to installation and/or local planning organizations to assist in compatible use planning?	X			
21.	Has any mitigation measures, resulting from any impact studies, been implemented at the range/area?		X		
22.	Is a process in place to address new or modified activities at the range/area for compliance with NEPA?	X			
a.	Are the results of any of the environmental impact analysis processes documented?	X			
23.	Has any NEPA compliance requirements negatively impacted the mission?		X		
Environmental Reporting					
POC: Roger Rein					
24.	Does the range/area submit Toxic Chemical Release Inventory (TRI) data OR is the data included with the installation TRI data?	X			
a.	Was TRI data associated with munitions related activities?	X			
25.	Has there been a release of hazardous substances, as defined by CERCLA that required reporting to the National Response Center?		X		
a.	Was NRC reporting associated with munitions-related activities?		X		
Environmental Restoration					
POC: Roger Rein					
26.	Are processes in place and documented (e.g., operating standards, best management practices, management plans, etc.) regarding spill prevention, response action, and internal Air Force reporting?	X			
27.	Has any non-munitions related areas of concern (e.g., leaking tanks, oil-water separator, etc.) been identified at the range/area?		X		
a.	Has identified non-munitions related area of concern been investigated and/or being remediated?		X		
b.	Has non-munitions related restoration activities negatively impacted the		X		
28.	Are there any historic munitions related areas of interest at the range/area?		X		
a.	Has identified historic munitions related areas of interest been investigated and/or being remediated?		X		
b.	Has historic munitions related clean-up activities negatively impacted the mission?		X		
Range Management					
POC: Roger Rein					
29.	Is the range/area appropriately designated on real property records?	X			
30.	Is the range/area appropriately documented in the Base Comprehensive	X			
31.	Is the range/area location and size appropriately depicted in the installation geographical information system?		X		
a.	Does the identified range/area boundary include the associated safety buffer zone?	X			
32.	Does the range conduct munitions related maintenance activities (e.g., munitions debris collection, UXO clearances, etc.)?		X		
a.	Are management, procedure, and schedule of such activities documented (e.g., operating standards, best management practices, plans, etc.)?	X			
33.	Does the range conduct non-munitions related range/area maintenance activities (e.g., berm replacement, target refurbishment, filter replacement,	X			

Complete the following checklist. As appropriate, please explain responses under "Comments" or separate page.	Yes	No	N/A	Comment
a. Are management procedures, and schedule of such activities documented (e.g., operating standards, best management practices, plans, etc.)?	X			
34. Does the range/area have a process in place to address off-range munitions items as a result of current range/area activities?	X			
a. Are procedures documented and copy provided to appropriate authorities?	X			
Range Sustainment/Encroachment				
POC: Roger Rein				
35. Is civilian and/or military development (e.g., land use, visibility, etc.) encroaching on the range/area?		X		
36. Is there any adverse impact on the surrounding area due to range/area activities (e.g., noise, etc.)?		X		
a. Has any mitigation measures been implemented?		X		
37. Does the range/area have a program or process in place to address public concerns related to activities?	X			
a. Are there any conflicts between the community and range operations?		X		
38. Are environmental, safety, and/or health compliance activities documented (e.g., operating standards, best management practices, management plans,	X			
a. Has the range/area received an environmental, compliance inspection?	X			
b. Has the range/area received safety and health compliance inspection?		X		
c. Did the range/area receive any notice of deficiencies?		X		
39. Are sustainment activities/efforts documented (e.g., operating standards, best management practices, management plans, etc.)?	X			
40. Are you aware of any issues or negative public perception associated with similar types of ranges/areas?		X		
Waste Management				
POC: Roger Rein				
41. Does the range/area generate solid waste, as defined by RCRA?	X			
a. Is solid waste disposed of on-range (e.g., historic or current landfill, etc.)?		X		
42. Does the range/area generate hazardous waste, as defined by RCRA (e.g., paints, solvents, lubricants, etc.)?	X			
a. Is hazardous waste stored at the range/area?	X			
b. Is hazardous waste disposed of on-range?		X		
43. Does the range/area have any waste management permits (e.g., RCRA Subpart X, Emergency Treatment/Storage, etc.) for any treatment, storage, and disposal activities occurring on-range?		X		
44. Is range residue (e.g., fragments, casings, target debris, etc.) collected for recycling?	X			
a. Is the material turned over to the installation's Qualified Recycling Program (QRP)?		X		
b. Is the material turned over to a Defense Reutilization and Marketing Office (DRMO)?	X			
45. Has management activities been implemented or altered (e.g., selection of non-hazardous products, etc.) due to waste management concerns?		X		
a. Are waste management activities documented (e.g., operating standards, best management practices, management plans, etc.)?	X			
46. Has any waste management concerns negatively impacted the mission?		X		
Water Quality				
POC: Roger Rein				
47. Is the range/area situated over an aquifer?	X			
a. Is the aquifer utilized as a drinking water source?		X		
48. Is the range/area located within a designated aquifer (groundwater) recharge zone?	X			
49. Are there natural surface water bodies (e.g., lakes, ponds, stream, etc.) present on the range/area?		X		
a. Do water bodies have a designated use (e.g., recreational, migratory bird management, etc.)?		X		

Complete the following checklist. As appropriate, please explain responses under "Comments" or separate page.		Yes	No	N/A	Comment
b.	Are wetlands present on or near the range/area?		X		
50.	Is there non-natural surface water features (e.g., retention ponds, drainage ditches, etc.) present on the range/area?		X		
51.	Does the range/area have a water discharge permit (e.g., NPDES, storm water, etc.) OR does the installation have a permit which includes the	X			
a.	Are outfalls monitored or sampled for MC?	X			
52.	Are any drinking water wells located on the range/area?		X		
a.	Is water quality testing performed?		X		
53.	Are any non-potable water wells located on the range/area?		X		
a.	Are the wells being monitored or sampled for MC?		X		
54.	Has management activities been implemented or altered (e.g., storm water drainage, erosion control, sediment collection, etc.) due to water quality concerns?		X		
a.	Are water quality management activities documented (e.g., operating standards, best management practice plans, etc.)?		X		
55.	Has any water quality concerns (e.g., run-off, drinking water sources, wetlands, floodplains, etc.) negatively impacted the mission?		X		

APPENDIX F
PHOTOGRAPHIC LOG

PHOTOGRAPH NO. 1

Date: 19 MAR 2013

Direction: East

Description:

The SAR is identified as Building 480. The EOD Range is co-located within the SAR northern berm.



PHOTOGRAPH NO. 2

Date: 19 MAR 2013

Direction: East

Description:

The Portland ANGB SAR is maintained by the 142nd Security Forces Squadron.



PHOTOGRAPH NO. 3

Date: 19 MAR 2013

Direction: East

Description:

The location of the sump pump is shown in this photo. This is located on the south side of the structure that covers the SAR firing line. The SAR has not been used since 2008.



PHOTOGRAPH NO. 4

Date: 19 MAR 2013

Direction: North

Description:

The layout of the EOD Range's concrete walls and the way it is built into the side berm of the SAR is shown in this photo.



PHOTOGRAPH NO. 5

Date: 19 MAR 2013

Direction: North

Description:

This photo shows the ponds that are located north of the EOD Range. Portland had received substantial amounts of rain the day prior to this photo being taken.



PHOTOGRAPH NO. 6

Date: 19 MAR 2013

Direction: Northeast

Description:

The munitions storage area is shown in this photo. The storage area is located approximately 350 feet Northeast of the SAR and EOD Range.



PHOTOGRAPH NO. 7

Date: 19 MAR 2013

Direction: Northwest

Description:

This photo shows the location of the EOD Range and a groundwater monitoring well that was installed for the 2011 Quantitative Assessment.



PHOTOGRAPH NO. 8

Date: 19 MAR 2013

Direction: West

Description:

This photo shows the soil boring location in relation to the EOD Range and a groundwater monitoring well that was installed for the 2011 Quantitative Assessment. The boring is shown as the white paint with a blue pin flag.



PHOTOGRAPH NO. 9

Date: 19 MAR 2013

Direction: West

Description:

This photo shows the soil boring location in relation to the EOD Range. The boring is shown as the white paint with a blue pin flag.



PHOTOGRAPH NO. 10

Date: 19 MAR 2013

Direction: North

Description:

Samples were collected using a hand auger to bore to 5 feet bgs unless an obstruction was encountered. This photo shows WESTON personnel in the process of hand augering to 5 feet bgs. Boring locations were performed as close to the range boundary as possible.



PHOTOGRAPH NO. 11

Date: 19 MAR 2013

Direction: West

Description:

All hand auger buckets were decontaminated before collecting each sample using non-phosphate detergent and deionized water.



APPENDIX G
ANALYTICAL SAMPLE DATA



Case Narrative

Method:	ALS SOP/7580	Client:	Weston Solutions
Analysis:	White Phosphorus P4	Account:	8101
Preparation SOP #:	OP-SW-7580	Matrix:	Soil
Analysis SOP #:	OP-SW-7580		
Batch: EGC/4392	HBN: 103994		
ALS Work Order:	1307984		

General Set Information: The field samples were received and batched for analysis.

Method Summary: This method was used to determine the concentration of white phosphorus in soil using a GC equipped with a DB-1 column and a FPD detector.

Sample Preparation: A 40 g sample aliquot was extracted using 10.0 mL Iso-Octane.

Hold Times: Holding time requirements were met for sample analyses.

Dilution(s): None.

Method QC (MB, LCS, LCSD): *Method Blank(s):* White phosphorus was not detected in the method blank greater than ½ the CRDL.

Laboratory Control Samples: All recoveries were within established limits.

Matrix QC (MS, MD, MSD): MS and MSD were prepared using sample 1307456001. MS recovery low due to matrix effect.

Instrument QC (ICV, CCV, etc): *Continuing Calibration Verification:*

All continuing calibration verification standards passed the percent difference criteria. See the Continuing Calibration Verification Forms.

NC/CAR: None.

Case Narrative

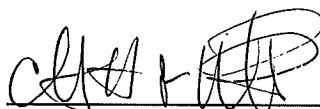
Sample Calculation: Analyte concentrations in the sample extracts were determined by interpolation from 1st order regressions of standard responses (peak height) vs. concentrations. Final concentrations in ug/L were determined from the equation:

$$C_s = \frac{C_E \cdot V_E \cdot DF}{V_s}$$

Where:

C_s	=	Analyte concentration in sample (ug/L)
C_E	=	Analyte concentration in extract (ug/mL)
V_E	=	Final volume of extract (mL)
DF	=	Dilution Factor
V_s	=	Initial volume of sample taken for preparation (L)

Miscellaneous Comments: MS recovery low due to matrix effect. RPD outside of limits due to matrix effect. Samples batched with different client samples to conserve resources.



Analyst: Christopher R. Winter

Date: 26th March, 2013



ANALYTICAL REPORT

Report Date: March 27, 2013

Mike Ruckgaber, P.E.
Weston Solutions
5599 San Felipe
Suite #700
Houston, TX 77056

Phone: (713) 985.6751

E-mail: mike.ruckgaber@westonsolutions.com

Workorder: **34-1307984**

Project ID: PortlandANG20077.048.077.5000

Purchase Order: 20077.048.077.500003

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
PO01-31-(0-1)-20130319	1307984001	03/19/13	03/20/13	Portland ANG
PO01-32-(0-1)-20130319	1307984002	03/19/13	03/20/13	Portland ANG

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 | PHONE +1 801 266 7700 | FAX +1 801 268 9992

ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company

Environmental 

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER



ANALYTICAL REPORT

Workorder: **34-1307984**

Client: Weston Solutions

Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: PO01-31-(0-1)-20130319	Sampling Site: Portland ANG	Collected: 03/19/2013			
Lab ID: 1307984001	Media: Bulk	Received: 03/20/2013			
Matrix: Soil/Solid/Sediment	Sampling Parameter: NA				
Analysis Method - EPA 7580					
Preparation: EPA 7580, Soil Prep	<u>Weight/Volume</u>	Analysis: EPA 7580, Soil			
Batch: EGC/4391 (HBN: 103959)	Initial: 40 grams	Batch: EGC/4392 (HBN: 103994)			
Prepared: 03/21/2013	Final: 10 mL	Analyzed: 03/23/2013 01:10			
		Instrument ID: GCE24			
		Percent Solid: NA			
		Report Basis: Wet			
Analyte	ug/Kg	MDL (ug/Kg)	RL (ug/Kg)	Dilution	Qual.
White Phosphorus	ND	0.15	0.50	1	U

Sample ID: PO01-32-(0-1)-20130319		Sampling Site: Portland ANG		Collected: 03/19/2013	
Lab ID: 1307984002		Media: Bulk		Received: 03/20/2013	
Matrix: Soil/Solid/Sediment		Sampling Parameter: NA			
Analysis Method - EPA 7580					
Preparation: EPA 7580, Soil Prep		<u>Weight/Volume</u>	Analysis: EPA 7580, Soil		Instrument ID: GCE24
Batch: EGC/4391 (HBN: 103959)		Initial: 40 grams	Batch: EGC/4392 (HBN: 103994)		Percent Solid: NA
Prepared: 03/21/2013		Final: 10 mL	Analyzed: 03/23/2013 01:21		Report Basis: Wet
Analyte	ug/Kg	MDL (ug/Kg)	RL (ug/Kg)	Dilution	Qual.
White Phosphorus	ND	0.15	0.50	1	U

Comments

Quality Control: EPA 7580 - (HBN: 103994)

MS recovery low due to matrix effect.

RPD outside of limits due to matrix effect.

Report Authorization

Method	Analyst	Peer Review
EPA 7580	Christopher Winter	Mila V. Potekhin

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: als@alst.com
Web: www.alst.com



ANALYTICAL REPORT

Workorder: **34-1307984**

Client: Weston Solutions

Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ACLASS (DoD ELAP)	ADE-1420	http://www.aiclasscorp.com
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdwlabservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Florida (TNI)	E871067	http://www.dep.state.fl.us/labs/bars/sas/qa/
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Lead Testing:			
CPSC	ACLASS (ISO 17025, CPSC)	ADE-1420	http://www.aiclasscorp.com
Soil, Dust, Paint ,Air	AIHA (ISO 17025, AIHA ELLAP and NLLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aiclasscorp.com

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.



Quality Control Sample Batch Report

Analysis Information

Workorder: 1307984

Limits: Historical/Performance

Basis: DoD QSM

Preparation: EPA 7580, Soil Prep

Batch: EGC/4391 (HBN: 103959)

Prepared By: Christopher Winter

Analysis: EPA 7580

Batch: EGC/4392 (HBN: 103994)

Analyzed By: Christopher Winter

Blank

MB: 325884 Analyzed: 03/22/2013 20:46 Units: ug/Kg				
Analyte	Result	MDL	RL	
White Phosphorus	ND	0.15	0.5	

Laboratory Control Sample

LCS: 325885 Analyzed: 03/22/2013 20:57 Units: ug/Kg					
Analyte	Result	Target	% Recovery	QC Limits	
White Phosphorus	21.7	21.3	102	70.3	140.9

Matrix Spike - Matrix Spike Duplicate

Sample: 1307456001 Analyzed: 03/22/2013 21:30 Units: ug/Kg		MS: 325886 Analyzed: 03/22/2013 21:08					MSD: 325887 Analyzed: 03/22/2013 21:18				
Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
White Phosphorus	ND	10.9	21.3	*51.5	65	135	14.6	68.9	*28.9	0	20



Quality Control Sample Batch Report

Analysis Information

Workorder: 1307984

Limits: Historical/Performance

Basis: DoD QSM

Preparation: EPA 7580, Soil Prep

Batch: EGC/4391 (HBN: 103959)

Prepared By: Christopher Winter

Analysis: EPA 7580

Batch: EGC/4392 (HBN: 103994)

Analyzed By: Christopher Winter

Comments

MS recovery low due to matrix effect.

RPD outside of limits due to matrix effect.

QC Data Approved and Reviewed by

<u>Christopher Winter</u>	<u>Mila V. Potekhin</u>	<u>3/27/2013</u>
Analyst	Peer Review	Date

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- - Sample and Matrix Duplicate less than 5 times the reporting limit

RPD - Relative % Difference (Spike / Spike Duplicate)


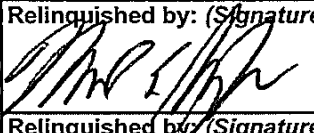

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable



7159/# 3 *in 1984*

Page 1 of 1

Client Name & Address: Weston Solutions 5599 San Felipe, Ste. 700 Houston, TX 77056 Phone: 713-985-6751 FAX: 713-985-6703 e-mail: mike.ruckgaber@westonsolutions.com			Project No.: 2007.048.077.5000.03 Project Name: Portland ANG Sampler (Signature): 			Preservation Code	Sample Matrix Code	Sample for Matrix QC	Analyses Requested										No. of Containers	Matrix Codes: W) Water B) Bulk L) Liquid F) Filler S) Soil G) Wipe D) Solid M) Media Preservation Codes: 1) Cool to 4°C 2) HCl to pH<2, 4°C 3) H2SO4 to pH<2, 4°C 4) HNO3 to pH<2, 4°C 5) NaOH to pH>12, 4°C 6) ZnOAc/NaOH to pH>9, 4°C Remarks
Field Sample Number	Site ID	Date	Time	Depth	ALS Sample Number				White Phosphorus											
POPI-31-(0.1)-20130319	Portland ANG	3/19/2013	1135	0-1		1	S		X											
POPI-32-(0.1)-20130319	Portland ANG	3/19/2013	1135	0-1		1	S		X											
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Rad <input type="checkbox"/> Flammable <input type="checkbox"/> Poison <input checked="" type="checkbox"/> Unknown			Sample Disposal <input type="checkbox"/> Return to Client <input type="checkbox"/> Archive for _____ Months <input checked="" type="checkbox"/> Disposal by Lab (fees may be assessed if samples are retained longer than 3 months)					Requested Turn Around Time <input type="checkbox"/> 2 Days (Rush) <input type="checkbox"/> 7 Days (Rush) <input type="checkbox"/> 21 Days <input type="checkbox"/> 3 Days (Rush) <input type="checkbox"/> 14 Days <input checked="" type="checkbox"/> Other (Rush = email data by COB on day due. Surcharges assessed.)												
Relinquished by: (Signature) 						Received by: (Signature) 						Carrier/Airbill #: 03-2013 10:10		Shipped to: ALS Environmental 960 West LeVoy Drive Salt Lake City, UT 84123 Phone: (800) 356-9135 Phone: (801) 266-7700 FAX: (801) 268-9992 WEB: www.alsglobal.com						
Relinquished by: (Signature)						Received by: (Signature)						Date		Time						
Relinquished by: (Signature)						Received by: (Signature)						Date		Time						

White - Laboratory Copy

Yellow - Client Copy



ALS Environmental
CHAIN-OF-CUSTODY

Project / Job / Task: 20077.048.077.500003			Split:		Workorder ID: 1307984			Requested Analysis												
Client: Weston Solutions					Account: 8101		Type: BULK													
Comments:							Preservatives													
							COOL													
							Containers													
Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count													
1	03/19/2013 11:35	PO01-31-(0-1)-20130319	1307984001		Soil/Solid/Sediment	A	1	A												
2	03/19/2013 11:35	PO01-32-(0-1)-20130319	1307984002		Soil/Solid/Sediment	A	1	A												
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY				SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY			
				Sample Prep / Analysis for: _____		Lab Notebook No.: _____	
				Prepared / Analyzed by: _____		Date / Time: _____	
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Edwards, Meredith D.	03/20/2013 10:10	ALS Sample Receiving	Sample Login				
<i>Meredith Edwards</i>	<i>3/20/13 10:10</i>	<i>SB</i>	<i>Storage</i>				
<i>SB</i>	<i>3-21-13 14:50</i>	<i>CS</i>	<i>7580</i>				
<i>CS</i>	<i>3-21-13 18:00</i>	<i>R37-1</i>	<i>LTS</i>				

ALS LABORATORY GROUP SALT LAKE CITY CLIENT-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)										
Client Name: <u>Western Solutions</u>				Project/Task/Site: <u>1704104</u>						
Date/Time of Receipt: <u>03-20-13 10:10</u>				Number of Coolers Received: <u>1</u>						
Condition of Coolers: <u>Acceptable/Unacceptable</u>				Temperature Control: <u>Present/Not Included</u>		Custody Seals: <u>Present/Absent/NA</u>				
Intact/Broken/NA				Location Temp Taken: <u>Control/Between Samples</u>		Are all temperatures within project specific guidelines? <u>Yes/No/NA</u>				
Tamper Evident: <u>Yes/No/NA</u>				Are all applicable pHs within specific guidelines? <u>Yes/No/NA</u>		Ice Present: <u>Yes/No/NA</u>				
Frozen/Melted/NA										
PH Check:	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA	Cyanide	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	TPH - 418.1	Yes/No/NA	Total Phosphorous	Yes/No/NA	Ammonia	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA
			TKN	Yes/No/NA						
Cooler Received	ALS Cooler No.	Temp.	Cooler Received	ALS Cooler No.	Temp.	Cooler Received	ALS Cooler No.	Temp.		
1	C13- <u>3008</u>	<u>8</u> °C	4	C13-	°C	7	C13-	°C		
2	C13-	°C	5	C13-	°C	8	C13-	°C		
3	C13-	°C	6	C13-	°C	9	C13-	°C		
Taken By: <u>Jamie Jassell</u> <u>Tam Van Tassel</u> <u>03-20-13</u>										
Signature Printed Name Date										

CLIENT-RELATED INFORMATION			
<input type="checkbox"/> Missing Cooler	<input type="checkbox"/> Missing Samples/Bottles	<input type="checkbox"/> Incorrect Preservation	<input type="checkbox"/> Chain of Custody Problems
<input type="checkbox"/> Cooler Conditions	<input type="checkbox"/> Broken/Leaking Samples	<input type="checkbox"/> pH Criteria Not Met	<input type="checkbox"/> Other:
<input type="checkbox"/> Missing Paperwork	<input type="checkbox"/> Incorrect Bottle Type	<input type="checkbox"/> Head Space in Bottles	EPA Custody Seal:
<input type="checkbox"/> Missing/Incorrect Bottle labels	<input type="checkbox"/> Cooler Temperatures Out of range	<input type="checkbox"/> Insufficient Sample Volume	
BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:			
<p>Faxed to Client? YES <input type="checkbox"/> NO <input type="checkbox"/> (if yes, attach Fax Cover Sheet)</p>			

Response Required Within 24 Hours

PROJECT MANAGEMENT		
PROJECT MANAGER COMMENTS:		
<p>ALS Project Manager: _____ Returned to Sample Receipt by: _____ Date: _____</p> <p>Printed Name Signature</p>		

FedEx *NEW Package*
Express *US Airbill*

FedEx
Tracking
Number

8025 2286 3617

Form
ID No.

0200

Recipient's Copy

1 From
Date 3/19/2013

Sender's Name Mike Ruckgeber Phone 832 347 3884

Company Weston Solutions

Address 5599 San Felipe 700

City Houston State TX ZIP 77056

2 Your Internal Billing Reference 70077.048.077.5000.03

3 To
Recipient's Name Receiving Phone 800 356 9135

Company ALS

Address 960 West LeVoy Drive
We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address
Use this line for the HOLD location address or for continuation of your shipping address.
City Salt Lake City State UT ZIP 84123

HOLD Weekday
FedEx location address
REQUIRED. NOT available for
FedEx First Overnight.

HOLD Saturday
FedEx location address
REQUIRED. Available ONLY for
FedEx Priority Overnight and
FedEx 2Day to select locations.



8025 2286 3617

4 Express Package Service *To most locations.
NOTE: Service order has changed. Please select carefully.

Packages up to 150 lbs.
For packages over 150 lbs., use the new
FedEx Express Freight US Airbill.

Next Business Day

☐ FedEx First Overnight
Earliest next business morning delivery to select
locations. Friday shipments will be delivered on
Monday unless SATURDAY Delivery is selected.

☒ FedEx Priority Overnight
Next business morning.* Friday shipments will be
delivered on Monday unless SATURDAY Delivery
is selected.

☐ FedEx Standard Overnight
Next business afternoon.*
Saturday Delivery NOT available.

2 or 3 Business Days

☐ FedEx 2Day A.M.
Second business morning.*
Saturday Delivery NOT available.

☐ FedEx 2Day
Second business afternoon.* Thursday shipments
will be delivered on Monday unless SATURDAY
Delivery is selected.

☐ FedEx Express Saver
Third business day.*
Saturday Delivery NOT available.

5 Packaging *Declared value limit \$500.

☐ FedEx Envelope*

☐ FedEx Pak*

☐ FedEx
Box

☐ FedEx
Tube

☒ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery
NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☒ No Signature Required
Package may be left without
obtaining a signature for delivery.

☐ Direct Signature
Someone at recipient's address
may sign for delivery. *Fee applies.*

☐ Indirect Signature
If no one is available at recipient's
address, someone at a neighboring
address may sign for delivery. For
residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?

☒ No ☐ Yes
One box must be checked.
As per attached
Shipper's Declaration.

☐ Yes
Shipper's Declaration
not required.

☐ Dry Ice
Dry Ice, 9, UN 1845 x kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging
or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment Bill to:

☒ Sender
Acct. No. in Section
1 will be billed.

☐ Recipient

☐ Third Party

☐ Credit Card

Obtain recip.
Acct. No. ☐

☐ Cash/Check

Total Packages 1

Total Weight 10.35 lbs.

Credit Card Auth.

Our liability is limited to US\$100 unless you declare a higher value. See the current FedEx Service Guide for details.

644

Rev. Date 1/12 • Part #167002 • ©2012 FedEx • PRINTED IN U.S.A. SAF

fedex.com 1.800.GoFedEx 1.800.463.3339

fedex.com 1.800.GoFedEx 1.800.463.3339



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

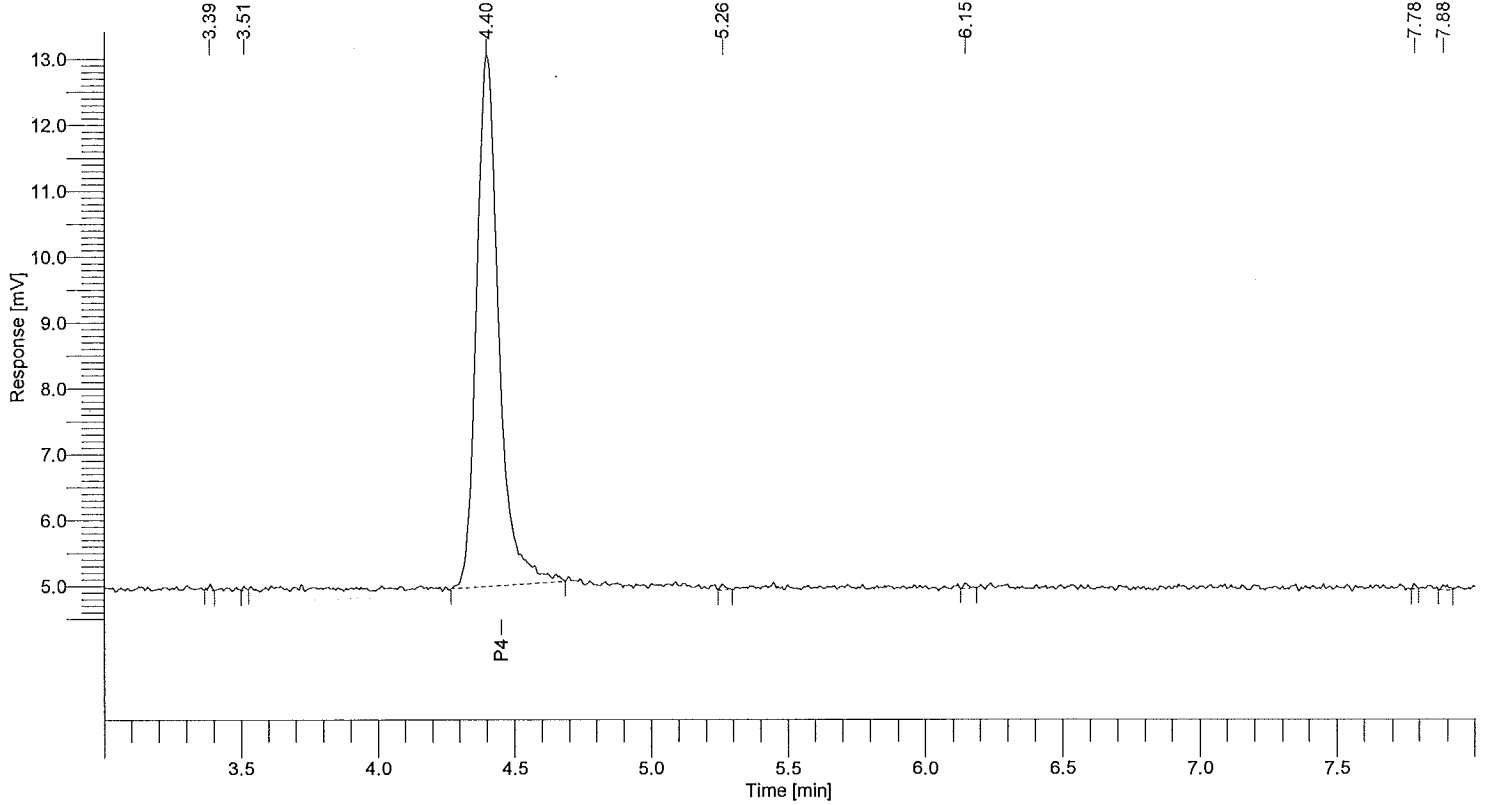
Environmental Division

Analytical Documentation

Software Version : 6.3.1.0504
 Sample Name : CCV2 0.05 ug/mL
 Instrument Name : GC24
 Rack/Vial : 0/15
 Sample Amount : 1.000000
 Cycle : 13

Date : 03/25/2013 09:50:54
 Data Acquisition Time : 03/22/2013 19:41:11
 Channel : B
 Operator : winter
 Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_015.rst
 Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.40	P4	8094	45728	0.04896	0.05000	97.9
						97.9

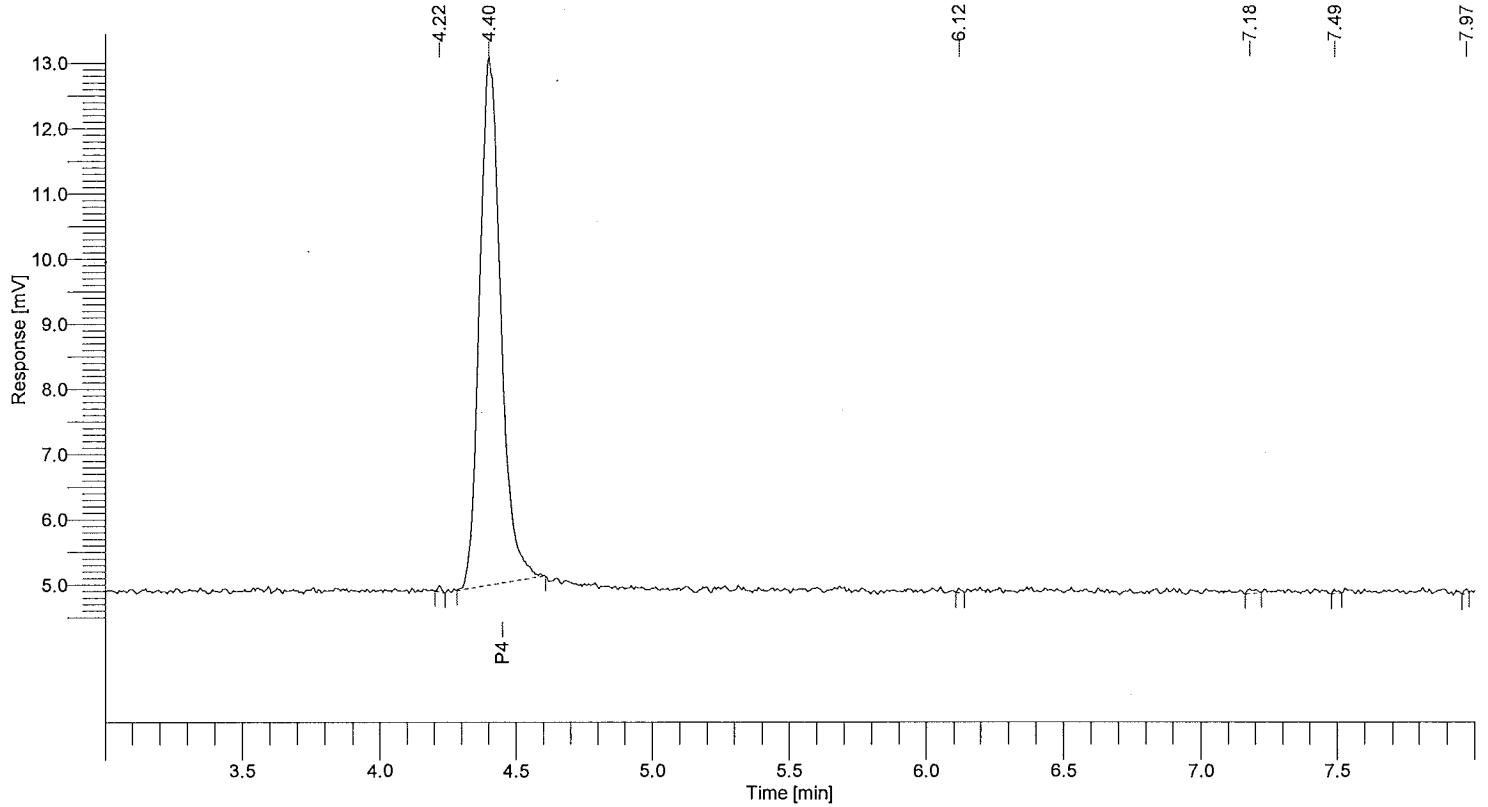
P4 recovery 85 to 115%? YES NO

Software Version : 6.3.1.0504
Sample Name : CCV3 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/26
Sample Amount : 1.000000
Cycle : 24

Date : 03/25/2013 09:51:20
Data Acquisition Time : 03/22/2013 21:41:25
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \\VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_026.rst

Sequence File : \\VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

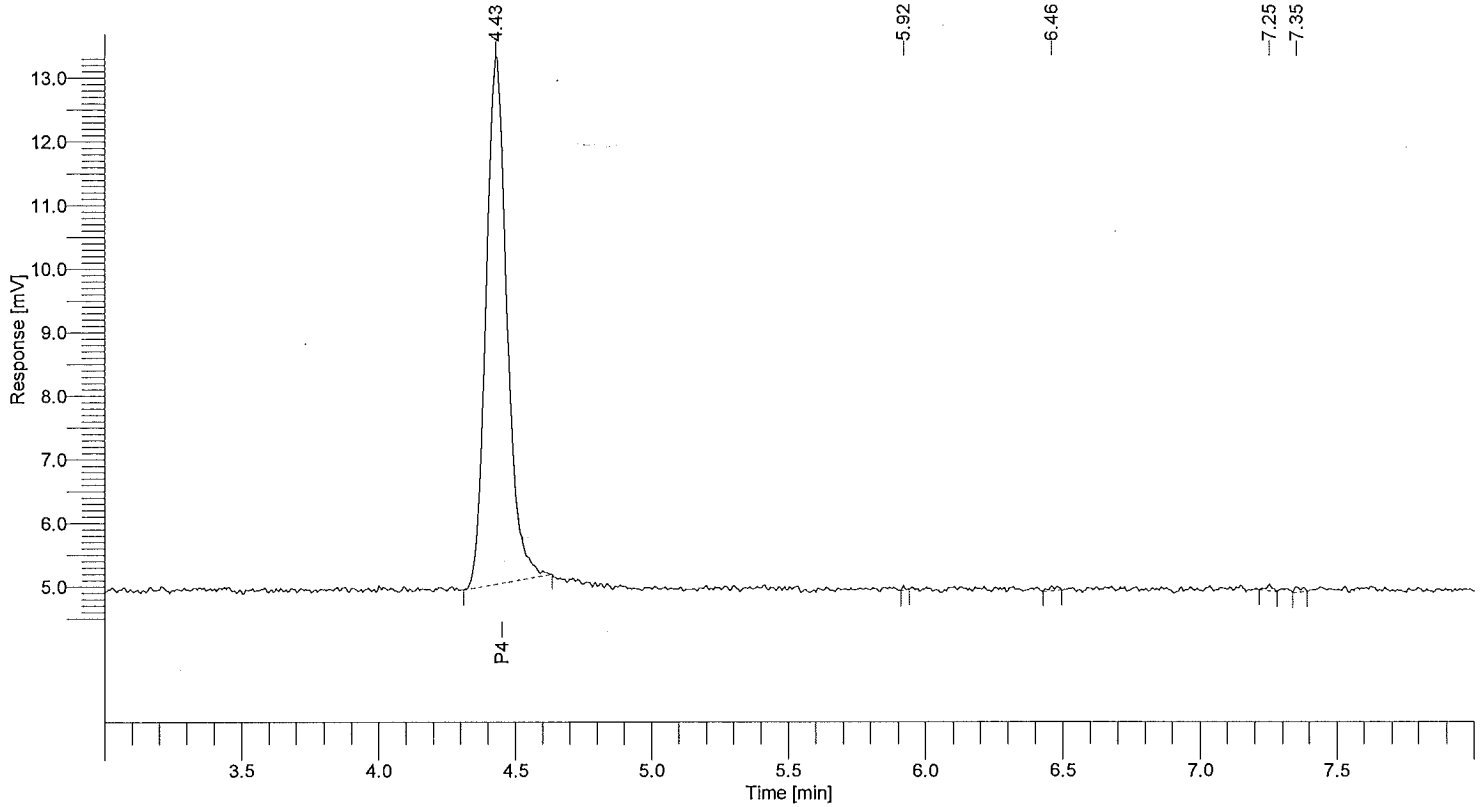
Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.40	P4	8071	44199	0.04882	0.05000	97.6
						97.6

P4 recovery 85 to 115%? ☒ YES ☐ NO

Software Version : 6.3.1.0504
 Sample Name : CCV4 0.05 ug/mL
 Instrument Name : GC24
 Rack/Vial : 0/37
 Sample Amount : 1.000000
 Cycle : 35

Date : 03/25/2013 09:51:43
 Data Acquisition Time : 03/22/2013 23:43:32
 Channel : B
 Operator : winter
 Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_037.rst
 Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.43	P4	8297	44061	0.05014	0.05000	100.3
						100.3

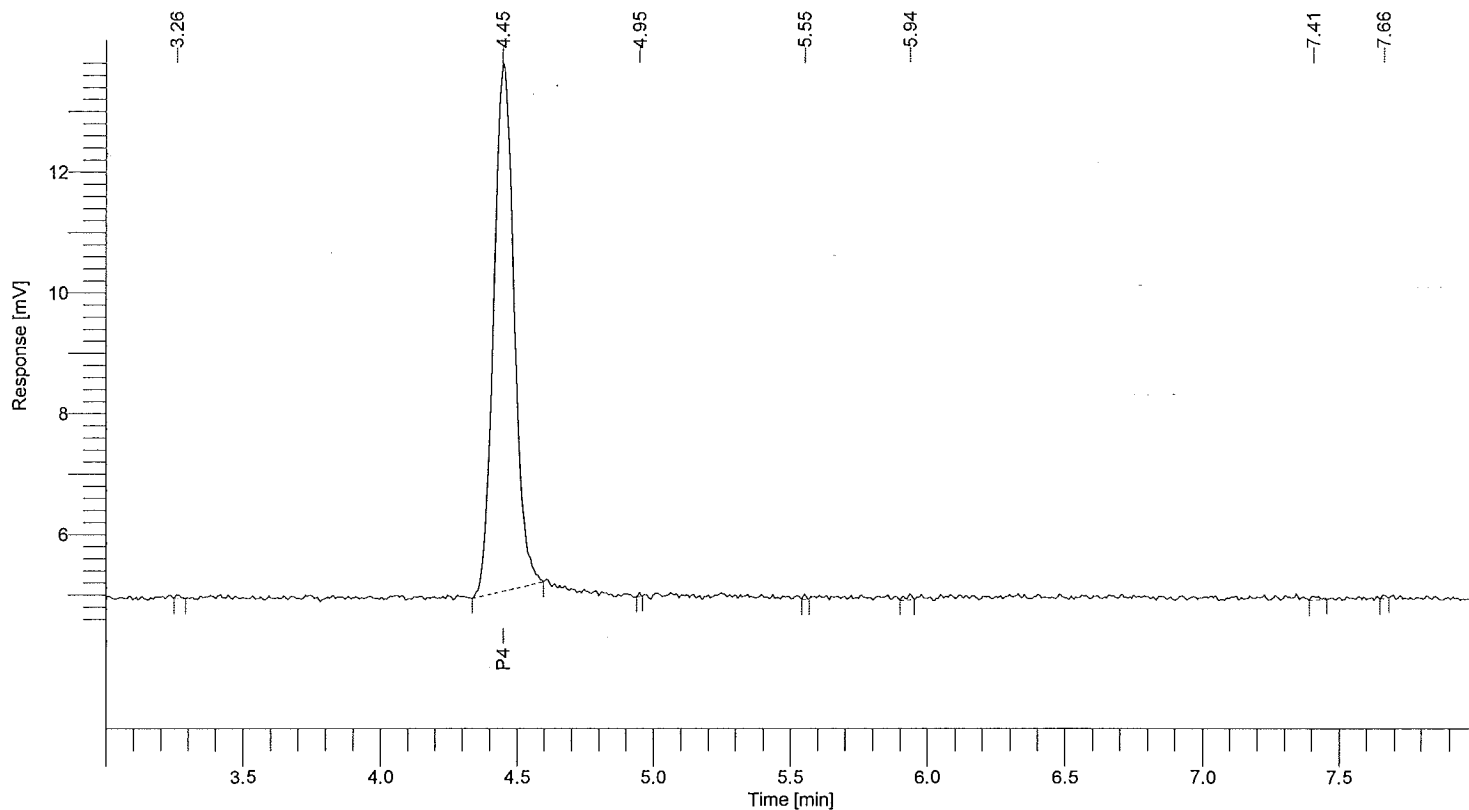
P4 recovery 85 to 115%? ☒ YES ☐ NO

Software Version : 6.3.1.0504
Sample Name : CCV5 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/47
Sample Amount : 1.000000
Cycle : 45

Date : 03/25/2013 09:52:03
Data Acquisition Time : 03/23/2013 01:31:52
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_047.rst

Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.45	P4	8720	45069	0.05261	0.05000	105.2
						105.2

P4 recovery 85 to 115%? ☒ YES ☐ NO

Fit Analysis Output For Method File: \\ALSLTWS012\TCCS\WINTER\GCE24\METHODS\24_P4.MTH
 Reprocess Number : alsbpx026: 1685851
 Component Name : P4
 Date : 03/20/2013 16:34:02

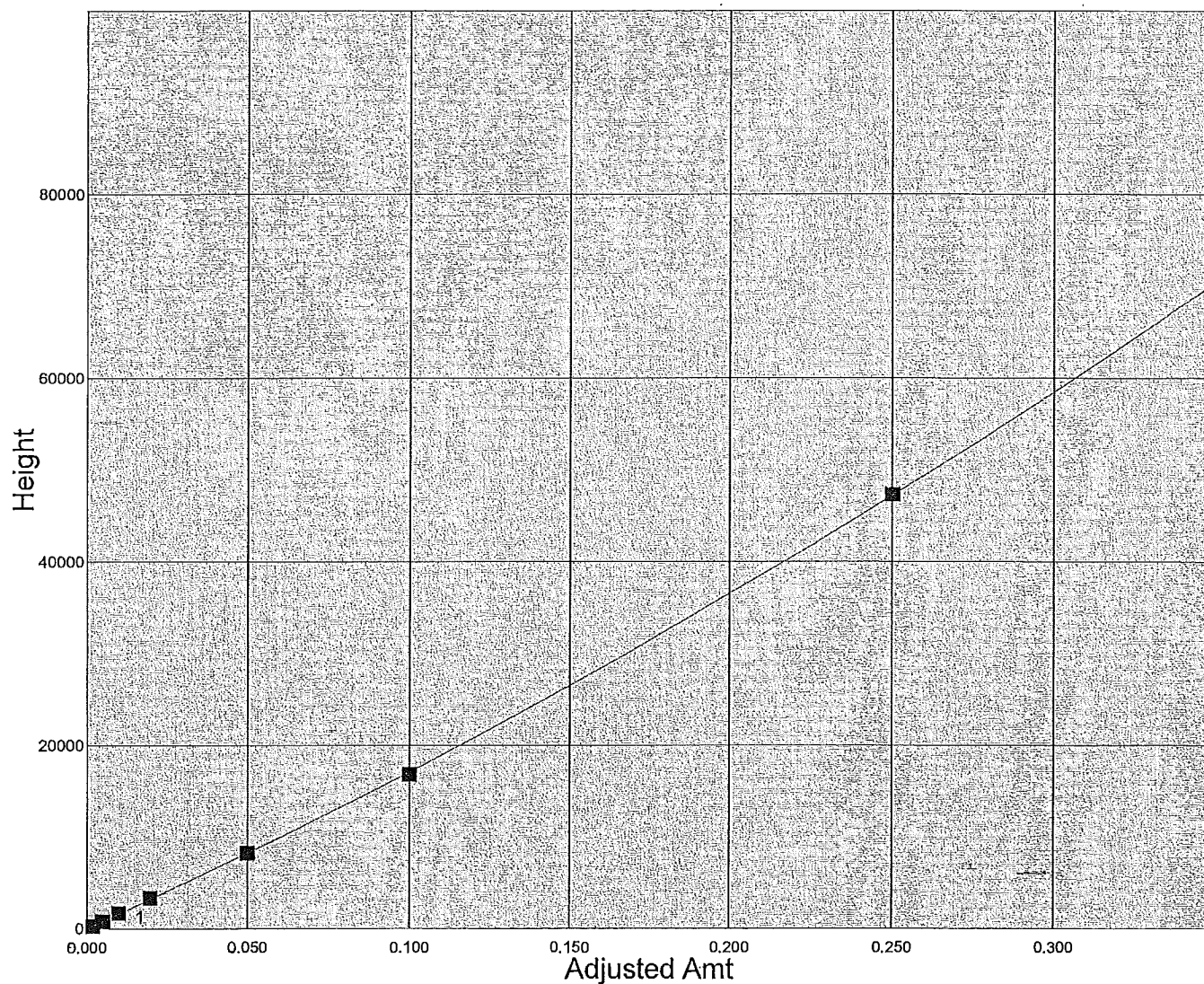
Curve Parameters:

Curve #1 : 2nd Order
 Weighting Factor = 1/x R-Squared = 0.999794
 Calibration Curve : $Y = (31.376776) + (158802.773029) X + (120481.126397) X^2$

Curve #1 :

Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta	%Diff.
7.	0.002000	0.001861	0.000139	7.473	327.314483	349.464	-22.150	-6.338
6	0.005000	0.004930	6.9695e-05	1.414	817.251586	828.403	-11.151	-1.346
5	0.010000	0.010686	-6.856e-04	-6.416	1742.041960	1631.453	110.589	6.779
4	0.020000	0.020543	-5.434e-04	-2.645	3344.565237	3255.625	88.941	2.732
3	0.050000	0.050011	-1.094e-05	-0.022	8274.587961	8272.718	1.870	0.023
2	0.100000	0.098572	0.001428	1.449	16855.488311	17116.465	-260.977	-1.525
1	0.250000	0.250424	-4.239e-04	-0.169	47355.018705	47262.140	92.878	0.197

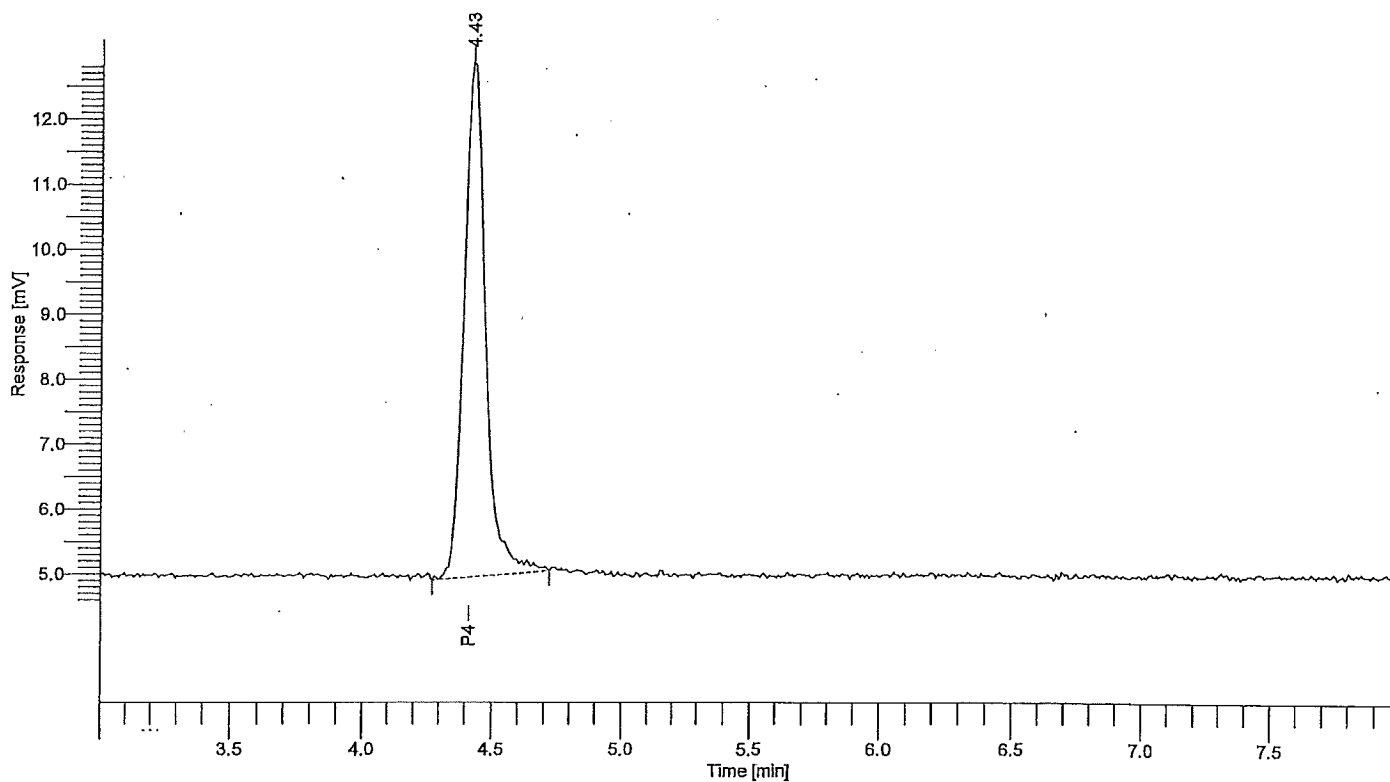
P4



Software Version : 6.3.1.0504
Sample Name : ICV 0.05 ug/mL prep by MVP
Instrument Name : GC24
Rack/Vial : 0/10
Sample Amount : 1.000000
Cycle : 11

Date : 03/20/2013 16:36:30
Data Acquisition Time : 03/20/2013 15:04:09
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \ALSLTWS012\TCCSWINTER\gce24\data\24130320\24130320_013.rst
Sequence File : \ALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV-s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.43	P4	7951	44879	0.04429	0.05000	88.6

88.6

P4 recovery 85 to 115%? YES NO

INJECTION LOG

File Name	Date Inject	Time Inject	Sample Name	Other ID	Instr ID	Column ID
24130322_004.rst	03/22/2013	17:44:17	CCV1 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130322_005.rst	03/22/2013	17:54:52	P4 STK0316	18312	GC24	DB-1 30m x 0.53mm
24130322_006.rst	03/22/2013	18:05:30	325233 RLVS 2uL	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_007.rst	03/22/2013	18:16:04	325234 MB	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_008.rst	03/22/2013	18:26:37	325235 LCS	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_009.rst	03/22/2013	18:37:09	325236 MS	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_010.rst	03/22/2013	18:47:47	325237 MSD	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_011.rst	03/22/2013	18:58:25	1307456012	HBN 103687	GC24	DB-1 30m x 0.53mm
24130322_012.rst	03/22/2013	19:09:02	P4 STK0320	18373	GC24	DB-1 30m x 0.53mm
24130322_013.rst	03/22/2013	19:19:45	325703 MB	HBN 103884	GC24	DB-1 30m x 0.53mm
24130322_014.rst	03/22/2013	19:30:26	325704 LCS	HBN 103884	GC24	DB-1 30m x 0.53mm
24130322_015.rst	03/22/2013	19:41:11	CCV2 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130322_016.rst	03/22/2013	19:51:58	325705 MS	HBN 103884	GC24	DB-1 30m x 0.53mm
24130322_017.rst	03/22/2013	20:02:46	325706 MSD	HBN 103884	GC24	DB-1 30m x 0.53mm
24130322_018.rst	03/22/2013	20:13:35	1307848008	HBN 103884	GC24	DB-1 30m x 0.53mm
24130322_019.rst	03/22/2013	20:24:24	P4 STK0321	18391	GC24	DB-1 30m x 0.53mm
24130322_020.rst	03/22/2013	20:35:14	325883 RLVS 5uL	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_021.rst	03/22/2013	20:46:11	325884 MB	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_022.rst	03/22/2013	20:57:04	325885 LCS	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_023.rst	03/22/2013	21:08:01	325886 MS	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_024.rst	03/22/2013	21:18:59	325887 MSD	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_025.rst	03/22/2013	21:30:12	1307456001	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_026.rst	03/22/2013	21:41:25	CCV3 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130322_027.rst	03/22/2013	21:52:37	1307456002	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_028.rst	03/22/2013	22:03:45	1307456003	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_029.rst	03/22/2013	22:14:51	1307456004	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_030.rst	03/22/2013	22:25:57	1307456005	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_031.rst	03/22/2013	22:37:04	1307456006	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_032.rst	03/22/2013	22:48:07	1307456007	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_033.rst	03/22/2013	22:59:18	1307456008	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_034.rst	03/22/2013	23:10:31	1307456009	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_035.rst	03/22/2013	23:21:36	1307456010	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_036.rst	03/22/2013	23:32:33	1307456011	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_037.rst	03/22/2013	23:43:32	CCV4 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130322_038.rst	03/22/2013	23:54:26	1307848001	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_039.rst	03/23/2013	00:05:21	1307848002	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_040.rst	03/23/2013	00:16:16	1307848003	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_041.rst	03/23/2013	00:27:07	1307848004	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_042.rst	03/23/2013	00:37:57	1307848005	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_043.rst	03/23/2013	00:48:48	1307848006	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_044.rst	03/23/2013	00:59:35	1307848007	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_045.rst	03/23/2013	01:10:23	1307984001	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_046.rst	03/23/2013	01:21:08	1307984002	HBN 103994	GC24	DB-1 30m x 0.53mm
24130322_047.rst	03/23/2013	01:31:52	CCV5 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm

Matrix: Soil HBN # : 103994	Client: Weston Solutions
	Set ID: 1307984
	Method: 7580 White Phosphorus
	Matrix: Soil
	Initial Calibration: 03/20/2013
	Samples analyzed: 03/22-23/2013

Instrument: GC24 (FPD02): HP5890 with DB-1 (30m x 0.53mm ID x 1.536um film) column and FPD detector with phosphorus filter.

Injection volume: 2.0 uL. Voltage: 75%. Injection temp: POCO. Detector temp: 325C.

GC Program: 80C for 8.0 min.

Sample QC : Method blanks and LCS/LCSD were prepared and analyzed. MS/MSD were prepared using sample 1307456001. MS sample recovery low due to matrix effect.

Dilutions: none.

Surrogate: Method does not require a surrogate.

Standard & QC Prep:

	Isooctane	Sample	Phosphorus 0.250 ppm 18321	Aqueous spiking solution
	(mL)	(g of Soil)	(mL)	
STD1	1.00		0.400	
STD2	1.00		0.200	
STD3	1.00		0.0800	
STD4	1.00		0.0400	
STD5	1.00		0.0200	
STD6	1.00		0.00800	
ICV (STD2)	3.00		0.200	18371 - ICV prepared by Mila Potekhin
CCVs (STD2)	3.00		0.200	
Blanks	10.0	40.0		
LCS/LCSD	10.0	40.0	0.250	18391
Samples	10.0	40.0		
MS and MSD	10.0	40.0	0.000	

Miscellaneous comments: 1) Quantitation was performed using peak height and 2nd order curve.

2) Concentration of P4 spike solution 18391 was established before analyzing samples.

3) Bottle top solvent dispensing pump checked for accuracy with a volumetric cylinder prior to processing samples. 10mL = 10mL.

Created by Christopher R. Winter 03/26/2013

GC/FPD Analyst writeup for analysis of white phosphorus (P4) in soil.

INJECTION LOG

File Name	Date Inject	Time Inject	Sample Name	Other ID	Instr ID	Column ID
24130320_005.rst	03/20/2013	13:38:53	Std1 0.25 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_006.rst	03/20/2013	13:49:36	Std2 0.10 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_007.rst	03/20/2013	14:00:13	Std3 0.05 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_008.rst	03/20/2013	14:10:48	Std4 0.02 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_009.rst	03/20/2013	14:21:29	Std5 0.01 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_010.rst	03/20/2013	14:32:02	Std6 0.005 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_011.rst	03/20/2013	14:42:39	Std7 0.002 ug/mL	18321	GC24	DB-1 30m x 0.53mm
24130320_012.rst	03/20/2013	14:53:21	Std8 0.001 ug/mL NOT USED	18321	GC24	DB-1 30m x 0.53mm
24130320_013.rst	03/20/2013	15:04:09	ICV 0.05 ug/mL prep by MVP	18371	GC24	DB-1 30m x 0.53mm



STANDARD REPORT

Working Standard - ICV .05ug/mL

ICV .05ug/mL		Description - CALIBRATION ICV P4			
Standard: 18371	Expires: 09/17/2013	Usable: Yes			
Lab Lot: 01062010 P4	Created By: M. Potekhin	Amount: 1 mL			
Part ID: ICV	Create Date: 03/20/2013	Validated By:			
MFG: ALS	MFG Lot:	Validated Date:			
Pos.	Analyte	Name	Concentration		
1	7723-14-0	Phosphorus	0.0500094 ug/mL		
2	7723-14-0W	White Phosphorus	0.0500094 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume Added	Expires
3334	iso-octane	iso-octane for P4	01/01/09 iso-oct	0.8 mL	1/1/2025
18321	P4 0.25	P4 0.25 ppm iso-octane sol	010510	0.2 mL	9/17/2013



STANDARD REPORT

Constituent

Working Standard - P4 0.25

P4 0.25		Description - P4 0.25 ppm Iso-octane sol			
Standard:	18321	Expires:	09/17/2013	Usable:	Yes
Lab Lot:	010510	Created By:	C. Winter	Amount:	100 mL
Part ID:	010510	Create Date:	03/18/2013	Validated By:	
MFG:	ALS	MFG Lot:	010510	Validated Date:	
Pos.	Analyte	Name	Concentration		
1	7723-14-0	Phosphorus	0.250047 ug/mL		
2	7723-14-0W	White Phosphorus	0.250047 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume Added	Expires
3334	iso-octane	iso-octane for P4	01/01/09 iso-oct	99.9433 mL	1/1/2025
18318	P4 441 ppm		010510	0.0567 mL	3/17/2014



STANDARD REPORT

Constituent

Working Standard - P4 441 ppm

P4 441 ppm		Description - P4 solution 441 ug/mL			
Standard: 18318	Expires: 03/17/2014	Usable: Yes			
Lab Lot: 010510	Created By: C. Winter	Amount: 100 mL			
Part ID: 010510	Create Date: 03/18/2013	Validated By:			
MFG: DCL	MFG Lot: 010510	Validated Date:			
Pos.	Analyte	Name	Concentration		
1	7723-14-0	Phosphorus	441 ug/mL		
2	7723-14-0W	White Phosphorus	441 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume Added	Expires
3784	Toluene	Toluene	CX498	100 mL	4/16/2025
5045	Stock P4	Stock P4	755059	0.0441 grams	8/6/2025



STANDARD REPORT

Constituent

Stock Standard - Stock P4

Stock P4			Description - Stock P4
Standard: 5045	Expires: 8/6/2025	Usable: Yes	
Lab Lot: 755059	Created By: M. Potekhin	Amount: 200 grams	
Part ID: 755059	Create Date: 1/1/2008	Validated By:	
MFG: Fisher	MFG Lot: 755059	Validated Date:	
Pos.	Analyte	Name	Concentration
1	7723-14-0	Phosphorus	1000 mg/g
2	7723-14-0W	White Phosphorus	1000 mg/g



STANDARD REPORT

Constituent

Solvent Standard - Toluene

Toluene		Description - 100% Toluene	
Standard: 3784	Expires: 4/16/2025	Usable: Yes	
Lab Lot: CX498	Created By: M. Potekhin	Amount: 8 L	
Part ID: 347-4	Create Date: 4/16/2009	Validated By:	
MFG: B&J Brand	MFG Lot: CX498	Validated Date:	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



STANDARD REPORT

Constituent

Solvent Standard - iso-octane

Iso-octane		Description - Iso-octane for P4	
Standard: 3334	Expires: 1/1/2025	Usable: Yes	
Lab Lot: 01/01/09 Iso-oct	Created By: M. Potekhin	Amount: 16 L	
Part ID:	Create Date: 1/1/2009	Validated By:	
MFG: Fisher	MFG Lot: 083929	Validated Date:	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

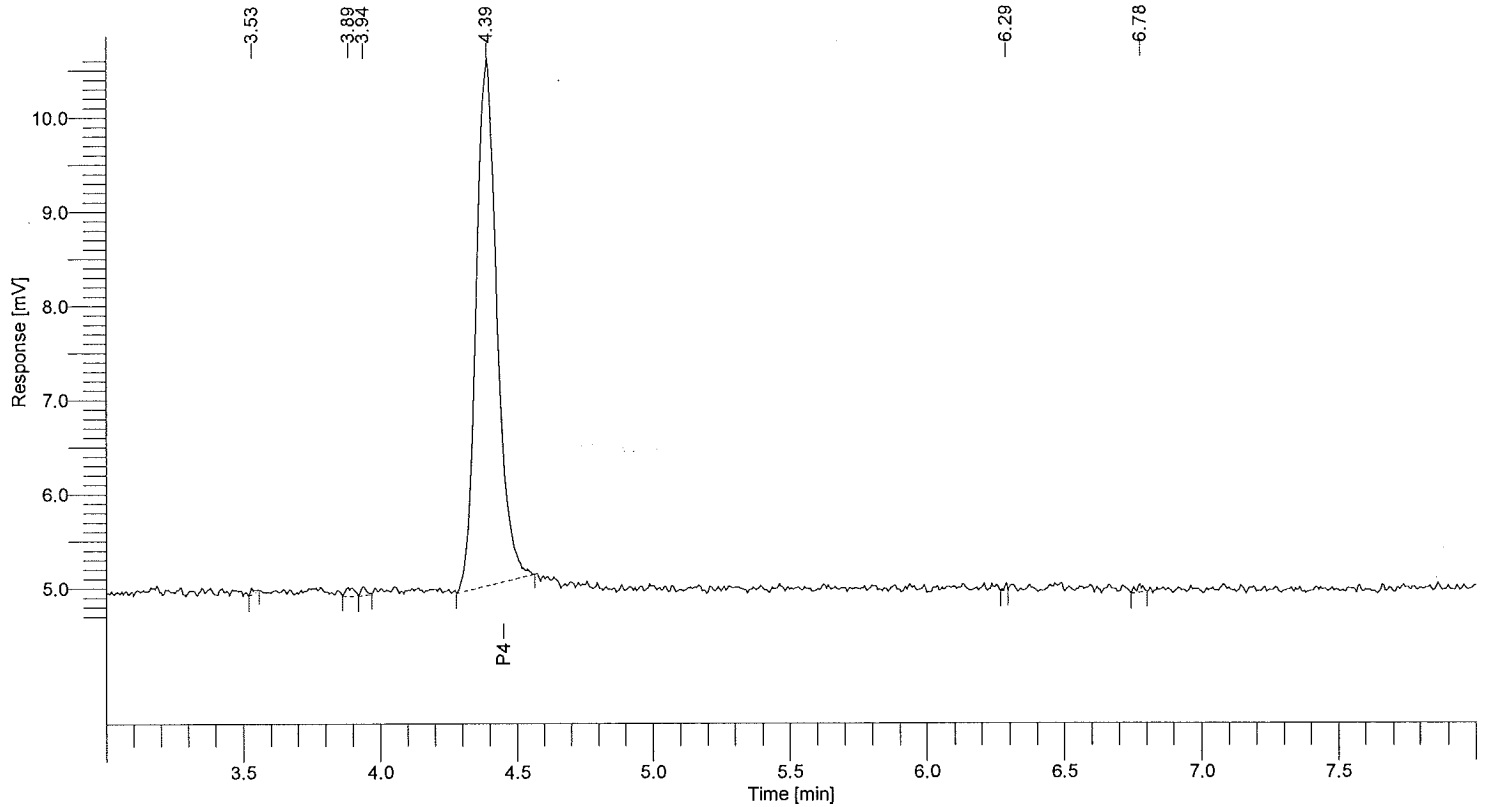
Raw Data *Calibration*

Software Version : 6.3.1.0504
Sample Name : P4 STK0321
Instrument Name : GC24
Rack/Vial : 0/19
Sample Amount : 1.000000
Cycle : 17

Date : 03/25/2013 09:51:04
Data Acquisition Time : 03/22/2013 20:24:24
Channel : B
Operator : winter
Dilution Factor : 100.000000

Result File : \VALSLTWS012\TCCS\WINTER\gce24\data\24130322\24130322_019.rst

Sequence File : \VALSLTWS012\TCCS\WINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 STANDARD REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL
4.39	P4	5577	29773	0.034042

3.40 ug/mL

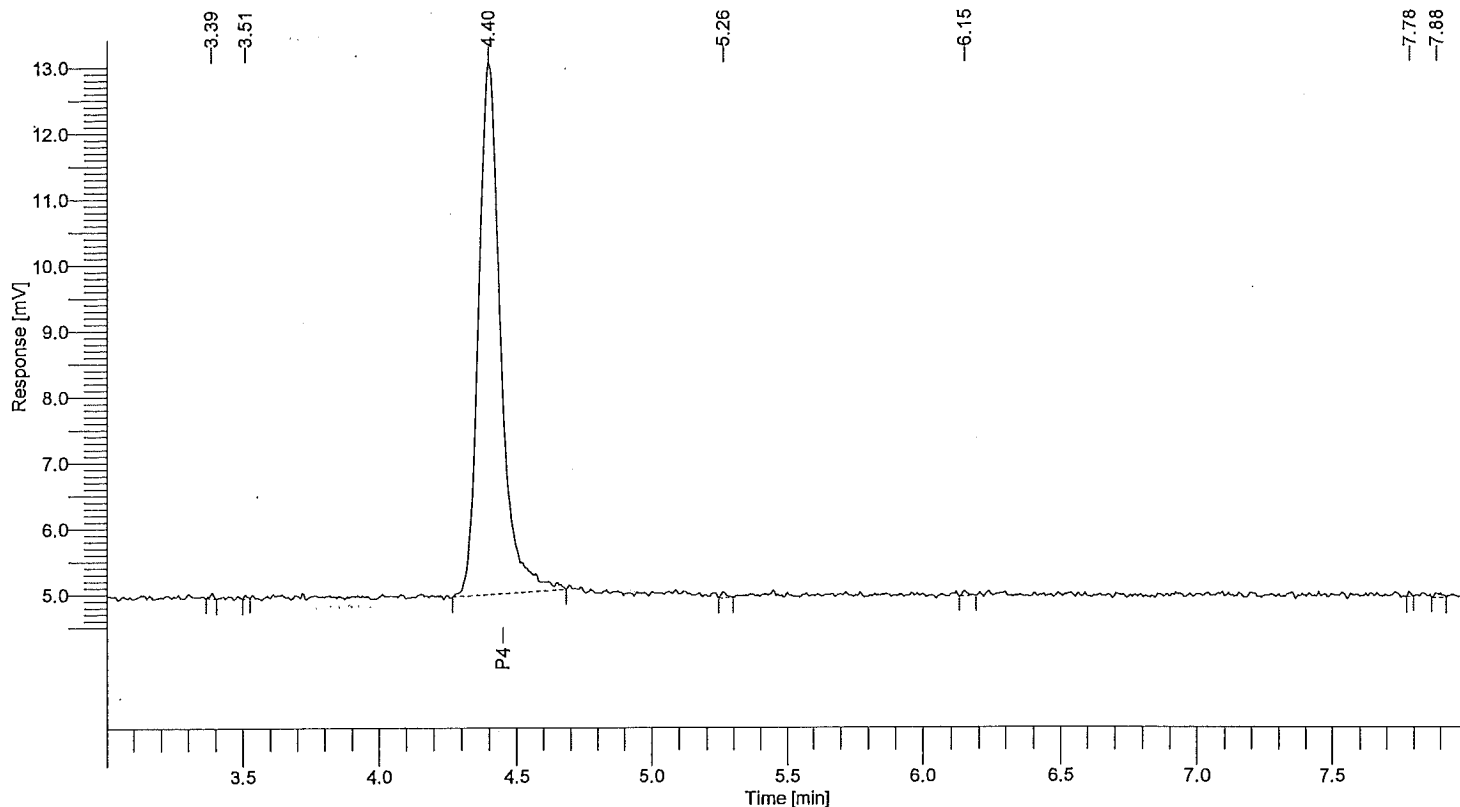
CW
3/25/13

Software Version : 6.3.1.0504
Sample Name : CCV2 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/15
Sample Amount : 1.000000
Cycle : 13

Date : 03/25/2013 09:50:54
Data Acquisition Time : 03/22/2013 19:41:11
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCS\WINTER\gce24\data\24130322\24130322_015.rst

Sequence File : \VALSLTWS012\TCCS\WINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.40	P4	8094	45728	0.04896	0.05000	97.9
						97.9

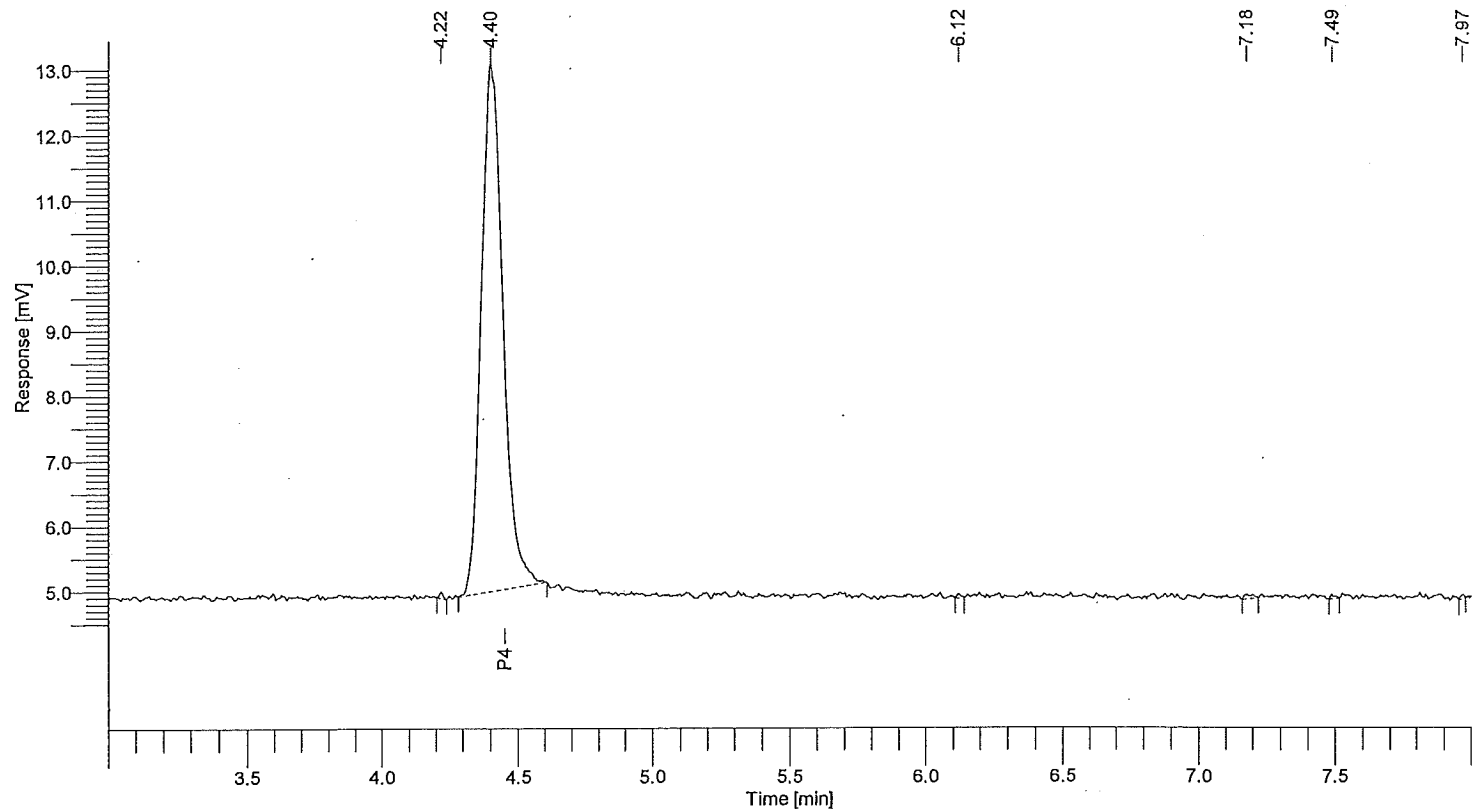
P4 recovery 85 to 115%? YES NO

Software Version : 6.3.1.0504
Sample Name : CCV3 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/26
Sample Amount : 1.000000
Cycle : 24

Date : 03/25/2013 09:51:20
Data Acquisition Time : 03/22/2013 21:41:25
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130322\24130322_026.rst

Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.40	P4	8071	44199	0.04882	0.05000	97.6
						97.6

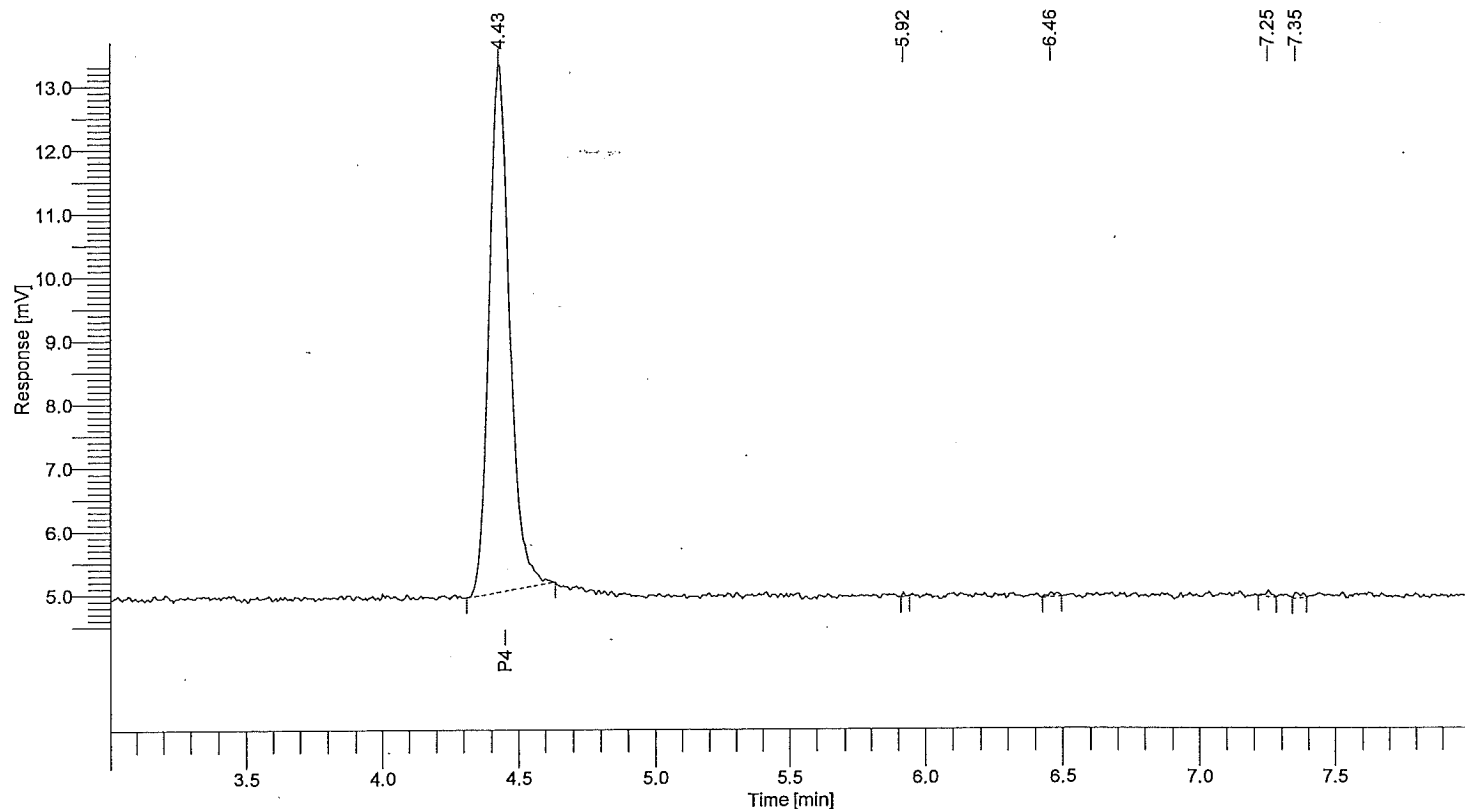
P4 recovery 85 to 115%? YES NO

Software Version : 6.3.1.0504
Sample Name : CCV4 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/37
Sample Amount : 1.000000
Cycle : 35

Date : 03/25/2013 09:51:43
Data Acquisition Time : 03/22/2013 23:43:32
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_037.rst

Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.43	P4	8297	44061	0.05014	0.05000	100.3
						100.3

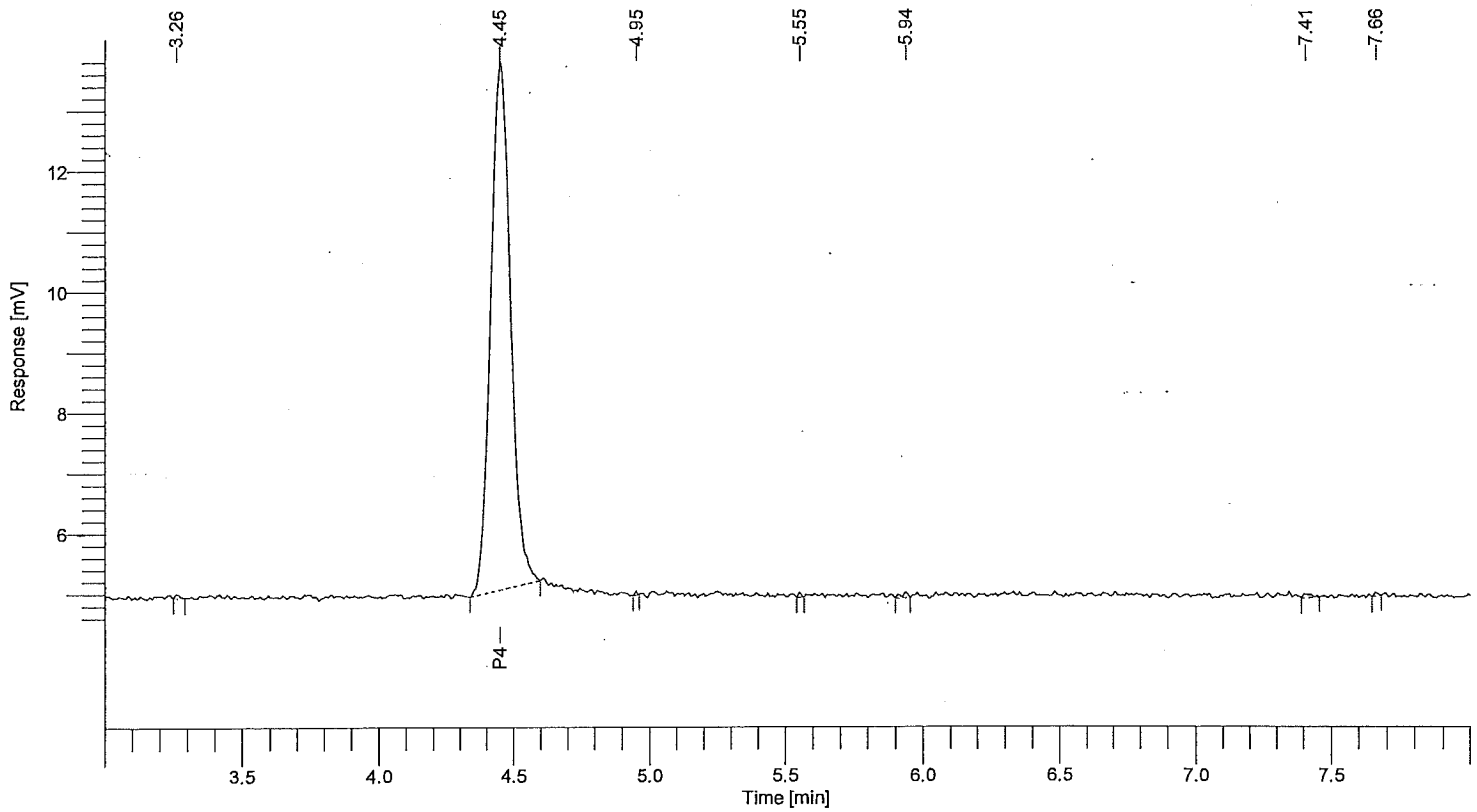
P4 recovery 85 to 115%? YES NO

Software Version : 6.3.1.0504
Sample Name : CCV5 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/47
Sample Amount : 1.000000
Cycle : 45

Date : 03/25/2013 09:52:03
Data Acquisition Time : 03/23/2013 01:31:52
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130322\24130322_047.rst

Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.45	P4	8720	45069	0.05261	0.05000	105.2
						105.2

P4 recovery 85 to 115%? YES NO

Fit Analysis Output For Method File: \\ALS\TWS012\TCCS\WINTER\GCE24\METHODS\24_P4.MTH
 Reprocess Number : als\bp026: 1685851
 Component Name : P4
 Date : 03/20/2013 16:34:45

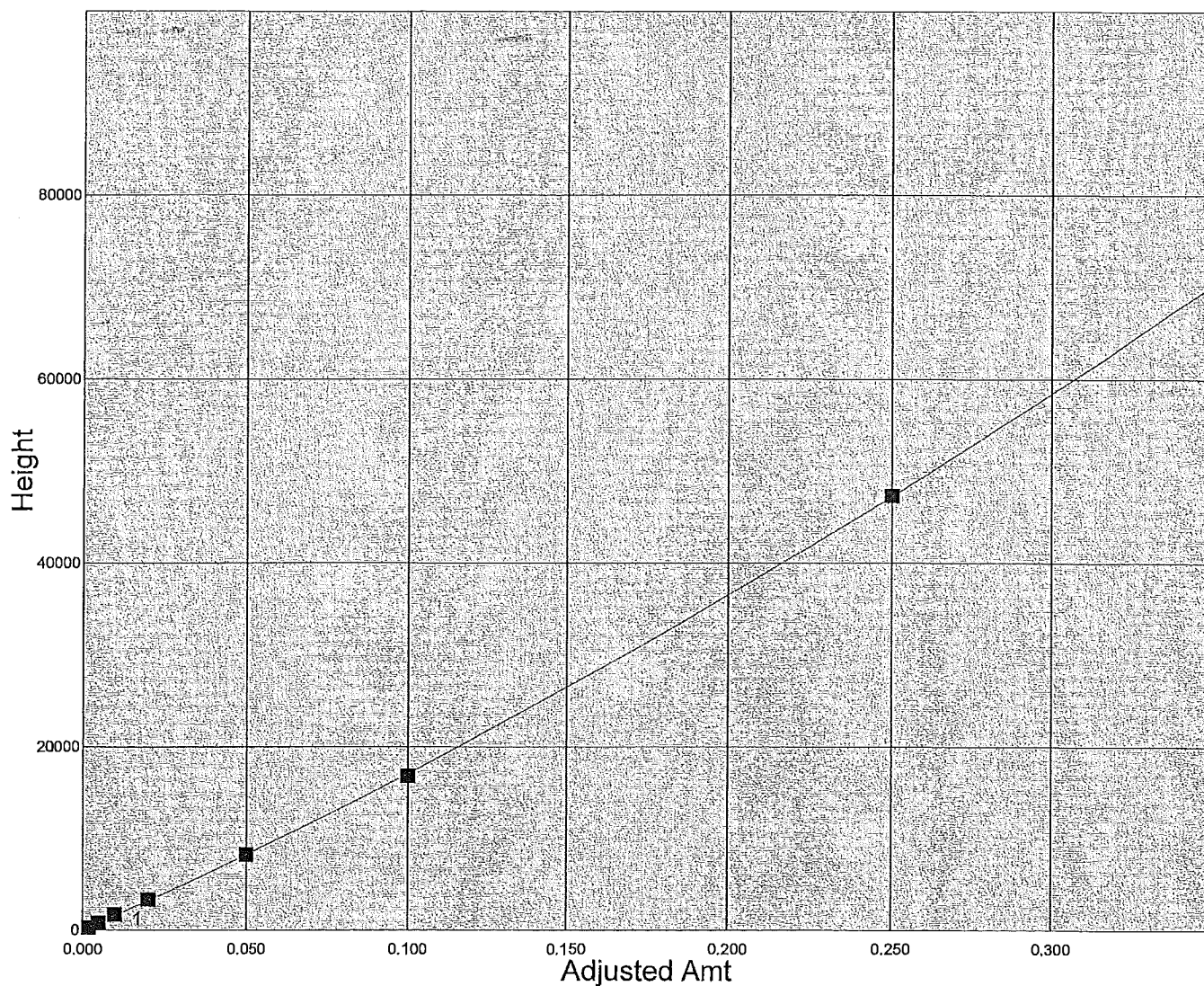
Curve Parameters:

Curve #1 : 2nd Order
 Weighting Factor = 1/x R-Squared = 0.999794
 Calibration Curve : $Y = (31.376776) + (158802.773029) X + (120481.126397) X^2$

Curve #1 :

Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta	%Diff.
7	0.002000	0.001861	0.000139	7.473	327.314483	349.464	-22.150	-6.338
6	0.005000	0.004930	6.9695e-05	1.414	817.251586	828.403	-11.151	-1.346
5	0.010000	0.010686	-6.856e-04	-6.416	1742.041960	1631.453	110.589	6.779
4	0.020000	0.020543	-5.434e-04	-2.645	3344.565237	3255.625	88.941	2.732
3	0.050000	0.050011	-1.094e-05	-0.022	8274.587981	8272.718	1.870	0.023
2	0.100000	0.098572	0.001428	1.449	16855.488311	17116.465	-260.977	-1.525
1	0.250000	0.250424	-4.239e-04	-0.169	47355.018705	47262.140	92.878	0.197

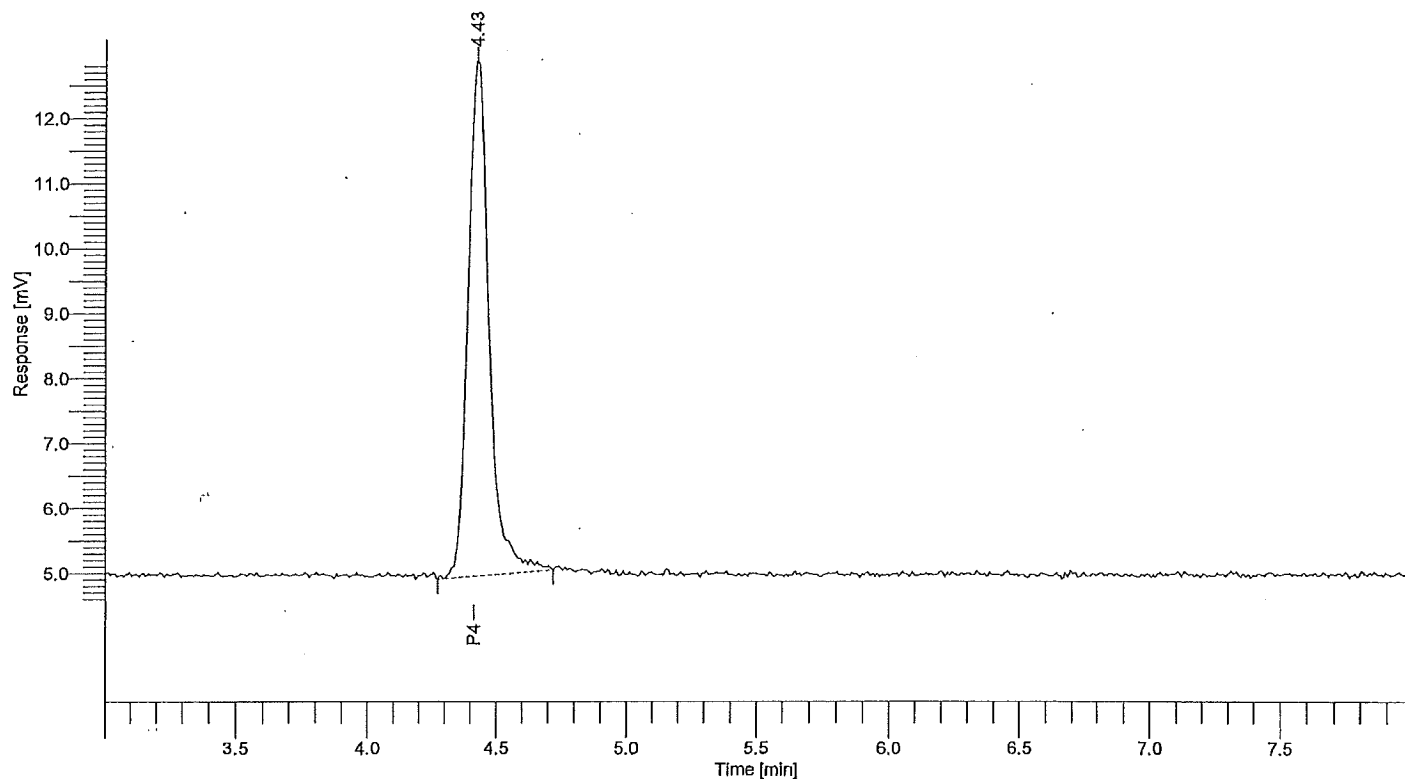
P4



Software Version : 6.3.1.0504
Sample Name : ICV 0.05 ug/mL prep by MVP
Instrument Name : GC24
Rack/Vial : 0/10
Sample Amount : 1.000000
Cycle : 11

Date : 03/20/2013 16:36:30
Data Acquisition Time : 03/20/2013 15:04:09
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_013.rst
Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 CCV REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	Target Amt ug/mL	Rec %
4.43	P4	7951	44879	0.04429	0.05000	88.6
						88.6

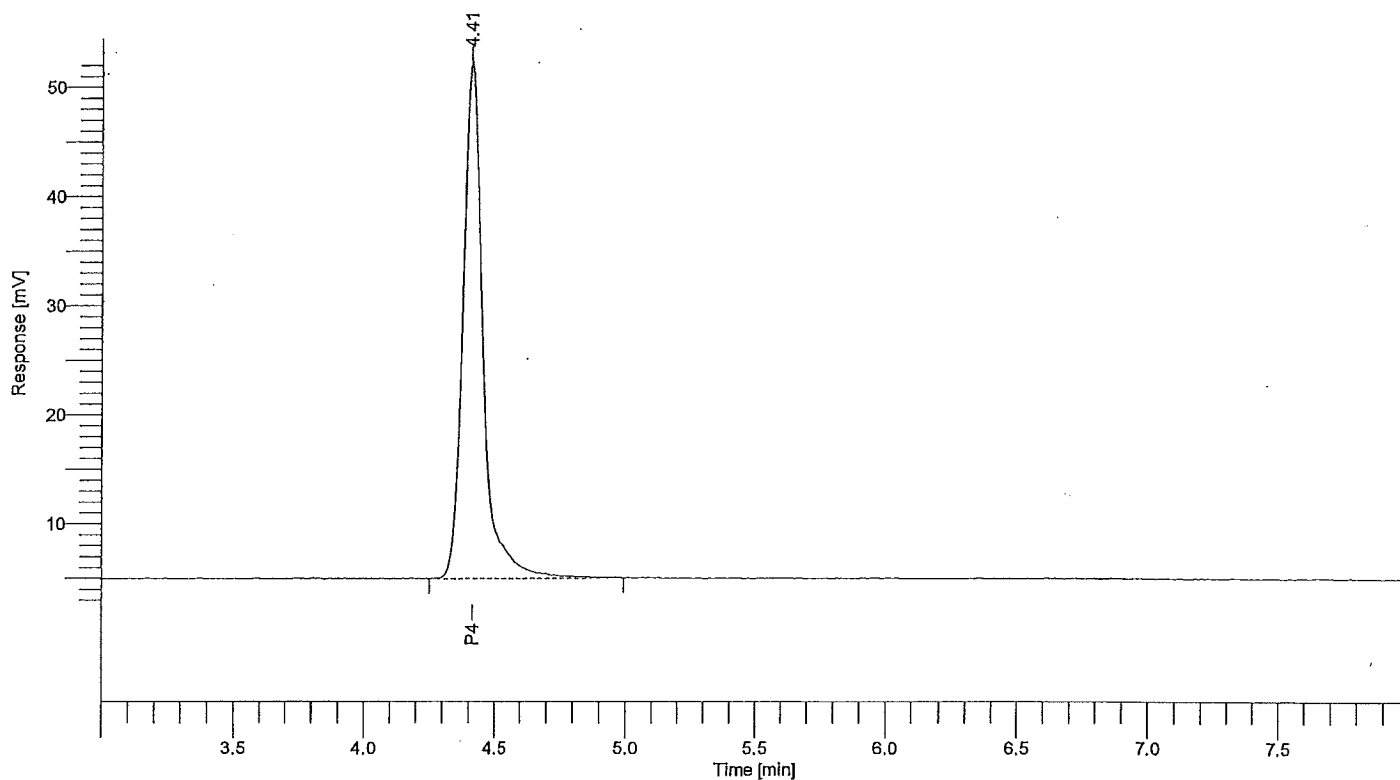
P4 recovery 85 to 115%? YES NO

Software Version : 6.3.1.0504
Sample Name : Std1 0.25 ug/mL
Instrument Name : GC24
Rack/Vial : 0/2
Sample Amount : 1.000000
Cycle : 3

Date : 03/20/2013 16:36:14
Data Acquisition Time : 03/20/2013 13:38:53
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \\ALSLTWS012\TCCSWINTER\gce24\data\24130320\24130320_005.rst

Sequence File : \\ALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

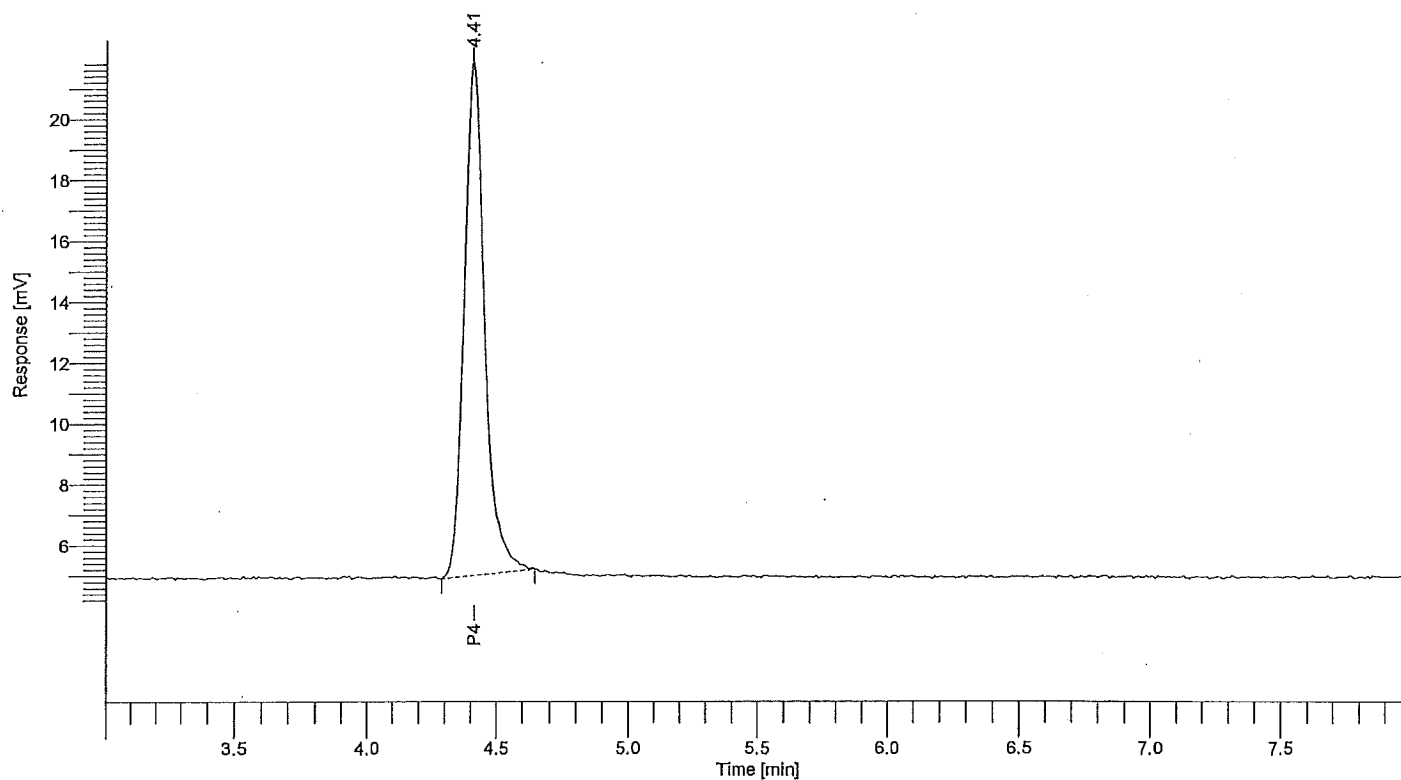
Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL
4.41	P4	47355	254266	0.261317

Software Version : 6.3.1.0504
Sample Name : Std2 0.10 ug/mL
Instrument Name : GC24
Rack/Vial : 0/3
Sample Amount : 1.000000
Cycle : 4

Date : 03/20/2013 16:36:16
Data Acquisition Time : 03/20/2013 13:49:36
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_006.rst
Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

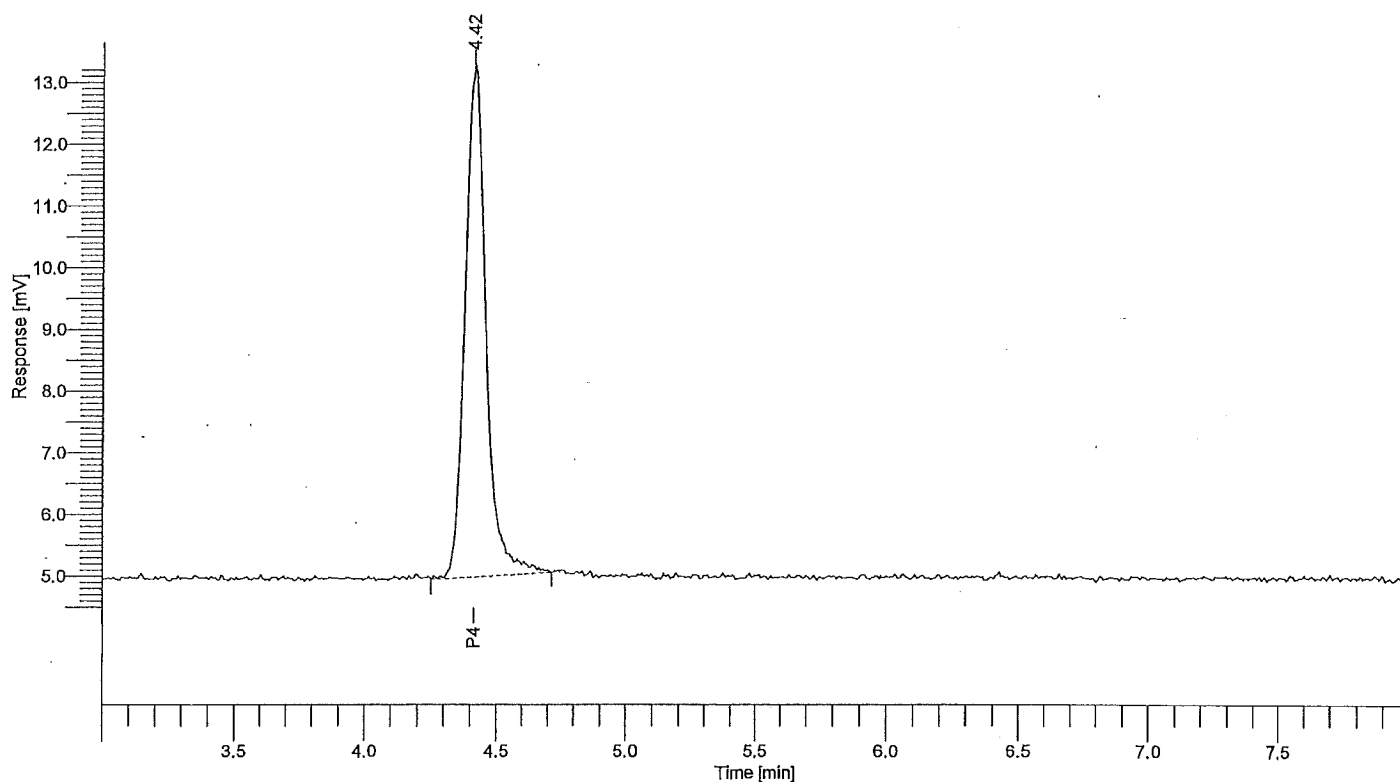
Time min	Component Name	Height uV	Area [uV-s]	Raw Amt ug/mL
4.41	P4	16855	92347	0.093329

Software Version : 6.3.1.0504
Sample Name : Std3 0.05 ug/mL
Instrument Name : GC24
Rack/Vial : 0/4
Sample Amount : 1.000000
Cycle : 5

Date : 03/20/2013 16:36:19
Data Acquisition Time : 03/20/2013 14:00:13
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \\ALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_007.rst

Sequence File : \\ALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

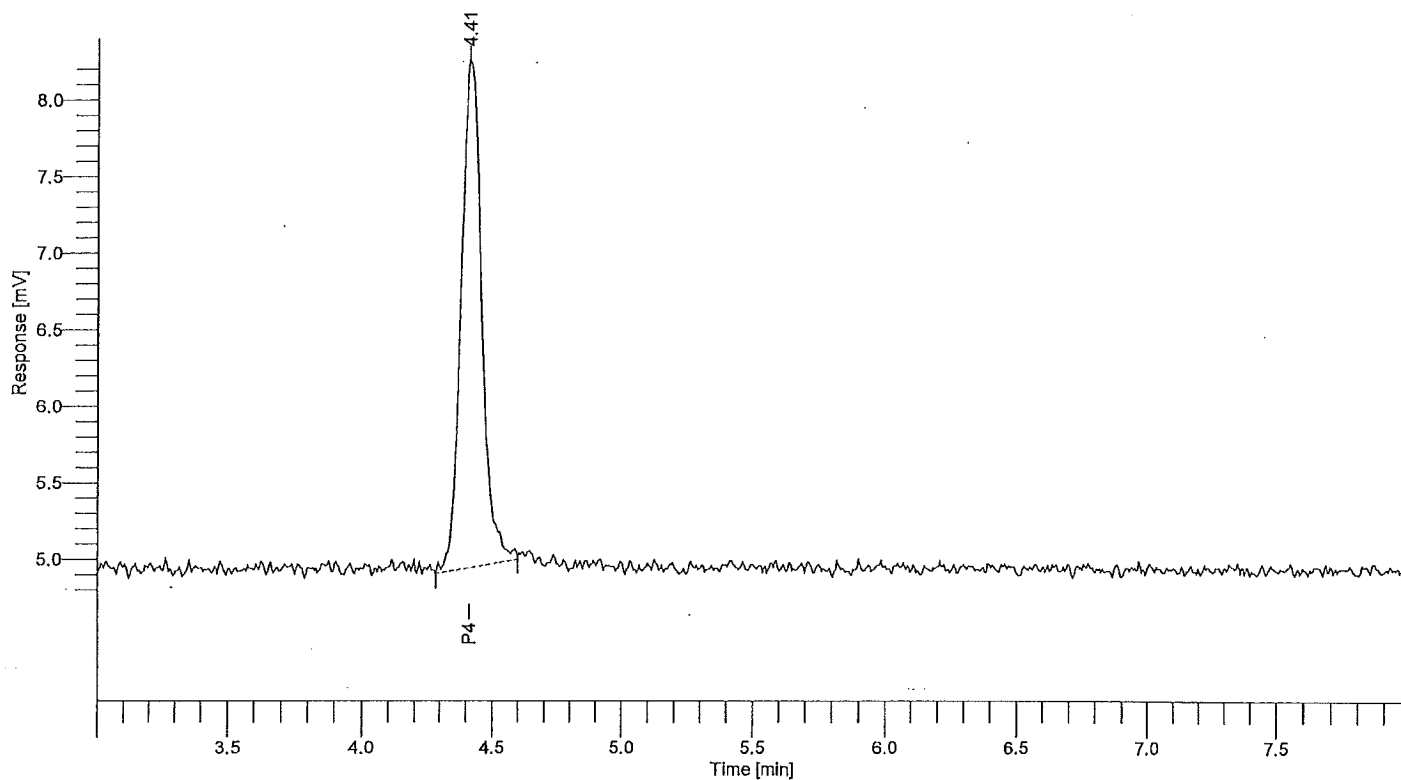
Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [μV·s]	Raw Amt ug/mL
4.42	P4	8275	46181	0.046067

Software Version : 6.3.1.0504
Sample Name : Std4 0.02 ug/mL
Instrument Name : GC24
Rack/Vial : 0/5
Sample Amount : 1.000000
Cycle : 6

Date : 03/20/2013 16:36:21
Data Acquisition Time : 03/20/2013 14:10:48
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \\ALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_008.rst
Sequence File : \\ALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

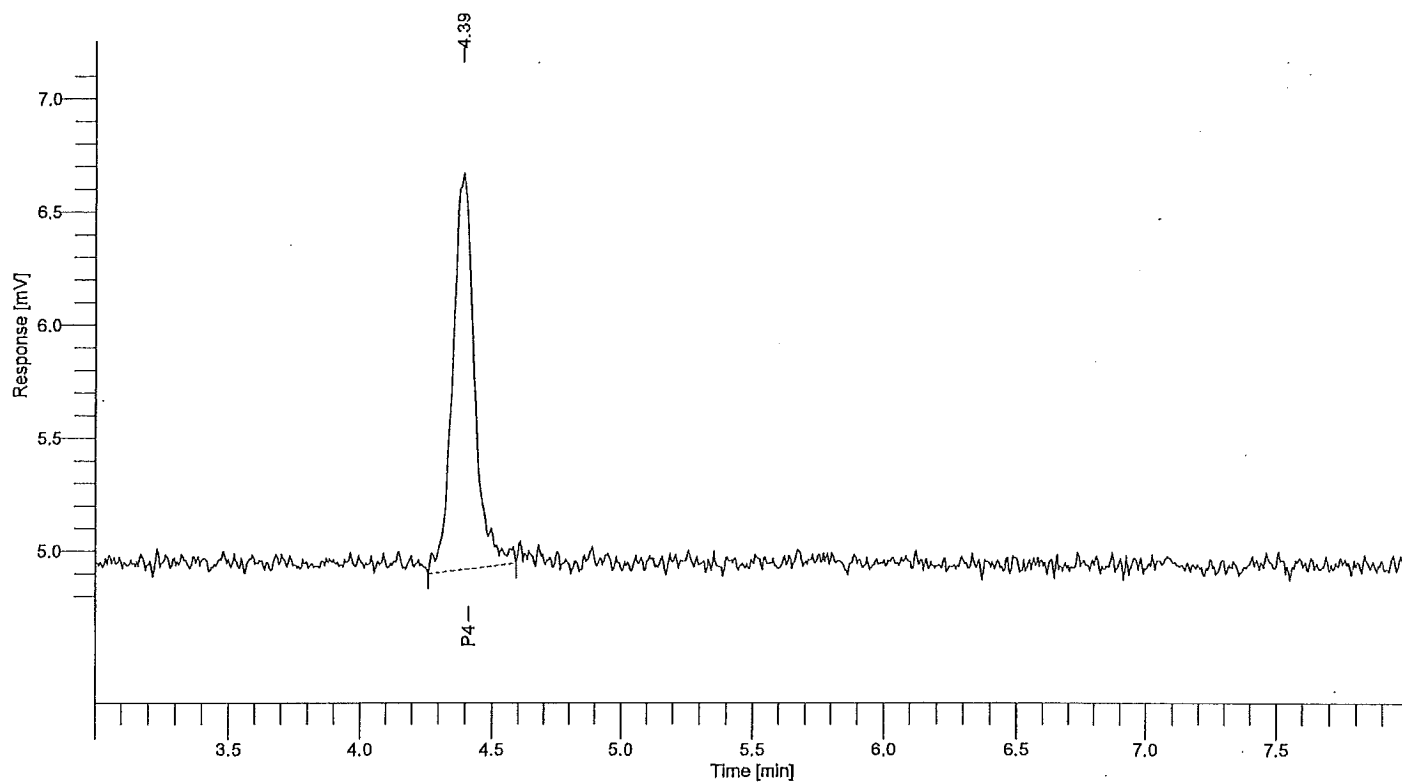
Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL
4.41	P4	3345	18079	0.018913

Software Version : 6.3.1.0504
Sample Name : Std5 0.01 ug/mL
Instrument Name : GC24
Rack/Vial : 0/6
Sample Amount : 1.000000
Cycle : 7

Date : 03/20/2013 16:36:23
Data Acquisition Time : 03/20/2013 14:21:29
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_009.rst

Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

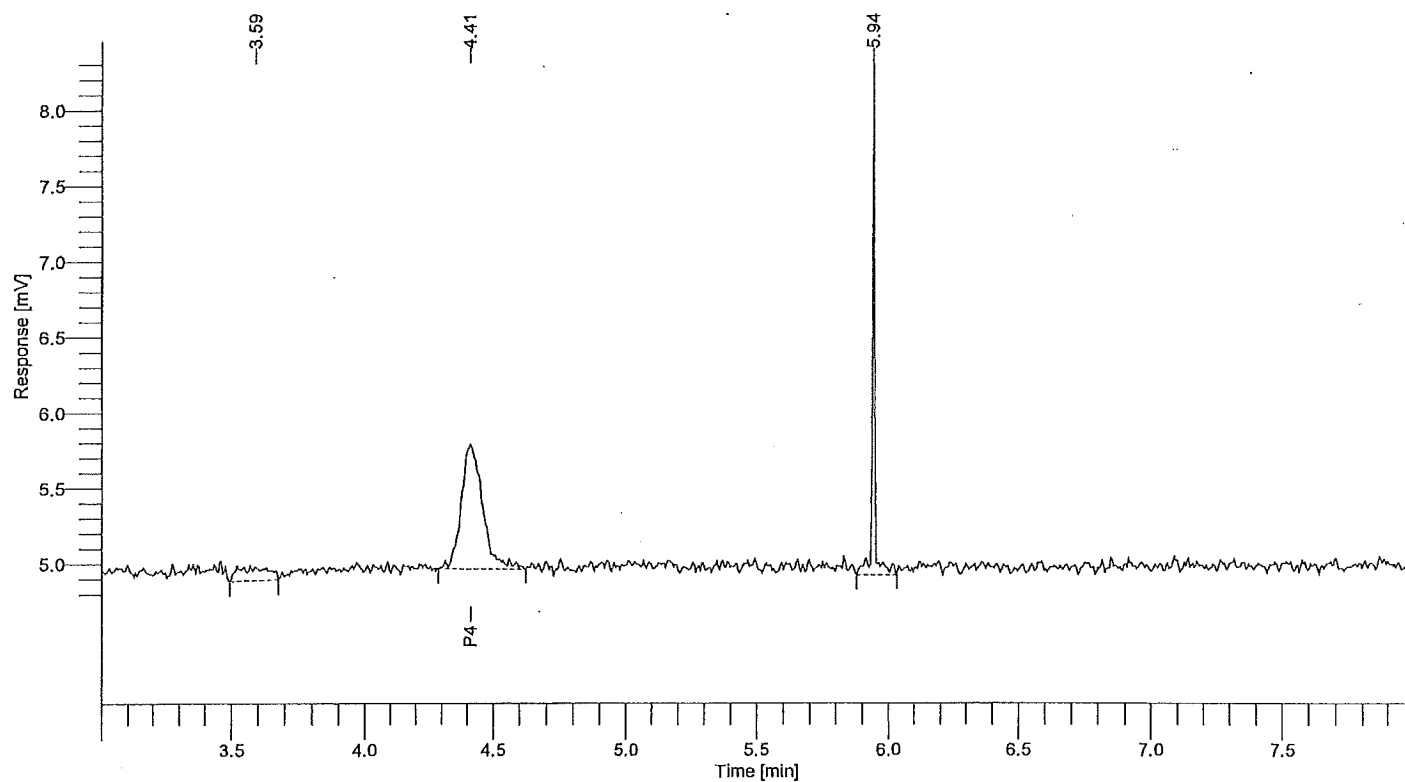
Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV-s]	Raw Amt ug/mL
4.39	P4	1742	9925	0.010087

Software Version : 6.3.1.0504
Sample Name : Std 0.005 ug/mL
Instrument Name : GC24
Rack/Vial : 0/7
Sample Amount : 1.000000
Cycle : 8

Date : 03/20/2013 16:36:25
Data Acquisition Time : 03/20/2013 14:32:02
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : VALSLTWS012\TCCSWINTER\gce24\data\24130320\24130320_010.rst
Sequence File : VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

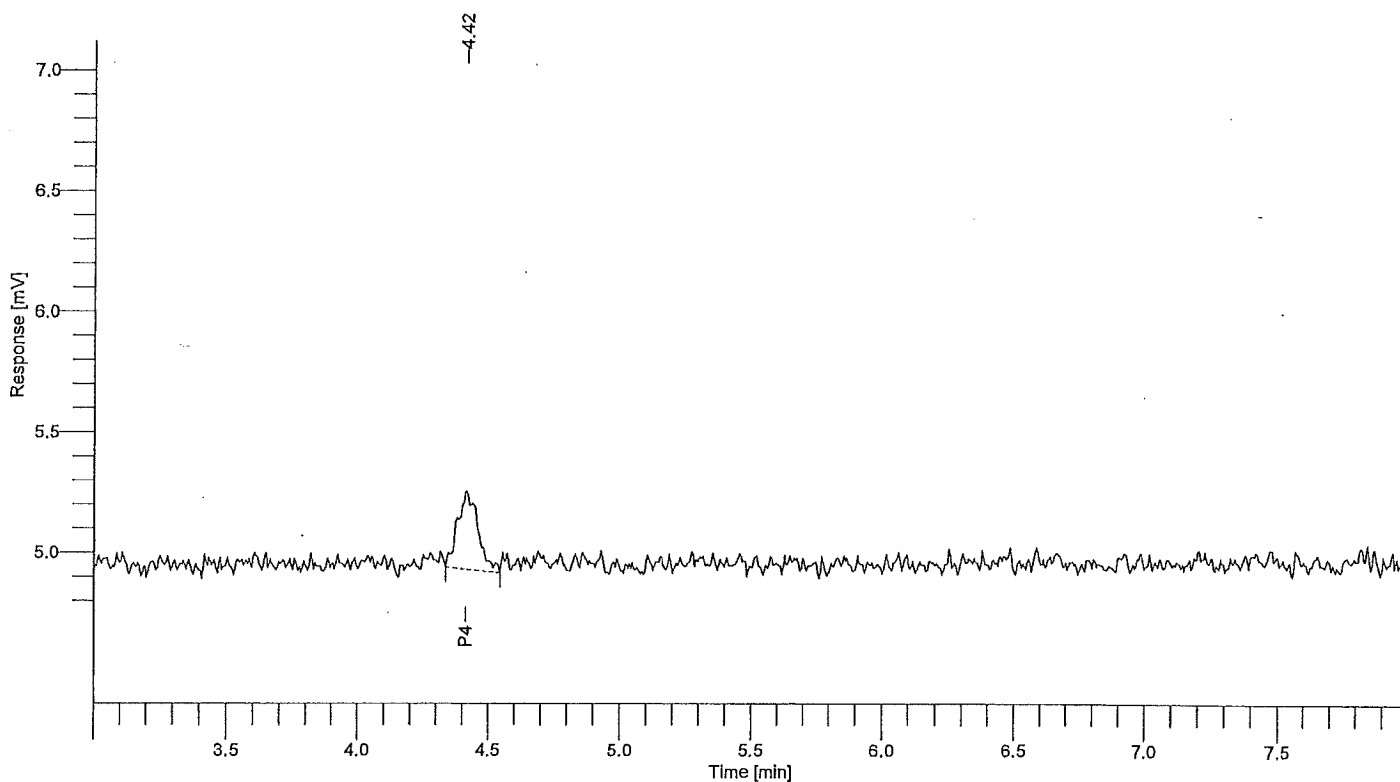
Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL
4.41	P4	817	4721	0.004993

Software Version : 6.3.1.0504
Sample Name : Std7 0.002 ug/mL
Instrument Name : GC24
Rack/Vial : 0/8
Sample Amount : 1.000000
Cycle : 9

Date : 03/20/2013 16:36:26
Data Acquisition Time : 03/20/2013 14:42:39
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSIWINTER\gce24\data\24130320\24130320_011.rst

Sequence File : \VALSLTWS012\TCCSIWINTER\GCE24\SEQUENCES\24130320_7580_P4_CALseq.seq



P4 STANDARD REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL
4.42	P4	327	1764	0.002294



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

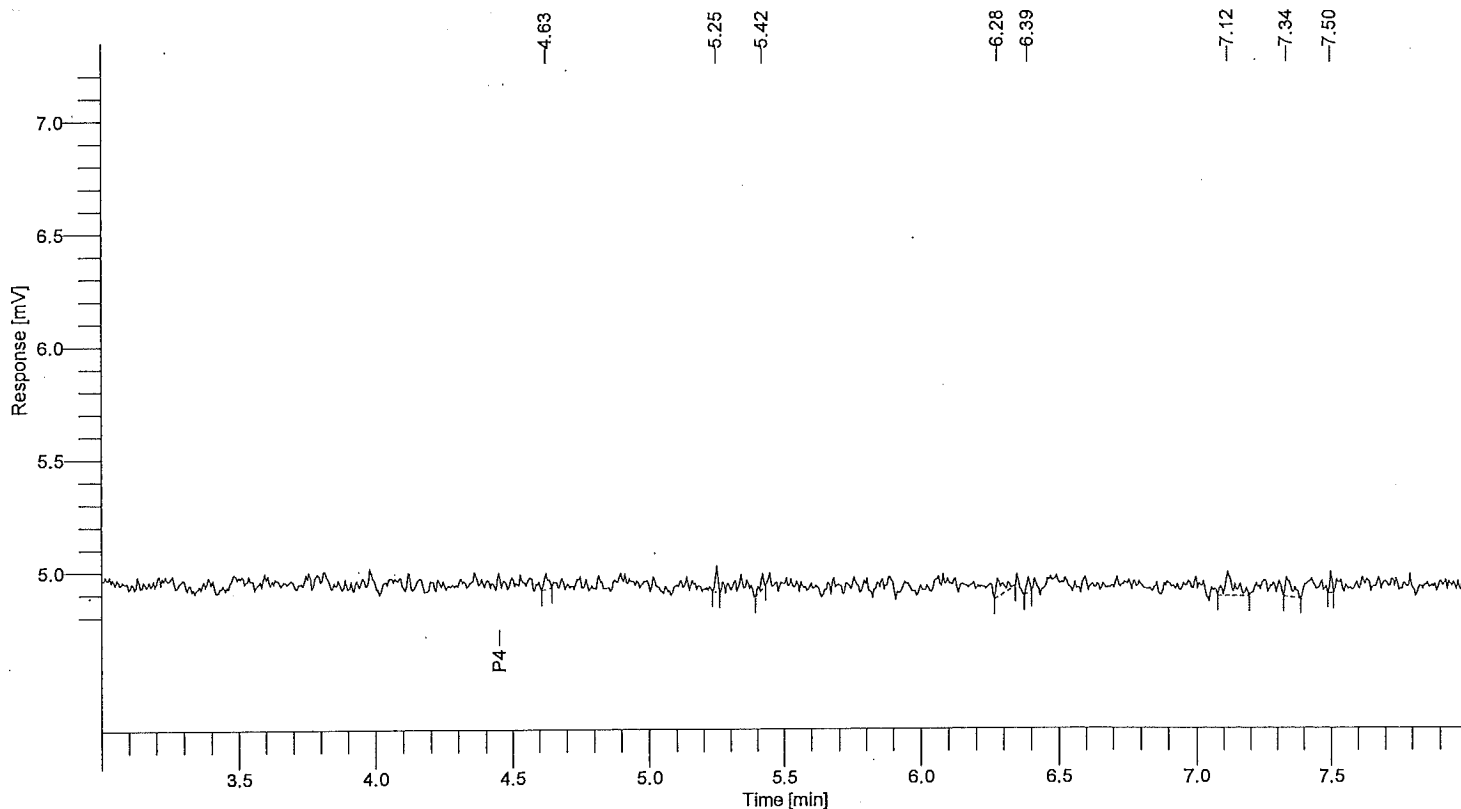
Raw Data

Software Version : 6.3.1.0504
Sample Name : 325884 MB
Instrument Name : GC24
Rack/Vial : 0/21
Sample Amount : 1.000000
Cycle : 19

Date : 03/25/2013 09:51:09
Data Acquisition Time : 03/22/2013 20:46:11
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\ITCCS\WINTER\gce24\data\24130322\24130322_021.rst

Sequence File : \VALSLTWS012\ITCCS\WINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL SAMPLE REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

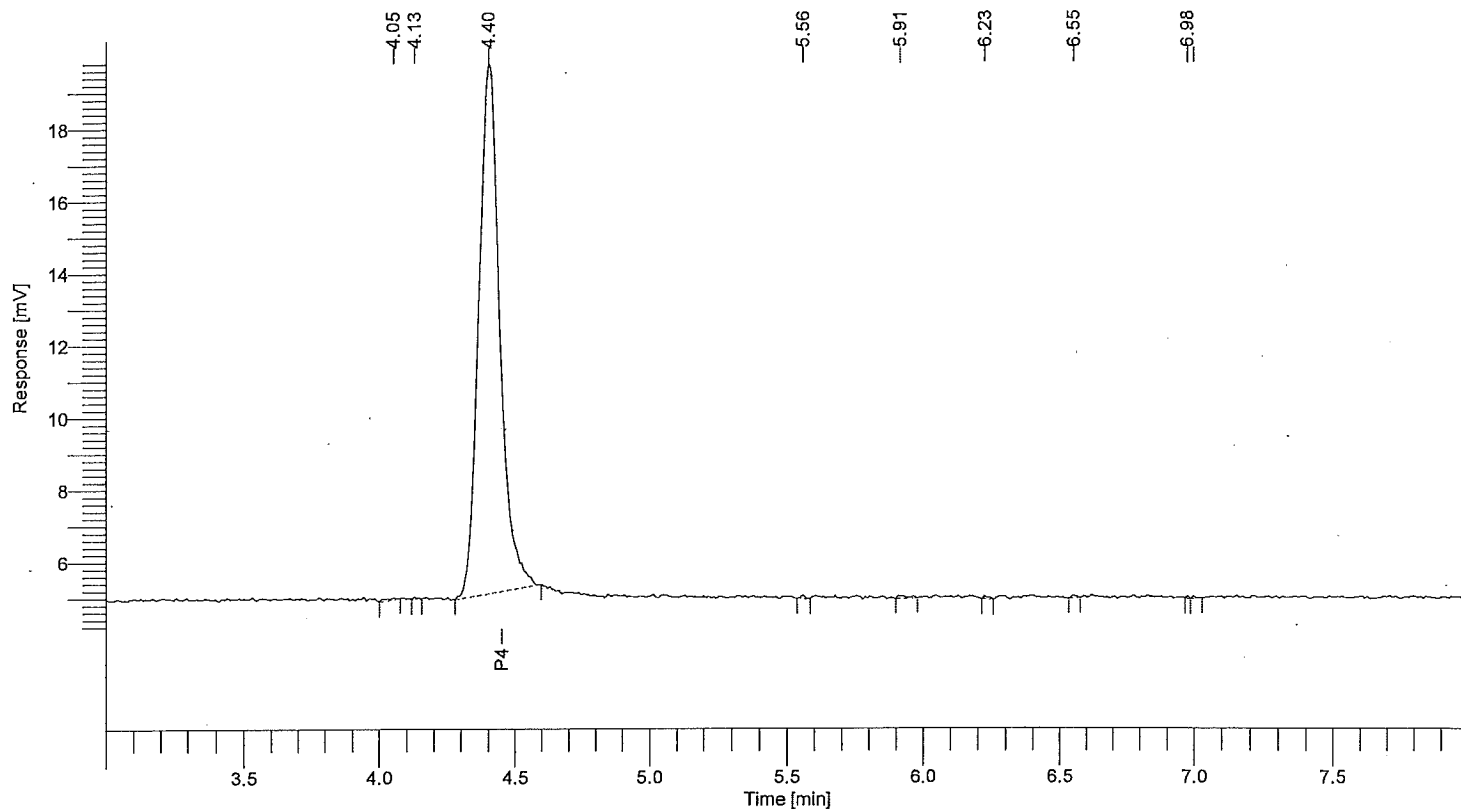
Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg
4.45	P4	0	0	0.000000	1	10.0	0.0400	1.000	—	—	0.0000

Software Version : 6.3.1.0504
 Sample Name : 325885 LCS
 Instrument Name : GC24
 Rack/Vial : 0/22
 Sample Amount : 1.000000
 Cycle : 20

Date : 03/25/2013 09:51:11
 Data Acquisition Time : 03/22/2013 20:57:04
 Channel : B
 Operator : winter
 Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCS\WINTER\gce24\data\24130322\24130322_022.rst

Sequence File : \VALSLTWS012\TCCS\WINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL QC REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [μV·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg	Spike Targ ug/kg	Rec %
4.40	P4	14705	80084	0.086700	1	10.0	0.040	1.000	0.0100	0.500	21.6749	14.17	152.9

21.7 102%

CW 7.24-17

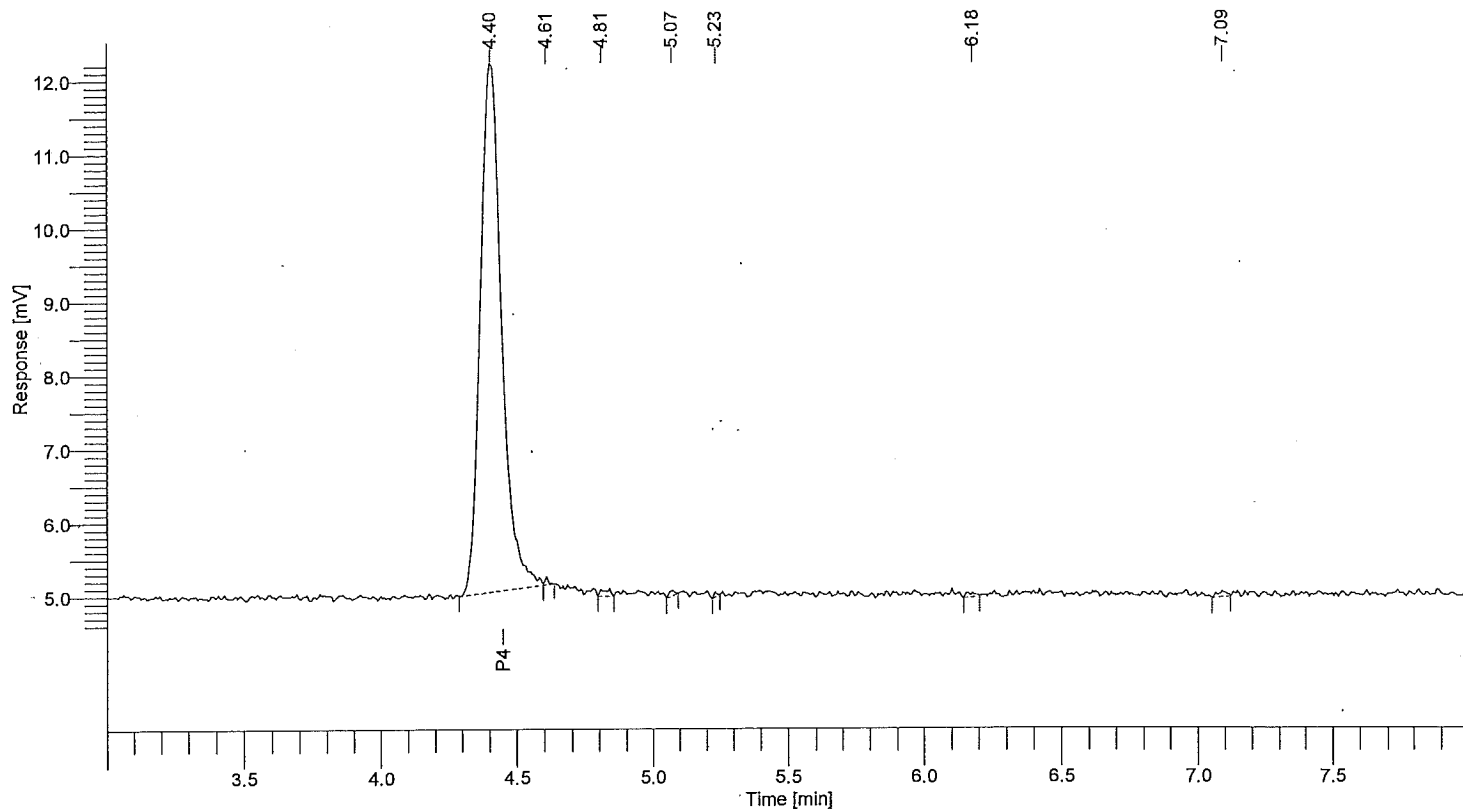
P4 recovery 75 to 125%? YES NO

Software Version : 6.3.1.0504
 Sample Name : 325886 MS
 Instrument Name : GC24
 Rack/Vial : 0/23
 Sample Amount : 1.000000
 Cycle : 21

Date : 03/25/2013 09:51:13
 Data Acquisition Time : 03/22/2013 21:08:01
 Channel : B
 Operator : winter
 Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCS\WINTER\gce24\data\24130322\24130322_023.rst

Sequence File : \VALSLTWS012\TCCS\WINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL QC REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg	Spike Targ ug/kg	Rec %
4.40	P4	7214	39670	0.043778	1	10.0	0.040	1.000	0.0100	0.500	10.9445	14.17 27.2	21.2 51.5%

P4 recovery 75 to 125%? YES NO

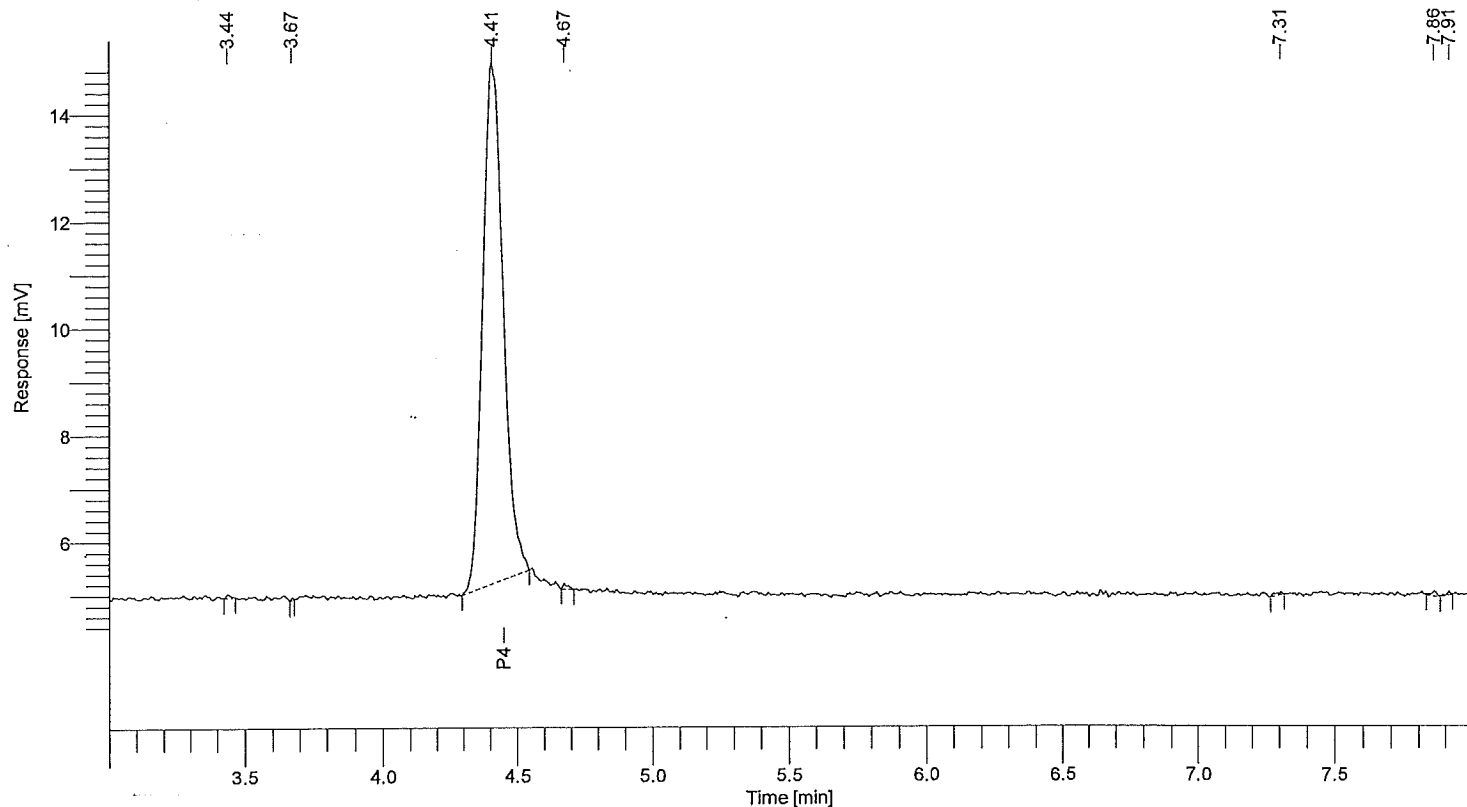
CW 3-24-17

Software Version : 6.3.1.0504
 Sample Name : 325887 MSD
 Instrument Name : GC24
 Rack/Vial : 0/24
 Sample Amount : 1.000000
 Cycle : 22

Date : 03/25/2013 09:51:16
 Data Acquisition Time : 03/22/2013 21:18:59
 Channel : B
 Operator : winter
 Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_024.rst

Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL QC REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [uV·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg	Spike Targ ug/kg	Rec %
4.41	P4	9748	52009	0.058581	1	10.0	0.040	1.000	0.0100	0.500	14.6453	14.17 21.2	108.3 68.9%

P4 recovery 75 to 125%? ☒ YES ☐ NO

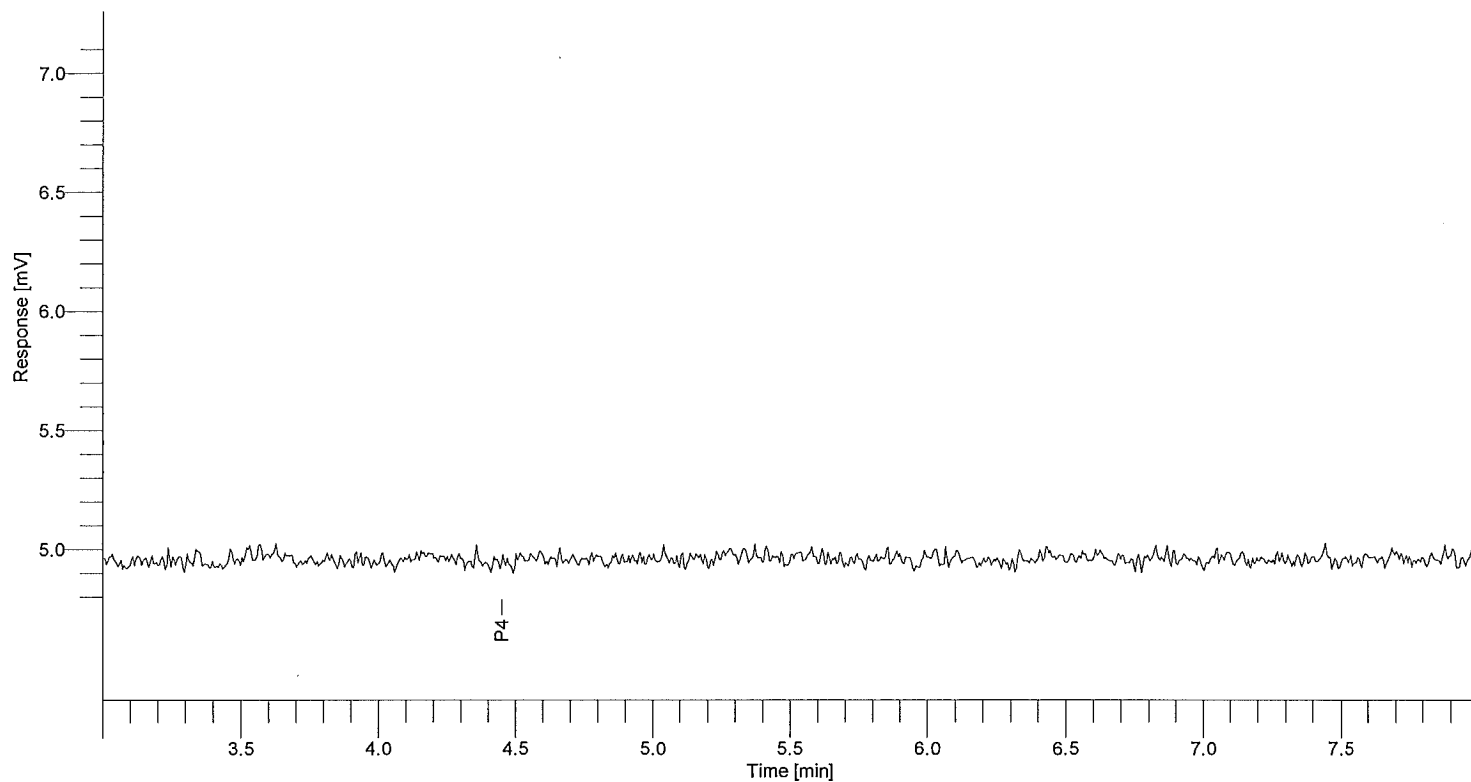
CW 3-24-17

Software Version : 6.3.1.0504
Sample Name : 1307984001
Instrument Name : GC24
Rack/Vial : 0/45
Sample Amount : 1.000000
Cycle : 43

Date : 03/26/2013 14:46:01
Data Acquisition Time : 03/23/2013 01:10:23
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \VALSLTWS012\TCCSWINTER\gce24\data\24130322\24130322_045.rst

Sequence File : \VALSLTWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL SAMPLE REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

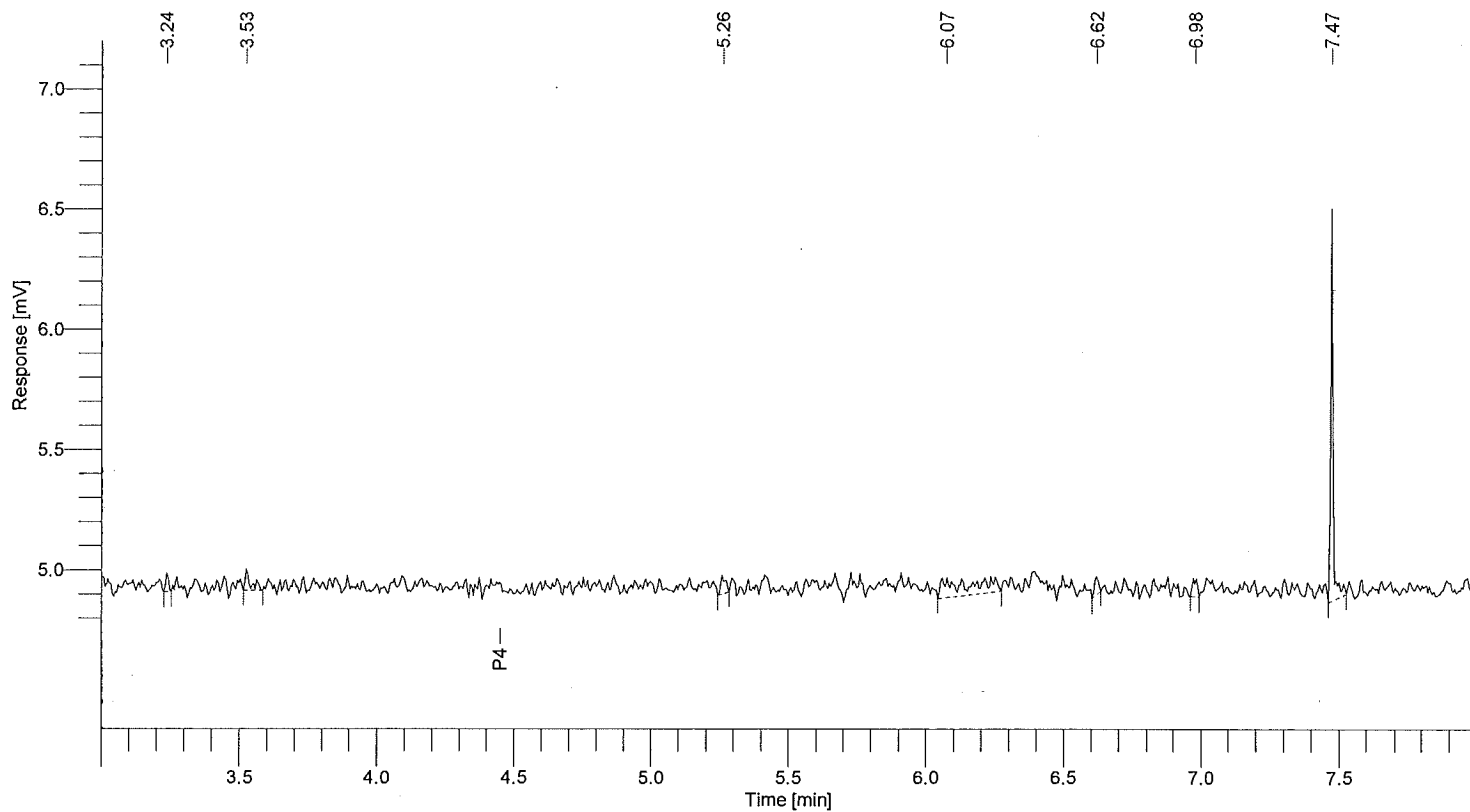
Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg
4.45	P4	0	0	0.000000	1	10.0	0.0400	1,000	—	—	0.0000

Software Version : 6.3.1.0504
Sample Name : 1307984002
Instrument Name : GC24
Rack/Vial : 0/46
Sample Amount : 1.000000
Cycle : 44

Date : 03/26/2013 14:46:03
Data Acquisition Time : 03/23/2013 01:21:08
Channel : B
Operator : winter
Dilution Factor : 1.000000

Result File : \\ALS\TWS012\TCCSWINTER\gce24\data\24130322\24130322_046.rst

Sequence File : \\ALS\TWS012\TCCSWINTER\GCE24\SEQUENCES\24130322_7580_P4_SOIL_H2Oseq.seq



P4 SOIL SAMPLE REPORT

Column A: DB-1 30m x 0.53mm x 1.5um

Time min	Component Name	Height uV	Area [μ V·s]	Raw Amt ug/mL	DF	Extract mL	Sample kg	Method DF	MDL ug/kg	PQL ug/kg	Adj Amt ug/kg
4.45	P4	0	0	0.000000	1	10.0	0.0400	1,000	—	—	0.0000

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Denver

4955 Yarrow Street

Arvada, CO 80002

Tel: (303)736-0100

TestAmerica Job ID: 280-40134-1

Client Project/Site: Portland Air National Guard

For:

Weston Solutions, Inc.

5599 San Felipe

Suite 700

Houston, Texas 77056

Attn: Mrs. Kristie Warr

M. Elaine Walker

Authorized for release by:

4/23/2013 2:05:15 PM

Elaine Walker

Project Manager I

elaine.walker@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?



Visit us at:

www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Definitions	6
Detection Summary	7
Method Summary	10
Sample Summary	11
Client Sample Results	12
QC Sample Results	18
QC Association	24
Chronicle	28
Receipt Checklists	32
Chain of Custody	35



Case Narrative

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Job ID: 280-40134-1

Laboratory: TestAmerica Denver

Narrative

CASE NARRATIVE

Client: Weston Solutions, Inc.
Project: Portland Air National Guard
Report Number: 280-40134-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Fourteen samples were received on 03/20/2013; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 4.2°C.

The samples requesting 6020 Metals (Cu, Fe, Pb, Zn, & W) were subcontracted to TestAmerica St. Louis, and the samples requesting Nitrocellulose & Nitroguanidine were subcontracted to TestAmerica West Sacramento. Their results are included in this report.

MS/MSD analyses were requested and performed on sample PO04-31-(0-1)-20130319 (280-40134-14).

On 04/15/2013 the client added Perchlorate analysis to samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) on a 5-Business Day TAT.

EXPLOSIVES - NITROGUANIDINE

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were analyzed for explosives in accordance with EPA SW-846 Method 8330A. The samples were leached on 03/24/2013, prepared on 03/25/2013 and analyzed on 04/04/2013.

No difficulties were encountered during the explosives analyses.

All quality control parameters were within the acceptance limits.

EXPLOSIVES

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were analyzed for explosives in accordance with EPA SW846 8330B. The samples were prepared on 03/25/2013 and analyzed on 04/09/2013.

The following samples were air dried and sieved per the procedure; however, the samples contained material that would not pass through the sieve: PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2). This material was removed and not extracted. The material appeared to be vegetation.

No other difficulties were encountered during the 8330B analyses.

All other quality control parameters were within the acceptance limits.

PERCHLORATE

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were analyzed for Perchlorate in accordance with EPA Method 6860. The samples were prepared on 04/16/2013 and analyzed on 04/17/2013.

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were very cloudy and full of sediment.

Case Narrative

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Job ID: 280-40134-1 (Continued)

Laboratory: TestAmerica Denver (Continued)

The samples were re-filtered before running on the instrument using a 0.45 micron filter.

Perchlorate was detected in method blank MB 280-169718/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged "J". However, because the result concentration was less than ½ the reporting limit, no corrective action was necessary.

Perchlorate failed the recovery criteria low for the matrix spike (MS) of sample PO01-31-(0-1)-20130319 (280-40134-1) in batch 280-169799. Perchlorate failed the recovery criteria high for the matrix spike duplicate (MSD). Perchlorate also exceeded the RPD limit. The associated laboratory control sample (LCS) recoveries met acceptance criteria, and the sample results have been flagged accordingly.

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) required dilutions prior to analysis due to the nature of the sample matrix. The reporting limits have been adjusted accordingly.

The interference check failed for Perchlorate at 137%, with an upper limit of 130%. The LCS is within limits for Perchlorate. Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were reported due to hold time constraints. The hits in these samples are J flags, therefore are estimated values.

No other difficulties were encountered during the Perchlorate analyses.

All other quality control parameters were within the acceptance limits.

TOTAL METALS (ICP)

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were analyzed for Total Metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 03/26/2013 and analyzed on 03/27/2013 and 03/28/2013.

Chromium was detected in method blank MB 280-166210/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged.

No other difficulties were encountered during the metals analyses.

All other quality control parameters were within the acceptance limits.

METALS BY ICP/MS

Samples PO02-31-(0-1)-20130319 (280-40134-3), PO02-32-(0-1)-20130319 (280-40134-4), PO02-31-(1-2)-20130319 (280-40134-5), PO02-31-(2-3)-20130319 (280-40134-6), PO02-31-(3-4)-20130319 (280-40134-7), PO02-31-(4-5)-20130319 (280-40134-8), PO03-31-(0-1)-20130319 (280-40134-9), PO03-31-(1-2)-20130319 (280-40134-10), PO03-31-(2-3)-20130319 (280-40134-11), PO03-31-(3-4)-20130319 (280-40134-12), PO03-31-(4-5)-20130319 (280-40134-13), and PO04-31-(0-1)-20130319 (280-40134-14) were analyzed for Metals by ICP/MS in accordance with SW 846 6020. The samples were prepared on 03/29/2013 and analyzed on 04/03/2013 and 04/04/2013.

Zinc was detected in method blank MB 160-43079/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged.

Due to the high concentration, Iron failed the recovery criteria high for the matrix spike (MS) and matrix spike duplicate (MSD) of sample PO04-31-(0-1)-20130319 (280-40134-14) in batch 160-44115. The presence of the '4' qualifier in the report indicates where the analyte concentration in the unspiked sample exceeded four times the spiking amount. The associated laboratory control sample (LCS) recovery met acceptance criteria, and the sample results have been flagged accordingly.

Samples PO03-31-(3-4)-20130319 (280-40134-12) and PO03-31-(4-5)-20130319 (280-40134-13) required dilutions prior to analysis to bring the concentration of target analytes within the calibration range. The reporting limits have been adjusted accordingly.

The post digestion spike % recovery for lead and zinc, associated with batch 160-43079, was outside of control limits, indicating possible

Case Narrative

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Job ID: 280-40134-1 (Continued)

Laboratory: TestAmerica Denver (Continued)

matrix interference.

The post digestion spike % recovery for copper and iron, associated with batch 160-43079, was outside of control limits. The concentration in the original sample is greater than 4 times the amount spiked in the PDS, making % recovery ineffective.

No other difficulties were encountered during the metals analyses.

All other quality control parameters were within the acceptance limits.

NITROCELLULOSE

Samples PO01-31-(0-1)-20130319 (280-40134-1) and PO01-32-(0-1)-20130319 (280-40134-2) were analyzed for Nitrocellulose in accordance with Method 353.2. The samples were prepared and analyzed on 03/27/2013.

Nitrocellulose was detected in method blank MB 320-13010/1-B at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged.

The matrix spike (280-40134-1MS) recovery for batch 320-13191 was outside control limits. The RPD for the MS/MSD pair is within established control limits. The matrix spike duplicate and associated laboratory control sample (LCS) recoveries met acceptance criteria.

No other difficulties were encountered during the Nitrocellulose analyses.

All other quality control parameters were within the acceptance limits.

PERCENT SOLIDS

Samples PO01-31-(0-1)-20130319 (280-40134-1), PO01-32-(0-1)-20130319 (280-40134-2), PO02-31-(0-1)-20130319 (280-40134-3), PO02-32-(0-1)-20130319 (280-40134-4), PO02-31-(1-2)-20130319 (280-40134-5), PO02-31-(2-3)-20130319 (280-40134-6), PO02-31-(3-4)-20130319 (280-40134-7), PO02-31-(4-5)-20130319 (280-40134-8), PO03-31-(0-1)-20130319 (280-40134-9), PO03-31-(1-2)-20130319 (280-40134-10), PO03-31-(2-3)-20130319 (280-40134-11), PO03-31-(3-4)-20130319 (280-40134-12), PO03-31-(4-5)-20130319 (280-40134-13), and PO04-31-(0-1)-20130319 (280-40134-14) were analyzed for percent solids in accordance with EPA SW846 3550C. The samples were analyzed on 03/22/2013 and 04/02/2013.

No difficulties were encountered during the % solids analyses.

All quality control parameters were within the acceptance limits.

Definitions/Glossary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
M	Manual integrated compound.

LCMS

Qualifier	Qualifier Description
D	The reported value is from a dilution.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

Metals

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
D	The reported value is from a dilution.
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
H	Sample was prepped or analyzed beyond the specified holding time
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Detection Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO01-31-(0-1)-20130319

Lab Sample ID: 280-40134-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perchlorate	0.75	D J	2.7	0.22	ug/Kg	5	✱	6860	Total/NA
Chromium	14		1.6	0.062	mg/Kg	1	✱	6010C	Total/NA
Lead	8.8		0.96	0.29	mg/Kg	1	✱	6010C	Total/NA
Nitrocellulose	0.79	J	4.9	0.76	mg/Kg	1		WS-WC-0050	Total/NA

Client Sample ID: PO01-32-(0-1)-20130319

Lab Sample ID: 280-40134-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perchlorate	0.23	J D	2.7	0.22	ug/Kg	5	✱	6860	Total/NA
Chromium	14		1.7	0.065	mg/Kg	1	✱	6010C	Total/NA
Lead	9.4		1.0	0.30	mg/Kg	1	✱	6010C	Total/NA

Client Sample ID: PO02-31-(0-1)-20130319

Lab Sample ID: 280-40134-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	18		1.1	0.11	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	19000		13	3.7	mg/Kg	2	✱	6020/DOD	Total/NA
Lead	14		0.34	0.11	mg/Kg	2	✱	6020/DOD	Total/NA
Zinc	58		5.6	1.5	mg/Kg	2	✱	6020/DOD	Total/NA
Tungsten	1.0	J	2.8	0.84	mg/Kg	2	✱	6020/DOD	Total/NA

Client Sample ID: PO02-32-(0-1)-20130319

Lab Sample ID: 280-40134-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	17		1.1	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	18000		14	3.8	mg/Kg	2	✱	6020/DOD	Total/NA
Lead	17		0.34	0.11	mg/Kg	2	✱	6020/DOD	Total/NA
Zinc	55		5.7	1.5	mg/Kg	2	✱	6020/DOD	Total/NA

Client Sample ID: PO02-31-(1-2)-20130319

Lab Sample ID: 280-40134-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	15		1.2	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	17000		14	3.9	mg/Kg	2	✱	6020/DOD	Total/NA
Lead	11		0.35	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Zinc	53		5.8	1.6	mg/Kg	2	✱	6020/DOD	Total/NA

Client Sample ID: PO02-31-(2-3)-20130319

Lab Sample ID: 280-40134-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	13		1.2	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	16000		14	3.8	mg/Kg	2	✱	6020/DOD	Total/NA
Lead	12		0.35	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Zinc	64		5.8	1.5	mg/Kg	2	✱	6020/DOD	Total/NA

Client Sample ID: PO02-31-(3-4)-20130319

Lab Sample ID: 280-40134-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	26		1.2	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	23000		15	4.0	mg/Kg	2	✱	6020/DOD	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Detection Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO02-31-(3-4)-20130319 (Continued)

Lab Sample ID: 280-40134-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Lead	20		0.37	0.12	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	71		6.1	1.6	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO02-31-(4-5)-20130319

Lab Sample ID: 280-40134-8

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	9.6		1.1	0.11	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	12000		13	3.6	mg/Kg	2	☼	6020/DOD	Total/NA
Lead	6.6		0.33	0.11	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	52		5.5	1.5	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO03-31-(0-1)-20130319

Lab Sample ID: 280-40134-9

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	17		1.2	0.12	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	20000		14	3.8	mg/Kg	2	☼	6020/DOD	Total/NA
Lead	9.7		0.35	0.12	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	59		5.8	1.5	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO03-31-(1-2)-20130319

Lab Sample ID: 280-40134-10

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	21		1.3	0.13	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	22000		15	4.2	mg/Kg	2	☼	6020/DOD	Total/NA
Lead	8.5		0.38	0.13	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	56		6.4	1.7	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO03-31-(2-3)-20130319

Lab Sample ID: 280-40134-11

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	12		1.2	0.12	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	15000		14	3.9	mg/Kg	2	☼	6020/DOD	Total/NA
Lead	20		0.36	0.12	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	63		6.0	1.6	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO03-31-(3-4)-20130319

Lab Sample ID: 280-40134-12

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	28		1.3	0.13	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	44000	D	39	11	mg/Kg	5	☼	6020/DOD	Total/NA
Lead	24		0.39	0.13	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	85		6.6	1.7	mg/Kg	2	☼	6020/DOD	Total/NA

Client Sample ID: PO03-31-(4-5)-20130319

Lab Sample ID: 280-40134-13

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	34		1.4	0.14	mg/Kg	2	☼	6020/DOD	Total/NA
Iron	46000	D	42	12	mg/Kg	5	☼	6020/DOD	Total/NA
Lead	29		0.42	0.14	mg/Kg	2	☼	6020/DOD	Total/NA
Zinc	96		7.0	1.9	mg/Kg	2	☼	6020/DOD	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Detection Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO04-31-(0-1)-20130319

Lab Sample ID: 280-40134-14

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Copper	18		1.2	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Iron	18000	J	14	3.9	mg/Kg	2	✱	6020/DOD	Total/NA
Lead	16		0.36	0.12	mg/Kg	2	✱	6020/DOD	Total/NA
Zinc	59		5.9	1.6	mg/Kg	2	✱	6020/DOD	Total/NA
Tungsten	1.1	J	3.0	0.89	mg/Kg	2	✱	6020/DOD	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Denver

Method Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method	Method Description	Protocol	Laboratory
8330 Modified	Nitroguanidine (HPLC)	SW846	TAL SAC
8330A	Nitroaromatics and Nitramines	SW846	TAL DEN
6860	Perchlorate by IC/MS or IC/MS/MS	EPA	TAL DEN
6010C	Metals (ICP)	SW846	TAL DEN
6020/DOD	Metals (ICP/MS)	SW846	TAL SL
D 2216	Percent Moisture	ASTM	TAL DEN
D 2216	Percent Moisture	ASTM	TAL SL
WS-WC-0050	Nitrocellulose	TAL-SAC	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-SAC = TestAmerica Laboratories, West Sacramento, Facility Standard Operating Procedure.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-40134-1	PO01-31-(0-1)-20130319	Solid	03/19/13 11:35	03/20/13 09:00
280-40134-2	PO01-32-(0-1)-20130319	Solid	03/19/13 11:35	03/20/13 09:00
280-40134-3	PO02-31-(0-1)-20130319	Solid	03/19/13 11:57	03/20/13 09:00
280-40134-4	PO02-32-(0-1)-20130319	Solid	03/19/13 12:00	03/20/13 09:00
280-40134-5	PO02-31-(1-2)-20130319	Solid	03/19/13 12:03	03/20/13 09:00
280-40134-6	PO02-31-(2-3)-20130319	Solid	03/19/13 12:08	03/20/13 09:00
280-40134-7	PO02-31-(3-4)-20130319	Solid	03/19/13 12:14	03/20/13 09:00
280-40134-8	PO02-31-(4-5)-20130319	Solid	03/19/13 12:17	03/20/13 09:00
280-40134-9	PO03-31-(0-1)-20130319	Solid	03/19/13 12:27	03/20/13 09:00
280-40134-10	PO03-31-(1-2)-20130319	Solid	03/19/13 12:30	03/20/13 09:00
280-40134-11	PO03-31-(2-3)-20130319	Solid	03/19/13 12:33	03/20/13 09:00
280-40134-12	PO03-31-(3-4)-20130319	Solid	03/19/13 12:45	03/20/13 09:00
280-40134-13	PO03-31-(4-5)-20130319	Solid	03/19/13 12:50	03/20/13 09:00
280-40134-14	PO04-31-(0-1)-20130319	Solid	03/19/13 13:00	03/20/13 09:00

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 8330 Modified - Nitroguanidine (HPLC)

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Nitroguanidine	0.039	U	0.25	0.020	mg/Kg		03/25/13 14:52	04/09/13 16:54	1

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Nitroguanidine	0.039	U	0.25	0.020	mg/Kg		03/25/13 14:52	04/09/13 17:47	1

Method: 8330A - Nitroaromatics and Nitramines

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
1,3,5-Trinitrobenzene	0.089	U	0.25	0.070	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
1,3-Dinitrobenzene	0.089	U	0.25	0.060	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2,4,6-Trinitrotoluene	0.089	U	0.25	0.057	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2,4-diamino-6-nitrotoluene	1.5	U	2.0	0.51	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2,4-Dinitrotoluene	0.089	U	0.25	0.049	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2,6-diamino-4-nitrotoluene	1.5	U	2.0	0.80	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2,6-Dinitrotoluene	0.089	U	0.25	0.054	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2-Amino-4,6-dinitrotoluene	0.089	U	0.25	0.045	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
2-Nitrotoluene	0.089	U	0.25	0.083	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
3-Nitrotoluene	0.089	U	0.50	0.054	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
4-Amino-2,6-dinitrotoluene	0.089	U	0.25	0.039	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
4-Nitrotoluene	0.18	U	0.40	0.11	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
HMX	0.089	U	0.25	0.077	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
Nitrobenzene	0.089	U	0.25	0.061	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
Nitroglycerin	0.99	U	5.0	0.77	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
PETN	0.89	U	4.0	0.86	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
RDX	0.089	U	0.26	0.085	mg/Kg		03/25/13 17:55	04/04/13 13:47	1
Tetryl	0.089	U	0.50	0.054	mg/Kg		03/25/13 17:55	04/04/13 13:47	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dinitrobenzene	96		83 - 122	03/25/13 17:55	04/04/13 13:47	1

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
1,3,5-Trinitrobenzene	0.086	U	0.24	0.068	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
1,3-Dinitrobenzene	0.086	U	0.24	0.058	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2,4,6-Trinitrotoluene	0.086	U	0.24	0.055	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2,4-diamino-6-nitrotoluene	1.4	U	1.9	0.50	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2,4-Dinitrotoluene	0.086	U	0.24	0.048	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2,6-diamino-4-nitrotoluene	1.4	U	1.9	0.78	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2,6-Dinitrotoluene	0.086	U	0.24	0.052	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2-Amino-4,6-dinitrotoluene	0.086	U	0.24	0.044	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
2-Nitrotoluene	0.086	U	0.24	0.080	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
3-Nitrotoluene	0.086	U	0.48	0.052	mg/Kg		03/25/13 17:55	04/04/13 14:13	1

TestAmerica Denver

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 8330A - Nitroaromatics and Nitramines (Continued)

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
4-Amino-2,6-dinitrotoluene	0.086	U	0.24	0.037	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
4-Nitrotoluene	0.17	U	0.38	0.10	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
HMX	0.086	U	0.24	0.074	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
Nitrobenzene	0.086	U	0.24	0.059	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
Nitroglycerin	0.96	U	4.9	0.75	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
PETN	0.86	U	3.8	0.84	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
RDX	0.086	U	0.25	0.082	mg/Kg		03/25/13 17:55	04/04/13 14:13	1
Tetryl	0.086	U	0.48	0.052	mg/Kg		03/25/13 17:55	04/04/13 14:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dinitrobenzene	96		83 - 122	03/25/13 17:55	04/04/13 14:13	1

Method: 6860 - Perchlorate by IC/MS or IC/MS/MS

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Percent Solids: 85.8

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perchlorate	0.75	D J	2.7	0.22	ug/Kg	☼	04/16/13 16:40	04/17/13 20:04	5

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Percent Solids: 86.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perchlorate	0.23	J D	2.7	0.22	ug/Kg	☼	04/16/13 16:40	04/17/13 21:29	5

Method: 6010C - Metals (ICP)

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Percent Solids: 85.8

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	14		1.6	0.062	mg/Kg	☼	03/26/13 07:30	03/27/13 02:58	1
Lead	8.8		0.96	0.29	mg/Kg	☼	03/26/13 07:30	03/28/13 09:01	1

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Percent Solids: 86.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	14		1.7	0.065	mg/Kg	☼	03/26/13 07:30	03/27/13 03:00	1
Lead	9.4		1.0	0.30	mg/Kg	☼	03/26/13 07:30	03/28/13 08:28	1

Method: 6020/DOD - Metals (ICP/MS)

Client Sample ID: PO02-31-(0-1)-20130319

Date Collected: 03/19/13 11:57

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-3

Matrix: Solid

Percent Solids: 86.8

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	18		1.1	0.11	mg/Kg	☼	03/29/13 09:53	04/03/13 23:45	2
Iron	19000		13	3.7	mg/Kg	☼	03/29/13 09:53	04/03/13 23:45	2
Lead	14		0.34	0.11	mg/Kg	☼	03/29/13 09:53	04/03/13 23:45	2

TestAmerica Denver

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 6020/DOD - Metals (ICP/MS) (Continued)

Client Sample ID: PO02-31-(0-1)-20130319

Date Collected: 03/19/13 11:57

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-3

Matrix: Solid

Percent Solids: 86.8

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	58		5.6	1.5	mg/Kg	☼	03/29/13 09:53	04/03/13 23:45	2
Tungsten	1.0	J	2.8	0.84	mg/Kg	☼	03/29/13 09:53	04/03/13 23:45	2

Client Sample ID: PO02-32-(0-1)-20130319

Date Collected: 03/19/13 12:00

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-4

Matrix: Solid

Percent Solids: 86.0

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	17		1.1	0.12	mg/Kg	☼	03/29/13 09:53	04/03/13 23:51	2
Iron	18000		14	3.8	mg/Kg	☼	03/29/13 09:53	04/03/13 23:51	2
Lead	17		0.34	0.11	mg/Kg	☼	03/29/13 09:53	04/03/13 23:51	2
Zinc	55		5.7	1.5	mg/Kg	☼	03/29/13 09:53	04/03/13 23:51	2
Tungsten	0.57	U	2.9	0.86	mg/Kg	☼	03/29/13 09:53	04/03/13 23:51	2

Client Sample ID: PO02-31-(1-2)-20130319

Date Collected: 03/19/13 12:03

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-5

Matrix: Solid

Percent Solids: 87.0

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	15		1.2	0.12	mg/Kg	☼	03/29/13 09:53	04/03/13 23:58	2
Iron	17000		14	3.9	mg/Kg	☼	03/29/13 09:53	04/03/13 23:58	2
Lead	11		0.35	0.12	mg/Kg	☼	03/29/13 09:53	04/03/13 23:58	2
Zinc	53		5.8	1.6	mg/Kg	☼	03/29/13 09:53	04/03/13 23:58	2
Tungsten	0.58	U	2.9	0.88	mg/Kg	☼	03/29/13 09:53	04/03/13 23:58	2

Client Sample ID: PO02-31-(2-3)-20130319

Date Collected: 03/19/13 12:08

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-6

Matrix: Solid

Percent Solids: 85.0

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	13		1.2	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:05	2
Iron	16000		14	3.8	mg/Kg	☼	03/29/13 09:53	04/04/13 00:05	2
Lead	12		0.35	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:05	2
Zinc	64		5.8	1.5	mg/Kg	☼	03/29/13 09:53	04/04/13 00:05	2
Tungsten	0.58	U	2.9	0.87	mg/Kg	☼	03/29/13 09:53	04/04/13 00:05	2

Client Sample ID: PO02-31-(3-4)-20130319

Date Collected: 03/19/13 12:14

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-7

Matrix: Solid

Percent Solids: 82.1

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	26		1.2	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:11	2
Iron	23000		15	4.0	mg/Kg	☼	03/29/13 09:53	04/04/13 00:11	2
Lead	20		0.37	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:11	2
Zinc	71		6.1	1.6	mg/Kg	☼	03/29/13 09:53	04/04/13 00:11	2
Tungsten	0.61	U	3.0	0.91	mg/Kg	☼	03/29/13 09:53	04/04/13 00:11	2

Client Sample ID: PO02-31-(4-5)-20130319

Date Collected: 03/19/13 12:17

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-8

Matrix: Solid

Percent Solids: 91.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	9.6		1.1	0.11	mg/Kg	☼	03/29/13 09:53	04/04/13 00:18	2
Iron	12000		13	3.6	mg/Kg	☼	03/29/13 09:53	04/04/13 00:18	2
Lead	6.6		0.33	0.11	mg/Kg	☼	03/29/13 09:53	04/04/13 00:18	2
Zinc	52		5.5	1.5	mg/Kg	☼	03/29/13 09:53	04/04/13 00:18	2

TestAmerica Denver

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 6020/DOD - Metals (ICP/MS) (Continued)

Client Sample ID: PO02-31-(4-5)-20130319

Date Collected: 03/19/13 12:17

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-8

Matrix: Solid

Percent Solids: 91.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Tungsten	0.55	U	2.8	0.83	mg/Kg	☼	03/29/13 09:53	04/04/13 00:18	2

Client Sample ID: PO03-31-(0-1)-20130319

Date Collected: 03/19/13 12:27

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-9

Matrix: Solid

Percent Solids: 85.7

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	17		1.2	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:25	2
Iron	20000		14	3.8	mg/Kg	☼	03/29/13 09:53	04/04/13 00:25	2
Lead	9.7		0.35	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:25	2
Zinc	59		5.8	1.5	mg/Kg	☼	03/29/13 09:53	04/04/13 00:25	2
Tungsten	0.58	U	2.9	0.87	mg/Kg	☼	03/29/13 09:53	04/04/13 00:25	2

Client Sample ID: PO03-31-(1-2)-20130319

Date Collected: 03/19/13 12:30

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-10

Matrix: Solid

Percent Solids: 81.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	21		1.3	0.13	mg/Kg	☼	03/29/13 09:53	04/04/13 00:32	2
Iron	22000		15	4.2	mg/Kg	☼	03/29/13 09:53	04/04/13 00:32	2
Lead	8.5		0.38	0.13	mg/Kg	☼	03/29/13 09:53	04/04/13 00:32	2
Zinc	56		6.4	1.7	mg/Kg	☼	03/29/13 09:53	04/04/13 00:32	2
Tungsten	0.64	U	3.2	0.96	mg/Kg	☼	03/29/13 09:53	04/04/13 00:32	2

Client Sample ID: PO03-31-(2-3)-20130319

Date Collected: 03/19/13 12:33

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-11

Matrix: Solid

Percent Solids: 87.0

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	12		1.2	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:52	2
Iron	15000		14	3.9	mg/Kg	☼	03/29/13 09:53	04/04/13 00:52	2
Lead	20		0.36	0.12	mg/Kg	☼	03/29/13 09:53	04/04/13 00:52	2
Zinc	63		6.0	1.6	mg/Kg	☼	03/29/13 09:53	04/04/13 00:52	2
Tungsten	0.60	U	3.0	0.89	mg/Kg	☼	03/29/13 09:53	04/04/13 00:52	2

Client Sample ID: PO03-31-(3-4)-20130319

Date Collected: 03/19/13 12:45

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-12

Matrix: Solid

Percent Solids: 76.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	28		1.3	0.13	mg/Kg	☼	03/29/13 09:53	04/04/13 00:59	2
Iron	44000	D	39	11	mg/Kg	☼	03/29/13 09:53	04/04/13 20:28	5
Lead	24		0.39	0.13	mg/Kg	☼	03/29/13 09:53	04/04/13 00:59	2
Zinc	85		6.6	1.7	mg/Kg	☼	03/29/13 09:53	04/04/13 00:59	2
Tungsten	0.66	U	3.3	0.98	mg/Kg	☼	03/29/13 09:53	04/04/13 00:59	2

Client Sample ID: PO03-31-(4-5)-20130319

Date Collected: 03/19/13 12:50

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-13

Matrix: Solid

Percent Solids: 74.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	34		1.4	0.14	mg/Kg	☼	03/29/13 09:53	04/04/13 01:05	2
Iron	46000	D	42	12	mg/Kg	☼	03/29/13 09:53	04/04/13 20:35	5
Lead	29		0.42	0.14	mg/Kg	☼	03/29/13 09:53	04/04/13 01:05	2
Zinc	96		7.0	1.9	mg/Kg	☼	03/29/13 09:53	04/04/13 01:05	2
Tungsten	0.70	U	3.5	1.1	mg/Kg	☼	03/29/13 09:53	04/04/13 01:05	2

TestAmerica Denver

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 6020/DOD - Metals (ICP/MS)

Client Sample ID: PO04-31-(0-1)-20130319

Date Collected: 03/19/13 13:00

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-14

Matrix: Solid

Percent Solids: 83.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	18		1.2	0.12	mg/Kg	☆	03/29/13 09:53	04/04/13 01:19	2
Iron	18000	J	14	3.9	mg/Kg	☆	03/29/13 09:53	04/04/13 01:19	2
Lead	16		0.36	0.12	mg/Kg	☆	03/29/13 09:53	04/04/13 01:19	2
Zinc	59		5.9	1.6	mg/Kg	☆	03/29/13 09:53	04/04/13 01:19	2
Tungsten	1.1	J	3.0	0.89	mg/Kg	☆	03/29/13 09:53	04/04/13 01:19	2

General Chemistry

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14		0.10	0.10	%			03/22/13 14:22	1
Nitrocellulose	0.79	J	4.9	0.76	mg/Kg		03/27/13 07:05	03/27/13 14:29	1

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13		0.10	0.10	%			03/22/13 14:22	1
Nitrocellulose	1.8	U	5.1	0.79	mg/Kg		03/27/13 07:05	03/27/13 14:35	1

Client Sample ID: PO02-31-(0-1)-20130319

Date Collected: 03/19/13 11:57

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-3

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13	H	0.10	0.10	%			04/02/13 06:45	1

Client Sample ID: PO02-32-(0-1)-20130319

Date Collected: 03/19/13 12:00

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-4

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14	H	0.10	0.10	%			04/02/13 06:45	1

Client Sample ID: PO02-31-(1-2)-20130319

Date Collected: 03/19/13 12:03

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-5

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13	H	0.10	0.10	%			04/02/13 06:45	1

Client Sample ID: PO02-31-(2-3)-20130319

Date Collected: 03/19/13 12:08

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-6

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	15	H	0.10	0.10	%			04/02/13 06:45	1

Client Sample ID: PO02-31-(3-4)-20130319

Date Collected: 03/19/13 12:14

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-7

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	18	H	0.10	0.10	%			04/02/13 06:45	1

TestAmerica Denver

Client Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

General Chemistry

Client Sample ID: PO02-31-(4-5)-20130319

Date Collected: 03/19/13 12:17

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-8

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	8.6	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO03-31-(0-1)-20130319

Date Collected: 03/19/13 12:27

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-9

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO03-31-(1-2)-20130319

Date Collected: 03/19/13 12:30

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-10

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	18	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO03-31-(2-3)-20130319

Date Collected: 03/19/13 12:33

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-11

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO03-31-(3-4)-20130319

Date Collected: 03/19/13 12:45

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-12

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO03-31-(4-5)-20130319

Date Collected: 03/19/13 12:50

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-13

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	25	H	0.10	0.10	%	—		04/02/13 06:45	1

Client Sample ID: PO04-31-(0-1)-20130319

Date Collected: 03/19/13 13:00

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-14

Matrix: Solid

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	16	H	0.10	0.10	%	—		04/02/13 06:45	1

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 8330 Modified - Nitroguanidine (HPLC)

Lab Sample ID: MB 320-12993/1-A

Matrix: Solid

Analysis Batch: 13918

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 12993

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Nitroguanidine	0.040	U	0.25	0.020	mg/Kg		03/25/13 14:52	04/09/13 16:19	1

Lab Sample ID: LCS 320-12993/2-A

Matrix: Solid

Analysis Batch: 13918

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 12993

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitroguanidine	1.00	0.917		mg/Kg		92	72 - 121

Lab Sample ID: 280-40134-1 MS

Matrix: Solid

Analysis Batch: 13918

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 12993

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitroguanidine	0.039	U	0.976	0.842		mg/Kg		86	72 - 121

Lab Sample ID: 280-40134-1 MSD

Matrix: Solid

Analysis Batch: 13918

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 12993

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitroguanidine	0.039	U	0.980	0.879	M	mg/Kg		90	72 - 121	4	20

Method: 8330A - Nitroaromatics and Nitramines

Lab Sample ID: MB 280-166537/1-A

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166537

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
1,3,5-Trinitrobenzene	0.083	U	0.23	0.066	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
1,3-Dinitrobenzene	0.083	U	0.23	0.056	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2,4,6-Trinitrotoluene	0.083	U	0.23	0.053	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2,4-diamino-6-nitrotoluene	1.4	U	1.8	0.48	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2,4-Dinitrotoluene	0.083	U	0.23	0.046	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2,6-diamino-4-nitrotoluene	1.4	U	1.8	0.75	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2,6-Dinitrotoluene	0.083	U	0.23	0.050	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2-Amino-4,6-dinitrotoluene	0.083	U	0.23	0.042	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
2-Nitrotoluene	0.083	U	0.23	0.078	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
3-Nitrotoluene	0.083	U	0.46	0.051	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
4-Amino-2,6-dinitrotoluene	0.083	U	0.23	0.036	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
4-Nitrotoluene	0.17	U	0.37	0.10	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
HMX	0.083	U	0.23	0.072	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
Nitrobenzene	0.083	U	0.23	0.057	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
Nitroglycerin	0.92	U	4.7	0.72	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
PETN	0.83	U	3.7	0.80	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
RDX	0.083	U	0.24	0.079	mg/Kg		03/25/13 17:55	04/04/13 12:54	1
Tetryl	0.083	U	0.46	0.051	mg/Kg		03/25/13 17:55	04/04/13 12:54	1

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 8330A - Nitroaromatics and Nitramines (Continued)

Lab Sample ID: MB 280-166537/1-A

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166537

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dinitrobenzene	96		83 - 122	03/25/13 17:55	04/04/13 12:54	1

Lab Sample ID: LCS 280-166537/2-A

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166537

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,3,5-Trinitrobenzene	2.43	2.52		mg/Kg		104	75 - 129
1,3-Dinitrobenzene	2.43	2.50		mg/Kg		103	80 - 124
2,4,6-Trinitrotoluene	2.43	2.48		mg/Kg		102	72 - 130
2,4-Dinitrotoluene	2.43	2.40		mg/Kg		99	80 - 124
2,6-Dinitrotoluene	2.43	2.13		mg/Kg		88	78 - 127
2-Amino-4,6-dinitrotoluene	2.43	2.36		mg/Kg		97	66 - 137
2-Nitrotoluene	2.43	2.42		mg/Kg		100	77 - 125
3-Nitrotoluene	2.43	2.51		mg/Kg		104	75 - 127
4-Amino-2,6-dinitrotoluene	2.43	2.53		mg/Kg		104	74 - 132
4-Nitrotoluene	2.43	2.39		mg/Kg		98	71 - 136
HMX	2.43	2.35		mg/Kg		97	70 - 129
Nitrobenzene	2.43	2.42		mg/Kg		100	80 - 121
Nitroglycerin	24.3	23.0		mg/Kg		95	68 - 131
PETN	24.3	24.5		mg/Kg		101	69 - 132
RDX	2.43	2.75		mg/Kg		113	75 - 128
Tetryl	2.43	2.35		mg/Kg		97	28 - 160

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dinitrobenzene	97		83 - 122

Lab Sample ID: 280-40134-2 MS

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: PO01-32-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 166537

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,3,5-Trinitrobenzene	0.086	U	2.38	2.48		mg/Kg		104	75 - 129
1,3-Dinitrobenzene	0.086	U	2.38	2.46		mg/Kg		103	80 - 124
2,4,6-Trinitrotoluene	0.086	U	2.38	2.47		mg/Kg		104	72 - 130
2,4-Dinitrotoluene	0.086	U	2.38	2.38		mg/Kg		100	80 - 124
2,6-Dinitrotoluene	0.086	U	2.38	2.11		mg/Kg		89	78 - 127
2-Amino-4,6-dinitrotoluene	0.086	U	2.38	2.31		mg/Kg		97	66 - 137
2-Nitrotoluene	0.086	U	2.38	2.37		mg/Kg		100	77 - 125
3-Nitrotoluene	0.086	U	2.38	2.43		mg/Kg		102	75 - 127
4-Amino-2,6-dinitrotoluene	0.086	U	2.38	2.35		mg/Kg		99	74 - 132
4-Nitrotoluene	0.17	U	2.38	2.34		mg/Kg		98	71 - 136
HMX	0.086	U	2.38	2.29		mg/Kg		96	70 - 129
Nitrobenzene	0.086	U	2.38	2.36		mg/Kg		99	80 - 121
Nitroglycerin	0.96	U	23.8	22.6		mg/Kg		95	68 - 131
PETN	0.86	U	23.8	19.8		mg/Kg		83	69 - 132
RDX	0.086	U	2.38	2.54		mg/Kg		107	75 - 128
Tetryl	0.086	U	2.38	2.31		mg/Kg		97	28 - 160

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 8330A - Nitroaromatics and Nitramines (Continued)

Lab Sample ID: 280-40134-2 MS

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: PO01-32-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 166537

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dinitrobenzene	98		83 - 122

Lab Sample ID: 280-40134-2 MSD

Matrix: Solid

Analysis Batch: 167956

Client Sample ID: PO01-32-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 166537

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,3,5-Trinitrobenzene	0.086	U	2.38	2.47		mg/Kg		104	75 - 129	1	30
1,3-Dinitrobenzene	0.086	U	2.38	2.44		mg/Kg		102	80 - 124	1	30
2,4,6-Trinitrotoluene	0.086	U	2.38	2.46		mg/Kg		103	72 - 130	1	30
2,4-Dinitrotoluene	0.086	U	2.38	2.38		mg/Kg		100	80 - 124	0	30
2,6-Dinitrotoluene	0.086	U	2.38	2.10		mg/Kg		88	78 - 127	0	30
2-Amino-4,6-dinitrotoluene	0.086	U	2.38	2.29		mg/Kg		96	66 - 137	1	30
2-Nitrotoluene	0.086	U	2.38	2.33		mg/Kg		98	77 - 125	2	30
3-Nitrotoluene	0.086	U	2.38	2.43		mg/Kg		102	75 - 127	0	30
4-Amino-2,6-dinitrotoluene	0.086	U	2.38	2.33		mg/Kg		98	74 - 132	1	30
4-Nitrotoluene	0.17	U	2.38	2.29		mg/Kg		96	71 - 136	2	30
HMX	0.086	U	2.38	2.30		mg/Kg		97	70 - 129	0	30
Nitrobenzene	0.086	U	2.38	2.36		mg/Kg		99	80 - 121	0	30
Nitroglycerin	0.96	U	23.8	22.6		mg/Kg		95	68 - 131	0	30
PETN	0.86	U	23.8	20.3		mg/Kg		85	69 - 132	2	40
RDX	0.086	U	2.38	2.54		mg/Kg		107	75 - 128	0	30
Tetryl	0.086	U	2.38	2.29		mg/Kg		96	28 - 160	1	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dinitrobenzene	99		83 - 122

Method: 6860 - Perchlorate by IC/MS or IC/MS/MS

Lab Sample ID: DLCK 280-169464/9 DLCK

Matrix: Solid

Analysis Batch: 169464

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	DLCK Result	DLCK Qualifier	Unit	D	%Rec	%Rec. Limits
Perchlorate	0.0500	0.0526		ug/L		105	70 - 130

Lab Sample ID: MB 280-169718/1-A

Matrix: Solid

Analysis Batch: 169799

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 169718

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perchlorate	0.0449	J	0.49	0.039	ug/Kg		04/16/13 16:40	04/18/13 11:13	1

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 6860 - Perchlorate by IC/MS or IC/MS/MS (Continued)

Lab Sample ID: LCS 280-169718/2-A

Matrix: Solid

Analysis Batch: 169799

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 169718

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perchlorate	0.485	0.473	J	ug/Kg		98	80 - 120

Lab Sample ID: 280-40134-1 MS

Matrix: Solid

Analysis Batch: 169799

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 169718

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perchlorate	0.75	D J	0.574	0.436	D J	ug/Kg	✱	-54	80 - 120

Lab Sample ID: 280-40134-1 MSD

Matrix: Solid

Analysis Batch: 169799

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 169718

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perchlorate	0.75	D J	0.548	1.70	D J	ug/Kg	✱	175	80 - 120	118	15

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 280-166210/1-A

Matrix: Solid

Analysis Batch: 166813

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166210

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.108	J	1.4	0.056	mg/Kg		03/26/13 07:30	03/27/13 03:11	1

Lab Sample ID: MB 280-166210/1-A

Matrix: Solid

Analysis Batch: 167015

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166210

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.77	U	0.87	0.26	mg/Kg		03/26/13 07:30	03/28/13 08:40	1

Lab Sample ID: LCS 280-166210/2-A

Matrix: Solid

Analysis Batch: 166813

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166210

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	17.4	17.3		mg/Kg		99	84 - 114

Lab Sample ID: LCS 280-166210/2-A

Matrix: Solid

Analysis Batch: 167015

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166210

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	43.5	44.7		mg/Kg		103	86 - 110

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: 6020/DOD - Metals (ICP/MS)

Lab Sample ID: MB 160-43079/1-A

Matrix: Solid

Analysis Batch: 44115

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 43079

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	0.30	U	0.99	0.10	mg/Kg		03/29/13 09:53	04/03/13 23:31	2
Iron	4.9	U	12	3.3	mg/Kg		03/29/13 09:53	04/03/13 23:31	2
Lead	0.30	U	0.30	0.099	mg/Kg		03/29/13 09:53	04/03/13 23:31	2
Zinc	1.30	J	4.9	1.3	mg/Kg		03/29/13 09:53	04/03/13 23:31	2
Tungsten	0.49	U	2.5	0.74	mg/Kg		03/29/13 09:53	04/03/13 23:31	2

Lab Sample ID: LCS 160-43079/2-A

Matrix: Solid

Analysis Batch: 44115

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 43079

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	98.9	95.3		mg/Kg		96	80 - 120
Iron	989	965		mg/Kg		98	80 - 120
Lead	98.9	99.3		mg/Kg		100	80 - 120
Zinc	98.9	94.2		mg/Kg		95	80 - 120
Tungsten	98.9	106		mg/Kg		107	80 - 120

Lab Sample ID: 280-40134-14 MS

Matrix: Solid

Analysis Batch: 44115

Client Sample ID: PO04-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 43079

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	18		119	138		mg/Kg	☼	101	80 - 120
Iron	18000	J	1190	20000	4	mg/Kg	☼	191	80 - 120
Lead	16		119	153		mg/Kg	☼	115	80 - 120
Zinc	59		119	177		mg/Kg	☼	100	80 - 120
Tungsten	1.1	J	119	109		mg/Kg	☼	91	80 - 120

Lab Sample ID: 280-40134-14 MSD

Matrix: Solid

Analysis Batch: 44115

Client Sample ID: PO04-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 43079

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	18		117	141		mg/Kg	☼	104	80 - 120	2	20
Iron	18000	J	1170	19600	4	mg/Kg	☼	158	80 - 120	2	20
Lead	16		117	154		mg/Kg	☼	118	80 - 120	1	20
Zinc	59		117	184		mg/Kg	☼	106	80 - 120	4	20
Tungsten	1.1	J	117	112		mg/Kg	☼	95	80 - 120	3	20

Method: D 2216 - Percent Moisture

Lab Sample ID: 280-40134-14 DU

Matrix: Solid

Analysis Batch: 43538

Client Sample ID: PO04-31-(0-1)-20130319

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	16	H	17		%		8	30

TestAmerica Denver

QC Sample Results

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Method: WS-WC-0050 - Nitrocellulose

Lab Sample ID: MB 320-13010/1-B

Matrix: Solid

Analysis Batch: 13191

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 13119

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrocellulose	1.28	J	5.0	0.78	mg/Kg	—	03/27/13 07:05	03/27/13 14:23	1

Lab Sample ID: LCS 320-13010/2-B

Matrix: Solid

Analysis Batch: 13191

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 13119

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrocellulose	50.6	25.1	J	mg/Kg	—	50	34 - 115

Lab Sample ID: 280-40134-1 MS

Matrix: Solid

Analysis Batch: 13191

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 13119

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrocellulose	0.79	J	48.1	16.8	J	mg/Kg	—	33	34 - 115

Lab Sample ID: 280-40134-1 MSD

Matrix: Solid

Analysis Batch: 13191

Client Sample ID: PO01-31-(0-1)-20130319

Prep Type: Total/NA

Prep Batch: 13119

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrocellulose	0.79	J	50.4	21.0	J	mg/Kg	—	40	34 - 115	22	71

TestAmerica Denver

QC Association Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

HPLC/IC

Prep Batch: 12993

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	
LCS 320-12993/2-A	Lab Control Sample	Total/NA	Solid	Sieve/Ultrasoni	
MB 320-12993/1-A	Method Blank	Total/NA	Solid	Sieve/Ultrasoni	

Analysis Batch: 13918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	8330 Modified	12993
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	8330 Modified	12993
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	8330 Modified	12993
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	8330 Modified	12993
LCS 320-12993/2-A	Lab Control Sample	Total/NA	Solid	8330 Modified	12993
MB 320-12993/1-A	Method Blank	Total/NA	Solid	8330 Modified	12993

Drying Batch: 166348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	Prep/Air Dry	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	Prep/Air Dry	
280-40134-2 MS	PO01-32-(0-1)-20130319	Total/NA	Solid	Prep/Air Dry	
280-40134-2 MSD	PO01-32-(0-1)-20130319	Total/NA	Solid	Prep/Air Dry	

Prep Batch: 166537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	166348
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	166348
280-40134-2 MS	PO01-32-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	166348
280-40134-2 MSD	PO01-32-(0-1)-20130319	Total/NA	Solid	Sieve/Ultrasoni	166348
LCS 280-166537/2-A	Lab Control Sample	Total/NA	Solid	Sieve/Ultrasoni	
MB 280-166537/1-A	Method Blank	Total/NA	Solid	Sieve/Ultrasoni	

Analysis Batch: 167956

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	8330A	166537
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	8330A	166537
280-40134-2 MS	PO01-32-(0-1)-20130319	Total/NA	Solid	8330A	166537
280-40134-2 MSD	PO01-32-(0-1)-20130319	Total/NA	Solid	8330A	166537
LCS 280-166537/2-A	Lab Control Sample	Total/NA	Solid	8330A	166537
MB 280-166537/1-A	Method Blank	Total/NA	Solid	8330A	166537

LCMS

Analysis Batch: 169464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-169464/9 DLCK	Lab Control Sample	Total/NA	Solid	6860	

Prep Batch: 169718

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	

TestAmerica Denver

QC Association Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

LCMS (Continued)

Prep Batch: 169718 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	6860	
LCS 280-169718/2-A	Lab Control Sample	Total/NA	Solid	6860	
MB 280-169718/1-A	Method Blank	Total/NA	Solid	6860	

Analysis Batch: 169799

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	169718
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	169718
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	6860	169718
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	6860	169718
LCS 280-169718/2-A	Lab Control Sample	Total/NA	Solid	6860	169718
MB 280-169718/1-A	Method Blank	Total/NA	Solid	6860	169718

Metals

Prep Batch: 43079

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-3	PO02-31-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-4	PO02-32-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-5	PO02-31-(1-2)-20130319	Total/NA	Solid	3050B	
280-40134-6	PO02-31-(2-3)-20130319	Total/NA	Solid	3050B	
280-40134-7	PO02-31-(3-4)-20130319	Total/NA	Solid	3050B	
280-40134-8	PO02-31-(4-5)-20130319	Total/NA	Solid	3050B	
280-40134-9	PO03-31-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-10	PO03-31-(1-2)-20130319	Total/NA	Solid	3050B	
280-40134-11	PO03-31-(2-3)-20130319	Total/NA	Solid	3050B	
280-40134-12	PO03-31-(3-4)-20130319	Total/NA	Solid	3050B	
280-40134-13	PO03-31-(4-5)-20130319	Total/NA	Solid	3050B	
280-40134-14	PO04-31-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-14 MS	PO04-31-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-14 MSD	PO04-31-(0-1)-20130319	Total/NA	Solid	3050B	
LCS 160-43079/2-A	Lab Control Sample	Total/NA	Solid	3050B	
MB 160-43079/1-A	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 44115

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-3	PO02-31-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-4	PO02-32-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-5	PO02-31-(1-2)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-6	PO02-31-(2-3)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-7	PO02-31-(3-4)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-8	PO02-31-(4-5)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-9	PO03-31-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-10	PO03-31-(1-2)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-11	PO03-31-(2-3)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-12	PO03-31-(3-4)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-13	PO03-31-(4-5)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-14	PO04-31-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079

TestAmerica Denver

QC Association Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Metals (Continued)

Analysis Batch: 44115 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-14 MS	PO04-31-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-14 MSD	PO04-31-(0-1)-20130319	Total/NA	Solid	6020/DOD	43079
LCS 160-43079/2-A	Lab Control Sample	Total/NA	Solid	6020/DOD	43079
MB 160-43079/1-A	Method Blank	Total/NA	Solid	6020/DOD	43079

Analysis Batch: 44411

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-12	PO03-31-(3-4)-20130319	Total/NA	Solid	6020/DOD	43079
280-40134-13	PO03-31-(4-5)-20130319	Total/NA	Solid	6020/DOD	43079

Prep Batch: 166210

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	3050B	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	3050B	
LCS 280-166210/2-A	Lab Control Sample	Total/NA	Solid	3050B	
MB 280-166210/1-A	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 166813

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	6010C	166210
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	6010C	166210
LCS 280-166210/2-A	Lab Control Sample	Total/NA	Solid	6010C	166210
MB 280-166210/1-A	Method Blank	Total/NA	Solid	6010C	166210

Analysis Batch: 167015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	6010C	166210
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	6010C	166210
LCS 280-166210/2-A	Lab Control Sample	Total/NA	Solid	6010C	166210
MB 280-166210/1-A	Method Blank	Total/NA	Solid	6010C	166210

General Chemistry

Prep Batch: 13119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	353 (NCell-Hyd)	
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	353 (NCell-Hyd)	
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	353 (NCell-Hyd)	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	353 (NCell-Hyd)	
LCS 320-13010/2-B	Lab Control Sample	Total/NA	Solid	353 (NCell-Hyd)	
MB 320-13010/1-B	Method Blank	Total/NA	Solid	353 (NCell-Hyd)	

Analysis Batch: 13191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	WS-WC-0050	13119
280-40134-1 MS	PO01-31-(0-1)-20130319	Total/NA	Solid	WS-WC-0050	13119
280-40134-1 MSD	PO01-31-(0-1)-20130319	Total/NA	Solid	WS-WC-0050	13119
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	WS-WC-0050	13119
LCS 320-13010/2-B	Lab Control Sample	Total/NA	Solid	WS-WC-0050	13119
MB 320-13010/1-B	Method Blank	Total/NA	Solid	WS-WC-0050	13119

TestAmerica Denver

QC Association Summary

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

General Chemistry (Continued)

Analysis Batch: 43538

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-3	PO02-31-(0-1)-20130319	Total/NA	Solid	D 2216	
280-40134-4	PO02-32-(0-1)-20130319	Total/NA	Solid	D 2216	
280-40134-5	PO02-31-(1-2)-20130319	Total/NA	Solid	D 2216	
280-40134-6	PO02-31-(2-3)-20130319	Total/NA	Solid	D 2216	
280-40134-7	PO02-31-(3-4)-20130319	Total/NA	Solid	D 2216	
280-40134-8	PO02-31-(4-5)-20130319	Total/NA	Solid	D 2216	
280-40134-9	PO03-31-(0-1)-20130319	Total/NA	Solid	D 2216	
280-40134-10	PO03-31-(1-2)-20130319	Total/NA	Solid	D 2216	
280-40134-11	PO03-31-(2-3)-20130319	Total/NA	Solid	D 2216	
280-40134-12	PO03-31-(3-4)-20130319	Total/NA	Solid	D 2216	
280-40134-13	PO03-31-(4-5)-20130319	Total/NA	Solid	D 2216	
280-40134-14	PO04-31-(0-1)-20130319	Total/NA	Solid	D 2216	
280-40134-14 DU	PO04-31-(0-1)-20130319	Total/NA	Solid	D 2216	

Analysis Batch: 166221

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-40134-1	PO01-31-(0-1)-20130319	Total/NA	Solid	D 2216	
280-40134-2	PO01-32-(0-1)-20130319	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO01-31-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Drying	Prep/Air Dry			1.0 g	1.0 g	166348	03/24/13 15:41	CDC	TAL DEN
Total/NA	Prep	Sieve/Ultrasoni			2.02 g	20 mL	166537	03/25/13 17:55	CDC	TAL DEN
Total/NA	Analysis	8330A		1			167956	04/04/13 13:47	MK	TAL DEN
Total/NA	Prep	Sieve/Ultrasoni			2.03 g	10 mL	12993	03/25/13 14:52	HA	TAL SAC
Total/NA	Analysis	8330 Modified		1			13918	04/09/13 16:54	KR	TAL SAC
Total/NA	Prep	6860			10.63 g	100 mL	169718	04/16/13 16:40	SPF	TAL DEN
Total/NA	Analysis	6860		5			169799	04/17/13 20:04	HKF	TAL DEN
Total/NA	Prep	3050B			1.09 g	100 mL	166210	03/26/13 07:30	RC	TAL DEN
Total/NA	Analysis	6010C		1			166813	03/27/13 02:58	HEB	TAL DEN
Total/NA	Prep	3050B			1.09 g	100 mL	166210	03/26/13 07:30	RC	TAL DEN
Total/NA	Analysis	6010C		1			167015	03/28/13 09:01	HEB	TAL DEN
Total/NA	Analysis	D 2216		1			166221	03/22/13 14:22	AFB	TAL DEN
Total/NA	Prep	353 (NCell-Hyd)			45 mL	40 mL	13119	03/27/13 07:05	TP	TAL SAC
Total/NA	Analysis	WS-WC-0050		1			13191	03/27/13 14:29	JB	TAL SAC

Client Sample ID: PO01-32-(0-1)-20130319

Date Collected: 03/19/13 11:35

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-2

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Drying	Prep/Air Dry			1.0 g	1.0 g	166348	03/24/13 15:41	CDC	TAL DEN
Total/NA	Prep	Sieve/Ultrasoni			2.09 g	20 mL	166537	03/25/13 17:55	CDC	TAL DEN
Total/NA	Analysis	8330A		1			167956	04/04/13 14:13	MK	TAL DEN
Total/NA	Prep	Sieve/Ultrasoni			2.03 g	10 mL	12993	03/25/13 14:52	HA	TAL SAC
Total/NA	Analysis	8330 Modified		1			13918	04/09/13 17:47	KR	TAL SAC
Total/NA	Prep	6860			10.47 g	100 mL	169718	04/16/13 16:40	SPF	TAL DEN
Total/NA	Analysis	6860		5			169799	04/17/13 21:29	HKF	TAL DEN
Total/NA	Prep	3050B			1.02 g	100 mL	166210	03/26/13 07:30	RC	TAL DEN
Total/NA	Analysis	6010C		1			166813	03/27/13 03:00	HEB	TAL DEN
Total/NA	Prep	3050B			1.02 g	100 mL	166210	03/26/13 07:30	RC	TAL DEN
Total/NA	Analysis	6010C		1			167015	03/28/13 08:28	HEB	TAL DEN
Total/NA	Analysis	D 2216		1			166221	03/22/13 14:22	AFB	TAL DEN
Total/NA	Prep	353 (NCell-Hyd)			45 mL	40 mL	13119	03/27/13 07:05	TP	TAL SAC
Total/NA	Analysis	WS-WC-0050		1			13191	03/27/13 14:35	JB	TAL SAC

Client Sample ID: PO02-31-(0-1)-20130319

Date Collected: 03/19/13 11:57

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-3

Matrix: Solid

Percent Solids: 86.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5152 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/03/13 23:45	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

TestAmerica Denver

Lab Chronicle

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO02-32-(0-1)-20130319

Date Collected: 03/19/13 12:00

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-4

Matrix: Solid

Percent Solids: 86.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5066 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/03/13 23:51	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO02-31-(1-2)-20130319

Date Collected: 03/19/13 12:03

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-5

Matrix: Solid

Percent Solids: 87.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4925 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/03/13 23:58	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO02-31-(2-3)-20130319

Date Collected: 03/19/13 12:08

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-6

Matrix: Solid

Percent Solids: 85.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5050 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:05	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO02-31-(3-4)-20130319

Date Collected: 03/19/13 12:14

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-7

Matrix: Solid

Percent Solids: 82.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5005 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:11	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO02-31-(4-5)-20130319

Date Collected: 03/19/13 12:17

Date Received: 03/20/13 09:00

Lab Sample ID: 280-40134-8

Matrix: Solid

Percent Solids: 91.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4964 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:18	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

TestAmerica Denver

Lab Chronicle

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO03-31-(0-1)-20130319

Lab Sample ID: 280-40134-9

Date Collected: 03/19/13 12:27

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 85.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5031 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:25	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO03-31-(1-2)-20130319

Lab Sample ID: 280-40134-10

Date Collected: 03/19/13 12:30

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4805 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:32	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO03-31-(2-3)-20130319

Lab Sample ID: 280-40134-11

Date Collected: 03/19/13 12:33

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 87.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4825 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:52	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO03-31-(3-4)-20130319

Lab Sample ID: 280-40134-12

Date Collected: 03/19/13 12:45

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 76.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4954 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 00:59	CB	TAL SL
Total/NA	Prep	3050B			0.4954 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		5			44411	04/04/13 20:28	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO03-31-(4-5)-20130319

Lab Sample ID: 280-40134-13

Date Collected: 03/19/13 12:50

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 74.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.4774 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 01:05	CB	TAL SL
Total/NA	Prep	3050B			0.4774 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		5			44411	04/04/13 20:35	CB	TAL SL

TestAmerica Denver

Lab Chronicle

Client: Weston Solutions, Inc.
Project/Site: Portland Air National Guard

TestAmerica Job ID: 280-40134-1

Client Sample ID: PO03-31-(4-5)-20130319

Lab Sample ID: 280-40134-13

Date Collected: 03/19/13 12:50

Matrix: Solid

Date Received: 03/20/13 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Client Sample ID: PO04-31-(0-1)-20130319

Lab Sample ID: 280-40134-14

Date Collected: 03/19/13 13:00

Matrix: Solid

Date Received: 03/20/13 09:00

Percent Solids: 83.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			0.5008 g	50 mL	43079	03/29/13 09:53	RW	TAL SL
Total/NA	Analysis	6020/DOD		2			44115	04/04/13 01:19	CB	TAL SL
Total/NA	Analysis	D 2216		1			43538	04/02/13 06:45	SB	TAL SL

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Login Sample Receipt Checklist

Client: Weston Solutions, Inc.

Job Number: 280-40134-1

Login Number: 40134

List Source: TestAmerica Denver

List Number: 1

Creator: Laspe, Laura

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Weston Solutions, Inc.

Job Number: 280-40134-1

Login Number: 40134

List Source: TestAmerica Sacramento

List Number: 1

List Creation: 03/22/13 03:50 PM

Creator: Tecson, Jeffrey

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	4.6
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Weston Solutions, Inc.

Job Number: 280-40134-1

Login Number: 40134

List Number: 1

Creator: McNairy, Jason

List Source: TestAmerica St. Louis

List Creation: 03/22/13 04:46 PM

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Chain of Custody Record

TAL-4124-280 (0508)

Client: **Weston Solutions, Inc.** Address: **5599 San Felipe, Suite 700** City: **Houston** State: **TX** Zip Code: **77056**

Project Name and Location (State): **Portland ANG** Contract/Purchase Order/Quote No.:

Project Manager: **Mike Ruckgaber** Telephone Number (Area Code)/Fax Number: **(713) 985-6751** Site Contact: Lab Contact: Carrier/Waybill Number:

Sampler ID: **MR** Temperature on Receipt: **no w** Drinking Water? Yes ☐ No ☒ No **141** 3/20/13

Date: **3/19/2013** Chain of Custody Number: **167985** Page: **1** of **2**

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix					Containers & Preservatives					Analysis (Attach list if more space is needed)					Special Instructions/ Conditions of Receipt
			Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Explosives	Metals (Cr/Pb)	Nitrocellulose	Nitroquandine	Metals (Fe, Pb, Zn)	
P001-31-(0-1)-20130319	3/19/13	1135			X	X							X	X	X	X	X	
P001-32-(0-1)-20130319	3/19/13	1135			X	X							X	X	X	X	X	
P002-31-(0-1)-20130319	3/19/13	1157			X	X							X	X	X	X	X	
P002-32-(0-1)-20130319	3/19/13	1200			X	X							X	X	X	X	X	
P002-31-(1-2)-20130319	3/19/13	1203			X	X							X	X	X	X	X	
P002-31-(2-3)-20130319	3/19/13	1208			X	X							X	X	X	X	X	
P002-31-(3-4)-20130319	3/19/13	1214			X	X							X	X	X	X	X	
P002-31-(4-5)-20130319	3/19/13	1217			X	X							X	X	X	X	X	
P003-31-(0-1)-20130319	3/19/13	1227			X	X							X	X	X	X	X	
P003-31-(1-2)-20130319	3/19/13	1230			X	X							X	X	X	X	X	
P003-31-(2-3)-20130319	3/19/13	1233			X	X							X	X	X	X	X	
P003-31-(3-4)-20130319	3/19/13	1245			X	X							X	X	X	X	X	

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months _____ (A fee may be assessed if samples are retained longer than 1 month)

QC Requirements (Specify):

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other **See Contract**

1. Relinquished By: **MR** Date: **3/19/2013** Time: **1630**

2. Relinquished By: **MR** Date: **3/19/2013** Time: **0900**

3. Relinquished By: Date: Time:

Comments:

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124-280 (0508)

Client	Project Manager	Date	Chain of Custody Number
Western Solutions Inc.	Mike Ruckaber	3/19/2013	167986
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page <u>2</u> of <u>2</u>
5599 San Felipe Ste 700	713-985-6751		

Special Instructions/
Conditions of Receipt

Sample I.D. No. and Description
(Containers for each sample may be combined on one line)

[illegible][illegible]

(A fee may be assessed if samples are retained longer than 1 month)

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
<i>[Signature]</i>	3/19/2013	1630	<i>[Signature]</i>	3/20/13	0900
2. Relinquished By	Date	Time	2. Received By	Date	Time

3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

APPENDIX H
THREATENED AND ENDANGERED SPECIES LISTS

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

LISTED SPECIES

Mammals

Terrestrial:

Columbian white-tailed deer (Columbia River distinct population segment)	<i>Odocoileus virginianus leucurus</i>	E
---	--	---

Birds

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

Fish

Inland:

Bull trout	<i>Salvelinus confluentus</i>	CH T
------------	-------------------------------	------

Plants

Willamette daisy	<i>Erigeron decumbens</i> var. <i>decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

PROPOSED SPECIES

Birds

Streaked horned lark	<i>Eremophila alpestris strigata</i>	PCH PT
----------------------	--------------------------------------	--------

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals

Red tree vole (North Oregon Coast distinct population segment)	<i>Arborimus longicaudus</i>
---	------------------------------

Plants

Northern wormwood	<i>Artemisia campestris</i> var. <i>wormskioldii</i>
-------------------	--

SPECIES OF CONCERN

Mammals

Pallid bat	<i>Antrozous pallidus pacificus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

Long-eared myotis bat
Long-legged myotis bat
Yuma myotis bat
Camas pocket gopher

Myotis evotis
Myotis volans
Myotis yumanensis
Thomomys bulbivorus

Birds

Northern goshawk
Tricolored blackbird
Western burrowing owl
Olive-sided flycatcher
Harlequin duck
Yellow-breasted chat
Lewis' woodpecker
Mountain quail
Band-tailed pigeon
Oregon vesper sparrow
Purple martin

Accipiter gentilis
Agelaius tricolor
Athene cunicularia hypugaea
Contopus cooperi
Histrionicus histrionicus
Icteria virens
Melanerpes lewis
Oreortyx pictus
Patagioenas fasciata
Poocetes gramineus affinis
Progne subis

Reptiles and Amphibians

Northern Pacific pond turtle
Coastal tailed frog
Oregon slender salamander
Larch Mountain salamander
Northern red-legged frog
Cascades frog

Actinemys marmorata marmorata
Ascaphus truei
Batrachoseps wrighti
Plethodon larselli
Rana aurora aurora
Rana cascadae

Fish

Pacific lamprey
Coastal cutthroat trout

Lampetra tridentata
Oncorhynchus clarki ssp

Invertebrates

Snails:

Columbia pebblesnail

Fluminicola fuscus (= columbianus)

Insects:

Mt. Hood primitive brachycentrid caddisfly
Mt. Hood farulan caddisfly
Columbia Gorge neothremman caddisfly
Wahkeena Falls flightless stonefly

Eobrachycentrus gelidae
Farula jewetti
Neothremma andersoni
Zapada wahkeena

Clams:

California floater mussel

Anodonta californiensis

Plants

Howell's bentgrass
Cliff paintbrush
Cold-water corydalis
Pale larkspur
Howell's daisy
Oregon fleabane
Barrett's penstemon
Whitetop aster
Oregon sullivantia

Agrostis howellii
Castilleja rupicola
Corydalis aquae-gelidae
Delphinium leucophaeum
Erigeron howellii
Erigeron oreganus
Penstemon barrettiae
Sericocarpus rigidus
Sullivantia oregana

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

DELISTED SPECIES

Birds

Aleutian Canada goose
American Peregrine falcon
Bald eagle

Branta canadensis leucopareia
Falco peregrinus anatum
Haliaeetus leucocephalus

Definitions:

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

Key:

E Endangered
T Threatened
CH Critical Habitat has been designated for this species
PE Proposed Endangered
PT Proposed Threatened
PCH Critical Habitat has been proposed for this species

Notes:

Marine & Anadromous Species: Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

Marine Turtle Conservation and Management: All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

Gray Wolf: In 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. On May 5, 2011, the Fish and Wildlife Service published a final rule – as directed by legislative language in the Fiscal Year 2011 appropriations bill – reinstating the Service’s 2009 decision to delist biologically recovered gray wolf populations in the Northern Rocky Mountains. Gray wolves in Oregon are State-listed as endangered, regardless of location.

Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon

The State of Oregon and the federal government maintain separate lists of threatened and endangered (T&E) species. These are species whose status is such that they are at some degree of risk of becoming extinct.

Under State law (ORS 496.171-496.192) the Fish and Wildlife Commission through ODFW maintains the list of native wildlife species in Oregon that have been determined to be either "threatened" or "endangered" according to criteria set forth by rule (OAR 635-100-0105).

Plant listings are handled through the Oregon Department of Agriculture.

Most invertebrate listings are handled through the Oregon Natural Heritage Program.

Under federal law the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration share responsibility for implementing the federal Endangered Species Act of 1973 (Public Law 93-205, 16 U.S.C. § 1531), as amended. In general, USFWS has oversight for land and freshwater species and NOAA for marine and anadromous species. In addition to information about species already listed, the USFWS-Oregon Field Office maintains a list of Species of Concern.

Additional information about the federal programs in place in Oregon can be found at the following websites:

- U.S. Fish and Wildlife-Oregon (<http://www.fws.gov/oregonfwo>)
- Northwest Region of NOAA-Fisheries (<http://www.nwr.nmfs.noaa.gov>)

Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon (T=threatened, E=endangered, C=candidate, DPS=Distinct Population Segment)

Common Name	Scientific Name	State status	Federal status
FISH			
Borax Lake Chub	<i>Gila boraxobius</i>	E	E
Bull Trout (Range-wide)	<i>Salvelinus confluentus</i>		T
Columbia River Chum Salmon	<i>Oncorhynchus keta</i>		T
Foskett Speckled Dace	<i>Rhinichthys osculus ssp</i>	T	T
Green sturgeon (Southern DPS)	<i>Acipenser medirostris</i>		T
Hutton Spring Tui Chub	<i>Gila bicolor ssp.</i>	T	T
Lahontan Cutthroat Trout	<i>Oncorhynchus clarki henshawi</i>	T	T
Lost River Sucker	<i>Deltistes luxatus</i>	E	E
Lower Columbia River Chinook Salmon	<i>Oncorhynchus tshawytscha</i>		T
Lower Columbia River Coho Salmon	<i>Oncorhynchus kisutch</i>	E	T
Lower Columbia River Steelhead	<i>Oncorhynchus mykiss</i>		T
Middle Columbia River Steelhead	<i>Oncorhynchus mykiss</i>		T
Modoc sucker	<i>Catostomus microps</i>		E
Oregon Chub	<i>Oregonichthys crameri</i>		T
Oregon Coast Coho Salmon	<i>Oncorhynchus kisutch</i>		T
Pacific Eulachon/Smelt (Southern DPS)	<i>Thaleichthys pacificus</i>		T
Shortnose Sucker	<i>Chasmistes brevirostris</i>	E	E
Snake River Chinook Salmon (Fall)	<i>Oncorhynchus tshawytscha</i>	T	T
Snake River Chinook Salmon (Spring/Summer)	<i>Oncorhynchus tshawytscha</i>	T	T
Snake River Sockeye Salmon	<i>Oncorhynchus nerka</i>		E
Snake River Steelhead	<i>Oncorhynchus mykiss</i>		T
Southern Oregon Coho Salmon	<i>Oncorhynchus kisutch</i>		T
Upper Columbia River Spring Chinook Salmon	<i>Oncorhynchus tshawytscha</i>		E
Upper Columbia River Steelhead	<i>Oncorhynchus mykiss</i>		T
Upper Willamette River Chinook Salmon	<i>Oncorhynchus tshawytscha</i>		T

Common Name	Scientific Name	State status	Federal status
Upper Willamette River Steelhead	<i>Oncorhynchus mykiss</i>		T
Warner Sucker	<i>Catostomus warnerensis</i>	T	T
AMPHIBIANS AND REPTILES			
Columbia spotted frog	<i>Rana luteiventris</i>		C
Green Sea Turtle	<i>Chelonia mydas</i>	E	E
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	E
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	T
Oregon spotted frog	<i>Rana pretiosa</i>		C
Pacific Ridley Sea Turtle	<i>Lepidochelys olivacea</i>	T	T
BIRDS			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	
Brown Pelican	<i>Pelecanus occidentalis</i>	E	E
California Least Tern	<i>Sterna antillarum browni</i>	E	E
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	T	T
Northern Spotted Owl	<i>Strix occidentalis caurina</i>	T	T
Short-tailed Albatross	<i>Diomedea albatrus</i>	E	E
Streaked horned lark	<i>Eremophila alpestris strigata</i>		C
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	T	T (Coastal population only)
Yellow-billed cuckoo	<i>Coccyzus americanus</i>		C
MAMMALS			
Blue Whale	<i>Balaenoptera musculus</i>	E	E
Columbian White-tailed Deer(Lower Columbia River population only)	<i>Odocoileus virginianus leucurus</i>		E
Fin Whale	<i>Balaenoptera physalus</i>	E	E
Fisher	<i>Martes pennanti</i>		C
Gray Whale	<i>Eschrichtius robustus</i>	E	
Gray Wolf	<i>Canis lupus</i>	E	E
Humpback Whale	<i>Megaptera novaeangliae</i>	E	E
Kit Fox	<i>Vulpes macrotis</i>	T	
North Pacific Right Whale	<i>Eubalaena japonica</i>	E	E
Northern (Steller) Sea Lion	<i>Eumetopias jubatus</i>		T
Sea Otter	<i>Enhydra lutris</i>	T	T
Sei Whale	<i>Balaenoptera borealis</i>	E	E
Sperm Whale	<i>Physeter macrocephalus</i>	E	E
Washington Ground Squirrel	<i>Spermophilus washingtoni</i>	E	
Wolverine	<i>Gulo gulo</i>	T	